KANSAS FISH & GAME

SPRING 1969

The Land Ethic

Wanted: 20,000 Wardens

Biology — Tool of Life

Look, But Don't Touch

Wildlife Is for Watching

When it's Springtime in Kansas—like right now—its a perfect occasion to be on the lookout for wildlife.

"Wildlife watching" is not only educational, but can be a lot of fun for a traveling family, especially one which appreciates the great out-of-doors, and delights in thousands of small beauties and thrills which various species of wildlife can produce.

What is prettier, for instance, than a cock pheasant, his rainbow-painted coat glimmering in an early morning sun, strutting and pecking at gravel beside a highway? You know when you see him that he has a harem nearby, too, and is closely guarding them. His strutting, of course, is to tell all that he is King.

How about a doe deer, her head bobbing up and down and her pointed ears ever erect, as she munches on tender wheat or alfalfa?

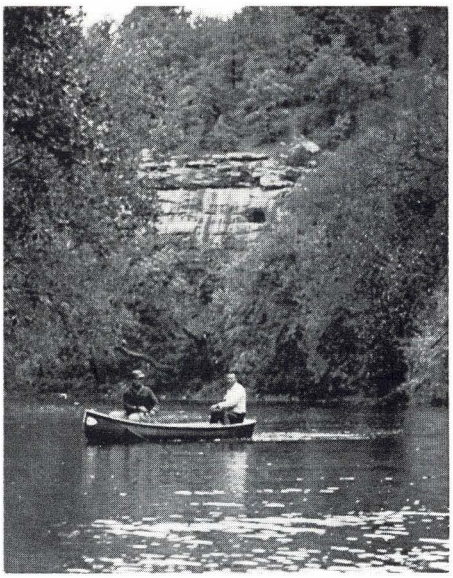
Spring is also the time for newborn and young wildlife to be seen. Some species of birds are now hatching. In a few more weeks, young quail, pheasants, rabbits, deer and various other birds and animals will be entering the world with weak calls and wobbly legs.

Officials of the Fish and Game Commission urge that persons who happen to find newly born wildlife leave them alone. It's fine to watch, but please, do yourself and wildlife a favor, and don't touch them!

The fact that a baby deer or rabbit is unattended by an adult animal doesn't mean that it has been abandoned or that its mother has been killed. Young are often left alone while the mother goes to feed or water.

The harm done to young animals through human contact in the wilds is surpassed by the danger of contacting rabies from the animal, also. In addition, it is unlawful to possess many wild animals at this time of year, even young ones, and anyone doing so is liable to prosecution for illegal possession.

So . . . leave "lost" babes in the woods and wilds—where they belong . . . Thayne Smith.



Cover Photo

Kansas is becoming one of the nation's top fishing states, and certainly Spring brings out the best of anglers to try their luck. Whether it be a large, federally-owned lake, a small state-owned impoundment, a clear farm pond, a Strip Pit or a glistening stream like that on our cover, fishing is a sport all its own, and rewarding in many ways. There's no doubt that fishermen, like the two pictured, can find a great amount of contentment and pleasure in drifting a lazy stream in a small boat or canoe, and many Kansas streams are conducive to this pleasant way of angling. The scene is on Shoal Creek, a majestically-beautiful little stream which abounds with tall timber and high bluffs, in the extreme southeast corner of the state . . . Photo by Thayne Smith.

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The Area Manager

By DARRELL MONTEI

"This is alright," remarked an elderly gentleman from Pennsylvania as he proudly displayed two rabbits, a cock pheasant and a brilliantly-plumed mallard drake.

"Alright" in more ways than one, he really meant. I met him in a well-marked public hunting area near Wichita, where he found good birdy-looking cover to hunt and the obvious satisfaction of game in the bag.

His compliments, made last fall, seem a little obscured now, but still personally gratifying as most talk has since turned to crappie runs, lunker bass and other fish tales. Never-theless, the recollection of the day serves to remind me of all the necessary work that has occurred since then and all the jobs to complete prior to next hunting season, which seems to approach quicker each year.

Perhaps it would be best to regress somewhat and explain that I am the Area Manager for wildlife management lands on Cheney Reservoir and on whose shoulders falls the responsibility of managing and developing the water and land areas to support better hunting for sportsmen.

Hunting is the primary reason for my job, but all forms of outdoor recreation such as fishing, camping and nature studies, are also important and receive attention during the year.

As the morning sun slowly erupted in the east pushing back the lingering chill from a persistant but dying Winter, I had allowed my thoughts to drift to moments of the past and speculation on the future. This was one of the last waterfowl counts I would be conducting until next Fall when the return of blue-wing teal would signal the arrival of a new hunting season and the cycle would begin again on my area. Somehow the combination of a crisp, bright morning and thousands of ducks and geese noisily announcing their intentions to forsake their winter home prompted my thoughts.

January and February did not seem so far back now, and the many chores accomplished during that period were still fresh. Storms and cold weather had limited the amount of outside work, yet several weeks were still spent in trimming and thinning tree areas and the resulting brush was carefully piled to provide winter cover for upland game.

Deeply rewarding was the thought that perhaps the covered offered by the brush piles was instrumental in helping some of the game survive the winter.

Considerable time had also been

Banding of ducks in winter is just one of many jobs of the area manager.

devoted to seeding grass on areas that were lacking cover for nesting, winter cover, travel lanes and loafing areas. It is hard to do a job and not realize the results for several years and such is the case with grass seeding. It takes approximately three years for a stand of native grass to develop to useable size and density to be beneficial to wildlife, and grass planted during my first year as Area Manager had finally provided good wildlife cover last summer.

A considerable number of pheasant broods were raised in the grass areas during the summer and had helped to make the past hunting season highly successful for pheasants. The definite satisfaction of accomplishment made those bitter cold days on a tractor pulling a grass seeder in January all seem worthwhile, although at the time a warm fire and a hot meal would have been extremely inviting.

It seems there is no time during the year when a tractor is not an integral part of my work as was in evidence this morning by the thousands of waterfowl busily feeding on grain that had been knocked down by pulling a plank over the standing grain left in the field for wildlife food. Knocking down the grain greatly increases the useage of the wildlife crops by waterfowl and upland game and is done on a progressive basis. As the waterfowl utilize all the grain in one field, adjacent fields are mowed or knocked down. In this way the grain will not lie on the ground long enough to rot or spoil before being used by wildlife. Portions of each field were left standing to provide food in case heavy snows should cover the food on the ground.

Other jobs of a somewhat warmer nature were accomplished during the past several months; such as leasing of farm land to tenant farmers which will insure the presence of all-important wildlife food for next winter, wildlife management and development plans for the coming year were formulated, and equipment in need of maintenance and care received attention.

Approximately 1,000 mallards were trapped and banded in January and dove banding operations were initiated in March. Subsequent band returns will help to increase our knowledge of the movements and habits of these two valuable game birds. What little slack time remained was devoted to catching up on a seemingly endless list of details that had piled up over the course of a year.

Sites had been prepared last fall for planting trees and shrubs and now the recently planted seedlings eagerly awaited the warming rays of the sun as it slowly arose out of hiding. Planting the trees was the easy part, cultivation is the long, time-consuming part. It requires hard work to establish a stand of trees and the results are not seen for several years, but the value of trees to wildlife is of vital importance. Perhaps this is why I eagerly await this year, knowing that if we have a good growing season the

Fruits of good game management is a full bag of cock pheasants for two hunters.

Area manager checks growth of evergreen trees, which are excellent wildlife cover, on one of his areas.

first trees and shrubs planted several years ago will begin to fulfill their habitat potential.

The rest of the summer will be filled with more tractor work; planting food plots, cultivation, repairing roads and assisting mired vehicles from the ever present mud holes. Early morning treks to the field will not cease with the departure of the waterfowl. One to two mornings and several late evenings each week will be filled with census work and observations on upland game. Information gained from this endeavor will be included in statewide data and used to better formulate hunting season recommendations for this fall. Such information as spring populations, nesting success and population increases or decreases plus types of cover used best by wildlife will be gathered this summer as in past summers and results recorded will be used to better evaluate the suitability of habitat added to the area over the past several years.

As always, slack periods produce various jobs and trash pick-up—especially during the summer—seems to provide almost a full-time job in itself. Repairs, construction and painting of signs, work on buoys for zoning the reservoir and a vast array of others are accomplished.

Of course, a part of the slack time will be devoted to gathering first hand data for my own tales of crappie runs and channel cat fishing. This type of information, strangely enough, sometimes provides better table fare than that gathered on paper. Hopefully, there will be enough spare time this fall to gather this same type of information on game instead of fish.

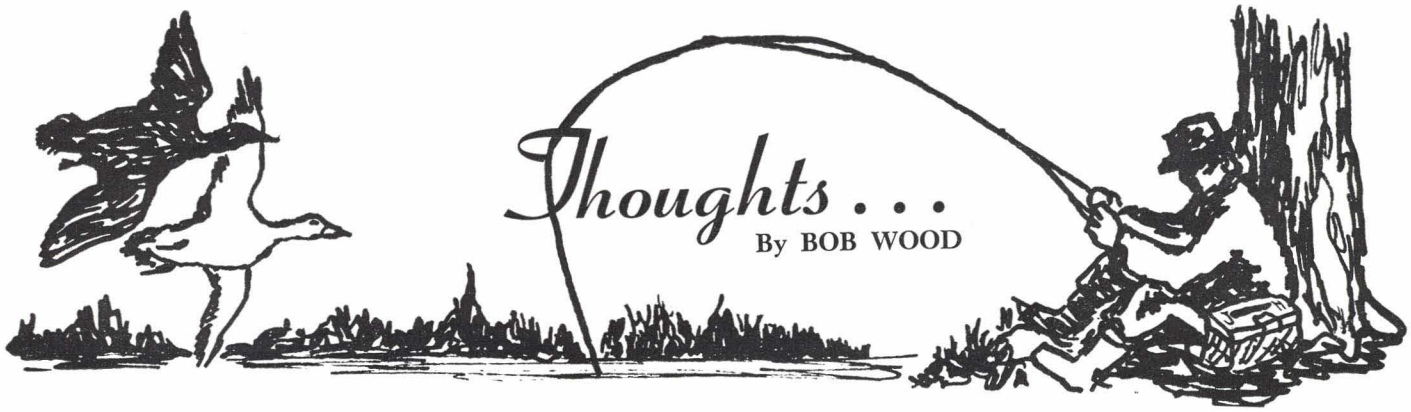
By mixing two qualities that are obvious by now, enjoyment of this type of work and plenty to do, it is needless to say the summer will pass quickly. Before long a chill in the night air and blue-wing teal again passing overhead will give evidence of the start of a new hunting season. If this fall is like the others, last minute preparations will be necessary: new public hunting area signs posted, roads graded, final harvest arrangements to be made, camping and parking areas given a final mowing plus many others. Public interest in the outdoors is again revived and although I present talks and programs pertaining to my area all year, an increased number of programs will be requested.

Finally the long-awaited first day of the season arrives to find numerous sportsmen on hand to try their skill and luck. A full bag can not be guaranteed, but a place to try for that full bag is guaranteed and this appears to be more critical with each passing year.

The hunting season provides an excellent opportunity to observe wildlife and interview hunters to discover if management procedures on the area have benefited the game populations. Information of this nature is vitally important and will be used in future development plans. Preparations for tree planting, grass seeding and farming arrangements for the coming winter and spring, as well as brush pile construction will be made throughout the fall.

A sudden noise to my left brought me back to the proper day and hour as a large flock of Canada geese quickly lifted, as if by signal, and effortlessly gained altitude. A mystical calling was beckoning and others by one's and two's then hundreds followed the first flocks initiative and struck a northerly path. Silently, I found myself wishing them success as the now perfectly-formed V's drifted out of sight. But enough, there is a lot of work to accomplish today and for the rest of the summer if I am to get the area ready for the geese on their return trip next fall. "This is O. K.," I said to myself in obvious satisfaction with my type of work. Then remembering the interview with the Pennsylvania hunter, I could not help but tell myself: "Yes sir, this is alright!"

Public areas are clearly marked with signs which are uniform throughout the state on Fish and Game Commission areas.



What is it that may unknowingly be the single biggest problem facing conservationists today?

We often hear via magazines, newspapers, radio, and TV public-service announcements of current and future dangers of air pollution, water pollution by solid wastes, over-zealous use of pesticides, and more recently of thermal pollution of streams. Granted, all are major problems to man and conservation of his environment, but an even more basic problem is a general unconcern toward learning about conservation and its principles.

This problem is basic to every level of our conservation field, from the state's efforts to make known workaday techniques of fish and game management to national-level efforts to make people aware of their effects on human habitat.

A need to know how to live compatibly with our natural surroundings is growing ever more important. Notwithstanding the pill, human populations are increasing. City boundaries are engulfing more and more land. Man's pressures through population growth are relentlessly rending the seams of nature's cloak. It has been projected that by 2000 A.D., an additional 120 million Americans will be making demands for food, fiber and space to live.

To further stagger one's imagination, it is said one megalopolis alone will extend from Chicago to Maine, then down the east coast to near Norfolk, Virginia. Due to sheer numbers, man is steadily overpowering his environment. Each individual man must soon come to realize he must make himself aware of his own habitat and how he affects it.

What is really frightening about this conservation ignorance is a general apathy in today's adults toward conservation-directed information, and probably even more importantly, their disinclination to fulfill their responsibility to future generations. Where does a solution lie? Without doubt, it lies with man's two most significant learning influences—schools and parents.

Schools should be a primary target for today's conservationists. The lowest elementary grades are not too soon to begin making people aware of their natural surroundings and fundamental concepts of proper care of human and wildlife habitats. Practically none of our elementary schools even mention that a simple act of felling a tree alters living conditions for many life forms, man included. Children can be made aware that clean water does not come from a tap; that all living things are placed in a pyramid of life, each either supporting or being supported by another; and that soil is a foundation for life and must be protected from abuse.

Farther up the educational ladder, few secondary schools offer conservation-oriented credit courses. Most mention conservation only briefly, allocating one chapter of their biology texts to the subject. At this stage of training, tomorrow's parents and teachers should be learning more of the intricate details of life's web and how we can strengthen, or destroy it.

Not only are we failing to teach conservation in schools, but a similar failure is also evident at home. A majority of adults are so unaware of nature, they are unable to encourage a spark of interest when it is shown by their offspring. In truth, too many adults still have an exploitation attitude of "grab first or do without." Obviously, such an attitude perpetuates an old proverb, "like father, like son."

Although adults are convenient to blame for failing to make their children aware of conservation needs, fault cannot be entirely theirs. We must once again come back to schools. Conservationally, today's schools are only slightly better than those of 25 years ago. Only within institutions of higher learning could a parent of today's elementary and secondary student have been offered an educational morsel adequate to at least partially satiate his appetite for conservation learning.

Are we destined to continue down this path of ignorance while at the same time we ever more rapidly destroy habitats of lesser creatures as well as our own?

Why shouldn't it be important for a third or fourth grader to know wild birds and fish have similar basic needs for food, protective cover and a place to nest?

More importantly, all should realize that man-caused loss of one of those needs means oblivion for an important spark of life. Mark this well. Such knowledge is as important to man's ultimate survival as is his ability to swallow.

U. S. Coast Guard statistics show that the average age of fatal boating accident victims is 37 years and that male victims outnumber females better than 10 to 1.

Wanted: 20,000 Wardens

By TOMMIE J. CRISPINO
Game Protector

Wanted: 20,000 more men like Carl E. Olson, RFD 3, Erie Kansas.

Olson, a farmer-sportsman, lover of the outdoors, a wildlife conservationist and promoter of good sportsmanship, is a man who believes in standing up for what is right—and did.

His reward? The satisfaction of being known as a man who's not afraid to be counted in supporting game protectors in conserving our wildlife and natural resources for ourselves and future generations.

During the recent quail season I received what appeared to be the usual letter telling of a hunting violation.

It started "Dear Mr. Crispino: On November 24 I saw some men in a car stop in the roadway and commit a quail violation. I observed quail being shot from the automobile and then one man out retrieving two quail that had been killed."

From this point on I found the letter to be more than just a complaint or gripe. It was a game protector's dream of how a violation should be reported and acted upon.

The letter continued: "The tag number and make of the car was *WY-CHEAT*. I am sure I can identify the subjects in the car as I turned around, followed them, got another look at them and made sure of the tag number. I have been very busy myself and haven't found time to go quail hunting yet. I would assist you in any way in this case, as I have very little respect for the road hunter who hunts in this manner. Sincerely, Carl E. Olson."

Upon being contacted by Federal Game Agent Jim Dowell and myself, Olson added even more details to the violation which resulted in complaints being filed by Neosho County Attorney John White. Later in court Olson testified to the violation which resulted in the conviction of the hunters as they appeared before Judge Dick Ashley and paid fines and costs totaling nearly two hundred dollars.

Carl E. Olson

Upon completion of the case Agent Dowell turned to me and said: "There's a man," speaking of Olson. "I've received some good tips in my years as an officer but have never seen a witness that solid before."

I had to agree.

We need more men like Olson in the field, on our lakes, rivers, streams and roadways—namely you—to keep an eye out for violators, game hogs or whatever you might call them, and wake them up to the fact that we as hunters, farmers and law-abiding citizens will not tolerate their stealing from us, our children and future generations.

Mr. Olson's report on the violation plus his action was a game protector's dream of how it should be done. Certainly a complete contrast to many tips received by officers such as a telephone call I received one night recently.

"Hello. "Is this the game Warden?"

"Yes sir, I'm a state game protector."

"I wanna know the law on spotlighting."

Suspecting the call was in regard to a violation, I cautiously said: "What are they spotlighting?"

"I don't know," was the answer.

"Is it going on pretty regularly?" I asked.

"They're out there now."

"About where do you live?" I asked. "If you can tell me the general area I'll get out and find out what they're spotting."

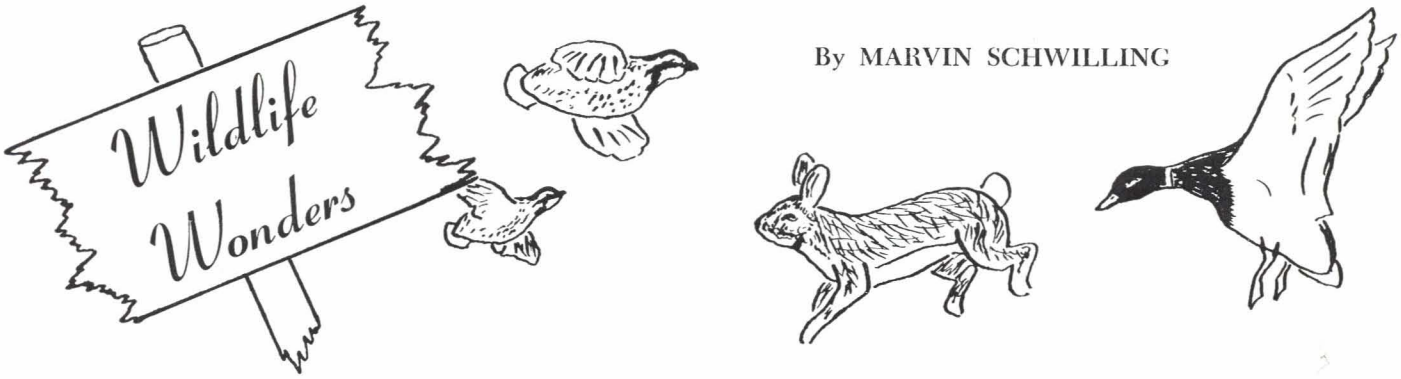
"Not going to tell you that. I only hunt coon—just want to know if they can spotlight them, don't care if they kill everything else."

With this reply making me a little irritable I answered that he had the wrong attitude and that I knew a lot of hunters who didn't hunt coon but would fight to help him protect his sport. "Oh, I'm a good sportsman, I belong to a couple of sportsmen's clubs," was his answer. From that point the conversation was cut to a short, "Good night."

What we need is 20,000 more men like Olson. Men with courage and just plain "guts"; men who will be on the lookout for "game thieves," notify the nearest officer and then "back him up." It's only a few who believe the laws apply to some one else and too often their activities in the field involving game violations, trespassing and reckless conduct, is the cause for landowners to judge all sportsmen by their actions.

Why should we who try to obey the laws be penalized for the actions of a few?

Stand up and be counted too. Give that violator his day in court. It may improve his methods of hunting or fishing in the future and can gain you the respect of your fellow sportsmen, neighbors and law-abiding citizens everywhere.



By MARVIN SCHWILLING

Of the twelve months March strikes me as being the most changeable. Could be I, like many other outdoorsmen, have a tendency to try to rush Spring.

The last week or more had been unseasonably warm and beautiful. The apricots were near full bloom. This morning the thermometer read 14 degrees. There will be no apricots this year.

I had an appointment to meet an avid duck hunter for lunch, then to look over and discuss the management of his waterfowl hunting marsh. This was near the Quivira National Wildlife Refuge. I arrived a little early so cruised around the backroads to acquaint myself with the surrounding habitat, and just to see what might be seen. Red-tailed hawks were on their nests this morning. The nests, no doubt, by now contain eggs and the female must protect them lest they chill or even freeze.

Just south of Hudson I stopped to look at some unusually large sumac brush that grew a short distance west of the road. As I walked over to the scattered sumac I was surprised to hear the "grunts" of herons that came from a large cottonwood grove still further west.

Sure enough, I had stumbled on to a great-blue heron nesting rookery. The open cluster of big-big nests was not visible from any roadway and was not recorded among the many known great-blue rookeries in Kansas. Even though the temperatures had dipped low during the night, now a beautiful day was developing and the big gray-blue birds were busy carrying sticks and weeds building on their nests. After several attempts to count the clusters of nests, from several different angles, I decided there must be about 46 in various stages of construction.

By late afternoon the temperature warmed to a plus 70 degrees—56 degrees temperature change in a slim eight hours—March was true to form.

Now the insects were hatching—tiger beetles were common in the bare tracks along the sandhill trails. I found an insect net still in the car trunk from last Summer and caught a number of these agile beetles. Most were the common sandhill beetles with red and light black markings on the tough elytra (wing covers). I followed a fencerow cowtrail over a ridge picking up tiger beetles along the way. Then there was one that was smaller, but a vivid-metallic green edged with a metallic copper color. This is a much less common species that is difficult to collect.

As I returned home the windshield of my car was streaked by the first sizable insect hatch of the season.

The ruddy ducks are back and defending territories on the marsh. These belligerent little ducks remind me of a pint-sized bulldog about to pop the buttons off his chest.

Surely no duck can be more proud, conceited or self-centered than this one. Admittedly the males are not short of beautiful. Their drab brown coats of winter now are basically a rich-rich red-brown. The crown on the head and tail are glossy black contrasted with a snow-white cheek and rump patch. The bill color now is pastel powder-blue, appearing artificial, as though some artist has set his brush to it creating unnatural coloring.

One drake was in evidence when I slipped quietly near the opening in the marsh and perched myself atop a muskrat house. He left no doubt that he was king of this portion of the marsh with a definite air of importance. His stubby tail was spread, turkey gobbler style. He swelled his chest like a pouter pigeon, and tucked his bill down tight against his chest as though he was picking his breast feathers or choking from something caught in his throat. The tip of the bill barely dipped into the water as he made short bouncing jerks forward, nodding the head and jerking the chin in.

Along with these exercises and short jerks an "ip-ip-ip-u-cluck-cluck," could be heard. Soon the display—a swim dance—was over. The bird sprang erect, shook himself, rested a short minute and performed again.

Then a female swam nonchalantly into the opening appearing to ignore the male. A second male came prancing into the area and soon learned this was a mistake. The first male attacked him full blast and the battle was on. Both birds, locked in combat, disappeared beneath the surface of the water. The mud and water fairly boiled. It was no bluffing contest.

When the two resurfaced the invading male had had enough and headed out full speed with the victor in hot pursuit. The chase lasted only about twenty feet with the smart Alec returning to his defended territory. He puffed up his chest, fanned out his tail, beat his showy bill on his chest and again uttered the strange un-duck-like sound. The female flattened her head and tail against the water and swam by barely in front of the male.

She had approved his battle victory.

The Land Ethic

By LELAND QUEAL
Game Biologist

Over 35 years ago, the late Professor Aldo Leopold of the University of Winconsin wrote a book entitled simply, *Game Management,* and with this effort provided the impetus for the vast strides in wildlife resource conservation that have occurred over the intervening years.

Dr. Leopold truly can be called the father of modern wildlife management. The concepts and theories of his day have become proven facts today and are the basis for game management in every area of North America.

Leopold's greatness did not end there; through the years he nurtured scores of students who later contributed much in their own right to the knowledge we now possess. But perhaps Leopold's foremost contribution was in the realm of conservation esthetics when he penned, *A Sand County Almanac.*

In this series of essays Leopold touched on a variety of subjects of simple but fundamental importance. He called for the development of a "land ethic" among our people. He wrote:

"The evolution of a land ethic is an intellectual as well as emotional process. Conservation is paved with good intentions which prove to be futile, or even dangerous, because they are devoid of critical understanding either of the land, or of economic land-use. . . .

"Conservation is a state of harmony between men and land. Despite nearly a century of propaganda, conservation still proceeds at a snail's pace; progress still consists largely of letterhead pieties and convention oratory. On the back forty we still slip two steps backward for each forward stride.

"The usual answer to this dilemma is 'more conservation education.' No one will debate this, but is it certain that only the *volume* of education needs stepping up? Is there something lacking in the *content* as well?

"Conservation is a state of harmony between man and land."

"It is difficult to give a fair summary of its content in brief form, but, as I understand it, the content is substantially this: Obey the law, vote right, join some organizations, and practice what conservation is profitable on your own land; the government will do the rest. . . .

"There is a clear tendency in American conservation to relegate to government all necessary jobs that private landowners fail to perform. Government ownership, operation, subsidy, or regulation is now widely prevalent in forestry, range management, soil and watershed management, park and

Buffalo was not only killed in great numbers, but the range it requires for life has largely been destroyed.

wilderness conservation, fisheries management, and migratory birds management, with more to come. Most of this growth in governmental conservation is proper and logical, some of it inevitable. That I imply no disapproval of it is implicit in the fact that I have spent most of my life working for it. Nevertheless the question arises: What is the ultimate magnitude of the enterprise? Will the tax base carry its eventual ramifications? At what point will governmental conservation, like the mastodon, become handicapped by its own dimensions? The answer, if there is any, seems to be in a land ethic, or some other force which assigns more obligations to the private landowner."

In the first two-thirds of this century, we have witnessed sizeable efforts to conserve for posterity the natural wonders of our land, while at the same time being able to utilize the harvestable surpluses produced by our renewable resources. This has been done mostly at the expense of the general taxpayer for the aquisition and management of forest and park lands and through tax assessments made upon sportsmen when purchasing fishing equipment and sporting arms and ammunition which have produced funds for research and management of wildlife resources.

However, this financial support is hardly voluntary, and twenty years after Leopold's words were published, conservation is still almost exclusively a governmental undertaking. Although most of Leopold's technological ideas concerning resource management have been accepted, his philosophical call for the development of a land ethic has never been heeded by the general public, by industry, or by self-centered, self-perpetuating government agencies.

We can look about us and see that basic fundamentals of resource management are being ignored. The constant quest is for short term economic gain as opposed to long term ecological stability. Governmental conservation, whether Federal, state or local, cannot keep ahead of public apathy and personal greed.

The Food and Drug Administration, as a safeguard to human health, permits zero tolerance for the presence of DDT or its derivitives in milk products, yet County Agents across the country constantly advocate the use of DDT, Dieldrin, Aldrin, Endrin, Heptochlor, Toxophene and other chlorinated hydrocarbons for control of a multitude of insect pests.

A new generation of farmers, with memories of the dust storms of the Thirties dimmed by time, undertake subsidized soil management practices and then, regardless of their effect on soil stabilization, discontinue those practices which are not profitable or which cause annoyances in their clean farming operation.

Channelization of major river systems is being planned and executed

Pollution, which comes in many forms, is choking many of our finest streams.

by the U. S. Army Corps of Engineers to speed water off the land to float barges downstream, whose potential payloads will encourage greater industrial development which in turn will further pollute our already septic rivers. The local result will be a ditch, barren of all but a trace of its former terrestrial life.

Constant air and water pollution from industrial, petro-chemical, and human wastes, feedlot drainage, overuse of fertilizers, herbicides and insecticides, and depletion of subsurface water due to irrigation and too rapid runoff threatens our entire public and private water systems.

In an effort to provide greater acreages of unobstructed farmland which will increase the agricultural margin of profit, habitat for all forms of wildlife is being reduced both in quantity and quality at alarming rates. What took years to develop naturally is destroyed in hours with herbicides, the chain saw and the bulldozer. All too often the hunter, already burdened with over-restrictive regulations, and his gun will get the unwarranted blame for the demise of a particular game species.

Modern man has come to expect that technological advances will always arrive in the nick of time to save him from ecological disaster. He tends to feel that each problem will be mastered and that there will be no 'day of reckoning.'

A parallel can be drawn to the running of the mile by great athletes. The sub-four-minute mile was once considered an unattainable goal, but eventually it was reached and there have been subsequent decreases in the record time. But there will come a point at which the physical and psychological prowess of man will permit no further reduction. For surely a mile cannot be run in 0:00:00. Similarly, technology will continue to save us for a time, but there is an ultimate limit to which man can pollute and destroy his environment and still find it habitable.

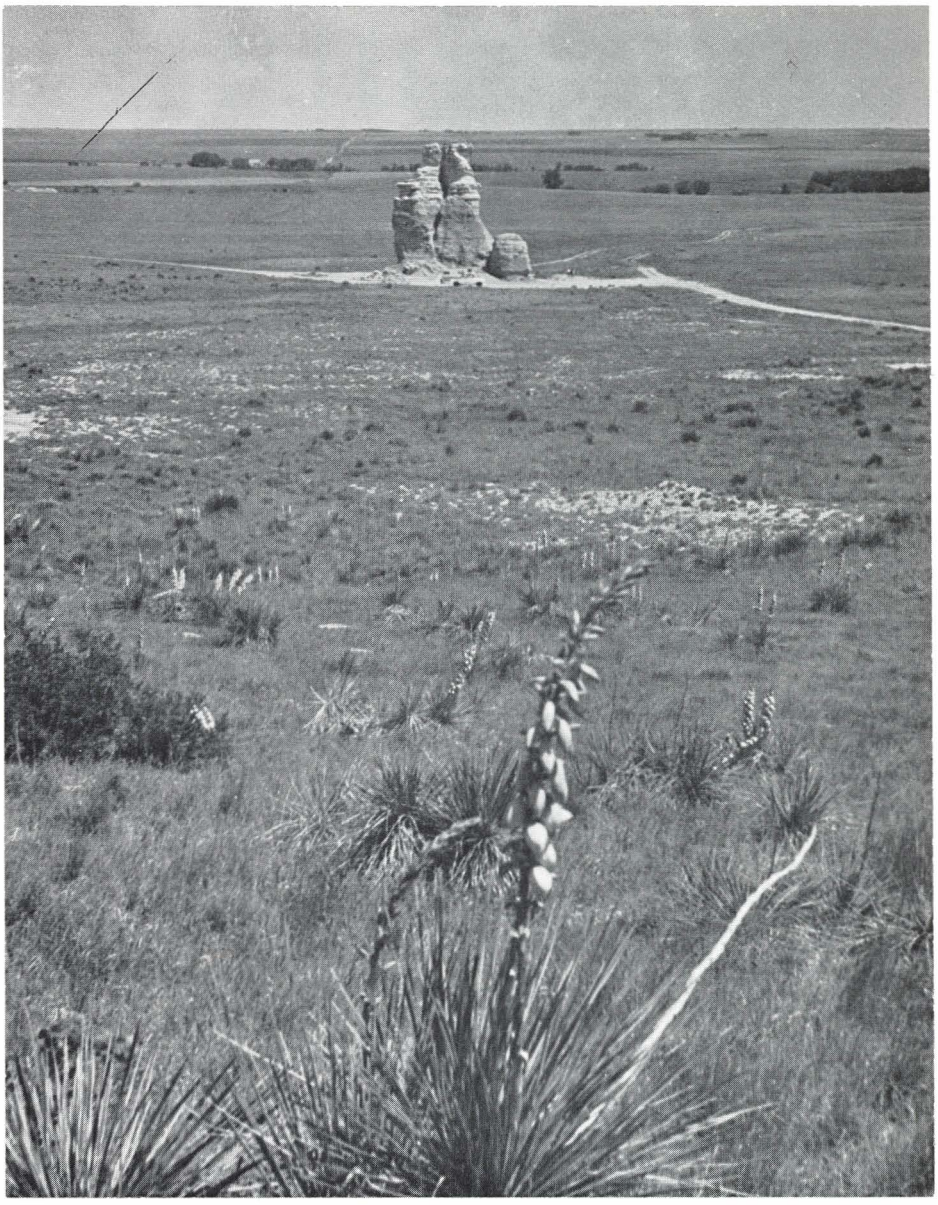
Professor Leopold concluded further:

". . . a system of conservation based solely on economic self interest is hopelessly lopsided. It tends to ignore and thus eventually to eliminate, many elements in the land community that lack commercial value, but that are (as far as we know) essential to its healthy functioning. It assumes, falsely, that the economic parts of the biotic clock will function without the uneconomic parts. It tends to relegate to government many functions eventually too large, too complex, or too widely dispersed to be performed by government.

"An ethical obligation on the part of the private owner is the only visible remedy for these situations."

We all, as individuals, must become more ecologically aware of our surroundings. We must develop a land ethic which is not completely dominated by bureaucratic or political expediency or by economic considerations.

If we fail now to implant this feeling for the ecological ramifications of our land in the conscience of our people, then we will fail forever. The potential for environmental destruction, forced upon us by unimpeded population growth and the unsatiated demand for a greater material standard of living, will eventually overwhelm our society.



Unmolested by civilization, land is generally productive, and time has a way of leaving many wonders.

Walleye—A Prized Import

It was a warm, sunny Summer day, and two men in a boat were busy watching a homemade depth-finder in the Blosser Cove area of Lovewell Lake near Mankato, Kansas.

Trolling over a ledge which produced a red-line blip on their depth gauge, the men were enjoying fair luck catching nice walleyes.

Suddenly, the rod of one of them—Floyd Stone of Belleville—dipped abruptly with a resounding strike on the Prescott Spinner lure he was trolling behind the little boat.

"I've got a nice one," he said to his partner, Dr. E. Raymond Galvin of Concordia.

It indeed was a nice one. Later weighed and measured, Stone's memorable catch weighed 10 pounds, nine ounces, a new walleye record for Kansas. The day was June 1, 1968.

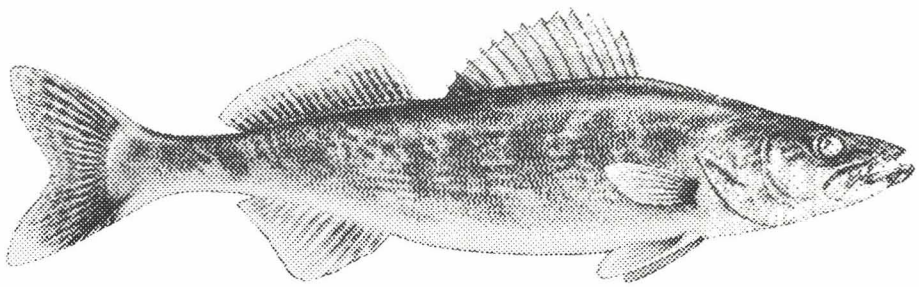
Lovewell is just one of many good walleye fishing lakes in Kansas. Nearly all of the state's 20 big lakes boast walleye populations, and some of them are top fishing areas.

The walleye was first successfully introduced in Kansas waters — at Kanopolis and Fall River Reservoirs—in 1957, and today it is one of the state's most prized game fishes. The first fry for stocking were obtained from the state of Wisconsin in exchange for channel catfish.

Now, the Fish and Game Commission—in its annual egg-taking program—hatches from 15 to 35 million walleye each year, stocking them in lakes and reservoirs throughout Kansas.

Actually, the walleye—affectionately called "Old Bleary-Eye" by some—is one of the early-running fish and some anglers say its appearance is a sure sign of Spring. In Kansas, however, walleye can be caught the year around, with spring and autumn the best times.

The world record walleye is a monstrous 25 pounder, taken from Old Hickory Lake, near Nashville, Tenn., in August, 1950. Experts think, however, that the record will be topped at any time.



Walleye (Stizostedion Vitreum)

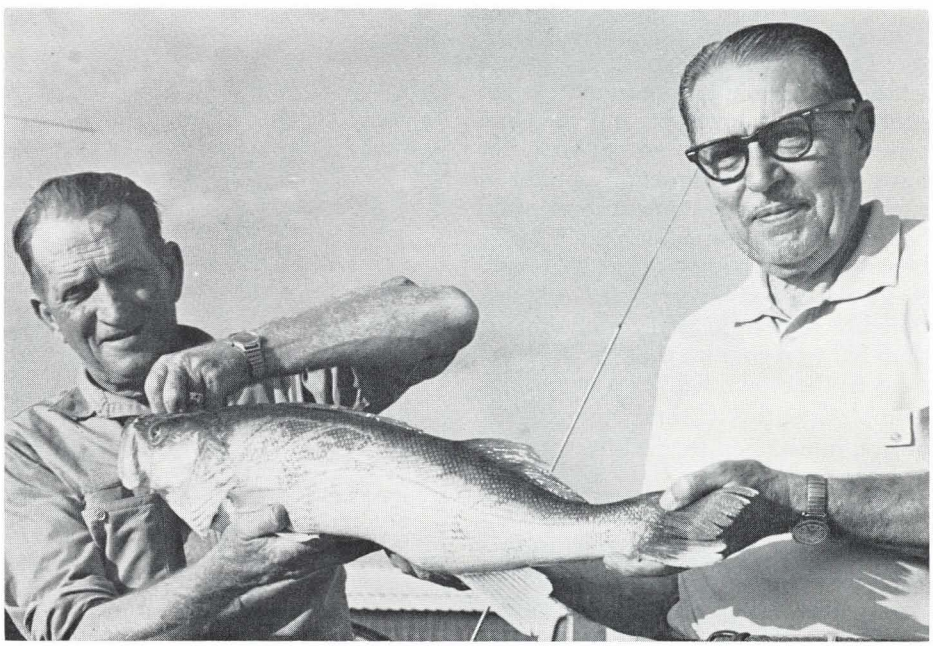
The range of the walleye is far, since it is a member of the perch family (it is not a pike) and a close cousin of the sauger. Essentially, it is found from Hudson Bay in Canada south to North Carolina and Alabama, and west to Kansas and Oklahoma.

The best lures for walleye? Jigs, weighted spinners, spoons, deep-diving plugs, minnows, worms and small frogs.

The best tackle for catching them? Veteran and expert anglers like to try their luck on ultra-light spinning equipment. They will also provide a lot of fun on fly rods and casting or spin-casting combinations. A short wire leader is recommended on the latter for this toothy rascal.

When you go for walleye, fish where you see fast water tumbling into a dark hole or around large boulders at reservoir outlets. Or, if you like to troll, get a depth-finder and locate a ledge in Lovewell or one of the many other fine lakes in Kansas.

If you don't have a depth-finder, try the rocky points or the deep water in front of the rip-rap of a dam. Kansas lakes support a lot of walleye. They are fine fish to catch, and when it comes to cooking, they can't be topped.



Floyd Stone (left) of Belleville, and Dr. E. Raymond Galvin, Concordia, hold Stone's record 10-pound, 9-ounce walleye caught last summer from Lovewell Reservoir near Mankato.

BIOLOGY . . . *Tool of Life*

By GEORGE C. MOORE

The role of biology is an integral part of our life and especially the life of a Fish and Game Department.

Biologists and their technical abilities and support is essential to accomplish the objectives of a well-balanced program of fact-finding, development and management. The technical phase of a fish and game program is often misunderstood and frequently frowned upon as a waste of money. Let's examine the part the technician plays in developing the Kansas Fish and Game program and some of the problems associated with biology.

When a young man graduates from a University which gives a degree in fish and game management, he is cocksure and eager to show the world that he can really produce fish and game. Often, he does not realize that his education has just started. He is correct in the fact that he can produce fish and game but too often he fails to recognize that he has to deal with people.

His real problem, that is, "people problems," start with his first job. They never cease nor become fewer; he merely learns to adjust to them. There is no other profession where there are so many experts as in the wildlife profession. Frequently when sportsmen get together and an issue arises everyone has an answer but most opinions are directly opposed to each other. The statement most often heard in such a discussion is, "I know because I have been hunting 35 years." Such self-styled experts are unquestionably sincere in their opinions but they fail to recognize that they are experts in their own field and would object stringently if some unqualified person questioned their ability or profession.

To become a game or fish biologist, certain basic academic training is required. He, then, must have field experience and be able to use his academic training to fit the field conditions. He must be able to interpret environmental

Big wild turkey wings it way toward heavy cover after being released from box. Turkeys have been planted in several areas of state in attempt to re-establish the species.

Herd of doe deer retreats from photographer near Meade State Park.

conditions and be versed in land-use practices so he can determine what is happening that effects fish and game populations. He gathers data in many ways, under all kinds of conditions. From the data he must be able to make reasonable predictions on what animals do.

In early Spring, technicians estimate spring populations by statistically planned whistling counts of the male. It gives a good indication of what is about to take place. The spring calling index does not, however, answer the questions regarding what actually takes place during the production season. Many other methods are used to determine actual production. Among them are road counts of breeding pairs of birds; the number of broody male waterfowl seen without hens, and whistling birds heard. Later in the year he surveys the broods and gets a good index of production by counting the number of individuals. This gives a reasonably accurate picture of production.

From this data the biologist can make recommendations for establishing the hunting season, but he still does not rest on his laurels. Many factors can upset the "apple cart" or influence hunting success, and, unfortunately, the average hunter bases the number of game birds or animals in an area strictly upon the success of his hunt on a given day. The biologist uses many methods to test the validity of his estimates of summer production.

Naturally the success of hunters is important and is not ignored. It must be used in conjunction of other factors such as the age of the animal, the sex, the physical condition, and the adult-juvenile ratio of the hunter's bag. All of these factors give him clues to the accuracy of his Summer predictions.

The fish biologist uses many tools in his work to make fishing better. He must know something about the characteristics of the watershed, and he has to take into consideration weather conditions and stream flow. He samples the stream, lake or reservoir to determine what fish species are present, their number, production, growth rate and specie composition of the entire population. If the habitat is usually muddy, resulting from a watershed that receives a considerable amount of rain or highly siltable soil, he knows that certain species will do better than others. He makes recommendations in his management program to favor those species most adaptable to the muddy water. If he finds large numbers of undesirable species, or if he finds a few large fish of several species with no young or intermediate sizes he knows that the composition of the population is out of balance and makes recommendations to correct it. If he finds large numbers of certain species but no large fish he looks for factors that may be conducive to reproduction, but poor growth. This may be an over-abundance of some species which result in an unbalanced population or sterile or unproductive water. He must be able to weigh many factors that cause these conditions so he can make recommendations to correct them.

The biologist not only must know the environment, he must know the conditions that affect the environment. He must study it at the same time sportsmen are using it for recreational

Burning of brush is common, but takes a heavy toll in wildlife cover.

purposes. More important he has to be "out there" studying throughout the year.

Modern fish and game management is designed to use all of the tools available and to study and correct the underlying causes that are constantly whittling away at our game and fish supply. This is where the trained technician plays a part. It is necessary to find the less conspicuous but deadly factors that work slowly but surely on the requirements of fish and game. Some of the causes are fairly easy to isolate but others are more difficult to pinpoint and because no environment is static he must be constantly vigilant. That is the reason why no *single* practice, such as closing the season, more stocking, greater enforcement or introduction of new stock has solved the problems.

That is why we in the Kansas Forestry, Fish and Game Commission have technically trained men along with game protectors and managers. We can not manage, nor would we have anything to protect, if we did not get the facts so that we could project what to expect from year to year.

All of these men—that is, biologist, protectors and managers—are necessary in a well-balanced program. The biologist must get the facts to guide the Commission in the basic objectives. The game protector is needed to enforce rules and regulations governing the use of our resources. He is, however, much more than the "enforcer" of a few years ago. He is the eyes, ears, and sometimes the nose (pollution) of the Department. He assists in gathering facts as requested by the biologist. He is the public relations man in his area and he assists in all types of fish and game management.

The game and fish manager is the man who manipulates the environment to create conditions suitable for fish and game. It may include raising hatchery stock or the introduction of a species in a restored habitat or the introduction of an exotic fish or game animal in a suitable environment. He is responsible for carrying out habitat improvement which is recommended by the technician as a means of restoring fish and game. Whatever it is, it

Violations take a toll. This rare golden eagle was shot and left in a roadside ditch near Garden City. Holding bird is Game Protector Bill Kline, Garden City. All eagles are protected by law.

Standing crops, near heavy cover, are tools of management, and provide excellent hunting areas.

must be based on facts that have been gathered by the biologist. It must be analyzed and have reasonable assurance of doing what it is supposed to do. Otherwise, we would not be using the sportsmen's money properly. The game manager must have effective tools to do a good job and these tools come from facts gathered through research.

It is obvious that the biologist plays an equal but essential part in the Commission's dynamic program of fish and game management. His job is not glamorous but often dull and monotonous. It requires long hours of work under all kinds of conditions with too little recognition and oftentimes much abuse.

He gathers information on annual production and trends; he studies factors that may project future population dynamics, and he studies the environment to determine what can be done to make the land more productive for game and fish. This information is made available to the administration and the Commission to be used when seasons, bag limits and other regulations are established. It is the Commission's responsibility to take this data and recommendations from the staff and weigh it against social and political factors so they can try to give the greatest amount of recreation to the maximum number of people.

In gathering scientific data the biologist considers the animal and its environment, but the Commission, in their deliberation, must consider hunters, fishermen, protectionists, bird watchers, nature lovers and all citizens alike. No matter what is done many letters will be directed to the Commission which starts by saying, "I am no expert but—," or "I have been hunting 35 years—," etc.

The average hunter will spend less time in the field during the entire 35 years he has hunted than the biologist spends during one year. The hunter is interested in filling his bag and sees little else other than his dog or conditions that makes his hunt more successful, convenient or easier.

The biologist sees the gradual changes that are taking place in the environment. He sees the destruction of habitat and the silting and pollution of our streams. He sees the daily hazards facing fish and game. He sees the practices that are highly competitive between successful farming and maintaining good fish and game habitat. He must try to devise methods to offset this continuous deterioration of the fish and game habitat so the managers and developers can attempt to maintain suitable environment, otherwise you would not have a place to hunt and fish.

The only request the biologist asks is recognition of his profession and his efforts in maintaining hunting and fishing. Remember, before you start your next letter with, "I have been hunting 35 years—but," that the biologist is highly trained in his specialized field just as most sportsmen are trained in their specialty.

Food and cover, consisting of milo and multiflora rose bushes, abound on Fish and Game management area.

Like eagles, ospreys use the same nests year after year, rebuilding them to the extent that some weigh up to 1,000 pounds.

The flight musculature of the tiny hummingbird is the strongest of any bird—one-third its weight.

"Old Sandie" Is on the Run

By JOHN RAY
Fisheries Biologist

After the ice breaks in Spring and water temperatures approach 55 degrees you may hear Kansas fishermen cry that "Old Sandie is on the run."

Old Sandie in this case is the white bass (*Roccus chrysops*), commonly called "stripers" or "sand bass."

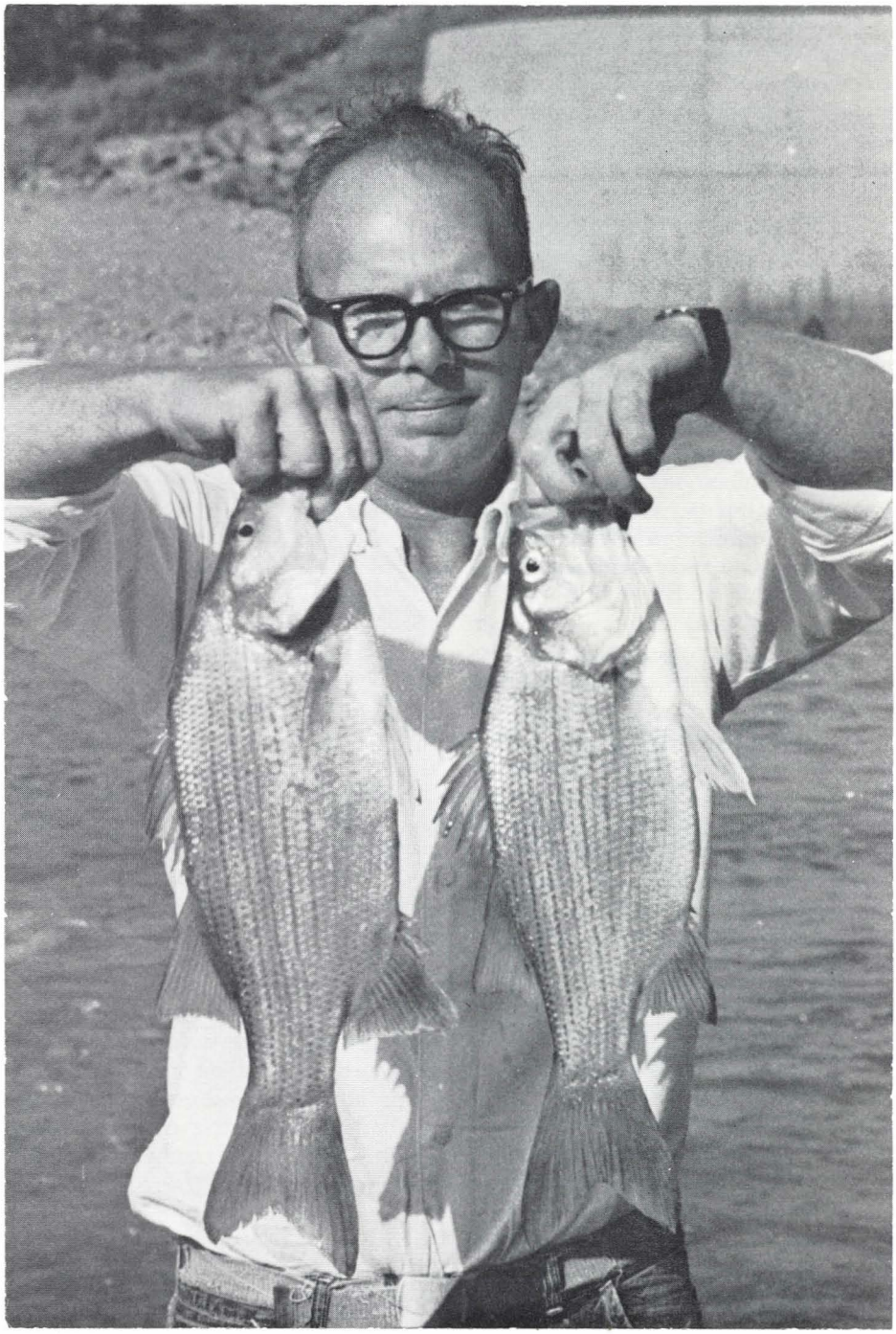
"Old Sandie" is not a native of Kansas and was first introduced into its waters in 1950. Small numbers of adults were stocked in both Fall River and Kanopolis reservoirs. Needless to say, its introduction has proven a remarkable success and most Kansas impoundments in which white bass have been introduced have provided adequate habitat for good growth, reproduction and survival. In fact, it has adapted so well in most Kansas reservoirs that it is highly abundant, grows rapidly and ranks high in the numbers of game fish creeled by fishermen. Therefore, no limit is placed on this highly desirable game fish.

The white bass, a true member of the bass family (Serranidae) is a close relative to the famous "striped bass" or "rockfish" which has recently been introduced to Kansas waters. Other famous cousins not found in Kansas are the Yellow Bass and the White Perch.

The white bass is best identified by its bluish-silver color and the six to twelve dark longitudinal lines which lie laterally along its body. The body is moderately compressed, has a forked tail and the mouth is typically bass-like, being rather large, and the lower jaw projecting beyond the upper jaw. Both dorsal fins are separated and the spinous dorsal fin generally possesses 12 spines. The anal fin possesses 3 spines and the soft rays in the fin number 11 to 13.

The striped bass looks much like the white. Identification between the two is difficult. The most distinctive difference is the size attained. The white seldom attains a weight over 5 pounds. Kansas has produced some white bass weighing over 5 pounds and the world record belongs to Henry A. Baker of Wichita. This fish was caught at the Toronto reservoir outlet on May 4, 1966, and weighed 5 pounds, 4 ounces. Like all record fish, it was a rare catch. The normal size white bass caught in Kansas usually ranges from ½ to 3 lbs. Anything above 3 pounds is an exceptional fish and above 4 pounds, a real lunker.

Growth of the white bass in Kansas is usually rapid and a one-year-

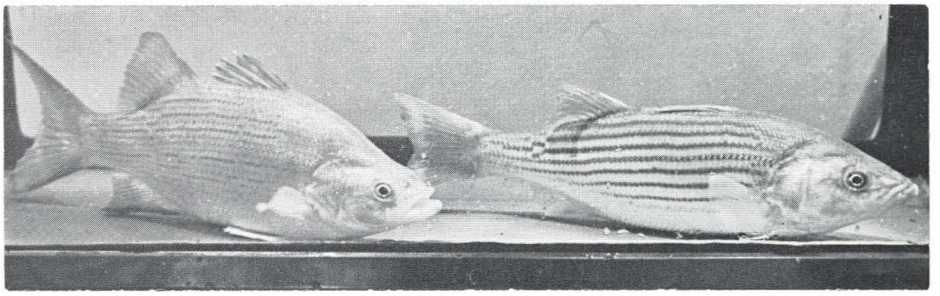


Carl Seal, Topeka, displays two excellent white bass—both over 3½ pounds—caught from Fall River Reservoir outlet.

old fish in some reservoirs will attain a length of 10 inches, with the average growth approximately 8 inches. A two-year-old fish will generally range between 10 and 15 inches. The life span of the white bass is usually short and they seldom live to an age beyond 6 years. However, some white bass in Fall River reservoir are reported to be 8 years of age.

The most desirable habitat of the white bass consists of deep, clear water in either a river, lake or reservoir. However, they have thrived well in some relatively shallow, semi-turbid reservoirs in Kansas. They spend most of their life in deep water, but in the Spring when the water reaches 64 degrees they travel upstream to spawn. This migration is largely unisexual with the males ascending the stream first and as the water warms up and their eggs mature, the females follow. The spawning period usually ranges from the early weeks of April to the middle of June when water temperatures range from 58 to 75 degrees. Spawning usually occurs in the streams above reservoirs. However, where tributary streams do not exist or lack water, spawning may occur in the lake. Upstream spawning is generally behind barriers such as riffles, rocky shoals or dams. In reservoirs white bass spawn over rocky, gravelly or sandy shoals. Depending upon the size of the female fish, white bass may spawn from 200,000 to 900,000 eggs during a season. When the females are ready to spawn they move into a school of males and release their eggs. The eggs are immediately fertilized by milt from the males. Slightly heavier than water, the eggs are adhesive, enabling them to sink slowly and stick to rocks and debris. The hatch success in Kansas is apparently comparatively low. As one fisherman aptly stated when observing large numbers of white bass going upstream to spawn: "If all those fish spawn and all the eggs hatch, we'll be up to our waders in white bass."

Despite the low hatch success, the white bass continues to reproduce in more than adequate numbers to supply the fisherman, and perhaps the most significant limiting factor in spawning success is water temperature. Sudden drops in temperature during the spawning run may produce partial loss or complete loss of spawned eggs.



There's a big difference in appearance of the white bass (left) and its cousin, the striped bass. Latter is an experimental fish in Kansas.

Dependent on water temperature, the eggs generally hatch in two to three days. The minute fry descend the stream in large schools to find food and protection in shallow waters of the reservoir. Small microorganisms make up the food supply and as the fish grow, they begin to feed on larger aquatic insects, crayfish and small fish. Notably, one of the preferred foods of the white bass is gizzard shad, an essential forage requirement for white bass in Kansas.

White bass feed in schools and their taste for the gizzard shad makes it fairly easy for the fisherman to locate them. Shad also travel in large schools, and appear as dark masses near the surface of the water. The flashing, skipping and jumping of shad is a signal, and almost invariably indicates they are being pursued by white bass from below.

White bass are voracious feeders and feed heavily both during and after the spawning runs. They appear to be sight feeders, and during spawning times easily caught with a variety of lures of which white lures are said to be the most preferred. During the run, many fishermen wade into streams and cast upstream below riffles or rocky shoals with good success. Preferred lures are spinners, jigs and spoons. Live bait such as minnows are fished with light sinkers so the bait bounces off the bottom with the current. In the reservoir, good fishing success for white bass is realized by trolling or casting into or near a school of gizzard shad, with spinners, jigs, spoons and bucktails the best lures.

Throughout the Spring, Summer and Fall months, white bass tend to remain and feed in schools. During the day they can be found in deep water and at night, feeding in shallow waters. They are heavily caught in Kansas during the Spring and early Summer months both before and following the spawning runs. Fishing success during other months tends to be "hot" and "cold" primarily due to the sporadic feeding activities of the fish. Overall fishing success for the white is related to spawning success and the dominance of specific year classes in the population.

Striped bass have been introduced in several Kansas reservoirs, including Wilson, John Redmond, Cheney, Glen Elder, and Elk City. Identification between small striped bass and white bass is difficult and requires careful study.

"Old Sandie" has become an important fish in our lakes and reservoirs, and any fisherman who has experienced the excitement of catching this "white fighter" looks forward to the "runs." It offers the fisherman white flesh of good consistency, which when fileted and placed in a frying pan not only looks inviting but stimulates the tastebuds.

How, when and where can you catch this fish? The following is a brief summary by region of lakes and reservoirs which offer fishing for the white bass:

NORTHEAST REGION:

Tuttle Creek Reservoir — Fishery studies indicate that a good white bass population is developing and these fish are attaining above average

growth, with a large percentage harvestable size. Several years may be required before it develops to peak potential, but good fishing should occur during the Spring, Summer and Fall of 1969. Suggested fishing areas in the Spring are in the Blue and Black Vermillion Rivers above the reservoir and possibly in some of the larger creeks feeding the main body of the lake. During late Spring, Summer and Fall, fishing should be best in deeper water.

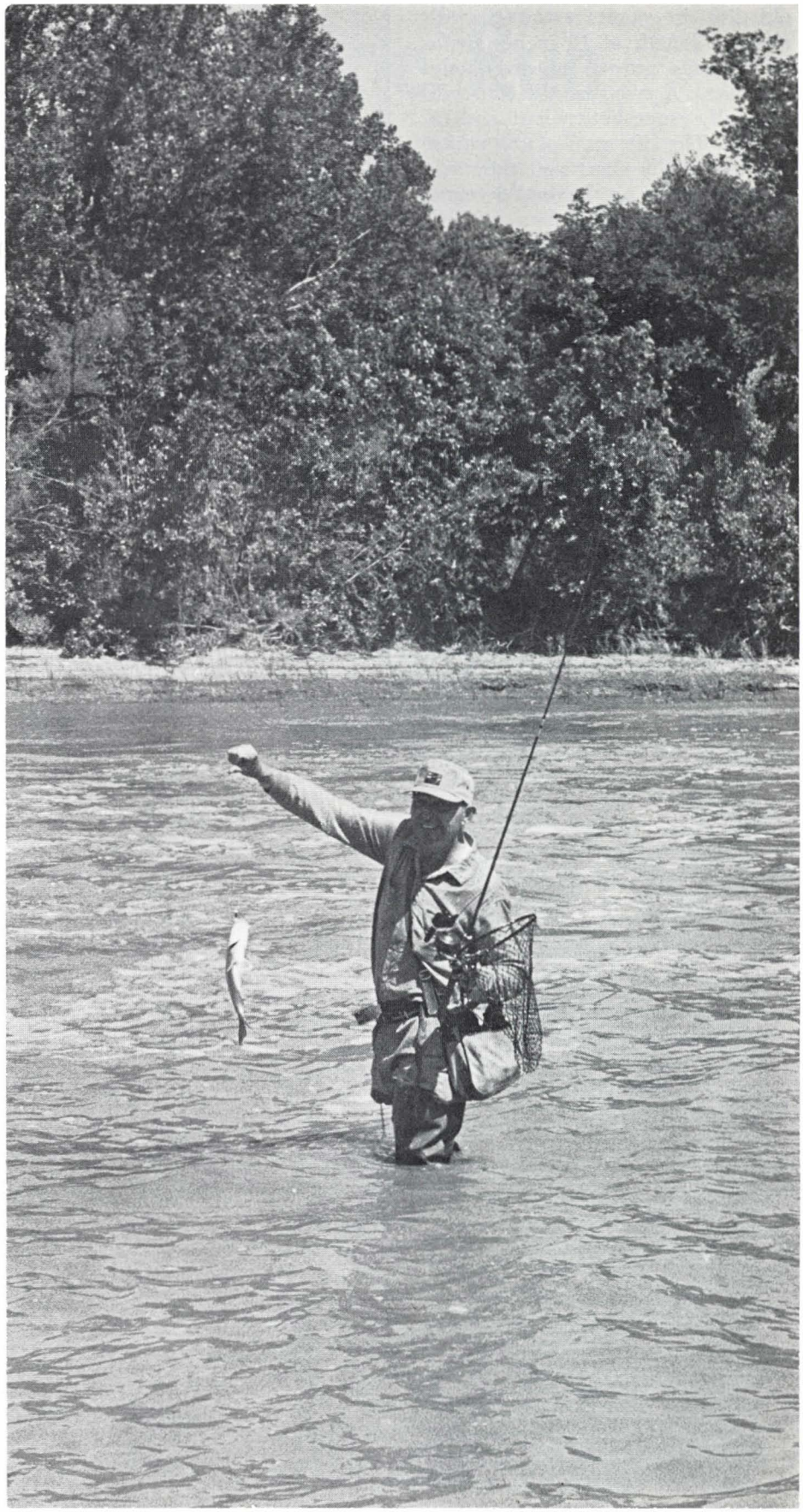
Milford Reservoir — Potential for white bass should be good. Species is abundant and offers good fishing in Harlan County Reservoir, upstream in Nebraska, on the Republican River. Test-netting studies indicate the white bass population is expanding and within the next few years, Milford should provide excellent fishing.

SOUTHEAST REGION:

Fall River Reservoir—Test-netting studies in 1966 indicate that 5-year classes of white bass are present and the oldest year class includes some 7 to 8 year old fish. Growth is good and many of the white bass are attaining a minimum harvestable size of 9 inches before reaching their second year. They appear to be third in abundance of all the game fish harvested from the reservoir. Large numbers of whites are caught in Fall River and Otter Creek during the spawning runs in the Spring. Fishing is good in the stilling basin and reservoir during the Summer and Fall.

Toronto Reservoir—Test-netting studies indicate that a sizable population of white bass exists in Toronto Reservoir and growth is average or above. Two-year old fish range from 9 to 13 inches. Early Spring runs are beginning to occur up the Verdigris River and in Walnut Creek. Fishing should be good in the Spring, Summer and Fall, both in the reservoir and in the stilling basin below the lake.

Chase County State Lake—A deep and clear small lake, it supports a rapidly-growing population of white bass, many of which are above 1 pound. The population is in excel-



Happy angler hauls nice white bass from fast-running waters below Kanopolis Reservoir.

lent condition. Angling should be best in Spring and early Summer and the white bass should respond to most lures and live baits such as minnows.

NORTHWEST REGION:

Kanopolis Reservoir — White bass were first stocked in this reservoir during 1950 and have thrived well. Fishing is excellent during the Spring months in the Smoky Hill River above the reservoir and in the stilling basin below the dam. Creel census checks from 1950 to 1960 indicate that Kanopolis produces some of the finest white bass fishing in the state and that they rank high in the game fish harvested. During the early Summer, fishermen should be hunting for schools of shad in the reservoir, and fishing below them.

Lovewell Reservoir—This reservoir has a good population of white bass, many of which weigh up to 2 to 2½ pounds. They first entered Lovewell via the Courtland Canal and many are caught near the canal inlet structure.

Kirwin Reservoir — Angling for white bass has been good to excellent, and was especially good during 1966. Growth is probably as good or better than any reservoir in the state, and during the year many white bass are taken which will exceed 1½ pounds.

Cedar Bluff Reservoir—White bass growth was greatly stimulated by the stocking of shad several years ago. Although their growth is probably not as good as in other Northwest reservoirs, older white bass have produced some excellent fishing. Fishing for the white bass in Cedar Bluff is best in the early Spring and early Summer but "hot" fishing often occurs during the Summer and Fall.

SOUTHWEST REGION:

Kearny County State Lake—White bass were introduced in this shallow semi-turbid irrigation reservoir of 3000 acres during 1965. Growth has been excellent, however, no successful spawning is yet apparent. Lack of suitable spawning areas seems to be the inhibiting factor.

Cheney Reservoir—White bass were first introduced in Cheney during the Fall of 1965 and has rapidly expanded in abundance. Growth has been exceptionally good with many whites 10 inches in length the first year. The primary factor is the high abundance and slow growth of the gizzard shad population. Conditions appear excellent for future white bass fishing. It is expected that large numbers of these fish will be harvested during the Spring and Summer of 1969.

Good catch of white bass, taken from Kanopolis Lake outlet, glisten in a bright Spring sun.

Somewhere in the state during the early weeks of April or before, "Old Sandie" will be ready to feed and enter the spring run. Anyone who has caught this "fine scrapper" and enjoys a fine eating fish will be hunting for him with zealous anticipation. If you haven't tried fishing for "Old Sandie," throw him a jig or two, and enter a new world of fishing pleasure.

Definitions Make a Difference

By BOB WOOD
Game Biologist

With greater and greater demands being placed on our game resources, it is becoming increasingly important that they be properly managed.

This need requires a scientific basis, which in turn calls for terminology applicable to such management as a science. However, a difficulty arises when an effort is made to explain principles and techniques of game management to a lay public.

Effective wildlife management often involves only 10 percent actual dealing with wildlife, with up to 90 percent being communication with people. It all boils down to the fact that if we as game managers are unable to clearly explain what we are working toward, thereby gaining public support, our efforts will be in vain.

In attempt to further understanding between supporters of the Fish and Game Department and technicians working for better game management in Kansas, the following is offered to discuss some of management's working terms. A thorough understanding of these terms by Kansas' conservation-minded sportsmen is essential if we are to carry on a program of modern game management.

When discussing how to have more game on a given parcel of land, one of the first things to come to mind is current *habitat* conditions. Habitat is one of the most common terms used in articles and discussions concerning game management, yet people continue to forget or disregard this extremely important factor when advocating a supposedly new solution to a wildlife problem.

Actually what is habitat, and is it important to know what part it plays in the life of an animal? When we speak of habitat, we are referring to actual physical land and vegetative characteristics required by a particular animal to survive. For quail, good habitat would include scattered clumps of woody vegetation intermixed with weed patches and grain fields with adequate grassy areas to provide nesting cover. All of these items must be within daily travel capabilities of quail. Kansas deer have a slightly different set of habitat requirements, being able to utilize some large timbered areas plus scattered clumps of brush. We can find both deer and quail in the same areas because good habitat for one can also include good habitat for the other. Each kind of wildlife has its own group of required living conditions necessary for survival. Before any animal can be properly managed, we must know and understand those habitat needs.

A phrase closely associated with habitat and extremely important to resident game having a rather low area of mobility, is *edge effect.* Edge refers to that zone where two different types of ground cover meet. For example, a crop-field and a pasture form an edge where they meet.

A weedy fencerow between two cropfields can be an extremely important edge for a covey of quail. The "effect" of edge is that most non-mobile game species which require more than one type of habitat component, will concentrate where two or more cover types meet. Abundance and distribution of small game on most lands is directly dependent on types of habitat present and amount of edge created by those habitats.

Now that we have habitat and edge characteristics in mind, we next want to know the *carrying capacity* of a habitat for game. Most farmers and ranchers will be able to readily comprehend this phrase. Simply, carrying capacity refers to the number of animal-units a given parcel of habitat can support. In this regard, wildlife is no different than domestic livestock.

Using a range survey, a rancher knows he can place only so many head of cattle or sheep on a 160-acre pasture. By exceeding his pasture's carrying capacity, the rancher's stock will not show gain and the grass will be damaged or eventually destroyed. Although most game species are incapable of destroying their own habitat (big game excepted), once a species exceeds the carrying capacity of its habitat, large-scale death, usually through starvation, disease, and predation, will dispose of any excess popula-

Excellent cover for many forms of wildlife is provided by thick, tangled hedgerow, and weed growth.

Good spot for survival during time snow covers ground is a cornfield, these pheasants have found. Good management includes leaving parts of crops standing, for just such emergencies. (Photo by Gary Hesket.)

tion. Small game animals can quickly recover their population, but big game (deer, elk, etc.) usually destroy much of their habitat before a die-off occurs. Recovery of big-game populations is then slowed by recovery of their habitat's carrying capacity.

Closely tied to and in fact a major factor enforcing carrying capacity, is the natural population control of *competition*. Competition may be either *intraspecific*, or *interspecific*. Intraspecific refers to two animals of the same species competing directly for food, cover, and living space.

For instance, breeding territories established by male pheasants and defended against intrusion by other male pheasants is one form of intraspecific competition. Interspecific competition would then be between individuals of different species. Predation, including hunting by man, is probably the most commonly known form of competition along this line.

Another equally important interspecific competition would be illustrated by that occurring between squirrels and acorn-eating insects, competition for foods necessary for survival of both animals. Working together, all forms of competition are important in that they effectively spread game populations throughout suitable habitat, thus playing a role in regulating that habitat's carrying capacity.

Keeping what has been discussed so far in mind, let's progress farther. Within all game populations, death is inevitable. As a rule, smaller animals have a high reproductive rate, necessitating a high death rate to keep their populations in some degree of balance with their habitat. Annual reproduction foretells annual death. Those deaths constitute each game population's annual *surplus*. This surplus will be taken primarily by disease, parasites, starvation, accidents, predators, severe climatic conditions, and even old age.

What is most important to understand about surplus is that not only will it be available and then lost every year, but the factors removing surplus are self-regulating and not totally cumulative. Death rates stay essentially the same every year, while types of death vary in intensity. If for some reason, one form of mortality does not occur, the slack will be taken up by another form. Thus, it is possible to hunt quail, or pheasants, or deer every year without endagering the species so long as hunting is restricted to each species' period of annual surplus.

Hunting losses will be compensated by a reduction in loss from other causes due to decreased competition between survivors for life's essentials. In some lightly-hunted animals, like squirrels and cottontails, long liberal seasons are possible since hunting mortality takes very little of the surplus. In such lightly-hunted species, habitat and climatic conditions play the biggest role in controlling populations. Keep in mind we are using as examples animals that have a well-established population and are classified by man as game.

Annual surpluses occur in all wildlife from spiders to whooping cranes. However, we consider most animals esthetically more desirable as non-game, thereby protecting them from hunting. Still, even without hunting, loss of annual surpluses effectively control populations. If they did not, we would be up to our ears in robins, hummingbirds, field mice, and a myriad of other things. Endangered species, having low, poorly-established populations, like whooping cranes, cannot be hunted, but they are still subject to some natural control as witnessed by the slow buildup of their numbers.

One final factor familiar to game technicians, but hardest of all for laymen to comprehend; is the *law of diminishing returns*, whereby as success in the hunt decreases, effort to achieve success also decreases.

As each hunting season progresses, game becomes more scarce and more wary, making it more difficult for hunters to find it. When hunting becomes mostly leg work with nothing to show for it, hunters stop going out. We all have experienced this reaction with quail or pheasants, going hard after them the first two or three weeks of the season, but seldom venturing out after that.

Of course, the law works at varying rates depending on the game species being pursued. Highly desirable game, like quail in Kansas, are hunted over a longer period of time each season than a species like pheasants which may see 70-80 percent of their total hunting pressure occurring in the first 10 days of a 30 day straight season. It is important to keep in mind, as long as hunting seasons are regulated, the law of diminishing returns will prevent any possibility of extensive over-harvest of any game population.

Painted by Nature and tucked away in a southern Kansas pasture is this scene of unusual rock formation and sagebrush. It is one of many such areas in Kansas unmolested by man. (Photo by Leroy Lyon).