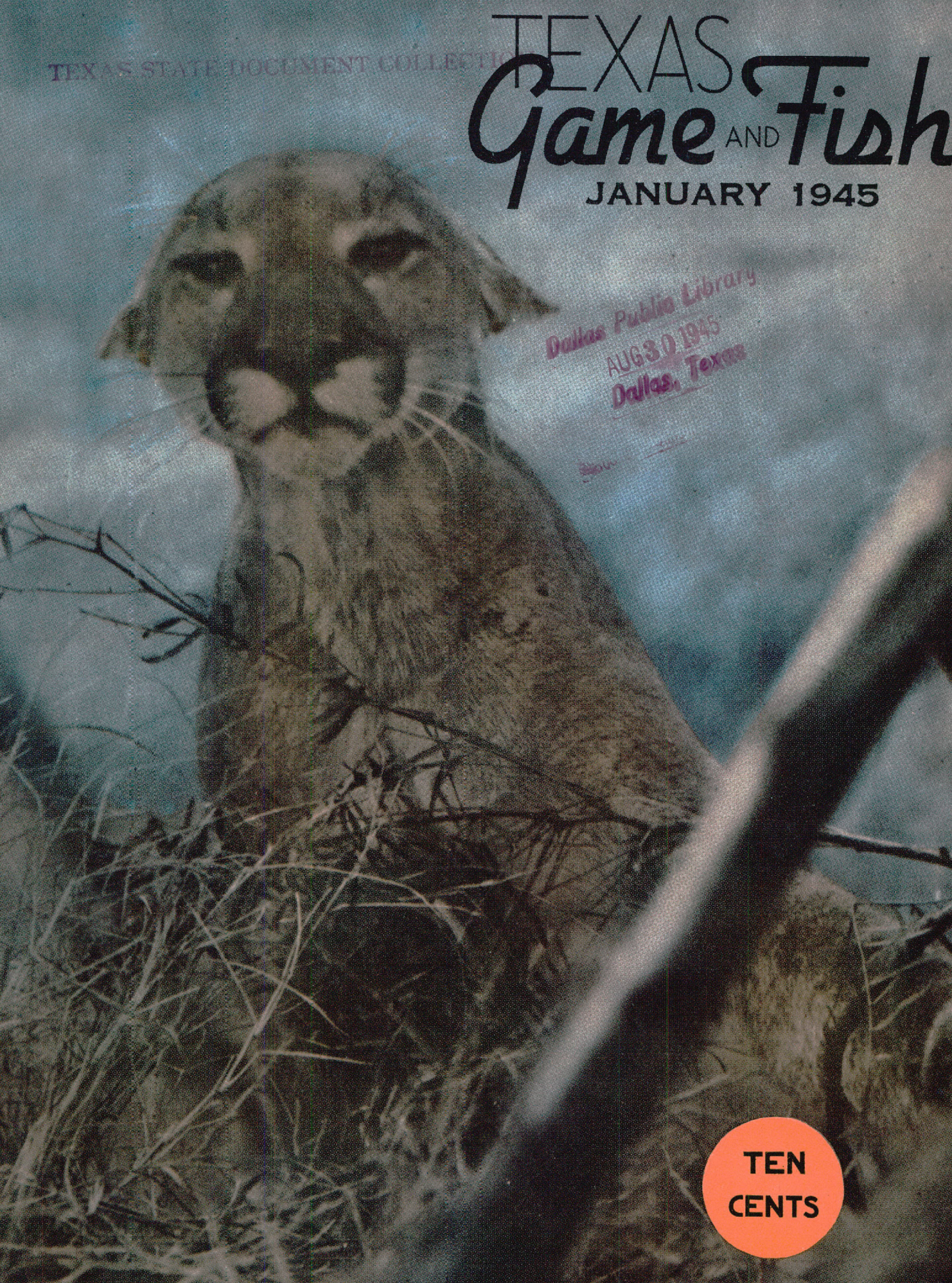
TEXAS Game AND Fish

JANUARY 1945



TEN CENTS

Speaking of COVERAGE

TEXAS GAME and FISH, the only outdoors magazine published monthly in the Southwest, covers a rich hunting, fishing and trapping population of more than 500,000.

Factual articles by top-notch writers who know Texas hunting, fishing and trapping from A to Z furnish strong reader appeal.

Here's a powerful sales force that is yours to command.

★ TEXAS *Game and Fish* "The Voice of Texas Sportsmen" ★

The True INWARDNESS

NOW and then some poor soul asks how can we, or other misguided folk, possibly be so foolish as to waste time and effort, not to mention expense, to go fishing—or hunting for that matter?

And thereupon our sympathy goes out to the inquirer, who evidently has been by-passed by some of the finest human emotions and instincts. One quipster will say that a man goes fishing to be lazy unseen—others that a man goes fishing for the same reason he plays golf—to get away from work.

As the *New York Times* put it: Men from eight to 80 enjoy fishing. One can't logically claim that it is the spirit of spring, for there is a group that braves cold winds and icy weather to obtain by artifice the denizens of pond and lake. Fishing is more than a seasonal urge; it has little to do with age; it is highly self-centered and introvert in character.

There's the deep peace and satisfaction of getting out-of-doors. It's good to feel the raw wind or the warm sun. It's good to be in old clothes and to wear a hat that has been a boon companion for years. It's good for a man to smell the earth and water and lift his eyes to stretching fields and wooded hills.

Naturally, anything as important as fishing is divided into camps of opinion. There are those who recoil in horror from using an earthworm and a cane pole. Some stand adamant for wet flies and some believe the piscatorial bill of rights means a dry fly. There are men who delight in scrambling along a stream's edge; some prefer to wade in shallow, swift water. Others get a rowboat from which they cast plugs among the lily pads and water grasses. One group believes in trolling slowly and comfortably.

This is the way it should be. Fishing is too important for any governmental bureau to regiment unduly methods, equipment and philosophies. Within a broad reasonable framework of reference, fishermen should have the privilege of regarding highly their own ideas and scoffing heartily at others.

☆

Washing the hands with strong soap and hot water soon after being exposed will often check or help to control ivy poisoning.

TEXAS Game AND Fish ★ ★

Vol. 3 **JANUARY, 1945** **No. 2**

Contents

COVER: Mature female mountain lion caught by Wildlife Biologist J. B. Davis and Warden Captain Herbert Ward on the banks of the Rio Grande on the Chupadero Ranch in Webb County.

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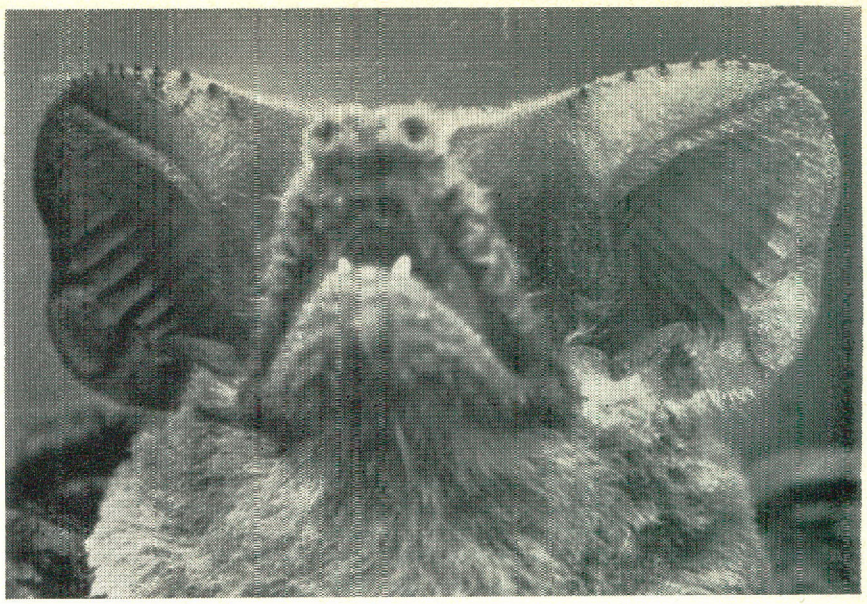
TEXAS BATS

By WILLIAM B. DAVIS



NO, THIS IS NOT A CHARACTER OUT OF A NIGHTMARE. It is a remarkable head study of the Mexican free-tailed bat.

MOST people are aware that bats exist, but few know very much about their habits or realize that nearly 2,000 different kinds occur throughout the world. More than 80 kinds occur in the United States, some 24 of which occur in Texas. The largest number of kinds is found in the tropical belts of the world; very few kinds occur in northern latitudes.

Because bats are active largely at night, are capable of flight and are seldom handled by man, numerous strange beliefs and superstitions concerning them have developed over the ages. To cite a few, some of which are still in vogue in certain parts of the world, that are recorded by the late Glover Allen in his interesting book titled "BATS":

(1) If bats become entangled in the hair of humans, especially women, sudden death will result.

(2) Bat blood applied to the eyes will assist one to see well at night.

(3) A clot of bat blood placed under the pillow of a sleeping woman will induce sexual desire.

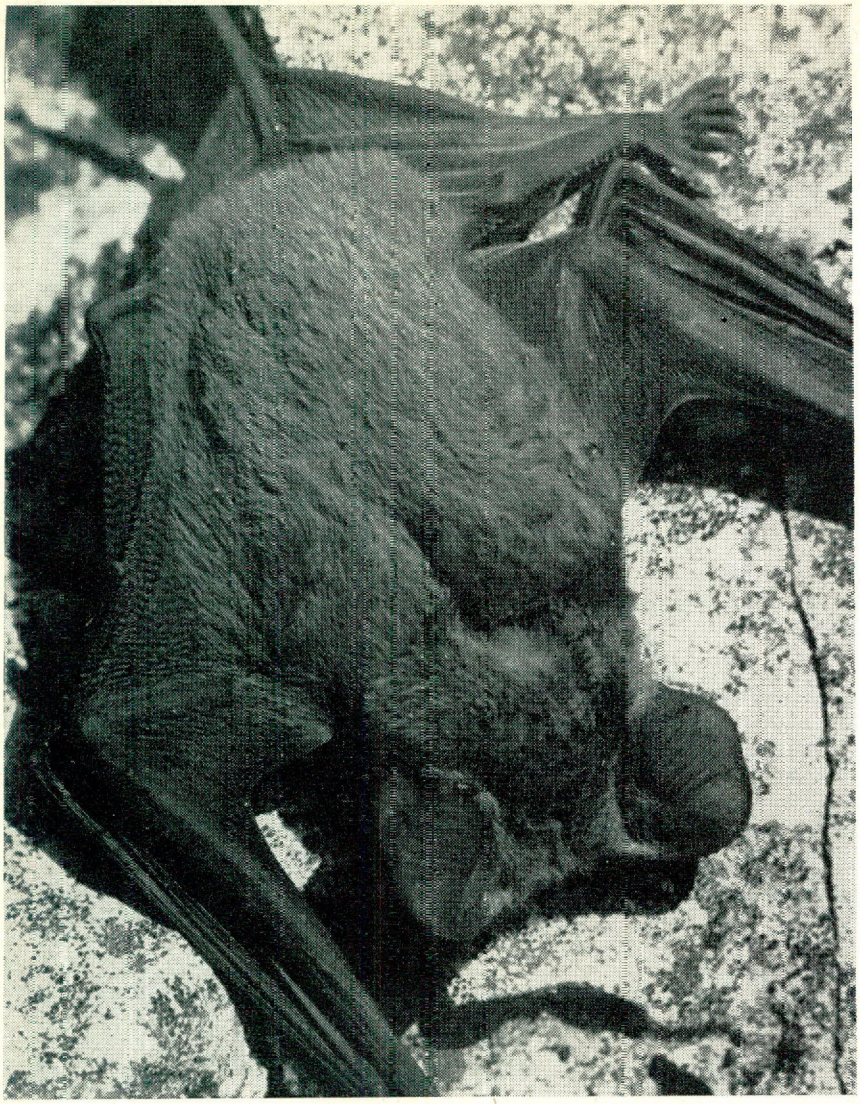
(4) To cure failing sight, apply an ointment of bat urine, gall of a fish and wild rue.

(5) To cure asthma apply an ointment made by boiling a bat in jasmine oil and allowing the mess to macerate in an iron pot. (A sure cure.)

(6) Bat oil is a sure cure for rheumatism.

(7) A mixture of the blood of a bat and the gall of a hedgehog is a

ENTRANCE TO A BAT CAVE near New Braunfels, Texas. At dusk each evening the mouth of this cave is almost solid with bats winging out into the night to feed. Standing at the mouth of the cave is a state game department biologist who has wrapped netting around his head preparatory to entering the cave.

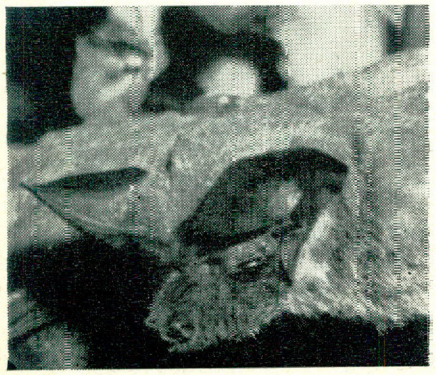


good hair remover. (Recommended to beauty parlors.)

(8) A bat captured alive and carried thrice around a house and then nailed alive and head downward over the door will keep away evil spirits. (Still in use in Holland.)

(9) To keep awake at night, cut off the head of a live bat, place in a black bag and tie to the left arm. (Recommended to motorists who have imbibed too much fire water.)

(10) To prevent a child from eating dirt, capture a live bat, skewer and roast it, then pull off the skin and force the child to eat it. This is held as an infallible remedy and was in use in North Carolina in colonial times.



A MEXICAN FREE-TAILED BAT AT ROOST. Above: Bats roost above ground so that they can drop and gain momentum on the take-off. Note the wings which consist of skin connecting the much elongated fingers with the shoulder. Lower Right: Bright metal tags are attached to a bat's leg. This enables biologists to study the habits of individual bats. Lower Left: The head of a common Texas bat. Note the pointed ears.

What is known about bats?

Structure—Bats are true mammals that have been modified to permit them to fly. The wing consists of skin connecting the much elongated fingers with the shoulder, the sides and the hind leg. Some bats have an additional membrane connecting the hind legs. They have all the structural parts of other mammals, including man, and they give birth to young. In many respects bats are similar in structure, particularly as regards the reproductive organs. Bats vary in size from the small pipistrelle, which weighs from 3 to 5 grams, to the large flying fox, a fruit bat of the Australian region, that has a wing spread of more than seven feet and weighs several pounds.

Flight and special senses—Most bats are unable to take wing from a horizontal surface, hence their habit of roosting above the ground so that they can drop and gain momentum on the take-off. The manner of flight varies with the species. Large bats as a rule are fast fliers, but speed is correlated with size and shape of the wing not with size of the bat. Narrow-winged bats, such as the Mexican Free-tail, are exceedingly fast and resemble swifts when in flight. The little brown bats have relatively short rounded wings and are "flutterers," but they have tremendous "lift" which enables them to take off from the surface of water or some other horizontal surface with relative ease.

Although the eyes of bats are functional, they are of little use to them in flying. Experiments have demonstrated that bats can easily fly and avoid objects when blindfolded. The ears are of especial importance to bats in flying and perhaps for this reason the ears are highly modified. Voice is also important in assisting bats to navigate in the dark, especially the supersonic sounds that are far beyond the range of human hearing. These sounds are said to set up sympathetic vibrations in objects, which sounds the bats can detect and thus avoid the

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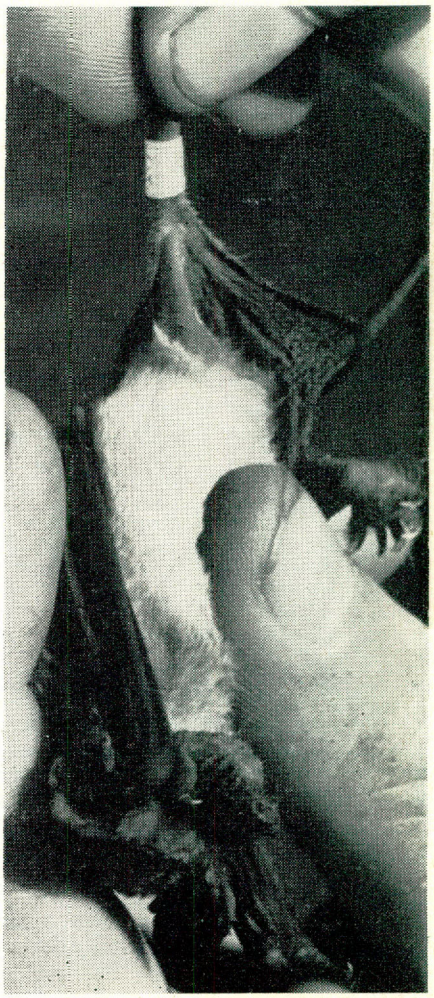
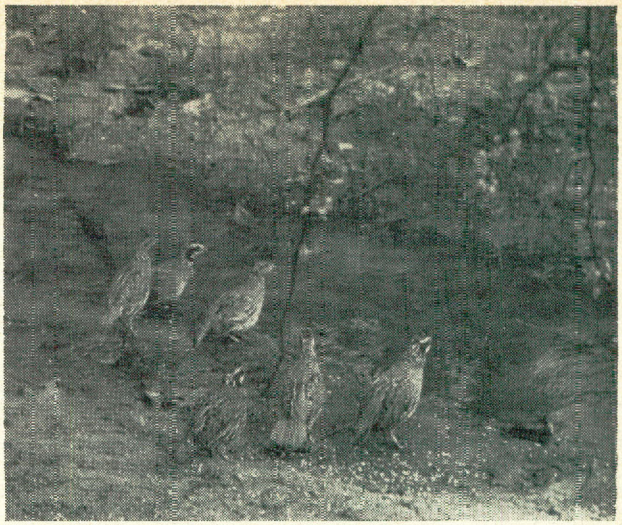
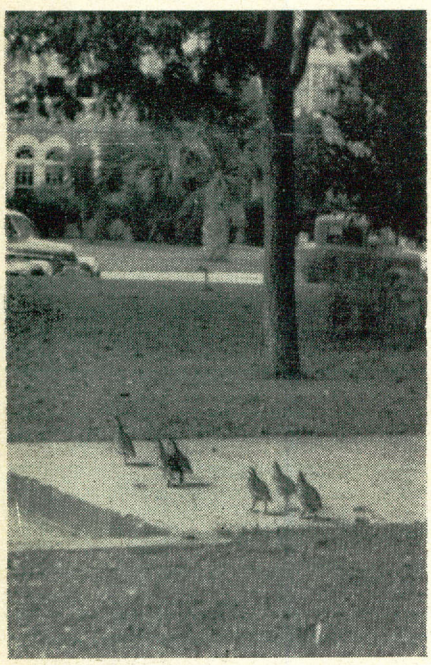


Why
TEXAS DOESN'T PEN-RAISE QUAIL



A COVEY OF BOBWHITES

THE job of improving quail hunting would be solved if all we had to do was to release more quail in our woods and fields. Unfortunately, the theory that quail can be permanently restored by simply turning loose more birds and that the more we turn loose the more we will have for shooting does not stand the test of practice.



***BOBWHITES** nonchalantly walking across a downtown street in Victoria, Texas, 8 a.m.*

The history of game and fish conservation management and restoration is replete with examples of efforts that have been made to restore or stimulate depleted game and fish species by artificial production in captivity. When the notable efforts of Mr. W. B. Coleman of Virginia were advertised to the sporting world that a single bobwhite quail hen, under favorable captive conditions, was capable of laying 100 eggs a year, most sportsmen immediately reached the conclusion that this was the solution to providing more quail for their guns.

Consequently, after many unsuccessful attempts with a great expenditure of wealth, time, and talent, it has been definitely established that bobwhite quail can be reared in captivity.

Virtually all of the efforts made up to this time, however, have been toward the perfecting of pen-raising methods, and rapid strides have been made in the mechanical procedure since Mr. W. B. Coleman's first successful attempt in 1929. Little attention has been given to the determination of the increase and survival of the quail after release. The sport of hunting is very much like football, wherein the proponents of each are always ready with an answer to all the problems of the sport or game without any kind of investigation. It is almost trite to say that sportsmen are quick to accept any panacea that will help improve their sport. Furthermore, most sportsmen are more concerned and impressed with enterprises which can be seen on a visit, such as a quail hatchery or a fish hatchery. A pond in a fish hatchery that is teeming with bass is more interesting to the average sportsman than a well stocked lake which they may never see. The same may be said of a farm that contains an excellent quail population. Perhaps this kind of thinking has greatly influenced and stimulated projects of doubtful value. Thorough fact-finding should precede all such endeavors if they are to achieve the purposes intended. It is obvious that problems of this kind are of immediate concern to all states and all sportsmen. It is unfortunate that hundreds of thousands of dollars were spent on the pen production of quail before any effort was made to determine their fate or survival after they were released.

The Game, Fish and Oyster Commission of Texas, more than fifteen years

***A BOBWHITE** nest containing 16 eggs in a two-year-old growth of black locusts.*

ago investigated the feasibility and advantages of using pen-raised bobwhite quail for restoration purposes. These early investigations, even if little data was available, convinced those making the experiments that investments in pen-raising quail could not be justified; and we, unlike many states, are in the position today of having used the sportsmen's money for better purposes than the uncertainty of producing tame bobwhite quail for liberation in the wild.

It is notable that those states, which probably had no other reason than a fond hope of doing something that was obvious, once they launched into very considerable investments for the pen-propagation of bobwhite quail, felt compelled to justify their capital investments by continuing to operate their quail hatcheries.

Other governmental agencies, such as the Soil Conservation Service and the Farm Security Administration, which launched upon artificial quail production just as enthusiastically as did the state, were not nearly so obstinate in continuing their endeavors along this line.

Some wealthy sportsmen have abandoned their efforts to increase quail by liberating pen-raised birds after their failures were obvious and because of their reluctance to continue to spend their funds in such questionable endeavors.

It is even true that dozens of individuals who have launched into a business of raising bobwhite and other game birds in captivity have sacrificed their projects after they found that such enterprises were not profitable. In 1933, the State of Texas passed a law permitting the propagation of game in captivity. It is of some interest to know that there was much enthusiasm on the part of amateur game breeders upon the passage of this law. Many of them freely admitted that they would become comfortably independent because of the benefits they would obtain from this law. Very few of those who began operations under this law a few years ago have continued in business. Not one of them has obtained any considerable success when measured by the return for money, effort, time, and talent invested.

Since the law was enacted, the Department has issued 1,108 licenses to game breeders, about 890 of whom engaged in quail propagation. The average length of time they remained in business was 15 months. During the eight years these breeders have been in operation, they have raised a total of only about 22,400 quail. Their losses from diseases and other factors, according to their reports, amounted to 10,000 birds during the period. Only 2,584, or 11%, of these birds were released for restocking, which shows clearly how inconsequential these efforts have been in restoring quail in Texas.

In considering the matter of pen-raising bobwhite quail, the Game, Fish and Oyster Commission is compelled to weigh the results which could be obtained for the sportsmen of the entire State. A quail hatchery to supply a small portion of the State of Texas would cost about $100,000. Annual operating costs, with no charges made for investment, would be approximately $25,000. Distribution costs for the production of such a hatchery would cost another $25,000. To properly serve the entire State, it would require at least ten hatcheries, which would require after investment, an annual expenditure of $500,000.

It is possible that if this amount of money were expended and Texas employed talents superior to those of any other State and if we obtained results ten times as good as have been obtained in any other State, then we might increase the shootable population of quail by 10% in Texas.

The Western Cartridge Company, after elaborate investigation on the merits of the use of pen-raised quail in improving hunting on a prepared and carefully controlled area of considerable size, came to the conclusion in effect that the liberation of pen-raised quail could not be commended as a State enterprise. On the other hand, they believed it was a method of increasing shooting opportunities for wealthy sportsmen who had available to them tracts of land on which they could operate as a group or as an individual and where the cost of the luxury was not a consideration. The recommendations of the Western Cartridge Company, we believe, were to the effect that some sportsmen place no limit on the amount they are willing to spend for desirable shooting. They nevertheless realize there is a very severe limitation on the amount of money spent for general or group benefits. For instance, an amount that would be required in this State to obtain a 10% increase benefit for the quail hunters of Texas, who may number as much as one-half of the total number of hunters, is more than is available to the Game, Fish and Oyster Commission for all game purposes.

We must consider the very harsh fact that the quail hunters who purchase a hunting license specifically and exclusively for the purpose of hunting quail pay to this Department only $2 annually. If we could exceed by five to ten times the results obtained in any other State for this amount of money, we could supply him with two or three quail per year by pen-raising methods.

The older quail hunters of Texas who remember the time in Texas when quail were much more abundant than they are at present, often do not take into consideration the factors which have brought about the decrease in the quail population. Hundreds of thousands of acres of land in Texas are now so intensively tilled that they will not produce one bobwhite quail where formerly they produced them in abundance. Great areas which once had abundant leguminous vegetation, which is one of the essentials for quail welfare, are now virtually barren of legumes because of the heavy stocking of sheep, goats and cattle. It is known that in the United States there are 244 species of legumes utilized by wildlife, and quail heads the list of those utilizing them. These plants produce seeds that will not rot readily, making

AN EXPERIMENT that didn't pan out as expected. This shipment of 1000 bobwhites from Mexico arrived at the Southern Pacific station in Houston on February 10, 1938. The birds were released in Harris County.

***TWO GAME DEPARTMENT BIOLOGISTS** have just taken bobwhites from trap in cover beside plowed field near Eagle Lake for banding.*

them available to quail in late winter when food is particularly scarce. If proper attention is given to the grazing range, these plants can be saved for quail as well as livestock, for which there is no better forage. Other thousands of acres are in rice, wheat, and other crops. A great portion of our quail range has been severely injured by general unwise farming, grazing, and forestry practices. Hedgerows were supplanted by the barbed wire fence. In turn, the barbed wire fences in many localities were and are being abandoned, and plowing has now been extended to the public highways and to the very edge of ditches and other field borders, leaving no quail cover or food. Soil conservation practices are just beginning in Texas, and the effects have not yet been felt to any considerable extent. Only during the last decade in Texas has there been any manipulations in land use for the specific benefit of wildlife. However, the most encouraging sign for the hunter is that farmers and ranchmen in considerable numbers are showing a direct interest in quail and other wildlife, and upon occasions have taken steps to handle their land in such a way as to aid it.

The Game, Fish and Oyster Commission and its corps of men employed for scientific work have been and are prepared to make direct and unequivocal recommendations as to the desirability of raising quail in pens as a State enterprise. In order that we may submit these recommendations, it was first necessary that we complete a survey of the quail habitats of Texas. It was next necessary that we obtain factual information of what other States have done in the pen-propagation of quail and the results obtained from liberation of the birds. It was also necessary that we conduct some experiments with pen-raised birds to determine the suitability of those birds for restoration purposes as contrasted with wild birds. We have painstakingly and carefully applied ourselves to this difficult assignment. We have called upon the published documents and the special opinions of experts who have had much experience and observations of such enterprises. We believe that this work has been pursued sufficiently far at this time to justify the compilation of our findings.

Through wildlife surveys, conducted over the last five years, we know that a sufficient seed stock of quail exists in most parts of the quail range in Texas and that all that is needed to bring them back is to bring about better living conditions for the birds. This can be achieved through favorable climatic conditions or through proper handling of the land and the control of hunting. Of course, man has no control over the weather, but he does have control over his livestock, forest, and farming practices. A quotation from Mr. Daniel W. Lay's publication entitled "Bobwhite Populations as Affected by Woodland Management" illustrates how land management may affect quail populations. Shortleaf and loblolly pine stands do not, as a rule, carry many quail, but after the pine is cut quail become more numerous and Mr. Lay states that: "The density of quail in cutover areas reaches a peak about the eighth year (76.8 acres per covey) and begins to decline about the tenth year." To produce more quail, Lay says further that "Favorable environmental change could be induced by landowners under a rotational system of harvesting timber. They could favor the interspersion of various timber age-classes that is essential to continuous quail production." Other land users can also devise ways and means of handling their land to produce more quail provided they care to do so and provided they possess potentially good quail land and have the cooperation of sportsmen. It is a well recognized principle in quail management that not more than one-third of the birds should be killed from each covey; overshooting is a cause of depletion in certain parts of Texas, especially near our cities. Hunting is subject to control. In Texas, landowners have recourse to the trespass law and the cooperation from game wardens, as well as other law enforcement officers, to enforce it. To admit the need for con-

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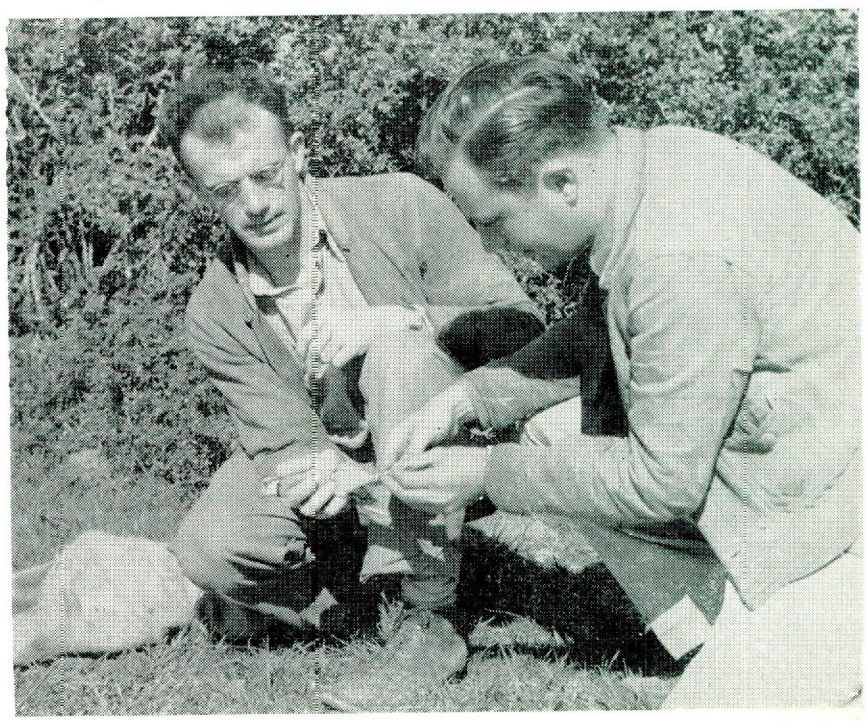
***BANDS** are placed on trapped bobwhite near Eagle Lake. Bands enable biologists to trace migration and habits of bobwhites.*



Let's Use
THE OLD SINGLE BARREL

By HARDY R. FIELDS

YOU as an individual may violently disagree with what is written here, but yours truly has a view, or shall we say notion, that will probably bring forth some sort of re-action if hung up in public and dusted off.

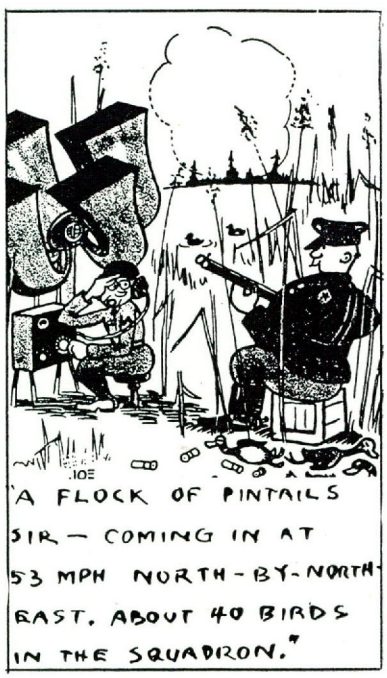
This exhortation has to do with shotguns. The old single shot versus the repeaters. To bring this subject to a quick focus and start the dust flying, I will state flatly that I believe that it would be much better for our game birds and animals if everyone used the old single fire shotgun. I realize that such a statement is considered treason by most people but it has its points gentlemen. Here's why.

Shotguns are used to hunt a variety of game. During a day's hunt ye hunter might shoot at doves, quail, pheasant, ducks, geese, rabbits and squirrels. It is doubtful if anyone has done such a thing in the last seventy years, but it could be done. Of the above named game, all of them congregate into groups except the rabbits and squirrels. Whenever one or more hunters concentrate a mass of fire power upon a group of any kind of birds there is a very good chance to wound more birds than are killed due to the average gunner being in a hurry to get in as many shots as possible. The average hunter cannot shoot accurately when in a hurry. If opinions published in our leading magazines of sport are to be accepted, fully 50% of the wounded birds escape to die elsewhere and are therefore a waste. Such a situation is not good regardless of opinion.

Now let's place in the hands of the hunter a single fire shotgun. Knowing that he has only one shot coming up he will probably be much more careful and probably shoot straighter. Having only one shot at his disposal, he will keep his vision on any bird he hits and go immediately to it as he will have no incentive to be looking for another bird to shoot during that moment. It is much better that a man should shoot at one bird and recover it if hit than to wound two which escape to die and be wasted. None of us has the right to waste game.

In days of yore when old grand-dad used a muzzle loader, the game stood around and watched the old fellow reload his old blunderbus and wondered what in tarnation made such an infernal uproar just a moment before. Today with game so scarce it takes hard work to find it, everyone wants to go afield armed with a machine gun and spray the welkin with a solid blanket of shot.

Now many a good brother will argue that he or his friend can double and even triple on doves, quail or any other birds foolish enough to fly up within range of their trusty repeaters and what's more they never lose any birds because their dogs dash out at once and bring in said birds ere they stop flopping. That's fine. It's a shame everyone isn't so good a shot, but for every good marksman there must be nearly a thousand who never made a clean double in their lives and furthermore they don't have a dog to help them recover the birds they do put down. The average hunter with a repeater does little more



than point his weapon in the general direction of flying game and fire three times which usually results in his crippling and losing three times as many birds as he recovers.

It is a hard task to locate birds in the grass and weeds as anyone knows who has tried it. When a hunter has more than one bird shot down and no dog to assist him, he will be lucky to find one of them. Wouldn't it be much more sensible for all of us to hunt with a single shot? The good marksman would get his limit regardless and have just as much fun as anyone and it would prevent a lot of hunters who are very poor marksmen from crippling a lot of game which would be lost forever. There is an ever increasing crowd of hunters each year which means an ever increasing number of birds to be crippled and lost. The average hunter with a repeater will kill twenty birds to recover ten, whereas the hunter with a single shot probably wouldn't kill more than twelve to recover ten.

It costs money these days for the State to raise game and anything a hunter can do to conserve it he should willingly do.

It is unthinkable that a man should be prohibited from hunting just because he isn't an excellent marksman or doesn't own a good dog. No citizen of good character should be prohibited from owning any kind of sporting arm regardless of whether it fires one time or several. What is written here is written in hope that sportsmen will voluntarily give up the desire to hunt with weapons having the nature of a machine gun.

It does not take modern fire power to enjoy hunting. Any archer who hunts with his bow will tell you that the gun armed hunter doesn't know what a thrill is. Any man who hunts with a single shot enjoys hunting as much as the man with the five shot repeater. If the only pleasure derived from hunting is to be found in the greed for killing game, then good brothers it is indeed a sorry sport. There are people in this country who hunt with the old muzzle loader just from the standpoint of sport and enjoy it immensely. However, such an extreme is not advocated.

What is advocated is this: if a larger percentage of game birds can be saved by using a single barrel, let's quit being greedy and use it. Heck with this business of killing twenty birds to obtain ten. It isn't fair to the hunters and it most assuredly is not fair to the birds. If you had to buy two chickens in order to eat one you wouldn't eat chicken often.

Now let's hear your side of it.

☆

There are a number of animals that live in the sea, but about the strangest of all is the manatee. One of the strangest things about them is the fact that Christopher Columbus mistook them for mermaids. The modern conception of a "mermaid" is about as close to the appearance of a manatee as a mountain is to a molehill.

ARMS AND AMMUNITION

Edited by A. S. JACKSON

SNAP SHOOTING

By COL. H. P. SHELDON
in The American Rifleman

THE TERM "Snap Shooting" is often used improperly nowadays. When a man remarks that he had "only a snap shot" at a grouse, a deer, or a bear, he generally means that he took a long chance at accomplishing something as improbable as picking the winning ticket in the Irish Sweepstakes.

That is not snap shooting, for snap shooting as it is understood and practiced by those who employ it correctly is a scientific and efficient method of gun pointing at short ranges. There is not much more uncertainty about scoring a hit than there is in any other form of field or combat shooting. A competent snap shot expects to average more hits than misses. He's not exactly surprised when he doesn't score, but neither is he greatly astonished when he does. Indeed there are gunners who can make more hits on moving targets at short range by snap shooting than they will score when there is time for more deliberate procedure—which also means, in some instances, more time to bungle the shot.

In his way, the snap shot is just as methodical as the old Schuetzen rifleman who sometimes spent a whole day in firing three shots. The snap shot merely condenses his shooting operations into the space of a second, more or less, according to his individual coordination.

The ability to do this kind of shooting is a lifesaver for a soldier on the battlefield, and is not a substitute for conventional aimed fire; it is a distinct method of gun pointing that can be used to take advantage of opportunities so brief that there's no time for more deliberate action.

The snap shot doesn't "lead" or "follow through" in the conventional sense, although when firing at a moving target he must make allowances for speed and angle. He has to make an instantaneous estimate of the problem, a flash photograph of it, so to speak, and "snap" the load of shot or the bullet at the point where he thinks the target will be when the shot arrives. The ability to do this consistently comes only with practice and is not easily acquired. In estimating the amount of allowance in this kind of shooting, the gunner must add the time it takes him to bring the gun from the "ready" position to the firing position because the trigger should be pulled at the instant the butt presses the shoulder. There is no time to swing. In fact, if there is time for a swing, the gunner shouldn't try to snap-shoot.

The nearest approach to snap shooting that I can think of in target shooting with a shotgun is the two incoming overhead shots at Number Eight post at skeet. Even there, however, there is time to get the swing started.

The best device that I've found for snap-shooting practice with gun or rifle is one which was recommended years ago by Major Askins. Tack a number of small sheets of paper at various elevations against the side of an old barn or wall. Face the wall with the gun at the ready. Select a target and fire at it instantly, **without hesitation.** One has to fight a tendency to "give himself the breaks" by taking an extra instant after the gun is up in which to check the pointing and make any correction necessary to get a certain hit. That won't do, for the purpose of the practice is to promote in the mind an unshakeable confidence that the load will strike the point at which one is looking.

The gunner or rifleman who has been well trained in deliberate fire is generally "sight conscious." He finds it hard to convince himself that he can hit anything without getting into the groove for more accurate alignment, and he's reluctant to "let off" otherwise. He just can't help it. If he will slip a "blinder," a two-inch cardboard disc, over the muzzle of his weapon so that he can't possibly align his sights, and continue his practice, he will find after a time that his groups are nearly as good as before.

That is Old Subconscious Mind doing his stuff.

"All right, child," he says. "You-all do de lookin' an' us back heah will do de pintin'."

To the conventionally trained marksman, it is a revelation to discover that looking at a thing and hitting it can be practically synonymous. Also, instantaneous!

Let it be emphasized again that snap shooting is not a substitute for deliberate, carefully aimed fire. Aimed fire has, and will always have, its obvious advantages. Snap shooting is only an additional trick in the gunner's bag; one capable of producing results at times when time is of the essence—and when there's damned little of it.

Actually, the gun is "sighted," even in snap shooting; of course, but it is done by that mysterious monitor in the human brain which controls so many of those things we "do without thinking,"—acts that are performed accurately and promptly and automatically without conscious mental direction. The boxer doesn't need to look at his glove **and** at his opponent's jaw; he looks only at the target, pulls the trigger, and the glove—Joe Louis' anyhow—arrives on time at the correct address without benefit of peep sights. Joe works out the strategy; his subconscious mind handles the tactics. It's the same thing for the snap shot.

A practicing psychologist might produce at this point a fine recondite formula to solve the snap shooter's problem. The best that I can manage, however, is that anyone aspiring to honors in this field should try to forget gun sights, keep his eyes (both of them) on the target, and cultivate his trust in the

ability of Old Subconscious to deliver the supplies at Point X at the proper instant.

After all, Old Sub has known you from infancy and has served you well, else you wouldn't be here. Let him know what you want done, and he'll do it. Try to tell him **how** to do it, and he'll say, in effect, "Lawd, chile! Don't you try to tell Ol' Sub **how** to skin a 'coon. Jest tell him you wants a 'coon **skinnt!**"

We have a cultivated impulse in aiming a gun to get the eyes down to the level of the barrel rib, or the rib up to the level of the line of vision. This is necessary for precision shooting, but it is not necessary for the killing of game—or men—at relatively close range in half of a split second. The snap shot isn't trying to make a neat group; his objective is to get a bullet, or a handful of shot, into a short-range target in the shortest time. I think he can get on more quickly if he looks about the rib instead of along it. He needs full vision for his fast-exposure "flash photo" of the situation, and the rib can be an obstruction.

It is my impression also that when a well-indoctrinated snap shot misses, it is not usually because he failed to estimate correctly the forward allowance, but rather that he mistimed the trigger pull and fired a wink too quick, or hesitated and fired a wink too late. That is why, in practicing the stuff, timing is of much more importance than accuracy, which will surely come if the timing is successfully developed.

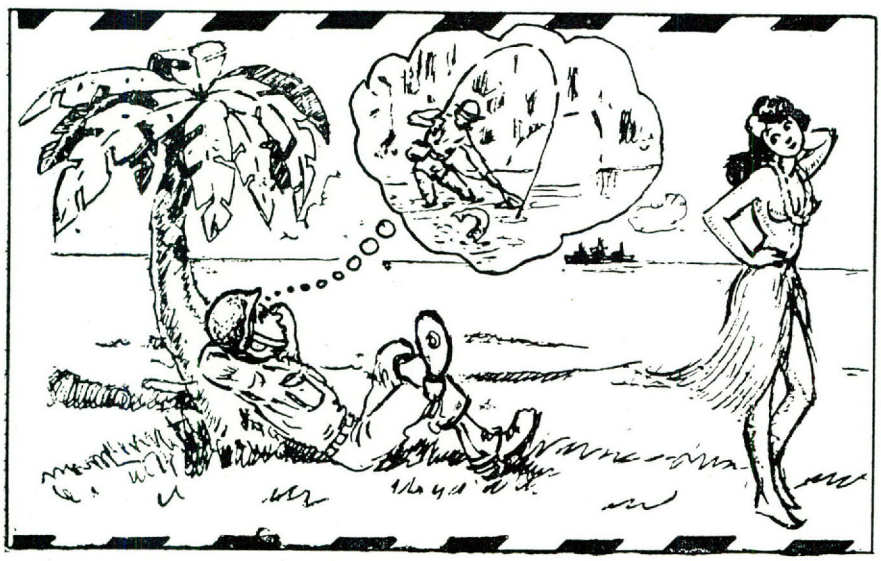
The whole point of snap-shooting practice is to perfect a rhythm that is as fast as a flash, but unhurried, and which finally becomes habitual.

Snap shooting, "by the numbers" would probably work out like this: "One"—target seen and estimate made. "Two"—gun coming up. "Three"—fire. The time allowance for the complete operation should be not much in excess of the time required to repeat aloud, and rapidly, the "one—two—three."

It's a fast operation and a beautiful one to see.

Snap shooting, as I am describing it, is a single-shot business. It has nothing to do with bursts of fire. Think of a woodcock flipping across a tiny opening in the branches, of a buck doing a one-second bounce over a windfall, of a lad with a rifle in his hands coming suddenly face to face with an armed enemy. In any of these situations the man who can deliver one effective round in double-quick time is more likely to get his bird, his venison, or his enemy, than he who depends mostly on the cyclic rate of fire of his automatic weapon. The elapsed time in getting off the first shot may be the same in each case, but the "pay-off" chances are infinitely in favor of the snap shot who has actually completed his sighting at the instance the target is recognized. There **may** be an opportunity for a second shot, or a third or a fourth, if he misses; but there'll be no necessity for the additional rounds if he lands with the first one, which he may confidently expect to do. In snap shooting it is the cartridge in the chamber that counts; not those in the magazine.

General Edson, in his splendid contribution to THE RIFLEMAN, made it very clear that in the wicked jungle fighting he found ample evidence to support his long-held belief that the bullet that hits is the only one that counts. He believes, and so do I, that for our men that bullet should be the first one fired.



A REAL SPORTSMAN IS BORN . . . NOT MADE.

In the field of combat there is one Referee—Death—and his decisions are final.

An ordinary two-dollar BB air gun is a fairly good arm for training purposes. It is cheap, its ammunition is cheap, and while its "accuracy" is dubious it is still good enough at twenty or twenty-five feet to serve the purpose. It's light and has no balance, but in spite of these faults one can learn with it much about the principles of snap shooting.

The best weapon, however, is the .22 rifle, repeater or auto-loading, and preferably one chambered for the short cartridge.

It isn't necessary to practice with a shotgun in order to learn to snap with a shotgun. He who has mastered the trick with either a rifle or a shotgun will have little difficulty in changing from one to the other once he's become familiar with the weight and balance of the new arm.

The problem of ammunition supply is a serious one. The beginner must anticipate firing, not hundreds, but thousands of rounds in practice before his reactions are fixed and precise. Fortunately, there's no need to fire away part of one's scant store of shot shells or big-game cartridges which can be used more profitably on game, when a .22 shot will serve as well.

The location of the tiny bullet hole in relation to the paper tab will indicate exactly the margin of error. If the rifle had been a .30-30 instead of a .22, the .30 caliber bullet would have struck the same spot, as would the center of the shot pattern had a shotgun been used.

The beginner will probably find that he must do quite a bit of shooting before he gets anything that remotely resembles a group. Nevertheless, if he persists and practices regularly, putting all emphasis on timing and rhythm, he will discover one day that the split-second shots are arranging themselves into a loose, very irregular group. The size of these groups will depend upon the gunner's patience and on the amount of practice he is able to put in; but I would say that when, at fifty feet, the groups average six inches the man who makes them is entitled to wear the insignia of the "Order of Snap Shots,"—which insignia should be a streak of lightning!

As previously stated, snap shooting is a short-range proposition; yet I have seen running deer killed by snap shots made with a rifle at ranges up to seventy-five yards, at least, and game birds killed with shotguns at distances up to forty yards.

At the outset, the groups will rarely be on the point of aim, but they will be more or less consistent in location, and so will furnish a basis for correction. Inasmuch as the regular sighting equipment is being "by-passed," these corrections must be made on the target—the way an archer does it. The gun is beginning now to follow the eye, so that, for example, if the group indicates that most of the hits are a foot low and a foot to the left, the gunner looks, not at the tab, but at a point approximately a foot high and a foot to the right. If he's got "rhythm," he'll find that he's coming close to center.

Partial corrections can be made by changing stock dimensions. Low groupings can be corrected by straightening the stock or by lengthening the butt at the toe. High groups are corrected by increasing the drop or shortening the toe. Lateral errors are corrected by increasing or diminishing the width of the

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Texas Bats

■ Continued from page 5

objects. Also, compression of air between the ear of a flying bat and a solid surface is thought to be detected by the inner ear and warn the bat. Bats are guided in their pursuit of flying insects almost entirely by the sense of sound.

Habitats—Several species of bats, for example, big brown bats, hoary and red bats, yellow bat, evening bat, and pipistrelle, are forest dwellers, roosting by day under loose bark, in hollows in the trees, or hanging up head downward from some twig or branch. Others inhabit caves or take up residence in man-made structures. To this group belong the Mexican free-tail, cave bat, lump-nosed bat, mastiff bat, several kinds of little brown bats, vampire bat, etc. Usually in sleeping the bats hang head down from some support, but many of them rest horizontally in cracks and crevices. Doubtless some special modification prevents the blood from accumulating in the head region as it would in man were he to be suspended by his feet.

Feeding habits—Most bats feed on night flying insects which they capture in flight; some feed on the ground, catching ground dwelling insects, others forage in trees, crawling about on the trunk and limbs. A large group feeds on fruits, especially in the tropics where fruits are available throughout the year; another group, the long-tongued bats, feed on the nectar of night blooming flowers. A few kinds are expert fishermen and feed largely on small fish that they capture near the surface of the water; others, the widely publicized vampires, feed on the blood of man, horses, cattle and other large mammals. A few are carnivorous and even cannibalistic, catching and eating other bats.

All bats must have water and this they get by swooping low over the surface and scooping up a mouthful at a time. A bat often makes several swoops before its thirst is quenched. This habit of drinking makes capturing them a relatively easy and interesting task simply by stretching thin wires or thread over their drinking place about two inches above the surface of the water. By this simple expedient I have been able to capture as many as 169 bats in two hours. Of course, another way to capture them is to ferret out their daytime roosts.

Breeding habits—All bats give birth to their young as does man and all other mammals except the Duckbill of Australia, which lay eggs. No bat has more than four mammae and most of them have only two, pectoral in position as in man. Thus, the number of young is frequently one, sometimes two or three and seldom four. The number of young seems to correlate well with the roosting habits; those that roost in the open have more young per litter. Cave bats usually have only one or two. This is interpreted to mean that tree roosting bats are exposed to more hazards and more young are needed to maintain the population.

Copulation in some species takes place in the fall of the year before the bats go into hibernation. The sperm are said to remain viable in the reproductive tract of the female all winter and do not fertilize the ova until the following spring when the females ovulate. Usually females of these species all ovulate within 48 hours and consequently all young in the colony are born about the same time. Other bats copulate only in the spring. After the breeding season is over, males and females usually segregate and roost in separate colonies.

The gestation period is known definitely in only one species of American bat—*Myotis lucifugus*—and in this instance it is about 60 days. Probably no species has a gestation period longer than 90 days. This is an exceedingly long period of uterine development for so small a mammal. Rats and mice have a gestation period of 21 days; ground squirrels, about 36 days; cats, 51 days; dogs, 63 days. Doubtless the long gestation period in bats can be correlated with the relatively large size of the young at birth and their rapid postuterine development. In some species the young bats at birth weigh one-third as much as the mother, which is indeed extraordinary when compared with the young of most other mammals. In man the ratio of weight of young to weight of mother is as 1:15; in the opossum it is about 1:10,000. A condition comparable to that of bats is found in some of the marine mammals. In the porpoise, which is common along the Texas coast, the young are nearly one-half as long as the mother.

Young bats grow rapidly and when about three weeks old are able to fly and forage for themselves; when four weeks old they are difficult to distinguish from adults. For comparison, a young opossum at the age of one month is still smaller than a new born mouse.

An interesting trait in some species of bats is that of the mother carrying her young with her on her nightly feeding flights. This "hitch hiking" is kept up until the combined weight of the youngsters equals or exceeds that of the mother. The young ones cling to the under side of the mother, using their specially modified teeth and their claws.

Natural enemies—The low reproductive rate in bats suggests that they are exposed to few predators. Investigation proves this to be the case. A few birds of prey (barn owl, horned owl, and bat falcon) and snakes (black and lyre) are known to prey upon them. Otherwise, their lives are lived in comparative safety.

Where do bats spend the winter?—In the tropics bats are active throughout the year, but in the latitudes the winter season is too cold for their continued activity. The bats have solved the winter problem in two ways: (1) by migrating to a warmer climate (like the Iowa farmers) and (2) by hibernating or sleeping through the long winter season. Three species of bats (hoary, red, silvery-haired) are definitely migratory and accomplish long sustained flights, even crossing several hundred miles of ocean to reach Bermuda.

Those that hibernate store up excess fat in the body cavity and under the skin to serve them as fuel to keep the body furnace functioning for a period of several months. On emerging in the spring, hiberating bats are mere shadows of their former selves, some individuals losing as much as 50% of their weight when they went into hibernation. While in hibernation, the bodily processes are drastically reduced. The heart beat is slower, the body temperature is but a few degrees above freezing, and the rate of respiration is very low. They may be cold to the touch, insensible to pain, and apparently dead, but they revive readily when placed in warm surroundings. Some kinds do not go into complete hibernation and may move about to a slight degree in their winter quarters.

Economic values.—Bats are protected in Texas by state law, which reads "Whoever wilfully kills or in any manner injures any winged mammal known as common bat shall be fined not less than Five ($5) Dollars nor more than Fifteen ($15)." Acts of 1907. This law doubtless was passed at the instigation of a once prominent doctor in San Antonio who was misled into believing that bats destroy malarial mosquitoes. As a matter of fact, bats eat few, if any, mosquitoes and never, as far as known, the low flying Anopheles, which transmits malaria. This law is antiquated and is so poorly stated that it is meaningless. The common bat of Texas is the Mexican free-tailed species, which, technically speaking, is not a "common bat" because that term applies to an entirely different family.

The guano or accumulated droppings of colonial bats is exceedingly high in nitrogen and is valuable as a fertilizer. In 1939, Mr. Will J. Tucker, Game Fish and Oyster Commission, reported that "a survey of the bat caves of Texas showed a computed annual income from guano of $12,757.50." The potential income from bat guano is considerably higher, however, because many bat caves are not being worked.

As far as known, Texas bats carry no disease transmissible to man, but the caves in which they live often are infested with ticks of the genus Ornithodorus that do transmit relapsing fever. One should be wary of visiting bat caves in central Texas for this reason. The "bed bug" found associated with bat roosts is not identical with the one afflicting man, nor does it feed upon him.

Bats roosting in a building in large numbers may be so offensive because of strong odors and squeaking that they become a nuisance. If this be the case, screening them out is effective in forcing them from the premises. Screening should be done in late summer after the young are able to fly and in the early evening after the bats have left the roost. Otherwise the stench from the decomposing trapped bats may be worse than the previous condition. For this

same reason, fumigation is not recommended.

Perhaps the chief economic value of Texas bats lies in their destruction of large numbers of insects. Among those eaten are a variety of beetles, including June beetles; numbers of moths whose larval stages are destructive to vegetation; leaf-hoppers; flies, etc. In general, most bats should be considered an asset to any community.

Kinds of Bats in Texas

Family Chilonycteridae — Lappet-chinned Bats. One species, **Aello megalophylla** Rehn is known from the Brownsville region.

Family Phyllostomidae — Leaf-nosed Bats. One species, **Leptonycteris nivalis** (Saussure) (Tail-less Bat). Known from the Big Bend National Park of Texas.

Family Vespertilionidae — Common Bats. Eight genera and 19 species are known from Texas, as follows:

Myotis lucifugus (LeConte) (Little Brown Bat)—Known only from the Trans-Pecos region.

Myotis yumanensis (H. Allen) (Yuma Bat) — Known from southwestern Texas.

Myotis velifer (Allen) (Cave Bat)—Occurs in southern and western Texas.

Myotis thysanodes (Miller) (Fringe-tailed Bat)—Known only from the Trans-Pecos.

Myotis volans (H. Allen) (Long-legged Bat)—Known only from the Trans-Pecos.

Myotis californicus (Audubon and Bachman) (California Bat)—Known only from the Trans-Pecos.

Myotis subulatus (Say) (Black-nosed Bat)—Known only from the Trans-Pecos and the region near Del Rio.

Pipistrellus subflavus (F. Cuvier) (Pipistrelle)—Eastern Texas west to the limit of forest lands.

Pipistrellus hesperus (H. Allen) (Canyon Bat)—Western Texas in the semi-desert areas.

Eptesicus fuscus (Beauvois) (Big Brown Bat)—Widespread in Texas; a forest lover; represented by an eastern and a western form.

Lasiurus cinereus (Beauvois) (Hoary Bat)—Widespread; a migrant; rare.

Lasiurus borealis (Müller) (Red Bat)—Eastern half of Texas in the forested areas. Represented by two forms.

Dasypterus intermedius (H. Allen) (Yellow Bat)—Known only from the Lower Rio Grande Valley.

Dasypterus floridanus (Miller) (Florida Bat)—Known to occur only in the eastern part of Texas.

Nycticeius humeralis (Rafinesque) (Evening Bat) — Eastern forested part of state.

Corynorhinus rafinesquii (Lesson) (Lump-nosed Bat) — Known only from the Trans-Pecos.

Antrozous pallidus (LeConte) (Pallid Bat)—Western desert areas, east at least to Kerr County.

Family Molossidae—Free-tailed Bats. Two genera and three species are known from Texas.

Tadarida mexicana (Saussure) (Mexican Free-tailed Bat)—Common over most of the state.

Tadarida macrotis (Gray) (Big-eared Free-tailed Bat)—Known only from the Big Bend National Park.

Eumops perotis (Schinz) (Mastiff Bat) — Only one specimen from Pumpville on the Pecos River is known from Texas.

Department of Fish and Game, College Station, Texas.

Who's the Sap?

Dear Hunters:

I'm not the bragging kind, but I feel sorry for the poor saps that spend their good money for a measly little old scrap of paper called a hunting license. Now I hunt a lot, and I say game is wild and free for those smart enough to get it. If my feet let a warden catch me, I'll never buy them another pair of shoes. There will be enough game for me as long as I live, so why should I give a darn for the other fellow or care for 50 years from now? If game gets scarce in one place, I just go to another. That is perfectly natural. That is the way a forest fire does. It's too much trouble to plant feed for game, observe seasons and plug your gun.

I've had some real fun in my day, ducking wardens, shooting, poisoning, and trapping fish and dodging mad farmers—which reminds me of the time I was hunting quail a month before the season opened on a cranky old farmer's place that had his land posted. I saw the old farmer plowing over in the far corner of his land, so I took my dog and circled a hill where he could not see us. We located a covey in his cow pasture and I took four quick shots, got my birds and climbed his fence in a hurry. In getting over the old rusty fence the top wire broke, but I didn't have time to fix it. Well, me and my dog went over on another place and the dog pointed in a cotton patch.

Those quail were young and not used to a dog so instead of flushing they ran down the cotton row. There must have been 20 quail in that covey, all lined up down the cotton middle, so I squatted down, lined 'em up and really mowed 'em down. I got 11 birds on the ground and two more when they got up. By this time it was getting late so I put the dog in the car truck where nobody could see him and started home. As I passed by the old cranky farmer's place with the posted land I saw him chasing his cows, all 10 of them in his neighbor's corn field. Seeing him run with his shirt-tail out fluttering in the hot wind made me laugh all the way home.

Some of the boys try to tell me that I am not a good sportsman, but I'm as good a shot as any of them. I know what the trouble is—it's envy. I get more game than any of them. Why I never go on a dove shoot without bringing back 25 or 30 doves and more than that if I scatter a little feed. And deer, I get five or six every year. Most of 'em are doe but a deer is a deer and once you clean 'em nobody knows the difference. Last summer I got a whole flock of turkey (7) of 'em at one shot. It was during one of those summer showers when the old hen was hovering over her fryers. They were real eating, too.

Pretty soon I'm going to tell you some of my fishing experiences. A little later I hope to organize a CLUB of us super-game-getters for I know there must be one or two fellows like me in every community. If our home town clubs are going to be critical because of jealousy and envy, we'll just form a club of our own, and why not, for we get most of the game, anyway.

Yours for all we can get,
MEAT-GETTER.

Gotta Teach 'Em Young

A Pennsylvania Game Protector reported the following:

"On Saturday, October 23, I apprehended a man 83 years old hunting rabbits. He had 5 shells in a Winchester pump gun and the safety off. He shuffled along and was trying to see one setting, but his years were obviously against him. I rebuked him and directed him to go home and violate no more. Fifteen minutes later I heard a shot in a small woods nearby and upon investigation found his 75-year-old brother hunting squirrels. He was more agile than his elder brother, and having shot a squirrel I imposed a ten dollar fine upon him. These men were accustomed to getting a few pieces of game each year before the season opened, and for years had never been caught. Theirs was a long lane, but it ended."

Why Texas

■ Continued from page 8

tinued restocking of shot-out areas is to admit the lack of effective management. In any case, controlled hunting perhaps can be achieved more easily than propagation since controlled hunting must be practiced any way.

To understand why and how a sparse brood stock of quail can repopulate an area, we have only to consider the reproductive powers of one pair of quail. If we should start with only one pair of quail under ideal conditions and assume that the original pair and their progeny live and reproduce for five years, let us see how many quail we would have at the end of five years. Female quail normally lay and hatch 14 eggs each year. At the end of the first year, we would have 16 quail; second year, 128; third year, 1,024; fourth year, 8,192; fifth year, 65,536 quail. Of course, this never happens under natural conditions. "Nature in the raw is seldom mild" applies quite well to quail attempting to raise little ones. Some wildlife authorities have shown that bobwhites normally lose 65 per cent of all eggs before the young emerge from the shell. Considering then that only 35 per cent of the eggs hatch each year we would have: First year, 7 quail, second year, 27; third year, 96; fourth year, 331; fifth year, 1,144. But the losses do not end here. It frequently happens that many young and adults, even if no hunting is done, lose their lives each year. Assuming that 25 per cent of the young and adults die each year, which may be high, we would have: End of first year, 5; second year, 15; third year, 41; fourth year, 104; fifth year, 269. This may seem low but frequently the survival may be much higher. But even at this rate of survival one pair of birds would produce a shootable population on 807 acres in five years, assuming that one bird to each 3 acres is a fair population density. Experience of field men has shown conclusively that bobwhites seldom exceed this density. Theoretically this population could not be obtained with one pair of pen-raised quail for they would die before the nesting season began; this of course assuming they were released in the fall. Investigation of the survival of pen-raised bobwhites in the wild by F. M. Baumgartner of Oklahoma A&M College has shown that only one pair out of 25 pairs live until the breeding season. Frequently none of them live. The ratio of chances of increasing bobwhites by releasing pen-raised birds, therefore, is 25 to 1 in favor of wild birds, provided of course there is any seed stock left. It is a rare thing in any quail country to find no quail at all.

Our most recent attempt at testing the value of pen-raised quail was in April, 1940, when 400 birds were released on a series of eight areas located in the counties of Llano, Tom Green, Irion, Glasscock, and Coke. A survey in late spring of 1940 revealed four coveys of young birds averaging 13 birds each or a total of 52 young. Since the parent birds were not captured for examination, we were not sure that all these were the offspring of the pen-raised birds or native quail. Native birds were present in small numbers on all the areas before the releases were made. Prior to release these areas had been ravaged by a drouth but good rains fell in all these counties except parts of Glasscock and Coke counties making conditions suitable for reproduction. On the two areas in the rainless counties no young quail were seen in 1940. Another survey was made in late spring of 1941 by Biologist Nils N. Nilsson and no young quail were seen on any of the areas. It is our belief that if breeding conditions were favorable, satisfactory quail population increases would have taken place irrespective of whether pen-raised stock was liberated.

Dr. Richard Gerstell, game research biologist for the Pennsylvania Game Commission, writing in the December, 1937, issue of the Pennsylvania Game *News*, says: "Though admittedly most popular with a very large percentage of the hunters, Pennsylvania's restocking program has for the money spent probably been the least effective of the Commission's quail management practices." Protection and the provisions of winter food and shelter were the other two practices. Gerstell implied that even winter feeding would not be necessary even in such a cold climate, if it were not for the occasional deep snows and very severe cold spells. Pennsylvania has used both wild trapped and pen-raised birds for restocking.

A great many persons do not know that quail under captive conditions are much more susceptible to diseases than is poultry. The diseases that attack quail are many; some of the most deadly ones are coccidiosis, pneumonia, blackhead,

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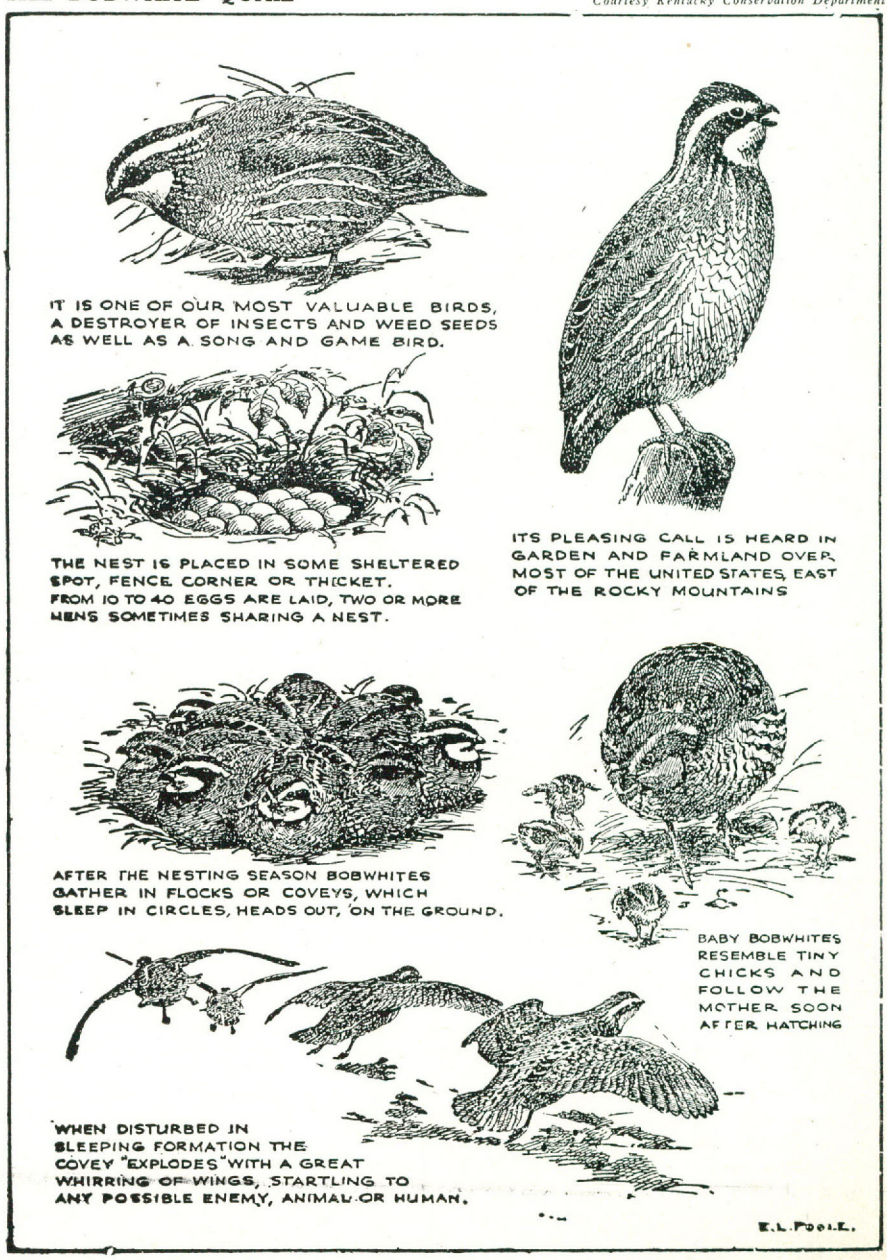
THE BOBWHITE QUAIL

Courtesy Kentucky Conservation Department



A Plan

TO REHABILITATE TEXAS OYSTER REEFS

ALL natural oyster reefs in Texas belong to the State and except for negligible amounts all oyster production is from these reefs. The decline in oyster production has been 75 per cent during the past forty years.

Oyster raising by private means has not been successful, chiefly because under Texas law the wild or natural reefs can not be leased and these localities are the best areas for oyster growing. The leasing of natural oyster reefs has to be done slowly, if rows, fights and riots are to be avoided and even so they have not been entirely avoided in other states, as is shown by the history of the oyster industry. It is late now to start leasing the reefs and the legislature will probably forbear from precipitating disturbances on the Texas Coast, although leasing of the natural reefs would doubtless result in immediate increase in oyster production, as it has in New Jersey. On the other hand, some authorities maintain that oyster cultivation by the State is more feasible than private cultivation anyway. This is probably incorrect, but in any event, at present the obligation to care for the natural reefs falls upon the government of the State. Since the decline in oyster production has reached an alarmingly low point an all out attempt to rehabilitate the reefs must be made by the Game Fish and Oyster Commission.

During the early part of 1944 the Commissioners of the Game, Fish and Oyster Commission set aside $25,000 for the oyster rehabilitation work. Biologically the oyster rehabilitation program as it is now planned is somewhat analogous to a fish hatchery program. It will be conducted in a way that takes advantage of the general knowledge that oysters reproduce well and grow thickly in brackish waters, thus crowding and starving each other, but grow well in saltier water where the crowding is less or non-existent. For the program this fall and winter it is planned to move oysters as cheaply as possible from the reefs in the back bays to the depleted reefs in the lower bays. These reefs will first be closed by proclamations posted in the fish houses in the two towns nearest the reefs, as is provided by law.

Work will be started on four reefs in Aransas Bay as soon as the weather gets cool. Small oysters will be gathered from reefs or seed locations in Copano Bay, selected by the Marine Biologist, and planted on the locations in Aransas Bay which he designates. He will outline the area, demonstrate how much the oysters should be culled, explain the scattering process and supervise the preliminary plantings. After that the work will consist of scattering a predetermined number of barge loads of oysters over a definite area and this work can be left in charge of a member of the oyster planting crew. At that time the Marine Biologist will go to Matagorda Bay to start the program in that area. Operations in other areas of the coast will be begun as quickly as supplies can be gathered and the preliminary examinations of the bottoms can be made. During the warm months of 1945 it is planned to carry on a shell planting program, where the conditions appear to be favorable, but that part of the program is tentative.

As outlined here the planting program is not broad enough to answer the serious questions concerning oyster production that now confront the Game,

By GORDON GUNTER
Marine Biologist

Fish and Oyster Commission. It is not a complete program. However, since all of the necessary information has not been gathered and the need for action is immediate, it is necessary to proceed with the planting program, which can be run in conjunction with a research program and at a saving in expense.

Knowledge of what factor or factors have been responsible for the decline in oyster production is an absolute necessity in planning a program of action for stopping the decline and starting it on the upgrade. Other facts, part of them of a biological nature, not directly related to oyster production decline must also serve as a background for a program of action. The following outline explains how this basic information must be gathered. All known important facts relating to the Texas oyster industry should be ascertained and organized with respect to each other. For example, the past history of the oyster industry should be reviewed carefully. This should include a complete survey of the statistics of past production and the ways of handling oysters. Information on where, when and how the oysters were taken and how these methods changed throughout the years should be gathered. The date that hand dredges, power dredges and power boats were introduced should be considered in relation to the changes in production statistics. The annual production statistics should also be examined in connection with drought years, flood years, improvements in transportation, rise and fall in prices and other factors. Changes in seasonal flow of Texas rivers and their influence on the salinities and silting of the bays should be ascertained. The history of canals, ship channels, breakwaters and dykes and their influence on reefs and the amount of reefs destroyed in their construction should be determined wherever possible. The history of industrial and municipal wastes put in the bays and their effects should be summarized. From these facts it should be possible to derive certain valid conclusions relating to the decline of oyster production on the Texas Coast. The known important biological facts about the Texas oyster should be summarized and related to the facts ascertained above for the purpose of planning what further facts are needed for the rehabilitation program. This phase of the work involves a summary of all pertinent facts in the literature. Furthermore, the unrecorded experience of oyster growers in other states, especially Louisiana, should be utilized to the fullest possible extent. The additional biological facts needed should be obtained after it has been ascertained from the above information just what they are. A survey of all reefs and a comparison of their condition with the condition and extent of the reefs in the past, so far as this is known, should be made. (In connection with this a geological survey of the extent and depth of mudshell deposits would be of interest and value to various industrial enterprises. This is a large program within itself and should be carried on by a geologist.) At present we know that field and laboratory experiments on the rate of growth, time and efficiency of spawning and setting, survival of the larvae, thickness at which oysters should be planted on reefs, the size and the age at which it is best to transplant oysters, the possibility of increasing the area of reefs by marginal shell plantings, the possibilities of starting new reefs by cultch plantings, the effects of dredging on reefs as compared to tonging, the best time of the year to move oysters and the salinity limits within which they can be moved, all carried out under experimental or varying conditions should be thoroughly worked out.

A laboratory and a boat, with a crew of two men and two biologists working full time on this program alone and with no other extraneous duties will be needed to carry it out. The boat, the crew and one biologist are already available, working in connection with the oyster planting program. A laboratory can be

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FERRIC SALT DEPOSITS vs. FISH AND OYSTERS

By J. G. BURR
Aquatic Biologist

A Biologist Seeks Clue to Reason Why Fish and Oysters Don't Thrive in Galveston Bay Waters

A WASTE water effluent containing ferrous and ferric chloride from the Tin Smelter at Texas City began entering Galveston Bay a little more than two years ago. The iron and chloride compound produced a green stream which, as it passed under the highway culvert, attracted no little attention, and fishermen soon began to conjecture that all the fish and oysters in the bay would be killed. Though there was not any proof of fish mortality, an investigation of just what was happening in the bay seemed in order, so on November 29, 1943, a shore-line check up was made, followed by another on April 6 of this year when a tour of the bay was made with the aid of a State boat, and bottom water samples were taken. Since then several other tests were made up to October 17.

If one stops to reflect that in the salts of sea water more than one-half is chlorine, and that the red clay in the bottom of the bay runs as high as 10 per cent iron oxide, it would seem a bit Don Quixotic to take seriously an effluent which adds only just a little more.

Certainly, too much acid is harmful but the alkaline bay water having a pH of 8.3 neutralizes the acid water of the ditch, which has a pH of around 5.0, as soon as the waters mingle. The ditch water enters an inlet called Swan Lake which has an area of about a square mile and connects with Galveston Bay by two short necks of water. On last November, 1943, the green water of the ditch turned to a vermillion red as it entered Swan Lake. Collision of the acid with the alkaline water precipitates iron which goes to the bottom after floating in reddish suspension for a time. To find how far the tides were carrying the suspended iron was at least a matter of scientific curiosity. A levee or breakwater extending from the shore a distance of five miles made it unlikely that the tide would go far in that direction; instead the falling tide would carry the red water toward and perhaps beyond the Causeway. There were no commercial oyster beds between the effluent outlet and the Causeway, but beyond the Causeway on the west side is an inlet called Jones Lake which had produced oysters. These had been killed out, some said by pollution, but probably by too much fresh water, as the rainfall had been unprecedented.

Toward Galveston Island and near the mouth of Offatts Bayou is located a good reef owned by Peden Brothers, and inside Offatts Bayou is the Rogers Oyster farm where the oysters, once the best in Galveston, have practically died out in recent years. At the extreme end of the Bayou toward town, oysters are abundant and untouched by pollution. The Peden reef has good oysters and the owners stated that no smelter effluent had bothered them; so the smelter effluent did not reach the Offatts Bayou oysters which lie farther on, and six miles from Swan Lake.

In attempting to trace the iron deposits it must be kept in mind that the Bay water has a pH of 8.3 which precipitates the iron, and the iron not being water-soluble could not be found unless it is in suspension. So the bottom water had to be boiled to get the suspended precipitates. Around the outlet of the effluent there was much in suspension and a great deal of precipitated iron on the bottom. But from there to Jones Lake and the Peden Reef beyond the Causeway the precipitates became increasingly thinner.

On the Rogers farm, however, the bottom samples showed a staggering amount of iron, and as above stated, the oysters were nearly if not all dead. Thus a sizable problem arose as to where the iron was coming from.

With the abundant iron oxide naturally occurring in the soil it became necessary to distinguish whether we were dealing with oxides, hydroxides, ferrous carbonate or what have you. My test of the ooze from the Offatts farm indicated hydroxide, more than enough to kill oysters by asphyxiation. Colorimetric tests of roiled bottom samples ranged from 30 to 360 p.p.m. calculated as total iron. A miscroscopic study confirmed the geletinous appearance of the hydroxide. However, the identification of iron hydroxide is not so easy, says F. W. Clarke of the U. S. Geological Survey in his work on Geo-Chemistry.

We quote: "The precipitated hydroxides of iron vary much in character and appearance, and their exact chemical nature, despite the plausible formulae assigned to some of the minerals, is by no means clear. In color they range from yellow through various shades of brown and red, and in texture they differ as widely. J. M. van Bammelen regards them as colloidal complexes of ferric oxide and water, to which chemical formulae are not properly applicable . . .

"According to P. Nicolardot, however, ferric hydroxide exists in at least six modifications which differ in their physical and chemical properties and in their content of water. They are all, he says, polymers of the simplest hydroxide." So, by whatever name, the hydroxide was present at the oyster farm. How it came to be there was a matter for further research.

Looking for a clue to oceanic deposits, as discussed by Clarke, it was pointed out that "when waters deposit their load in the presence of much decaying organic matter, ferrous carbonate is laid down," and again "Buchanan invokes the reducing agency of organic matter, which transforms the sulphates of sea water to sulphides, precipitating iron." A field test showed a small amount of hydrogen sulphide in the bottom ooze of the Rogers farm. The bottom water was apparently static and but little influenced by the tide where the depth was 20 or 30 feet, the surface water only, moving in and out of the bayou.

It was known that a meat packing house effluent had gone into the bayou but this, allegedly had been stopped some time ago. When asked how long the effluent had been contaminating the bayou,—fifteen years, was the reply. If salt water is a preservative, the packing house waste is, no doubt, slow in breaking down, and no one can promise any oysters until some tropical storm is violent enough to scour the bottom of the bayou.

In the deeper bottoms of the bayou where the hydroxide was found, certainly no oysters could live, but the inshore oysters on shallow beds also were dying which leads one to believe that some toxic gas arising from the deeper bottoms causes the mortality. This deterioration of the oyster beds was well advanced before the coming of the tin processing plant.

Whether the iron precipitates from the tin smelter were harmful to shrimp which crawl along the ground could not be determined but the heavy deposits were restricted to a small area adjacent to the effluent outlet. To investigate more fully, on September 20 at high tide we sailed into one of the necks of water that connects the bay with Swan Lake. The pH was 7.1. The soil analysis revealed 11.18 per cent iron as iron oxide. The bottom water contained no dissolved oxygen. Top oxygen was not determined but four young mullets and a crab were taken in a

net and they seemed to be in perfect condition. Vegetation in the water near the shore was rank, and a plankton test on another occasion showed microscopic life in the usual abundance. The reddish water was heavily charged with suspended iron.

Some chemical changes had taken place since the last visit. In an attempt to reduce the degree of acidity of the effluent large quantities of oyster shells had been used. The green water of the ditch had become red and there was a slight reduction of the acid. The pH at the outlet into the bay was about the same as before, 7.1 but the M.O. alkalinity had jumped from 34 p.p.m. to 116, doubtless resulting from the lime of the shells, and the precipitation of iron had increased threefold to 45 p.p.m., in the bottom water samples.

On October 17 three water samples were taken from Swan Lake. At the ditch entrance the pH was 4.8; the total acid, 3,520 p.p.m. (?) and the total iron 960 p.p.m. In the middle of Swan Lake the pH was 5.2. This high acidity is accounted for by the low tide. The total acid was 70 p.p.m. and the dissolved oxygen 2.9 p.p.m. Two iron tests were made of this sample. Ten mls drawn from the top with a pipette showed 30 p.p.m and ten mls drawn from the bottom which had some precipitation showed 120 p.p.m. The pH 5.2 is below fish toleration but apparently fish were staying away as no dead ones were seen. The third sample was taken where Swan Lake empties into the bay. Here the pH was 7.0, the acid 30 p.p.m., dissolved oxygen 2.6 p.p.m and the iron again 45 p.p.m, as on September 20.

Comparing the April and September visits there were large increases of iron at the four stations along the shore to the Causeway but little if any of it came from the smelter, in my opinion. For, as we moved through the ship channel there were seen great dumps of red clay which were not present on the April visit. It was explained that the dumps recently had been thrown up by the government dredges in deepening the ship channel. As heretofore stated, the analysis of some of these clay samples showed as much as 10 per cent iron oxide. This per cent is in line with the findings in the great oceans from which a composite of 51 samples of red clay contained 8.66 per cent of iron oxide. This dredging in Galveston bay which continued for many days, had roiled the water and perhaps tons of the red clay in suspension had been carried by the tides and deposited far and wide; hence the increase of iron picked up at the various stations.

Whether or not there is potential danger to the bay proper from the tin smelter there will be continued agitation and a demand that something be done. The tin plant is doing everything chemically possible to work out a solution of the waste water problem, which is by no means easy. This will doubtless be accomplished before serious harm results.

Why Texas

■ Continued from page 14

ulcerative enteritis, aspergillosis, and many parasites, both internal and external. The problem of keeping these diseases away from quail breeding pens is a major one. In fact, this is the limiting factor in the pen production of quail. Many able scientists have studied the diseases of quail. One of them is Dr. Charles Bass of the School of Medicine, Tulane University. Dr. Bass says that the chance of disease in a quail hatchery is in direct ratio to the length of time a hatchery is in operation. Furthermore, he believes that pen-raised birds released in the wild are likely to transmit diseases to wild birds in ratio to the number released. Most successful hatcheries have in their employ a quail disease-parasite specialist and a well equipped laboratory where a constant guard is kept against disease.

To keep down production costs and to prevent the spread of disease, most quail hatcheries now hold their birds in captivity only until they are from eight to ten weeks of age. Quail raised in captivity up to this age cost about 85 cents each. The stigma of disease is much feared by quail propagators and one of the means employed to prevent epidemics is not to allow young quail to touch the ground until they are liberated. If quail are held throughout the winter, quail propagators have found the cost of production will rise two-fifths; for example, the Oklahoma A. & M. College produces birds for 79 cents up to ten weeks of age. To hold them through the winter would cost $1.31. Furthermore, quail propagators have come to the conclusion that the best time of year to liberate quail in order to get better survival is to release them in late summer or early fall at the age of about ten weeks. When released at this time, they contend that the birds will have access to a greater amount of food and cover, which is certainly true. Naturally no institution is more interested in the increase of bobwhite quail than are the cartridge manufacturers, and among them the Western Cartridge Company has been studying the problem of releasing pen-raised birds for a period of five or six years. They alone, as far as we know, have data to show that summer or early fall released birds are better than those released in the spring. A recent publication put out by this organization states that late summer or fall stocking "is more economical than spring stocking **because spring released birds, according to our evidence, do not in a practical sense survive at all.**" They claim that another reason why fall released birds are better than spring released birds is that some of the birds can be taken by the hunter during the open season following release, whereas birds released in the spring do not live until the second open season.

☆

A jay-walker in the country is a city guy who walks across soft cultivated fields, or fails to close a gate behind him.

Banded Sharp-Tail Shot After 7 Years

How great an age can a sharp-tailed grouse attain? This question arises from the recent shooting near Trout Lake on Michigan's upper peninsula of a bird of this species that was wild-trapped, banded and released seven years ago. The bird was one of a number transferred from the western to the eastern end of the peninsula and was shot not far from the point released.

The Department of Conservation says the bird's age is unusual, and expresses its belief that the sharp-tails have established themselves in the Trout Lake locality.

A Plan

■ Continued from page 15

constructed for approximately $5,000. Additional expenses of $5,000 a year for salary of the second biologist, his travel expense and laboratory running expenses will be needed, if the research is carried on in connection with the planting program. With this staff and working facilities a thorough oyster program designed to answer the questions and solve the most important problems of oyster rehabilitation in Texas could be carried on in connection with the oyster planting program and completed in approximately five years at a cost of $30,000.00, in addition to the money expended on the rehabilitation program as it is now planned. If this research were carried on alone and there were no planting program, much of the work would duplicate what is to be done in the program already started and the total expense for a five-year period would be in the neighborhood of $60,000.00.

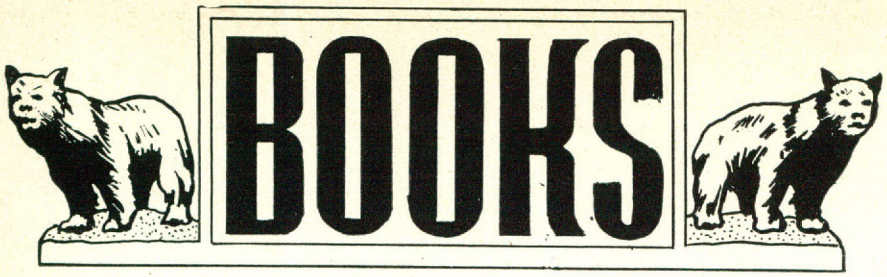
The research work plus the planting work, as it is now planned, amounts to a total program. Without the research program the oyster planting work will be a piecemeal attempt and with the present staff there will not be time for the Marine Biologist to analyze and experiment as we go along. The result will be that either in the case of success or failure we will not be able to show why. Therefore, the complete program will be the cheapest in the long run and it should be started at the earliest possible time, for the oyster problems in Texas are acute.

☆

Sportsmanship is a simple little thing. It is but conducting oneself in a manner so as not to intrude upon the rights of another.

☆

Largest increases among migratory waterfowl in recent years have been shown by the mallard and pintail, according to the Fish and Wildlife Service. The total population of the mallard at the present time is between 35 and 40 millions, and that of the pintail in excess of 20 millions.



SHOTGUNNING IN THE UPLANDS—By Ray P. Holland. More than 200 pp., 8 full-page reproductions of oil paintings and many drawings in line by Lynn Bogue Hunt; foreword by Dave Newell. Published by A. S. Barnes & Company, 67 West 44th St., New York, 18, N. Y. Price $7.50.

Here is a book to warm the heart of every upland hunter, whether his favorite quarry be bobwhite, woodcock, pheasant, ruffed grouse, or any of the many other feathered gamesters pursued with dog and gun.

Ray Holland knows his birds and knows his sportsmen by virtue of lifelong association with both. He draws on his vast experience in the field to recapture and share with his readers priceless moments, each with its quota of lore, presented in delightfully assimilable form. The beginner will find it inspiring and educational—the experienced hunter will find it as satisfying as a reunion with old friends, and full of hints for greater hunting success in days to come.

The illustrations, both oil paintings and line drawings, were made especially for the book by Bogue Hunt, top-flight wildlife artist. They match the spirit of the text and help make the book as beautiful as it is entertaining and instructive.

ON YOUR OWN—By Samuel A. Graham and Earl C. O'Roke. How to Take Care of Yourself in Wild Country. A Manual for Field and Service Men, 156 pp., 52 illustrations. Published by University of Minnesota Press, Minneapolis, 14, Minnesota. Price (Handbook Size) $2.00.

This authoritative book is addressed to all who may, at some future time, find themselves alone in a wilderness, dependent entirely upon their own resources. It not only tells how to live "off the country," but describes a wide range of perils such as reptiles and insects, poisons and infections, quicksands, quagmires and temperature extremes, and tells how to cope with each.

It explains how to ascertain whether water is poisonous or not, how to obtain drinking water from fish, how to construct an effective fish spear, how to build traps of many kinds. In short it is full of practical aids to human survival under primitive conditions.

Arms

■ *Continued from page 11*

comb at the point of contact—a thicker comb if the groups are to the right, and a narrower comb if the groups are to the left.

The combat soldier, unfortunately, can't send his weapon to a gunsmith for stock alterations. It would be a damned good thing if he could, for the fit of his rifle is almost as important as the fit of his GI shoes. He can, however, learn to "hold off," or to change his snap-shooting stance. Light pressure against the comb counteracts a tendency to shoot to the left; heavier pressure at the point of contact will move the group from right to left; a high contact will bring a low group, and vice versa.

This is one of the functions that are more difficult in definitions than they are in execution, thanks again to Old Subconscious, who, if we persistently require certain results, will finally use his unfathomable powers to produce them for us, provided that we give him the tools to work with: namely, reasonable coordination of muscular energy, energy, nervous energy, and vision—and endless practice. Jack Dempsey, I have been told, habitually came out of his corner humming a gay and lively little two-step. I know why. He was establishing his personal rhythm and getting set to do some "snap shooting."

Indeed it is difficult to avoid drawing comparisons between the skilled snap shot and the skilled boxer or fencer, for all these alike have trained to coordinate all their powers to produce one brief instant of precise action; an action executed so fast that the conscious mind often retains only a blurred picture of what actually occurred.

If a man knows how to snap and wants to be mean about it, he can take birds right out from under his companions' gun muzzles, much to the discomfiture of the latter. He can also snap a Jap or a Nazi right out from under his helmet quicker than his victim can say "Banzai!" or "Heil Hitler!"

Right now the emphasis is on snap shooting for combat purposes and here again we find that sport shooting contributes to the combat efficiency of the individual soldier.

It is obvious that when peace has been restored, the whole prewar pattern of target shooting must be arranged so as to include many events of a nature so startling as to shock the orthodox marksman of a few years ago. Speed of fire will be increasingly emphasized, but in all the ensuing roar, we should not overlook the vital importance of that first quick shot delivered effectively at point-blank range.

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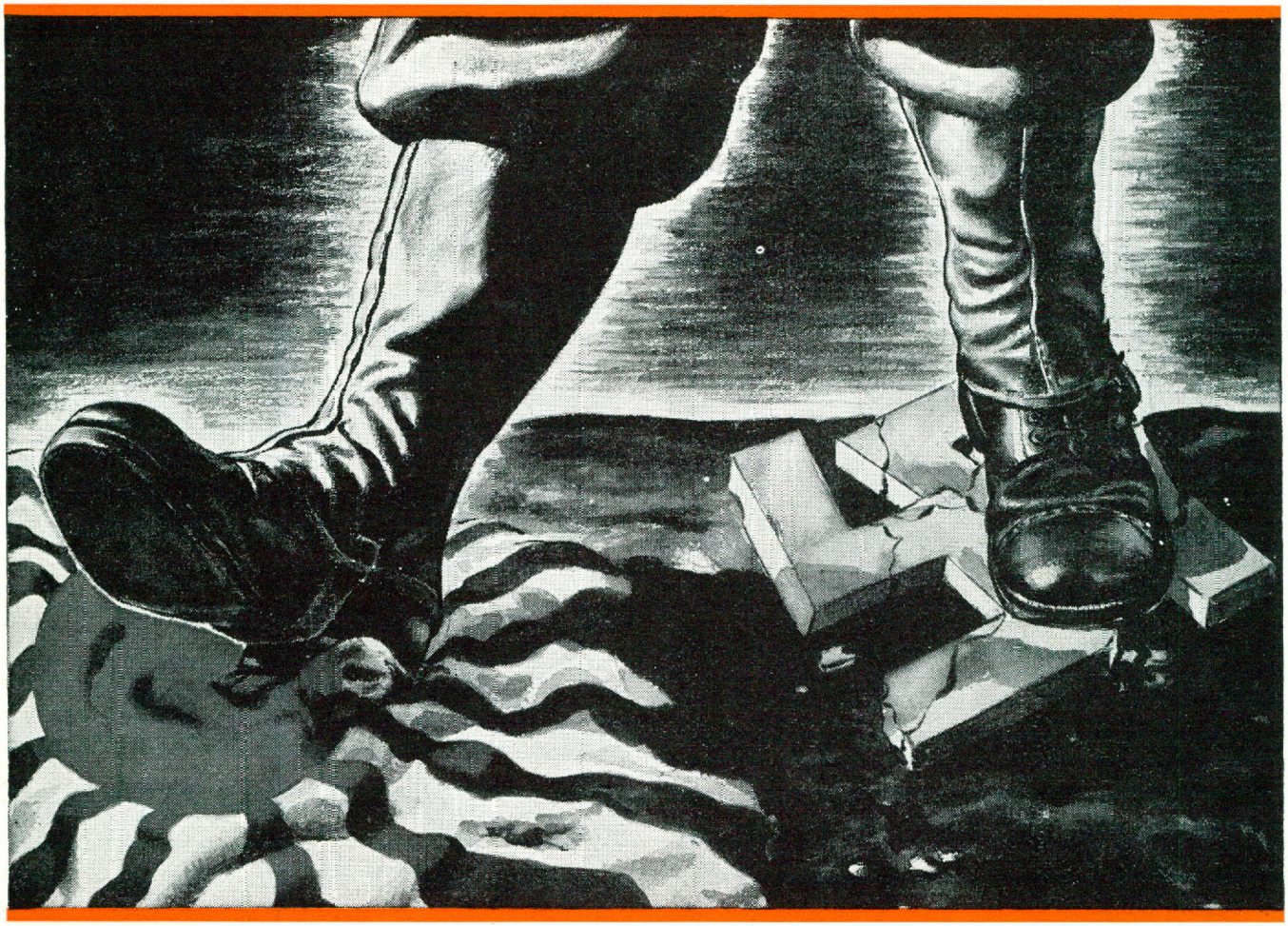

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