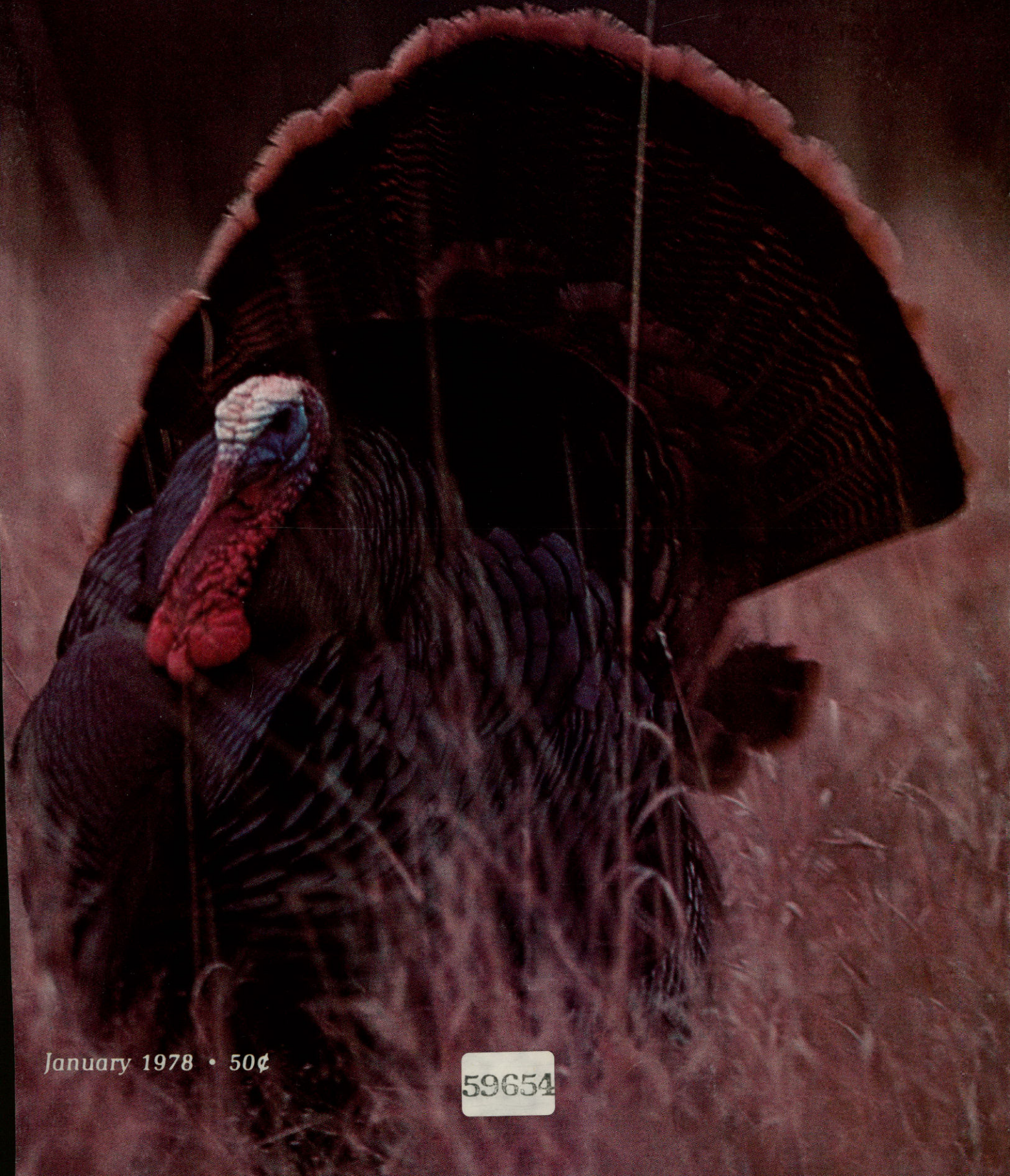


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# TEXAS

PARKS & WILDLIFE



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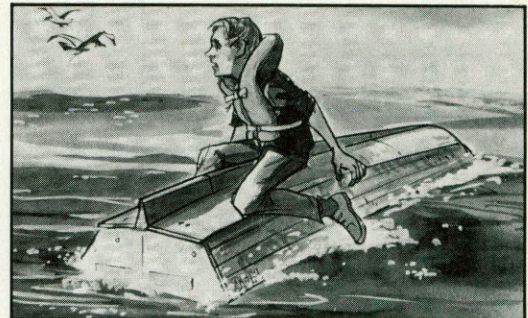
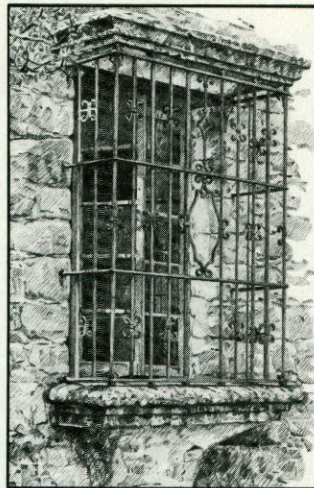
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Published monthly by the Texas Parks and  
Wildlife Department, 4200 Smith School  
Road, Austin, Texas 78744, AC 512  
475-4891. Republication of material is not  
permitted except by special written permis-  
sion. The inclusion of advertising is consid-  
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able upon request. Subscription rates: \$5 for  
one year and \$9 for two years. Single copies  
and all back issues, 52¢. Foreign subscrip-  
tion rates: \$6 for one year and \$11 for two  
years.

Postmaster: If undeliverable, please send  
notices by form 3579 to 4200 Smith School  
Road, Austin, Texas 78744, Second class  
postage paid at Austin, Texas, with addi-  
tional entry at Oklahoma City, Oklahoma.

Publication Number 541360



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and swollen wattles, the male turkey struts and gobbles to attract a harem and  
establish his superiority over any other nearby males. This antagonism between  
males lasts through late summer; however, during the fall and winter they gather  
together in flocks. Photo by Bill Reaves.

**Inside Front:** Spectacular scenic beauty awaits the backpacker who hikes the  
mountain trails at Big Bend National Park. Photo by Bill Reaves.





ANNETTE  
MORRIS  
NEEL

*Illustrations on these pages depict the reconstructed Mission Espíritu Santo as it can be seen today.*



# MISSION ESPIRITU SANTO

## Bringing Christianity and European civilization to Texas Indians

by Wilson E. Dolman, Parks Interpretation and Exhibits

Illustrated by Annette Morris Neel

Long before Anglo-American settlement in Texas, the Marquis de Aguayo consecrated Mission Nuestra Señora del Espíritu Santo de Zuñiga on Lavaca Bay. Named in honor of the Holy Ghost (Espíritu Santo) and the current viceroy of New Spain, Baltasar de Zuñiga, the mission was charged with the dual purpose of Christianizing and civilizing the Karankawa and other Indian groups living in the vicinity.

Within a few years of its 1722 founding, the mission was moved to a healthier site inland on the Guadalupe River, a move precipitated by the hostility of the Karankawa. Then in 1749 the frontier defenses of New Spain were reorganized and, to fit into the new plan, Espíritu Santo was moved to its final location on the San Antonio River.

The long-term residents of

the mission were predominantly from the Aranama tribe, though other groups were represented in lesser numbers. The Aranama were primitive hunters and gatherers living along the San Antonio and Guadalupe Rivers, and as such had no agriculture or permanent houses. By language and culture they were one of the Coahuiltecan tribes which ranged along the Gulf Coastal Plain and inland over the dry reaches of southern Texas and northeastern Mexico.

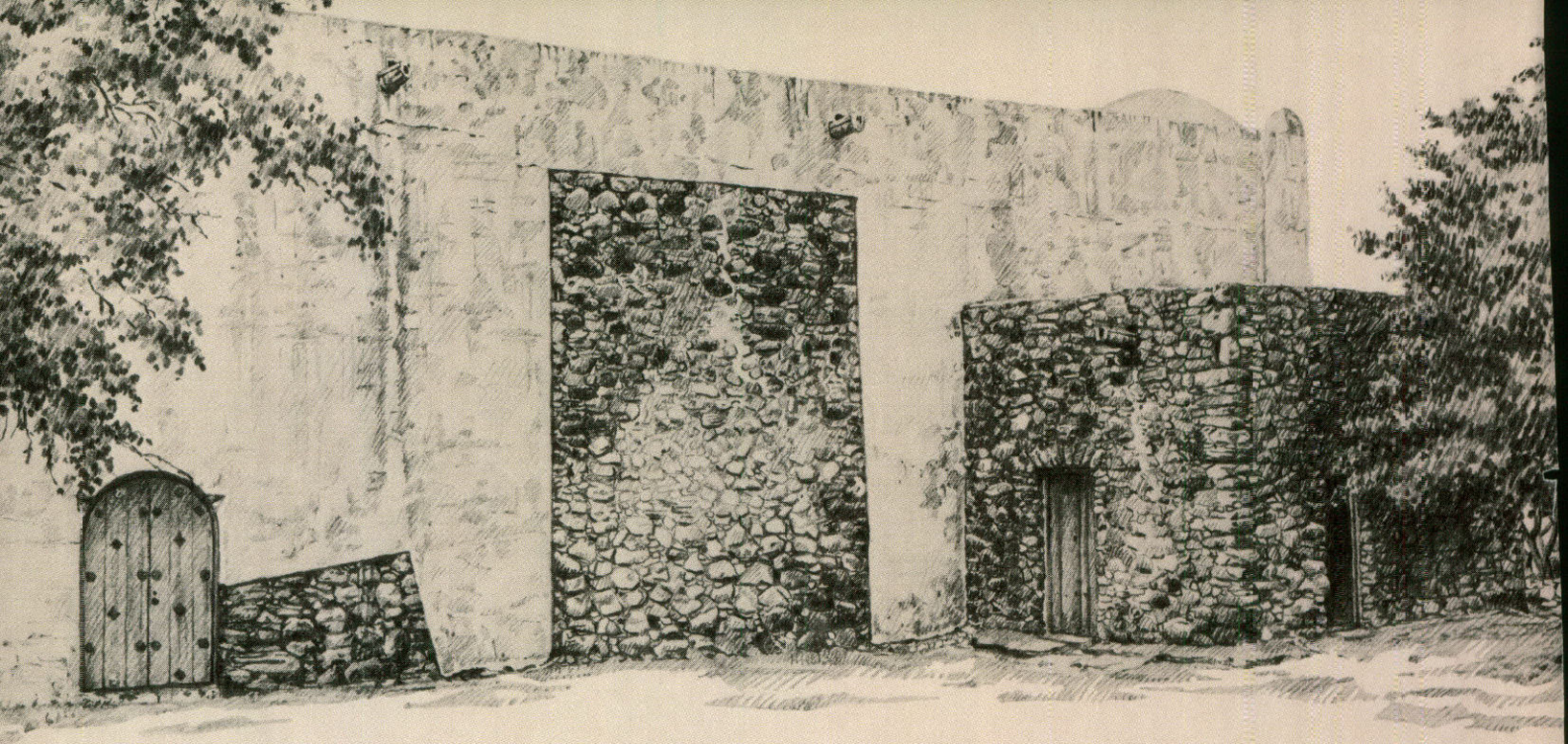
Security, both from hunger and from more warlike tribes, enticed them to submit to mission discipline. They were called neophytes because they were new converts to be initiated into the mysteries of Christianity and European civilization.

Neophyte families received a metate (stone used for grinding corn), a kettle, pots and an iron grill to furnish their small

cell-like rooms which lined the inside of the mission compound. Personal items included clothing, blankets, iron knives, rings, bracelets, beads and religious medals. European contact radically changed their culture as permanent dwellings, agriculture, European clothing and goods became a part of their lives, and Catholicism substituted for their pagan religion.

The missionaries used a system of reward and punishment to persuade the neophytes to adhere to the rigorous schedule of religious services, instruction and work. The ringing of bells announced the times for the various activities. Rewards included showy trinkets, extra clothing and food luxuries such as chocolate and sugar. Withholding privileges was the principal means of correction since corporal punishment often





*During reconstruction of portions of Mission Espiritu Santo in the 1930s, the granary walls were rebuilt and finished with plaster, much as the original structure was finished. Wall portions still standing when reconstruction started were left unplastered, so park visitors can see the original stonework.*

*The missionaries' influence and exposure to European-style goods caused extreme changes in the Indians' lifestyle. Adoption of European dress and religion were outward signs of profound alterations, some would say destruction, of the Indians' culture.*







*Small rooms adjacent to the west end of the granary were priests' quarters. The floors are of original clay bricks fired at the nearby kiln. Although the bricks appear well-preserved, they crumble easily if walked on.*

A. NEEL

caused the neophytes to flee.

Despite the attractions of mission life, the missionaries experienced difficulty in keeping the neophytes from running away. Flight, even if only temporary, provided escape from a tedious discipline which was totally new to them. Hunger, however, often induced them to return.

The priests assigned to Espiritu Santo were Franciscans from the missionary college at Zacatecas, Mexico. They received some training in the practical aspects of running a mission on the isolated frontier, but mostly they learned on the job. Many dedicated their lives to the saving of pagan souls, and a number died and were buried at Espiritu Santo.

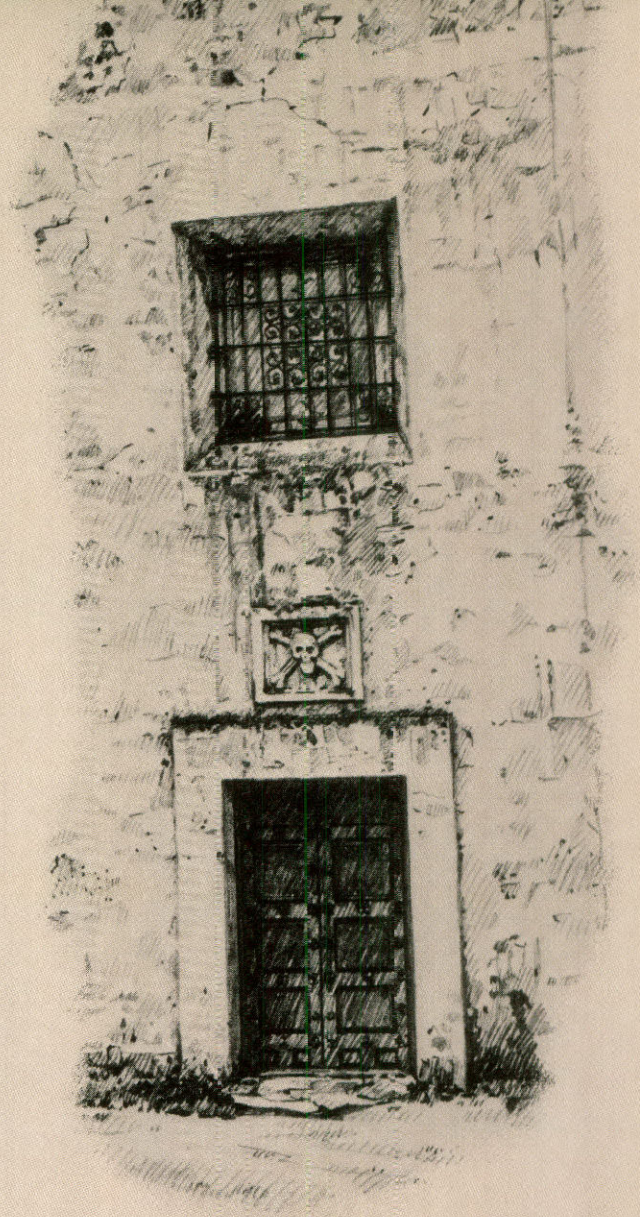
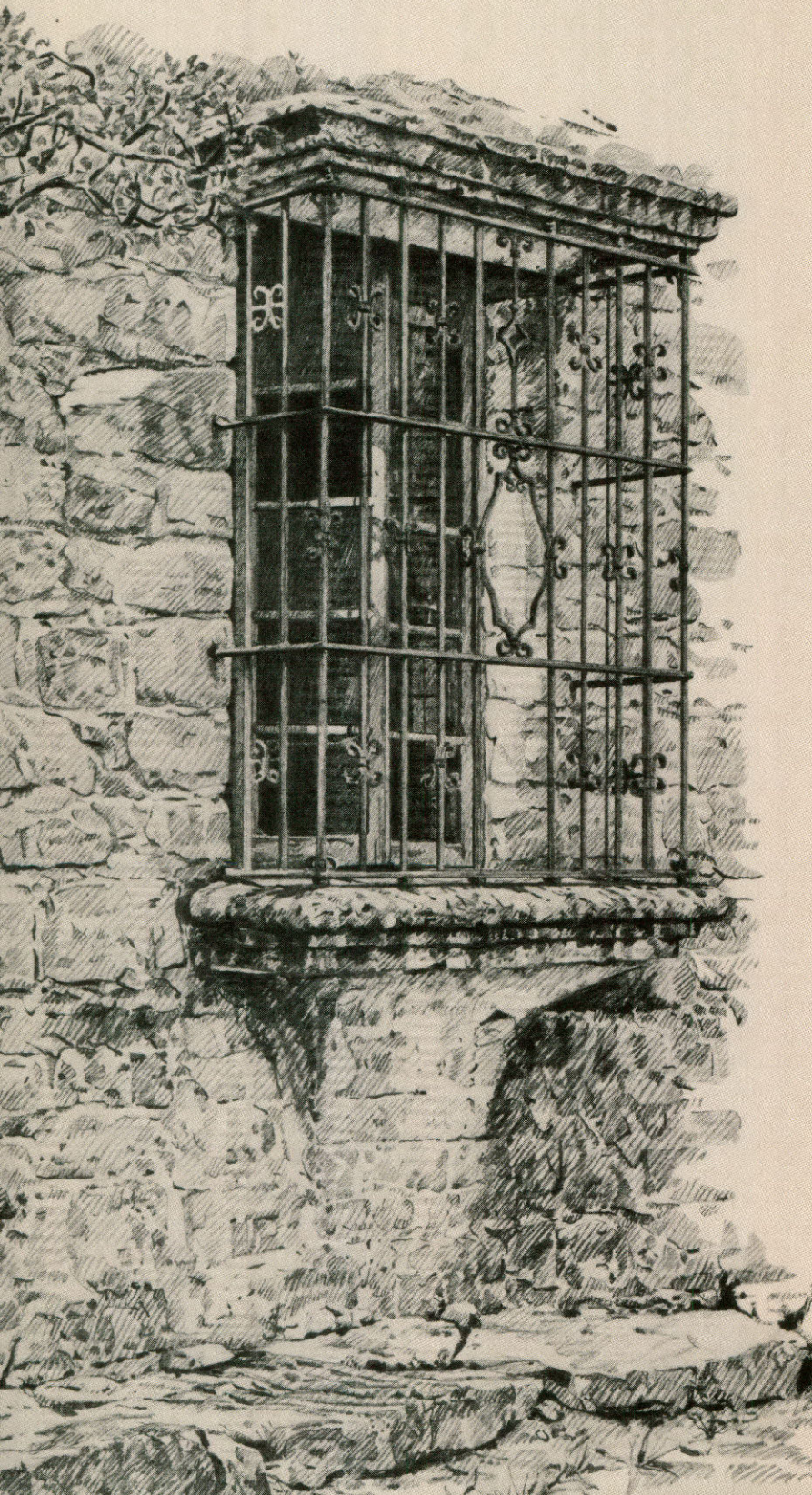
Soldiers from the presidio nearby were assigned to protect

the mission. The soldiers also were expected to help the missionaries in the difficult and often exasperating task of teaching the neophytes.

Too frequently, however, the ecclesiastics and the military authorities quarreled over responsibilities, authority and priorities.

Espiritu Santo had mixed results in its efforts to achieve the goals of economic self-sufficiency and saving souls. On the economic side, crops failed regularly because of drought, and at those times corn had to be carted either from the missions at Bexar or from those on the Rio Grande. The cattle herds, on the other hand, increased rapidly in numbers and provided food and extra income  
*(Story continued on page 8)*





*Architectural features of the mission are partly functional, partly symbolic and partly decorative. The seemingly incongruous symbol of the skull and crossbones (above) was a motif common to mission architecture of the period and was meant to symbolize the transitory nature of life.*

*The reconstructed iron grille window on the north wall of the workshop is an example of the missionaries' interest in decorative features. Metal fragments found on the site indicate the workshop once had a similar window. The original grille probably was made at the mission forge.*

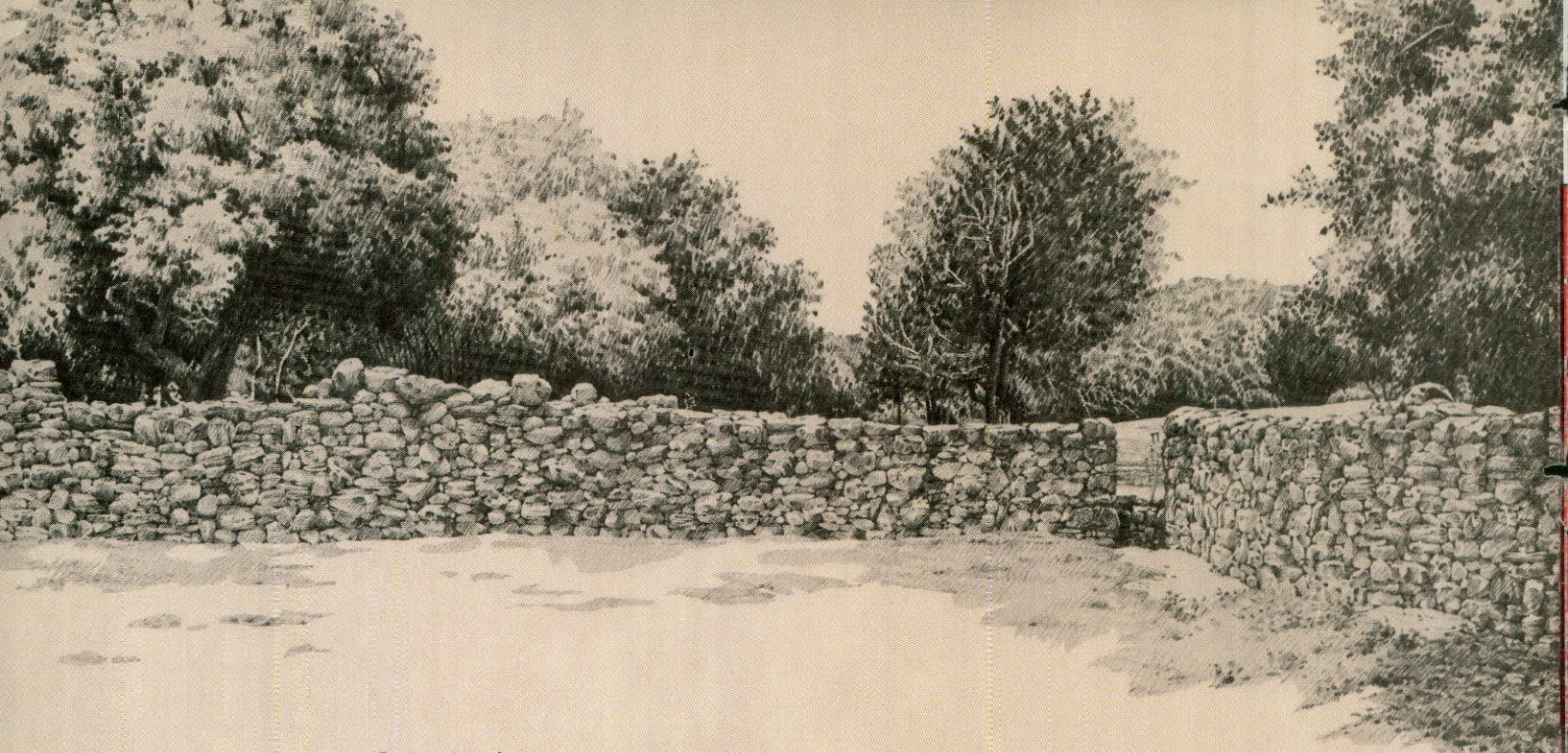


Archaeological excavations revealed the mission's well was located in this low place near the corner of the church and granary. Historians have concluded from other constructions of this period that the well was of stone construction finished with smooth plaster, as were the walls of the church and granary. This protected water supply was essential to the safety of the mission and its inhabitants.



A. NEEL





*Projecting from two corners of the mission compound, tall bastions protected approaches to the walls and were used for sentry posts. At its original height, the southwest corner bastion commanded an excellent view of the river and the countryside beyond it. Discovery of foundations of a semi-circular adobe wall, which enclosed this corner into a corral or pen, has raised some questions which may never be answered. Was it used to pen oxen, horses or sheep, or was it built for an entirely different purpose?*

with which to purchase goods from Saltillo.

The religious achievements were similar. Permanent conversions to Christianity were made, but the greater number abandoned Christianity in favor of their traditional pagan ways. The permanent Mexican community of La Bahía grew up around the presidio, not around the mission.

The greatest difficulties facing the mission arose from the raids of the feared Lipan Apache and Comanche. They killed neophytes and slaughtered large numbers of cattle and, since the military was unable to pacify them, were the most important cause of the mission's decline. Though the mission endured until 1831, the last four decades of Espíritu Santo's history were filled with frustrations and failure.

A partial reconstruction of Mission Espíritu Santo is the central feature of Goliad State Historical Park, and the history of the mission is told in exhibits located in the granary, which opened to the public in 1976. The exhibits include a model which shows how the mission probably looked at the height of its development. Dioramas portray various activities in the life of the mission and its inhabitants. Illustrations, artifacts and descriptive texts give basic information. The last section of the exhibits describes the historical and archaeological research behind the reconstruction.

An audiovisual program depicts the culture of the Aranama Indians before European contact.

The mission is further brought to life in a portion of the workshop where appropriate

artifacts and replicas illustrate the spinning, weaving and pottery-making which were done there. The office of the mayordomo, who was the Indian overseer, also has been refurnished to provide an understanding of the functions of the administrative center of the mission.

Religious aspects of mission life soon will be emphasized properly with the refurnishing of the church. Based upon an inventory compiled in 1783, furnishings in the church will include a main altar with paintings and statues and two side altars.

With the help of the park interpretive staff, these exhibits and refurnishings will give insight to life in the Spanish missions and their role in the development of early Texas.

\*\*





*Mission Indians lived in quarters constructed along the inside of the compound walls. The first shelters, simple huts built with pickets and thatch, were called jacals. These dwellings eventually were replaced with more permanent structures made of wood, adobe and stone. Along the west compound wall are the only surface remains of these quarters. Stone foundations and, at one point, this well-preserved stone hearth, can still be seen today. The Indians lived and cooked in family units rather than communally.*





# Supplemental Feeding

## More than scattering corn

by Jim R. Perkins, Wildlife Biologist

**Many landowners and hunters** consider supplemental feeding an important factor in deer management and a source of nutrition when native forage is in short supply. Under certain conditions a supplemental feeding program can help, but most deer feeding programs do

not provide enough additional nutrients to be of any value.

There is a distinct difference between feeding and baiting deer. Maintaining deer feeders from October through December is a common practice on many ranches to attract deer to hunting blinds, during the hunting season. Unfortunately, most of these baiting efforts stop just before additional feed is really needed by the deer. Supplemental feeding should be done during stress periods, and then only under specific conditions. Stress periods for deer are usually encountered when the protein content of the forage is at a low level during severe winters and dry summers.

Supplemental feeding of deer





*During severe winters and dry summers when protein content of forage is low, supplemental feeding can help, but most feeding programs do not provide enough nutrients to be of value. The best way to insure adequate nutrition is through good range management.*

rate. If large numbers of deer are desired, domestic livestock must be reduced to prevent damage to the range. Under good range conditions, deer and cattle do not compete for food; however, deer, sheep and goats are in direct competition for the available food supply.

Supplemental feeding of deer may be beneficial if the herd is harvested adequately each year and the range is in good condition. Only under closely controlled conditions will supplemental feeding benefit growth rate of body and antlers. The benefits of a supplemental feeding program are best realized when feeding is done within deer-proof fenced areas that permit the landowner to closely control deer numbers.

An important consideration in any feeding program is the type of feed to be used. Feed types vary from fertilized food plots to commercial feeds in the form of cubes, pellets and blocks. In East Texas, the most popular way of supplementing the diet of deer is to plant crops such as oats, peas or winter wheat. Deer eat most agricultural crops but prefer those which are fertilized. Fertilization of native plant species will produce an increase in usage of these plants by deer.

In the Texas Hill Country the most popular feed used is corn, although it is one of the poorest types of deer feed available. Corn is low in protein (approximately seven to eight percent) and high in carbohydrates. Deer need a daily diet that contains at least 16 percent protein for optimum development of bones and muscles. A diet of less than 10 percent protein may result in inferior animals and poor antler development. Supplemental feeds should be at least 16 percent protein and include a two to one calcium-phosphorous ratio.

Studies conducted by Texas Parks and Wildlife Department

biologists have indicated that vast acreages of Texas' deer range are overgrazed by domestic livestock and the levels of crude protein in available deer forage is below desired levels. The exception is in the South Texas Brush Country where protein content in forage varies from season to season but maintains a higher annual average than most other areas of the state. In the Edwards Plateau, or Hill Country, the average annual protein content in the vegetation utilized as deer food is below the desired level on the majority of the range. Add an overpopulated deer herd, overgrazed and overbrowsed ranges and the result is relatively smaller deer and bucks with inferior antlers.

If deer have the genetic capability for quality antlers and body size, good quality bucks result from a combination of adequate nutrition, good calcium and phosphorous during early stages of body and antler development. A buck will usually be at the peak of body and antler development when 4½ to 5½ years of age.

Before a supplemental feeding program is started, a landowner should examine his ranch and determine if (1) his deer herd is at or slightly below carrying capacity of the range, (2) the range is in good condition and (3) his annual harvest is adequate. Accurate field records need to be maintained to manage a deer herd. Records of annual harvest of bucks and does, field-dressed weights of animals harvested, antler measurements of bucks (inside spread, basal circumference of main beam, number of points) and, most important of all, the age of the animals harvested should be maintained annually. Other information that might be of importance to the rancher is a vegetation inventory of forage plants available and annual usage of forage plants. Parks and Wildlife Department biologists are available to assist landowners in establishing harvest quotas for their particular ranch. If the deer herd is on poor range and overpopulated due to inadequate harvest, then a supplemental feeding program would be a waste of money and effort.

can be expensive but, unless properly done, it is of little or no benefit to the deer. The most efficient means of insuring adequate nutrition is through a good range management program that provides sufficient cover and a variety of browse plants as well as forbs. This is done by reducing deer and domestic livestock numbers to levels that allow the range to recover and remain in good condition. A common mistake made by many landowners attempting to develop a range management plan is to omit the number of animal units of deer present when calculating use of the range. If deer are present, they are utilizing available forage and must be considered as part of the stocking



When the decision is made to initiate a supplemental feeding program, a type of feed must be selected. Food plots of oats, peas, peanuts or winter wheat can be planted where cultivation is possible and soil types meet the requirements of the crop to be planted. In some areas of the Edwards Plateau where food plots are not possible because of the rocky terrain, feeding by hand or the use of automatic feeders are two methods that may be considered. Range blocks containing 20 to 36 percent crude protein or cubes (16 to 20 percent protein) should be considered. If automatic feeders are used, a pellet of at least 16 percent crude protein would be desirable. A 3/16-inch cube-size pellet is necessary to eliminate jamming of the feeder mechanism. Only commercial feeds containing crude protein and not urea should be used. Deer are unable to digest urea protein.

The landowner may discover that his deer will not immediately belly up to the feed trough and start eating. Deer must learn to take supplemental feeds. Where deer have utilized corn in the past, it would be wise to mix the corn with the cubes or pellets at the beginning of the feeding program. As the deer become accustomed to the commercial feeds the amount of corn can be reduced gradually and finally eliminated. Protein blocks may be placed at feeding stations to provide a source of supplement that will be available at all times.

Deer pellets can be prepared by most feed dealers. The following feed formula was prepared and is used by the Texas Parks and Wildlife Department in one of the white-tailed deer research studies on the

Kerr Wildlife Management Area near Kerrville. This feed is in the form of a 3/16-inch cube-size pellet and contains 16 percent crude protein; no urea is used.

- 20 percent peanut hulls
- 20 percent corn meal
- 5 percent dehydrated alfalfa meal
- 22 percent ground milo
- 15 percent cottonseed meal
- 10 percent soybean meal (44 percent)
- 5 percent masonex
- 2.5 percent vitaway fortifier (trace minerals)
- 0.5 percent vitamin/trace mineral premix
- 40 grams aeromycin per ton

It should be noted this feed is used on penned deer and is considered a total diet, containing more bulk or fiber in the form of peanut hulls than would be necessary for deer on native range. The protein content of the feed could be in-

creased by reducing the amount of peanut hulls and increasing the amount of cottonseed meal. This would, of course, increase the cost of the feed and would provide little additional benefit because excess protein would not be digested. The feed formula as given above is considered a good supplemental feed for range-fed deer and costs very little more than corn.

In summary, a supplemental program may prove beneficial under certain conditions. In most cases, however, the best way to feed deer is through good range and domestic livestock management and an adequate deer harvest.

The Texas Parks and Wildlife Department has a staff of trained biologists and technicians to assist landowners in their deer management program. In addition, six extension biologists are available to develop management plans for individual ranches. \*\*

*Combat poor nutrition with adequate deer harvest and good range management.*



Martin T. Fulfer

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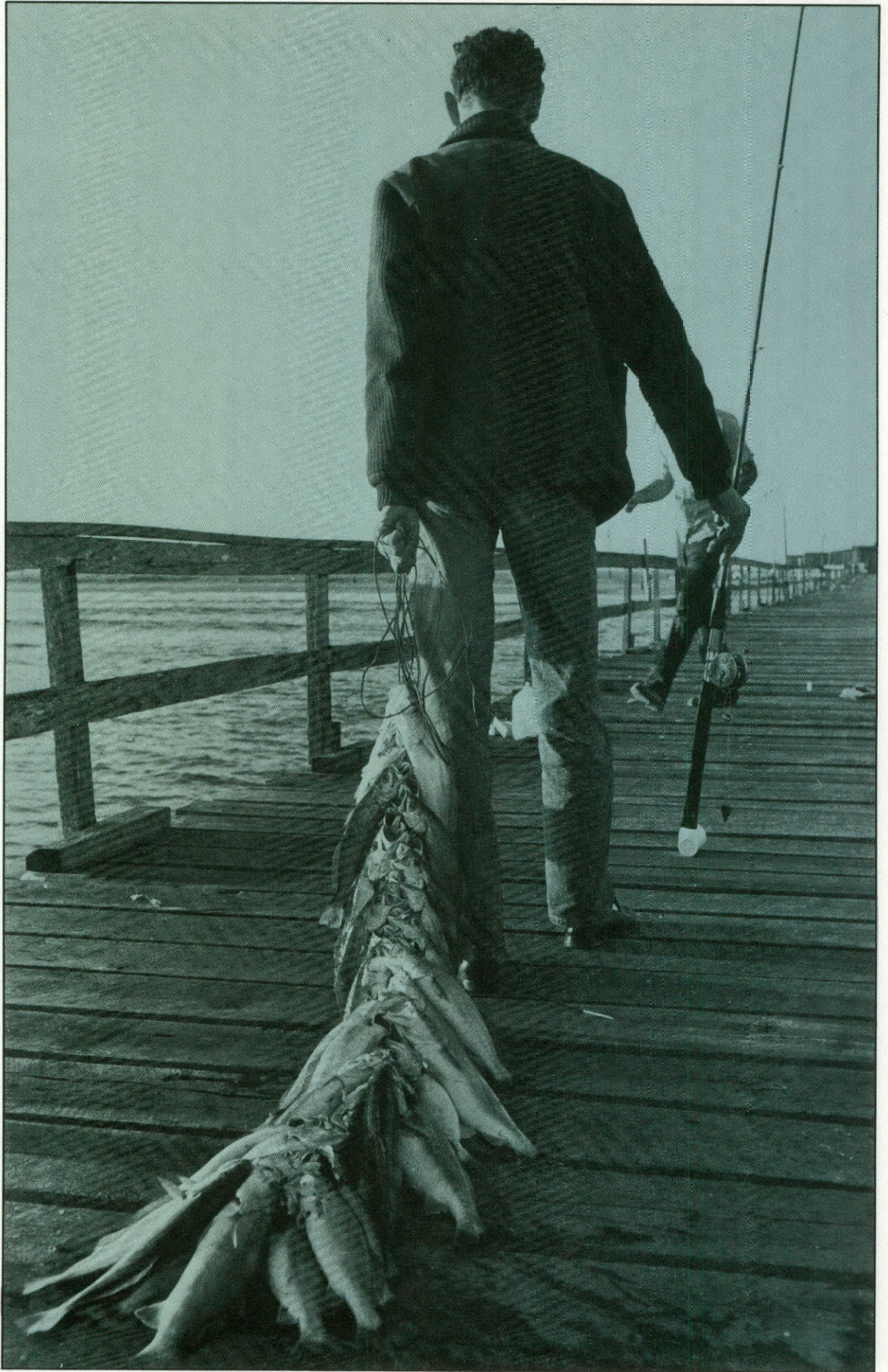
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Buddy Gough



# Winter Fishing

North wind howling.  
Water thick as mud

and the color of hot chocolate.

Time to put aside the rod and reel  
until next spring.  
No use fishing now;  
you can't catch fish  
in winter. Don't  
you believe it!

by Ernest G. Simmons, Coastal Fisheries, Rockport

Along the coast some of the best fishing occurs in winter, and some of the biggest fish are caught then. It's true there often are slack times between the fall and spring "runs," and it's true the open bays can get rough and dangerous. But it's also true fishermen who know local waters frequently take home full stringers.

Texas winters are characterized by sharp intense northers normally followed by a few days of calm. During these calm spells bay waters may turn crystal clear with a greenish cast, a condition encountered most often on the bay side of the barrier islands. Fishermen seeking these areas should stay alert to weather forecasts because a sudden norther sweeping in can turn an enjoyable occasion into a wet, miserable and even dangerous trip.

Winter fishing really begins in the fall. In October flounder start moving toward the Gulf to spawn, and this migration sometimes extends through December. Knowledgeable fishermen seek them along the edge of channels and passes. Some fish at night using lanterns and gigs. Others fish during the day, bouncing worm jigs, strips of squid or dead shrimp slowly along the bottom. What many fishermen don't know, however, is that some flounder remain in the bay year around. These fish, usually found in deeper water, can be caught all winter.

Although primarily a fall fishery, the croaker run does extend into winter, particularly in mild years. Croaker are not large fish, seldom weighing more than two pounds and averaging much less, but they are fine fighters and good eating. The best fishing spots are channels leading toward passes. When the run is in full swing, a fisherman can sit comfortably on the bank, insulated from the wind, and catch strings of 50 fish or more. With double leaders, two fish on one cast are not uncommon. Medium-sized tackle should be used to get the full benefits of the sport this scrappy fish can provide.

Some fishermen won't break out a rod and reel un-

less the wind is howling and the water rough and muddy. Then they go out on piers or jetties and fish for big black drum. Usually they are equipped with heavy tackle capable of casting a bait well beyond the range of the average angler. Each fisherman has his favorite spot, usually a small reef or a depression in the bottom. They frequently bring home fish.

Other people like to work the surf for redfish and seatrout. They seek remote areas and fish during the fall and winter, often staying overnight. They use cut bait when the wind is high and the surf muddy, but during calmer weather they use lures and spoons. The successful ones are experts at reading the surf to detect favorable angling spots. They wouldn't trade this for any type of summer fishing.

The occasional blizzard which hits Texas can lead to a real bonanza for the hardy angler. As waters chill, fish move from the shallows into deep channels, holes and basins. Recently dredged boat basins seem to be more attractive to these fish than older ones which may be polluted. If the weather gets cold enough, well below freezing, the fish in the basins begin to lose equilibrium and come to the surface where they can be scooped up with nets. If the cold persists, they may die.

If the weather stabilizes before loss of equilibrium sets in, the fish, particularly seatrout, lie like cordwood in the deep water. They will hit a bait or lure, but may do so slowly. They also may be snagged by the angler. At times large fish are abundant, but they may be so full of smaller fish, which show distress first, they won't hit anything. Sometimes fishing picks up as the water begins to warm and the fish move about more. Basin fishing is very popular in South Texas.

Winter fishing has some advantages over summer angling. On the average, the game fish are often larger, and there are fewer bait-stealing trash fish such as hardheads and pinfish.

Winter fishing can be miserable when the wind seems to cut to the bone and chill the blood but simple precautions can alleviate this discomfort. Several layers of warm clothing, with the outer layer in the form of a wind-proof slicker suit, provide good protection. It's a good idea to avoid large open bays in small boats, even in the calm between blows. Fishermen who do go out in boats should wear good life preservers and let people know where they are going and when they plan to return. It's only sensible.

Always bear in mind that in Texas winter winds may howl and scream, but the days between blows are some of the most pleasant of the year. Small fish may be scarce, but large ones are there for those who meet winter's challenge.

\*\*



Millions of people go backpacking in the United States each year in search of fresh air, exercise and solitude or just for a brief taste of freedom from the complexities of everyday urban existence. Some of these recreationists are learning the hard way that a significant number of state and federal laws have been passed which place restrictions and control on their wilderness experience.

Most people do not know that recent federal and state laws on backpacking can get a naive hiker or camper into trouble. The code of Federal Regulations Title 36 for camping in Restricted Use Areas carries the possible penalty of a \$500 fine and six months in prison. This is, indeed, a harsh and unpleasant fact which confronts the users of American National Wilderness Areas. Ironically, backpackers seeking temporary escape by embarking on a wilderness experience often arrive at their destination only to find as closely regulated an environment as the one they were trying to escape. However, before you bristle with indignation at the thought of it, let's look at why these regulations have come about.

Backpacking, as a recreational activity, has existed for many years, but only within the past few years has it become so widely popular. The rapid increase in the number of backpackers and the fact that no training is required for backpacking are the major factors contributing to the problems facing today's wilder-

ness. Also, backpacking, like many other activities, attracts participants from all walks of life, with varying degrees of experience and education. Consequently, the poor judgment and undesirable actions of some hikers, backpackers and other wilderness users, such as equestrian trail riders, have brought about detrimental environmental effects which reflect negatively on all wilderness users.

One such undesirable act is the habit some trail users have of cutting straight down the slope between switchbacks when descending from a high point. Switchbacks are trails built on steep slopes that zigzag back and forth across the slope. They not only provide an easy way for hikers to ascend steep slopes, but they also deter erosion caused by overly steep trails. While cutting straight down the slope may save the backpacker a few seconds in hiking time, it also does great harm to the trail by damaging plant life, loosening soil and causing rocks to roll downhill. The result is serious hillside erosion. Remember, trails are built at great expense to assure the hiker maximum ease in travel and exposure to nature while protecting the environment.

In Idaho's Sawtooth Wilderness, countless millions of footsteps have

eroded deep ruts into the fragile alpine meadows. Nationwide, campers and backpackers have seriously damaged the ecological balance of many streams by dumping dishwater, grease, detergent, chemicals, oils, cigarettes, tin cans or toilet paper and sanitary napkins into these streams or along their drainage areas. Government officials and environmental coalition groups are warning recreationists to clean up their actions and conduct or these

groups will take the necessary measures to force campers to coexist with the flora and fauna. This means leaving as little sign of passing as possible.

Many hikers, seeing the proverbial handwriting on the backpackers' trail, now willingly carry out debris and litter left behind by others who were careless, callous or thoughtless. Boy Scouts are no longer taught pioneer survival techniques, such as cutting soft

*Perched atop a mountain ledge in Big Bend National Park, the backpacker enjoys spectacular scenery that extends as far as the eye can see. The climb is well worth the effort as the mountain air invigorates the body, clears the lungs and sharpens the mind. How tragic it would be if the careless actions of a few could one day deny this pleasurable experience to all backpackers.*

# BACKPACKING

## An endangered sport

Article by Hal Toy  
Photo by Jim Work



boughs to sleep on or digging rain trenches around their tents. The Scouts' long-range goal is to have no detrimental impact on any wilderness area they may visit.

The blazing campfire of yesterday is becoming a thing of the past in wilderness areas. Informed backpackers have realized the negative environmental effects of such campfires. Story telling around the dying embers is being reluctantly swapped for less impact on slow-to-recover topsoil. When practical and when wood resources permit the luxury, primitive trails encompass a nonintrusive campsite with a built-in fire ring.

Some backpackers tote a few charcoal briquets or hardwood charcoal along for a campfire. More important, most of the experienced backpackers have discovered the practical benefits of miniature gas, alcohol or butane stoves designed for backpackers. Such stoves are clean, efficient, extremely compact and simple to operate. With such a device tucked away in their packs, campers eliminate the frustrating need to search for firewood. They forgo the pleasure of a roaring campfire in exchange for the knowledge and feeling that they have left untouched the precious and slowly renewable natural resources of the campsites.

According to Robert L. Reid's "The New Wilderness Ethic" in the June 1977 *Elks* magazine, recent legislation is bringing home the growing concern over the lax ethics of a growing number of wilderness users. Some of the examples he cites are:

- All designated camping areas along the Appalachian Trail in Great Smoky Mountain National Park are strictly limited to 14 persons each.

- In New Hampshire's Great Gulf Wilderness, no camp may be set up within one quarter mile of another, or within 200 feet of a trail or stream.

- A fine of \$500 has been set for failure to safeguard one's food cache against bears in Yosemite National Park.

- Only 75 persons per day are

permitted access to California's Mount Whitney Trail.

- A computerized Wilderness Permit System now places strict controls over admission to National Wilderness Areas, and is used in a general way to plan the itineraries of all persons who are granted entrance.

Loss of resources through overuse and destruction of wilderness character are the prime reasons for imposition of controls. Widespread voluntary adoption of conservation-minded backpacking practices may offer the only hope of slowing or minimizing the trend toward legislative control.

Reid offers to the backpacker the following ethics guidelines:

- Camp only on mineral soil (not meadows or soft vegetation), at least 100 feet from streams and lakeshores. Whenever possible, camp at existing sites.

- Attempt to keep all trails and campsites in as natural a state as possible. For example, do not blaze trees, make improvements of any kind, cut wood or otherwise disturb the natural setting.

- Pack out everything you packed in. If you find litter left by others, pack it out as well.

- Use a stove instead of a campfire.

- Wash yourself and your dishes without soap (water only), away from lakes and streams.

- Bury all human waste at least eight inches deep and at least 150 feet from water.

- Stay on the trail. Never take shortcuts.

- Make it your goal to leave any wilderness area in exactly the same condition as you found it.

- Wilderness should be preserved, not for our pleasure, but because it has an integrity of its own.

An additional area of increasing environmental concern is the disturbance of soil and resulting wind and water erosion caused by the cutting action of the waffle tread almost universally present on hiking boots. On most trails, boots with a tread design which does not loosen the soil are just as good as those with the waffle pattern.

The wilderness areas of America are as vital in the complex fabric of life on earth as is man. If for any reason we deserve to be preserved, then for precisely the same reason, so must they, Reid states.

Michael Abel defends backpacking in his book *Backpacking Made Easy* by declaring: "Contrary to popular conception backpacking is a very safe sport. Backpackers seldom get hurt. The fresh mountain air invigorates your body, cleanses your skin, clears your lungs and sharpens your mind. It is one of the few sports which is open to everyone, be they young or old. It is also a sport in which everyone can participate, not spectate. Furthermore, it is a sport in which everyone wins, and the prizes are many."

Backpacking represents an attempt by man to reintegrate himself with his environment. Man desires

Photographs by Orion Knox





to see, smell and touch nature again. Most people's exposure to nature consists of the trimmed lawns of suburbia, the crabgrass of an empty lot or the controlled environment of a city park. The artificial environment of our megalopolises deprives us of a sensitivity to nature. The backpacker yearns to venture beyond the domain of mechanized mankind. In the wilderness or even the primitive camping areas of some state parks, an air of tranquility and purity challenges the camper to once again, for a few fleeting moments, reclaim an air of individuality and a sensitivity not to be found in everyday life.

In addition to the quest for nature, some people set off on wilderness trails to test their physical stamina, vim and vigor or to seek specialized information on plants, flowers and fauna. Still others

merely come to enjoy the serenity of the natural environment. Backpackers are a special breed who know that the best tasting fish in the world can be caught and cooked in the outdoors. They have not been seduced by our high-technology, contemporary civilization to where a state of atrophy exists. Instinctively, there is still a little "call-of-the-wild" in their nature. \*\*

*EDITOR'S NOTE:* Next month, how to get started in backpacking — proper equipment, how to use it and where to get it.

*Cold temperatures or rainy weather are but two challenges faced by backpackers in the pursuit of their sport. With the proper equipment tucked away in their packs, they are ready to face these inconveniences of nature. A slicker effectively sheds the rain while a down-filled sleeping bag inside a light-weight tent serves as a cocoon against the cold.*





# around the state...

News of the Texas outdoors from the Parks & Wildlife Department's news service.

## ARTIFICIAL REEF PROGRAM CONCLUDED

AUSTIN—The recent establishment of a small wade fishing reef in Tres Palacios Bay has concluded the Texas Parks and Wildlife Department's current artificial reef construction program.

Located in four feet of water just off the Palacios shoreline near the so-called "Baptist Encampment," the new reef will be easily accessible to wade anglers and should soon be attracting game fish.

Like all the artificial fishing reefs which have been placed in Texas bays, the wade fishing reef was constructed with old automobile tires which in the past in other states had proven to be excellent reef materials.

The wade fishing reef is constructed with only 120 tires, but unlike the reefs dropped into deeper bays, the tires are not stacked. Rather, they are bound tread-to-tread to lie flat on the bottom, covering a large area.

In the Tres Palacios project and the department's deep-water reefs, several private organizations and industries helped get the job done.

The special machine used to prepare the automobile tires for the reef construction is owned by the Goodyear Rubber Company which loaned it to the department for the duration of the artificial reef program. Goodyear also aided in obtaining tires for reefs in Aransas and Corpus Christi Bays.

For the largest reef project in Sabine Lake, assistance was given by Lamar University, the Sabine-Neches Conservation Club, the Pleasure Island Development Commission and the Payless Tire Company. In addition a tug boat was furnished by Mike Smith, a barge by Bill Monroe, a dragline by County Precinct Three and dragline mats by the Quality Mat Company.

Equipment and transportation assistance for the Galveston Bay reef and the Tres Palacios Reef was given by Parker Brothers of Houston.



STATE RECORD—Robert Haas of Sherman with his state record 28-pound, four-ounce striped bass caught below Denison Dam Oct. 30.

## STATE RECORD STRIPER, BARRACUDA CERTIFIED

AUSTIN—If there ever was any doubt about the tailrace at Denison Dam below Lake Texoma being a striped bass hotspot, it is forever laid to rest.

Back in December of 1974, John M. Smith of Pottsboro hauled out a state record striper there weighing 27 pounds, 5 ounces. Then, on October 30 of this year, Robert Haas of Sherman caught a 28-pound, 4-ounce beauty out of the same area to establish a new state record.

Haas' fish measured 39½ inches in length and 24 inches in girth and was caught on live bait.

The fish was certified by the Texas State Fish Records Committee of the Parks and Wildlife Department.

The department also recently certified a new saltwater state record barracuda, caught by Henry Ed Foerster of Universal City on July 24. The fish weighed 46½ pounds and was caught 26 miles southeast of Port Aransas. The former record was held by Mark E. Johnson of Houston with a 45-pounder.

## APPLICATIONS ASKED FOR WARDEN TRAINEES

AUSTIN—The Texas Parks and Wildlife Department has begun accepting applications from prospective trainees for the 33rd game warden school set for September, 1978.

Deadline for receiving applications will be Feb. 28.

A series of interviews will be con-

ducted in the various law enforcement regions around the state in April, with final selection of the class being made in July.

Interested persons should contact department regional or district offices or Austin headquarters, 4200 Smith School Road, Austin Texas 78744.



## COMMISSION REOPENS TRANS-PECOS DUCK SEASON

AUSTIN—The Texas Parks and Wildlife Commission has re-opened a large area of the Trans-Pecos previously closed to all duck hunting.

The department staff asked the commission to open the area to duck hunters in response to a federal judge's ruling that the state should reconsider its Proclamation No. 34, which established waterfowl seasons.

The closing of all or portions of eight Trans-Pecos counties had been mandated by the U.S. Fish and Wildlife Service in order to afford protection for the Mexican duck, an endangered species.

The Parks and Wildlife Commission reluctantly acceded to this order by closing the waterfowl season "in those counties south of Interstate 10 from the New Mexico line to Fort Stockton, from there south along U.S. Highway 385 to Big Bend National Park and along the western edge of Big Bend to the Rio Grande."

## OPTOMETRISTS CHECK VISION OF HUNTER SAFETY STUDENTS

AUSTIN—Good vision is a part of hunting safety, so the Texas Parks and Wildlife Department and the Texas Optometric Association are cooperating on a volunteer program to detect vision problems among hunter safety program students.

Optometrists across the state are volunteering to perform free visual screening and in many cases are giving educational talks and literature to youngsters enrolled in hunter safety courses.

Department hunter safety officials stress that the eye tests are entirely voluntary and are performed only by professional optometrists.

A vision chart is used to determine visual acuity (keenness of perception). Also there are tests for color perception, peripheral vision, dominant eye and hunters' ability to use open sights.

Persons interested in hunter safety courses should contact department district or regional offices or the headquarters at 4200 Smith School Road, Austin, Texas 78744.

Subsequently, a group of sportsmen filed suit in U.S. District Court for the Western District in El Paso, asking the court to enjoin the department from enforcing the Fish and Wildlife Service order.

The group's petition contended that loss of habitat and interbreeding with the mallard duck are the two main threats to the species, rather than

hunting pressure.

The same state regulations that normally would have applied to duck hunting in the Trans-Pecos were maintained with the exception that mallard hens were protected—a feature of the regulation designed to protect the Mexican ducks which closely resemble mallard hens—and shooting hours of sunrise to sunset were established.

## LACK OF BRAUNIG SPAWN NUMBER ONE BASS MYSTERY

AUSTIN—In the disciplined world of science there apparently still is room for a good old-fashioned mystery.

Such a mystery exists in the waters of Victor Braunig Lake on the outskirts of San Antonio—and Texas Parks and Wildlife Department biologists have been trying to solve it for the past six years.

The mystery is simply "Why won't black bass spawn in Lake Braunig?"

The question was raised in 1968 when Braunig was a four-year-old impoundment. The bass spawn that year—and every year since—was zero.

A six-year study was launched in 1969, when department fisheries biologists started conducting every conceivable test on the fish and their environment to find the cause.

From that point on, a variety of interesting data unfolded. One oddity was that while spawning was halted, black bass fry released into the lake grew at a remarkable rate.

Even to the present, Braunig is known to fishermen as a "big bass" lake, with heavy, thick-bodied lunkers being caught with some regularity. But this stocking success still doesn't answer the non-spawning question.

Neil Carter, the department's director of inland fisheries research, said the Braunig problem points up the fact that lakes which are utilized for power plant cooling have a higher than normal water temperature. "When you artificially change a lake's water temperature you alter a number of factors which can affect fish," Carter said.

But strangely, temperatures in Braunig have consistently been within the normal parameters for bass reproduction, Carter noted.

Part of the experiments included investigations of conditions in nearby

Calaveras Lake, another power plant lake which shares its watershed with Braunig. Biologists have seen signs that whatever is inhibiting the spawn in Braunig is beginning to do the same in Calaveras.

Here are some of the experiments conducted in an attempt to isolate the cause of spawning difficulties:

—Bass taken from Braunig and placed in hatchery ponds started spawning two days later.

—Bass from a normally reproducing population in Calaveras Lake failed to spawn when placed in pens in Braunig, but fertilized bass eggs collected from a private lake hatched in Braunig Lake water and healthy fry were produced.

—Hormone injections failed to make mature bass from either lake spawn when placed in pens at Braunig.

The Braunig bass exhibited no physical abnormalities on examination except a liver condition that should not have had any effect on reproduction.

The biologists' report said "... Reproductive failure was apparently not due to poor water quality, overabundance of other fishes, parasite infestations, unusual blood components, pesticide or heavy metal contamination, spawning substrate deficiencies or egg or fry mortality."

The repressive agent, biologists concluded, apparently is present in Lake Braunig water but cannot be identified at present.

Carter said that unless conditions somehow change the bass population will have to be supplemented through regular stocking.

"With the increasing number of water-cooled power plants in the state—both nuclear and non-nuclear—we may be seeing a lot more problems like this in fish management," said Carter. "Each one will have to be monitored individually and treated as an entirely individual case."



# FREEZING TO DEATH

by Jeffee Palmer

**"Freezing to death"** is a common expression used by people who are only chilled; but the hypothermia victim is indeed freezing to death as his body core temperature drops below normal.

The human body is an electrochemical device which can only function properly within a very narrow temperature range centered on 98.6 degrees Fahrenheit. A few degrees variation in either direction causes illness. If the normal body temperature increases, the person has a fever; an equal drop, and the person has hypothermia.

Body mechanisms must cope with these temperature changes. When the body temperature goes up, the person sweats, breathes more rapidly and the skin becomes flushed as blood vessels open up under the skin surface to allow heat to escape.

When a person becomes hypothermic, the body shuts down the blood vessels close to the skin in the arms, legs and head causing the lips and skin to turn a bluish-gray. At the same time, warm blood is kept in the trunk region of the body to protect the vital organs.

Normally, the body creates more heat than is needed for its operation. Excess heat is radiated to the air around us or trapped under our clothing to keep us warm on cold days. This protective layer of warm air can be lost when wind or cold water penetrates our clothes. Once the layer of warm air protecting the body is lost, hypothermia may result.

Hypothermia is not always easy to spot. Generally, one of the first symptoms is violent shivering, an attempt by the body to generate heat through exercise. Mental disorientation is another symptom and may show up as forgetfulness, confusion, personality change, inability to make decisions or making the wrong decisions. Ask a victim how he is feeling and he might tell you he is fine, not cold at all. Victims also tend to be clumsy, los-

ing coordination and manual dexterity.

As hypothermia deepens, shivering gives way to muscle spasms, muscle rigidity and the loss of the use of arms and legs. The illness then progresses until the victim appears drunk or drugged, loses consciousness and finally appears dead. Unless steps are taken to stop and reverse the effects of hypothermia, the victim will die.

Hypothermia may be separated into two broad categories — chronic, or hypothermia with a relatively long onset; and acute, or rapid onset hypothermia.

Chronic hypothermia generally is associated with exposure to cold in inadequate clothing or shelter for a time that may range from a few hours to several days. Because chronic hypothermia takes some time to develop, the victim of chronic hypothermia should be protected from further heat loss and taken to a hospital for treatment as rapidly as possible.

Acute hypothermia, usually associated with immersion in cold water, kills 40 to 50 Texans each year. When a person is immersed in cold water, the skin and nearby tissues cool very fast; however, it may take 10 to 15 minutes before the temperature of the heart and brain starts to drop. Unconsciousness may occur when the core temperature reaches 90 degrees Fahrenheit, and heart failure usually results at 85 degrees. But a person in cold water may drown before either of these stages occur because hypothermia causes the victim to lose the ability to coordinate the movements of his arms and legs and his mind becomes disoriented.

Texas coastal and inland water temperatures, on the average, decline to the upper 50s by mid-December. Coldest water temperatures are registered in January, and they do not begin to climb until late February. During a cool spring, hypothermia could be a hazard for



**Chronic hypothermia is usually associated with exposure to cold weather for a time that may range from a few hours to several days. Acute hypothermia occurs upon immersion in cold water and may develop in as little as 10 to 15 minutes or take several hours.**

**Keep as much of the body as possible out of the water. Getting on or partially on a boat or anything else that floats increases chances of survival.**

whitewater canoeists as late as April, especially on the lower Guadalupe River.

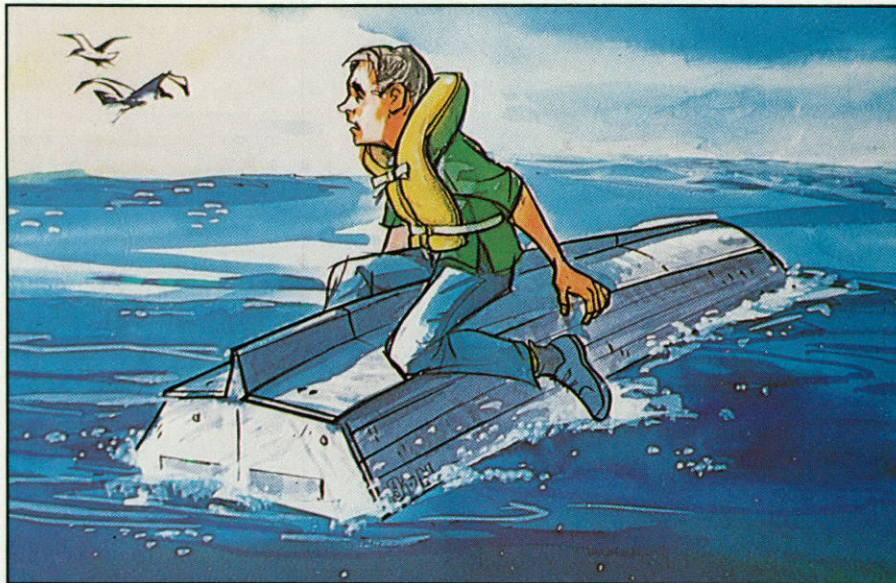
The immediate disappearance syndrome, another phenomenon associated with cold water survival, aside from hypothermia, describes the person who falls into the water, sinks and is never seen alive again. The shock of suddenly entering cold water can induce uncontrolled rapid breathing; cause intense physical pain, confusion and dizziness; and may stop the heart. Wearing a PFD (personal flotation device) is the only known protection against this type of accident.

If you must enter cold water, try





In a fetal or "Heat Escape Lessening Posture" many areas of high heat loss are protected. Keep the head out of water to reduce heat loss.



Cartoons courtesy U.S. Coast Guard

to do so gradually in order to reduce the shock of sudden immersion. In an emergency, when you must jump, try to hold your breath, pinch your nose and clamp the palm of your hand over your mouth to prevent involuntary breathing and swallowing of water.

Hypothermia requires some time to take effect. The length of time depends on how cold the

water is, as well as the physiological characteristics, behavior and clothing of the victim. Large people take longer to cool than do small people, so children react faster than adults. Thin people cool faster than fat people, and men faster than women of the same body size.

The body may be compared to a bottle holding a certain amount of

energy. The larger the bottle, the more it holds; and the better insulated it is, the slower it loses energy.

While remaining still in the water, the areas of greatest heat loss are the head, neck, sides and groin. Major arteries and other blood vessels in these areas come close to the surface and, since these areas generally are not well covered by protective layers of body fat, the blood flowing through them can be cooled rapidly.

Wearing many layers of clothing help reduce heat loss in much the same fashion as a diver's wet suit. Wool and cotton help hold heat better than synthetics.

One way to reduce heat loss is to keep as much of the body out of the water as possible. Most boats will float even when capsized or swamped. Getting in or partially on the boat or anything else that floats will increase chances of survival. If for some reason you are not wearing a PFD, or should become separated from it, locate any floating objects which you can use to stay afloat. An accumulation of flotsam also makes it easier to spot you should the boat sink.

The key to survival is the conservation of energy, or heat contained within the body. Anyone not wearing a PFD must expend some energy to stay afloat, which increases heat loss. Since the head is a high heat loss area, it is important to keep the head out of the water. For this reason, drownproofing, a technique developed for survival in warm water will, in cold water, accelerate the heat loss because it requires putting the head in the water.

A person in a PFD can assume a fetal or "Heat Escape Lessening Posture" (HELP) so many areas of high heat loss can be protected. Also, if there are several people, huddling close together in a circle will assist in reducing individual heat loss.

In 55-degree water, you can ex-



pect to survive for about 1½ hours if you are swimming. Floating still in a PFD you may survive for 3½ hours and assuming the "HELP" position you may survive for 5½ hours.

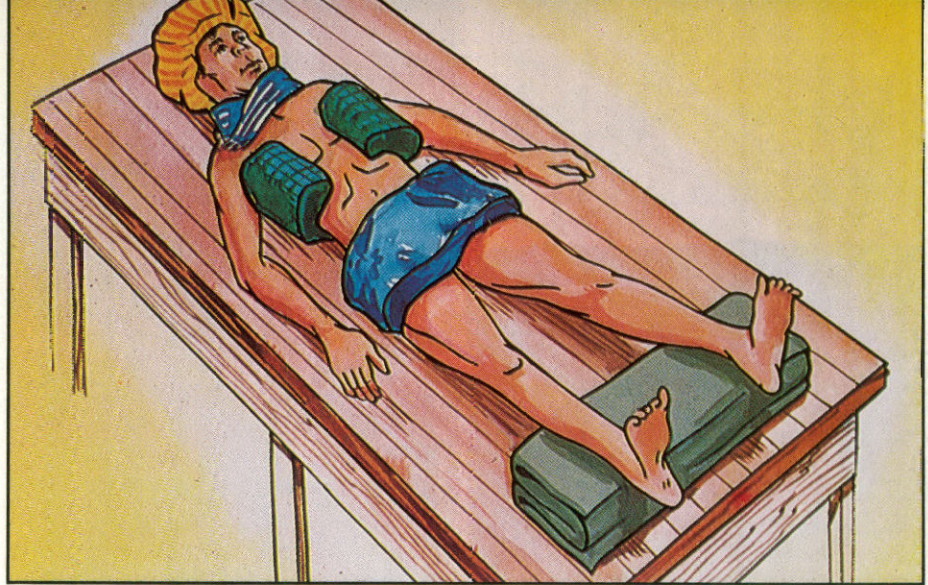
The victim without a PFD has a hard choice to make; either stay put and take his chances on being picked up, or try to swim to shore. If he elects to swim, his energy will be used at a higher rate, which might not allow him to reach shore. He must consider that he also will start to feel the early effects of hypothermia — mental disorientation and loss of coordination — while swimming. Distances on the water are deceptive. It may be farther to shore than it looks; additionally, currents and tide may work against the swimmer.

A hypothermia victim can become unconscious, but remain alive if he is wearing a PFD. His unconscious, floating body can still be picked up and saved. However, without a PFD, he will slip below the surface and drown.

Even though all signs of life are absent — no pulse, no blood pressure and the eyes fixed or dilated — cardio-pulmonary resuscitation should be administered to the hypothermia victim. Since hypothermia can lengthen the time before irreversible death of cells occurs, the victim should be declared dead only by a doctor, and then only after the victim has been rewarmed and still does not respond.

This also holds true of victims, especially children, who drown in cold water. A number of people have been successfully resuscitated after being immersed for a considerable length of time. The most notable example is a young man who was trapped in a car on the bottom of an ice-covered pond for 38 minutes before he was revived. When he was pulled out of the water, there was no sign of life, no heart beat, no blood pressure, water in the lungs and eyes fixed and dilated. He is now back in college and doing fine.

First aid for hypothermia must be started immediately. The victim may be unable to generate enough



**Place victim on hard surface with feet elevated. Wrap warm, moist towels around neck, head, sides and groin. As towels cool, rewarm them with warm water tested with your elbow.**

heat to raise the internal temperature of his body to normal operating levels. Applying heat is important but it must be done carefully. Improper rewarming may allow the colder blood in the arms and legs to reach the core of the body — the heart and lungs — and cause the temperature to drop to a level where life can no longer be sustained. A drop in the core temperature after rescue is called "after drop." It is difficult to avoid some after drop but the magnitude and duration must be reduced to the lowest possible levels.

It is important to determine what type of hypothermia the victim has because the treatment for each type is different. Victims of acute, or rapid onset hypothermia should be rewarmed quickly. Their bodies probably have not had time to undergo dangerous biochemical or fluid changes. But victims of chronic, or slow onset hypothermia may have had time for significant chemical and fluid changes to occur, because the cooling has taken place over many hours or days. They should be protected against shock and further heat loss and evacuated to a hospital as rapidly as possible.

In both types of hypothermia it is important to ensure that the patient does not lose additional body



**Even when victim can breathe on his own, mouth-to-mouth resuscitation helps by adding warmth through the rescuer's exhaled breath. Breathe with the victim.**

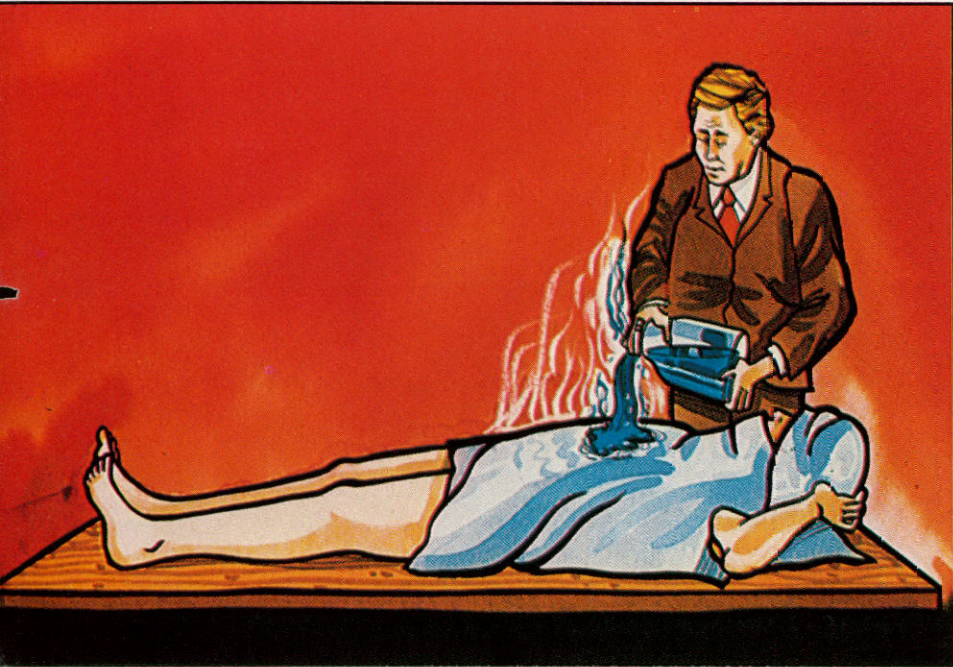
heat. Because of his loss of strength and the weakened condition of his heart, he should be handled as little and as gently as possible. Jostling or manipulation of a hypothermia victim may cause cardiac arrest.

#### **First Aid:**

Move the victim to shelter and warmth as rapidly as possible.

Gently remove all wet clothing. The feeble amount of heat energy the victim has left must not be expended on warming and drying wet clothes.





A heated blanket wrapped around victim's trunk and head also works well. Rewarm blanket by pouring warm water over it. Hot water bottles inside the blanket with the victim assist treatment. Water should be no more than 110° F. to prevent burning.

Raise the central core temperature by applying heat to the head, neck, sides and groin.

Heat may be applied in several ways:

1. Place the victim on his back on a hard surface with the head low and feet elevated. Wrap warm, moist towels or other textiles around his neck, head, shoulders, sides and groin. As these packs cool, rewarm them in water approximately 110 degrees. Check the temperature of the water by testing it with the elbow; it should be warm, but must not burn. Placing the victim on a hard, flat surface will permit the administration of cardio-pulmonary resuscitation if needed.

2. A heated blanket that can be wrapped around the victim's trunk and head also works well. An effective method of reheating the blanket is to pour warm water over it. Hot water bottles inside against the victim also work well.

3. A victim suffering mild hypothermia may be rewarmed by placing him in a bathtub filled with water of about 105 degrees to 115 degrees. Keep his arms and legs out of the water and keep the water circulating. This technique should not be used on unconscious hypothermia victims.

4. A last choice is to put the victim in a shower, directing the warm spray at his trunk.

5. A time-tested field method is for one or more rescuers to use the warmth from their own naked bodies to warm the victim's naked body. Victim and rescuers should be wrapped in a sleeping bag or a blanket to trap the body heat.

6. Another good field method is mouth-to-mouth resuscitation using the warmth in the rescuer's exhaled breath to warm the lungs. This can be used even when the victim breathes on his own, but the rescuer must be careful to breathe with the victim and not against him.

7. Wrapping the victim's head in a loose scarf or otherwise covering it, will not only reduce heat loss, but also trap some of the heat in the victim's exhaled air, using this warmth to pre-warm the next breath.

There are some time-honored

folk remedies which may cause harm or even death to the hypothermia victim.

1. **Do not** give the victim any alcoholic beverage. A shot of brandy or other alcoholic beverage relaxes the blood vessels in the extremities, allowing them to cool faster. Alcohol may give the victim a rosy glow and make him feel warmer, but it accelerates the circulation of blood and actually makes the whole body cool faster.

2. **Do not** rub the body of a hypothermia victim. Especially do not rub it with snow. Rubbing may cause injury and stimulate circulation leading to more after drop. Rubbing with snow removes additional and needed body heat and may cause cell damage.

3. **Do not** listen to someone showing signs of hypothermia when they tell you they don't need treatment. Remember mental disorientation is a symptom of hypothermia.

4. **Do not** wrap a victim in a blanket without a source of heat in the blanket with him to keep the temperature of his trunk warmer than his extremities. Otherwise, the insulating blanket may distribute the core heat to the extremities and cause after drop. If necessary, use a blanket to protect the victim from further heat loss to extremes of weather. Do not put the victim's feet in hot water.

5. Giving liquid to a hypothermia victim is not recommended. The administration of any liquid must be approached with caution. Only in cases of mild hypothermia, where the victim is merely cold and shivering, should any liquid be given, and then only hot sugary liquids.

It is important to remember that proper preparation and knowledge is important for survival under difficult conditions. The wearing of proper clothing and protective equipment, particularly the PFD for boaters, is critical should an accident take place. An accident can happen to anyone, but survival is no accident.

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# LONG SHOTS SHORT CASTS

compiled by David Baxter

## **States offer rewards for reporting illegal game kills**

— New Mexico and Utah are offering rewards to their citizens who report illegal hunting activities to respective game departments. Utah's Board of Big Game Control has authorized rewards of up to \$1,000 for information leading to the arrest and conviction of anyone illegally killing a moose, bighorn sheep, mountain goat or buffalo. Rewards of up to \$750 may be paid in elk and antelope cases and up to \$500 in cases involving bear, deer or cougar. In New Mexico, sportsmen's groups from Belen and Carlsbad and visitors to the New Mexico State Fair have made donations totaling \$2,938 to the Game and Fish Department's Operation Game Thief reward fund. The fund is now up to \$12,840. The Operation Game Thief reward fund, derived entirely from donations, is used to reward persons in New Mexico who provide information leading to the arrests for violations of that state's game laws. Minimum rewards are \$250 for big game cases and \$50 for other game law violations. The reward fund is administered by a 16-member citizen's task force, which can also dole out larger rewards in cases of particularly flagrant violations. Payment is pending on a \$1,000 reward for the person who helped crack a case involving the deaths of five elk in York Canyon near Raton.

## **Wetlands vital fish nursery**

— Lehigh University in Pennsylvania has completed a four-year study of some 95 different fish species that generally live in the open

seas. Of that total, 85 species use wetlands as a nursery and 25 use them as spawning grounds. "Most fishermen think of their catch as inhabiting only deeper waters," states the report. "However, it is likely the fish they catch have spent at least part of their lives in shallow waters, in areas that must be protected and preserved. . . ."

## **Pennsylvania hunters form organization**

— The Pennsylvania Game Commission has formed an organization called SPORT, an acronym for Sportsmen Policing Our Ranks Together. One of the aims of SPORT is better communication among hunters and landowners. In recent years, Pennsylvania landowners have complained to the state's game agency that too many hunters go into private property without first asking permission. Many of the landowners now are participating in the SPORT program and say they have no objection to hunting or hunters, but would like the courtesy of being asked before their land is used for hunting.

## **National Park Service recycles beverage containers**

— A five-cent refundable deposit has been placed on bottles and cans of beverages sold in all National Park areas. The program is an effort to conserve energy and reduce litter that has accumulated along park roads, campgrounds, picnic areas and the backcountry of many parks.

**Grass carp problems** — Grass carp or white amur have been declared undesirable fish in Texas and many states. Reports come from Indiana that grass carp in the 20-pound class have been taken by commercial fishermen from the Wabash River. Indiana fisheries personnel believe a number of ponds near Terre Haute were illegally stocked with the Asian fish a few years ago. These recently caught fish, however, are believed to have moved up the Ohio River from the Mississippi where several thousand pounds of grass carp are said to be taken annually. Minnesota personnel have destroyed grass carp in trout ponds, and personnel in California have done the same with fish found in a Napa County pond. Grass carp are native to China

where they attain weights of up to 100 pounds. They have been introduced throughout the world as possible vegetation controls. But the ineffective digestive system of the fish results in the passage of partly digested plant material into the water, enhancing fertility and stimulating algal growth. Many fisheries officials are concerned about the possible effects of grass carp on rice crops and aquatic vegetation needed by waterfowl and furbearers. The fish has been banned from 35 states.

## **North Carolina trophy bass limit**

— An 18-inch minimum on largemouth bass in four lakes is being considered by the North Carolina Wildlife Resource Commission. Biologists with the department made fish population surveys on the lakes and believe some type of trophy regulation would be effective on smaller lakes (280 to 2,560 acres) which receive heavy fishing pressure. Even if adopted for the four lakes, the 18-inch limit is not something to be used on a wide scale. But North Carolina biologists believe it would be the most practical way to improve both the average size and number of bass caught from the four lakes. If adopted, the experimental trophy limit would be used for four years on each lake.

## **Trout species off endangered list**

— Restoration of the greenback cutthroat trout has been so successful that state and federal officials have moved to take the species from the endangered list. The greenback cutthroat is found only in Colorado and first was listed as endangered in 1969 because of hybridization and deterioration of habitat. Decline of the fish started in the early part of the 20th century from degradation of habitat by mining, logging, grazing and irrigation projects in Colorado. Much of the remaining population and habitat are on public lands which appear to be safe from degradation. Efforts are underway to breed the species at hatcheries and release them to their former ranges. The greenback cutthroat trout is to be placed on a threatened species list which is a much improved status.

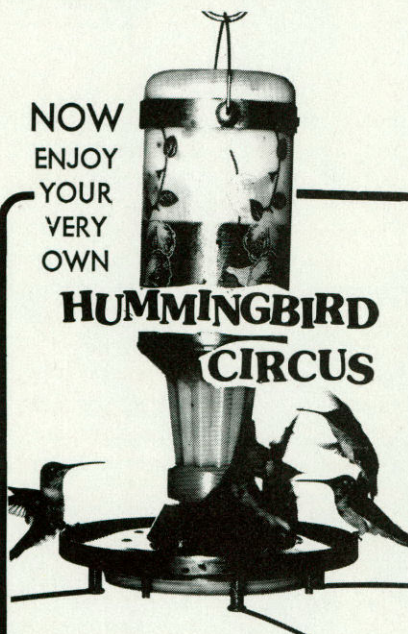


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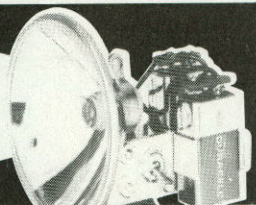
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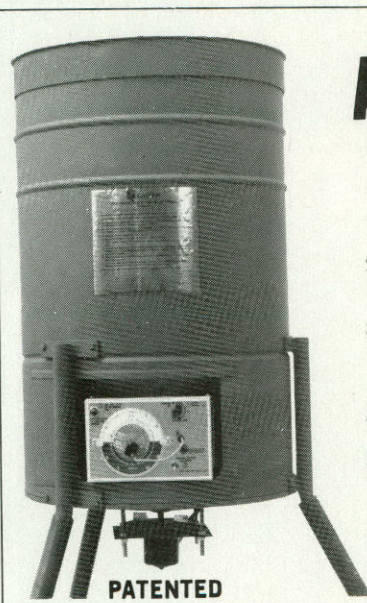
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## Young Naturalist Snowflakes

Article by Ilo Hiller

Photo by Leroy Williamson

**Like beautiful crystal ornaments,** winter creates its icy jewels — the snowflakes.

These delicate, artistic designs form when water vapor (water not in a liquid state) in clouds comes in contact with microscopic, airborne particles of dust, soil, rock or volcanic ash at



temperatures below freezing. Upon contact, the water vapor sublimates (changes into a solid state without becoming liquid first) to form a tiny ice crystal. As more water vapor freezes around it, the original crystal forms branches that grow into a flat, six-sided snowflake. The temperature of the water vapor must be 20 degrees or lower before a snowflake will form.

Even though all snowflakes have six sides or points, no two look exactly alike. Shape and size depend upon the temperature and amount of moisture in the air. The more solid patterns form slowly in clouds high above the earth where there is less moisture and the temperatures are colder. In warmer, moisture-filled clouds, the crystals grow more quickly and form lacy, feathery branches. Ideal temperatures for snowflake formation range between 10 degrees above and four degrees below zero.

All of the snowflakes that form in the cold atmosphere of a cloud do not fall on the earth as snow. If the air near the ground is too warm, the snowflake melts on the way down, becomes a raindrop and we never know it was once an icy crystal.

When air temperatures become cold enough for falling snowflakes to make their trip to the earth, the frozen crystal still may melt upon touching the ground if the ground temperature is too warm. As a solid, the ground cools more slowly than the air and can be several degrees warmer. This explains why snow often covers the cold metal surfaces of a parked car or garbage can lid yet does not stay on the ground. Once the ground temperature becomes cold enough, snowflakes can quickly cover it with a blanket of white.

Those of you who live in a part of the state where snow rarely, if ever, falls might like to design and make snowflake decorations for your room. These artificial snowflakes can be attached to a mobile, hung from the ceiling or a light fixture, suspended in front of a window or fastened to a background and hung on the wall as a picture.

To make these artificial snowflakes, you will need a piece of foil, a box of plastic straws, a pair of scissors, craft glue and, of course, your imagination.

The straws in these snowflakes are white with blue stripes, but you may prefer to use solid white. Cut them in pieces about one-fourth inch in length. Use a ballpoint pen to mark the cutting lines on the straws so the pieces will be more or less the same size. The number of straws needed for each snowflake depends upon the size and

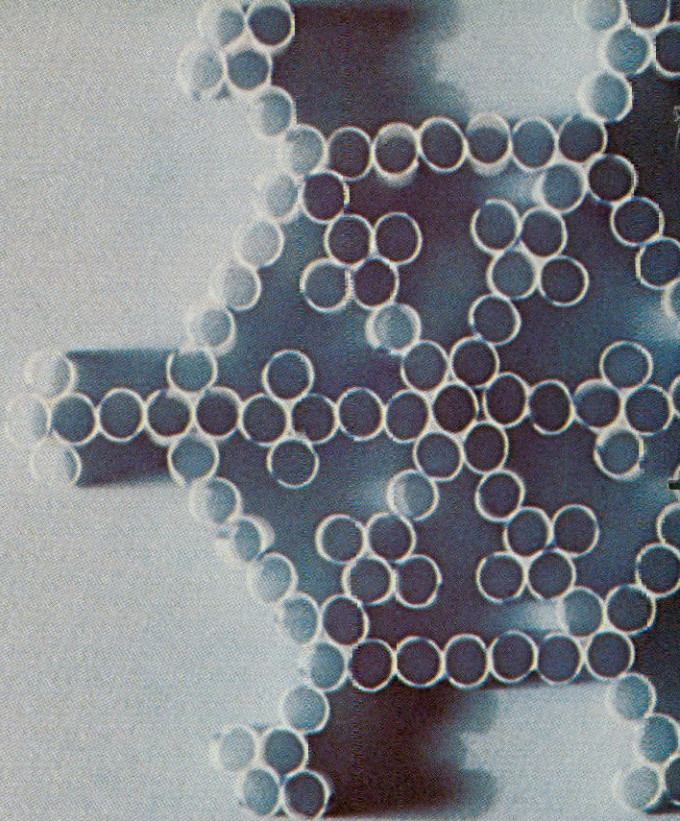


Photo by Bill Reaves

design, but you should cut up at least eight straws at the beginning.

Draw three intersecting lines about five inches long on the piece of foil to form the six equally spaced points of the snowflake. They serve as a pattern to keep the snowflake design even. A small circle of tape with its sticky side out will help anchor the snowflake to the center of the foil pattern.

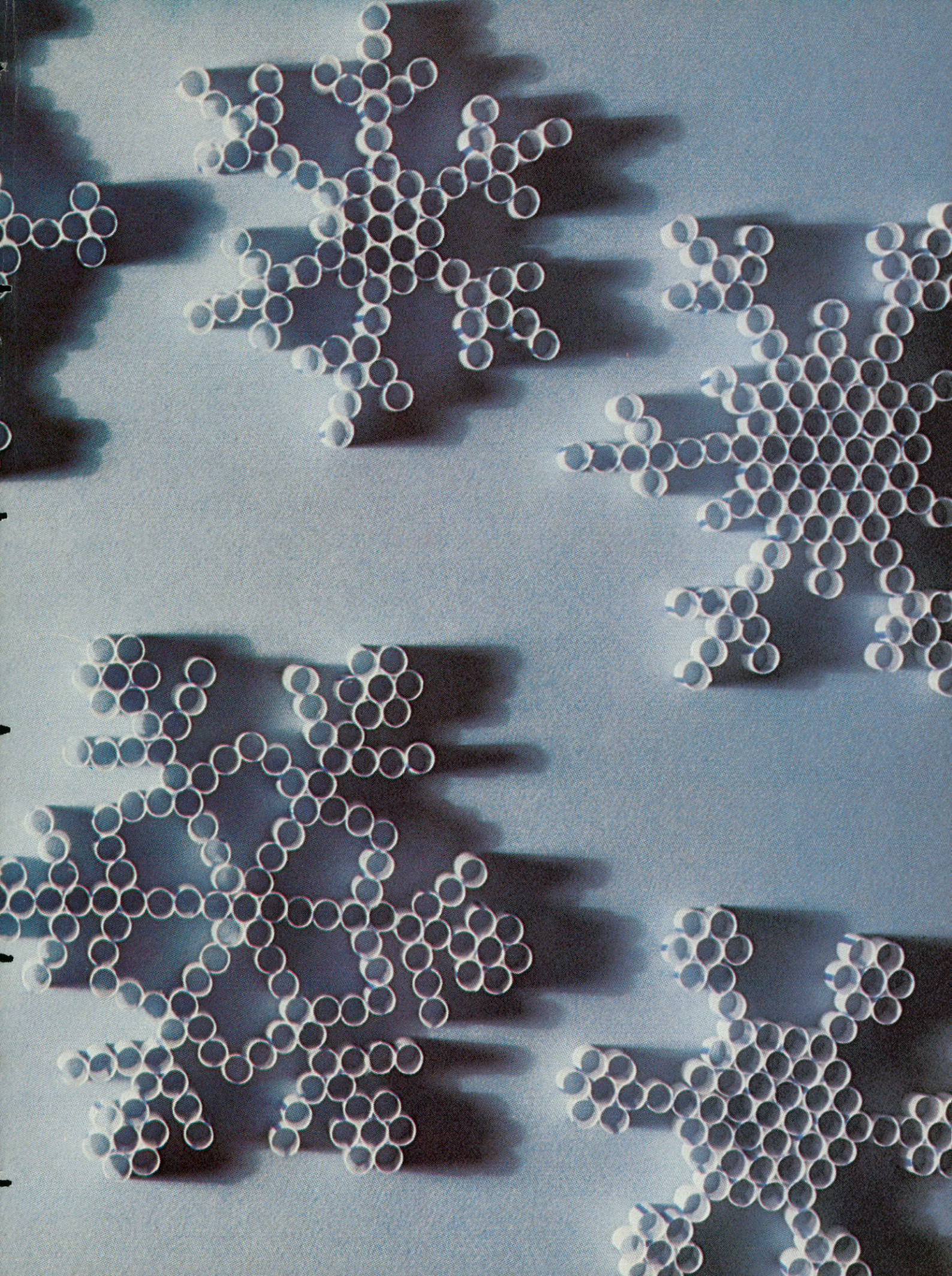
Now you are ready to glue the sides of the straws together in whatever hexagon design you want. (While speaking of glue it should be mentioned that all glues do not stick to the slick surface of plastic straws. In fact, I tried three different kinds before finding one that would work. The snowflakes fell apart when thin, white glue and nontoxic, plastic model glue were used. A thick, white, all-purpose craft glue called "Tacky" glue held best. This brand or a similar one should be available in most hobby or craft stores.)

Allow the snowflakes to dry overnight before attempting to handle them. If you were messy while gluing them together, they may be stuck to the foil. To remove them, carefully slip a table knife between the snowflake and the foil.

The finished snowflakes will be fragile, but if you handle them carefully, you should have some nice decorations for your room this winter.

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# LETTERS TO THE EDITOR

## Opossum Reproduction

Could you provide information about the breeding habits of the opossum? I have fellow employees who sincerely believe the male opossum breeds the female opossum through the nose because of the forked penis. I find this difficult to accept, but can find no written proof.

Glenn Kaase  
Bellville

■ The opossum's mode of reproduction, elucidated by careful, direct observation, has been faithfully recorded in scientific journals. The widespread myth that opossums copulate through the nose, and after a lapse of time, the female blows the minute fetuses into the pouch, is completely false. The legends of this mating and birth are presumably based on anatomical features of both sexes. As you stated in your letter, the male opossum's penis is bifurcated, but the forked ends enter paired vaginal canals which join the female's two uteri, not the female's nostrils. The young are conceived in the usual manner of mammals.

Since the only double openings in the female's body that are easily seen are the nostrils, it is easy to see how this myth began. In addition, just prior to giving birth, the expectant female spends some time licking out the pouch to prepare it to receive the young. Those who believe the through-the-nose theory use these facts as a logical basis for their totally erroneous belief.

## License Required

Back in 1972, I was informed that a person 65 years of age or older was not required to have a fishing license. However, recently I was told that a fishing license is required no matter what the age. I presume this is a new law.

C. C. Rooks

Oklahoma City, Oklahoma

■ In 1972, Texas did not sell a nonresident fishing license. However, as a result of S.B. 222, 65th Texas Legislature, R.S., nonresidents now are required to have a Nonresident Fishing License to fish in any of the public waters of the state. A Temporary Nonresident Fishing License (\$4.50) may be purchased to

fish for five consecutive days in lieu of the regular Nonresident Fishing License (\$10.50). There are no age exemptions on the nonresident licenses, but Texas residents 65 years of age or older and 16 years of age or younger still are not required to have a fishing license. To be considered a resident, you must live in the state for six consecutive months prior to purchasing a license.

Licenses are available through local sporting goods stores or may be obtained by sending the appropriate fee to the Texas Parks and Wildlife Department, License Sales, 4200 Smith School Road, Austin, Texas 78744, and indicating which license is wanted.

## Starling Pet Food

I noted with interest your article on starlings and that 23,000 were killed at one time by a few shotgun blasts. What became of the carcasses? They would have made good pet food either canned or frozen and probably would have brought a higher price than tuna or other meats used in commercial pet foods. At four ounces each, that's 5,750 pounds of birds.

I have shot, cleaned and frozen starlings for my cats and they love them. Please convey my idea to your readers who also might like to harvest them to save money on pet food and get rid of a few thousand starlings at the same time.

R. L. Kelly  
Lewisville

■ Although starlings are not protected by state or federal laws, most cities have laws against discharging firearms within the city limits. Please check with your local law enforcement officers before blasting away at neighborhood starlings.

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**INSIDE BACK COVER**

Millions of tiny snowflakes were required to transform this portion of Tyler State Park into a frozen wonderland. Although snow is a common occurrence in many parts of the state, some Texas residents rarely, if ever, see it cover their trees and lawns. Learn something about snowflakes on page 28. Photo by Leroy Williamson.









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