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PARKS & WILDLIFE



March 1973 • 50¢



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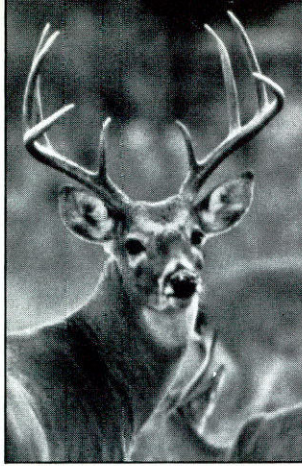
**TEXAS PARKS & WILDLIFE
magazine**

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

NEAL COOK Editor
ED DUTCH Associate Editor
ILO HILLER Assistant Editor
ANNETTE MORRIS NEEL Art Editor
JIM WHITCOMB Photo Editor
ETHEL SPECK Advertising-Circulation

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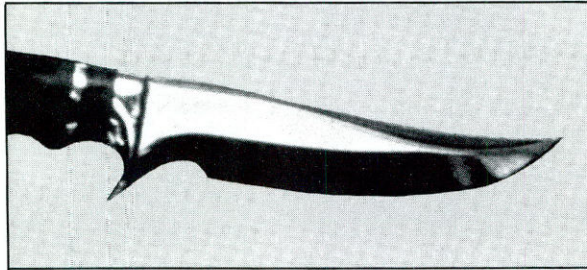


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Front Cover: Misuse or overuse of pesticides can endanger all wildlife including the cardinal. See article on Page 12. Photo by Martin T. Fulfer.

Inside Front: The voracious little short-tailed shrew seldom exceeds three inches in length but consumes a tremendous amount of food as it forages both day and night. Photo by Martin T. Fulfer.



Questions and answers about **REGULATORY RESPONSIBILITY**

by Wayne Tiller



WHAT IS REGULATORY RESPONSIBILITY?

Regulatory responsibility is a heavy phrase that more and more Texans are confronting each year, especially if they are hunters, fishermen or otherwise outdoor recreation oriented.

At the present time, 228 of the state's 254 counties are affected and indications are that the list will grow during the 1973 session of the Legislature.

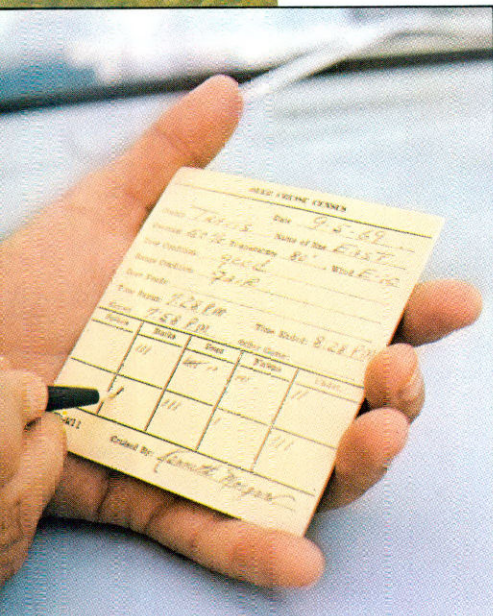
Basically, the program places the responsibility for managing wildlife resources in the participating counties in the hands of the Parks and Wildlife Commission. Commission regulations are based on scientific research of game and fish problems and information gained from public hearings held throughout the state. In this way, regulations can be established to utilize to the fullest extent the wildlife resources available at that particular time and these regulations can be adjusted to meet emergency situations. Counties not in the commission's program set their hunting and fishing regulations by state law through legislation.

WHY IS REGULATORY AUTHORITY BETTER THAN LEGISLATIVE REGULATIONS?

State laws regulating the harvest of fish and game resources may be changed and altered only by action of the Legislature which meets every other year. Therefore, any emergencies cannot be dealt with until the next Legislature convenes.

Under the Regulatory Authority program, field workers of the Parks and Wildlife Department and/or sportsmen, landowners or other interested individuals bring to the commission's attention a particular problem and through special proclamation the regulations may be adjusted. This is not only true in emergency conditions demanding a reduction of hunting pressure, but if an unforeseen abundance is discovered, the regulations can be quickly adjusted as they were on

After considering all the information gathered by the department's trained staff, such as buck-doe ratios found in censuses and factors in deer die-offs, as well as the public's opinions, the Parks and Wildlife Commission establishes seasons and regulations. Research is continuously carried out on fish and wildlife to aid in making decisions and to help insure quality fishing and hunting.



John Suhrstedt

Leroy Williamson

quail in some South Texas counties last season to allow hunters to remove an excess of game.

HOW DOES A COUNTY GET INTO THE PROGRAM?

Counties in the Regulatory Authority program of the Parks and Wildlife Commission have been included after the people of a county requested such action through their representatives in the Legislature. In the interest of the hunting and fishing public and of the ranchmen and landowners, the Legislature provided a law instructing the Parks and Wildlife Commission to keep abreast of changing conditions and emergencies through its research program and to set regulations based on this factual information.

WHAT ARE THE OBJECTIVES?

The principal objective of the Regulatory Authority program is the management of wildlife resources on the basis of scientific research findings. Under this authority, when emergencies such as drouth, flood, fire, etc., occur or if a species is threatened by depletion or waste, new regulations can be passed immediately to protect the species.

Another objective of Regulatory Authority is to adjust the number of any species to the carrying capacity of its range in order to develop healthier individuals. By holding a species at or near the range carrying capacity, ample food will be assured for each individual. In areas where overpopulations of deer occur and the ratio of does to bucks is greater than it should be, a harvest of doe deer may be recommended to help reduce the deer herd to the level of the food supply.

ARE LANDOWNERS FORCED TO PARTICIPATE IN ANTLERLESS HUNTING?

In areas where research personnel of the Parks and Wildlife Department have determined that an overpopulation of deer occurs and/or that there is an unbalanced ratio of does to bucks, the landowner still retains the final decision as to whether or not he wishes to remove his surplus deer by hunting. The proclamations permitting the hunting of doe deer cannot become valid until the owner or person in charge of the land has agreed to the number of doe deer which may be removed by hunting. Even after he has accepted permits for harvesting antlerless deer, the landowner still retains control because he may elect to issue only a few of the special permits to



hunters on his land.

WHO SETS SEASONS AND REGULATIONS IN COUNTIES IN THE PROGRAM?

The Parks and Wildlife Commission establishes seasons and regulations after considering all the information gathered by the department's trained staff of specialists and the opinions gathered at public hearings held in each county. These actions are usually taken at a Commission meeting held during the spring quarter at the Austin office. Regulations set by the commission become law 15 days after the commission meeting, except in those counties where Commissioners' Courts must approve proclamations.

WHAT INFORMATION IS USED IN SETTING HUNTING AND FISHING REGULATIONS?

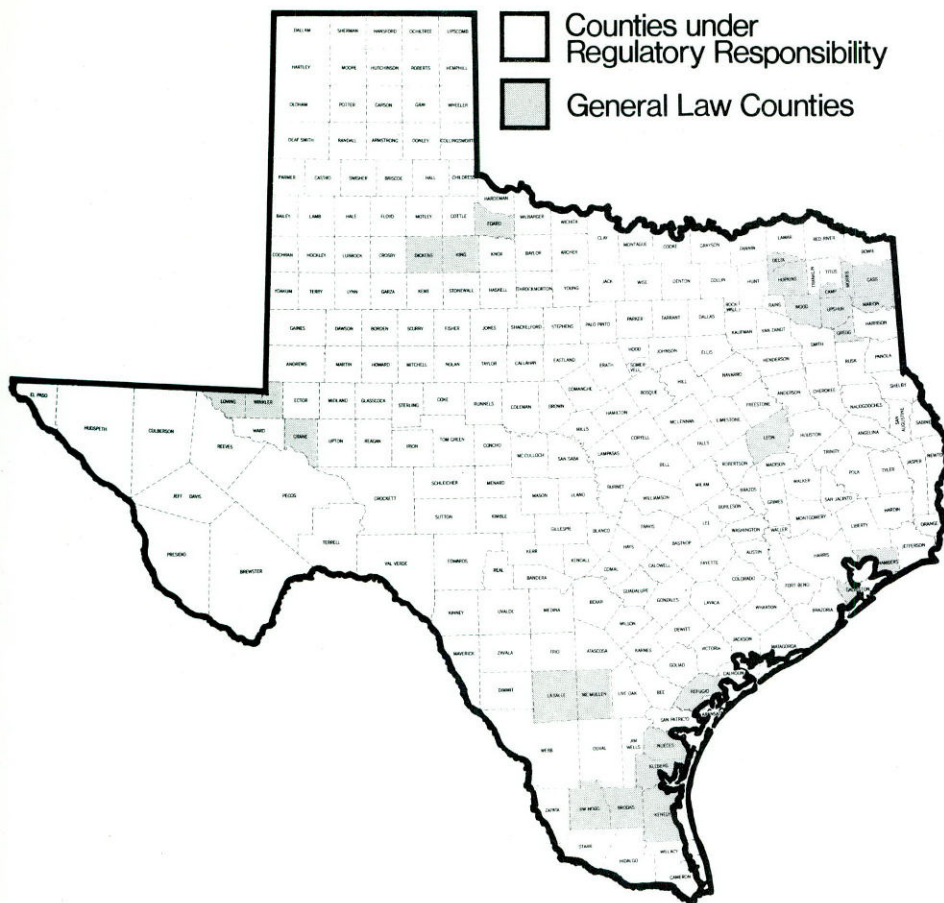
Parks and Wildlife Commission regulations established each year to regulate the taking of game and fish in counties under the Regulatory Authority program are based primarily upon information gained from research projects and survey efforts of the department's field biologists. However, information gained from interested public individuals also contributes to the final decisions. Such public information is

gained from hearings conducted in each county and from individuals attending the Commission meeting at which regulations are established.

HOW DOES THE PUBLIC HAVE A VOICE IN SETTING REGULATIONS?

After field biologists have conducted their work and have drawn up proposed hunting and fishing recommendations, public hearings are scheduled in each county affected by the Regulatory program. These hearings are advertised at least 10 days prior to the hearing date as required by the Regulatory Authority Acts concerned. At the public hearing the proposed regulations are read and explained to those in attendance. Any questions the public may have are answered, and proposed regulations are sometimes submitted by the landowners or sportsmen at this public hearing. All such proposals are recorded and presented to the Parks and Wildlife Commission when that body meets to prepare regulations for those counties concerned.

When the Parks and Wildlife Commission meets to establish regulations for the counties in the program, interested individuals again have a chance to voice their opinions about regulations concerning their county of resi-



All of the unshaded counties on the adjacent map are affected by the Regulatory Authority program to some extent. In most of these counties, the commission regulates all fish and wildlife and is considered to have full responsibility. In the other counties, it has only partial responsibility. This partial responsibility means that regulations may only be applied to fishing, one species of wildlife such as deer, or any combination of species such as deer, turkey and quail. Hopefully, the department will eventually gain full responsibility in all of the state's 254 counties.

dence. Regulations set by the commission become law 15 days after the commission meeting, except in those counties requiring approval of Commissioners' Courts.

HOW ARE EMERGENCIES MET?

When an emergency situation such as a drouth, flood, fire, etc., occurs, or if a species is threatened by depletion or waste, new regulations can be passed immediately and become effective within a few days to protect the affected wildlife in the area involved. Likewise, if regulations established earlier in the year are shown to be inadequate due to an overabundance or unanticipated high breeding success of a particular species of wildlife, new regulations can be passed in time to adjust the seasons and bag limits to utilize game surpluses to the most practical extent.

WHAT TAKES PLACE IN THE COUNTY PUBLIC HEARING?

At public hearings held in each county, usually in the county courthouse during the spring, biologists and other personnel of the Parks and Wildlife Department present and discuss the regulations proposed for that particular county. The hearing officer also accepts any testimony concerning the proposed

regulations submitted by landowners or sportsmen and enters this testimony into the recorded minutes of the hearing. All this information will be used by the Parks and Wildlife Commission in preparing the final regulations affecting game and fish in the county concerned.

WHAT BIOLOGICAL PROJECTS ARE CONDUCTED IN REGULATORY AREAS?

When a county turns over the responsibility for setting seasons, bag limits, and methods of taking game and fish to the Parks and Wildlife Commission, a crew of game and fish technicians is assigned to the county, and game management and fishery survey projects are established. Through various complicated and technical processes, technicians determine the vegetative and soil types of the county, make lake and stream surveys, locate game populations, lay out census lines for game species, check annual production of each species, determine the proper annual harvest for each species and set up research jobs on any species where additional information is needed. This work is carried out continuously from year to year so that the state of any species is known at all times and any significant changes can

be met immediately with regulations to reflect the population of that particular animal.

SUMMATION:

The Regulatory Authority program of the Parks and Wildlife Commission was established by the Legislature in the interest of the hunting and fishing public and of the ranchmen and landowners on whose land game is raised, in an effort to provide hunting and fishing regulations adaptable to changing conditions and emergencies which might threaten wildlife resources. Just as the secret to success of a large corporation is its research section, the secret to the Regulatory Authority program is the staff of highly-trained scientific investigators employed by the department.

The main objective of the Regulatory Authority program is the management of wildlife resources on the basis of scientific research. A complementary purpose is to adjust the number of any species of game and fish to the level of the carrying capacity of its environment, in order to develop healthier individuals and a population that will be self-sustaining yet will not conflict with other animals' or man's interests. The management of wildlife resources is a complicated process requiring the judgment and perspective of trained biologists and wardens. However, the major responsibility of proper game and fish management rests in the hands of the landowners, and in mutual understanding between the landowner and sportsmen. It is through cooperation between the department, landowners and sportsmen that better management and conservation for wildlife of Texas will be achieved. **
Reprinted from January 1967 issue.



caddo lake state



scenic park

by Ilo Hiller

Draped in Spanish moss and nestled deep in Northeast Texas is Caddo Lake State Scenic Park. The area is rich in history and legends and known for its fishing opportunities.

Land for this uniquely beautiful park was acquired from 1933 to 1937 by deeds from private owners, with Charles Copp, Jr. and Marvin Turney donating the first 130 acres. Located 14 miles northeast of Marshall and one mile north of Karnack, the park now encompasses 478 acres along Big Cypress Bayou and includes a 30-acre cypress pond.

Vegetation within the park varies from pine-hardwood forests to cypress swamps and, as a result, a myriad of wildlife abounds. In fact, most of the wildlife species of Northeast Texas are found in and around the park or along the shoreline of Caddo Lake.

It's a great spot for bird watching because of the many different species which nest in or pass through the area. Ducks, geese, herons, egrets, gulls and the anhinga (water turkey) are attracted to the watery habitat. Vireos, warblers, thrushes, flycatchers, woodpeckers and towhees are just a few of the other species found in this varied habitat.

Interpretive exhibits displayed in the headquarters building acquaint visitors with the area's wildlife, vegetation and history. The introductory alcove contains a relief map of the park and its facilities.

Subsequent panels are devoted to the forest trees, wood samples, baldcypress, wildlife found in this swamp habitat, fishes common to Caddo Lake, familiar birds, Indian life and artifacts, Caddo Lake history and park trails.

A stroll along the Caddo Forest Trail can be an educational as well as enjoyable experience. Numbered posts along the way correspond to numbers in a trail guide to identify common trees and other plants of the area. But whether the park visitor is able to tell a hackberry from a hickory or a Christmas fern from a southern lady fern, this shady, meandering trail with its calling birds, chattering squirrels and varied scenery will provide a pleasant interlude from life's busy pace.

Facilities for the camper include eight trailer sites with water, electrical and sewage hook-ups; 20 campsites; eight screened shelters; and nine single-

family cabins. Reservations for the screened shelters and cabins should be made in advance to assure their availability. Write directly to the park superintendent at Route 2, Box 15, Karnack 75661.

A boat ramp, children's play area and strategically located sanitary facilities and showers are provided for the use of all park visitors.

Mystic Caddo Lake, accessible from the park by both car and boat, seems to weave a spell of enchantment over the entire area. A maze of lagoons, bayous and swamps with moss-draped cypress trees towering to majestic heights add to the mysterious atmosphere and age-old beauty.

According to a Caddo Indian legend, the original lake was created in chaos in a single night. The chief of the tribe, warned in a dream by the Great Spirit of the impending disaster, moved his people from the bayou banks to higher ground. Heavy rain began to fall, the earth shook and trembled and streams reversed their directions. The next morning the tribe stood and gazed with awe upon the vast lake which covered the place where their village had been.

Another theory attributes this chaotic event to the New Madrid earthquake which rocked the whole Mississippi Valley and formed Reelfoot Lake in Tennessee.

Historians and geologists however, find that the lake was created by the Great Raft, a long series of natural log jams on the Red River. This raft blocked portions of the river for over 200 years and forced water back into the Red River tributaries to form a number of lakes.

Regardless of how it was originally formed, Caddo Lake maintains its present water level as a result of a Corps of Engineers dam completed in September 1971. This new dam replaced the flood-control dam built in 1914 at Mooringsport, Louisiana.

Texas and Louisiana share this fishing paradise and honor each other's fishing licenses. Caddo's main channels are marked with numbered pilings set at varying intervals and lake maps are available from businesses in the area. Fishermen unfamiliar with the lake should be warned against venturing out of sight of familiar landmarks or channel markers without the services of an experienced guide. Bearings are easily lost once the angler strays into the thick maze of vegetation, and one cypress tree looks very much like another. A long, lonely night spent in a cold, damp boat in the middle of the eerie setting can be a miserable experience.



But don't let these words of caution dampen your fishing spirits because sunfish; black and white crappie; black, yellow, white and Kentucky spotted bass; channel, blue and flathead catfish; chain pickerel; bowfin; paddlefish; and gar abound in the waters of Caddo, and you don't have to get lost in the swamp to catch them.

Most anglers agree that just having an opportunity to catch a fighting pickerel is reason enough to visit Caddo. Native fishermen claim the pickerel will attack any artificial lure but recommend the flashing, wobbling or spinning types which resemble large minnows. After following the lure for several feet, this torpedo-shaped fish with its mouthful of razor-sharp teeth strikes with a slashing explosion which is then followed by a series of erratic surface runs and acrobatic leaps. Quite a display and thrill for the average fisherman.

So, whether you come to fish, bird watch, study nature, camp or just relax in these unique surroundings, Caddo can meet your requirements. **





OUTDOOR BOOKS

THE MUSHROOM HANDBOOK by Louis C. C. Krieger; Dover Publications, Inc., New York, N. Y., 1967; 560 pages, \$3.95 paperback edition.

Mushroom—gourmet delight or deadly fare.

Few individuals venture further than the local supermarket to obtain this delicacy because of the innate fear most of us have of eating wild mushrooms. But a delicious variety of specimens awaits those brave souls who, armed with knowledge, go out in the woods to gather their own.

If the idea of gathering wild mushrooms appeals to you, a good book to consider before venturing forth is

The Mushroom Handbook by Louis C. C. Krieger.

Krieger prepared this material while he was a mycologist (specialist in the branch of botany dealing with fungi) at the New York State Museum in Albany, and it was released as a museum handbook in 1935 under the title *A Popular Guide to the Higher Fungi (Mushrooms) of New York State*. With slight alterations, it was reissued by the Macmillan Company in 1936 and again in 1947 as *The Mushroom Handbook*. In 1967, with a new appendix listing the nomenclatural changes since 1935, Krieger's material was reprinted as one of the Dover Books on Nature.

Krieger's book is more than just a guide to the edible and non-edible fungi; it is truly a handbook on mushrooms.

Numerous black and white photographs found throughout the text and 32 color plates of edible, unwholesome and poisonous specimens help the reader to identify the various types.

For individuals more interested in study, there are sections on field observations, requirements and habitat, collection for study, life histories, general characteristics and the economic importance of the fungi.

For the gourmet there is a section on the common edible mushrooms with special emphasis on the kinds safe for the beginner. Also included in this section are directions for preparing baked, stewed, fried, broiled, creamed, roasted, stuffed, pickled and dried mushrooms as well as mushroom soup, fritters, catsup and salad. Another section containing instructions for growing mushrooms may also be of interest to the gourmet.

So whether you gather or study them, *The Mushroom Handbook* will provide hours of interesting reading.—Ilo Hiller

Department Booklets Now on Sale

The Parks and Wildlife Department publishes the following fish and wildlife booklets. The prices include postage. Send check, cash, or money order to the Texas Parks and Wildlife Department, John H. Reagan Building, Austin, Texas 78701 and specify which booklets you want. **

General Interest Bulletins

Comprehensive bulletins of interest to the serious student and sportsman

FRESHWATER FISHES OF TEXAS — Bulletin #5-A

Full-color illustrations of most of the fish caught in Texas' inland waters; includes information on life histories, range, characteristics and importance. Price — 60¢ plus 3¢ tax.

THE MAMMALS OF TEXAS — Bulletin #41
Comprehensive descriptions of the characteristics and habitat for each Texas mammal; includes range maps and black and white photographs. Price — \$1.07 plus 5¢ tax.

FOOD AND GAME FISHES OF THE TEXAS COAST — Bulletin #33

Black and white illustrations of fishes commonly caught in Texas' coastal waters; includes information on range, appearance and habits. Price — 55¢ plus 3¢ tax.

POISONOUS SNAKES OF TEXAS AND

FIRST AID TREATMENT OF THEIR BITES — Bulletin #31

Full-color photographs of each of the poisonous snakes of Texas; includes descriptions of habitat and characteristics, plus first-aid treatment for bite victims. Price — 60¢ plus 3¢ tax.

CATFISH AND HOW TO KNOW THEM — Bulletin #39

How to recognize catfish; includes their characteristics and information on where to find them. Price — 30¢ plus 2¢ tax.

Management Bulletins

Technical publications of specialized interest for advanced students and landowners to assist them in scientific projects.

QUAIL MANAGEMENT HANDBOOK FOR EAST TEXAS — Bulletin #34

Requirements for quail production in East Texas. Price — 50¢ plus 3¢ tax.

QUAIL MANAGEMENT HANDBOOK FOR WEST TEXAS ROLLING PLAINS — Bulletin #48

Comprehensive study of quail management in West Texas; includes information on the quail's needs, hazards and population structures. Price — 35¢ plus 2¢ tax.

TEXOTICS — Bulletin #49

Presentation of exotic game animals in Texas; includes their legal, ecological and

economic importance. Price — 35¢ plus 2¢ tax.

WATERFOWL HABITAT MANAGEMENT IN TEXAS — Bulletin #47

Information for maximum waterfowl production. Price — 77¢ plus 4¢ tax.

GRAY SQUIRREL IN TEXAS — Bulletin #42

Fundamental needs for encouraging gray squirrel, with special emphasis on East Texas populations. Price — 45¢ plus 2¢ tax.

TEXAS DEER-HERD MANAGEMENT PROBLEMS AND PRINCIPALS — Bulletin #44

Requirements for production of healthy deer herds in Texas. Price — 55¢ plus 3¢ tax.

BRUSH CONTROL ON THE RIO GRANDE PLAIN — Bulletin #46

Brush control methods in the Rio Grande Plain and their impact on wildlife management. Price — 35¢ plus 2¢ tax.

THE SHRIMP FISHERY — Bulletin #50

Introduction to the biology of commercial species of Texas shrimp. Price — 55¢ plus 3¢ tax.

THE CRABS OF TEXAS — Bulletin #43

Introduction to the biology of Texas crabs. Price — 50¢ plus 3¢ tax.

TEXAS OYSTER FISHERY — Bulletin #40

Introduction to the biology of Texas oysters. Price — 45¢ plus 2¢ tax.

THE TEXAS MENHADEN FISHERY — #45-A

Introduction to the biology of Texas menhaden. Price — 50¢ plus 3¢ tax.

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LONG SHOTS SHORT CASTS

compiled by Neal Cook

Brighten Your Lures: Old lures which have lost their original colors can be brightened with fingernail polish. Almost every imaginable color of fingernail polish is available for use. To add sparkle to the lures, paint them with clear fingernail polish and then sprinkle on glitter which can be bought in almost every five and dime store. After the polish dries, give the lure two or three more coats of clear to prevent the glitter from coming off.

Lots of Manure: A turkey farm with 100,000 birds has about 15 tons of waste daily. A 1,000-pound steer produces about 56 pounds of manure and urine daily; therefore, a feedlot handling 30,000 animals has to contend with 850 tons of waste daily. The disposal of this waste is a tremendous problem for which producers must find answers.

Watchgeese? In Phoenix, Arizona, a jury recently found that a local homeowner could not keep geese in his yard because they were noisy and created a public nuisance. The homeowner claimed the geese were there to protect his property and acted in the same way as a watchdog. One publication noted that not allowing a person to keep geese might be dangerous and that we might all "rue the day when geese are outlawed, and only the outlaws have geese."

Keep Them Together: Fishing swivels often find their way down to the bottom of the tacklebox and are hard to find. To keep them together, string them on a large safety pin. The pin will be easy to find in the box and, if you plan to use a lot of swivels in a day, pin them all to your shirt or coat where they can be easily found.

Front and Back: Trailer hitches on both the front and back of the car make it easier to put a boat in and take it out of the water. Using the front hitch allows you to see what you are doing in a tight situation and keeps the rear wheels high and dry where they can get good traction.

Try a Guide: Many people pass up the opportunity to enjoy good fishing by paying two dollars to save one. On almost all Texas lakes there are professional guides to take you fishing. Their services range from \$20 to \$40 for two people—depending upon how long you want to fish—and include the use of their boat as well as their expert advice on where and how to fish. If a person only fishes a few times a year, the expense of buying and maintaining even the smallest boat far overshadows this guide fee, and since you can't keep up with the day-to-day movements of the fish as easily as the guide does, your chances of catching fish are better with his help. Try it sometime, you may like it.

YOU'RE THE SOLUTION
TO WATER POLLUTION

CAUTION:

Indiscriminate use of pesticides does more harm than good.

by Thomas E. Chandler
Chemist, Environmental Branch

Given a choice between two tomatoes, one red, firm and unblemished that would rank high at any county fair, or one that is blemished and partly eaten by insects, which would you buy?

Have you ever thought of why fresh produce at your local market or vegetable stand is of a much better quality than would have been expected 30 years ago?

This apparent increase in the quality of fresh and preserved food has resulted in many instances through use of organic compounds commonly referred to as pesticides. But have you ever questioned what the long range effect of unrestricted use of pesticides could be to our environment and to us?

Since man's beginning, he has devised ingenious methods to protect his crops and buildings from the forces of nature. Man thought that pesticides would finally conquer one of the forces of nature—attacks upon his crops and buildings by insects. The unlimited and unrestricted use of pesticides has now turned into an ecological crisis that mankind must face.

Pesticides have become an integral part of modern man's existence. Through man's ignorance, indifference and sometimes callous disregard of consequence, he has backed himself into an ecological corner and is now searching desperately for a way out.

Prior to the 1940's, pesticides were

few in number. Those on the market were expensive and cumbersome to use, therefore, they were used sparingly and often only in emergency situations.

After the 1940's, pesticide usage rapidly changed from limited to unrestricted. The convenient use of pesticides changed to one of regular necessity.

In America today we expect unblemished foodstuffs in great variety and at relatively modest cost. We do not want to find worms in our ears of corn, or in our tomatoes, or our apples and other vegetables and fruits that we buy in the markets. We demand and expect protection from the attacks of

insects and animal-borne diseases. We demand relief from the physical discomforts of mosquitoes, gnats and flies. We take for granted our weed-free yards, and our beautiful weed-free roadside parks. Those of you who plant your own gardens expect them to be pest-free, but at what cost?

All of these expectations and demands of our modern standards of living have one thing in common. They are wholly or partly dependent upon





Reagan Bradshaw

the continued and extensive use of pesticides. The benefits that we have achieved from the use of pesticides have not been without cost. Man's successful quest for efficiency and high production in agriculture through the use of pesticides was purchased at the price of ecological diversity that once held insects and other pests in check by natural predation. Pesticides are not selective killers and they will destroy as many organisms that are beneficial to man as they will those that are harmful to man. The recent change in modern agricultural practices to the planting of large acreage in one type of crop has rendered these crops highly susceptible to insects, diseases and weeds. This biological instability means that only through the continued use of pesticides can our productivity be maintained.

The period from 1945 to 1965 witnessed the introduction of hundreds of synthetic pesticides. This new, booming industry coincided with those changes in agriculture leading to an even greater dependence upon pesticide usage.

Between 1945 and 1960 the use of pesticides throughout the world was unrestricted and almost unlimited. Little attention was paid to reports of massive die-offs of quail, other small game, songbirds and fish. Though little concern was felt by government, some ecologists heeded these warnings and became alarmed, but only a few would listen. In 1962, one person wrote a book which rocked industry and government back on their heels, publicly disclosing the environmental threat, actual and potential, posed by the unrestricted use of pesticides. The author was Rachel Carson and her book was entitled *Silent Spring*.

Most articles in print today for the layman fail to bring out the effects of pesticides on animals and the environment except to say that they are long lived, will kill many different types of organisms, and are dangerous to the environment.

Although the complex language of scientists sometimes obscures the meaningful information we need, everyone should develop a basic understanding of the effects, characteristics, classification and toxicities of the pesticides known as organochlorines and organophosphates.

The effects on fish and wildlife may be considered in three parts. Part one consists of the modes of action of pesticides, part two consists of biological magnification and examples, part three consists of pesticide residues also with examples.



Jim Whitcomb



Neal Cook

Modes of action are classed as acute, chronic or indirect. In the acute class, the organism is contaminated directly by contact with the pesticide or by ingesting the pesticide with its food. Acute effects may be noticed during or shortly after spray application, or later, when the animal acquires lethal levels of pesticides from its food or surroundings or from a different area.

Probably the most difficult to measure and evaluate is the chronic mode of action. During times of plenty, when food is abundant, birds feed upon DDT-contaminated food. Large amounts of DDT are stored in the fat reserves (fat stored in body tissues) of

these birds without apparent harm to them. But when a period of time comes when food is not abundant (stress periods), then the birds must fall back on their fat reserves to keep from starving. As the fats are used up, the DDT is concentrated until the lethal level is reached and the birds die from DDT poisoning.

Other examples of the chronic mode of action is where low levels of DDT in some birds do not kill the adults, but cause them to lay thin-shelled or infertile eggs. The population will then decline. Lower levels of DDT are also passed from adult female fish to their eggs. As the unborn fish progress



Reagan Bradshaw

through embryonic development, the fats within their bodies are utilized and the DDT is concentrated to lethal levels. The unborn fish then die from DDT poisoning.

The indirect mode of action is when pesticides need not kill fish or wildlife directly to cause damage. The destruction of food organisms in streams by careless use of pesticides will deplete or eliminate fish without directly killing them.

Biological magnification (the concentrating of pesticides to a higher level at each step of food chain) is the reason most organochlorines are dangerous from an environmental standpoint.

Biological magnification is a function of food chains or trophic levels, where minute amounts of the persistent insecticide are ingested by small plants and animals. These small animals and plants are in turn eaten by larger animals and these in turn by still larger animals. At each level of the food chain the insecticide is concentrated to a higher level. Animals at or near the end of a food chain will acquire lethal amounts of the insecticide.

In one instance the insecticide DDD was used to control a gnat problem; it was used without restriction, sprayed over the water and allowed to run into the water. Much later a massive die-off

The use of pesticides is essential for sustaining high-quality yields of field crops such as grain sorghum but overuse or misuse can eventually result in the death of fish and wildlife. An understanding of the potential harm of pesticides by all users will help prevent needless loss of life.

of fish-eating birds occurred. Investigations showed that the waters had an insecticide level of 0.02 ppm (parts per million), this was concentrated to 5 ppm in plankton (microscopic plants and animals in water), and up to 2,000 ppm in fish. The birds that had died were found to have up to 1,600 ppm in their tissues.

Pesticide residues are amounts of pesticides that remain in the environment when spraying or other forms of application are completed. They occur in soils and plant or animal tissues and may be detected and measured by sensitive analytical methods. Most animal life in the world today, man included, have at least traces of DDT in their systems, and many animals may have substantial amounts depending on their habitat and exposure. The average amount of DDT in human fat tissue throughout the world is 12 ppm. Human milk has an average of 5 ppm (average in the United States 0.05 ppm-0.26 ppm) compared to the limits set by the Health, Education and Welfare Department of no more than 0.05 ppm allowed in cow's milk for human consumption.

Through highly complex studies and experiments, scientists have found that sometimes residues can kill, inhibit reproductive success, cause physiological and anatomical changes in tissues, affect behavior patterns or render the animals less able to survive in nature.

CLASSIFICATION

Pesticides, literally pest-killers, are chemicals designed to kill or otherwise inhibit plants or animals that compete or interfere with our comfort, health, production of food and fiber, or damage our property. Rachel Carson has probably come up with the best definition of pesticides. She calls them biocides, literally life-killers, since they kill living things.

Pesticides can be placed into one of the following categories: insecticides, fungicides, herbicides, rodenticides, nematocides, acaricides, desiccants, defoliants and plant regulators.

TOXICITIES

The toxicity of pesticides is the degree to which a given pesticide or pesticide formulation is poisonous to living things. The term LD 50 is used to express toxicity, this is the lethal level dosage required to kill 50 percent of the test animals usually in a 96-hour toxicity test. It is usually expressed as milligrams (1/1000 grams) of toxicant per kilogram (1000 grams) of body



Reagan Bradshaw

weight. The expression "milligrams/kilograms" is the same as "ppm" which is the usual expression of pesticide concentration or level. Toxicity data are valuable tools, but may vary considerably from animal to animal. Even animals of the same species under different environmental conditions may react differently. Laboratory results may not be the same as data obtained in the field under natural conditions.

CHARACTERISTICS

Under the characteristics of pesticides we will consider only the synthetic organic insecticides consisting of the organochlorines and the organophosphates.

Organochlorines affect the central nervous system, are stored readily and accumulated in large amounts in stored fats, stimulate the Steroid complexes (vitamin D, bile acids, sex hormones and adrenal cortical hormones), reduce fertility, interfere with defense mechanisms of animals, alter brain wave patterns affecting behavior and can directly kill wildlife adjacent to sprayed areas.

Organochlorines have been blamed for changing the levels of hormones and enzymes. In one instance, mother fur seals were observed beating their pups to death on the rocks, and an imbalance in the hormone controlling the maternal instinct was discovered. Because of a pesticide-affected enzyme which controlled shell development, some pelicans were found to be laying thin-shelled eggs that could not support the weight of the mother birds. In both instances, abnormally high levels of

organochlorines were discovered in the fatty tissue.

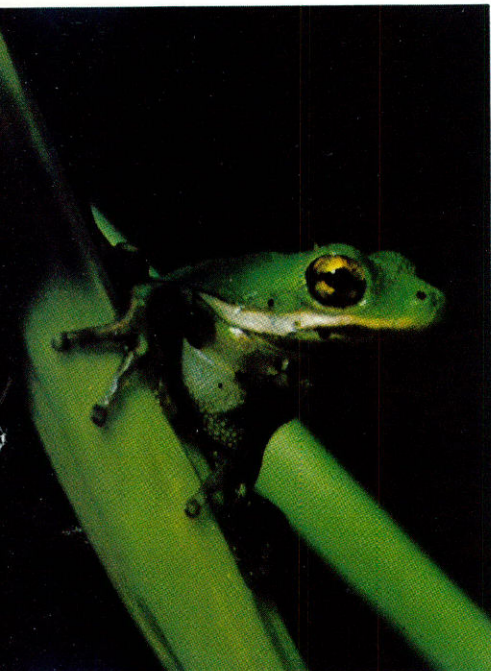
Like most organic compounds these are insoluble in water, but are soluble in organic solvents. Their toxicities may vary from extremely high to low, but probably the most important characteristic from an environmental standpoint is their persistence in the environment. Depending upon environmental conditions, organochlorines may stay in the environment from three to 30 years. Examples of persistence are as follows: Aldrin (1-6 years), Dieldrin (5-25 years), DDT (4-30 years) and Chlordane (3-5 years).

Since these are extremely stable compounds, they are capable of being moved through the environment by physical and biological forces. Penguins of the Antarctic have been discovered to have residues of organochlorines in their body tissue. The theory is that residues are carried from land masses by the ocean currents to the bird's feeding grounds off the coast of the Antarctic.

Some of the common organochlorines are:

Dieldrin	Chlordane	Lindane
Aldrin	Endrin	DDT
Heptachlor	Toxaphene	Thiodane
Methoxychlor		

Organophosphates kill by disrupting vital nerve functions. Death is usually caused from suffocation in mammals by interference with the nerve impulses to the diaphragm. As a group, organophosphates are more toxic than the organochlorines, but lack their stability for persistence in the environment. They are rarely accumulative, but



Ed Dutch

recent studies have found a few which are.

These compounds may enter the body through any route (skin, respiratory, intestinal region, etc.) and several deaths have been reported of farm workers and crop dusters dying from organophosphate poisonings.

Some of the organophosphates are:

Parathion	Diazinon	Azodrin
TEPP	Fenthion	DDVP
Malathion	Abate	Phorate

PROPER USE AND ALTERNATIVES

Pesticide use is important for control of insects, but other safer measures could be used. Biological controls using predatory insects that prey on undesirable species or chemicals which attract the undesirable species into traps are two of the many new methods of controls being studied. Planting strips of different crops instead of one crop on large acreages will reduce the needed habitat for reproduction for each type of insect that attacks each crop.

The following was taken from a paper by Dr. James B. Elder, U. S. Bureau of Sport Fisheries and Wildlife, and will explain the role of the average citizen in the use of pesticides.

What about use of pesticides?

You, the urbanite, have a clear responsibility here. The aerosol can filled with insecticide and the can of weed killer have become a ubiquitous part of our household furnishings. They are available in a bewildering variety at grocery, hardware, garden and other stores.

Collectively the millions of containers of pesticides in home use add up to a potent hazard to fish and wildlife and the environment. Strict adherence to a few simple precautions will minimize this hazard.

1. Is there a clear need for pest control? Or are you spraying "just to keep the pests away."
2. Have you considered alternative methods? Why not try digging some of those weeds rather than using a potent herbicide?
3. Know your chemical. Select the most specific and least toxic pesticides that will do the job. Use the minimum recommended amount rather than the maximum.
4. Avoid the use of long-lived pesticides known to concentrate in animal tissue. This includes most of the organochlorines (i.e., chlorinated hydrocarbons) such as DDT, dieldrin, heptachlor, etc.
5. Read the label, all of it. Pesticides labels are not advertising matter. They are legal documents. Follow the instructions carefully. However, don't expect the label to give you more than broad guidance on hazards to fish and wildlife. You should analyze your pest control situation carefully and take whatever steps are needed to protect important non-target values. For instance:

- (a) Are there robins or other birds nesting in your trees or shrubs? Hold off spraying until the young are fledged.
- (b) Does your land slope to a

Biological controls are a much safer method of controlling pests. Predatory reptiles, frogs, toads and insects may well be an alternative for pesticide use in many instances. Research is showing that these beneficial creatures naturally prey on many of the harmful species which destroy field and garden crops as well as ornamentals.

stream or lake? Be certain there is no chance of spray washing into the water area.

(c) Protect bees. Limit your spraying to late in the evening when bees are inactive.

6. Dispose of empty pesticides containers properly. Follow the manufacturers' recommendations on the label. Don't wash your spray equipment in the street where the effluent can end up in a nearby creek or river.

7. In all pollution matters, bear in mind constantly the immortal words of Walt Kelley's "Pogo."

"We have met the enemy, and he is us!" **

Your best source of information on what pesticides to use is the Agricultural Extension Service. For information on possible hazards to fish and wildlife, contact the U.S. Bureau of Sports Fisheries and Wildlife.

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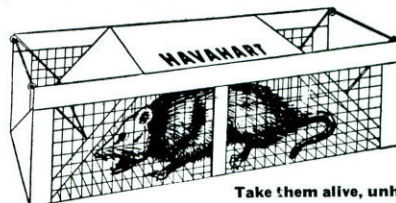
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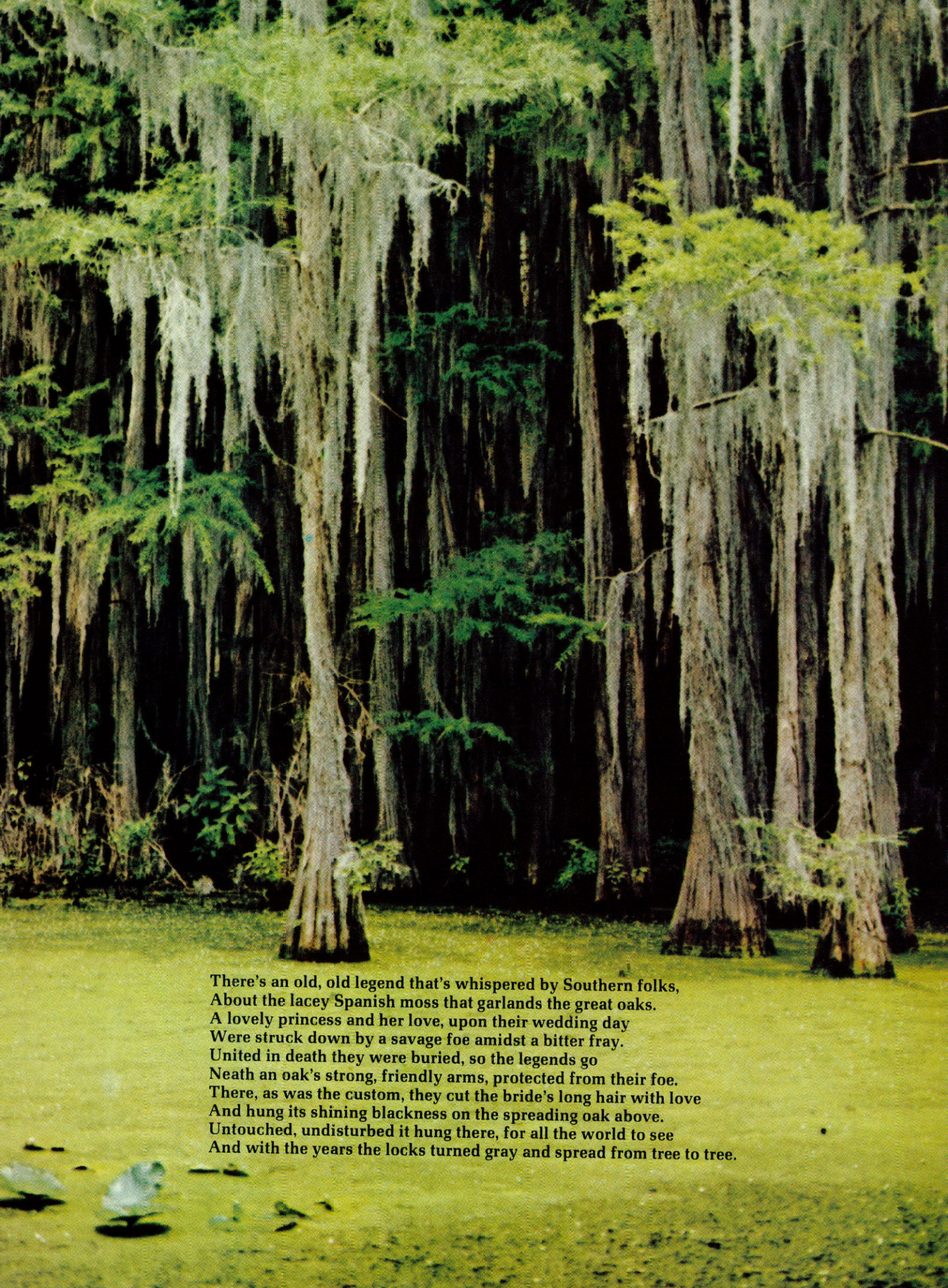
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There's an old, old legend that's whispered by Southern folks,
About the lacey Spanish moss that garlands the great oaks.
A lovely princess and her love, upon their wedding day
Were struck down by a savage foe amidst a bitter fray.
United in death they were buried, so the legends go
Neath an oak's strong, friendly arms, protected from their foe.
There, as was the custom, they cut the bride's long hair with love
And hung its shining blackness on the spreading oak above.
Untouched, undisturbed it hung there, for all the world to see
And with the years the locks turned gray and spread from tree to tree.



SPANISH MOSS



by Terrie Whitehead

What is this gray festoon that drapes itself majestically over the limbs of trees? Many names are used but the most common in the South is Spanish moss. However, this "moss" is really not a moss at all; in fact, it is a relative of the pineapple.

Its name began as a practical joke among the French, Spanish and Indians. When the French arrived in Louisiana, they learned the moss was called tree hair, or "itla-okla" by the Indians. Thinking the plant looked like the long, black beards of the earlier Spanish explorers, the French advised the Indians to name it Spanish Beard or "Barbe Espagnol."

The Spaniards, considering this a term of ridicule and insult, attempted to get even by persuading the Indians to use a more appropriate name, "Cabello Frances," or French Hair.

The final decision was eventually left to the Indians, and they chose "Barbe Espagnol" because it sounded better to them. For many years afterwards, the plant was referred to as "Spanish Beard" until the current term "Spanish moss" was adopted.

Spanish moss is also referred to as old man's beard, long moss, vegetable horse-hair and, more scientifically, *Til-*

ladsia usneoides. The moss is named for Elias Tillands, a professor at the University of Abo, Sweden, in 1673. Tillands made a catalog of all plants around Abo that were transplanted natives from the Western Hemisphere. The species named *usneoides* was assigned because of its resemblance to the lichen *usnea*. The family name is Bromeliaceae.

But Spanish moss is not one of the true mosses which are members of the more primitive division of plants, the Bryophyta. True mosses are not flowering plants and usually grow in damp areas on the ground. They are small, reaching a maximum size of four or five inches and produce no seeds, reproducing instead by spores. The gray Spanish moss is quite different from true mosses, related to true moss only by name.

Although it has a European name, Spanish moss is native to the Western Hemisphere. Studies reveal that the plant is morphologically the same in nine Southeastern states and in Central and South America.

Spanish moss is an epiphyte, or air-breather with a covering of minute fuzzy hair-cells with which it obtains moisture and nourishment from the rain and dust. These tiny cells are gray, but under these cells the plant is green.

This green coloration is a sign that the plant contains chlorophyll, thereby enabling it to manufacture its own food through photosynthesis.

The plant has been falsely accused of being a parasite and killing trees. Although the gray festoon has been known to "choke" a tree to death by shading it too much or growing so dense that the tree cannot produce leaves, it is not a parasite. It grows just as well on dead trees, electric wires or fence posts.

The plant does not even have a root system; it attaches itself to the trees with tiny hooks. These hooks obtain a small portion of moisture from the tree, but not an appreciable amount. Sometimes Spanish moss will act as a sponge, soaking up water until it weighs several times its normal weight. It may become so water-heavy that it breaks limbs.

When looking at a tree laden with Spanish moss, it is impossible to distinguish the individual plants which form the clumps dangling from the limbs, for each clump is made up of many intertwined plants. Each plant is composed of a stem from which numerous tendril-like leaves grow. These leaves intertwine with the leaves of the neighboring plants so that uncurling an individual plant for study is very challenging. The stems grow up to 12 feet long

SPANISH MOSS



Sim Oefinger

Indians called the moss "Pale Moon Flower" because of the small, yellowish-green flowers which bloom in the spring with the fragrance of night. The delicate flowers are only a quarter-inch wide and last approximately four days. It is interesting to note that only one flower grows per plant and the plant may not flower every year.

and the clumps are made of old and young plants of varying lengths.

Each individual plant produces one small yellow flower and the plant may not flower every year. The flowers appear from the middle of April to the first part of June, each flower lasting only four days, and then seeds are formed.

All attempts to grow Spanish moss from these seeds have failed. It seems probable that the need for natural germination prevents cultivation.

Spanish moss is adversely affected by shade. Although it is not particular about its host, it will not grow well on trees such as pines which have thick leaf coverage year-round. Not only do the leaves block out the sun but they also shield the moss from adequate rain.

The plant will spread until it reaches a barrier such as a treeless area or perhaps a thick stand of pines. In Florida and Georgia, there are barren gaps in Spanish moss growths as large as five or six miles across.

Spanish moss is more than just something pretty at which to look. It proves useful to both man and animals. Of the many birds that build moss-nests, the most dependent upon Spanish moss is the perula warbler. Since the warbler has not been observed to nest without it, the continued survival of this bird appears to be dependent on this particular moss.

Squirrels utilize the moss for limb or outside nests, and some may carry the vegetable horse-hair inside their winter nest holes. Even bats find the moss a nice daytime retreat. Livestock sometimes eat the moss in lieu of hay to serve as a bulk supplement, but no animal could survive only on Spanish

moss because its fibers are indigestible.

Approximately 163 different kinds of insects, not counting spiders, have been found to nest and lay eggs in the moss. Caterpillars and moths occasionally eat the young shoots, but not often.

Man also has made use of the moss. Originally it was harvested for packing breakable goods. Later its potential was discovered for stuffing mattresses, padding upholstery and acting as a binder in the construction of mud and clay chimneys.

Shipments of moss on a commercial scale began after the War Between the States when the upholsterers in the furniture trade began to use it in considerable quantities. It was collected by hand, generally with the aid of a hook or blade attached to a long pole, and was piled in large heaps, or buried in long, shallow pits. This allowed the gray outer portions of the strands to rot away. The remaining central fiber which turns black was carefully combed and cleaned, baled and marketed. These tough, resilient, hairlike fibers filled the cushions of automobile and railway coach seats, mattresses, chairs, couches and even horse collars.

The industry continued until the mid-1950's when synthetic foam upholstering materials began to be used almost exclusively. Today this interesting industry is almost gone with only a few people in Southwestern states still collecting and ginning the moss.

Since 1969, Spanish moss has been observed to be dying and disappearing in Florida, Mississippi, South Carolina and Georgia. Primary investigations into the decline of Spanish moss speculated the cause to be virus, insects, air pollutants or a combination of these causes. However, conclusive tests show that the actual cause is the fungus *Fusarium soloni*.

It is not an exotic disease; it is common in air and soil. The fungus thrives on 67 species such as beans, pumpkins and squash. In these plants, the fungus causes root rot. Because Spanish moss does not have a root system, it attacks the actual plant.

Experts report that the Spanish moss is recovering, but not rapidly. The moss tends to grow slowly because of its dependence on wind and animals to spread its seed.

Although sometimes taken for granted, Spanish moss will never be entirely forgotten. Ancient folklore and legends alone add permanence to its mystic beauty. It is not a moss, nor a parasite. But beyond this scientific data, Spanish moss means something different to each person. **



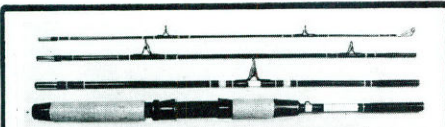
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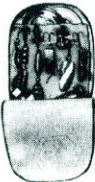
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Beautiful and Useful

Texas craftsmen create handmade knives



Knives by Clyde Fischer

by Neal Cook
Photography by Jim Whitcomb

Knives are considered by many persons as objects of beauty, but to others they are only tools to be used for hacking and cutting.

For those who can appreciate one of man's oldest tools and weapons for both of these reasons, the profession of handcrafting knives is growing.

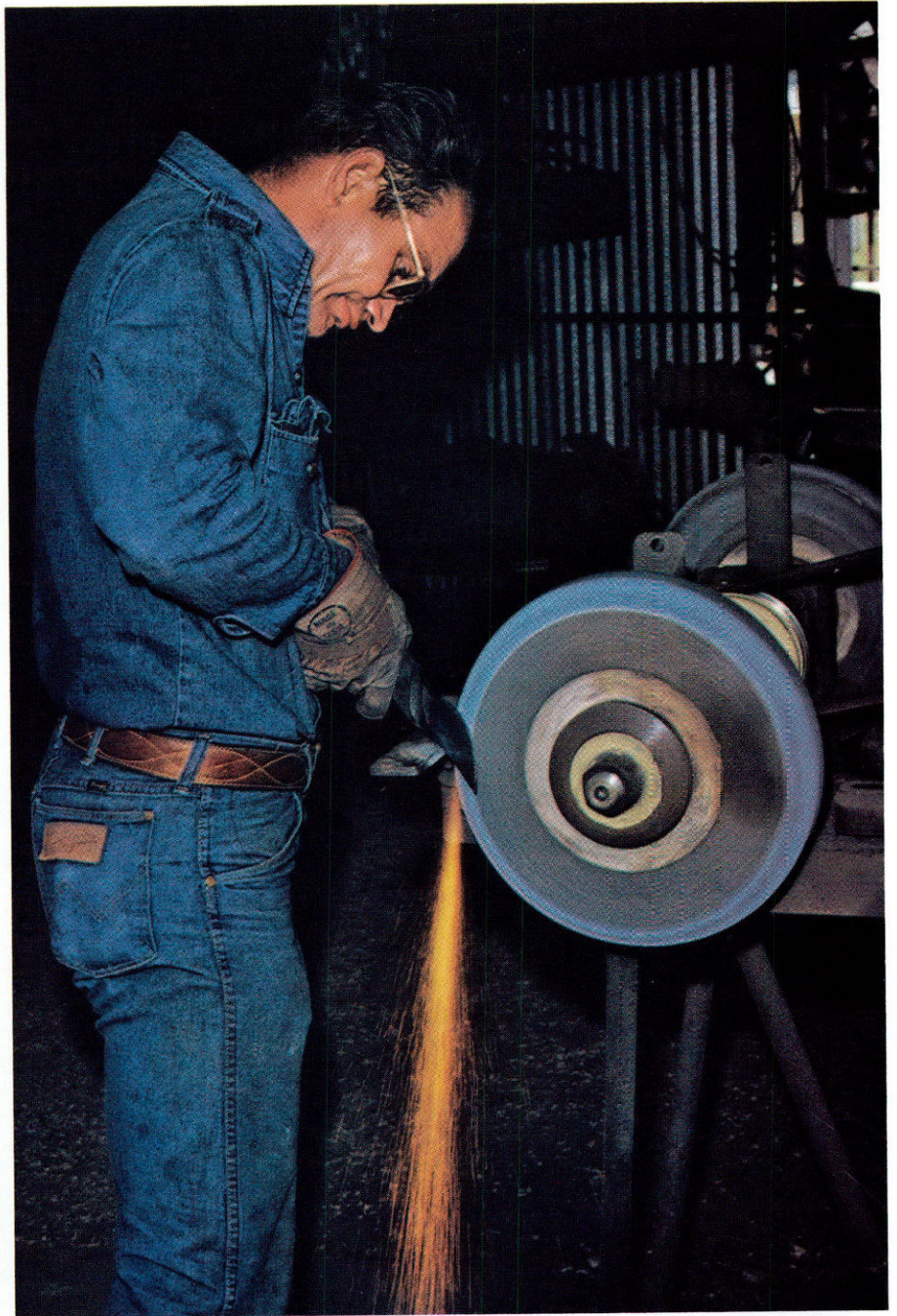
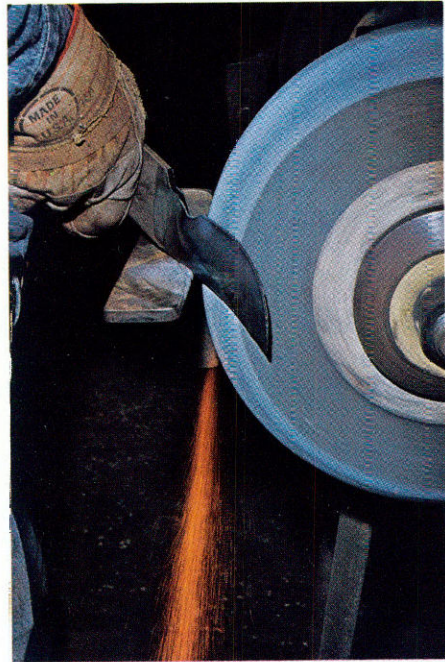
These knives are made of high-carbon steel, tempered to perfection so they will hold an edge much longer than the average hunter could imagine. They are designed to be easy to use, and several knife-makers will prepare one to meet your own specifications if they believe them practical.

For centuries each blade was made individually, shaped from a red hot piece of steel and then painstakingly sharpened to a cutting edge. With the growth of technology, most knives became the end result of mass production. Hundreds, and thousands of identical blades began to flow from the ends of production lines.

When a new hunting knife was needed, all a person had to do was visit the store or order one from a catalog. The personalization and pride of ownership in most knives was lost as everyone began to carry knives pretty much alike.

However, within the past few years the art of handcrafting knives has been reborn. Hundreds of individuals have begun to make their

From chrome vanadium tool steel, the blade is ground to specified dimensions, and then the tang (part to which the handle is attached) is cut. If a butt cap is used, a threaded end must be welded to the tang, and the blade is ready for tempering to the correct hardness. The quality of the steel and the hardness to which it is tempered are two of the differences between these handmade knives and those sold in most stores. After a hilt is welded on, the next process is that of building the handle. Measurements on the seasoned mesquite used for the handle in the photographs mark where a hole will be drilled, for securely fastening the tang.



own knives either professionally or as a hobby. The quality of these knives varies, but we are fortunate to have some of the finest artists of this ancient craft located in Texas.

These knives cost much more than the production-line variety available at the local sporting goods stores, often \$50 to \$150, and they are not as easily attainable. Often you must wait three to eight months from the time you order until you receive your knife. But once you have paid the price and waited for your blade, you have a knife which has no exact duplicate. It has been ground on a fiery wheel; held and guided by a man's hands. Slight variations while grinding personalize each knife. The handle, prepared to your specifications, completes your individual knife.

Anyone who has a workshop or work area large enough for a drill

and grinding wheel can make his own knife and start into the hobby. But grinding a file into the desired shape and attaching the handle is much harder and more time consuming than most people anticipate. They sweat and swear for hours grinding the blade and sanding the handle only to be dissatisfied with the end result. The hobby stops before it has really begun.

Before deciding that you want to make an entire knife, you may want to try putting a handle on a blade that is already ground and tempered. For this you will need a good workshop with vise, power drill and grinder and several types of files. The listed knife makers with stars by their names sell blades as well as parts for the handles.

Handcrafting the handle for your first knife will give you the pride which comes with creativity, and after you have completed several

knives, you may then want to try your hand at making one from start to finish. A good book for the knife enthusiast is *American Handmade Knives of Today* by B. R. Huges. This book is available for \$2.95 from Pioneer Press, P. O. Box 684, Union City, Tenn. 38261.

For the pride of ownership without the work, ordering the knife from a professional is the most practical route. In many Texas cities, knife makers create their cutlery on a limited basis. They often make only enough knives to supply their friends or the few additional people who have heard about their product. If you want to see some of the knives made by these people, I can only suggest that you call firearm and sporting goods dealers in your town to see if they know of any local craftsmen.

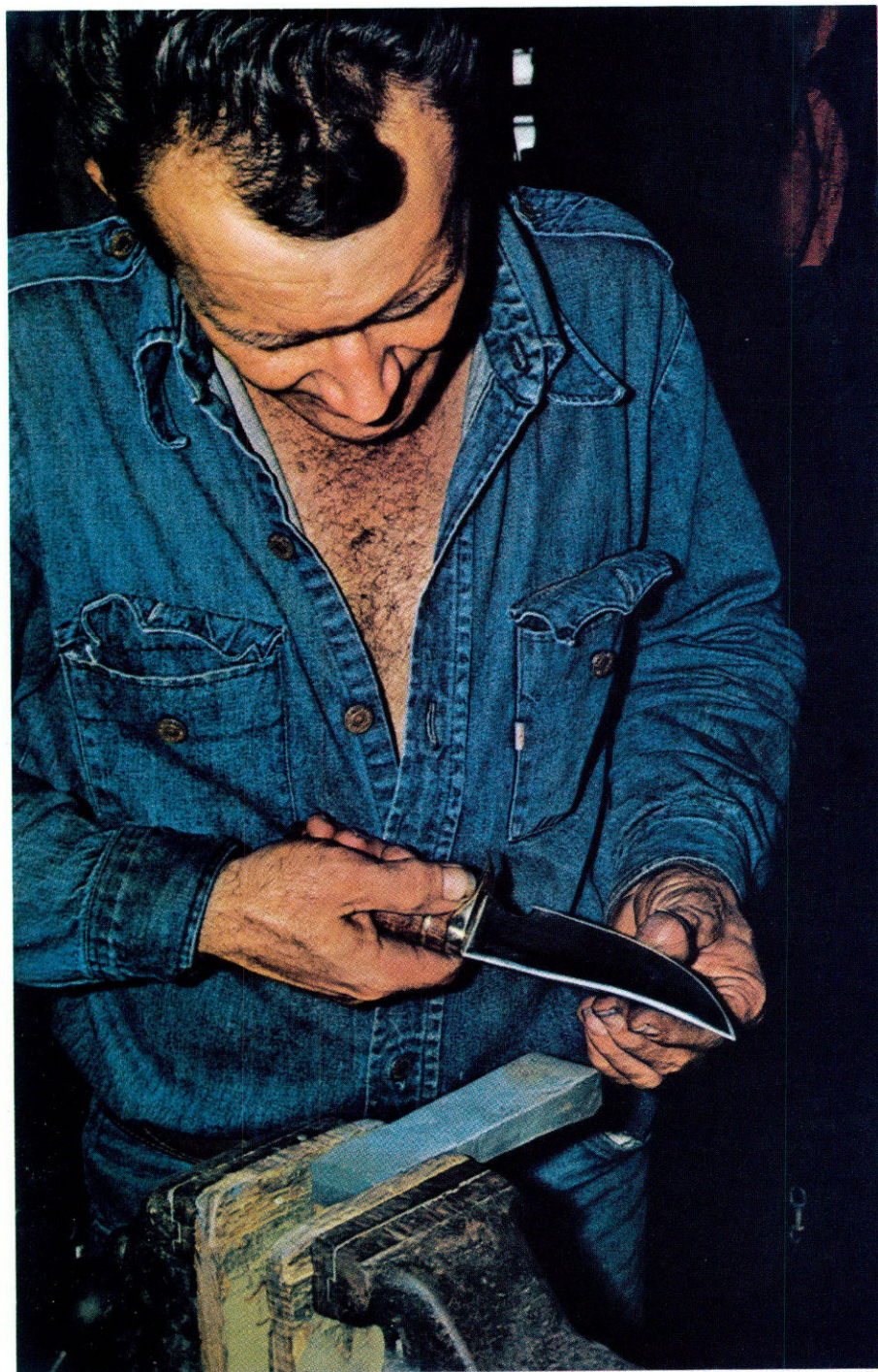
The persons listed here are the ones I found who send catalogs



showing their knives. If you are interested in obtaining one of their catalogs send them 50 cents for postage and handling.

All of the craftsmen listed provide guarantees against defects in workmanship and several are proud enough to guarantee their product for the life of the original owners. Others have money-back guarantees if you are not satisfied with the knife you receive. **

Parts for the handle are fastened to the tang with epoxy glue and by tightly screwing on the butt cap. Never use the epoxy made for automobile body-work on a knife. A special metal-base epoxy must be used. The handle is first shaped on a sanding wheel or with a wood rasp. Finishing is with sandpaper. After the knife is polished, a final cutting edge is put on and the knife is ready for delivery.



Arnold Knives

Box 1427
Grand Prairie, Tx 75050

Barbee Knives

J. L. Barbee
Box 1702
Fort Stockton, Tx 79735

Bone Knives

Ralph Bone
806 Avenue J
Lubbock, Tx 79401

***Steve's Custom Knives**

Steve Davenport
301 Meyer
Alvin, Tx 77511

Norman Dew Handcrafted Knives

339 Magnolia
Channelview, Tx 77530

Dumatrait Knives

Gene Dumatrait
Rt. 1, Box 42
Orange, Tx 77630

***Fischer Custom Knives**

Clyde Fisher
Route 1, Box 170-M
Victoria, Tx 77901

Gault Presentation Knives

Clay R. Gault
1626 Palma Plaza
Austin, Tx 78703

***Hale Handmade Knives**

Lloyd Hale
Box 5988
Texarkana, Tx 75501
\$1.00 for catalog

Don Hastings

216 W. Colorado
Palestine, Tx 75801

Handmade Knives

Chubby Hueske
4808 Tamarisle
Bellaire, Tx 77401

Jerry Hunt

4606 Princeton
Garland, Tx 75040

Robert Ludwig

1028 Pecos
Port Arthur, Tx 77640

Joe Martin

Box 6552
Lubbock, Tx 79401

Jerry McAlpin

Box 7
Bullard, Tx 75757

Custom Knives

Max Meyer
418 Jolee
Richardson, Tx 75080

Mitchell Custom Knives

Bobby Mitchell
511 Avenue B
South Houston, Tx 77587

Nolen Knives

Rebel Field
Mercedes, Tx 78570

Jim Pugh

917 Carpenter
Azle, Tx 76020

Silver Fox Knives

4410 42nd St.
Dickenson, Tx 77539

Stone Knives

C. W. Stone
703 Floyd Rd.
Richardson, Tx 75080

***Bob Schrimsher**

P. O. 11448
Dallas, Tx 78423

***Van Sickle Cutlery Co.**

Frank L. Van Sickle
P. O. Box 3688
San Angelo, Tx 76901

Weatherford Bros. Knives

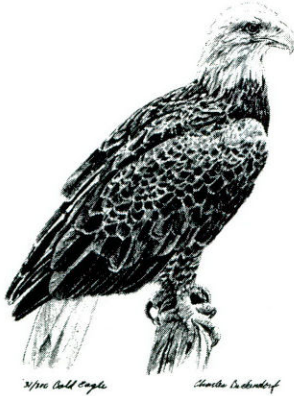
4775 Memphis Drive
Dallas, Tx 75207

*Knife-makers who supply blades and handle parts.

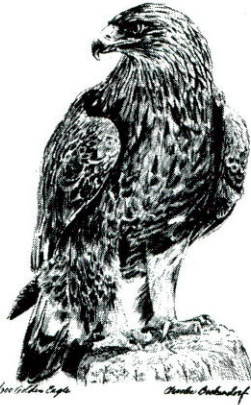
LIMITED EDITION OF ORIGINAL PRINTS BY CHARLES BECKENDORF

The term original print means that the artist that did the original drawing must also make the plates for printing. In this edition I have also done the printing.

Many prints today are called limited editions when there may be several thousand prints made. This edition is highly limited to only 300 impressions, and no more will ever be done. Each print is given a number, identified and signed by me.



1/100 Bald Eagle Charles Beckendorf
1 BALD EAGLE



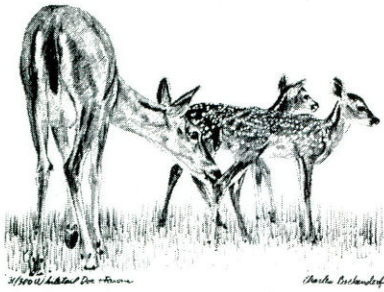
1/100 Golden Eagle Charles Beckendorf
2 GOLDEN EAGLE



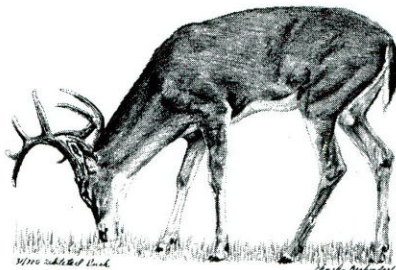
1/100 Great Horned Owl Charles Beckendorf
3 GREAT HORNED OWL



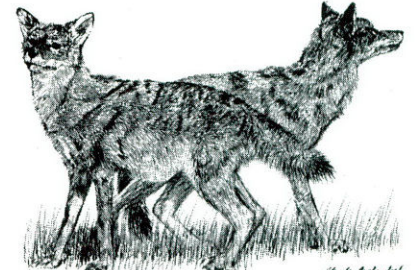
1/100 Red Tail Hawk Charles Beckendorf
4 RED TAILED HAWK



1/100 Whitetail Doe & Fawns Charles Beckendorf
5 WHITETAIL DOE & FAWNS



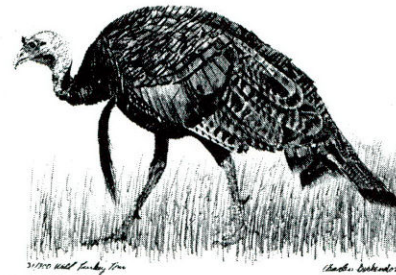
1/100 Whitetail Buck Charles Beckendorf
6 WHITETAIL BUCK



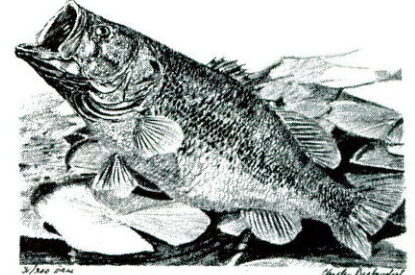
1/100 Coyotes Charles Beckendorf
7 COYOTES



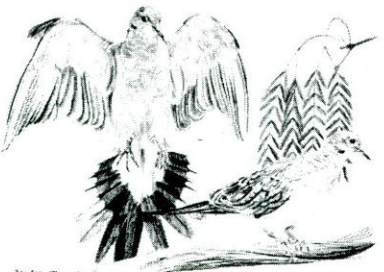
1/100 Turkey Hen & Poult Charles Beckendorf
8 TURKEY HEN & POULTS



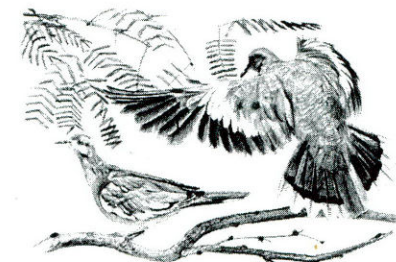
1/100 Wild Turkey Gobbler Charles Beckendorf
9 WILD TURKEY GOBBLER



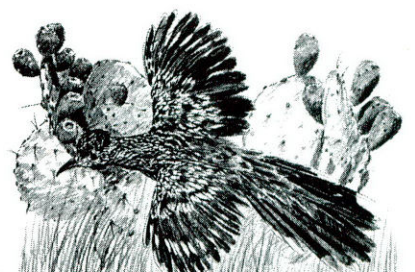
1/100 Bass Charles Beckendorf
10 BASS



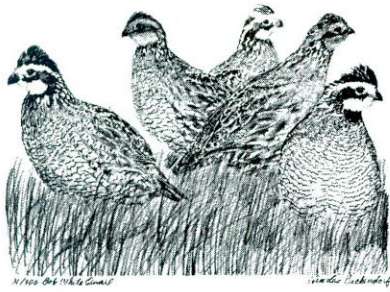
1/100 Mourning Dove Charles Beckendorf
11 MOURNING DOVE



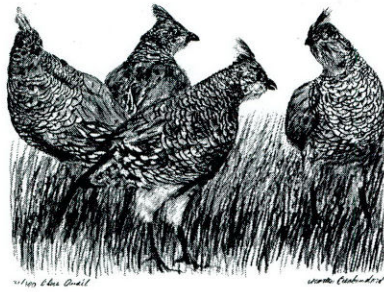
1/100 Whitewing Dove Charles Beckendorf
12 WHITEWING DOVE



1/100 Roadrunner Charles Beckendorf
13 ROADRUNNER



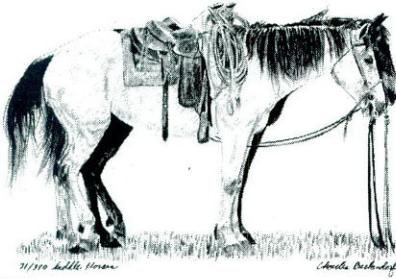
14 BOB WHITE QUAIL



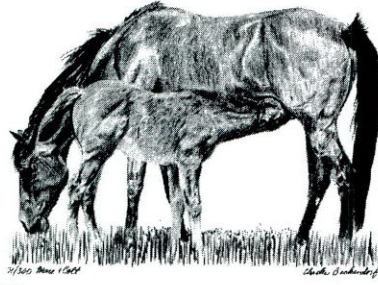
15 BLUE QUAIL



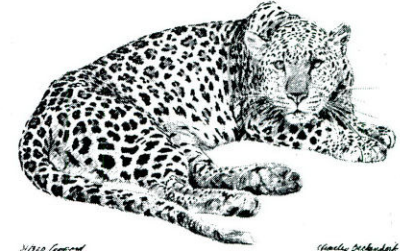
16 BISON



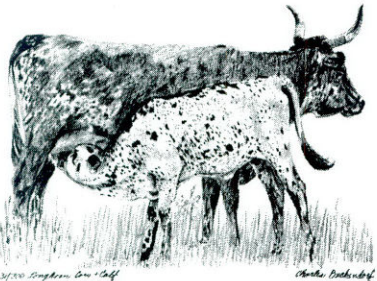
17 SADDLE HORSES



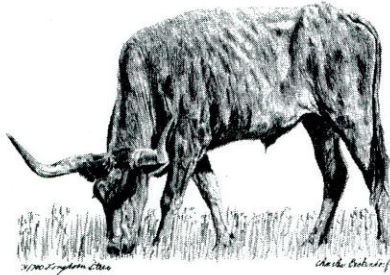
18 MARE AND COLT



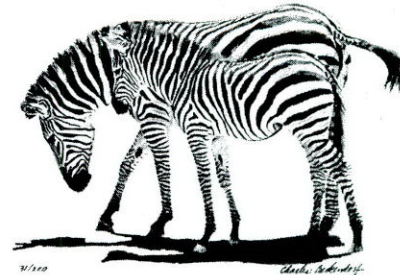
19 LEOPARD



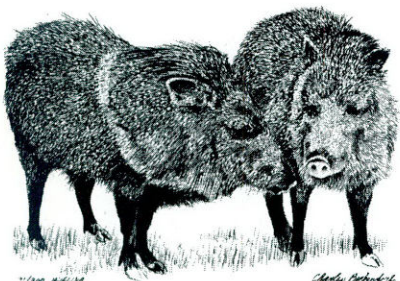
20 LONGHORN COW & CALF



21 LONGHORN STEER



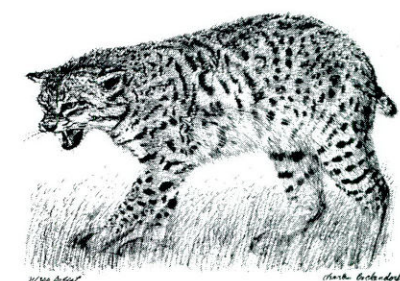
22 ZEBRA



23 JAVELINA



24 RACCOON



25 BOBCAT

The original prints are black & white, 11 x 14 inches, standard size, and cost \$6.00 ea. the first thirty prints of each subject are individually hand colored by me using permanent pigment watercolors, and cost \$30.00 ea. Texans please add 5% sales tax. All prints are mailed the same day of receipt of order in a hard cover folder, postage paid. Satisfaction of print and condition of package is fully guaranteed. Simply put the number corresponding to the print or prints you select on a sheet of paper with your complete return address. Enclose check, cash, or money order and mail to:

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Young Naturalist

Birth of Snakes

by Ilo Hiller

Courtship and breeding activities assume primary importance to members of the snake world when those warm spring days hit Texas. This strong urge to reproduce helps insure that the young will arrive by late summer or early autumn and have time to feed and gain strength to face their first winter.

Snake reproduction is unique in the fact that some species lay eggs (oviparous) which must then hatch while others bear their young alive (viviparous). Although most snakes are egg-layers, live-bearing species are quite numerous in the United States and include the boas, water and garter snakes, water moccasins, copperheads and rattlesnakes. Racers, hog-nosed, ring-necked, indigo, king, bull, pine, coral, rat and whip snakes fall into the egg-laying category.

Since some females are capable of delaying pregnancy after mating, the exact time between mating and egg-laying or the birth of live young varies with each species and cannot always be accurately determined. However, eggs usually are laid within two months. They can appear from May through August, but most are laid in June and July and hatch in August and September.

The female lays and conceals her eggs under leaf mold, decaying vegetation, rotting logs, woodpiles, rocks, in holes or wherever they will receive both heat and moisture. Heat, received by direct or indirect sunlight or produced by decaying nest materials, incubates the eggs. The higher the temperature, the faster the egg development. But since weather, nesting sites and nesting materials are too variable to maintain specific temperatures, it is impossible to say how long the incubation period lasts. The time may vary from a few days to several months depending on the species and conditions.

Most egg-layers abandon the eggs shortly after they are laid, but some have been found protectively coiled around the eggs or lying on the nest. Some also have been discovered incubating their eggs. To do this, the female warms her body in the sun and then wraps herself around the clutch.

When hatching time arrives, the young snake must



free itself. To accomplish this task, nature has provided it with an "egg tooth" capable of making slits in the tough egg skin. Numerous slits weaken the shell to allow the hatchling to poke its head through to the outside world. Although free, the young snake does not leave the protection of the shell immediately and may take from a half to a full day to emerge after the first slit is made. No help awaits the newborn, and if it is to survive, it must find food and protect itself from heat, cold and predators. Within a few days after hatching, the "egg tooth" which is no longer needed is shed.

The actual birth of live snakes is quite simple. Although the female displays restlessness just prior to delivery, she is relatively quiet during the process. She elevates her tail and the young snake is expelled, usually enclosed in a delicate, transparent, membrane sac. These sacs are ejected either slowly or rapidly until all of the snakes are born.

This group of baby snakes is called a brood, and the number of snakes in a brood varies. Water snakes may deliver as many as 100 young while boas may have as few as two. Rattlesnake broods usually range from four to 25 and garter snakes from 25 to 70.

When the young snakes break out of their membrane sacs, they are able to fend for themselves immediately. For example, the poisonous snake is born with venom capable of paralyzing small prey, and young constrictors are able to throw their coils around prey instinctively.

Regardless of how they enter the world, young snakes come equipped to take their place in this hostile environment. **



Partially enclosed in its membrane sac, the newborn copperhead (opposite page) can expect no assistance from its mother. Hatching time has arrived for the clutch of prairie kingsnake eggs (above) and some of the young snakes have already emerged and are examining their surroundings. Others are still trying to cut through the tough, leathery shells or cautiously looking over the world to which they must soon adapt.

LETTERS TO THE EDITOR

Armadillo Fare

I have killed many armadillos on our farm because they dig under the barns and sheds, but have never tried to clean and eat one. It seems to me that they would be very hard to dress out.

I have heard that they are good to eat and taste somewhat similiar to pork. I've seen many recipes which make use of armadillo meat.

If you have any information as to cleaning, preparing or even some recipes, I would very much appreciate hearing from you.

Ronald Shiflet
Houston

Cleaning armadillos is really not as hard as it may seem. The most difficult obstacle is not the shell, as you would think, but rather the thick skin on the underside. Lay the animal on its back, resting on the shell, and cut it as you

would skin a deer—down the middle of the body and up each leg. The skin should also be cut around the head and tail, but don't remove them because they may be used as handles later in the cleaning process. When slitting the skin, be careful not to cut into the intestines or the stomach. This will taint the meat.

Work the skin away from the meat around the underside, grasp the tail and pull the carcass out of the protective shell. The shell can be left under the body to keep the meat from getting dirty. Now remove the viscera by slitting the body from just in front of the hindquarters through the rib cage and up the neck. The hindquarters must also be split with a knife or small hatchet to remove the large intestine and anus. Cut off the feet, tail and head, and the carcass is ready to be cooked.

The offensive odor, evident while cleaning, is nothing to worry about. This smell will be lost after the skin and shell are removed and does not

affect the taste. The armadillo is an exceptionally clean animal and has no parasites. Its protective shell and food habits make it more desirable than the outward appearance might first indicate.

Cleaning is well worth the effort for the meat is delicious, tasting somewhat like lean pork, and it can be prepared in many different ways. There is also much more meat under that hard shell than anyone would imagine.

Try making armadillo sausage from your pork sausage recipe. Since there is very little fat on an armadillo, it will be necessary to mix a little pork fat with the meat.

Armadillo can also be roasted. Place the cleaned animal in a pot of water, add a couple of red pepper pods, salt to taste and parboil the meat until it is tender. Remove the meat from the pot, place it in a baking pan and sprinkle it with black pepper and flour. Roast as other meats, basting frequently with the stock, until well browned.

To fry young armadillo, cut the meat into small pieces, soak them in a bowl of milk for about 30 minutes and roll them in seasoned flour. Fry the pieces as you would chicken.

For barbecued armadillo, the meat should be parboiled for a short time to make it more tender but not to the point where the meat falls away from the bones. Remove the meat from the water, drain it and then place it on the grill over wood coals or charcoal. Baste frequently with a favorite barbecue sauce and butter. Cook slowly until the armadillo is well browned and saturated with the sauce.

Delicious soups, stews, casseroles or other dishes can also be created by using the meat from this unusual creature.

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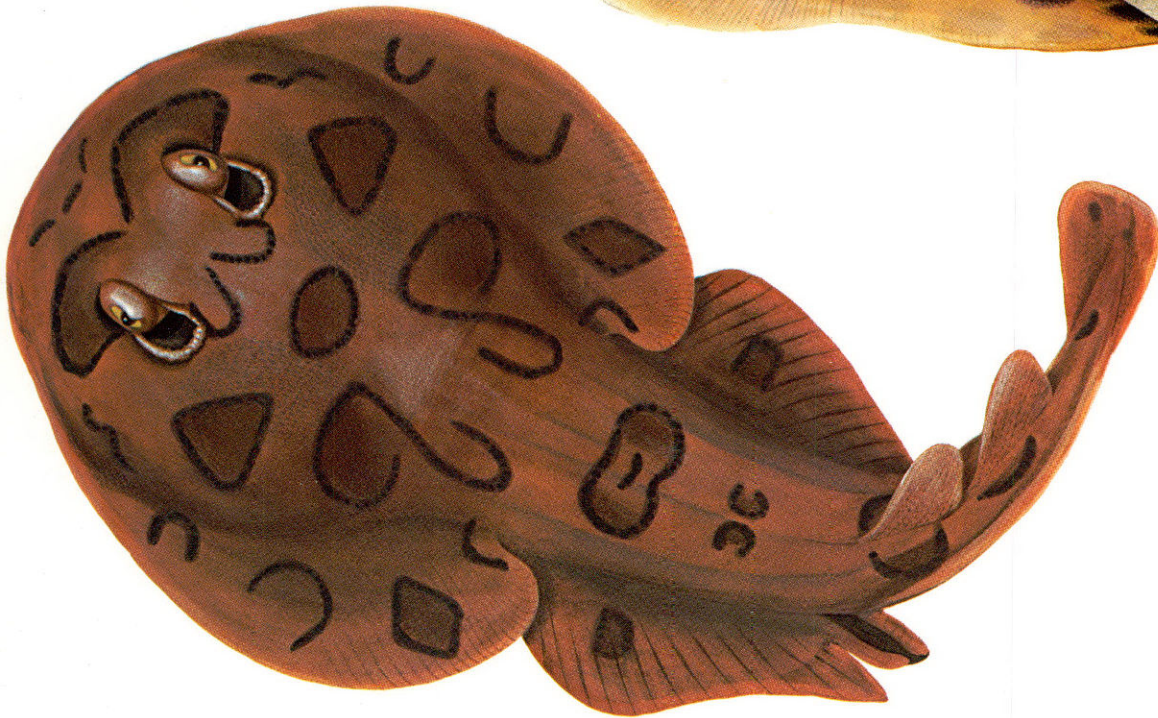
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BACK COVER

The countryside is beginning to come alive with the beauty, color and fragrance of the profusion of white flowers of the dogwood trees. They are found throughout the forest regions of the eastern half of Texas. Photo by Jim Whitcomb.



TEXAS SALTWATER FISHES

Skates and rays are among the unusual fishes of the Texas coast. The Texas clearnose skate (top) frequents shallow sandy and grassy flats throughout most of the year. It feeds on crustaceans and small fish. This species which sometimes reaches two feet in length is so-named because of the transparent areas on each side of the snout.

The electric ray (bottom) is characterized by its ability to produce an electric shock. Its small size, similar to that of the clearnose skate, prevents this species from causing severe shocks to humans. It too inhabits the sandy, grassy flats and feeds on crustaceans and mollusks on or near the bottom.

Artwork by Henry Compton.

