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FRONT COVER: Drake redhead by Lowell Washburn.

BACK COVER: Cottontail rabbit by Ron Johnson.

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By Lee Gladfelter

September is here, and the warm summer days are gradually giving way to the cooler days of fall. It is again time for those who enjoy small game hunting to begin thinking about and planning for their sport. But in those thoughts, squirrel hunting has been slowly abandoned by more and more hunters each year. Why? There are still high squirrel densities in timbered areas around Iowa; yet fewer and fewer hunters report pursuing this challenging and elusive little animal. Let's take a brief look at this sport and see if there are any obvious answers to this dilemma.

Possible Reasons

Facts are available that demonstrate a declining interest in squirrel hunting. In 1963, about 150,000 hunters participated in the sport of squirrel hunting compared to only 84,000 in 1986. Squirrel hunting declined gradually for the first 10 years of this period, but then increased to a peak of about 160,000 hunters in 1973. From that point on, there has been a rather steady decline to a low point in 1986. One factor that has contributed to this decline is a general reduction in hunting license sales during the past 20 years. But, sluggish hunting license sales is not the only factor, because of those hunters purchasing a license, a smaller percentage report they hunt squirrels now than in past years.

In 1963, an estimated one and one-half million squirrels were harvested compared to only one-half million in 1986. There is some evidence that squirrel hunting is a "secondary" sport to other hunting activity such as for pheasants or quail. Pheasant hunting has also been declining because bird populations have been reduced by significant habitat loss. But in years with good pheasant numbers and corresponding high harvest, squirrel harvest also increases. This indicates a connection between squirrel harvest and hunting pressure for other game species.

Declines in timbered habitat could be suspected as a factor since there has been a continual reduction in timbered acreage. However, this habitat loss has been stabilized recently because of falling land

SQUIRREL HUNTING

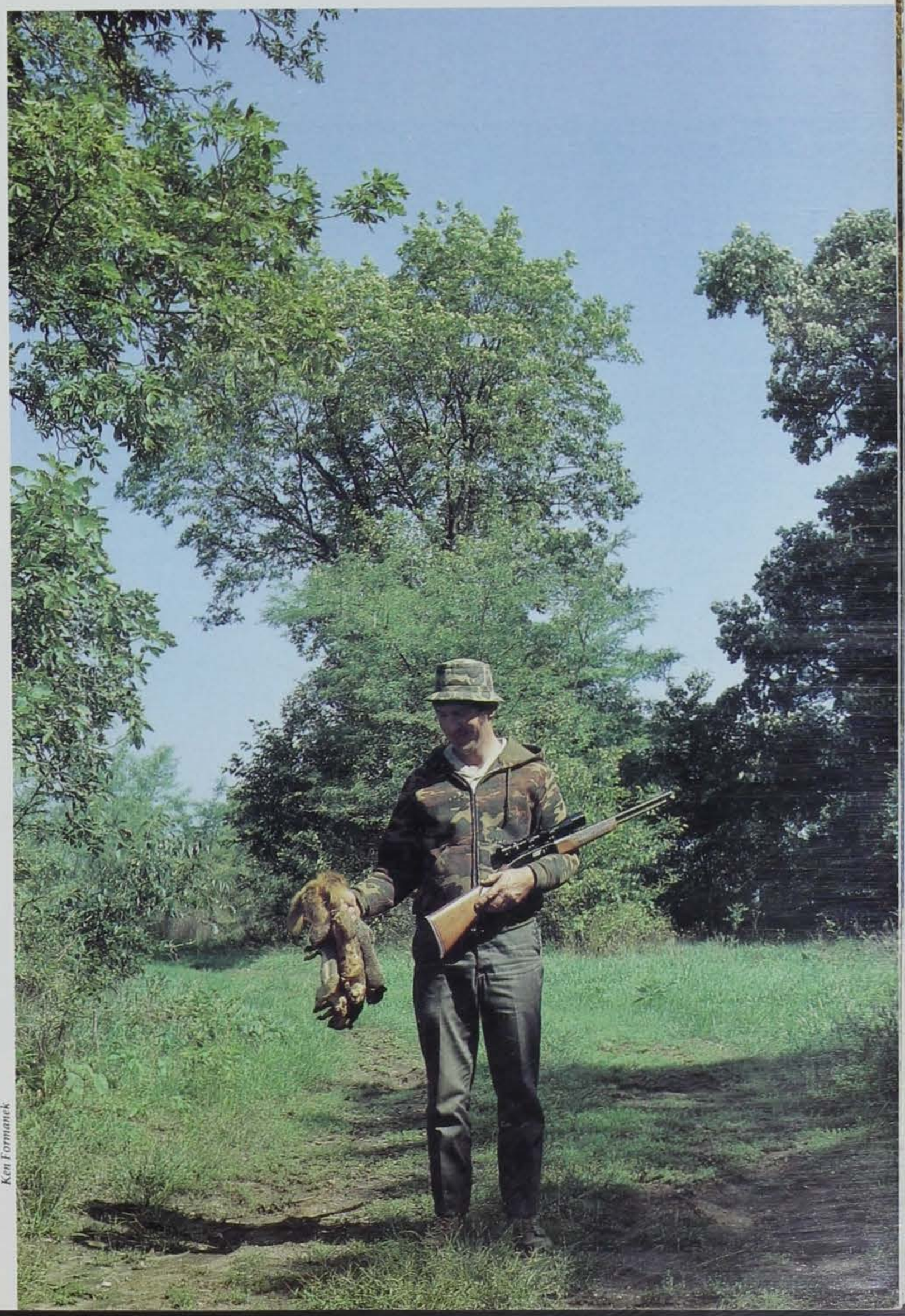
The Forgotten Sport

values. Low land prices have increased the amount of timber placed into public ownership at the state and county levels and opened to public hunting. Also, many timbered areas have been privately purchased for the purpose of providing hunting recreation for their owners.

Another reason for decreased interest in squirrel hunting may be that hunters participate in many other fall hunting activities that compete with squirrel hunting. Pheasant, quail and rabbit hunting are old standbys, but hunter interest is growing in other game species. Fall turkey hunting is a relatively new sport in Iowa and one that is gaining popularity. Interest in deer hunting has been increasing rapidly because of higher deer numbers and liberalized seasons. Deer hunting with primitive weapons such as bow and arrow and muzzleloading rifle is recruiting many new hunting enthusiasts each year. Ruffed grouse and gray partridge hunting is also on the increase.

Missed Opportunities

It is hard to point a finger at any one factor, but one thing is for certain — many hunters are missing out on a challenging hunting experience. Squirrel hunting is an excellent sport for young people because it builds knowledge of hunting techniques, animal behavior, marksmanship, safety and ethics. It provides an opportunity for parents to teach their children a way to enjoy nature. Entering an oak-hickory forest on a frosty fall morning provides an experience of serenity and solitude rivaled by few other sporting events. What better way for a parent to share some time and companionship with a child than to take them on a forest adventure?

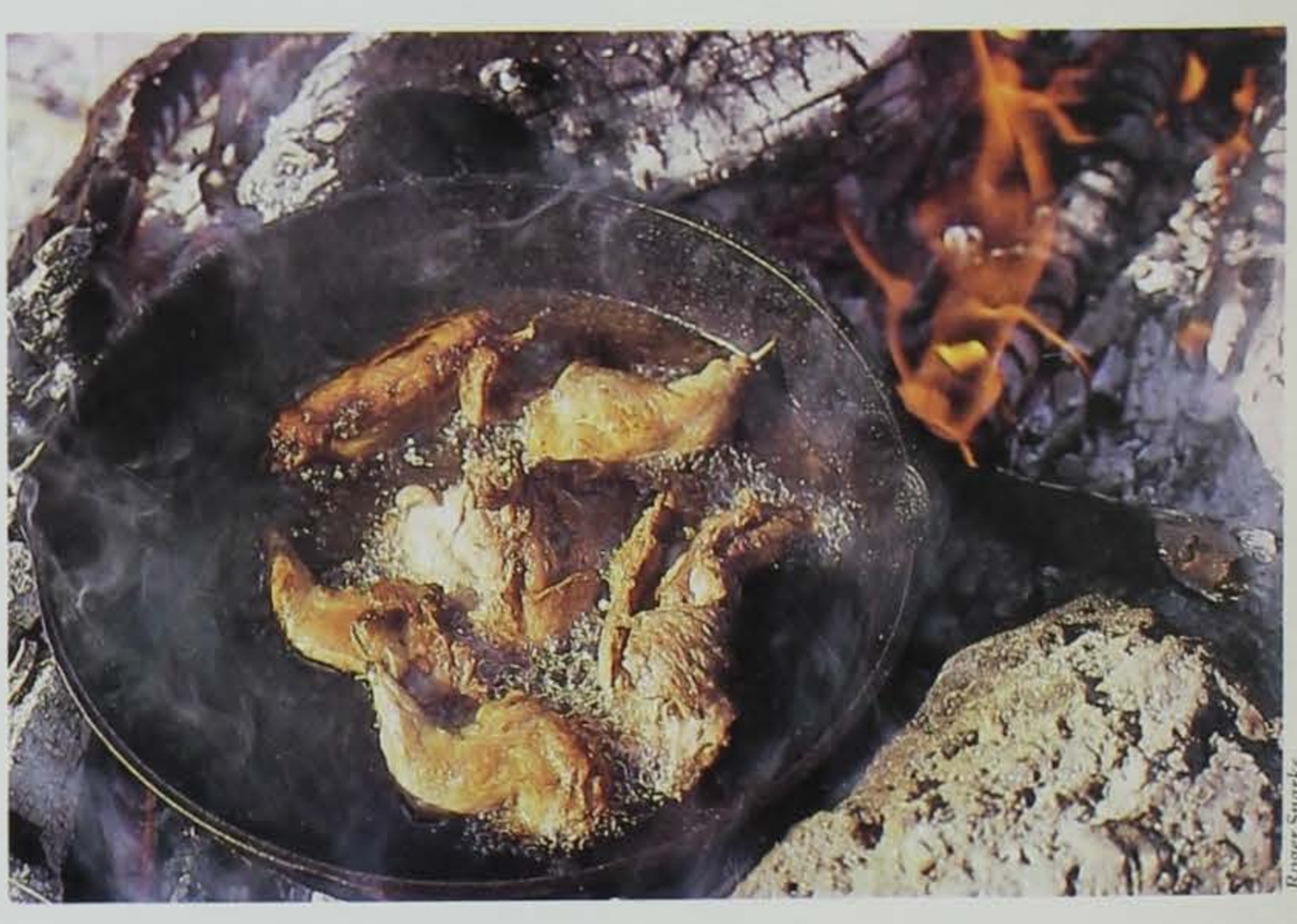


Ken Formanek

Jerry Leonard

Fox Squirrel

Another benefit to squirrel hunting — the food they provide.



Roger Sparks

Lee Gladfelter is a wildlife research biologist located at Boone. He holds an M.S. degree in wildlife conservation from the University of Idaho. He has been with the department since 1969.

There are two species of squirrels that can be legally hunted in Iowa. Fox squirrels are reddish-yellow in color with variations ranging from blond to black. Grey squirrels are smaller in size and are grey on the back with white underparts. Fox squirrels occur statewide, but are found in higher densities in northeastern and southeastern Iowa and selected woodlands in central and north-central Iowa. Grey squirrels are found mainly in the eastern portion of Iowa. Fox squirrels prefer small timbered areas interspersed with agricultural fields while grey squirrels are usually found in large unbroken timber tracts. Preferred foods for both species include acorns, walnuts, hickory nuts, buds, seeds and corn. Squirrel density, especially for grey squirrels, is highly dependent on the mast crop produced each year. Both species heavily use dens in dead limbs or trees to raise young and provide protection from bad weather. These food and cover requirements restrict squirrels mainly to older timber.

Squirrel season generally opens early in the fall beginning on Labor Day weekend and extends into late January. This year's season runs from September 5, 1987, through January 31, 1988. There are no shooting hours, and a liberal daily bag limit of six is allowed with 12 in possession.

One good hunting technique is to quietly slip into the forest and take a stand in an area of good squirrel densities. Squirrels have extremely keen eyesight and hearing, and they are as adept at escaping danger on the ground as in treetops. Hunters should wear camouflage clothing, remain motionless and sit at the base of a tree to reduce backlighting. Patience is a critical attribute when "stand" hunting for squirrels.

Another hunting technique is to "still" hunt by moving slowly and quietly through timber looking for squirrels. This technique can be successfully modified by moving 100 yards and then "stand" hunting for 15-20 minutes and then moving another 100 yards. "Still" hunting requires a great deal of skill and knowledge of terrain and behavior of squirrels. This is a high-quality experience because hunters are challenging the keen senses of "Mr. Bushytail."

Areas of squirrel activity can be located by signs they leave behind. Cracked acorn and hickory nut shells at the base of a tree, or bare corn cobs next to a cropfield are tell-tale signs. Squirrels can also be located by listening for acorns being cut and dropped to the ground. Squirrels spend a great deal of time collecting and storing nuts for the cold winter months. They are also very vocal and can be located by their chattering or scolding barks used to communicate with each other. Another vulnerable time is during the December and January breeding season when mating chases expose them to a patient hunter.

Hunters are more successful if they hunt during peak squirrel activity periods. Squirrels feed heavily around sunrise for several hours and then retire to a den or leaf nest for an afternoon rest. In late afternoon, they again increase their food-gathering activity. Fox squirrels seem to be more active during midday than their grey cousins. Weather is also a determining factor for activity. They enjoy bouncing around the timber on calm, sunny days but avoid movement on windy, rainy days. Wind and rain reduce the effectiveness of their hearing and eyesight since every motion or sound becomes a potential predator. Hunting usually improves after a storm front moves through as squirrels become active to make up for lost time.

Selection of a weapon depends a great deal on hunter preference and hunting technique used. Some hunters prefer a .22 caliber rifle with a four-power scope to pick off stationary targets, while others prefer a shotgun such as .410 or 20-gauge because they may be dealing with a moving target. One trick hunters can use is to remain stationary after shooting a squirrel and continue to watch the area for others to renew their activity. Hunters who shoot and immediately walk over to their prize will be observed by other squirrels making them more wary and harder to hunt.

Squirrels remain one of Iowa's most under-used wildlife resources and are likely to remain so unless a major shift in hunter preference occurs in the near future. Squirrels are a direct by-product of hardwood forests, and management practices that damage the forest can be detrimental to squirrel populations. Leaving a few large acorn-producing trees when selectively cutting timber will pay big dividends in squirrel production. Leaving some dead trees standing is another good practice because it provides critical denning areas.

Squirrels continue to thrive while providing millions of hours of recreation for hunters as well as those who just enjoy watching the antics of these nimble little forest creatures. They are an interesting and highly adaptable wildlife species that live in relative harmony with humans. Is squirrel hunting the forgotten sport? For those of us who have experienced the thrill and challenge of squirrel hunting in Iowa, I can answer that question with one word — never. Squirrel hunter numbers may be declining, but for those who participate in this sport the enjoyment is still at a high level.

Some of Iowa's PRIMITIVE FISH

By Jim Bruce

This information regarding sturgeon is an excerpt from the new edition of "Iowa Fish and Fishing." The book is available from the DNR at $15 each. To obtain a copy, send $15 to Iowa Fish and Fishing, Wallace State Office Building, Des Moines, Iowa 50319-0034.

Sturgeon Family *Acipenseridae*

Three members of the sturgeon family inhabit Iowa waters. Sturgeon are primitive in character, and include many of the largest freshwater fishes in the world. Some species formerly abounded in coastal waters and entered rivers to spawn. Sturgeon are easily distinguished from all other fishes by the rows of armor-like bony plates or scales which partially cover the body. Four fleshy barbels are located on the long, pointed snout that projects far beyond the inferior mouth. The tail fin is heterocercal, meaning the vertebral column turns upward into the upper lobe. The upper lobe, consequently, is longer and better developed than the lower.

The largest of the Iowa sturgeon is the lake, or rock sturgeon. It is quite rare in our waters. These fish live to be very old, and specimens approaching 50 years have been reported. The most common sturgeon in Iowa is the shovelnose or hackleback. It is common in the Mississippi and Missouri Rivers, and also frequents the lower portions of the larger interior rivers that are tributary to the great border rivers. The fish is less abundant than in former years, but it is still commercially important in river landings. The pallid sturgeon, which closely resembles the shovelnose, is presently confined to the Missouri River, where it is infrequently observed.

In the early days of commercial fishing along the Mississippi River, sturgeon were harvested principally for the roe, or eggs, which were prepared as caviar. The carcasses were said to have been discarded. At the present time, however, the fish is highly prized, and smoked shovelnose sturgeon always demands a high market price. Both the lake and pallid sturgeon are classified as endangered species in Iowa and are protected.

Lake Sturgeon

Lake Sturgeon
Acipenser fulvescens Rafinesque

Other names for the lake sturgeon include rock sturgeon, rock fish, rubber-nose and black sturgeon. Distribution of the lake sturgeon in Iowa is confined to the Mississippi River where it is very rarely reported in commercial fishing operations and by anglers.

Young lake sturgeon are tan or buff-colored, sometimes contrastingly blotched with dark, becoming more uniformly dark as they grow older. Adults are slate-gray to black above and light beneath. The body is partially covered with five longitudinal rows of heavy, bony plates

or scales. The head is roundly conical in shape and not flattened. Spiracles, or openings from the throat cavity to the outside above and behind the eyes, are present. The mouth is inferior and almost sucker-like, capable of being protracted for ease in sucking foods off the bottom. The fish feeds entirely by taste and has four fleshy barbels on the underside of the snout which act as sense organs to gauge the distance from the mouth to the bottom.

Lake sturgeon spawn in late spring usually in streams, but they have been observed in the shallow areas of lakes in locations where it is native to lentic waters. This fish is not native to Iowa lakes, and little is known of its spawning habits in our rivers. In Wisconsin, female lake sturgeon mature at 24-26 years of age, when approximately 55 inches in length. The females spawn once every four to six years, the males mature at a smaller size and spawn every year or two. Each female produces as many as 700,000 eggs. The eggs hatch in eight days at 55°F. The male and female grow at the same rate; the females are longer-lived with 97 percent of the fish over 30 years of age being female. It reaches a weight of several hundred pounds in some waters, but the largest reported from this state is about 100 pounds.

Lake sturgeon feed primarily from the bottom. Their food consists largely of insect larvae, snails, bits of aquatic plants and other litter from the floor of a lake or stream. Young fish less than eight inches in length are known to feed on minute crustaceans.

There is no open season for lake sturgeon in Iowa, precluding any commercial or sportfishing value.

Shovelnose Sturgeon

Scaphirhynchus platorynchus Rafinesque

Other names for the shovelnose sturgeon include sand sturgeon, hackleback, switchtail and flathead sturgeon.

This species is rather widely distributed in the Mississippi and Missouri Rivers and is occasionally collected in the larger tributaries of these rivers. Nowhere is it abundant, but it is considered common in many navigation pools of the Mississippi.

Color of the shovelnose is buff or olive-drab above and light beneath. The entire body is armored with heavy plates. The snout is markedly flattened or shovel-shaped. There are no spiracles. There is a very long, thread-like filament attached to the top lobe of the tail fin, from whence the fish gets one of its common names — "switchtail." This filament is very fragile and is often missing, especially in older individuals. This species commonly attains a weight of six to eight pounds, although four- or five-pound specimens are more common. The state record is 12 pounds and was caught in the Des Moines River in Van Buren County.

The shovelnose is primarily a river fish, very seldom being found in the absence of a current. In the Mississippi River, it frequents the tailwaters below wing dams and other structures which accelerate current flow.

Spawning occurs in May and June, with the spawning run being greatest during years of low flow. Little is known about the spawning activity of this species. Fish mature at five to seven years of age when around 20 to 24 inches in length. Females do not spawn every year, and the larger specimens produce about 50,000 eggs. Fish over 12 years of age are very rare.

The food habits of the shovelnose are similar to those of lake sturgeon. Primarily a bottom feeder, shovelnose sturgeon feed principally upon insect larvae, small mollusks and other bottom organisms. Algae and bits of higher aquatic plants are also consumed, but ingestion is probably incidental to feeding on bottom organisms.

Shovelnose Sturgeon

Shovelnose are the only sturgeon which can be legally taken in Iowa, and they are actively sought by commercial and sport fishermen. Approximately 50,000 pounds are harvested annually by commercial fishermen from the Mississippi River.

Pallid Sturgeon

Scaphirhynchus albus Forbes and Richardson

Other names for the pallid sturgeon include white sturgeon and hackleback.

Inclusion of the pallid sturgeon in the Mississippi River is based on a single immature specimen captured in 1930 near Keokuk. The Missouri Department of Conservation lists the pallid sturgeon as exceedingly rare and confined to the Missouri and Mississippi Rivers penetrating only a few miles into the Mississippi upstream from the mouth of the Missouri. The species is somewhat more abundant in the Missouri River upstream of Iowa; but nowhere in its range is it common.

The pallid sturgeon is similar in appearance to the shovelnose sturgeon, but is much lighter in color, has smaller eyes and a longer and sharper snout. The inner barbels on the lower surface of the snout are only about half as long, instead of about four-fifths as long, as the outer barbels. The belly is naked in contrast to the shovelnose sturgeon. Maximum size reported for pallid sturgeon is 68 pounds.

The pallid sturgeon was not recognized as a distinct species until 1905. Prior to that time, it was included with the shovelnose. Habitat preference is similar to shovelnose. The fish spawn in late spring or summer. Males mature at three to four years of age and females somewhat older.

Food habits are similar to lake and shovelnose, except that fish have considerable importance in the pallid sturgeon diet.

Jim Bruce is a fisheries biologist located in the Rathbun Lake area. He holds a B.S. degree from Iowa State University and has been with the DNR since 1972.

Caught Up in the World of Fur Harvesting

Text by Ron Andrews
Photo by Lowell Washburn

What possesses anyone to go out in zero-degree temperatures, get wet, freeze their fingers, toes or whatever, to check their trap line? What possesses a fox hunter to brave 25-degree-below-zero windchill factors to take a fox on a blustery day? What possesses a raccoon hunter to slog through a river at night, stumble through a timber following "Ol' Blue," sometimes in pouring rain, in pursuit of the masked marauder? Obviously people have the option to do other "more comfortable things" in life.

There are many reasons why people hunt and trap furbearers. Although fur harvesters often say it is mainly for money, in reality most fur harvesters pursue their quarry for other less tangible reasons. Several recent studies completed in various parts of the country have consistently shown that most fur harvesters rate values, such as challenge and recreation, the outdoor experience with nature, pioneer heritage, camaraderie and wildlife damage control, above economic gain as reasons why they pursue furbearers. Why?

Challenge and Recreation

Fur harvesters, of necessity, must learn in great detail the life history and behavior of the animals they seek. A recent national survey found that fur harvesters were among the most knowledgeable groups when talking about wildlife and were also among the most concerned for the preservation of wildlife habitats and resources.

Fur harvesting also requires long hours, tough physical labor and the need to be out every day regardless of weather conditions. A typical day on the trap line, even for "part-timers," begins before daylight with checking and resetting traps. Their day does not end until well after dark when all the furs have been properly taken care of and equipment prepared for another day. Raccoon hunters spend countless hours between dusk and dawn pursuing their quarry — watching, listening and training their hounds, and properly taking care of the dogs and equipment for another night's run. Fox and coyote hunters generally pursue their sport in very harsh winter weather conditions, trying to outwit their foe in waist-deep snow, blustery winds and bitter cold temperatures.

There is also a certain amount of trophy value associated with the first muskrat or fox a fur harvester takes or that big coyote, raccoon, mink or beaver that previously eluded capture several times before. The rewards of many hours of effort are generally slim and yet to those who understand and harvest fur, nothing can be more satisfying.

Outdoor Experience and Pioneer Heritage

Some of the motivations for fur harvesting are difficult to express, but are an immeasurable part of the experience. Seeing the changing mood of nature — the different flora and fauna, experiencing frosty sunrises and glorious sunsets far removed from the everyday rush of life, experiencing first hand the mighty forces of a blizzard or thunderstorm can also fill a fur harvester with awesome wonder. These experiences with nature can be addictive. Fur harvesting gives one an opportunity to be their own boss. There is also a feeling of satisfaction and accomplishment that comes from being able to identify animal signs at a glance and to interpret what is seen with a fair degree of accuracy. For some fur harvesters, there is the knowledge that they are practicing a skill which dates back to the time of their forefathers, a time when this country was first pioneered.

Camaraderie

Heart-warming relationships between family members can be strengthened when fur harvesting experiences occur. One can develop a kinship with others by sharing interests. The yarns and tales told by successful fur harvesters about their quarry or the "one that got away" further motivates a person. The stories add to countless hours of recreation and build and establish deeper friendships. The relationship between fur harvester and hound or mule sometimes knows no bounds.

Damage Control

Some people trap and hunt as a method of reducing property damage and livestock losses. Landowners and livestock producers often fall into this category. Although there are some methods of preventing or reducing wildlife damage that do not involve removal of animals, the fact remains that the only practical solution to many problems is removing the animals that are causing the damage. Trapping beaver that are flooding corn or trapping and hunting coyotes that kill sheep remain important methods in removing problem animals.

Economics

Although monetary return is important to many fur harvesters, money is often overemphasized. Those individuals who begin hunting and trapping because they think it will be an easy way to make a "fast buck" soon find out otherwise. If the average fur harvester took their annual earnings, subtracted the costs of equipment, hounds and transportation, then divided the remainder by the number of hours spent obtaining permission, scouting, handling and selling the furs, they soon realize that their hourly earning is quite low and often in the red. But for most, the attraction goes far beyond the tangible dollar.

Responsibility

No matter what one's motivation for wanting to harvest fur, fur harvesters should never pursue fur unless they are willing to do so properly, as required by law. There is no room in the ranks for fur harvesters unwilling to accept that responsibility or who are unwilling to respect and study the animals they seek and the property they seek them on.

Nineteenth century naturalist Henry David Thoreau best summarizes the "chemistry" of a fur harvester. "I went to woods because I wish to live deliberately, to front only the essential facts of life, to see if I could learn what it had to teach and to when I came to die discovered that I had not lived." Most fur harvesters, by choice, are deeply proud of their heritage and life. Who is to say they are wrong?

Ron Andrews is a furbearer resource specialist located at Clear Lake. He holds a B.S. degree in fisheries and wildlife biology from Iowa State University. He has been with the department for 20 years.

Enjoy Nature's Subtle Sounds

Protect Your Hearing

Text and photos by Bob Mullen

Have you ever taken the time to really listen and to appreciate the multitude of sounds that enhance our enjoyable moments afield? Have you clearly heard the call of the bobwhite quail, the whirring sound of a covey of quail as they explode from cover, the raucous call of crows in the distance late in the day, or the scolding chatter of a fox squirrel as you stroll through the timber? Unfortunately for many people, these sounds are barely discernible for some and go unnoticed by others. It is not that some people don't want to hear these wonderful sounds of the outdoors, but that they cannot.

We have what some might consider to be an epidemic of hearing loss that is unnoticed by most people until it is too late. It is from countless hours of enjoyment spent hunting and shooting. Right about now you are probably thinking this doesn't apply to you. But if any of the following has ever happened to you, think again about your hearing. Your hunting partner asks if you heard the turkey gobbler drumming, but you do good just to hear him gobble. You have a quail flush to the side, or behind you, and you don't even know it is there until your hunting partner shoots. It seems like people talk softer than they did several years ago. You catch yourself having to have something repeated. These all could be signs that your hearing just isn't what you thought it was.

In the past, people who enjoyed hunting and target shooting were unaware that shooting any firearm results in a variety of noises which are harmful to the unprotected ear. Most obvious of these noises is the muzzle blast, produced by high pressure powder gases leaving the gun's muzzle after the bullet or shot leaves the muzzle of the barrel. Bullets traveling in excess of 1,100 feet per second produce shock waves which result in a "crack," basically the same as a sonic boom created by high speed jet aircraft. With the exception of the "crack," the noises of gunfire are extremely brief, lasting only a few milliseconds.

Sounds are rated by a system called decibels (db). The noises created by firearms that cause damage to our ears are rated by what is called "peak sound pressure limits" in decibels (db). A standard velocity .22 rimfire cartridge produces 151 db of peak sound pressure to the unprotected ear. The three-inch .410 produces 167 db, a two and three-quarter-inch 12-gauge fired from a 26-inch barrel produces 166 db and the 30-06 rifle produces 171 db. Surely the .22 rimfire cartridge wouldn't harm a person's hearing.

Otologists are in general agreement that approximately 150 db is the maximum peak sound pressure limit for gunfire noise without causing danger of speech reception. Therefore, even the .22 rimfire can result in hearing damage. Current trends toward shorter rifle and shotgun barrels will only increase muzzle blast noise. The worst offender of all for muzzle blasts are handguns.

It seems rather obvious that hearing protectors are needed when shooting. Many times, a person close to a shooter receives the most harmful sounds. Muzzle blast is worse to the side of a gun, such as from shots fired by your gunning partner in your duck blind, or by other shooters at a firing range. The majority of shooters experience hearing loss in the ear on the off side of the gun if they have failed to wear hearing protectors while shooting. (The "off ear" would be the left ear for the right-handed shooter.)

You still say you don't have any hearing damage or loss, and you have shot for years without hearing protection. Have you ever been close to a muzzle blast, or shot for a period of time and had a ringing in your ears? That ringing is the result of damage to your hearing, even though the ringing goes away. A strange characteristic of gunfire hearing damage is that it doesn't always result from firing over a long period of time, but may result from one unfortunate experience.

Loss of hearing can result from damage to tiny hair-like cilia in the ear that act like antennae. Repeated damage to these cilia can result in hearing damage that is irreversible and permanent. Nerve deafness is the result of acoustic trauma (intense noise) which may damage the inner ear. This nerve deafness may heal over a period of six months if loud noises are avoided.

One has the choice of either avoiding loud noises, or wearing protective ear plugs or muffs. It is pretty well accepted that any noise of 85 db and above, over a period of time, will cause hearing damage. Hearing loss is usually accompanied by high frequency tinnitus, a ringing in the ears.

If you shoot and don't use any type of approved hearing protection, you are receiving damage to your hearing — and it will continue and get worse. You may still be thinking you have no hearing problem, but you may have loss at certain frequencies. The first signs of loss due to frequency-related damage from gunfire noises will be difficulty in clearly hearing female voices, children's voices and someone speaking to you in a room with several others talking at the same time.

Until twenty years ago, I failed to wear ear protection while shooting or hunting, as most others failed to do likewise. A few years ago, I fired a revolver once without hearing protection on. I experienced a ringing in my ears that would not go away. After going to an audiologist and otologist, they confirmed a hearing loss in the frequency range which was the result of gunfire.

What then is the best ear protection? Whatever kind that you will consistently wear. I don't mean a wad of cotton or Kleenex stuffed in your ears, but an approved hearing protector. Well-designed shooting ear muffs are the best ear protection, especially for target shooting with a rifle, pistol or shotgun. Ear muffs are the best, but are impractical for most hunting. For field purposes, one of the most practical, effective and inexpensive devices is a foam ear plug. The foam plugs can be reused and are very effective. Another type of ear plug is the "Lee Sonic." The "Lee Sonic" allows normal hearing, but loud noises such as gunfire cause a valve in the ear plug to close. It is very important that a person get the correct size plug to fit their ear. A tight seal is essential to achieve effective results when firing a gun. Hunters should be encouraged to wear ear plugs when afield. When shooting a high-powered rifle or center-fire handgun, a combination of foam rubber ear plugs plus a pair of shooting ear muffs is encouraged.

Today's competitive trap, skeet, rifle and pistol shooters all wear protective hearing devices. Besides protecting their hearing, it helps to improve their scores. Without hearing protection, recoil seems worse than it really is due to the loud noise of the muzzle blast. With any loud noise, the body unconsciously reacts by flinching which can cause a lower score by a shooter.

I would suggest you wear adequate hearing protection while enjoying your shooting sports. But don't take my word for it. Visit with your doctor, and you will find they will consider ear protection invaluable when shooting. The only thing I am an authority on is that failure to use ear protection years ago and failure to wear ear protection every time I shot resulted in my hearing damage. Protect your hearing now so you can always enjoy it.

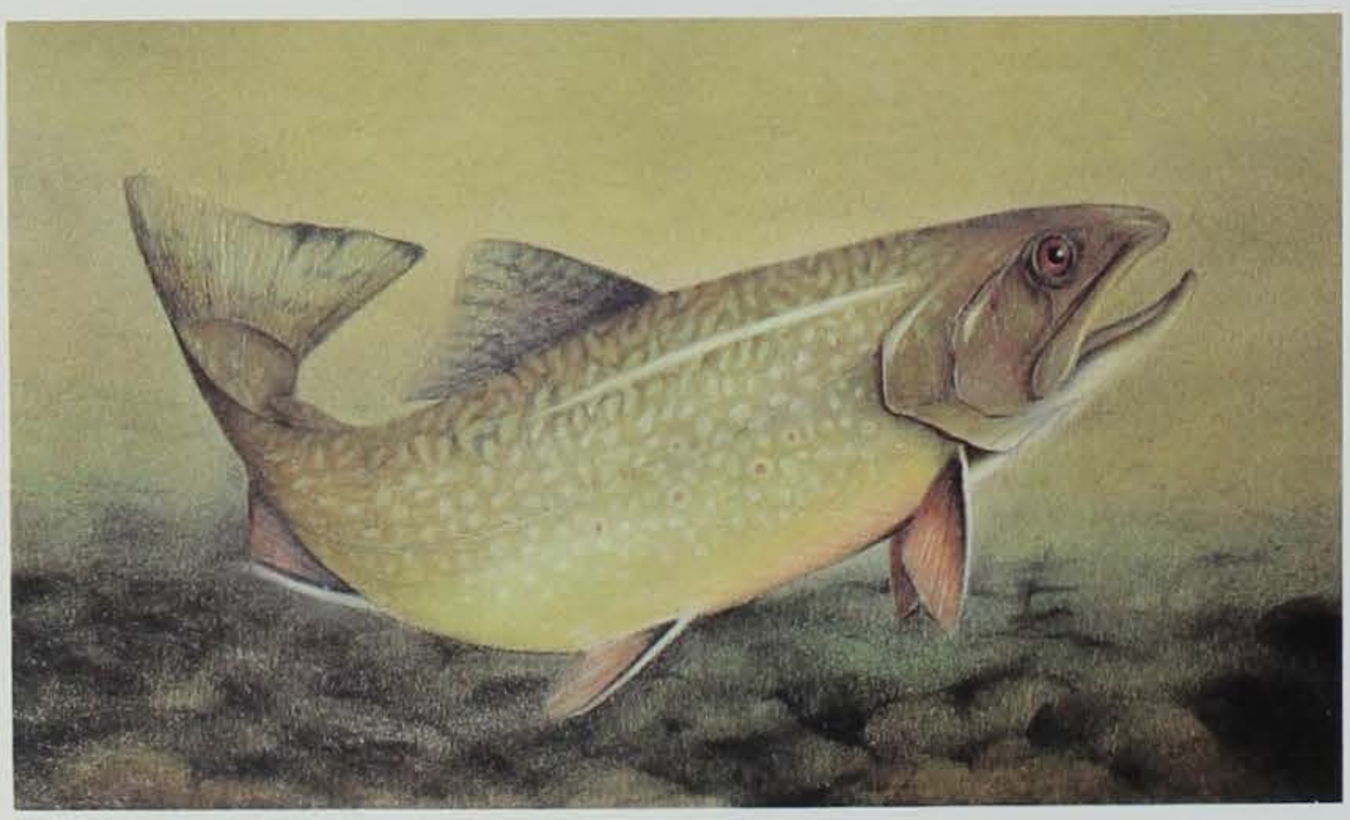
Bob Mullen has been with the DNR since January 1971 as a conservation officer. He is a graduate of Northwest Missouri State University with a B.S. degree.

Well-designed shooting ear muffs will provide the best protection, especially for target shooting.

For field purposes, foam ear plugs or "Sonic" ear plugs are the most practical and effective.

STAMP CONTESTS
An Iowa Tradition

1988 Waterfowl Stamp, pintails by Mark Cary



1988 Trout Stamp, brook trout by Doug Sampson

By Deidre Martin

For 15 years, Iowa's stamp contests have been producing quality artwork from across the state. In 1972, the migratory waterfowl stamp was commissioned to Iowa's own nationally known wildlife artist, Maynard Reece. The Iowa duck stamp design became a competition the following year, followed by the trout and habitat stamp competitions in 1974 and 1979 respectfully. With the exception of California's duck stamp contest which began in 1971, Iowa has the nation's oldest wildlife stamp competition.

The 1988 stamp contest winners were chosen this past June. The three division winners were: Jack Hahn of Middle Amana for the habitat stamp, Doug Sampson of Des Moines for the trout stamp, and Mark Cary of Des Moines for the duck stamp. This year, 57 entries were received. Winning the contest, open only to Iowans and run by the DNR, is one of the highest achievements a wildlife artist can make.

Designs are selected on the basis of competition, anatomical accuracy and suitability for use on a stamp. The artists submit their designs to the Iowa Department of Natural Resources. The winning designs become the stamps that hunters and fishermen must purchase to pursue their sports.

This year's winners are as unique in their own right as their artwork. Habitat stamp winner Hahn, who also won the 1985 duck stamp and finished second in this year's duck stamp competition, operates Hahn's

Bakery at the Amana colonies. He has entered the contest the last eight years, and does so for the competition.

"Competition makes you try harder and do better," says Hahn. Even though he is a veteran to the stamp competition, he says the winning feeling is always good. "It felt terrific, it always does. It's a small painting, but I put a lot of effort into it. It would be a really lonely thing if I was the only one who enjoyed it."

First-time entrant Cary of Des Moines, an art teacher at the Des Moines Christian School, says winning might help him gain some recognition and credibility. "I've tried unsuccessfully to get into the art realm in Iowa," says Cary. Cary, who moved from Nebraska to Des Moines six years ago, says even though he has sold some of his artwork while in college, winning this contest was a surprise. "I really didn't expect to win. It was my first time. Maybe now I will be able to be a part of the shows I want to be in."

Sampson, the trout stamp winner, is a full-time graphic artist who has entered for the past several years in the different divisions. He says the contest gives him a chance to do something different. "The trout contest is more creative. The artwork I do in my job is quite different."

Sampson decided to enter the trout competition because of his familiarity with the brook trout. "I have been collecting trout stuff for years, so I chose the type I knew the best," he said. "I have been drawing my whole life, but I have been doing wildlife only the past six years."

All of the artists used their own methods of preparation for the contest. Sampson took several months to complete his drawing. "I usually worked on it late at night, but not necessarily every night," he said.

Cary's mode of preparation included using anything helpful he could find — pictures, slides and study skins.

Hahn's has been different every time. "I picture how it will look in my head at the beginning," said Hahn. "Planning and preparation are three-fourths of the work — after that, I just do it."

1988 Habitat Stamp, mourning doves by Jack Hahn

Besides as stamps, the winning designs are also available as art prints. These limited edition prints are usually purchased by wildlife art enthusiasts and art collectors, with the DNR receiving 40 percent of the wholesale price of the prints. The artists are required to make a minimum number of art prints for the general public to purchase.

Revenue collected from the duck stamps and prints is used for various waterfowl conservation programs such as land acquisition, development, restoration, maintenance and wetland preservation. Habitat stamp and print revenue goes toward the development of wildlife habitat in the state. And Iowa's trout program is supported primarily through the sale of trout stamps and money generated from the sale of trout prints.

The duck and habitat stamp prints will sell for $120 each and the trout stamp print for $100. The duck stamp sells for $5, the habitat stamp for $3 and the trout stamp for $8. The artists will have prints available for purchase at the following addresses:

Mark Cary
Duck Stamp Winner
5820 Pleasant Drive
Des Moines, Iowa 50265

Doug Sampson
Trout Stamp Winner
3116 Valdez Drive
Des Moines, Iowa 50310

Jack Hahn
Habitat Stamp Winner
Middle Amana, Iowa 52203

Duck stamp placings, second through fifth, include Hahn, Mark Dannewitz of Garner, Gary Twedt of Osceola and Jane Beck Stoner of Peterson. Habitat stamp placings, second through fifth, were Craig Carlson of Davenport, Buzz Balzer of Milton, Mike Dunbar of Bettendorf and Sheila Christiansen of Onawa. Trout placings, second through fifth, were Dunbar, Dan Seward of LeGrand, Dan Damjanovic of Waterloo and Ed King of Cedar Rapids.

Deidre Martin is a student at Iowa State University majoring in journalism and mass communications. She recently completed an internship with the DNR's information and education bureau.

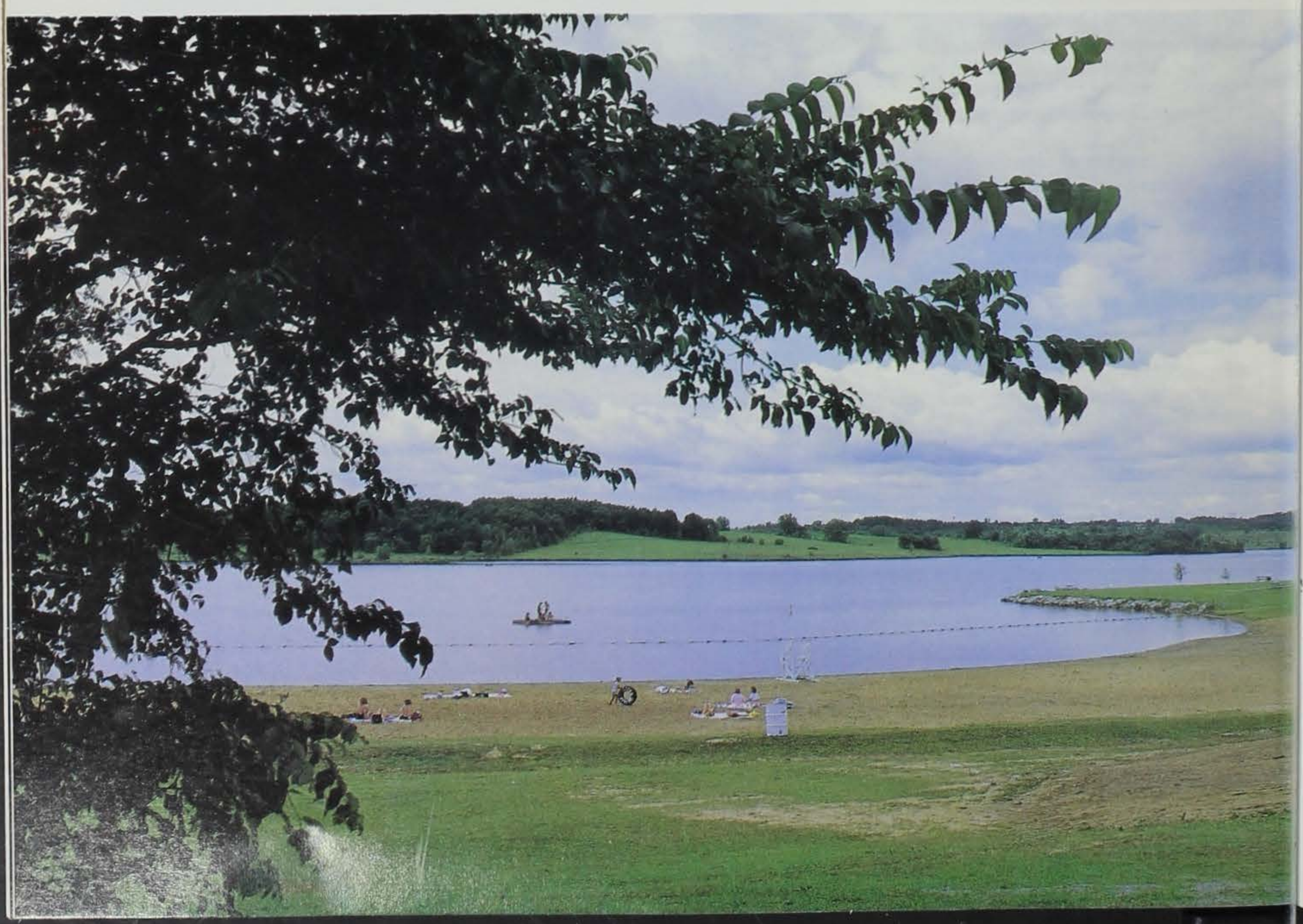
PLEASANT CREEK

Cashing in on the Lottery

Text by Jerry Reisinger
Photos by Ron Johnson

A prominent Iowa legislator predicted it would be "the most important recreation and conservation push in Iowa since the Great Depression." He was talking about the 1985 legislation that made significant funding available over the next five years to accomplish badly-needed state park and recreation area facility development projects. This legislation created the Iowa lottery. Certainly, no one can question that lottery funding is already having a major effect on the Pleasant Creek State Recreation Area.

Pleasant Creek is nearly 2,000 acres in size and is located between Waterloo and Cedar Rapids. Although the 410-acre lake was constructed in the early 1970s, by 1986 only very limited recreation facility development had taken place. Considerable funding had been used for development of necessary roads and utility systems, but Iowa's declining economy prevented construction of such facilities as shelters, shower buildings and beach and boathouse structures.



Pleasant Creek, even without formal visitor facilities, had become one of Iowa's most heavily-used recreation areas. The area has provided boating, fishing, picnicking, nonmodern camping, swimming and hunting opportunities for thousands of visitors annually. It was imperative that recreational facilities be developed to ensure visitor enjoyment and safety.

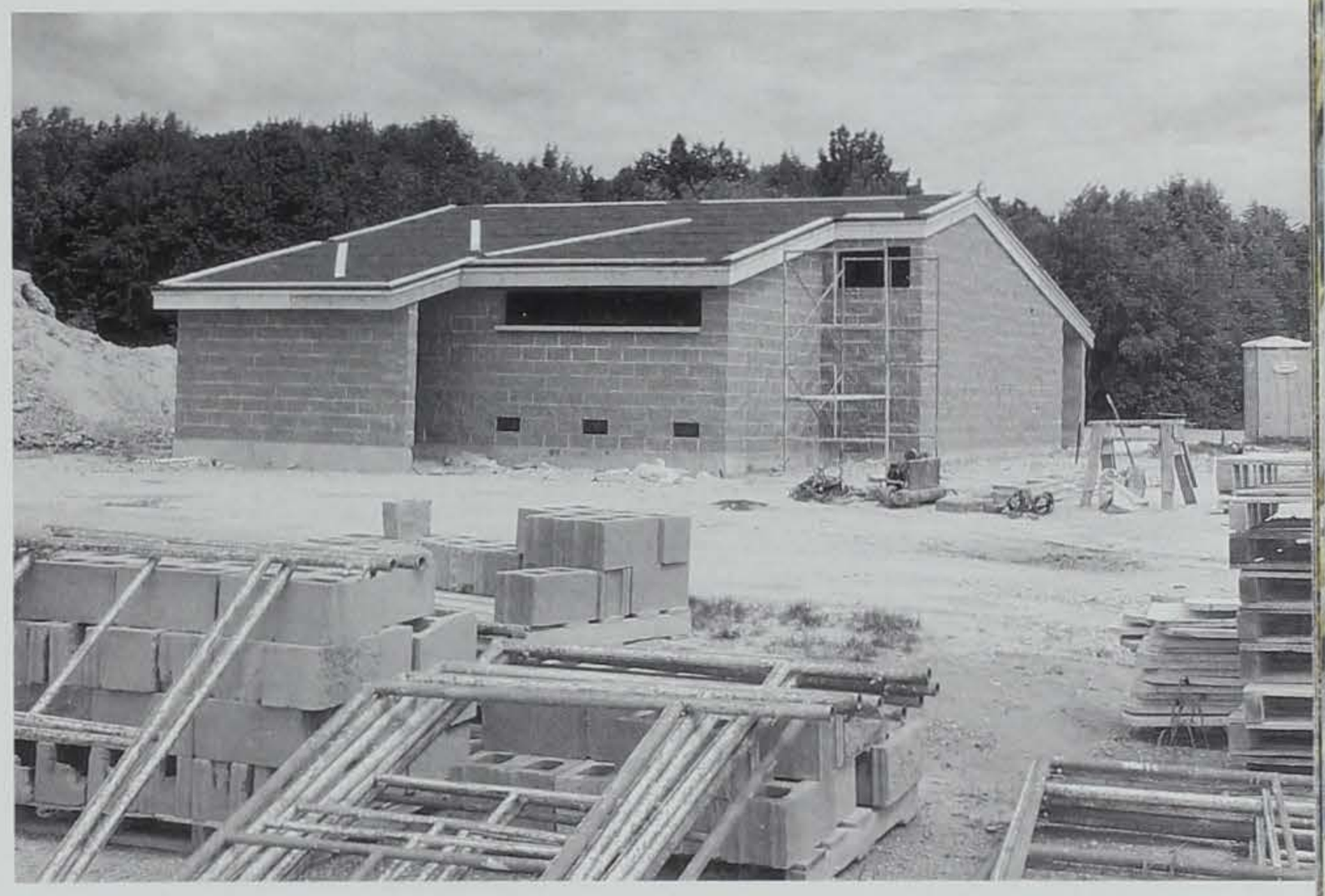
This year, the DNR has finally been able to develop some basic visitor facilities at Pleasant Creek through proceeds from the Iowa lottery. Until this time, Pleasant Creek did not have even one modern restroom. Now, a modern restroom in the north picnic area is nearly completed, as well as a new restroom/shower building in the campground, and a beach concession building. In addition, a 312-car parking lot at the beach will soon be finished along with two large open shelters, electrical hookups in the campground, and a service building for the maintenance area.

A new office and visitor center to be located near the park entrance is in the design stage. This building will allow easy access for park visitors who need information and will provide displays and interpretive materials. It will also include a meeting room available for park programs as well as group use.

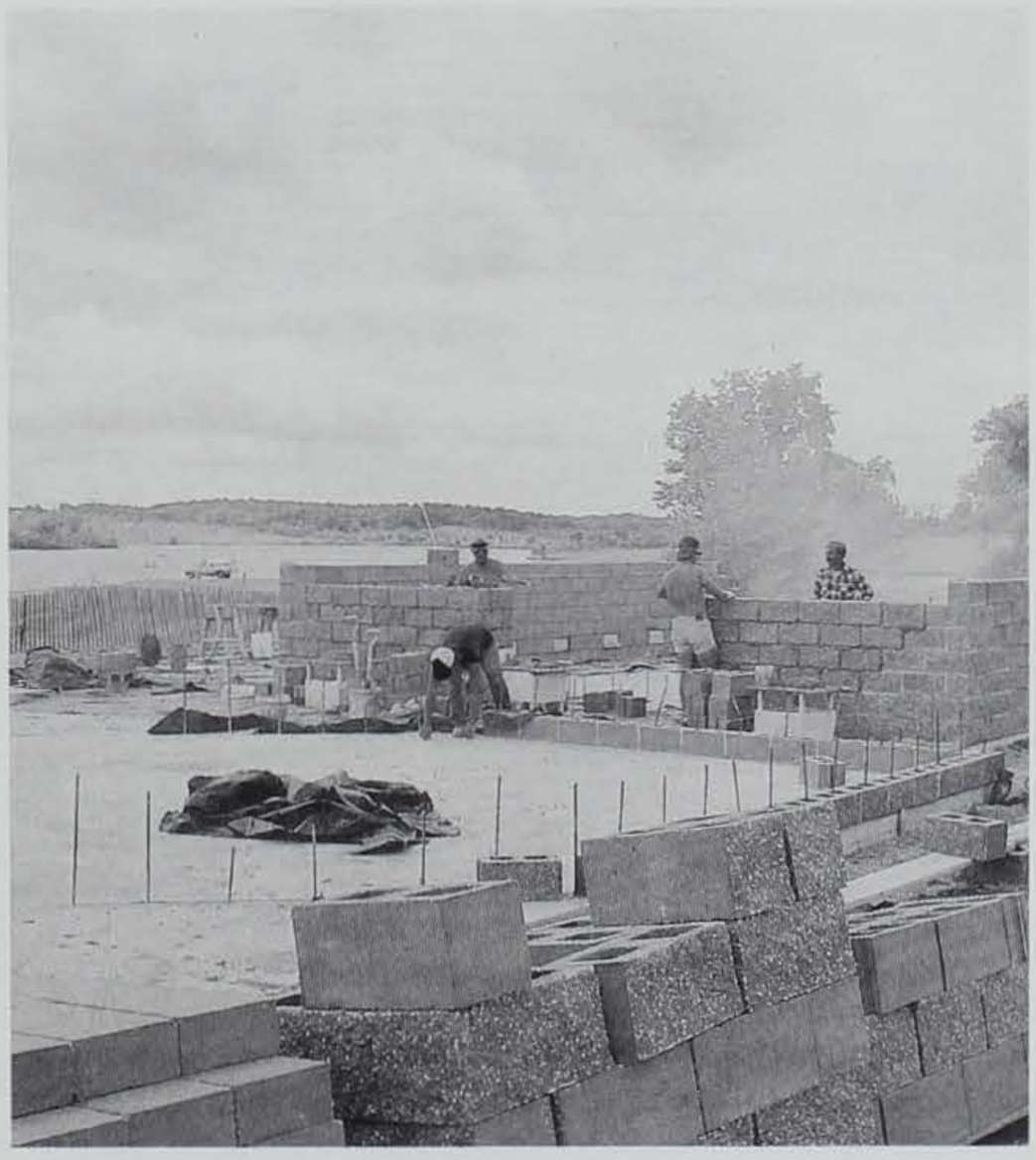
Another new facility at Pleasant Creek will be a year-round shelter for the south side of the lake. A portion of the funding for this shelter will come from a donation by the Cedar Rapids' Bass Masters.

Through the Iowa lottery, Pleasant Creek will soon provide quality facilities for the public to enjoy. Some folks are already saying they do not mind nonwinning numbers so much, knowing that profits from the lottery help to improve our state's park and recreation areas. In a sense, *everyone's a winner* with the Iowa lottery!

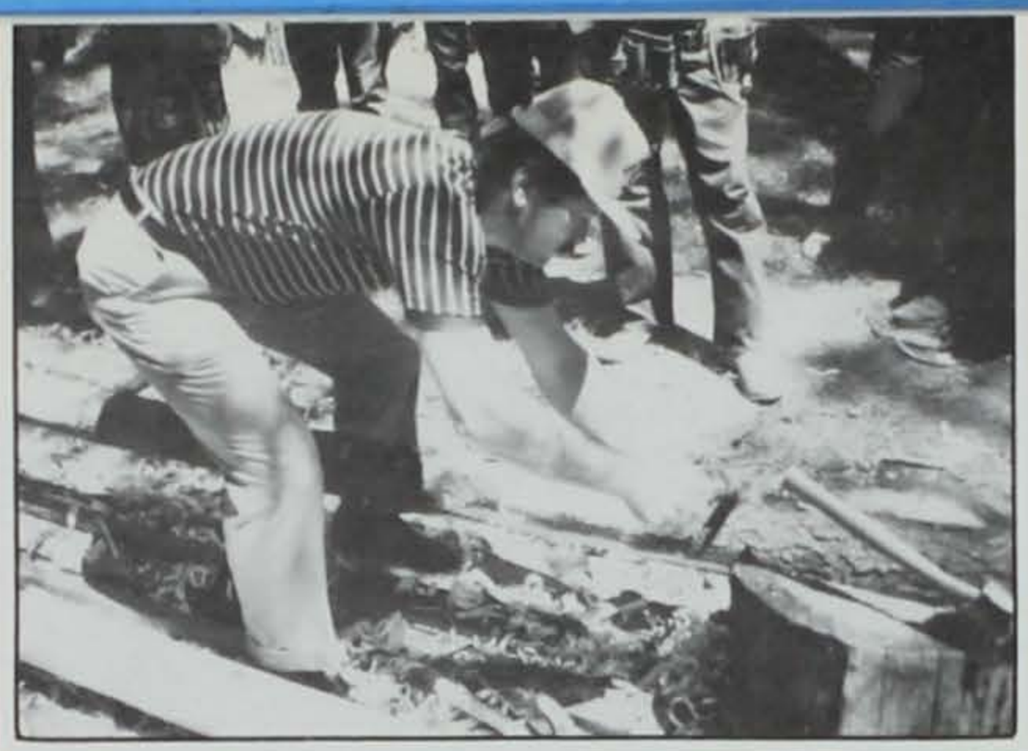
Jerry Reisinger is the park ranger at Pleasant Creek. He holds a B.S. degree in public administration from Upper Iowa University. He has been with the department since 1972.



Showerhouse under construction at Pleasant Creek.



Construction of this beach and concession building was made possible by money from the DNR's share of the state lottery.



As one of Gov. Branstad's three summer trips to state parks, celebrating June and July as Take Pride in Iowa Outdoors months, he strips the bark off of a log that will later become the mast for the full-size replica of the keelboat, "Discovery", at Lewis and Clark State Park. The Governor also spent workdays with local volunteers at Ledges State Park near Boone and Pleasant Creek State Recreation Area near Cedar Rapids.

Classroom Corner

By Robert P. Rye

Muskrat

Muskrats excite many visitors of the Conservation Education Center. A brief study of a muskrat home shows that birds, turtles, frogs, spiders and insects share the house. Look where the muskrat lives and determine how they and you are interdependent. Also test your knowledge with the following true/false questions.

1. Because of their great numbers, muskrats produce more profits for the American trapper than any other furbearer.
2. The muskrat is a true rodent, being more like a mouse than a rat.
3. The muskrat has only eight teeth in each jaw.
4. The muskrat is characterized by a round furry tail.
5. The muskrat leaves indistinctive marks after crossing a mud flat.
6. The muskrat is not clever in avoiding traps.
7. The muskrat does not hibernate.
8. The muskrat seems awkward on land but is an excellent swimmer.
9. Muskrats' only homes are tunnels excavated in banks of rivers or lakes.
10. The muskrat is chiefly a vegetarian and will even eat corn in the fields.

Answers:

1. True; 2. True; 3. True; 4. False (The tail is long and hairless.); 5. False (Because it is a furbearer that drags its tail, it leaves its track as well as its footprints.); 6. True; 7. True; 8. True; 9. False (They also build lodges of roots and marsh weeds in permanent shallow water.); 10. True.

1986-87 SMALL GAME HARVEST RESULTS

Hunters harvested 79 percent more quail during the 1986-87 hunting season than the previous season with 339,000 birds taken. Other small game numbers harvested stayed the same or decreased slightly.

Pheasant harvest was the same as last year with 855,000 birds taken. The percentage of resident licensees hunting pheasants increased to 76 percent, while 95 percent of non-resident hunters hunted pheasants.

Hungarian partridge harvest of about 60,000 birds decreased from the previous season when 74,000 birds were harvested.

"Game bird numbers generally increased in response to better weather in 1986, but wet field conditions and extensive standing crops early in the hunting season made difficult hunting for pheasant and hun hunters," says Terry Little, wildlife research supervisor, for the DNR. "Mild weather in January allowed quail hunters to take advantage of higher quail numbers during the late season."

Squirrel and rabbit harvests have declined for nearly a decade as hunter interests have decreased. Slightly over half a million squirrels were harvested during the season. Cottontail rabbit harvest decreased by about one-third from the 1986 season to 472,000. Nearly 93,000 hunters pursued cottontails.

Harvest for other small game species were 13,000 ruffed grouse; 4,000 rails; 9,000 snipe; 12,000 woodcock; and 6,000 jackrabbits.

According to Little, the outlook for 1987 is for continuing recovery in small game populations. The mild winter in 1986-87 allowed a good carryover of breeding stock and the warm early spring triggered an early nesting season. There is a lot of nesting cover available as a result of federal conservation reserve and annual set-aside programs.

NATIONAL WILDLIFE REFUGES CHARGE ENTRANCE FEES

Visitors to some national wildlife refuges will now pay an entrance fee, according to the U.S. Fish and Wildlife Service.

The fees, authorized in the Emergency Wetlands Resources Act of 1986 apply to Iowa's DeSoto Bend National Wildlife Refuge in Harrison County west of Missouri Valley. Refuges will charge an entrance fee of $2 per vehicle and $1 per person for those arriving in a van or bus with 10 or more people. The service expects to collect about $8.3 million in fee revenue during fiscal year 1988. Thirty percent of the receipts would be used for refuge operation and maintenance and 70 percent for wetland acquisition.

Holders of a current federal duck stamp would be exempt from the proposed fees. Also, anyone holding a Golden Eagle, Golden Age, or Golden Access Passport could enter the refuges without additional charge. No fees will be charged for children under 16 years of age.

Conservation Update

THIRD ANNUAL HAWK WATCH

To help people view and identify hawks as they migrate through the state, a hawk watch has been scheduled September 26 and 27. The watch will be held 11 a.m. to 5 p.m. each day at Effigy Mounds National Monument located three miles north of Marquette on Highway 76.

Raptors, ranging from the commonly seen turkey vulture and red-tailed hawk to the federally endangered bald eagle and peregrine falcon, migrate through Iowa each fall. Some birds such as the broad-winged hawk migrate in kettles with a half dozen to several hundred birds soaring together. The largest kettle reported last year had 1,500 broad-winged hawks.

"During the fall, several thousand hawks will migrate above the bluffs framing the Mississippi River near Effigy Mounds. The river is a major landmark, and the bluffs create thermal updrafts which the hawks seek during migration. Last year, turkey vultures, sharp-shinned hawks, red-tailed hawks, rough-legged hawks, bald eagles and a peregrine falcon were seen at Effigy Mounds," said Laura Jackson, urban biologist for the Department of Natural Resources.

Over 15 types of raptors, in varying numbers, migrate through the area. On an average day, 20 to 30 birds will be seen. On a cool, clear day, with winds from the north following a cold front, several hundred birds may be seen.

This program is made possible through donations to the Chickadee Checkoff on Iowa's state income tax form. For additional information, call Laura Jackson at (515) 281-4815 or Effigy Mounds Chief Ranger Jim David at (319) 873-3491. There is no charge for the event.

DNR DONATES JACK PINE SEED TO CHINA

The Department of Natural Resources has donated one pound of jack pine seed to China to help reforest 2.4 million acres burned in a forest fire in May and early June.

An extensive area of northern China suffered the fire which killed 193 people and left more than 50,000 people homeless.

The seed was donated through the Iowa Society of American Foresters and will be sent to the Forestry Society of China. The seed will then be turned over to the Chinese Ministry of Forestry for seedling production and eventual planting in the burned area.

CORRECTION: On page 11 of the August 1987 issue of the *Iowa CONSERVATIONIST*, the caption below the photo of the windbreak should read, *A windbreak on the* northwest *side of your home will help reduce heat loss in winter.*

NWF INTERVENES IN CALIFORNIA LEAD SHOT LAWSUIT

The National Wildlife Federation (NWF) has asked a federal court in Sacramento, California, to allow the NWF to intervene in a lawsuit brought by the California Fish and Game Commission against the federal government.

The fish and game commission lawsuit charges that the U.S. Department of the Interior is illegally threatening to leave the waterfowl hunting season closed in California this year unless the commission agrees to require non-toxic steel shot for hunting in several designated counties.

Interior bowed to pressure from conservationists in July 1986 by agreeing to enforce a nationwide ban on lead shot for waterfowl hunting by 1991. The NWF, which had sued the Interior to require a nationwide ban beginning with the 1987 season, hailed this agreement as an historic compromise. The closing of several counties in California to lead shot was the Interior's first step toward implementing the ban throughout the state.

Under an amendment to the Interior's annual appropriations bill, the department can impose steel shot zones only with a state's consent. The Interior has interpreted several federal laws, however, including the Endangered Species Act, as leaving the federal government with the final authority on whether to leave areas closed to hunting. The fish and game commission suit is intended to challenge the Interior's interpretation of these laws.

Conservationists, led by the NWF, have vigorously opposed lead shot for waterfowl hunting for many years. Lead shot pellets annually poison an estimated two to three million ducks, geese and swans which ingest the pellets. In addition, lead shot has killed more than 125 bald eagles that feed on waterfowl.

"The compromise that we reached with Interior last summer resolved a long-standing and important problem — the wide scale poisoning of waterfowl by toxic lead shot," said NWF president Jay D. Hair. "We are intervening in this case to prevent the fish and game commission from wrecking a carefully crafted compromise accepted by the courts, the Interior department, the conservation community and most states."

PRAIRIE SYMPOSIUM TO BE HELD AT U.N.I.

A one-day prairie symposium is scheduled for Saturday, Sept. 5, at the University of Northern Iowa, Cedar Falls. The symposium, entitled "Iowa's Lost Landscape: Prairie Remnants and Reconstruction," will be held in McCollum Hall. Eight individuals who specialize in prairie research or reconstruction will speak.

Registration is $20 and includes lunch. Student registration is $8.

For further information, contact the Biology Department, U.N.I., Cedar Falls, Iowa 50614. (319)273-2456.

Warden's Diary

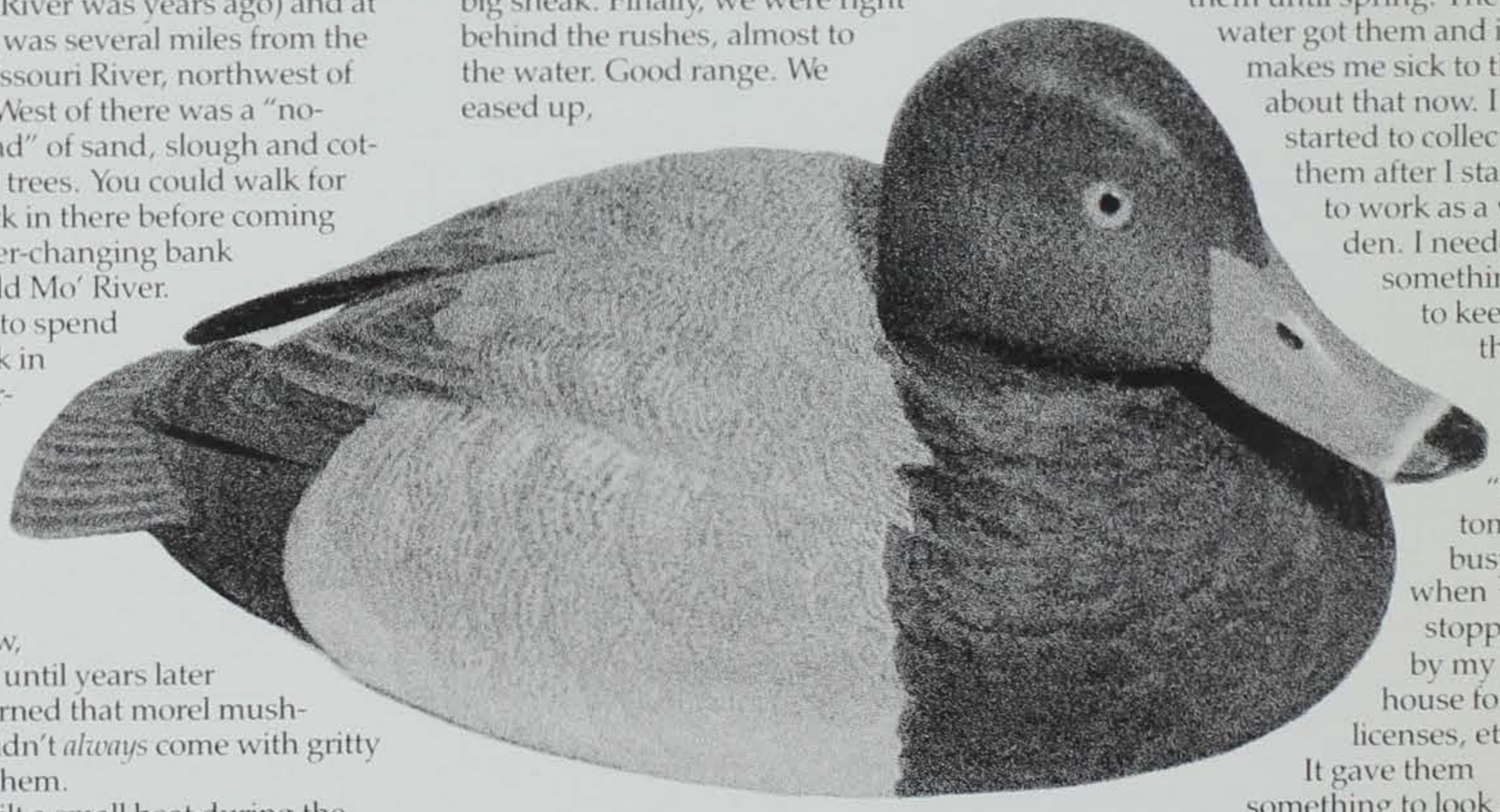
By Jerry Hoilien

I get accused of telling stories about a lot of people, so here's one on myself. It goes way back to my beginnings as a duck hunter. It's fun to wander back through your memory to the "good ol' days." Back to those fall days when the ducks start down the ol' Missouri.

I first started to hunt ducks with a good friend, Rogene Eisele. His granddad was Wylie English, who owned the Ol' English Byough — a large, long slough which dropped off the high bank (that's where the old Missouri River was years ago) and at that time was several miles from the actual Missouri River, northwest of Onawa. West of there was a "no-man's land" of sand, slough and cottonwood trees. You could walk for miles back in there before coming to the ever-changing bank of the wild Mo' River. We used to spend days back in there during the spring hunting mushrooms. You know, it wasn't until years later that I learned that morel mushrooms didn't *always* come with gritty sand in them.

We built a small boat during the winter in my basement. Small wasn't the word for it, compared to today's standards. Anyway, the two of us could just fit into it. Sitting like two porcupines, very carefully we would cross the English Byough and hide in the willows on a point. Before we decided to make a blind, we used to try to hide behind one another as the ducks worked the slough. Usually, they spotted us and we didn't kill very many ducks. After building the blind, the ducks naturally started to fly elsewhere. You know how that is!

One day we noticed the ducks working way west of us. They were pouring into the trees about a half mile away. After we watched about a dozen different bunches cup their wings and drop in, we decided enough was enough and started to hike over to whatever was attracting them. We walked and walked. First, one of us would start to veer off to one side, then the other would have to straighten him out. At any rate, we walked until our tongues hung out. Finally, we could see some water ahead. Ah-ha! We could see some ducks on the water! *Shhh, got to sneak.* Down on our bellies, we made the big sneak. Finally, we were right behind the rushes, almost to the water. Good range. We eased up,



guns ready — and stared in amazement at our own decoys! You bet — one big circle. At least it wasn't a long walk back!

We did get better. My first duck call was an old tin mason jar lid. A small stove bolt dragged across the edge, making a sound that satisfied us. Didn't do much for the ducks, but then one day when we were sitting in our blind eating lunch, Rogene stiffened and reached for his gun. We were both starring down our gun barrels at what we thought was a duck. Suddenly it sank, straight down! It was our first look at a Pied-bill grebe. "Hell diver" it is commonly called. We probably couldn't have hit it anyway because they dive so fast, but it is a good thing we didn't shoot because they are a protected species.

Grandpa English used to laugh so at us that we quit telling about our adventures of learning how to hunt ducks. Grandma English always had homemade cookies and hot chocolate waiting when we got back.

I remember setting a sack of heavy old wooden decoys beside the blind and forgetting to go back after them until spring. The high water got them and it makes me sick to think about that now. I started to collect them after I started to work as a warden. I needed something to keep the "customers" busy when they stopped by my house for licenses, etc. It gave them something to look at while I finished with someone else. I started out trying to collect a hen and drake of all kinds of decoys. This got to be too much, so I limited it to old wooden ones. Back in those days, you could buy them for fifty cents or they would give them to you just to get rid of them. I was given a lot of them over the years and have a fair collection. There are lots of memories there. I started putting the history (if known) of former owners, where hunted, etc., on a plate on the bottom. Makes it more interesting, but that's another story. Maybe next time...

Tapping A Different Crop in Carroll County

By Raymond R. Anderson
Photo by Ron Johnson

In the cornfields of southwest Carroll County, just outside the town of Halbur, an unfamiliar object has "taken root." Rising 180 feet above the ground on the farm of Edward and Marie Eischeid, stands the derrick of the Grace #14 drilling rig, the largest rig ever to operate in Iowa. Anchored by this towering structure, a rotating drill bit is churning deeper into the ground beneath the cornfields probing for a much different "crop" — petroleum.

continued

The drilling, which will cost an estimated $4 million, is being conducted by the AMOCO Production Company as a part of their exploration of one of the last major, untested, potential petroleum provinces in the continental United States, the Midcontinent Rift Zone. Drilling of the M.G. Eischeid #1 oil test began in March 1987 and is scheduled to continue to a depth of about 15,000 feet. The deepest hole previously drilled in Iowa was the Wilson #1 oil test drilled in Page County in 1930 to a depth of 5,305 feet.

The geological feature that AMOCO is exploring, the Midcontinent Rift Zone, is a fracture in the earth's crust that occurred in response to a collision between the continents of North America, Europe and Africa about one billion years ago. This rift extends from central Lake Superior, southwest across Wisconsin, Minnesota, Iowa and Nebraska into central Kansas, a total of about 1,000 miles.

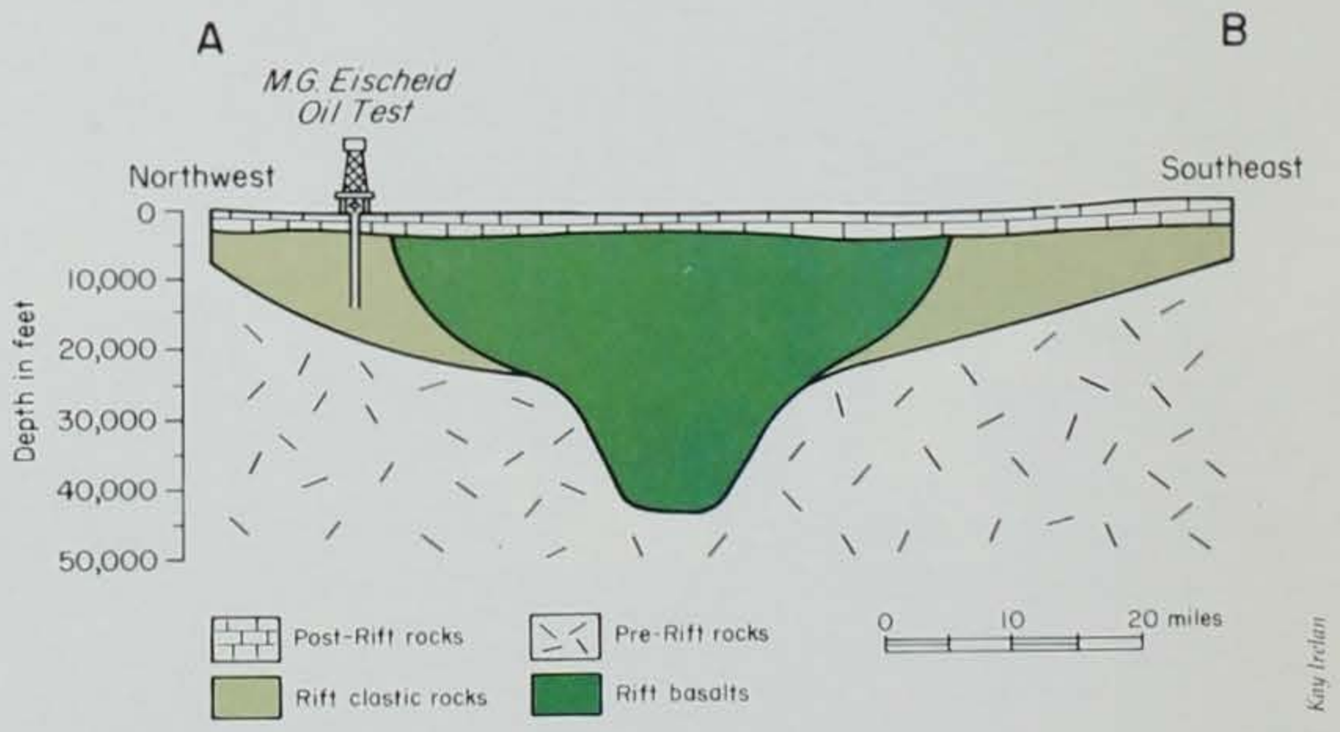
In Iowa, the rift ranges from about 50 to 120 miles wide, and includes a central horst (uplifted block) of basalt (black volcanic rock, typically found on ocean islands such as Hawaii). This core of uplifted basalt is flanked by deep basins filled with clastic rocks (sandstones, siltstones and shales) deposited in river systems and lake environments that were present in the area, also about one billion years ago. These ancient rift rocks are covered by younger sedimentary rocks and glacial deposits, and lie buried 1,000 to 5,000 feet below Iowa's land surface. The clastic rocks which fill the flanking basins are the potential reservoirs for billions of barrels of petroleum (oil and gas). The AMOCO oil test is exploring the northern end of one of these major basins where the clastic rocks thicken, along a feature referred to as the Defiance Basin.

The first hint that petroleum deposits may exist along the Midcontinent Rift Zone came with the discovery of oil seeping from the ceiling of a copper mine on the Upper Peninsula of Michigan. Tests on the oil indicated that it came from the billion-year-old rocks that were being mined. Exhaustive studies of rock samples collected during the drilling of earlier, shallow petroleum tests and water wells along the rift were initiated by a number of exploration companies. Sources of geophysical information along the feature, such as maps which depict variations in the earth's gravity and magnetic fields, were also examined.

These studies were followed by the acquisition of an extensive series of deep seismic profiles of the rift zone. The profiles were compiled by exploration companies using a geophysical technique known as "vibroseis." Large, truck-mounted vibrators served as the signal sources which sent low-frequency sound waves deep into the earth. The sound waves reflected off the various rock units they encountered, and returned to the surface where they were picked up and recorded by thousands of sensitive microphones called geophones. Hundreds of hours of computer time were required to transform these recorded signals into useful seismic profiles. The profiles have provided geologists with an important two-dimensional picture of the deeply buried rock strata and its geometric configuration. Profiles have indicated places where oil may be trapped, but do not show where oil is. Exploration companies have generated about 5,000 miles of these seismic profiles in Iowa; AMOCO alone has generated 1,650 miles of this data.

Following this preliminary data gathering, those areas that exploration geologists think are most promising for potential petroleum resources are then leased from landowners. Leases give the exploration company the exclusive right to explore for and produce petroleum on the leased land for the term of lease. Because of the high risk of this venture, the landowner is typically paid $1 per acre per year for the land under lease. (Larger payments are made in areas of the country where the uncertainties are fewer.) In addition, the owner is promised one-eighth of all petroleum revenues produced from the land, and is guaranteed that any land disturbed during the exploration process will be restored, and compensation made for any crop damage. These leases are usually ten-year, renewable agreements. It is estimated that about five million acres of Iowa land have been leased as a part of the exploration of the Midcontinent Rift Zone, with AMOCO holding about 827,000 acres under lease.

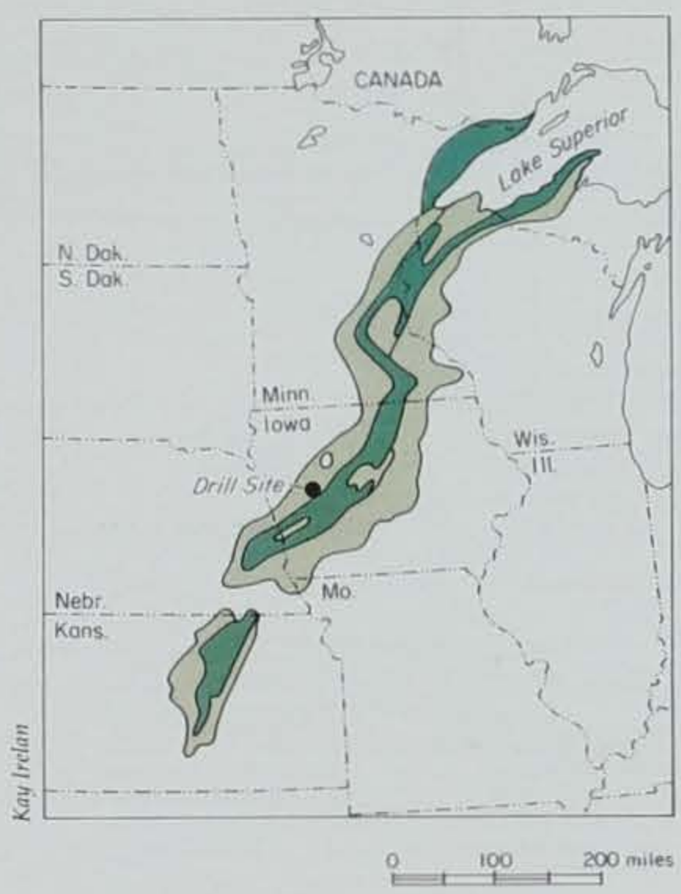
The M.G. Eischeid well is only the second hole drilled to investigate the oil potential of the Midcontinent Rift Zone. (The first



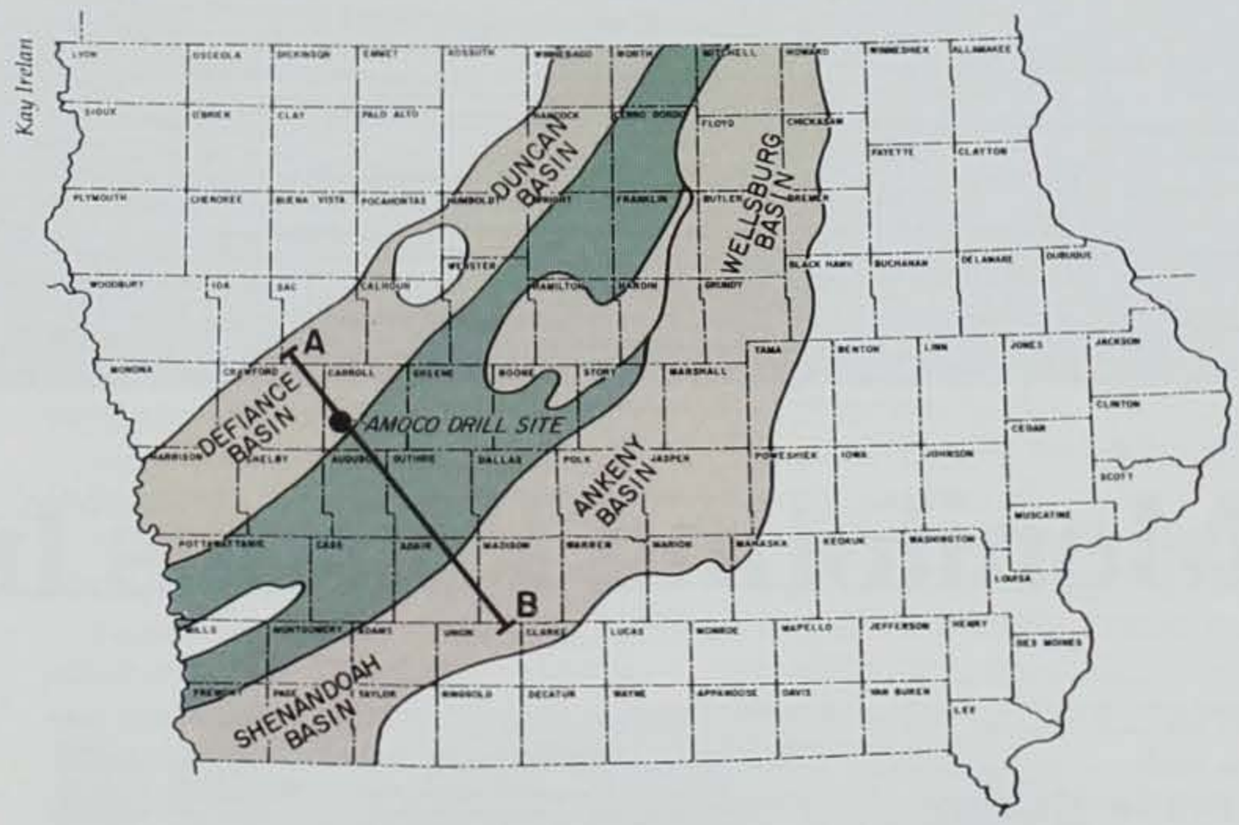
The selection of a site for test drilling is aided by subsurface profiles of the Midcontinent Rift Zone compiled from seismic data, well logs, and gravity and magnetic data. The extent of this cross-sectional view is marked by the heavy line "A-B" in Figure 2.

test was drilled by Texaco in northeastern Kansas in 1984, but all information from the test remains confidential.) The Iowa well is of great interest to the petroleum industry because it is penetrating a rock sequence which is much different than rocks from which petroleum usually is produced. The potential source rocks (organic-rich rocks which might have generated petroleum) are about one billion years old, much older than traditional source rocks which are usually less than 500 million years. Additionally, these potential source rocks originated in river and lake environments, whereas most petroleum is derived from rock that formed in oceanic environments.

Susan Landon, a site geologist for AMOCO Production Company, described the Eischeid well as the most significant oil well presently being drilled in the United States, and maybe even in the world. Information gained by AMOCO from drilling this well will initially be held confidential, but rock samples, well logs and other information will be turned over to the Geological Survey Bureau and will be available for public inspection at the conclusion of the confidentiality period. While AMOCO estimated the possibility of encountering economic deposits of petroleum in the Eischeid well at only about two chances in 100, there is still the possibility of discovery of a major new oil field. If the AMOCO long shot is successful and significant petroleum deposits are discovered, Iowa could become a major petroleum-producing state. The increased exploration and drilling activity, and the addition of petroleum revenues would provide a valuable boost to the state's economy and a rather unconventional diversity to the state's traditional agricultural base.



The Midcontinent Rift Zone is an ancient geologic feature that developed from a fracture in the earth's crust about one billion years ago. The rocks which compose this feature are exposed to view in the Lake Superior area, but are deeply buried by younger geologic deposits in Iowa. The goal of the deep, exploratory well in Carroll County is to test this area for potential petroleum resources. Figure 1.



This map shows the distribution of the Precambrian-age "basement" rocks which form the Iowa portion of the central rift (green) and the adjoining sedimentary basins (tan). Land-leasing activity by petroleum companies is concentrated within counties underlain by these rocks. Figure 2.

Raymond R. Anderson is the supervisor for geological and mineral resources in Iowa City. He holds an M.A. in geology from the University of Iowa. He has been with the department for 17 years.

DNR Photo

Monitoring Poisons In The Air

By John Vedder

The DNR has air monitors such as these located in Des Moines that check the amount and kinds of toxins in the air.

Ron Johnson

AIR POLLUTION HAS BEEN MONITORED IN IOWA FOR THE PAST 30 YEARS. For the first ten years, the federal government managed the operation through a small scale monitoring network. This network included sites in Cedar Rapids, Davenport, Des Moines, Dubuque and Waterloo.

During the 1960s, the increasingly harmful effects of uncontrolled pollution became a national issue. In response, state and federal governments greatly increased their efforts to protect the environment. This effort included the collection of more information about the location and seriousness of pollution problems. As a result, the air monitoring net-

work was expanded to a statewide system in the early 1970s.

The Iowa air monitoring network measures the six most common types of air pollution. These "criteria pollutants" are particulate (dust), sulfur dioxide, carbon monoxide, ozone, nitrogen dioxide and lead. "Criteria pollutant" means that the Environmental Protection Agency (EPA) has set allowable pollution levels, called monitoring standards, for the pollutant. This includes at least one primary standard, and in some cases a secondary standard. Pollution levels below the primary standards should not cause harm to public health. Pollution levels below the secondary standard should have little impact on public welfare. Keeping air pollution levels below these standards is one of the main goals of the air quality regulatory efforts.

Particulate Monitoring

Particulate air pollution is caused by many sources and occurs throughout the state. High particulate pollution levels tend to occur around industrial areas and urban centers, and urban particulate is usually more contaminated with toxic components than in rural areas. Therefore, most of the particulate monitor sites are in the potential problem areas of our larger cities. Some other locations are monitored to indicate how far below air pollution levels are, compared to the rest of the state. These monitoring stations include a site in Backbone State Park as well as sites in some rural communities.

Considerable effort is made to control particulate in the state, partly because several urban areas have monitoring values above the primary or secondary standards. Some of this effort may be reduced because of a technical improvement in the particulate monitoring method. Prior to this summer, the standard was based on total suspended particulate (TSP), which includes up to 30 micron-sized particulate (for scale, the dot in the "i" is about 300 microns in diameter). However, only particulate below 10 microns in size is small enough to harm human health.

The new monitoring method for fine particulate (PM-10) only measures particles up to 10 microns in size. For the past two years, PM-10 monitors have been operated in areas which continue to show violations of the old TSP standards. These PM-10 monitors have shown no violations of the newly adopted PM-10 health standard. As suspected, this indicates that past TSP monitoring has overstated the health threat of particulate air pollution in Iowa.

Sulfur Dioxide Monitoring

In Iowa, most sulfur dioxide (SO2) air pollution comes from the burning of coal and oil, either in power plants or as part of an industrial process. Some of these sources, which include electrical utilities and some large industries, have the potential to cause violations of the 24-hour SO2 health standard. The SO2 monitoring sites are in some of these expected problem locations.

At most of these sites, monitoring has not shown SO2 pollution levels above the standards. However, there are two exceptions. The first of these occurred when an SO2 site was established in 1984 to monitor the impact of coal-burning emissions from a source in Keokuk. In this case, high pollution values were immediately recorded, including seven violations of the 24-hour SO2 health standard in 1984. These high SO2 pollution levels stopped early in 1985 after the source switched to a lower sulfur coal.

The second of these exceptions occurred when an SO2 site was established in 1985 to monitor the impact of coal-burning emissions from a source in Clinton. Once again, high pollution values were immediately recorded, including frequent violations of the 24-hour SO2 health standard. However, this time the problem did not stop or appear to improve after the source switched to a lower sulfur coal. Further analysis indicated that the industrial processes at this plant have the potential to cause locally high SO2 pollution levels. In response, the company has been developing, and will soon use, a strategy to reduce the SO2 emissions from these processes.

Because of these two recently confirmed SO2 air pollution problems, monitoring is being planned for other potential SO2 problem areas.

Other Monitoring

Serious air pollution problems with ozone and carbon monoxide (CO) still plague large cities such as Los Angeles and Denver. Fortunately, because of its rural environment and relatively flat land, Iowa has not had much of a problem with these pollutants. Ozone monitoring in our three largest urban areas last showed a violation of the current ozone standard in 1980. Des Moines, the area most likely to have high CO pollution levels, has not shown a standard violation since the downtown monitor was moved to a new location in 1984. Monitoring will continue in these areas because pollution levels are occasionally close to exceeding the standards at some monitor sites.

The gradual switch to no-lead motor fuels was expected to eliminate the main potential cause of high lead air pollution levels in Iowa. This has been confirmed by low monitoring values at expected worst-case traffic-related monitor sites. Because of these low values, the removal of most of the lead monitor sites is being considered.

The state has never found evidence of high nitrogen dioxide (NO2) air pollution levels. Therefore, NO2 monitoring is conducted mainly to provide data to EPA for national trend analysis.

Although Iowa only monitors the "criteria pollutants," we expect to add the capability to monitor less common types of air pollution. This new effort will be part of the increasing national interest in potential problems with "air toxics." Because of the type of industry and economic activity in Iowa, we expect that the need for this kind of monitoring will be limited to a few areas.

John Vedder is an environmental specialist. He has been with the department for 11 years.

CALENDAR

September

Sept. 2	Evening Prairie Walk	Jackson County Hamilton's Prairie Maquoketa (319) 652-3783
Sept. 2	Roadside Ramble 2:00 p.m.	Wright County Eagle Grove Library (515) 532-3185
Sept. 4	Champion Trees Display and Slide Program 8:30 p.m.	Polk County Thomas Mitchell Park Mitchellville (515) 967-4889
Sept. 5	Full Moon/Little Eyes are Watching 9:00 p.m.	Story County McFarland Park Ames (515) 232-2516
Sept. 5	Campground Program 6:00 p.m.	Jackson County Spruce Creek Park Bellevue (319) 652-3783
Sept. 5	Trees of Iowa 2:00 p.m.	Mahaska County Russell Wildlife Nature Center (515) 673-9327
Sept. 5	Champion Trees Display and Slide Program 8:30 p.m.	Polk County Jester Park Granger (515) 999-2559
Sept. 5-6	Movies	Carroll County Swan Lake State Park (712) 792-4614
Sept. 6	Champion Trees Display and Slide Program 8:30 p.m.	Polk County Yellow Banks Park Pleasant Hill (515) 266-1563
Sept. 6	House Concert Dave Moore 2:00 p.m.	Clinton County Eagle Point Nature Center Clinton (319) 847-7202
Sept. 6	Iowa's Prairie Heritage 2:00 p.m.	Carroll County Swan Lake State Park (712) 792-4614
Sept. 6-20	Prairie Heritage Week Painting Display	Harrison County (712) 642-2114
Sept. 10	Harvest Moon Hike	Mahaska County Russell Wildlife Nature Center (515) 673-9327
Sept. 11	Sunset Hike	Webster County Chilren's Forest Kennedy Park (515) 576-4258
Sept. 11-13	Prairie Heritage Celebration	Marshall County Iowa Veteran's Home Marshalltown (515) 753-4306
Sept. 12	Hypothermia Seminar 1:00 p.m. - 3:00 p.m.	Jackson County Spruce Creek Park Bellevue (319) 652-3783
Sept. 12	Monarch Migrations 2:00 p.m	Story County Doolittle Prairie Story City (515) 232-2516
Sept. 12	Help Tag Migrating Monarchs, Shelter #4 10:00 a.m. - 2:00 p.m.	Polk County Easter Lake Park Des Moines (515) 285-7612
Sept. 12	Prairie Seed Gathering 1:00 p.m. - 3:00 p.m.	Palo Alto County (712) 837-4866
Sept. 12, 13	Wood Crafts 10:00 a.m.	Page County Pioneer Park (712) 542-3864
Sept. 12-19	Clay County Fair	Clay County (712) 262-4740
Sept. 13	Hopeville Rural Music Reunion	Clarke County Hopeville Park (515) 342-3960
Sept. 13	Seed Harvest 2:00 p.m.	Story County Doolittle Prairie Story City (515) 232-2516
Sept. 13	8th Annual Pioneer Craft Fair 12:00 noon - 5:00 p.m.	Grundy County Grundy County Museum Morrison (319) 345-2688
Sept. 13	Winemaking	Winneshiek County Lake Meyer Nature Center (319) 534-7145
Sept. 15/ Oct. 20	"Nature Night at the Movies" 7:00 p.m.	Webster County Kennedy Park Recreation Center (515) 576-4258
Sept. 17	Help Tag Migrating Monarchs 4:00 p.m. to sunset	Polk County Fort Des Moines Park Des Moines (515) 999-2557
Sept. 18-20	Briggs Woods Rendezvous	Hamilton County Briggs Woods Park Webster City (515) 832-1994
Sept. 19	Prairie Walk 2:00 p.m.	Plymouth County Five Ridge Prairie Preserve (712) 947-4270
Sept. 19	Fall River Float 1:30 p.m.	Carroll County North Raccoon River (712) 792-4614
Sept. 19	Lessons from the Past 2:00 p.m.	Story County Doolittle Prairie Story City (515) 232-2516
Sept. 19	Monarchs on the Move 9:00 a.m.	Wright County Lake Cornelia Park Clarion (515) 532-3185
Sept. 19-20	Log Cabin Days	Harrison County (712) 642-2114
Sept. 20	Bow Hunter's Clinic	Jackson County Izaak Walton League Clubhouse Maquoketa (319) 652-3783
Sept. 20	Prehistoric Cultures	Winneshiek County Lake Meyer Nature Center (319) 534-7145
Sept. 20	Puffball Rally (Mushroom Hunt) - 1:30 p.m.	Carroll County (712) 792-4614
Sept. 20	House Concert Dave Moore 7:00 p.m.	Clinton County Eagle Point Nature Center Clinton (319) 847-7202
Sept. 26	Star Party/Autumn Skies 8:30 p.m.	Story County McFarland Park Ames (515) 232-2516
Sept. 27	Trees in Autumn	Winneshiek County Lake Meyer Nature Center (319) 534-7145

October

Oct. 2-4	ICEC Workshop	Guthrie County Conservation Education Center (515) 747-8383
Oct. 3	Falls Migration Watch 7:00 a.m.	Carroll County Swan Lake State Park (712) 792-4614
Oct. 3	Birds - Seed and Feed 2:00 p.m	Mahaska County Russell Wildlife Nature Center (515) 673-9327
Oct. 4	Movies	Winneshiek County Lake Meyer Nature Center (319) 534-7145
Oct. 5	Winter Birdfeeding 7:00 p.m.	Palo Alto County Iowa Lake Community College Emmetsburg (712) 837-4866
Oct. 8	House Concert Jim Kennedy 7:00 p.m.	Clinton County Eagle Point Nature Center Clinton (319) 847-7202
Oct. 9-11	Eden Valley Rendezvous and Music Festival	Clinton County Eden Valley Refuge Clinton (319) 847-7202
Oct. 10	Indians of Iowa 2:00 p.m.	Mahaska County Russell Wildlife Nature Center (515) 673-9327
Oct. 10	Fall Bicycle Ride Cinder Path Trail	Clarke County (515) 342-3960
Oct. 10	Full Moon Walk 7:30 p.m.	Plymouth County Hillview Park (712) 947-4270
Oct. 10	Trapper's Clinic	Jackson County Spruce Creek Park Bellevue (319) 652-3783
Oct. 10	Hike Though Fallow Marsh	Palo Alto County (712) 837-4866
Oct. 11	Canoe Float	Jackson County Maquoketa River (319) 652-3783
Oct. 11	Seed Harvest 2:00 p.m.	Story County Doolittle Prairie Story City (515) 232-2516
Oct. 15	Evening Color Hike 6:00 p.m.	Polk County Yellow Banks Park (515) 999-2557
Oct. 16-18	Camp EWALU Fall Workshop	Buchanan County (319) 636-2617
Oct. 17	Prairie Walk 10:00 a.m.	Plymouth County Five Ridge Prairie Preserve (712) 947-4270
Oct. 17	Trapper Safety	Mahaska County Russell Wildlife Nature Center (515) 673-9327
Oct. 18	Woodland Nature Hike 1:30 p.m.	Carroll County (712) 792-4614
Oct. 20	Orionid Meteor Watch 5:00 a.m.	Carroll County Swan Lake State Park (712) 792-4614
Oct. 23	Halloween Hike 7:00 p.m.	Clinton County Eden Valley Refuge (319) 847-7202
Oct. 24	Weather Folklore 2:00 p.m.	Mahaska County Russell Wildlife Nature Center (515) 673-9327
Oct. 24	Halloween Hike	Hamilton County Briggs Woods Park (515) 832-1994
Oct. 24	Halloween Hike	Wright County Lake Cornelia Park Clarion (515) 532-3185
Oct. 25-26	Halloween Hike 7:00 p.m.	Palo Alto County Lost Island-Huston Park (712) 837-4866
Oct. 29	House Concert Dalia Goldstein 7:00 p.m.	Clinton County Eagle Point Nature Center (319) 847-7202
Oct. 31	Cemetery Hike 2:00 p.m.	Mahaska County Russell Wildlife Nature Center (515) 673-9327

September

S	M	T	W	T	F	S
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October

S	M	T	W	T	F	S
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Ron Johnson

Environmental Education — Nurturing the Future

By Dennis Carlson

Do you remember the first time you saw a butterfly emerge from its cocoon or felt the cool, dry skin of a snake? Who taught you how to hunt for squirrels on a crisp fall day or morels on a spring morning? How did you learn the names of Iowa's woodland wildflowers or prairie grasses? Was it your grandfather or mother or schoolteacher who walked with you to teach you? Was it your own sense of wonder and curiosity that urged you to explore?

Many of us are fortunate to understand and appreciate the many wonders of nature through our own experiences in the outdoors and our involvement with special people who take the time to show us how wonderful and diverse nature is throughout the year.

However, with today's increasing concern about our limited natural resources and more people living in an urban setting, many of our young people have not and will not get the opportunity to learn about our natural environment and how vital it is to our survival and quality of life. That's why it's important that all people, especially our young people, have the opportunity to understand, appreciate and get involved in the future of our natural world.

This understanding and involvement is known as environmental education and has become an area of increasing importance to the programs of Iowa's 98 county conservation boards. These programs range the spectrum from full-time naturalists who devote 100 percent of their time to environmental education programs to rangers who host an evening program for park users during the summer. These programs may involve residents of all age groups and activities of all kinds — from bird feeding stations at the senior citizen home to insect studies with preschool classes.

Environmental education programs may take place in many settings — from school field trips to church summer camps to an evening walk in the woods. The important thing is that the programs help people understand the workings of the natural world so that we may wisely use and enjoy our environment without destroying it for future generations.

As we hear more each day about concerns for water and air quality, wildlife populations and hunter ethics, it becomes more urgent to provide opportunities for everyone to understand, appreciate and get involved in the future of our natural world. Environmental education is the key to that future.

Why not encourage your schools, your community and your children to become involved and informed about the great outdoors we call Iowa. Take advantage of the environmental education programs sponsored by your county conservation board. Let your sense of wonder and curiosity lead you. And let someone show you how we can all help keep Iowa a great place to live — now and into the future.

Dennis Carlson is the director of the Franklin County Conservation Board.

The September D

What began as an experiment has since changed

...most duck seasons...are designed to allow a maximum number of hunters to bag the greatest number of ducks while having the least effect on long-term waterfowl populations. To achieve these goals simultaneously would be to attain the perfect duck season.

Duck Season

the complexion of Iowa duck hunting.

Text and photos by Lowell Washburn

Few wildlife management decisions are more profoundly complex, potentially controversial or the subject of more politics than are the setting of hunting regulations for waterfowl. Hunters have been the backbone of waterfowl conservation and represent a highly motivated and often outspoken group of recreationalists who take their sport more than a little bit seriously. At times, the individual preferences of the duck hunters themselves seem almost as varied as the birds they pursue, and determining exactly what is best for both ducks and duck hunters becomes a task of dynamic proportions.

When boiled down to their basic components, most duck seasons, regardless of where they are held, are designed to allow a maximum number of hunters to bag the greatest number of ducks while having the least effect on long-term waterfowl populations. To achieve these goals simultaneously would be to attain the perfect duck season.

Over the years, Iowa's veteran duck hunters have had the opportunity to sample just about every combination of season dates imaginable. There have been long seasons, short seasons, straight seasons and splits. Some combinations have been good. Some not so good.

But just about the time the state's waterfowlers had thought they had seen it all, yet another heretofore untested set of season dates were begun as a three-year experiment in 1979. This marked the beginning of Iowa's September duck season which has been held for the past eight years.

Essentially all the experiment did was to change the first segment of the traditional split duck season. Instead of having the season commence during October, it called for the first five days of hunting to take place in September. At a glance, such a change may indeed seem trivial. However, over the long haul it has proven to be just the opposite and has in fact changed the entire complexion of Iowa duck hunting.

According to state waterfowl biologist, Jim Hansen, much of the experimental season's success has hinged largely upon a single species — the blue-winged teal. The speedy blue-wing is the most abundant duck to nest in Iowa and is also the one least affected by gunning pressure. But wherever it occurs, the blue-wing is the very first duck to depart the breeding grounds, and peak numbers pass through Iowa during August and September.

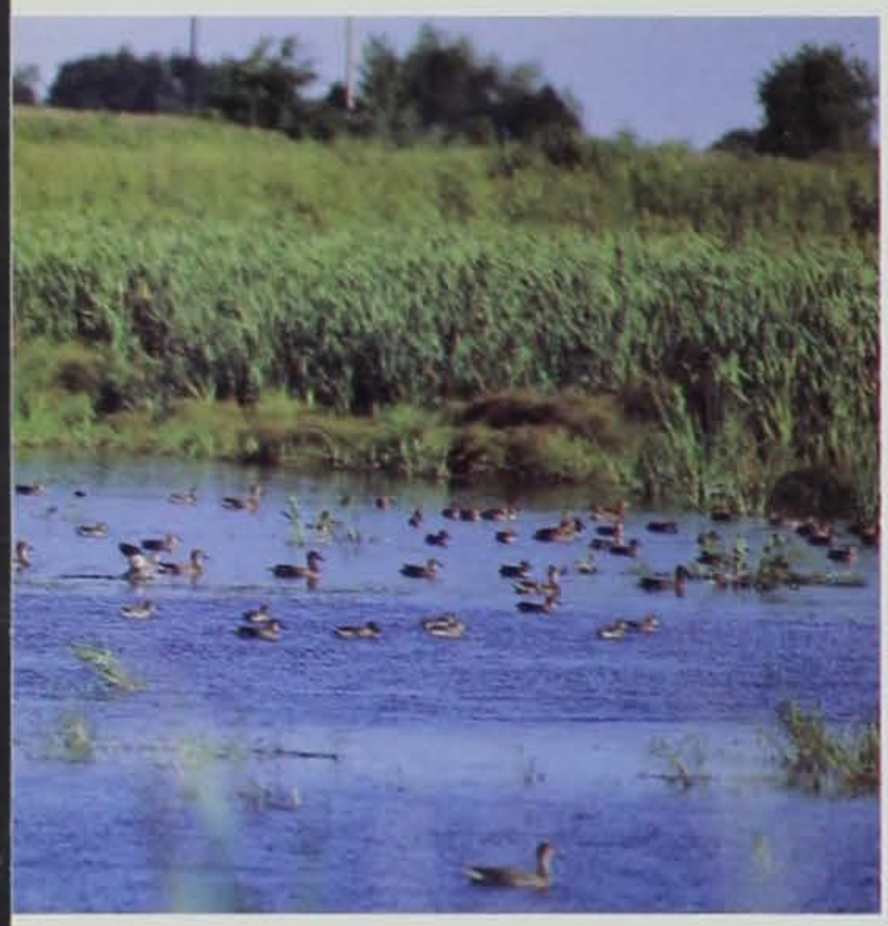
Traditionally, by the time the season opened in October, most teal were already south of Iowa — an undesirable situation that left local populations of mallards and wood ducks to absorb the brunt of opening weekend shooting pressure. Consequently, a good share of the logic behind the September season was to redirect some of that pressure toward teal.

"It was hoped that the blue-wings, through their abundance and willingness to decoy, would provide something of a buffering effect for those other species, while at the same time increase the total bag," said Hansen.

Seasoned waterfowlers were already aware that the idea of redirecting hunting pressure toward teal was not new. During the 1960s, the state staged a series of special teal-only hunting seasons. But in spite of the fact that these seasons were extremely popular with hunters, they were discontinued after four years. Improper identification had resulted in a substantial number of protected species being killed. Since only teal were legal game, the others were left in the field.

In the wake of Iowa's teal seasons, biologists continued to wrestle with ideas of how to tap the tremendous recreational resource the birds represented. In order to fully exploit the potential, teal would have to be hunted during September. It also seemed logical that in order to avoid the old problems of misidentification and waste, any early hunting season would have to be included as part of the regular duck season with all species becoming legal game.

Once it was determined that Iowa would conduct such a season on an experimental three-year basis, a number of monitoring devices were established to help the DNR and the U.S. Fish and Wildlife Service evaluate any changes in the harvest of blue-winged teal as well as to document the impact on other species, especially wood ducks.



The DNR conducted scheduled parking lot bag checks during the experiment, while the Fish and Wildlife Service surveyed hunters through mail questionnaires. The DNR also conducted large-scale bird banding operations with a major emphasis on wood ducks — the species considered most likely to suffer from early hunting. Over 20,000 wood ducks were banded in Iowa from 1972 through 1983.

There probably couldn't have been a better year to launch the experimental seasons than 1979. It had been a wet year and habitat conditions were ideal. Marshes were at crest, backwaters flooded, and sheet water ponds lay everywhere. Duck production had been good throughout the prairies, and when the shooting started, the birds rose like clouds of insects. For many sportsmen, it was like turning the clock back 50 years. Teal were 10-point ducks then, and many hunters told of limiting out by the time the sun had cleared the horizon.

Although there may never be another duck season quite like 1979, the combined results of those first three years have been consistent with information gathered during subsequent years. First of all, the early seasons have been extremely successful in allowing Iowans to harvest an increased number of ducks. In fact, during a typical September season the total average bag has been as high as 20,000 ducks per day, a figure which far exceeds any other period including the peak migration periods in October and November.

As anticipated, blue-winged teal have made up a large percentage of that harvest, and federal harvest data indicates that the take has increased 73 percent. It might also amaze some hunters to learn that the total take of mallards during the September season is also higher than during most of the second split season. The only notable exceptions occur during the peak of the mallard migration which occurs during the last week of October or first week of November. However, during the September period the total percentage of mallards harvested when compared to October openings, has declined slightly due to the availability of teal. Wood ducks have comprised about the same percentage of the harvest as they did prior to the September seasons.

Although local habitat conditions play an important role in the success of any waterfowl hunting, they are particularly crucial to the September season. It takes a lot of habitat to slow down migrating blue-wings, and peak concentrations occur in Iowa during years when there is an abundance of shallow, temporary sheet water ponds. Generally speaking, as the water goes, so goes the harvest of teal.

But regardless of what the habitat conditions may happen to be in a given year, Iowa's experimental seasons have never failed to draw a major segment of the state's duck hunters as is evidenced by the average daily bag.

"This has been expected," says Hansen, "since past surveys have shown that both ducks and duck hunters are more plentiful during the early portions of a hunting season. Mild, shirt-sleeve weather combined with the number of ducks available is simply too much for the average hunter to resist."

Even though most waterfowlers envision themselves as hard-core late season enthusiasts who sit with ice-laden mustaches guarding the last air hole of a frozen marsh, such scenes exist mainly in the mind's eye. Scheduled bag checks have revealed that the actual number of hunters taking advantage of such late season conditions are so few as to not even register. By contrast, there are more sportsmen afield during the early season than at any other time.

"The September season is also a big hit with Iowa's youngest hunters," notes Hansen. "Kids and teal make an unbeatable combination, and even the most inexperienced of hunters can expect some shooting during the early split. The days are still long and provide an opportunity for gunning the sunset flight after school. As frosting on the cake, a major migration of blue-wings usually occurs on at least one of the early season's weekdays."

But in spite of its obvious popularity, Iowa's early season has not been without its critics. Most of that criticism has come from dyed-in-the-wool mallard hunters who fail to recognize any other species. Some have dubbed it the "mosquito season" and claim that the insects are "bigger than the ducks." Most would prefer to see those hunting days attached to the end, rather than the beginning, of the hunting season. But since over 50 percent of the state's duck harvest consists of species other than mallards and since relatively few sportsmen continue hunting after freeze-up, DNR officials feel that to continue the September seasons is in the best interests of the majority of duck stamp purchasers. All available information shows it to be the season with the most ducks, the most hunters and the highest success. As a side benefit, it has managed to keep young people interested in and successful at duck hunting — even in an age when video games, football and a myriad of other activities compete for their leisure time. From a waterfowl management perspective, it has allowed Iowans to harvest more ducks with no measurable negative impacts to the resource.

Even though there is probably no such thing as the illusive perfect season, Iowa's September duck hunts come amazingly close.

Lowell Washburn is an information specialist located at Clear Lake. He has been with the department since 1984.

Ron Johnson

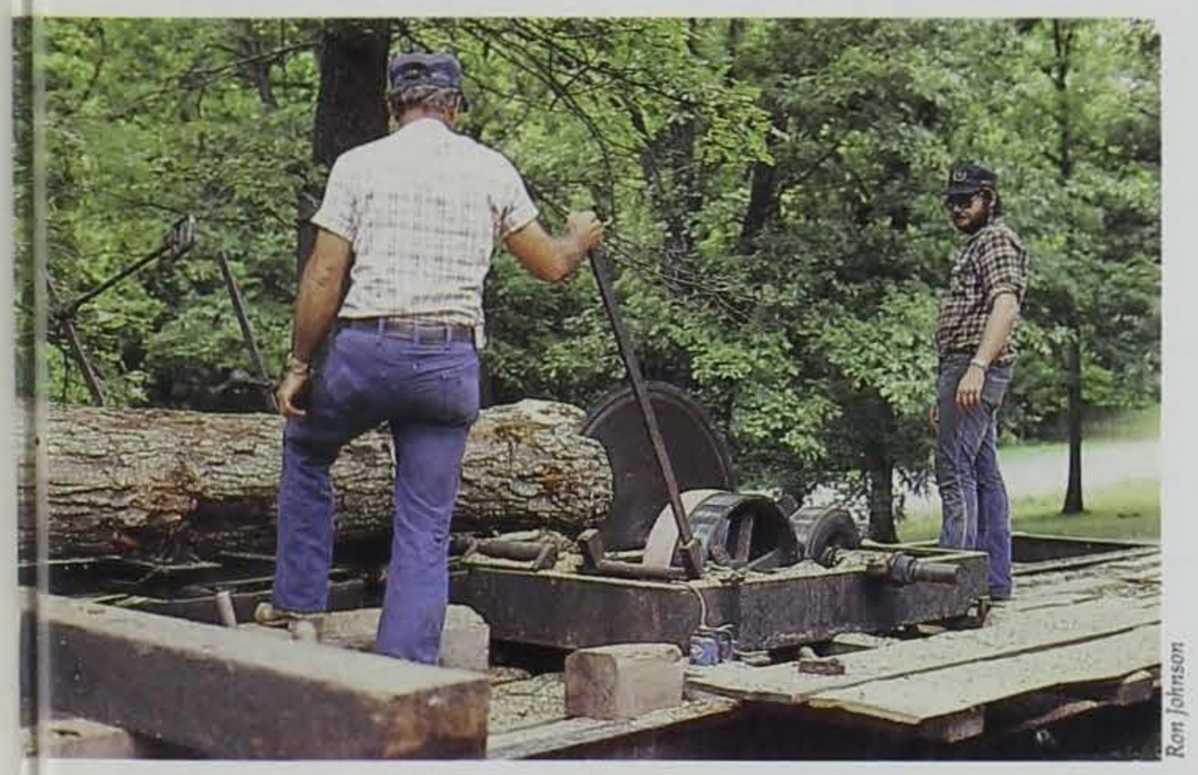
CRAFTS people from across the Midwest will once again be partaking in this year's Forest Crafts Festival being held October 10 and 11. Lacey-Keosauqua State Park, just south of Keosauqua in Van Buren County, is the site of the celebrated annual event.

Wood crafts will be on display and for sale. A sawmill, chain saw carvings and forestry and wildlife demonstrations will also be featured.

Held in conjunction with Keosauqua's Fall Festival of Colors, the purpose of the Forest Crafts Festival is to promote an awareness of the importance of Iowa's forest resources.

The festival is free to the public. Ample parking and free bus service to the park will be available at Keosauqua. The hours of the festival are from 10:00 a.m. to 6:00 p.m. on Saturday, and from 10:00 a.m. to 5:00 p.m. on Sunday. We look forward to seeing you!

1987 FOREST CRAFTS FESTIVAL
October 10-11



Ron Johnson

Ron Johnson

Any crop improvement program tries to reproduce desirable qualities. Tree improvement is no different. Because black walnut is Iowa's most valuable tree for timber production, our tree improvement efforts are aimed at producing superior walnut trees.

Iowa's tree improvement program is conducted by Jerry Grebasch, Department of Natural Resources' nursery manager, cooperating with area and district foresters of the DNR, and Archie Sparks of the Iowa Nut Growers Association.

The focus of Iowa's tree improvement efforts is vegetative reproduction of superior trees. The technique

Jerry Leonard

TREE IMPROVEMENT

By Jim Bulman

used is called "chip bud grafting" by which buds from desirable trees are grafted onto black walnut root stock. The method is quick and easy for the experienced grafter. This spring, Sparks and his companions completed 1700 grafts in a few days' time.

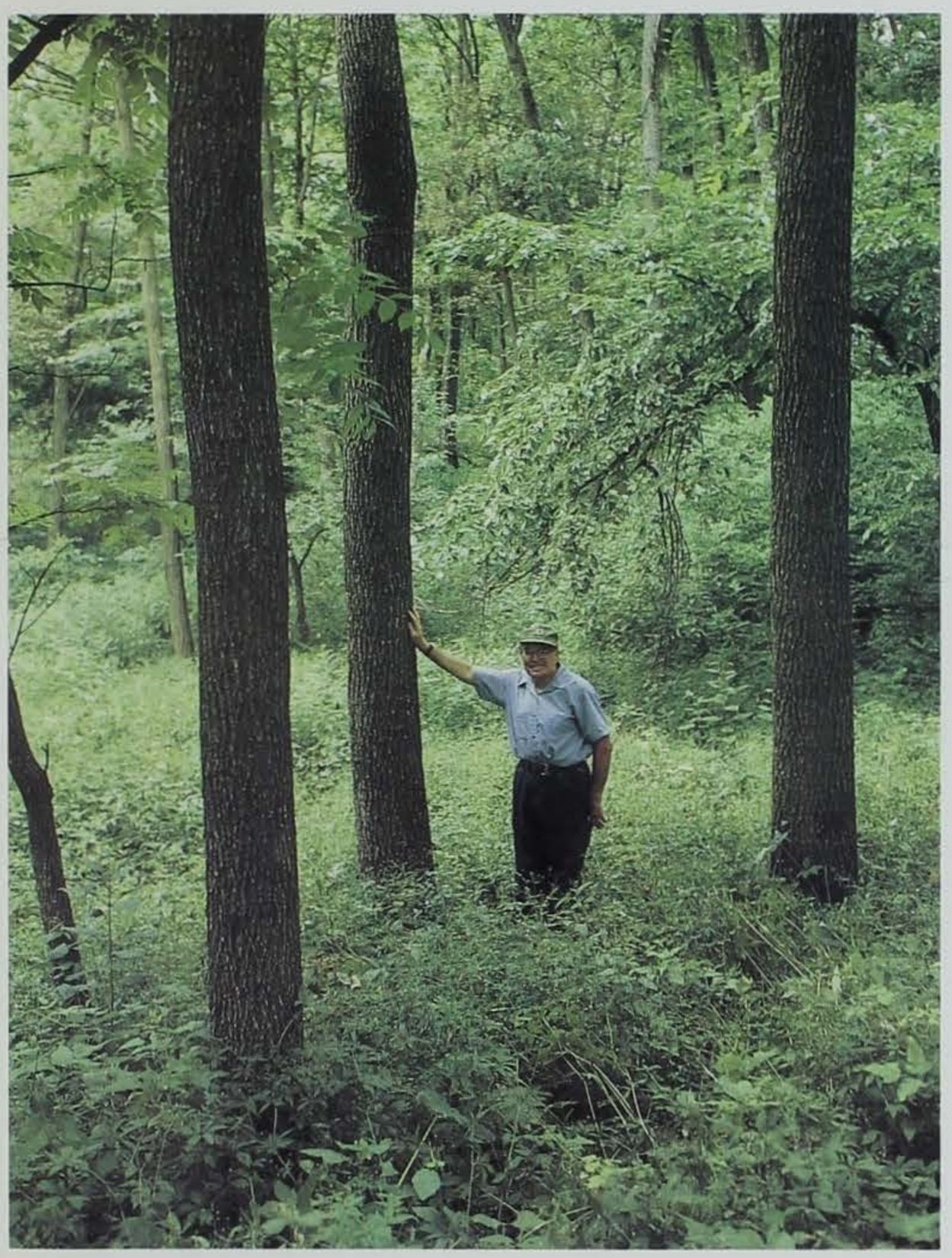
Buds to graft are collected from treetops in several different ways. Buds can be collected when trees are cut down, by climbing the tree or by shooting twigs out of treetops with a rifle. Buds must be on twigs that are growing vigorously. Collections are made in February and March.

An abundance of suitable buds may be lacking on certain trees. This is overcome by taking what buds are available and grafting them onto walnut saplings. For every graft that takes, there may be five or more new buds the following year.

Part of the tree improvement effort is to bring walnut progeny together from all over the state to Yellow River State Forest in Allamakee County. Here they can be evaluated, undesirable specimens thinned out, and the remainder used to produce seeds which should grow into trees of superior quality.

Ken Formanek

Jim Bulman is chief of the forest management bureau. He holds a B.S. degree in forestry from Iowa State University.

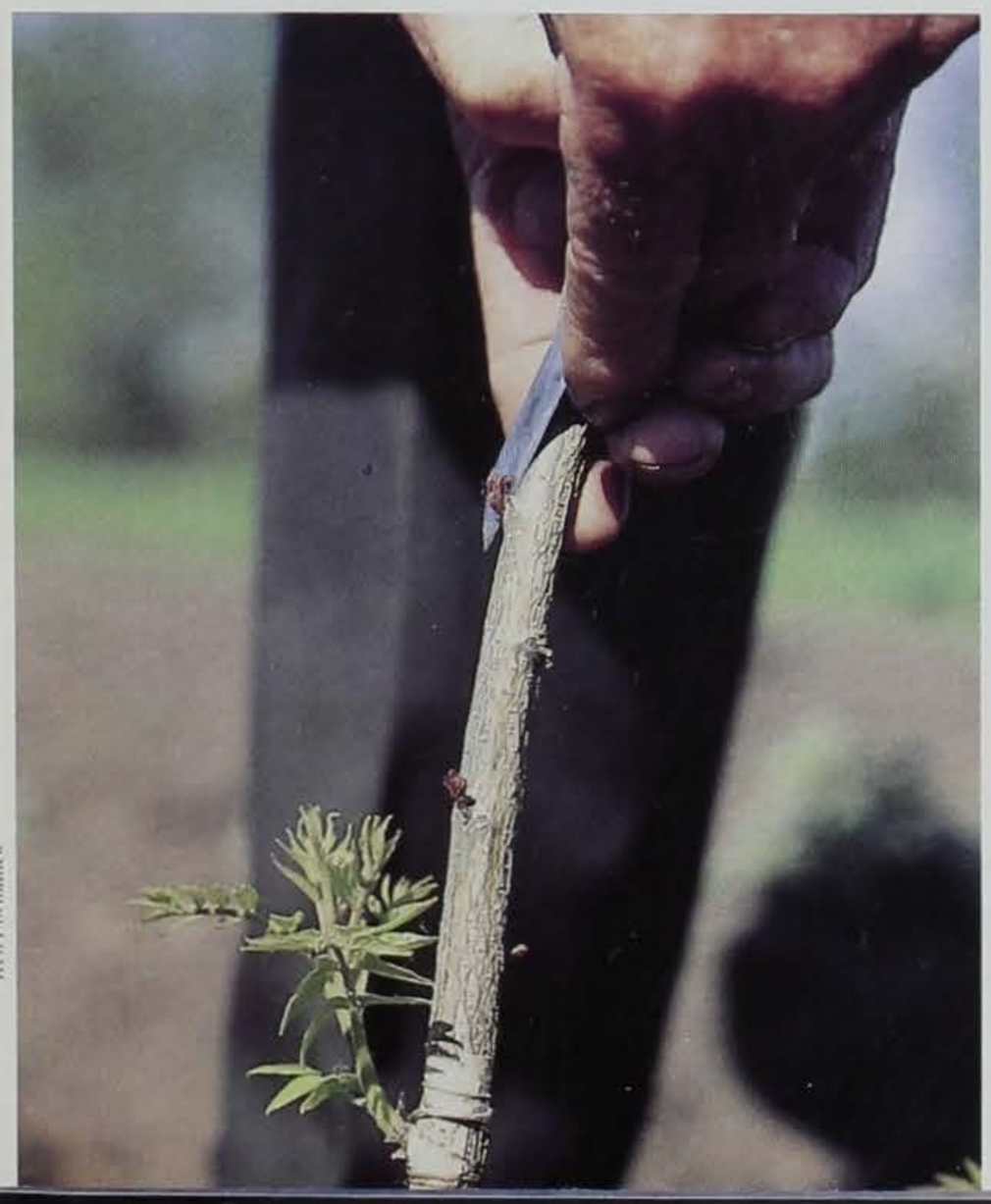


DNR Photo

A notch is cut in the walnut root stock seedling (below) and the bud is then grafted onto the seedling (below, center).

Ken Formanek

Ken Formanek



Ken Formanek

Ken Formanek

The seedling is taped to securely hold the bud in place (above). To stimulate growth of the individual bud, other buds are "cleaned" from the seedling (left).

Tree improvement of this kind help produce seed and superior quality trees.