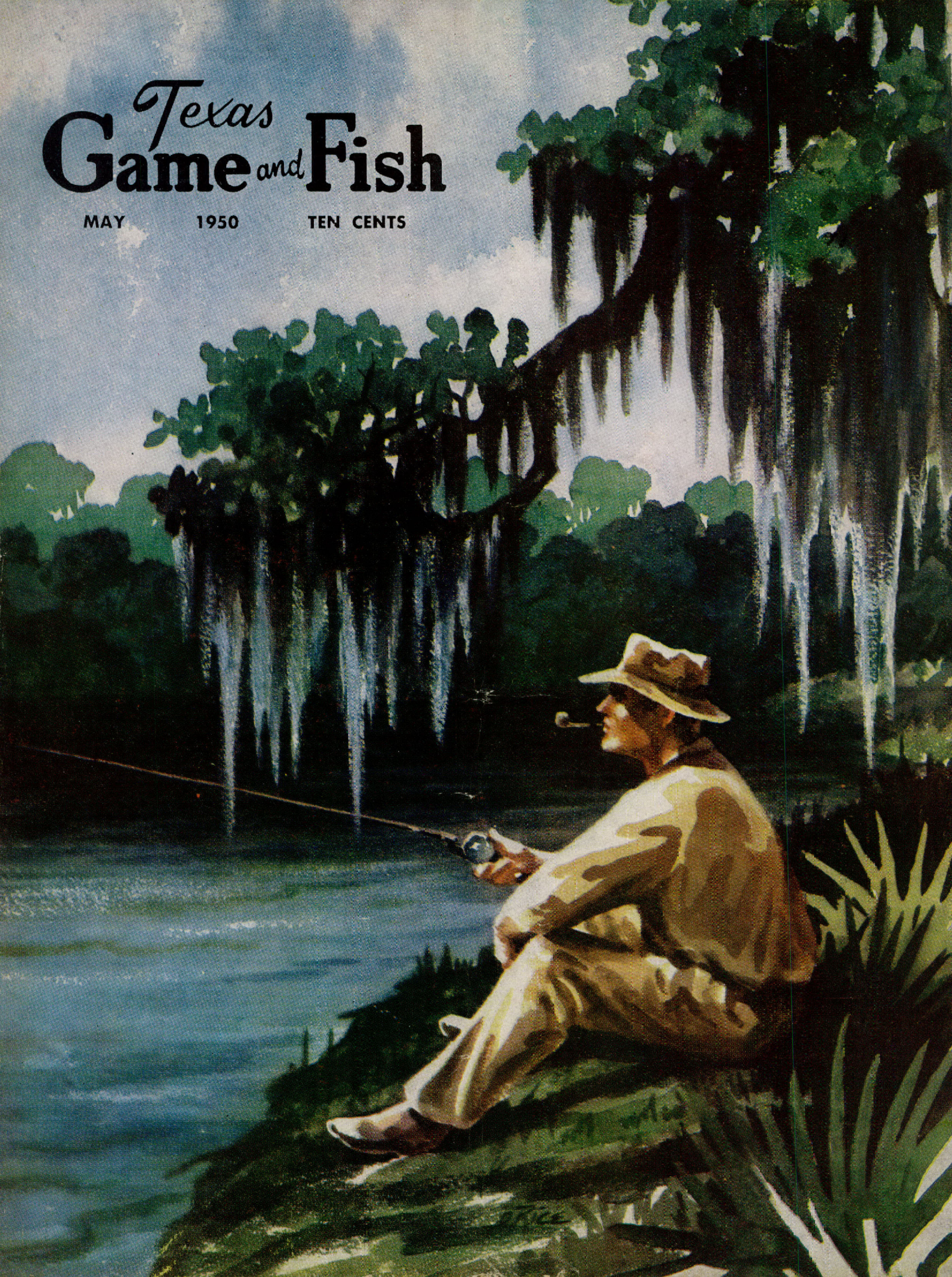


Texas Game and Fish

MAY

1950

TEN CENTS



PICTURE OF THE MONTH



Texas Game and Fish

A MONTHLY MAGAZINE DEVOTED TO THE PROTECTION AND CONSERVATION OF OUR NATIVE GAME AND FISH; AND TO THE IMPROVEMENT OF HUNTING AND FISHING IN TEXAS.

★

TEXAS GAME AND FISH is published monthly by the Texas Game, Fish and Oyster Commission. Subscription price \$1.00 per year. Single copies 10 cents each.

TEXAS GAME AND FISH regrets that it cannot continue subscriptions beyond date of expiration. Checks and money orders should be made payable to STATE GAME, FISH and OYSTER COMMISSION. Editorial and Advertising offices, Walton Building, Austin, Texas. Entered as second-class matter May 19, 1943, at the postoffice at Austin, Texas, under the Act of March 3, 1879.

Postmaster: If undeliverable, please notify TEXAS GAME AND FISH on form 3578-P at the Walton Building, Austin, Texas.

Members of the Game, Fish and Oyster Commission: W. Scott Schreiner, Kerrville, *Chairman*; Gene Howe, Amarillo; Dr. Will E. Watt, Austin; A. T. McDannald, Houston; V. F. Neuhaus, Mission; Walter Lechner, Fort Worth; H. D. Dodgen, *Executive Secretary*; H. E. Faubion, *Assistant Executive Secretary*.

Directors of Divisions: F. M. Cowser, Austin, *Law Enforcement*; Marion Toole, Austin, *Inland Fisheries*; W. C. Glazener, Austin, *Wildlife Restoration*; Robert G. Mauermann, Austin, *Departmental Publications*; Joe Marks, Austin, *Hatcheries and Engineering*; W. J. Cutbirth, Austin, *Chief Clerk*; J. L. Baughman, *Marine Biologist*.

Manuscripts should be addressed to Editor, TEXAS GAME AND FISH, Walton Building, Austin, Texas. All manuscripts should be accompanied by photographs. TEXAS GAME AND FISH always is interested in pictures of game and fish catches, unusual hunting and fishing scenes, bird dogs, and in group pictures of hunting and fishing organizations. Photographs used in TEXAS GAME AND FISH will be returned after publication.

★

COVER—By Orville O. Rice

★

In This Issue

★

May, 1950 • Vol. 8, No. 6

CONTENTS

The Nutria Comes to Texas	4
By GEORGE A. PETRIDES New fur-bearing animals are being imported and released in lakes and ponds in an effort to keep those areas free of aquatic weeds.	
When Game Was Plentiful	6
By A. S. JACKSON In bygone days, wildlife was taken for granted.	
A Naturalist in the Rio Grande Valley	8
By CHARLES G. JONES Nature's generosity is on display in the Valley as in no other section of the United States.	
The Turkey Trap	10
A picture story of trapping turkeys in South Texas for the purpose of restocking other areas.	
Food Grows Wild in Texas	12
By J. L. BAUGHMAN There are hundreds of plants native to Texas that could produce everything from sugar and soft drinks to medicines that relieve everything from housemaid's knee to aching hearts.	
Bamboo Fishing Rods	14
By GENE CRAIGHEAD This article discusses the plant from which split bamboo rods are made by fishermen.	
Audubon Camp	15
Texas campers will meet June 18 for the first of five consecutive two-week sessions.	
The Sportsman's Worst Enemy	16
By ROGER M. LATHAM Laymen place their lives in the hands of doctors, but they do not trust their sport in the hands of men with a similar amount of professional training.	
Should We Kill Does?	18
A discussion of the deer situation in the Texas Hill country.	
Ancient Beliefs About Fish	20
By JOEL F. WEBBER To the ancient Egyptians, fish were supposedly endowed with miraculous powers.	
Pass Cutting on Padre Island	22
By J. G. BURR A complete record of the pass cutting program is set forth in this article.	
Marine Fishes of Texas	24
By J. L. BAUGHMAN The first in a series of articles on the marine fishes of Texas.	
About Pet Deer	25
By W. C. GLAZENER The game department tries to discourage people from making pets of fawns.	
Fishes of Texas	26
By MARION TOOLE Third in the series about fishes of Texas.	

ROBERT G. MAUERMANN
Editor



The Cover

Whether it's the little fellow who has not yet made his first dollar or the ambitious career man who has not yet made his first million, the shady shores of lake or stream provide a common meeting ground. On this month's cover, Orville Rice has captured the tranquility of early summer fishing against a background of nature's symphonic colors and sounds.

The Nutria Comes to



The nutria, muskrat-like in appearance, has been introduced in many parts of Europe and North America from South America. Large individuals may grow to be forty inches long and twenty-five pounds in weight. (Photo by U. S. Fish and Wildlife Service.)

By George A. Petrides

Leader, Texas Cooperative Wildlife Unit*

FROM SOUTH of the border a new immigrant has come to Texas. This newcomer is a muskrat-like animal whose original home was in South America. There it was found in marshes from southern Brazil and central Chile southward. The fur of this aquatic rodent has been in world trade for a century or more, and fur farmers have attempted to domesticate nutrias in many parts of Europe and North America.

Wherever they have been imported, some specimens have escaped. In consequence, wild nutrias now have been reported in the United States in Washington, Oregon, New Mexico, Louisiana, Alabama, Iowa and Ohio. In Louisiana, ten imported nutrias were released in the coastal marshes in 1939. Commercial trapping was first undertaken four years later. In 1947, over 28,000 pelts were sold. Nutrias are now one of the principal fur crops of that state.

In appearance, the nutria is rat-like but with a dense light brown pelage.

*The Texas A. and M. College, Texas Game, Fish and Oyster Commission, U. S. Fish and Wildlife Service, Wildlife Management Institute, cooperating.

Large individuals may grow to be forty inches long and twenty-five pounds in weight. The animal also is known as the coypu or South American beaver, though the moderate-sized, round-tailed nutria scarcely resembles the large, flat-tailed beaver of North America.

Nutrias are capable of a very rapid increase in numbers. The average litter size is five, and two or three litters a year are possible. The females' teats, peculiarly, are arranged high on the sides of the animals, presumably permitting the young to suckle while partly immersed.

They eat only vegetation, so far as is known. Cattails, waterlilies, cutgrass, arrowhead and many other types of floating and erect water plants seem to be readily consumed.

Nutrias may build reed piles for use as nests. There are also reports of their digging burrows. An English biologist determined that these diggings extended into banks for a maximum distance of about four feet. They averaged about eight inches in diameter and their entrances were just below the water level.

The present abundance of the nutria in the coastal marshes of Texas is not definitely known. Fur buyers in

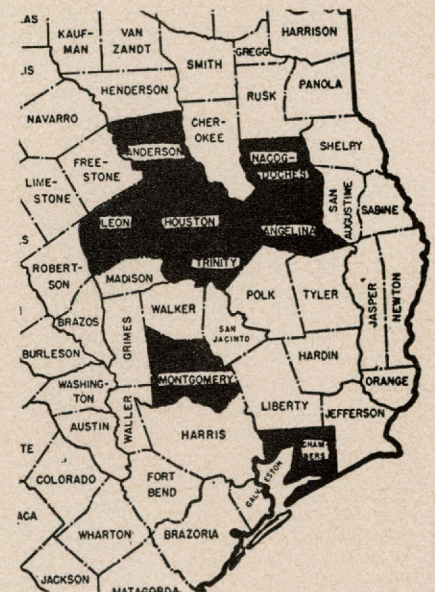
Dallas and other large fur centers report receiving an occasional pelt from this district. The actual location of the trapping areas from which the pelt originate, however, is seldom certain. Probably a small number of nutrias have become established in the coastal counties east of Galveston Bay. The species can be expected to increase rapidly in the fresh-water marshes of the area if a nucleus is indeed present at this time.

Inland in Texas nutrias currently are being imported and released in lakes and ponds in an effort to keep those fishing areas free of aquatic weeds.

In the spring of 1948, a Houston resident imported a number of nutrias from the Louisiana coast and stocked a cutgrass marsh in Anderson County. He also gave a few to a friend in adjacent Houston County. The latter found that his animals removed a great deal of undesirable vegetation from the small lake that he had stocked.

In both areas the nutrias thrived. As they increased, surplus animals from Houston County were sold to neighboring lake owners. Within the next year, nutrias from this pond and from the Louisiana source were distributed throughout much of East Texas. One planting also has been made in a lake near San Antonio.

From photographs and notes made over a period of time at lakes and



Nutrias are known to have been introduced into thirteen localities in nine East Texas counties during the year 1947-48. The one remaining county not shown on the map is Medina.

Texas

marshes occupied by nutrias, it is quite evident that these animals do an excellent job of removing such plants as waterlily, cattail, cutgrass (*Zizaniopsis*), and arrowhead. There also is some evidence that submerged vegetation is removed by either their movements or feeding or both.

Small lakes which have been stocked by ten or more of these animals for six months or more have been remarkably well cleared. Where larger lakes or fewer animals were involved, widespread plant removal has not yet become evident, but in most cases of this type not enough time has passed to permit an adequate appraisal of results.

There seems to be little doubt but that nutrias can be efficient removers of unwanted pond vegetation. Furthermore, the pelts have some value. During the past winter, pelts over twenty-three inches long brought from \$4 to \$6. Smaller pelts, however, were much less valuable and furs under eighteen inches long were practically worthless. At the present time, live animals bring a much higher price for restocking purposes. The latter market doubtless will decline rapidly as nutrias become more common.

Despite the apparent values of nutrias, their potential abilities to damage the dams and levees of irrigation and navigation structures have not yet been fully determined. From Louisiana there are rumors, which in all fairness deserves further investigation, indicating that nutrias are causing rice growers some difficulty by plugging channels and otherwise interfering with the free flow of water.

Strangely enough, no evidence has

• Continued on Page 27

Feeding stations of nutrias often are muddy places just above the water line where tracks, droppings and the remains of waterlily pads, cattail roots and other foods are common. A section of a "weedy" pond in Anderson County, second photo, where a dozen nutrias had been released a few months previously, in the spring of 1949. Lower photo shows that the waterlilies in this same pond had been largely destroyed by late November. Underwater "mosses" also became scarce and cattails were being consumed by nutrias. No frosts had occurred to alter the vegetation, and the changes between the time that this photograph and the preceding one was taken seemed to be due only to nutria activity. (Photo by Texas Co-operative Wildlife Unit.)



When Game Was Plentiful

By A. S. Jackson

DURING THE PAST few years I have spent hundreds of hours in searching Texas newspapers for items bearing on wildlife, its abundance, utilization, and public opinion relative thereto in the early settlements.

Some items from the many at hand are cited here. They are representative of the lot, with the exception that no reference touching on the buffalo has been used. In brief, these newspaper items illustrate two phases of thought and action toward wildlife. The early ones seems to indicate that wildlife was taken for granted as an asset to be used along with soil, water, and wood for fuel and fencing.

The first newspapers were largely devoted to heated political discussion, and the reader looks in vain for references to the wildlife or subjects closely related to it.

In the *Telegraph*, published at Columbia, May 2, 1837, this rote to emigrants occurs:

"Let no able-bodied man emigrating to Texas neglect to provide himself with a good rifle or musket and at least one hundred rounds of ammunition. Those who wish to enjoy the advantages of a country should come prepared to defend it . . ."

That these words did not go unheeded is implied by the following on the editorial page of the same newspaper on December 2, 1837:

"Large numbers of emigrants are continually arriving from the United States. We notice with pleasure that most of them are well supplied with good rifles. We fear, however, that too small a portion of them are farmers. Those desirous of emigration should continually bear in mind that Texas is an agricultural country and therefore offers at present but few inducements to any except practical farmers."

However, a column entitled "Recollections and Reminiscences" appeared in the *Galveston Daily News* issue of August 28, 1877, which indicates that the emigrants to Texas set up their own criteria of fitness for citizenship. Signed by "Wood, A." it relates:

"Old pioneers of 1820 to 1835 were often given to understand by speculative prospects traveling

through the colonies that so soon as Indian depredations ceased, this beautiful, fertile country would settle up with a better class of emigrants—therefore the newcomer was often greeted with the exclamation, 'I suppose you are of that better class we have been advised were coming. We are anxious to see that better class.' The country so vast was slow in filling up, and though emigrants were constantly arriving, it was like the waters of the river constantly pouring into the ocean—scarcely more perceptible. An old lady, a mother pioneer, was overheard gossiping with a neighbor who lived only seven miles away, and who had made a fashionable call to spend three days, 'Have you seen any of the better class? I have been waiting and waiting to see the better class. Those who are coming in have fine clothes, it is true, and I have seen none of the ladies wearing moccasins or homespun, but the men are not educated. Deer, bear, and turkeys don't seem to mind being shot by them. They seem to know that they are entirely safe. They know nothing about Indian fighting, which is a constantly recurring necessity. I would not feel secure if I depended on men whose education had been so much neglected, for defense and protection! Better class, indeed! What is a little book learning in a country like this in comparison with the strong arm, the brave heart and dead shot, of dauntless men like your husband, and men who have got to love the sport of Indian fights'."

Newspapers at a later date were to record that the newcomers whom the old lady so harshly criticized were apt pupils in the school of education she recommended.

In at least one instance the status of wildlife as an important asset was recorded. In the *Colorado Tribune*, Vol. V, No 13, July 12, 1852, reference is made to the hardships of Austin's first colony. Reproduced in whole, it follows:

"Facts relating to the first settlement of a new country are generally interesting to the emigrant. The following hasty sketch, composed of materials furnished in conversation, by one of the first

three hundred may prove illuminating.

"1882: From the 20th of April to the 20th of August, there was no rain, and then but one or two showers. About the 29th, the wet season set in but the crops were by this time ruined. The only corn in the neighborhood was raised by Andrew Robinson, and but for the game with which the country abounds, the inhabitants must have perished for hunger. At that period, it was no uncommon sight to behold from four to six hundred deer on the newly burnt patches of prairie; which together with turkeys, snipe, grouse, quails, partridges and the endless variety of birds so common in the country, sustained them.'"

A later period, variable in time as settlement for given areas stabilized, but reaching a peak in the 70's and early 80's is depicted, when wild game was slaughtered on an unprecedented scale. It is to be noted that the peak, as shown by occurrence of news items, was reached during the decade when the Winchester repeating rifles, models of 1873 and 1876, and their efficient fixed ammunition were gaining favor. Texas, for all her vast size, was filling up, life for the settler had become more secure, and a rough and ready social order had come into being.

Enough of the items occurring in Texas newspapers during the era are reproduced to give the reader, willing to read between the lines, a picture of what appalling destruction of wildlife must have occurred.

Items are by exchange appearing in state news columns of the *Galveston Daily News* on dates cited.

August 1, 1877—*Henrietta Journal*—Scarcity of water is driving all kinds of game eastward. Mr. Bartlett, living near Red River in this country, has killed 278 head of deer in a circumference of ten miles from his house. In addition to these he has killed countless numbers of antelope and other small game.

August 31, 1877—*San Antonio Herald*—gives the result of a two-week hunt at Kickapoo Springs, on the Sycamore north of Fort Clark, by two brothers, Messrs. Henry and James Dignowity: Three bears, sixty-seven deer, two hundred and nineteen turkeys, (104 of which were shot in one day, all with the

rifle) four geese, forty-six ducks, thirty quails, two hundred and seventy-five pounds of honey.

July 21, 1878—Hardin County—Game is plentiful and venison hams are selling at 25 cents each.

August 24, 1879—Mason County news item—Mr. Tom Gamel killed over 100 deer so far this year. Our woods are alive with deer and other game. We hear of a number of men in this section who are following no other pursuit this year but that of killing deer, the skins when dressed bring a fair price.

September 26, 1879—A Mason County man made \$112 this year from deer pelts.

December 26, 1880—Brownsville **Cosmopolite**: Mallard and teal ducks sell in our markets at a little over 4 cents each; Brant geese at a bit apiece, and a leg of venison for 37½ cents.

December 4, 1880—Henrietta **Shield**: A load of wild turkeys was brought to town last Sunday and sold at fifty cents apiece. They are reported abundant in the west.

December 10, 1880—**Bugle**: A wagon load of wild turkeys were brought in town last week and sold for 25 cents apiece.

Small birds and non-game species did not escape notice as is shown

by the following unique items:

September 2, 1879 — **Corpus Christi Free Press**: One day this week a boat arrived from Bird Island, 22 miles south of here, with a novel cargo—the skins and oil of some three thousand pelicans.

September 24, 1879—**Comanche Chief**: Bob Stephens came through town last week with a cargo of live prairie dogs, one hundred in number. He got them out west, and is on his way to Fort Worth, where he will dispose of them.

The question of what use could have been anticipated for these prairie dogs is suggested by a second reference.

October 14, 1879—**McKinney Inquirer**: A man from Coleman County was in the city on Thursday with a lot of prairie dogs which he was selling for rattlers. It is said that they are equal to the ferret for hunting out and killing rats and mice.

July 30, 1878—**Gainesville Hesperian**: One hundred and fifty mocking birds were carried to Chicago this week from Gainesville.

Throughout the newspaper record of game slaughter as depicted above, was found no note sounding the word conservation. Indeed,

public opinion seems to have been asleep to what was happening. In all the period leading up to the publication of the first general game law of 1879, one item ventured to suggest that among certain elements the slaughter of birds was not welcomed. On June 25, 1878, the **Galveston Daily News**, in its state news carried the following item:

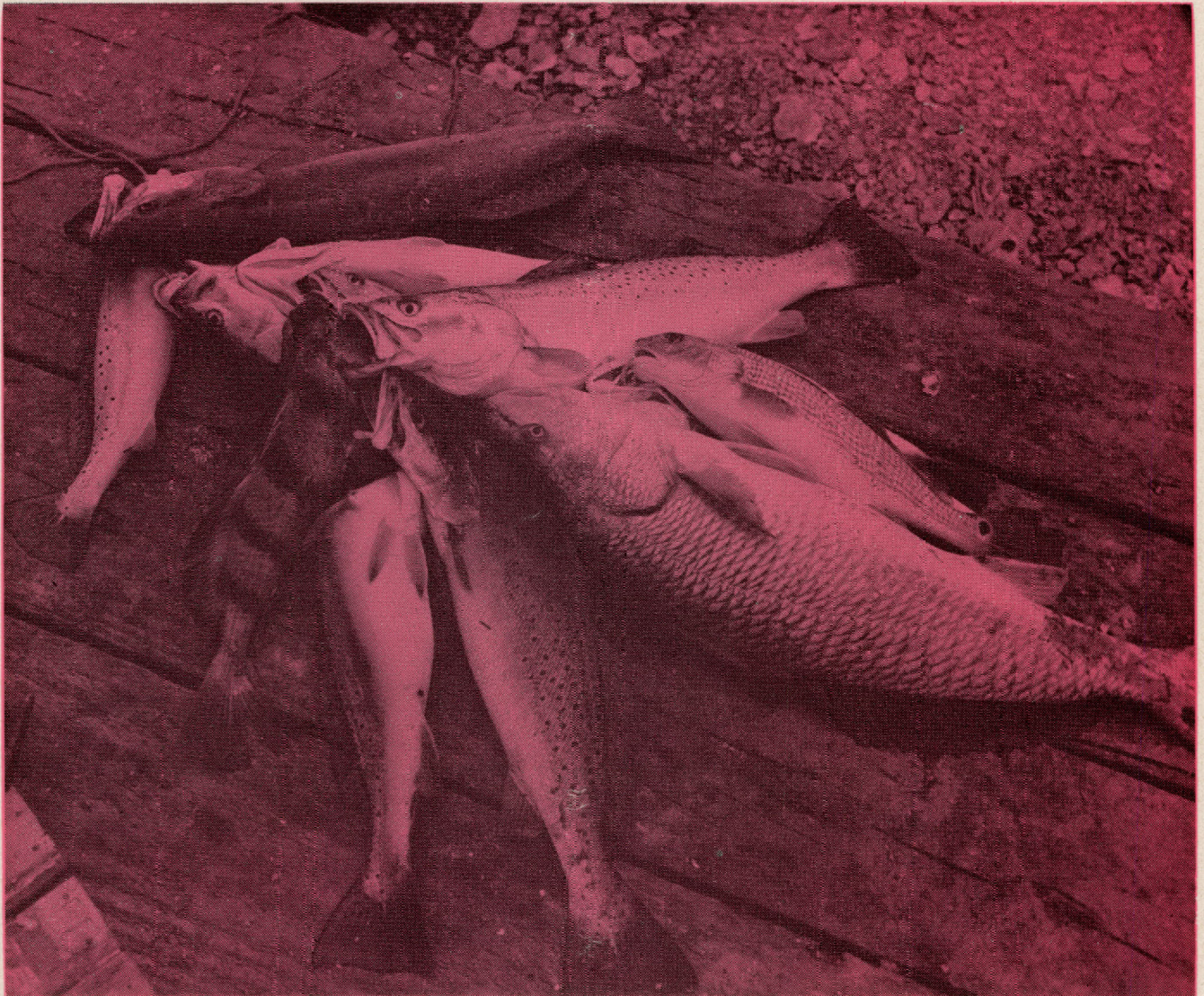
McKinney Inquirer—June 22: We saw a couple of duckling captured in East Fork a few days ago. This is a long way south for these birds to raise their young. Sportsmen are killing a great many birds in the grain fields. As a rule, this is not relished by farmers, and many may say they will post their farms in order to protect the birds. Those who have orchards begin to appreciate the labor of birds in protecting the fruit from the ravages of insects.

So much for the newspaper record. If one is sickened after reading the entire collection of notes at one sitting, he must be at the same time heartened by the changes which have followed, changes which reflect by contrast, and awareness on the part of news editors to wildlife, values and needs, and an awakened public consciousness.

Market hunting of our game contribute to its decline in all parts of the United States. The bob whites below, tied in bunches of six, were confiscated in Illinois in 1904 by C. C. Buck. Mr. Buck, of Pharr, Texas, is shown at the left.



A Naturalist in the



THE GENEROSITY of nature is in evidence throughout the Rio Grande Valley as in no other section of the United States. There are birds, animals, fish, flowers, trees and shrubs on display in this border country during all seasons of the year. An extreme of forty miles from any part of the valley places you in the heart of the whitetail deer territory where bucks weighing 200 pounds are bagged. Wild turkeys, the purest strain in North America, are also found in the same area. But if this type of game does not appeal to you, then still within the distance mentioned, is found the javelina or wild hog. Texas and particularly the Mexican border are the only remaining range of this animal. To those who enjoy hunting predators, there is the sport of taking a Mexican lion, a native of this section.

By Charles G. Jones

Northern Hidalgo and Willacy counties are ideal for bobwhite quail, the deep sandy soil permitting a good hatch regardless of heavy rains. Starr and Western Hidalgo counties are the homes of the blue quail, an outstanding game bird. However, the blue quail are a bit confusing to the bird dog, since the birds persist in running. The Cameron and Willacy county coast line is nationally known as a winter feeding ground for geese and ducks—thousands of snow, and greyfronts, with hutchins geese frequenting this area. At the same time, canadian and blues are often encountered. As to ducks, they are there by the thousands, sixteen varieties visiting this section during the season.

The outstanding and much sought after favorite of all valley game birds, the white winged dove, has as its centralization point, Hidalgo and Willacy counties. An estimated 30,000 hunters last season shared honors in getting their limits.

A bird, peculiar to the Valley, is the chachalaca, whose habitat is that of the brush country, rare now because the brush land is being converted into cultivated fields. The red-billed pigeon, commonly called the bluerock, is a frequenter of timbered areas along the river and resacas. Equally as large as a domestic pigeon and at one time found in great numbers throughout the valley the red-billed pigeon now is seldom seen, because there is very little timber remaining. The black-bellied tree duck nests in the hollow of a tree, and good hatches

Rio Grande Valley



have taken place on the federal refuge known as the Santa Ana tract south of the Alamo. The white-fronted dove, sometimes called wood pigeon, has a distinctive guttural note that makes it easy to identify. This bird is in a very limited area of the valley; it has never been found a greater distance than forty miles north of the Rio Grande River. It is slightly larger and has larger legs than a whitewing. This member of the dove family is of a light brown coloring with under parts of a reddish tinge.

A bird of beauty is the green jay with its green, black, blue and yellow plumage. It is looked upon as a predator by some, but it adds to the many other attractions of the valley. Not rated very high as a bird of beauty is the grooved-billed ani, a bird of decidedly dark coloring with a

very thick reddish bill. It is known to some as the black parrot, because of the parrot-like bill. A peculiarity of the bird is its awkwardness in flight which is attributed to poor wing development.

All lakes, ponds and canals in the valley are stocked and abound with big mouth black bass which affords sport equal to that of other famous fishing sections of Texas. Yellow and blue catfish lurk in the waters of the Rio Grande. A trip to the coast off Port Isabel often results in catches of marlin sailfish and silver kings. During a run of fish, which takes place several times a year, boat loads of golden croaker, Spanish mackerel and trout can be caught.

Those who appreciate nature in all its phases can revel in the beauty of blossoming retama. Its leaves, like

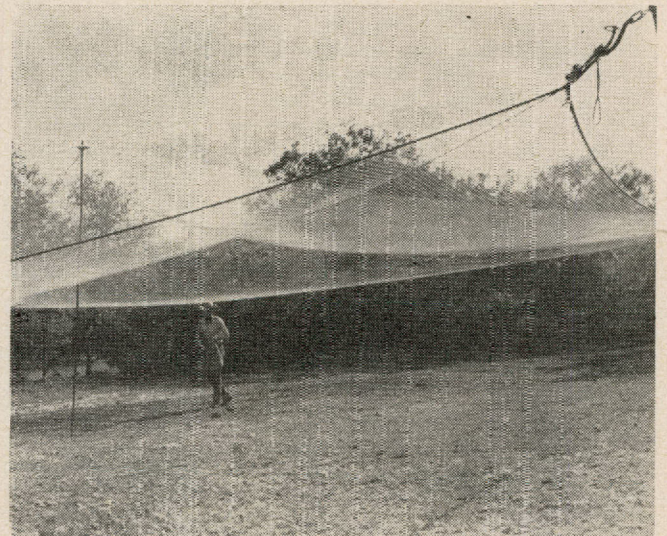
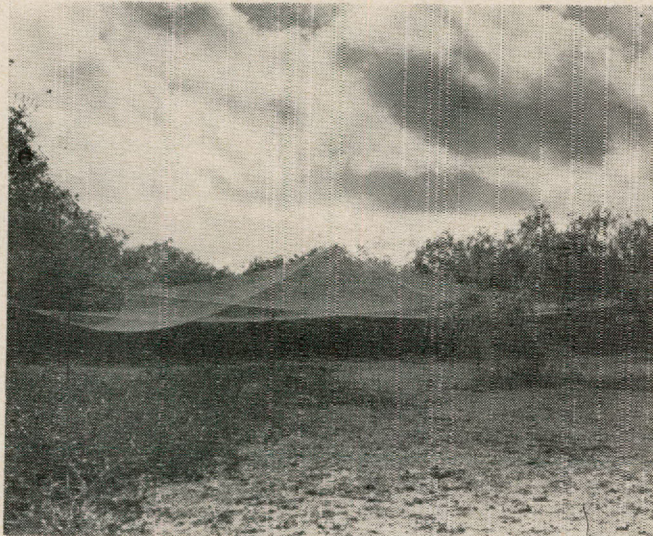
lace, hang in graceful drapery for the gorgeous and fragrant lemon colored flowers, and are long remembered by those who see them. The anacua is another acacia that lends beauty to its surroundings because of its bower of snow white fragrant blossoms that turn into golden colored berries. The ebony is outstanding because of its dark green foliage, and following heavy rains, it is covered with myriads of white blossoms which give it the appearance of being bedecked in snow.

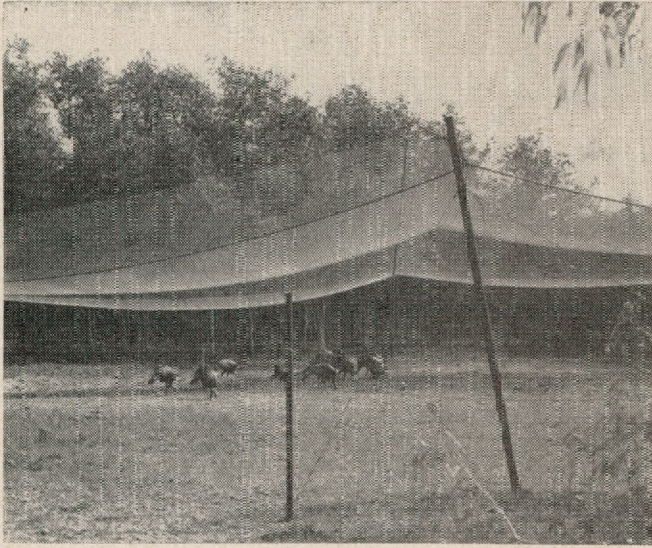
Did someone say flowers? Take a ride over the remaining pastureland where thousands of acres have been transformed into nature's varicolored carpet of millions of wildflowers so beautiful that many trips will be made in order to revel in this scene of grandeur.



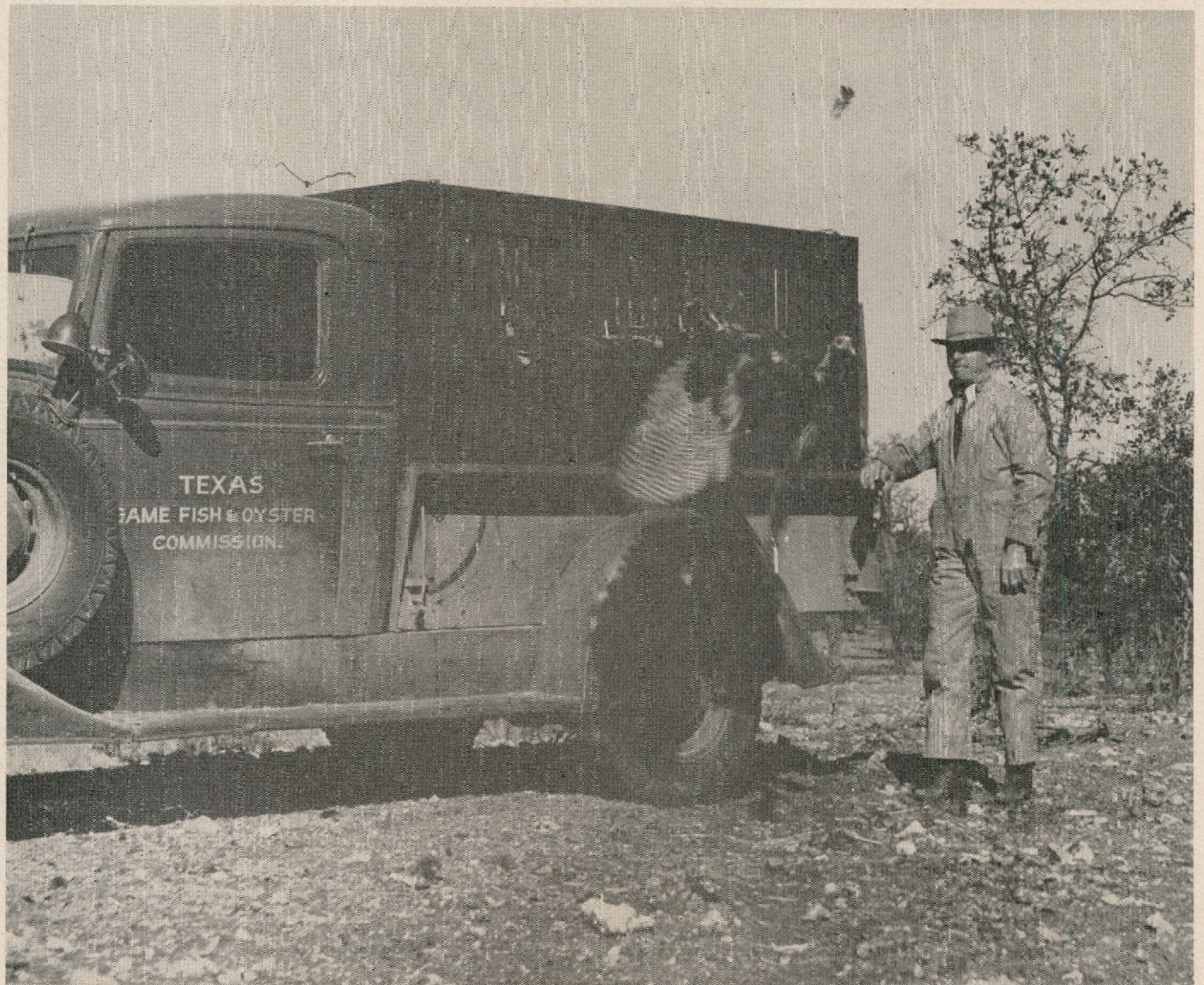
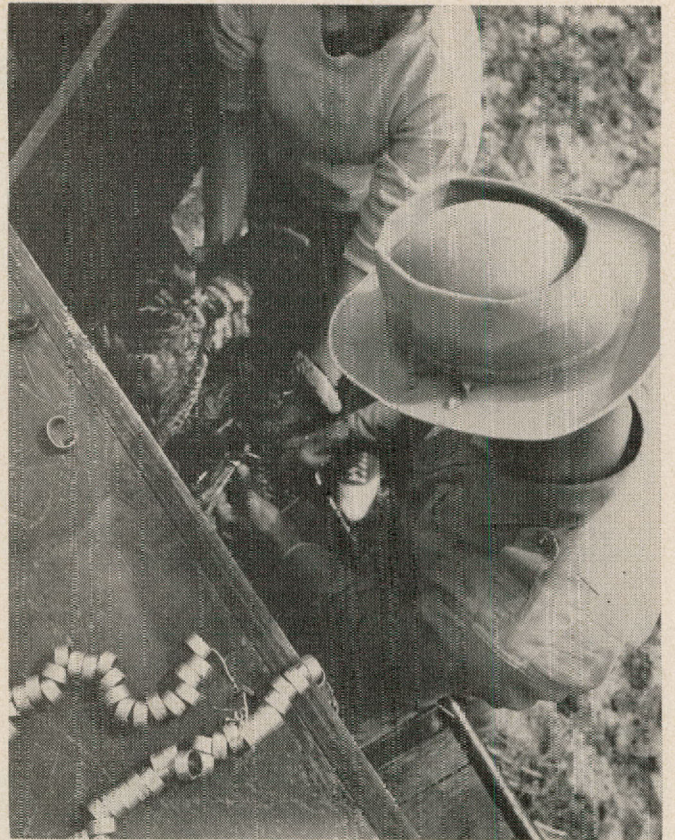
The Turkey Trap

Turkey trapping as done by The Texas Game, Fish & Oyster Commission has become an exacting science. The upper photo shows two large gobblers in their natural South Texas habitat. Taking them for transplanting purposes requires a large tent-like trap as shown in the lower left photo. Lower right, one of the trappers leaves corn and maize for bait.





After turkeys begin feeding underneath the trap (above), the net is dropped. Each turkey to be transplanted is tagged (right), then trucked to previously checked areas and released (lower).



Food Grows Wild in Texas

By J. L. Baughman

IF EVERY domesticated plant in the Southwest were suddenly to die, if we had no corn or potatoes, if there were no cotton, no beans, carrots, sugar cane, lettuce, wheat or rice, there would still be more than 150 plants that could be used for food, producing everything from sugar to soft drinks, and from vegetable soup to flour.

Moreover, should our drug supply be curtailed for any reason, there would still be another 100 plants which could be depended upon to relieve everything from stomach-ache to housemaid's knee, and balm for an aching heart. Others produce fibers from which cordage can be manufactured, and one, wild flax, might even in time be brought by cultivation to where it could furnish thread for the weaving of linen.

The food producers of this list might be roughly divided into five or six categories: first, those which bear edible fruits; second, those which furnish nuts, some of the seeds and pods of which may be eaten; others from which salad could be made; those that produce edible roots and fibers and others which might furnish us with sugars and juices.

Common examples are blackberries, paw-paw, and persimmons. Persimmons are eaten raw; they have been made into beer; and the persimmon bread of the early settlers is supposed to have far surpassed the gingerbread of our childhood. Elderberries are another of the early standbys, and from these were made pies and jellies and jams, as well as cakes in which the fresh flowers were chopped up and mixed with the batter before baking.

Two plants that are common in Texas are not generally thought of as edible. They are the yucca, or Spanish dagger, and the prickly pear. Yet farther to the south they are much relished by the Mexican population, and form a valuable addition to their diet. From the yucca, the seed pod is used, and the Mexicans speak of it as the "date fruit," slicing it and drying the pieces in the sun for winter use. When fresh, it has a peculiar sweetish taste and is said to be quite palatable, while the green pod, with the rind removed, upon being cooked, resembles a sweet potato in flavor. The sliced pulp of the nearly ripe pods is also in demand in the making of pies supposed to be similar to those made of apples. The leaves of this plant also contain long and strong fibers which might possibly be used as cordage.

Prickly pear is not so versatile. The fruits are eaten raw after the bristles have been removed, or occasionally they may be stewed. They may also be dried for winter use. This was done by the Indians who utilized the stem, roasting it after first removing the spines. It was occasionally used as a dressing for wounds, first being peeled, and then placed over the lesion.

Many of the cacti are edible, and as one author has said, it would be possible to eat a dinner in which cactus furnished the cooking pot, part of the food, and all of the light. The bisnaga or barrel cactus of Southwest Texas, when hollowed out, was used to boil food by dropping hot stones into the water which was used for cooking. From the saguaro, the Papagos get wine, fruit syrup, and a coarse flour from which they make a mush. Cholla cactus, one of the most dreaded of the thorn bearers, pro-

duces an edible fruit, and the ocatillo, or candlewood, has wood so rich in resin that it burns with a steady blue flame like that of waxed paper.

The agave is another of the prickly plants that has a myriad of uses among the primitive people. Known as the century plant, it is used as an ornamental shrub in South Texas. South of the border, where it is called henequen, it does more tricks than an organ grinder's monkey. Parts of it are roasted to be used as a food, but one of the most ancient of uses is that by which the placid peon procures his pulque. The flower bud is cut off, and the crown of the plant is scooped out. Here the sap gathers and ferments, forming a beverage. Mescal or distilled pulque, is a favorite liquor in Mexico. Fibers of the leaves form the sisal of commerce.

Another plant closely related to this and to the yucca could be relied upon to supply that enemy of the small boy, soap. "Amole" the Mexican woman calls it, and it is known as lechuguilla to South Texans. The saponin that makes it so valuable as a cleanser can be separated from the Spanish daggers and the century plants themselves so that no one's face or clothes need go dirty.

Mesquite beans furnish a meal which can be made into mush, and the pods a black dye of singularly lasting quality, while the gum which exudes from the trunk form both a medicine and a mucilage. Fairly closely related to the mesquite are two other common trees, the huisache, which is used in the manufacture of perfume, and the "Palo Verde" or "Cloth of Gold." Known to the Spaniards as the "Green Tree" because leaves, twigs and bark all

are of one soft green tint, it has gained its second name because each spring it is beautifully starred with tiny yellow blossoms so numerous as to justify the title, but which soon give way to clusters of seed pods which were long gathered by the Indians because of their bean-like seed.

Various plants of the territory could be utilized for medicines and drugs. Our white spider lily that dots marshy places produce a drug listed in the pharmacopeia. Castor beans, of course, can always be relied upon for castor oil, while the common may apple which was known and used by the aborigines produces a drug, Podophyllum, in every day use as a purgative. Dandelions furnish a diuretic, and the bark of the wild cherry is an excellent fever medicine. Sassafras bark furnishes a stimulant, while even marihuana can help, for it becomes a narcotic, Cannabis, that is occasionally used in medicine, while the fibers of the stalk could be used as hemp.

There is still another plant that may prove of exceptional value. This is teprosia, or goat's rue, a common plant over much of Texas. It grows about two feet tall, and in season has long drooping clusters of white, rose colored, and red flowers, much resembling those of the wisteria. This is another member of the pea family known in the east as the rabbit bean or devil's shoe string. One of these at least contains rotenone, a poison harmless to humans but so deadly to insects that only a fraction of an ounce in 1,500 gallons of water is suf-

**PLANTS PRODUCE
EVERYTHING
FROM FLOUR TO
DRUGS**

• Continued on Page 29



BAMBOO FISHING RODS

By Gene Craighead

WITH THE INCREASING popularity of the home construction of split bamboo rods by fishermen, it seems appropriate to give some information on this very unusual plant, the bamboo: differing from our familiar grasses by having woody stems. Of all the plants on earth, the grasses *monocotyledons*, are of the greatest use to the human race. To these belong the cereals, sugar cane, sorghum, and the bamboos, which are used extensively in the industrial arts. The bamboos, the largest of the grasses are of vast importance in the Indo-Malay region, and to somewhat lesser degree in the United States. They are used in building houses, bridges, floors, walls, rafts, water pipes, golf clubs, ski poles, furniture, paper and fishing rods. The tender shoots of some species are a choice vegetable.

The bulk of China's paper requirements has been supplied, for hundreds of years, by hand-dipped bamboo pulp. Paper is being made by machine, on a commercial scale from bamboo pulp. There are between 600-700 described species of bamboo, yet to the fisherman there is one genus and specie that is of great importance; namely *Arundinaria amabilis*; Tonkin or Tsing-lee cane.

Arundinaria amabilis was only recently introduced from China, as living plants. Since introduction, its culms have been most highly satisfactory and a most universally used source of material for split bamboo fishing rods.

Tonkin or Tsing-lee cane is grown in the Waichap District of Indo China. The culms or canes are usually crowded into dense clumps where some of them attain a height of forty to fifty feet. The cane grows best on hill-sides where it can be cultivated.

The type of soil has a lot to do with the quality of Tonkin Cane. When the cane is cut at the butt another cane comes from the same root. It takes about eight years for a two-inch Tonkin sprout to grow to a point where it can be used again. The smaller diameters grow more quickly and the three-quarter-inch diameter stick can be used within two to three years. The bamboo grown in marshes is very porous and pithy, and is not suitable for making bamboo fishing rods. The best cane should be thick walled, as the strength of the cane lies in the outer edge of the wall. The fibro-vascular bundles in Tonkin cane are exceedingly close and dark at the outer edge.

When Tonkin cane is cut, it is brought down to the Fathan district green, placed in fields and is left for a month or two where it dries out in

the sun. Before it is completely dried out it is taken into warehouses, straightened and sorted as to size and quality. All split and imperfect sticks are eliminated. The cast off canes are used for many other purposes.

The propagation of bamboos is by division of the underground parts; usually the culms are cut a foot or two above ground and should include the second or third node. The remaining stump is separated from the parent clump, removed from the ground and planted in a new site. Another method is by layering or burying live culms to a depth of about six or eight inches. New shoots will develop at the nodes in several weeks. Propagation by seed is probably the most ideal way, but the seed deteriorates very quickly and in some species flowering takes place only at intervals of twenty to eighty years. The seed resemble our common oat.

After working with Tonkin cane, I was interested in talking with some one that had been to the country where it was grown, so I visited Charles H. Demarest, Water and Beekman Streets, New York City, who has been an importer of Tonkin bamboo since 1895. He has bamboo from all parts of the world. His first trip to China was in 1934, and he has been there three times since. At the present time it would be impossible for him to go up-country because of the Communist cut-off from Canton.

There are two general types of bamboo, the running or the clump. The running type has a single foot or rhizome which grows in a horizontal position underground. Often the stem and roots of bamboo will extend for twenty-five or more feet, depending on the species, the nature of the soil, and the care that is given after the planting has been made. In the United States some of the hardier species will stand a temperature of 16-20° F. The clump type of bamboo develops rhizomes which grow for a short distance horizontally and then grow upward and form culms, which is nothing more than an enlarged stem of grass. The clump type does not spread rapidly like the running type.

Under favorable growing conditions culms will reach heights of sixty to seventy feet with basal diameters up to four or five inches and this growth takes place in from sixty to ninety days. Growths have been recorded of nearly thirty-six inches in twenty-four hours. The diameter of any culm when six inches high is as

great as when full grown. These culms are thick walled and are very easily split, especially after they have properly seasoned. The arrangement of the fibro vascular bundles and the seasoning of the cane has everything to do with making good split bamboo rods. The denser and more closely knit these bundles are the finer the quality of cane. Rod builders speak of this area as the enamel, or fiber density. Culms are not mature in hardness of wood until the end of the second or third year, and should never be cut for fishing rods before that age is attained. Often a five-year period is reached before any cutting is done in a young grove. Culms usually live for five to twelve years, with no increase in height or diameter. All culms should be marked, and by this means the proper time for harvesting is known. Thinning is practiced to prevent crowding and to permit enough sunlight to burn the surface of the culms. Proper curing makes them more resistant to insect injuries, especially the powder-post beetle.

Some small manufacturers used Tonkin cane prior to 1895, but not until that time did larger manufacturers start using it. Before Tonkin cane was used for fishing rods, many imported hard woods were used such as Calcutta cane from India, while Dagama, Lance Wood and Green Heart were some of the imported woods. The Japanese bamboo is used for fishing poles because they are light weight and very strong. Philippine bamboo is used for the construction of furniture and houses.

Hiram Leonard, the father of the flyrod, used ash and lancewood to construct his first flyrod about 1871, and it was about this time that he constructed his first split bamboo rod, from Calcutta cane. With the use of Tonkin cane, better rods were built. Fishing, fly casting or surf casting rods made from various other woods, metal and synthetics are not in a class with those made from Tonkin bamboo, because of its good back-pull, whip, light weight and resilience.

In selecting cane it should be examined carefully to find out whether or not any of the moulds or cellulose rots (*Chaetomium*) are present. They range in color from a brilliant orange to a deep grey. It is the deep grey one that attacks the fibro vascular bundles and completely destroys them, reducing the strength of the cane. Once its presence is detected the cane should be discarded. This grey mould also attacks clothing and is easily recognizable on sight.

—Pennsylvania Angler.

Audubon Camp

LOCATED IN THE picturesque hill country of the Edwards Plateau, and on the banks of the beautiful Guadalupe River is Schreiner Institute at Kerrville, which is the site of the Audubon Camp of Texas. Campers will meet there June 18 for the first of five consecutive two-week sessions, with Dr. Charles LaMotte, professor of botany at Texas A. & M., as director.

To advance the cause of conservation education in Texas is the purpose of this non-profit camp for adults. In the past two summers of operation, the camp, sponsored by the National Audubon Society, has demonstrated to Scout and recreation leaders, teachers, camp counsellors, garden and civic club leaders and interested citizens, how fascinating it is to gain first-hand information on animals, plants, soil, and water and their interrelationships.

During daily field trips, campers become acquainted with life in a variety of natural habitats: pond, marsh, stream, field and forest. The guides are trained naturalists who help campers develop an appreciation of the interdependence of living things and their relation to the soil and water of their habitat. No state can maintain its natural resources until its conservation becomes an essential part of the thinking of the majority of its citizens. To this objective, the Audubon Camp is dedicated.

Audubon campers may receive junior level credit in biological science from the University of Texas. Students desiring to transfer such credit elsewhere should consult their college advisors. Enrollment in each session will be limited to fifty campers. Up to June 14, all inquiries concerning the camp should be addressed to Mrs. Edna W. Miner, 2206 Brun Street, (phone Justin 4482), Houston 19; after June 14, address all letters and telegrams to Audubon Camp of Texas, Kerrville, Texas, telephone 297W.

Audubon campers will visit many lovely spots on the Guadalupe River such as the one depicted in the above right photo when they meet at Kerrville for the annual Audubon Camp. The scene below is a part of the Kerrville Fish Hatchery.



The Sportsman's Worst Enemy

By Roger M. Latham

DO YOU REMEMBER the song "I'm My Own Grandpa?" We could change the lyrics a little and come up with one for sportsmen—"I'm My Own Worst Enemy!" Most hunters and fishermen who read this are going to be shocked and perhaps hurt when they find out that conservation leaders throughout the country consider them one of the most important, if not the most important, stumbling block in the way of better hunting and fishing. In fact, some of these sportsmen have practically dedicated their lives to fighting against the very things that they think they are fighting for. Sounds like double talk, doesn't it? But it isn't double talk; it's sad truth.

Within the past twenty years, sportsmen's clubs have sprung up all over the country, and they have become affiliated and federated to such an extent that they can now exert considerable pressure upon state conservation departments. In some states, they have become so powerful that the more important policies and key personnel of the conservation departments must meet with the approval of the organized sportsmen. What has been the result of this new power and this "cooperative" interference upon the part of hunters and fishermen? It has meant a change, in many cases, from scientific game and fish management to non-scientific management based upon selfish desires, political prop-wash, unproved lay ideas and oftentimes wild guesses.

Many of the resolutions adopted by sportsmen's groups are preposterous. A large club in one of the eastern states passed a resolution and sent it to the conservation commission suggesting that the commission erect a two-foot woven wire fence along all main highways in the state as a means of reducing highway mortality of cottontail rabbits. This state has 41,000 miles of paved highways. In order to erect the fence as suggested, the department would have had to spend all of its income for several years, and probably the repair bill alone would have kept it in the red until the project was finally abandoned. And of course, it is obvious that it would have been next to impossible to carry out the idea anyway, since many, many openings for farm lanes and other entrances would nullify its value.

This is just one resolution but typical of many thousands like it (some

are even more unreasonable) which the sportsmen in all sincerity submit as management plans to improve their sport. Nearly every sportsman seems to have some pet idea of his own which he believes to be a panacea for all conservation ills. And almost any member of a club who is well-liked and respected can get sufficient backing to pass his suggested resolution. Thus they continue to pour in, from individuals, from small clubs and even from national organizations.

What do the trained wildlife leaders think of all this? They think that American sportsmen have more ego than any other similar group of people in the world. What other group comprising so many millions of men could boast that every member is an expert in the particular field of interest? Where else would you find untrained men with sufficient egotism to tell others with years of academic and practical training in their field how to run their business? Do these hunters and fishermen stop to tell engineers how to build highways and bridges? Do they tell their doctors that they don't have appendicitis but that it's gall stones instead? Do they tell their dentists that a tooth doesn't need to be filled just because he says it does? Do they argue and disagree with chemists, pharmacists, architects, lawyers or even expert tradesmen such as carpenters, mechanics, plumbers and electricians? No, because they realize that these men have had years of training and experience which qualify them to do their jobs well. These hunters and fishermen also realize that they, themselves, have had little or no training in these fields and therefore are not qualified to criticize or suggest.

And yet, without any training whatsoever in the field of wildlife management, these same hunters and fishermen set themselves up as experts to criticize and damn and fight the efforts of professionally trained wildlife men all over the country. Most of the wildlife leaders, the technicians and the research workers have had six to eight years of college work the same as engineers, doctors, lawyers and dentists. Why a layman will place his life in the hands of his doctor with complete confidence, and not even trust his sport in the hands of another man with a similar amount of professional training is difficult to understand.

What are some of the ways hunters and fishermen are hurting their own sport? There are endless numbers of examples of their short-sightedness

and stubbornness, but one or two will suffice to illustrate the point.

It should be understood, first of all, that reference will be made here only to those activities of sportsmen as pressure groups—their attempts to interfere with sound, scientific as well as common sense management of wildlife. The fact that many hunters and fishermen break the conservation laws and thus adversely affect their own sport and that of others is another story.

Everyone has heard of the deer problem which is probably the greatest single management headache that wildlife men have to face in the nation today. But it is a misnomer to call it a deer problem, because it is actually a hunter problem. Management sounds simple, and would be simple, but the hunters of most states where deer are overly abundant will not agree to permit the conservation departments to manage the herds scientifically and sensibly in many cases. They object to shooting does, and because only the bucks are harvested year after year, the herds increase beyond all reasonable proportions.

Here in a nutshell is why it doesn't pay to permit deer to become overabundant. When deer become too numerous they so deplete the browse supply that there is insufficient food of the proper quality to support this large number in a normal, healthful condition.

In agriculture, we save only a small part of the crop as seed, and utilize the rest, knowing that next year the seed will produce another crop to harvest. With our deer in some states, we harvest a small number which would correspond to the farmer's seed, and leave the main crop to die and rot. Is this sensible management? If a state has 300,000 mature does in its herd, and if each of these does is capable of producing one or two fawns each when well fed, then it is reasonable to think that as many as 150,000 to 200,000 of these should survive until the hunting season in the fall, and that a number equivalent to this annual production could be harvested every year without reducing the productive capacity of the herd in the slightest!

But in spite of the fact that conservation departments in deer states have made careful studies and have begged and implored the sportsmen, practically on bended knee, to listen to reason, they remain firm, and stubborn, and determined to see their deer hunting reduced to nothing. The fact

that the deer only weigh about half as much as they did forty years ago means nothing; that the antlers are reduced to matchstick proportions is of no significance; and that dozens of dead deer in every wintering yard is merely game department propaganda. Could Shakespeare have been thinking about sportsmen when he had Puck make his famous observations about mortals?

In the East, the sportsmen are still forcing the game departments to import cottontail rabbits from Missouri for release, even though one research study after another has shown that the survival is low, and that the native stock is more than adequate without any imported additions.

These are just two examples picked at random to illustrate the distrust that hunters and fishermen seem to have for the wildlife profession. It is not uncommon to hear a hunter say that the game department of his state is trying to ruin the hunting and intimates that there must be an epidemic of insanity in the department. It would take a psychologist to explain why hunters and fishermen imagine

that the men who have dedicated their lives to conservation work, who are working for sportsmen and being paid by the sportsmen's money, could possibly want to ruin their sport. What possible motive could they have and what could they gain? Even if a wildlife specialist felt no obligation to the sportsmen, his desire for success in his profession would certainly stimulate him to his best efforts. Surely a sportsman who will take a moment to think will see that such reasoning must be false.

In spite of this fraternal spanking, the intent of this article is not to criticize the organization of sportsmen nor the federation of sportsmen's clubs as such, because this organizing and meeting of good fellows with a lot in common is the proper thing to do. Hunters and fishermen enjoy each others companionship, and they like to get together to work and swap ideas. And with the potential influence of their millions of members, the sportsmen's clubs are capable of accomplishing much toward the conservation and restoration of our natural resources. The only point

of criticism of these groups is that certain of their activities are misdirected. Instead of saying, "Here's what we want you to do" to their conservation departments, they might better say, "What would you like to have us do to help improve our hunting and fishing?"

As organized and federated groups, the sportsmen of the United States can fight against anti-conservation legislation, stream pollution, marsh drainage, overgrazing in the West, the exploitation of our wildlife and many other endangering influences. And they should fight for the restoration of nesting areas for waterfowl, better forest fire protection, the soil conservation program — just to mention a few. (This should leave them little time for fighting their conservation departments.)

And as an individual sportsman, they can obey the game and fish laws and report others who willfully violate them; they can build good will between the farmer and sportsmen, help plant game food and cover, help

• Continued on Page 28



SHOULD WE KILL DOES?

(Editor's Note: The following article is a compilation of material previously published in TEXAS GAME AND FISH and presents a problem which is still critical in sections of the Texas Hill country.)

WELL-MEANING people who are anxious to keep up the deer populations sometimes place these animals in fenced enclosures of various sizes. At first, the deer usually do exceedingly well in places of this kind, as they are protected from poachers. But after a while the deer increase beyond the carrying capacity of their range and the fenced area can no longer support them properly. Choice kinds of feed necessary to deer health are first destroyed; later the staple foods are reduced, and finally, there is not enough of the staple foods.

Deer begin to die, especially during periods of drouth and severe cold weather. The person who sponsored the project doesn't know what to do. Naturally, there are but two things to do: provide more room for the impoverished deer or reduce their number. He cannot take down the fence to provide more room, for the deer would then destroy the surrounding crops, so he keeps the fence up and more deer die.

Under the state game laws he cannot kill anything but those bucks having more than two pronged antlers. Although he kills his cows as well as his bulls, he cannot kill his female deer. He doesn't want to anyway, for he has been taught for years that it is almost a crime to kill doe deer under any conditions, even if it may be helpful to his penned-up deer herd. Yet if deer herds are to be kept within bounds, does must be hunted as well as bucks.

You may say that while this thing happens under a deer-proof fence it will never happen where deer have plenty of country over which to roam. But it does exist in many places in Texas. Large areas of land are affected, particularly in the Hill Country.

Has the Hill Country always been good deer hunting country? The answer is no. In the beginning, parts of this country were not even good deer range. In the country where the habitat was suitable there were deer, but that was many years ago. Most of the original deer population vanished as the settlers came in.

Old-timers tell us that when the pioneers first settled the Hill Country there was a limited amount of deer habitat, and that most of it was along

the streams. They tell how the deer began to spread along with the liveoak and shinoak. As these shrubs took to the gentle slopes and plateaus, so did the deer—that is, so long as man would let them.

About forty years ago the people of this region began in earnest to protect deer, and today in many localities there are more deer per section of land than there are quail per section of land in most good quail country in Texas. Over large areas there are as many as one deer to four acres.

As deer herds were built up so were the herds of livestock, particularly goats and sheep. The livestock industry grew rapidly until the region became the outstanding goat and sheep raising section in the United States. Deer hunting also became excellent, and hunters came from far and near to match their skill against the wily buck. Ranchers were able to cash in on this resource upon passage of the Shooting Preserve Act, which permitted them to charge for hunting privileges.

After a while the average shooting preserve operator received about \$20 for each deer taken. This system was and still is very pleasing to the ranchmen, for it gave them some compensation for the loss of gardens and crops through the depredations of deer. It enabled them to finance the building of fences in some places to keep the deer out of the gardens and crops. Very little gardening is done in the region, however, because the soil is so thin and rocky.

As the liveoak and other evergreens spread and covered the country it

became better sheep and goat range—it also became better deer range. As a result, sheep, goats, and deer can be found almost everywhere in the Hill Country.

Things went well for a while, and the sheep, goats, and deer thrived until overstocking depleted the natural forage. Too many deer and livestock were using the range. The deer and livestock then began to suffer from malnutrition because of the lack of nourishing and palatable feed, especially the herbs and some of the shrubs and weeds.

In short, the "pie and cake" disappeared from most ranches, and the more staple foods, like liveoak browse, became less and less available. Deer that died or were killed had their stomachs full of food, but it wasn't good food. Goats and deer relish about the same kind of food and feed, and together they trimmed all the shrubs and trees up so high that neither of them could reach the foliage easily, and not at all in some places. Among wildlife scientists the point-of-reach is called the "plimsol line."

If you want to, you can call it the goat line or deer line. By whatever name you give it, the results are the same—less food of poorer quality for deer and goats. Nearer the ground surface the sheep are taking off the nutritious weeds, grasses, and leguminous plants like the bluebonnet which, besides producing a beautiful flower, is a good range food for deer and livestock.

Through the years the range is getting worse and worse, and the deer are finding it more difficult to get



Through the years, this range has become worse and worse, with deer finding it difficult to get proper nourishment. However, their numbers increase despite unhealthy herd conditions, and consequently, the deer are small and suffer from malnutrition.

proper nourishment. The Biblical statement, "Man cannot live by bread alone" applies to deer as well as man. Undernourishment has also made the deer susceptible to parasites. Sickness among the deer followed. During critical periods like drouths deer began to die. Later they began to die when conditions seemed to be pretty good.

For years now hunters and ranchmen have been grumbling because fewer and fewer large bucks are taken during the hunting season. Why? Due to excessive hunting of bucks in some localities and undernourishment, a large percentage of the bucks now are small ones.

Wildlife conservation consists of two phases, restoration and management, and management is just as important as restoration. Only in this way can wildlife, and this includes other species besides deer, be maintained and kept in a healthy condition. Unhealthy deer herds are always subject to disease and large herds in other states have been known to have died off completely. It can happen here! The job of restoration is a cooperative affair between the landowners, sportsmen, and the state department, but the job of management, especially the maintenance of healthy living conditions, rests mainly with the landowners. With its force of state game wardens protection can be provided but this activity mainly goes with restoration.

The question of killing doe deer cannot forever be laid on the shelf, for the killing of males in a polygamous species like deer has, within reasonable limits, no effect on the production rate. Proper legislation is sorely needed to allow the taking of does so that over-population of deer may be controlled. Excessive deer numbers are a drain on the land, for about six deer will eat as much forage as one cow. One deer will eat as much as one goat or sheep. Deer numbers must be adjusted along with the livestock if the range is to be kept in good condition and continue to yield a satisfactory crop, whether it be deer or livestock. If a deer herd is not shot down it will starve down. During the restoration period doe deer should not be killed, for all females are needed for reproduction. Later, however, when an open season is justified, bucks should be killed according to sound principles of game and land management because large, sexually mature animals are needed as sires. But along when the herd has reached the carrying capacity of the land, doe deer should be taken to keep it under control. Not generally known is the fact that deer will continue to breed and increase even if the herd is not in a healthy condition.

Texas is not the only state which has had to deal with this problem. Of

the forty-eight states, about thirty-five have enough deer of one kind or another to justify hunting, and of these thirty-five about seventeen have open season on doe deer in one form or another. The removal of doe deer by hunting is the most practical and economical way of controlling over-populations. Trapping is too expensive and cumbersome and at best can only cover a limited territory. By hunting female deer, the sex ratio can be kept in balance and lessen the pressure on bucks and make available more forage for the remaining deer. It will allow the bucks to grow larger, thus providing a better trophy and more meat. Certainly venison from doe deer is a better human food than that from bucks because does are usually fatter and the flesh is not as tough. Many does on the over-populated ranges are probably too old

Game Warden Kills Eighteen Rattlesnakes

Being in the right place at the right time enabled Game Warden Lynn L. Large of Eagle Pass, to hit the jackpot on rattlesnakes in Maverick County. While patrolling on the Chapman and Barnard ranch about 18 miles north of Eagle River, Warden Large killed 18 rattlesnakes one afternoon between the hours of three and six p. m. He found the reptiles in ones and twos and reported they apparently were just leaving hibernation since they "all were very fat and in fine condition."

to produce young. Hunting does would, in time, reduce or even remove this "excess baggage" from the range, making more room for more virile females, as well as for the remaining fawns and bucks.

Restocking buck deer from other portions of the state will not remedy the ills of over-grazing nor produce bigger offspring. It is next to impossible to trap and release enough bucks in any county to achieve this purpose—it is more or less like mixing one drop of ink with 1,000 gallons of water—the color cannot be detected. In the first place the bucks are not available and in the second place the entire state treasury would be bankrupt if such an activity were conducted on a scale large enough to achieve the intended objective.

Meanwhile, deer management in over-populated deer ranges must be recognized as an integral part of good land management and handled accordingly. If it isn't, more trouble is sure to follow.

EXOTIC SPECIES NEED STUDY

State conservation departments are under constant pressure from well-intentioned sportsmen to introduce foreign game birds and mammals into this country. With the gradual return of normal conditions in Europe, this pressure will grow more intense as importers find new stocks of game and start advertising campaigns aimed at sportsmen. Enough money already has been wasted on misdirected introductions of exotic species to finance a first-class restoration program for native game over most of the United States.

Most haphazard introductions of exotic which may capture the fancy of sportsmen are foredoomed to failure. All animals have definite habitat requirements. The chukar partridge has been introduced into nearly every state in the Union, yet it has survived in only a few localities in the West, notably in Nevada. Pheasants have been released repeatedly in the South, and as consistently have disappeared. Unless climate and habitat are as favorable as that in its native range, a bird or mammal cannot survive as a transplant. In addition to the complete disappearance of the import, failure may stem from two other causes: the new species may compete with and drive out native wildlife; or it may become an agricultural pest. Our own valuable and relatively innocuous muskrat is Pest Number One in much of central Europe.

Not all introductions are bad. The pheasant is a case in point. In some places, native game bird has been driven out by changes in habitat brought about by man's agricultural activities and forestry practices. There are many places today where native species cannot survive because of such changes and where an exotic might fill the gap.

At the present time, studies are being conducted by the U. S. Fish and Wildlife Service to find birds and mammals which will survive in such areas. When they are found, they will be brought to this country only if complete studies show that they will not compete with native wildlife or become pests, and that their chances for survival are excellent. State conservation departments are as anxious as the sportsmen to fill the blanks on game ranges. Sportsmen, however, should not bring pressure on administrators to introduce new game species until complete studies have been conducted.

When bats sleep or rest they hang head downward by means of the claws on their hind feet.

Ancient Beliefs About Fish

•
By
Joel F.
Webber

MOST OF OUR modern superstitions are not new; in fact, they are relics of the ancients. In the dim and distant period known as "tribalism," the priests of the primitive sects, conscious of some strange and powerful force beyond their comprehension, attributed many of the phenomena of Nature to the workings of gods and demigods. Hence, acts of superstitious character were attempts to bribe or appease the gods. Nowadays, we call such shenanigans "luck."

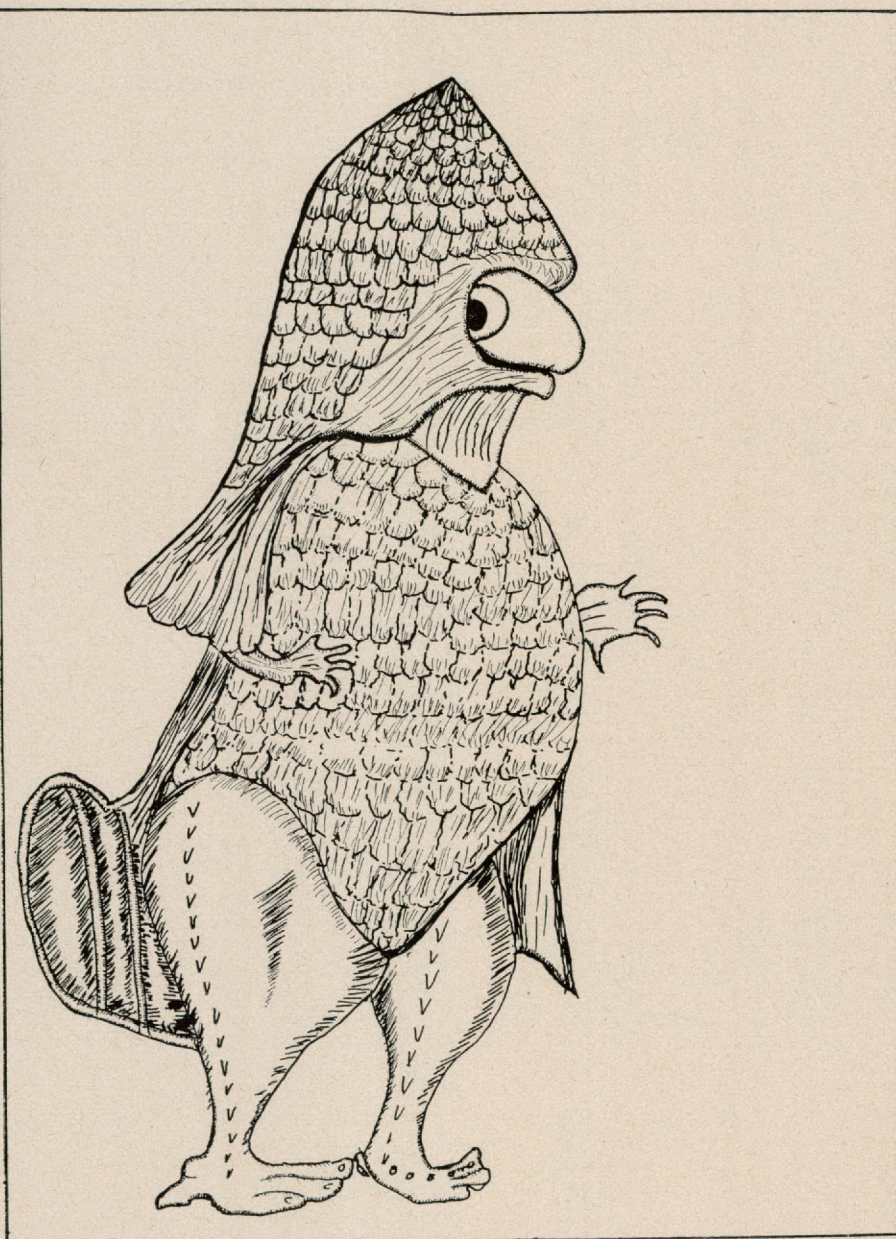
Science and superstition became a strange blending of fact and fiction in the time of the ancient Egyptians. While plants and animals, according to their belief, were supposedly endowed with miraculous powers, the fish superstitions were really dillies.

The Egyptians believed that the

carp—a close cousin to the goldfish—was the bravest of all fish. To it was given the power of bestowing perseverance and good fortune to all mortals who ate of its flesh. As to lovers: carp steaks on the family table inevitably enticed the little guy with the bow and arrows to do his stuff.

Continuing the legend, the carp supposedly had the strength to leap waterfalls and in so doing, eventually to ascend to the Chariot of the Sun. From this interesting legend, we derive our custom of keeping goldfish, which incidentally, came to us via Japan.

Isis, Goddess of the Moon, looked upon carp with particular favor, and to those fishermen who wore emerald rings while angling for carp, she guaranteed a full catch and a safe return. But if they



didn't wear that ring, it didn't mean a thing!

Next to the Egyptians came the Romans with their superstitions. While the priests of the Egyptians disseminated their beliefs, from the double-domed philosophers came the superstitions that lay the short-sword experts by the heels.

Pliny, who was among the top ranking philosophers of his age, attributed miraculous powers to fish. In his Ninth Book of Natural History, he assures us that fish have the power of prophecy. But the pay-off came during the wars of Augustus Caesar. Pliny solemnly proclaimed that the fish of the oceans and seas jumped out of the water beseeching Caesar to take dominion over the depths. When he hesitated to grab all of this underwater territory, the fish, softening him up, whispered prophecy into his ear.

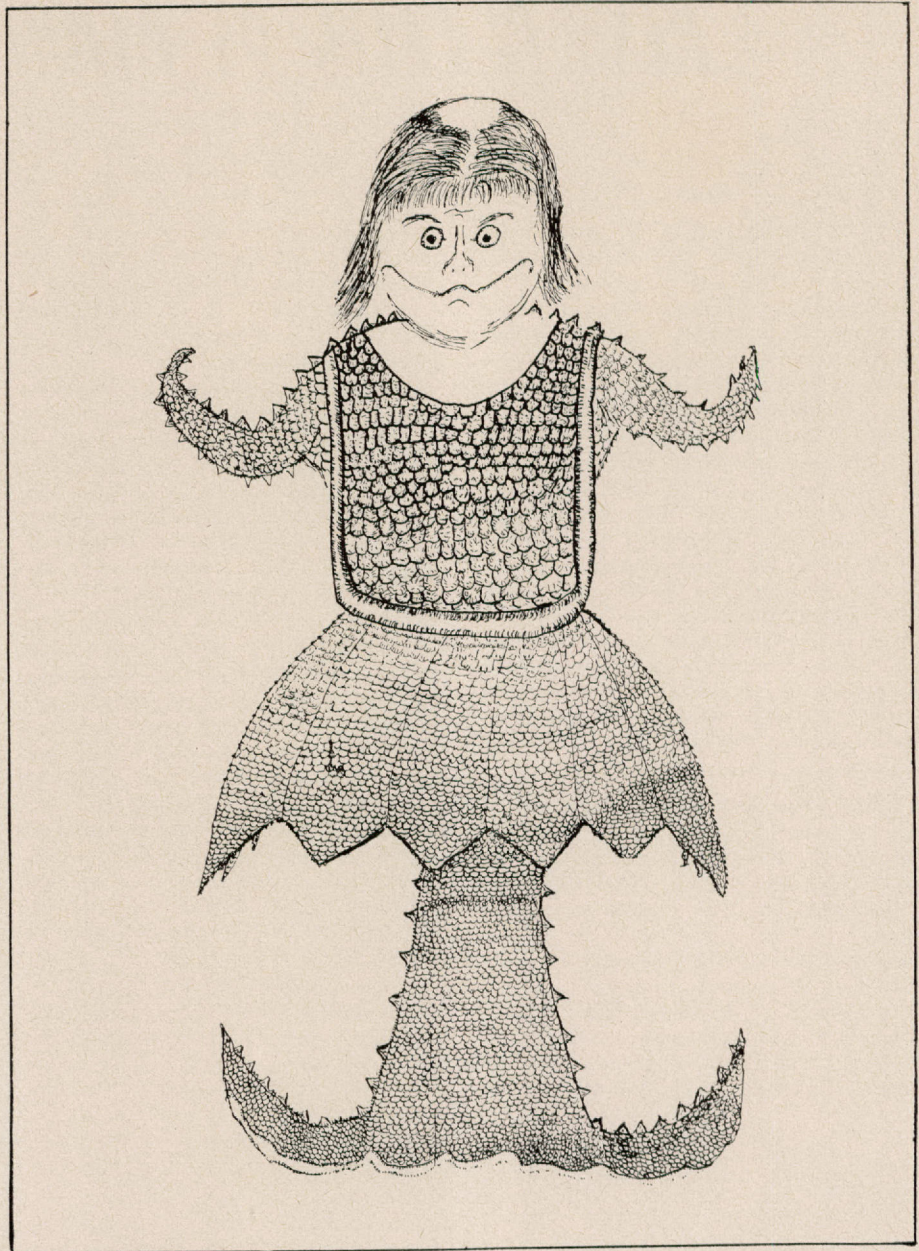
Unknown to modern fish experts is the *anthia* which is referred to by Pliny. Fishing for it required special clothing and ritual. To be successful in *anthia*-fishing, Pliny urged the fisherman to dress in clothing all of one color. He speaks of the meat being sweet and tender but does not say how it was prepared.

The eel had the third largest following among the superstitious ancients. The Egyptians both worshipped and ate them. But the Jews who were living in bondage refused to touch the flesh of an eel and denounced the worship of the principal Egyptian fish-god Dagon. Among the members of the eel family there is the conger, which grows to enormous lengths and was well known to the ancients, most of whom considered its flesh unpalatable. But the aroma of burning conger eel fat was said to be so fragrant that it restored the sense of smell to dead persons.

Aristotle, the ancient Greek philosopher, believed eels had no parents and emerged full grown out of the mud. Their origin today is still somewhat of a mystery.

Pliny had some original ideas concerning the death of eels. He thought that when the time came for eels to die, they dashed themselves to pieces against the rocks and from the fragments emerged the newborn eels.

While eels, *anthia* and tritons (the name for mermen) are not to be found in the creel of the modern fisherman, Aristotle did mention that trout were simply crazy over music and writes of a fishing trip in which he played the lute and sang to the trout. His fishing partner scooped them up by the



bushel, these finny music lovers.

Successful fishing in the days of the ancients was governed by all sorts of charms and occultisms. The position of the planets, especially the moon, was thought to govern the luck of fishermen. The moon, insofar as it governs tides, does make or break a fishing trip. In this respect, we can still afford to string along with the ancients.

To these colorful sages and philosophers of a by-gone age, the art of fishing was on a high moral plane. Not every slob with a hook was considered a sportsman. Oppian, another Greek, laid down for the angler specific rules which included his physical condition, vigilance, craft and character. Above all, Oppian insisted the angler be truthful!

Plato, on the other hand, was a spoil-sport and a sour-puss. He hated fishing and attributed to it the anglers' complete moral disintegration.

It is not surprising that in the ancient days, with the science at hand being sketchy, the anglers brought to gaff some strange denizens of the deep. These, they probably thought, were the wayward pets of the gods. And this lack of knowledge persisted until fairly recent time, as we now reckon it.

Five years after the death of Rabelais, the author of some rather risqué reading matter, the capture of an unusual fish was announced. It had the shape of a man wearing a cowed robe, and a tonsured head. So it was called the monk-fish. This

• Continued on Page 29

PASS CUTTING ON PADRE ISLAND

(Chapter XI)

By J. G. Burr

IT IS WELL KNOWN that fish travel back and forth through passes that connect the bays and the Gulf and that an interchange of water between these bodies is of the greatest importance. That is especially true with reference to Laguna Madre with its continuous stretch of water more than a hundred miles long when not obstructed by the great sand flats. During the summer of 1949, the Intra-Coastal Canal was extended through the laguna, penetrating the Great Flats and allowing an exchange of water between the north and south sections of the bay. Within a month the salt concentration had been reduced approximately 30%. A decided improvement appears to be assured with a probable reduction of fish mortality which had resulted from the heat and the concentrated salt.

While the salt problem now seems to be less acute, there is still the argument that fish need a pass so that they can come in from the Gulf. That fish use the passes to escape from the shallow bays in warm weather, and from freezing temperatures in the winter, is obvious to the experienced fisherman. The dismal failure of pass-cutting which began in 1938 is still green in the memory of those along the coast, but all are not

convinced that the failure was inevitable. If a complete record of the undertaking is set forth, and that is what we are trying to do, there should never be any serious resurgence of the pass-cutting program.

The opening of fish passes had been a dream for more than a quarter of a century; just when the dream had its origin must be left to the early dwellers of the coast land. The idea grew in intensity and was supported along the coast from Rockport to Brownsville and especially in the regions of Kingsville and Corpus Christi.

U. S. engineers, on the other hand, had pointed out from the beginning that fish passes will not remain open, and this judgment has been supported not only by the experience of the federal government but by that of one of the middle Atlantic states as well. But Texas had to become another proving ground, and yet it is doubtful that the evidence gained in that prolonged effort is acceptable to certain individuals who do not wish to be convinced.

In explanation of the failure, it will be said that the cut was not wide enough, or that it was slanted in the wrong direction, or that jetties would have prevented a closing of the cut.

Without denying any of this there is a stubborn fact that sweeps away every other consideration: The Murdoch pass **did** remain open for some months but during that time the salinity of the Laguna Madre was not reduced or relieved beyond the immediate vicinity of the pass. The Gulf water moved in and out as an entity without mixing appreciably with the water of the laguna. One engineer stated that to be effective a pass would have to be ten miles wide.

Summarizing the operations which began in 1938, Corpus Christi Pass, which was cut and recut two or three times, soon closed on the Gulf side so completely that identification of the location was difficult. On Padre Island the Murdoch Pass, which was opened and recut several times after each closing, soon became permanently closed. Only Cedar Bayou Pass remained in good condition for a time and then began to show signs of closing. After the complete failures at the Corpus and Murdoch passes the ill-fated enterprise was abandoned. The total cost of the operation was \$114,426.00; the original cost of the dredge, \$26,629.00.

The writer recently had occasion to examine some old maps of Padre Island and the Laguna Madre which are in the archives of the State Library at Austin. An old Spanish map of 1820 shows two passes about midway of Padre Island. A later map of Texas by Arrowsmith dated 1840 shows one pass opposite the present sand flats. It was probably the pass which the Mexican surveyor in 1828 named Pass San Agustin, which was landmarked as "The half way, or middle of the land." The county map of 1847, then known as San Patricio County, shows no pass but the sand flats were then forming and were covered with water only at high tide as noted on the map. Doubtless, up to 100 years ago, when the Laguna began to be cut in the middle by sand flats, there was enough tidal exchange to prevent excessive concentration of salt. Several factors must have contributed to the forming of the flats. Among them is a legendary tidal wave of 1836 which hit the island and moved over portions of the island into the Laguna. Eroded sand from the passes may have contributed their part, and



Pictured at left is the dredge that was used in cutting passes. Its original cost was \$26,629.00.

perhaps as of equal importance, it was the meeting place of the two tides, which entered from the north and the south and dropped their load of sand at this mid-way point.

Here is resumed the details of pass cutting. In the seven years of the experiment, four years were devoted to the Padre Island pass at Murdoch Landing which was named "Yarborough Pass" in honor of the former commissioner who resided at Corpus Christi. It should here be noted that Mr. Yarborough is in no way responsible for the fate of the marine failure. The dredge was named "A.E.," the initials of Senator A. E. Wood, former chairman of the Game, Fish and Oyster Commission, who has been for many years a champion of conservation work and had the courage to sponsor a trial of the coastal venture.

Former coastal director, W. W. Boyd and his successor J. B. Arnold were strong supporters of the move to cut passes through Padre and other islands along the coast. In 1938, when Corpus Christi pass was being opened, Boyd, in his annual report, expressed the belief that a pass on Padre at Murdoch Landing "would eliminate entirely the destruction of fish life in that body of water (The Laguna.)"

Here is how it worked out in practice. The Murdoch pass was first cut through on April 14, 1941. It was 120 feet wide at the top, eighty feet at the bottom and five and a half feet deep, and its lineal distance was 8,800 feet. The time consumed in the operation was 130 days.

J. B. Arnold, in his annual report of that year, said: "At that time heavy rains fell along the coast and the salinity of the upper part of Baffin Bay fell from twice that of the sea water to almost fresh enough to drink. Winds from the north prevailed and the fresh water flowed down into the Laguna and the salt water pushed out through the pass."

With ideal conditions that then prevailed an unusual thing was noted. Al Kleberg of Kingsville reported the presence of shrimp, flounder, and jelly fish around Riviera Beach and Los Olmos Creek. Such a thing had been unknown in Baffin Bay. He said they all disappeared when the sea again became too salty. Around a pass there is always good fishing and while the Murdoch cut remained open commercial fishermen reported good hauls.

The pass which was opened in April was completely closed late that winter, says the annual report of 1941-42. By mid-November, 1942, a recutting of the pass was completed. The pass closed again during the winter of 1943 and dredging was resumed in the following June and continued into 1944. The pass was open in November 1944 according to Bob Tanner, game

and fish warden pilot who made several trips over the Laguna by air. So in November the dredge moved into the upper Laguna, and after deepening some shallows, docked at Corpus Christi the following March. About this time the Murdoch pass was again choked up with sand, and when visited by the writer in July 1945, the end next to the Gulf was completely filled up for a quarter of a mile.

The measure of security enjoyed by fish in the Laguna for the four years up to the spring of 1945 can be attributed to the rainfall which, for the period, averaged 30.86 inches, which is well above normal precipitation for the area. As this rainfall, for most of the time, took care of the needs of the Laguna and Baffin Bay, it is not conceivable that the pass, even when open, made any material contribution to the wellbeing of these bodies of water.

A dolphin, a marine mammal, is closely related to the whale.

* * *

No animal of economic importance has been domesticated for the past 2,000 years.

* * *

Sound travels four times as fast through water as through air, and 15 times as fast through iron.

* * *

It is estimated that 2,326,000 big game animals now are living in the national forests of the United States.

J. T. SWANSON DIES AT COTULLA

John Thomas Swanson, Game Warden Supervisor in the Junction district, died suddenly Thursday morning, April 13, 1950, of an apparent heart attack. He and several wardens were in Cotulla on special assignment at the time of his death.

Mr. Swanson was 56 years of age and was continuously employed by the Texas Game, Fish and Oyster Commission as a warden and supervisor of wardens since April 1, 1927. He was a tireless, conscientious worker and was held in very high esteem by members of the Game Department as well as those with whom he worked and associated. His district was one of the largest in the state and perhaps his untimely death resulted from his strenuous efforts in administering to the affairs of his men and the people of his district.

He is survived by his wife, a brother and a step-daughter to whom the entire personnel of the Game Department extends condolence.

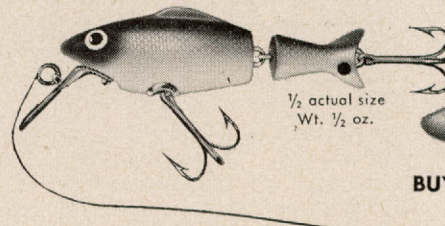
The jack rabbit is sometimes called a "narrow-gauge mule."

The prairie dog is not a dog but a ground squirrel.

Fowl cholera killed more than 36,000 ducks wintering in the Texas Panhandle in 1947-48.

Grabbing a Bait to eat!

You get action in one gulp with SPOT TAIL MINNOW lures. Rascally old fighters go for these plastic lifelike lures. If you are interested in catching *more and bigger* fish . . . get a variety of the 10 colors available in the two Spot Tail Minnow series, 700 and 1300. Jointed model (1300 series) shown below.



**BUY FROM YOUR LOCAL DEALER
\$1.25 EACH**

Wood's lures are acclaimed the world's foremost fish lures!

WOOD MANUFACTURING CO.
EL DORADO • ARKANSAS

Marine Fishes of Texas

By J. L. Baughman

This is the first of a series of articles on the marine fishes of Texas, and is aimed at presenting a general part of the picture. In the articles to follow, Mr. Baughman will discuss the various species of fish separately.

ONE OF THE OLDEST books on the natural history of the New World is a weighty Spanish work in four volumes entitled "Historia General y Natural de las Indias, islas y tierrefirme del mar Oceano," by Gonzalo Fernandes de Oviedo y Valdes, and concerns mainly the West Indies and the coasts of the Gulf of Mexico, with their surrounding waters.

"And here," says Oviedo, "is to be noted that in the great ocean sea there is a very strange thing to be considered, which all that have been in the Indies affirm to be true; and, this is that like as on the land, there are some provinces fertile and fruitful, and some barren, even so doth the like chance in the sea; so that at some windes the ships sail fiftie or a hundred, or two hundred leagues and more without taking or seeing of one fish: and again, in the selfe same ocean in some places, all the water is seen tremble by the moving of the fishes, where they are taken abundantly."

Oviedo's statement concerning the distribution of fishes is as true now as it was then, and in many parts of the world we know no more about the matter than did the ancient Spaniard.

This statement may be applied particularly to the western Gulf of Mexico, where, despite the work of Evermann and Kendall, (1894), of Pearson (1929), of Gunter (1945) and the papers of Fowler, (1931), Reed (1941) and Baughman (1938-1950) the distribution of many of our common fishes is not well known.

Whenever the subject has been given any consideration, it has been the tendency to consider the western portion of the Gulf as more or less identical with Florida and the West Indies, as far as the fishes were concerned, except for the northern portion. This has been compared to the coasts of the Carolinas. There are apparently some salient differences, however, and as a possible working hypothesis for intelligent consideration of our fishes, we may consider the western Gulf of Mexico as a more or less sep-

arate entity, cut off from Florida by the vast and silt-laden flood of the Mississippi, and from the West Indies by deeps extending from the mouth of that river down through the Yucatan Channel, past the Misteriosa and Rosalind Banks to the southern shores of the Caribbean Sea.

Even a cursory inspection of the history of the area for the past few years will show that, from a portion of the waters in question, many species of fish new to science have been taken, to a number greater than from any other similar area. Moreover, none of these species are found to any great extent (so far as we know) in the Floridian fauna. Add to this the fact that certain species, such as the sawfish (*Pristis Microdon*) and certain flounders, have not been reported from more eastern waters, although they occur in the waters of Central and South America, and you have a partial basis for the hypothesis that many of the species in this portion of the Gulf have come, not from the eastward, but rather originated to the South, and have migrated northward along the coast of Central America, Texas forming the northernmost portion of their range.

The western Gulf, then, forms a pocket, somewhat similar to the Gulf of California, which catches and retains species that do not appear on contiguous continental coasts, i. e., in the one instance to the east of the Mississippi, and, in the other, on the outer portion of the peninsula of Lower California. This hypothesis is, of course, open to criticism, and may be proved entirely wrong as further material from the area is collected and examined.

It is unfortunate that no extensive work such as the "Fishes of Chesapeake Bay" has ever been published on the Gulf, for, as it now is, this remains one of the last great, unexplored frontiers of the sea.

Nevertheless, there is a good deal of material at hand, in the form of scattered articles and collections, and from this we are able to gain a reasonably good idea of at least the major species of fishes that we have, and to tell a little about their distribution and habits.

In the articles which will follow, from time to time, we will endeavor to give as clear a picture of this as our present knowledge makes possible.



LOY BROWN IS NEW PRESIDENT

Loy Brown of Brownwood was elected president of the Texas Wildlife Federation when it met in Fort Worth April 16. Other officers chosen at that time were vice-president, Dr. Frederick Weston, San Antonio; and secretary, W. G. Streckert, Brownwood. Dr. Weston is the immediate past president of the Wildlife Federation while Brown and Streckert are active members of the Brown County Sportsmen's Club.

Plans were also completed at the meeting for the Wildlife Rodeo to be held in Brownwood, May 26, 27, and 28. A stag party and barbecued chicken dinner have been arranged for Friday evening, the 26th; a square dance for Saturday evening, the 27th.

The facilities in Camp Bowie, site of last year's rodeo, have been greatly increased for holding all of the events in connection with this rodeo. Construction has been completed for another skeet range and house together with traps which will accommodate twice as many skeet shooters as there was room for last year.

The casting tournament pool has been increased in size to a seventeen-acre lake containing 135 acre-feet of water. This lake has been well stocked with bream and other pan fish and will be ready for the added event of a Junior Anglers contest. Prizes will be awarded to Junior Anglers in accordance with contest rules without any entry fee being charged.

The Brown County Rifle and Pistol Club and the National Guard have just completed a modern indoor target range for pistol and small bore shooting. This range is equipped with steel backstops; sand pits, and automatic target carriers. It is well lighted and will accommodate as many as nine shooters at a time. The outdoor range is also being remodeled and will be equipped with new target carriers and other modern range equipment.

ABOUT PET DEER

By W. C. Glazener

PUBLIC INTEREST and personal fancy with regard to wild birds and animals take curious turns now and then. Some people derive pleasure from the "wildness" of nature and are content to let wild things remain so. With others, "wildness" of native species apparently is an urgent challenge to tame and domesticate, with little regard for effects on the objects of their attention. In Texas, this tendency has widespread and particular application to deer.

Each spring and summer, letters, telegrams, telephone calls, and personal visitors arrive at the Austin office of the Game, Fish and Oyster Commission, requesting permits for keeping fawn deer in captivity. As a rule, it is reported that the fawn in question "was deserted by its mother and left alone to starve in the woods." Requests come from points throughout Texas, wherever deer populations occur.

Each winter there are many requests for the commission to come out and pick up pets that have become nuisances, or to furnish a mate for a "lonesome" buck or doe. Most pet deer develop tastes for expensive ornamental shrubs and yard flowers, including those on neighboring premises. This nuisance frequently leads to broken friendships, some of long standing, and to prolonged dissatisfaction thereafter. As winter comes on, pet bucks show unexpected belligerent tendencies. They may decide to attack anyone at any time, and are particularly dangerous to women and children. Serious injuries and narrow escapes are not uncommon.

As a matter of law and administrative policy, the game commission tries to discourage people from picking up fawns. Very few fawns found in the woods actually have been deserted. Doe deer leave their fawns in hiding for the first two to three weeks, returning to them at frequent intervals so that they may suckle. After fawns are a few days old, they may move around some between these suckling periods. Even so, a doe seldom fails to find her young, so keen are her sense of smell and hearing. It is probable that more fawns are lost through human "rescue" than through parental "desertion." On the other hand, there are instances where worm-infested fawns are saved, particularly through proper treatment by ranch hands.

Once a deer fawn is fondled and fed with no injury or undue disturb-

ance, it tends to be increasingly trusting of adopted parents—even of humans. Consequently, deer that grow up in captivity or in human company lose most or all sense of fear. Pet deer, therefore, are relatively useless to the game commission for stocking purposes. When released in the wild, many of them move in on farm yards. Others range along and across public roads, easy prey of any illegal hunter who may pass.

Timing of these urgent requests for moving pet deer is inopportune. They arise during the period when commission personnel and equipment, unfortunately, are all busy with heavy responsibilities growing out of hunting seasons and regular trapping programs. Therefore, any effort to accommodate such requests usually disrupts other important scheduled activities. People not familiar with these conditions sometimes feel that the commission lacks sympathy when their solicitations do not bring prompt and favorable action.

Big scale trapping of wild deer is now a routine and efficient operation. Costs per deer are relatively low, certainly much less than the cost of detailing men and trucks to gather up scattered pet animals at irregular intervals. In addition, wild deer are far more satisfactory for introduction on restoration areas. By remaining wild and self-supporting, they constitute less of a problem and give more guarantee of really bringing about deer restoration on the area concerned.

Game Warden Reports Wildlife Tragedy

Game Warden Wardlow Northam of Mount Pleasant turned reporter when a rare wildlife tragedy occurred in his area. His letter helped carry to newspapers and radio stations throughout the country the story of lightning striking a flock of geese.

His laconic report to the game department follows:

"On Sunday, April 2, during an electrical storm, a flock of wild geese was struck by lightning. There were twenty-seven in all. They were all Canadian honkers. Some of the huge birds were torn to pieces by the bolt. This strange incident occurred near the Bowie and Red River county line. The geese were in flight when killed."

Lead Poisoning In Waterfowl Is Related to Diet

If ducks could obtain a balanced diet, the problem of lead poisoning would be minimized. This was disclosed at the 15th North American Wildlife Conference in San Francisco in a paper presented by James S. Jordan and Frank C. Bellrose of the Illinois Natural History Survey.

Since 1948 the Illinois Natural History Survey, the University of Illinois, and the Western Cartridge Company Division of Olin Industries have been endeavoring jointly to find a shot pellet which will prevent or ameliorate lead poisoning in waterfowl. Secondly the research workers are seeking to determine the importance of lead poisoning as a factor in waterfowl management by finding out the incidence of ingested shot pellets in major waterfowl habitats across the nation and by determining the degree of mortality produced by various numbers of shot pellets when taken by different species of ducks.

In searching for food and grit on the bottoms of shot-over lakes and marshes ducks frequently pick up shot pellets which resemble in size and texture the seeds of several important food plants. When taken into the gizzard, the pellets set up a toxic reaction which, depending upon its diet, physical condition, and the number of shot pellets taken, may sicken or cause the death of the duck.

The most striking discovery of this study to date has been the relationship of its diet to the bird's resistance to lead poisoning. Mallards, teal, and domestic Pekin ducks were used in the experiments. Those fed on corn and seeds alone often succumbed when given only one Number 6 shot pellet. When waterfowl were fed corn or seeds supplemented by leafy aquatic vegetation, they showed little or no effect after being fed several pellets. Ducks sickened by lead poisoning often recovered after being placed on a proper balanced diet.

All alloys tested for use in shot to date have presented impossible metallurgical problems or have the same toxic effect as lead. Jordan and Bellrose believe that the solution to the problem lies in better waterfowl management aimed at stabilizing water levels so as to encourage the growth of leafy aquatic food plants, particularly in regions where corn, grains, and other seeds form the bulk of the birds' diet.

FISHES OF TEXAS

Shovelnose Sturgeon

By MARION TOOLE

The Shovelnose Sturgeons, *Scaphirhynchus platyrhynchus* (Rafinesque) are fish that very few Texas anglers will ever see. There have been several of them caught out of the Wichita River, near Wichita Falls, and they have also been taken from the Red River.

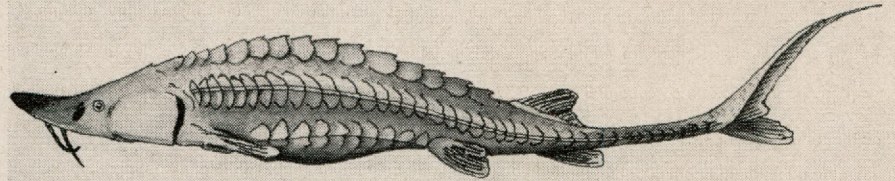
These are very interesting fish because they are present day representatives of some of our earlier prehistoric fishes.

The shovelnose sturgeons are just one of the several species of sturgeons occurring in our world. Sturgeons are another family of fishes that are found in both our fresh waters and the seas. According to David Starr Jordan and Barton W. Evermann, the Shortnose Sturgeon, *Acipenser brevirostris*, have been reported from the coast of Texas, but this species and any other species of sturgeons that have been collected from our coast line will be reported as marine fishes. The shovelnose sturgeons have other common names by which they are known, such as Hackleback or Switch-tail.

Many of the sturgeons attain tremendous sizes, some growing to a length of twelve feet, but our subject never grows that big and a three foot specimen would be a record fish.

As may be seen from the illustration, the shovelnose sturgeon is not a pretty fish, but it is a most unusual fish. They are a pale olive color, that approaches a brownish hue on the back and their underside is whitish. They have a broad, depressed, shovel-shaped snout. Under their snout and in front of their mouth they have four barbels hanging down. Their body is elongated and tapers off into a long tail. They have one row of strongly keeled scutes along their back, one row of scutes along the lateral line of each side and one row of ventral (bottom) scutes on each side. In between these rows of scutes are found small scale-like plates which serve to complete this species' armor.

Not much is known about the feeding habits of these fish, but aquatic insect larvae seem to be their main diet from specimens studied. The writer had some of these fish in an aquarium in captivity and observed them feeding many times. In the aquarium they readily consumed beef heart that was cut into strips the size and shape of earthworms. They would swim over



the bottom of the tank with their barbels dragging on the bottom and the minute one of their barbels touched food, the mouth would unfold down and the food would be scooped up.

Not much is known regarding their spawning habits. Apparently they spawn between April and June and it is thought that they ascend the smaller streams to spawn. They usually are found running with the paddle fish and spawn about the same time as do the paddle fish.

Shovelnose sturgeons are caught in nets and are also taken on setlines

and trotlines baited with cut-bait, small fish and worms. In the White River of Arkansas the favorite bait is worms taken from old piles of sawdust that accumulates around sawmills.

These fish have a considerable economic value. Their flesh is sold as steak or fillets, both smoked and unsmoked. Their roe or eggs constitute their most valuable asset since sturgeon roe is the source of the finest caviar. However, roe taken from the shovelnose sturgeons is usually mixed with roe taken from the paddlefish.

Hunting Fatalities Increase In Texas

Texas may prove to be a fertile field in the national movement by the Wildlife Management Institute to increase safety among hunters. The institute has announced that a survey of "six of the nation's more popular hunting states indicates that the number of fatal hunting accidents has been cut exactly in half during the past eight years." But the trend in Texas has been upward: thirty-seven gunners were killed and sixty-nine wounded last fall as contrasted with twenty-eight dead and fifty-eight wounded for the preceding year.

While the total number of hunters increased slightly in Texas in 1949 over 1948, the proportionate number of accidents was still higher.

Reporting on the opposite trend nationally, the institute observed: "The survey shows that hunting fatalities in these states decreased progressively from 6.4 per 100,000 hunters in 1940 to 3.2 in 1948. During the same period, the number of licensed hunters increased by more than 1,000,000. The states of Maine, Michigan, Minnesota, New York, Pennsylvania and Wisconsin were selected for the test. In 1940, 2,671,955 hunting licenses were sold in these six states. In 1948, the number of licensed hunters had increased to 3,742,989. Non-fatal accidents dropped from 30.5 to 21.8 per 100,000 hunters during the survey period."

Exploratory Vessel To Conduct Studies

The John R. Manning, an exploratory fishing vessel, arrived at Honolulu on March 26 after an eleven-day voyage from San Pedro, California. The Manning is a purse seine-type vessel which was constructed to perform exploratory fishing operations in the central and western Pacific Oceans. Named in commemoration of John R. Manning, former chief technologist of the old Bureau of Fisheries, the Manning completes the fleet of three vessels for the Pacific oceanic fishery investigations.

The Manning is eighty-six feet long, twenty-two feet in beam and will be equipped with a purse seine, longlines and trolling gear for tuna.

The vessel is constructed along typical lines of a Pacific Coast purse seiner and has a cruising range of 8,000 miles. She is fitted with a brine refrigeration system to preserve about thirty tons of tuna for subsequent studies on the quality of fish taken from unexploited areas.

The vessel will engage in a shake-down cruise for a period of about ten days in the vicinity of the Hawaiian Islands to test thoroughly the operation of the fishing gear before departing on a long range cruise. The Manning will explore new fishery resources and conduct studies on how these may be economically exploited.

• Continued from Page 5

yet been called to our attention in either Texas or Louisiana to indicate that nutrias do dig extensive burrow systems here. Possibly, therefore, they may not menace dams in this area. More study is needed, however, before definite information on this point will be available.

Damage by nutrias to gardens and field crops has been reported in England, Washington State and elsewhere. But this damage is rarely considered great.

Nutrias can travel overland for great distances. In Ohio, a farmer found a nutria eating corn out of a trough with the pigs. This animal was about twelve miles from any large stream or lake.

It seems certain that nutrias will spread from their present locations. This will be true since the vegetation of these areas will be becoming scarcer while the populations will be becoming greater. Intensive trapping would tend to limit the rate of spread, but that a natural spread will take place seems inevitable. And restocking by persons anxious to experiment doubtless will continue.

In view of the abilities of the nutria to thrive in some portions of Texas, it can be fairly safely stated that the nutria is here to stay.

Anyone contemplating buying and releasing nutrias into new sections of this region should realize that the way in which nutrias will affect our welfare is not yet certain. In some areas, they may be wholly beneficial. In others, particularly in irrigated sections, they may be undesirable. They travel rather rapidly, and introduction of them into one area may soon result in their spread into adjacent districts. While we are gathering further information on the species, it probably would be well to further the spread of the nutria only after extremely careful thought on the matter.

FISHERMEN!

Raise Lutex Wiggle Worms for profit and pleasure.

100 — \$1.00 500 — \$4.00

1,000 — \$7.50 Postpaid

Instruction pamphlet with order.

LUTEX WORM FARM

Box 352 Luling, Texas

Tired of Old Recipes? Try These New Ones!

Do you have a leg of venison left in the deep freeze from last hunting season? Here's how to do something different with it.

With a sharp-pointed knife, make one-inch incisions all over the leg and insert small pieces of pork. Prepare the following marinating sauce:

- ½ cup red wine
- ½ cup wine vinegar
- 1 tablespoon salt
- ½ teaspoon black pepper
- bouquet garni
- 2 sliced onions
- 2 sliced carrots
- ¼ cup oil

Marinate the venison in this sauce. (In France, almost all game is marinated before cooking. It makes the meat tender and heightens the flavor.) Turn the leg over occasionally and baste with the sauce so that the

flavor will permeate the whole leg. Roast in a 350-degree oven, allowing eighteen minutes per pound. Venison should be rare. Serve with piquant sauce or pepper sauce.

If there are no quail in the ice, maybe you can get some squab for this one:

- 6 birds
- salt, pepper
- butter
- 3 tablespoons flour
- 6 boiled chickens' livers
- onion juice
- 1 teaspoon finely chopped parsley
- 6 pieces toast.

Split birds, season with salt and pepper and spread with four tablespoons butter, rubbed until creamy and mixed with flour. Bake in hot oven (425 degrees) until well browned, basting every four minutes with two tablespoons butter melted in one-fourth cup water. Chop livers, season with salt, pepper, and onion juice, moisten with melted butter, and add parsley. Spread mixture on toast, arrange a bird on each canape, and garnish with parsley.

* * *

Texans like most things barbecued, fish being no exception. Here's how to barbecue bass.

Take a three- or four-pound fish, place in a buttered, shallow pan, and sprinkle with salt.

Saute a tablespoon of butter and two tablespoons of chopped onions until golden, then add the following ingredients:

- 1 cup catsup
- 3 tablespoons Worcestershire
- 2 tablespoons brown sugar
- ¼ tablespoon salt
- 2 tablespoons vinegar
- ¾ cup lemon juice
- ½ teaspoon pepper

Let the mixture simmer for five minutes, then pour over the fish and bake at 425 degrees for 35 to 45 minutes.

* * *

And here's a different way to serve perch:

Preheat the broiler on which the fish are to be broiled. This will prevent them from sticking. Broil the fish twenty minutes, turning them only once. Place the fish on a hot platter and cover with maitre d' hotel sauce.

Sea Otter Colonies

Establish In Alaska

Sea otters, almost destroyed by heavy slaughter at the hands of Russian and American fur traders during the early 1800's, have increased under rigid protection until they now number more than 8,000 animals living in colonies along the coast of Alaska and the Aleutian Islands. The U. S. Fish and Wildlife Service is undertaking to increase numbers still further by creating new colonies through the transplanting of small numbers of breeding animals to favorable areas.

Protection for the sea otter began as soon as Alaska was acquired by the United States when the killing of this unique species was rigidly curtailed. In 1910, when the otter seemed doomed, complete protection was given. Since 1940, a long-range management program to increase numbers of the otter has been under way.

Sea otters, at one time, were found all along the Pacific Coast and California maintains a herd of about 200 rigidly protected by the state independent of the sea otters found in Alaska. The sea otter is one of the most unusual of all American mammals and its rescue from the brink of extermination by sound management and protection makes fascinating reading. Small-scale wars were waged over the sea otter herds in early times.

BILL THREATENS RESTORATION PROGRAM

A bill, which would wipe out the Federal Aid in Wildlife Restoration program by depriving it of funds, has been introduced into the House by Congressman Harold D. Donohue of Massachusetts.

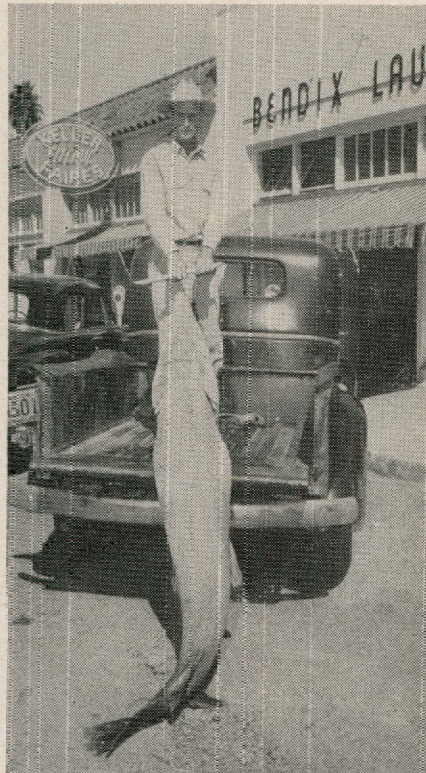
This bill, H. R. 7569, which is now in the House Ways and Means Committee, would repeal excise taxes on firearms and ammunition that, under the Pittman-Robertson Act, are allocated back to the states for wildlife restoration work.

Under this Act, all states have been able to expand game restoration programs far beyond their unassisted capabilities. In many states, sportsmen now are able to enjoy hunting in areas which, without the Federal Aid in Wildlife Restoration Act, today would be devoid of wildlife. In many cases, mere remnants of past game stocks have been rebuilt to the point where they produce harvestable annual surpluses. Notable is the spectacular restoration of the pronghorn antelope in the West, the enlargement of the natural range of the bighorn sheep, and the restoration of turkey hunting in states where America's biggest game bird had long been absent from the game lists. In the United States there is no useful species which has not benefited directly from the Federal Aid program. Several have been restored to plenty from a status of near-extirmination.

If the Donohue Bill were to become law, all states would have to curtail their activities for the benefit of the sportsman. Many excellent, established projects, which now are dependent upon revenue from the Pittman-Robertson Act, soon would be abandoned, or the cost of hunting licenses would have to be multiplied to meet the demand. Plans for future expansion of wildlife restoration work, now in blueprint form, would have to be junked.

The Pittman-Robertson Act is one of the most valuable and most popular tax bills in the Federal statute books. Organized sportsmen are firmly behind it, as was evident in the outburst of sentiment which followed the president's veto of its companion, the Dingle Federal Aid to State Fisheries Bill, last fall.

Congressman Donohue might do well to sound out the sentiments of the organized sportsmen in his district before pushing H. R. 7569 too far.



This gar, caught by Jess Sewell of Weslaco, Texas, was taken in a gill net. It measures 7 feet and 10 inches in length. However, Mr. Sewell modestly says it is only a Rio Grande minnow.

HOSLEY NAMED TO ALASKA POST

Dr. Neil W. Hosley has been named leader of the new Alaska Cooperative Wildlife Research Unit at the University of Alaska, Fairbanks.

Dr. Hosley is recognized as one of the nation's outstanding research authorities on forestland wildlife and has been chief of the Section of Wildlife Investigations on Public Lands of the U. S. Fish and Wildlife Service since 1946. Before his affiliation with the service, he was associate professor and head of the Department of Forestry and Wildlife Management at the University of Connecticut. In his new appointment, which became effective the middle of March, he will supervise the work of graduate students and conduct some personal research into wildlife problems in Alaska. The unit is a cooperative research project involving the University of Alaska, the U. S. Fish and Wildlife Service, the Alaska Game Commission and the Wildlife Management Institute. The new unit will train biologists to carry on sound wildlife programs in the territory. Because a large segment of Alaska's economy is based upon wildlife resources, the new unit should prove one of the most important yet formed.

Sportsman's Enemy—

• Continued from Page 17

with stream improvement work, teach a young boy or girl how to hunt and fish and aid in an endless number of other activities.

With the ever-increasing demand upon our supply of fish and game, the job ahead looks mighty big even with everyone cooperating, and, with sportsmen bucking the conservation departments, it presents a very discouraging picture. Let's try to have a little more confidence in the professionally trained wildlife man; he's on your side, and he's your best friend!

—Pennsylvania Game News.

Flying squirrels travel by sailing from the top of one tree to the base of another tree which they climb and repeat the aerial descent.

* * *

A blue whale may be 100 feet long and weigh 150 tons—larger than the biggest of dinosaur.

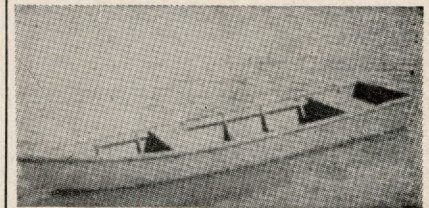
* * *

Birds killed by fowl cholera should be burned or buried so rats or other animals will not spread the disease organisms.

* * *

The male cardinal fish of Australian waters holds the eggs of the female in his mouth until they hatch. During the five-week period of incubation he can take no food.

The Handiest Fishing Boat Afloat Today



Fishermen! Here's the boat you have been waiting for. A real man's boat right down to the last rivet. 11'7" long, 43" beam, a 36" transom and 12" gunwales. Weighs 106 pounds. Made of aluminum and riveted for longer wear. Air tanks under each 1x12 pine seat. Gunwale and deck strips are of no-leak construction. Price \$99.50, FOB Palestine. Sold only by Manufacturer. Circular on request.—Write

**Palestine Sheet Metal Works
Palestine, Texas**

Ancient Beliefs —

• Continued from Page 21

creature was captured off the coast of Norway and presented to Margaret de Valois, Queen of Navarre. A similar catch was made in the same year and given to Charles V, King of Spain.

The monk fish was again caught in 1760 and was described as being a combination of skate and shark. It weighed about 160 pounds and had a hide like a shark's which was useable as sandpaper.

Another ecclesiastical creature was the bishop-fish, which was reported in the 16th Century. This one was taken to the court of the Polish King where it made signs that it was unhappy.

Acceding to the fish's request, the court attendants returned it to the sea. It was never reported again.

The ancients either ate fish or hated it. In some parts of the world, fish eaters were warned they were courting ulcers of the stomach from their habit. It is true that they probably contracted typhoid from some fish. But their discomforts were attributed to the goddess Atargatis, who took vengeance upon those who ate fish.

Hippocrates, the "Father of Medicine," disapproved of eating fish if one suffered from pulmonary diseases. Claudius Galen, who lived in the Third Century A. D., said that fish, "... provide the best food for the idle, sick and the silly!"

It is truthfully said that today's superstitions become tomorrow's science. The ancients, despite their many superstitions, have laid a sturdy foundation for modern man's love of angling.

Many of our pet beliefs and theories may be exploded with the passing of centuries. Yes, exploded enough to make the ancients look pretty wise, and make our new-fangled tackle and gear look as prehistoric as the bronze hooks and the hempen lines of Pliny and Oppian.

The opossum is the only mammal in North America with a built-in nursery in the form of a pouch where the young are carried for six to eight weeks after birth.

FISH WORMS

Mature Red Wrigglers

Carefully Selected

100 — \$1.00 500 — \$4.00

1,000 — \$7.50 Postpaid

GILL'S WORM GARDENS

Box 385

Meridian, Texas

Things You May Not Know

Whales often "hold their breaths" for as long as fifty minutes. They, like all other mammals, however, can drown if they get water in their lungs.

* * *

The horns of the African rhino are not attached to its skull. They grow out of the skin and have a high commercial value among the Chinese, who use them for medicinal purposes.

* * *

The small water ouzel, a bird that likes water insects, "flies" under water, using the same wing motions that other birds employ in the air. The ouzel walks about on the bottom of a stream as easily as other birds walk on land. Its feathers are so thick that the body never becomes wet.

* * *

The dragon fly's compound eye which is composed of nearly 30,000 units, permits vision in almost all directions.

* * *

The jerbia, a small rodent built somewhat like a rat, can jump fifteen feet. To make an equivalent jump, considering body size, a man would have to jump two hundred feet.

John Muir Trail Trip Is Planned

Joseph C. Wampler, archeologist-mountaineer of Berkeley California, is mustering recruits for a hiking trip along the John Muir Trail through the Sierra Nevada.

The trip will take four weeks beginning in July and will cover a distance of 200 miles entirely within the boundaries of national parks and forests. Pack horses will carry all dunnage, and those who elect to make the trip on foot rather than on horseback will not be burdened with packs. Professional packers have been employed to handle the animals.

Mr. Wampler has engaged in archeological research in the near East and is a well-known explorer and mountaineer. He is seeking 35 or more men and women who wish to take a unique vacation at low cost. The cost of the four-weeks' trip is nominal either for walking or for those who will ride. Further details may be obtained from Joseph C. Wampler, 1940 Hearst Avenue, Berkeley 9, California.

Near Record Attendance at Wildlife Conference

The 15th North American Wildlife Conference sponsored by the Wildlife Management Institute and held in San Francisco on March 6, 7, and 8, was one of the best attended of these international meetings. The near-record attendance of 1,130 closely approached that tallied at the 14th North American Wildlife Conference in Washington, D. C., last year.

More than 60 important papers on soils, water, forests, and wildlife were presented by eminent scientists and administrators. The Conference consisted of three general and six technical sessions and the annual banquet was held on March 7 in the headquarters hotel. This was the first North American Wildlife Conference ever held west of Denver and the bulk of the attendance was made up of sportsmen, wildlife technicians, biologists, and administrators of natural resources in the western states. For most of these, it was their first opportunity to attend one of these annual meetings.

For the first time in the history of the Conference, the opening general session, under the chairmanship of Dr. Roy E. Simpson, superintendent of Public Instruction of the California Department of Education, was devoted to the important topic of conservation-education.

Food Grows Wild —

• Continued from Page 12

ficient to destroy aphids. Rotenone originally came from the Dutch Indies as a powder, ground derris root, but the supply has been cut off, and at present we are dependent upon South American productions of roots of a vine called cube, the plant from which the familiar cubeb cigarette is made.

Best of all, however, the very grasses of our fields might be made to help. Recent experiments have proven them so rich in all the vitamins necessary for health that twelve pounds of grass has been found equal in vitamin content to 340 pounds of fruit and vegetables. Grass powder, made from the dry and pulverized blades, is said to be available for cooking, and if one enterprising manufacturer has his way, it may not be long before you save the clippings from your lawn to be turned into cocktails, or when you drop into your favorite soda fountain your order will be "A shot of juice, blue grass preferred."



BOOKS

THE BOY'S COMPLETE BOOK OF FRESH AND SALT WATER FISHING. By Oliver H. P. Rodman and Edward C. James. 275 viii pages. Illustrated with two half-tones and numerous line drawings. Published by Little, Brown and Company, 34 Beacon Street, Boston 6, Massachusetts; 1949. Price \$3.50.

Prepared by two of America's best-known fishing writers, this book, as the title implies, was written especially for the young, beginning angler. No attempt, however, has been made by the authors to "write down" to the school boy at the expense of accuracy or completeness. The fisherman, whether 16 or 60, who cannot find a few new pointers in the pages of this work, can give up reading and devote all his spare time to fishing.

The volume is divided between the co-authors into two distinct sections. The first, on fresh-water angling, was prepared by Edward C. James, who is associate editor of "Outdoors" magazine. Fly fishing, bait casting, live-bait fishing, and ice fishing are all covered in a thorough and workmanlike manner. Oliver H. P. Rodman, publisher of "Outdoors," has handled his specialty, salt water fishing. This nationally known authority on inshore fishing discusses equipment, tackle, and fishing methods in the informal but informative and highly readable style which characterizes his previous writings in national magazines and in several books on salt water fishing. It is a book which will appeal to fishermen of all ages and will prove an invaluable aid to the young angler just getting started in a fascinating sport.

BIRDS IN YOUR BACK YARD by Ted Pettit. 209 x pages. Illustrated by Donald Ross, and 18 half-tones. Published by Harper and Brothers, 49 East 33rd Street, New York 16, New York; 1949. Price \$3.00.

With a little encouragement, a fragment of wilderness may be lured to back yards in towns, suburbs, and cities. Bird boxes, a conscientiously tended feeding station, and judiciously selected shrubbery will attract birds which most town dwellers see only in fields and woods. Bird study of this kind may be undertaken by people of any age and physical condition. The

financial outlay is negligible since all that is needed are a few boards hammered together to make houses and feeding shelters, table scraps, and an illustrated bird guide. Among the essential items, however, should be included this new book by Ted Pettit. It contains full instructions for those who would get the most out of this inexpensive and entertaining hobby.

Full instructions on how to attract various groups of birds are given, and plants which will attract shy species from miles around are listed. For those who wish to go a step further, there are detailed instructions on obtaining photographic close-ups of birds without benefit of expensive telephoto equipment. Bird students already interested in attracting birds to their homes will find many valuable tips between the pages of this volume; those who wish to start a fascinating hobby which requires little cash, experience, and less time than they will wish to spend will find it invaluable.

JACK MINER AND THE BIRDS
—by Jack Miner; 302 pages.
Illustrated copiously with half-tones. New Memorial Edition published by The Reilly and Lee Com-

pany, 325 West Huron Street, Chicago, Illinois. Price \$3.50.

Jack Miner, who died in 1944, was a unique individual in the American conservation movement. His life story, told in this book in his own direct style, reflects a number of paradoxes which gave color to his long career. A big, rugged, rough-hewn man, raised on a backwood homestead in Canada, he was as gentle and as sensitive as a school girl in many ways. A former market hunter, he became sated with this distasteful occupation, and in later years his shooting was confined to killing predatory birds and mammals, which he termed "cannibals." A man with little formal education, he still acquired, by personal observation, a vast store of knowledge of the birds and mammals around his Ontario home. His sanctuary is world famous and his bird banding work pioneered in the study of bird migration. Both these activities now are carried on by his sons through the Jack Miner Foundation.

Miner was a firm believer in predator control as one of the most important tools of wildlife management. His philosophy on the relationship of man to other living things apparently was founded on the Biblical quotation—God created man "and gave him dominion over all." The Bible was his textbook of wildlife management and the fields and woods of Ontario his laboratory. Although subsequent findings of more recent field investigations have provided new concepts for practical wildlife management, Jack Miner obviously was one of the foremost naturalists of his day. This book is his story from his own pen, and it is fascinating reading.

FIVE WHOLE YEARS or ONE YEAR

\$5⁰⁰

Subscribe

\$1⁰⁰

Now!

CLIP AND MAIL THIS BLANK TODAY!

TEXAS GAME and FISH,
Walton Building, Austin, Texas

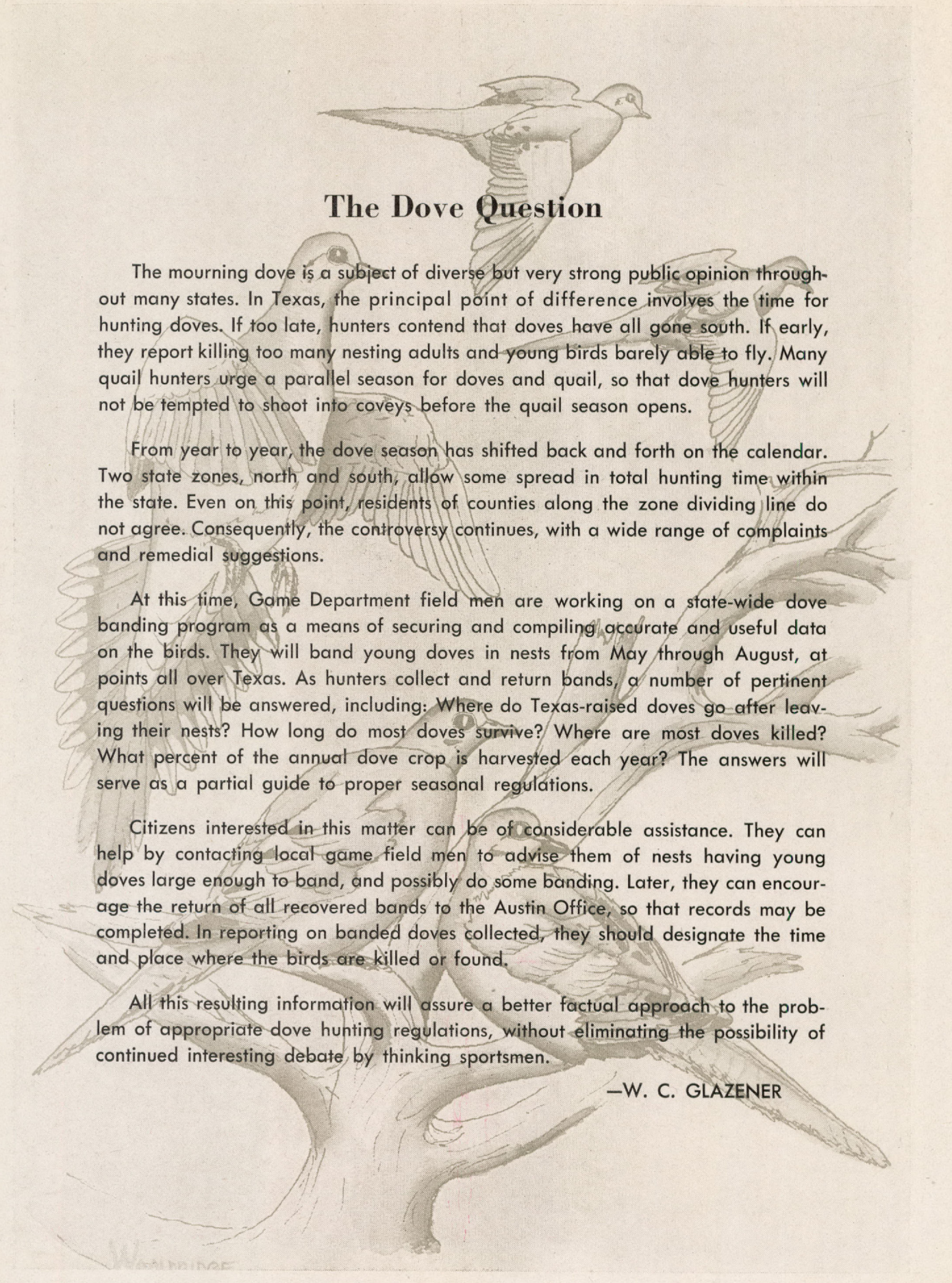
I enclose \$ _____; Send me TEXAS GAME and FISH
for _____ years, starting with your next issue.

Name _____

Street and Number _____

City and State _____

New _____, Renewal _____



The Dove Question

The mourning dove is a subject of diverse but very strong public opinion throughout many states. In Texas, the principal point of difference involves the time for hunting doves. If too late, hunters contend that doves have all gone south. If early, they report killing too many nesting adults and young birds barely able to fly. Many quail hunters urge a parallel season for doves and quail, so that dove hunters will not be tempted to shoot into coveys before the quail season opens.

From year to year, the dove season has shifted back and forth on the calendar. Two state zones, north and south, allow some spread in total hunting time within the state. Even on this point, residents of counties along the zone dividing line do not agree. Consequently, the controversy continues, with a wide range of complaints and remedial suggestions.

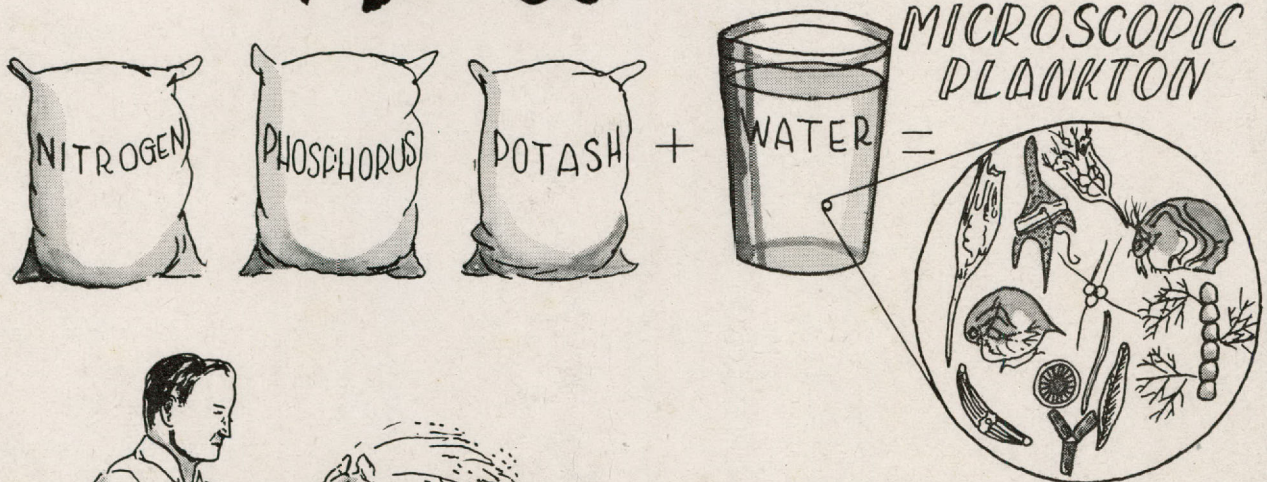
At this time, Game Department field men are working on a state-wide dove banding program as a means of securing and compiling accurate and useful data on the birds. They will band young doves in nests from May through August, at points all over Texas. As hunters collect and return bands, a number of pertinent questions will be answered, including: Where do Texas-raised doves go after leaving their nests? How long do most doves survive? Where are most doves killed? What percent of the annual dove crop is harvested each year? The answers will serve as a partial guide to proper seasonal regulations.

Citizens interested in this matter can be of considerable assistance. They can help by contacting local game field men to advise them of nests having young doves large enough to band, and possibly do some banding. Later, they can encourage the return of all recovered bands to the Austin Office, so that records may be completed. In reporting on banded doves collected, they should designate the time and place where the birds are killed or found.

All this resulting information will assure a better factual approach to the problem of appropriate dove hunting regulations, without eliminating the possibility of continued interesting debate by thinking sportsmen.

—W. C. GLAZENER

CONSERVATION At Work



(BASIC FISH FOOD)

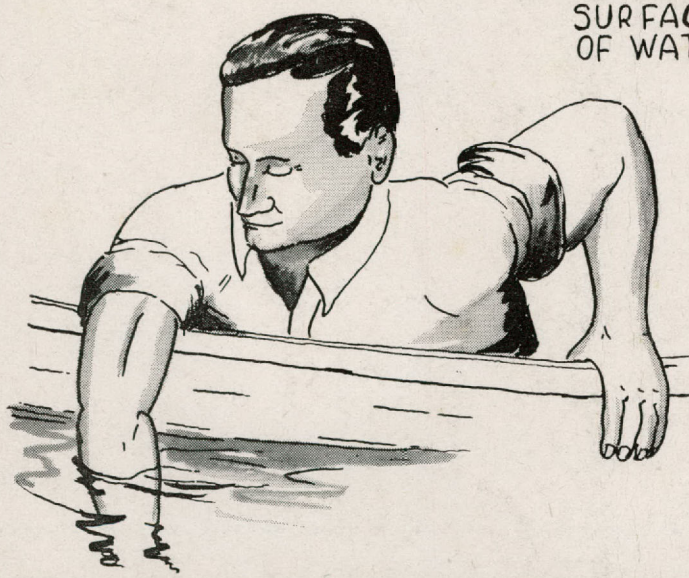
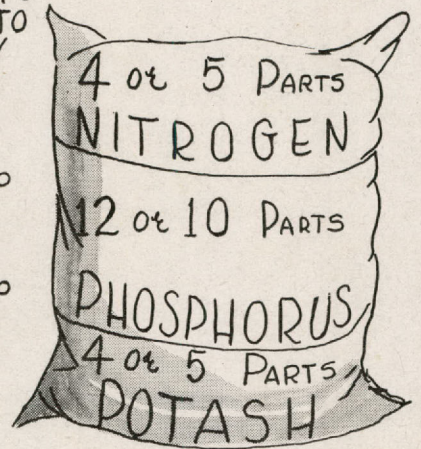


APPLY ONE HALF REQUIRED AMOUNT ON FIRST APPLICATION. DIVIDE REMAINING HALF INTO FIVE OR SIX APPLICATIONS TO BE APPLIED AT TWENTY DAY INTERVALS THEREAFTER.

4 - 12 - 4 RATIO

5 - 10 - 5 RATIO

300 POUNDS PER SURFACE ACRE OF WATER



DANGEROUS TO MAKE SUBSEQUENT APPLICATIONS UNLESS HAND CAN BE SEEN TWELVE INCHES UNDER WATER. IF HAND IS VISIBLE CONTINUE FERTILIZER APPLICATIONS.

FARM POND FERTILIZATION