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Iowa  
**CONSERVATIONIST**  
August 1989  
Department of Natural Resources

# Iowa CONSERVATIONIST

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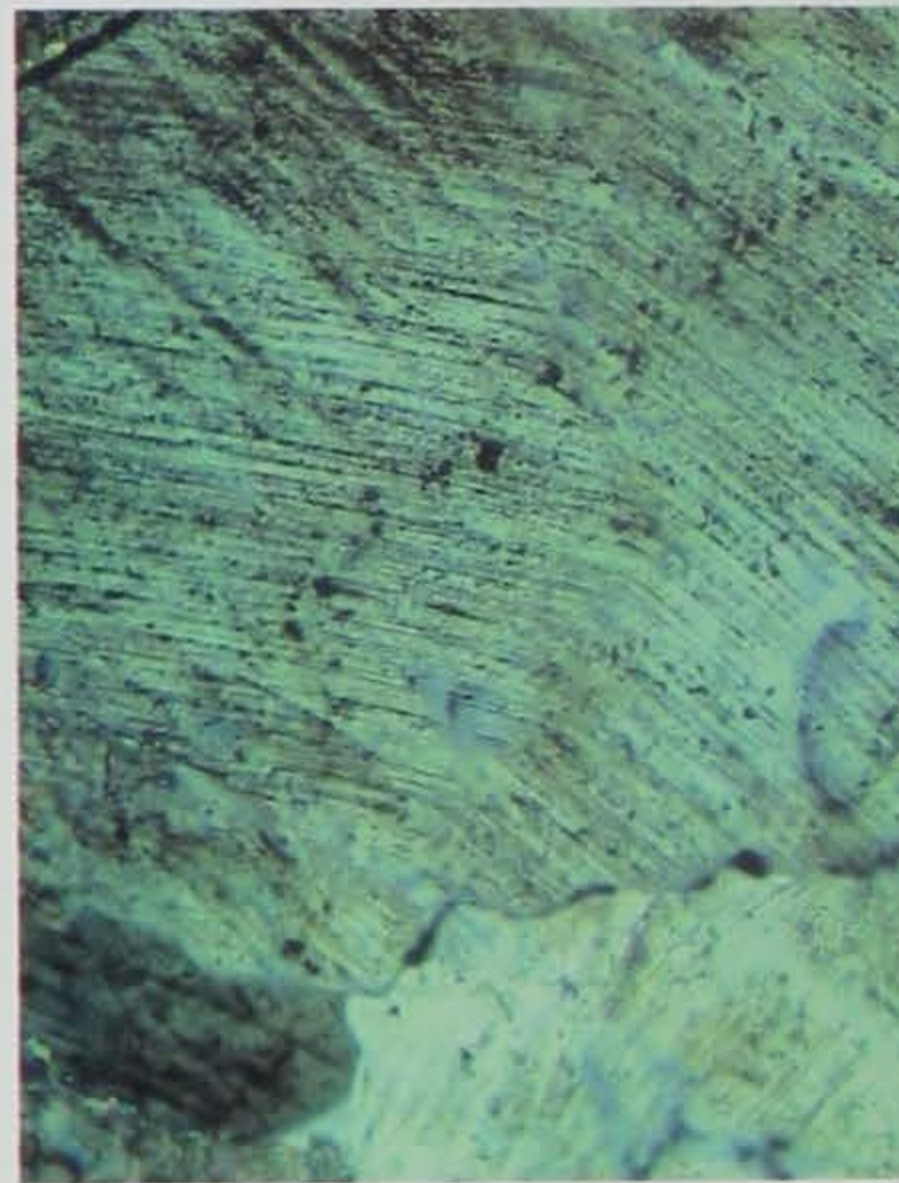
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# Environmental Management Program

## Refereeing the Struggle for the Mississippi River

by Kevin Szcodronski

You've heard and read about "it" before. "It's" mighty, but still constantly being tugged and yanked on from all directions. At a quick glance you would think "it" has plenty for everyone and everything. But that is not the case because demands are plentiful. Things are improving, however, particularly since Congress has taken specific action to help assure that no single group of users are allowed to dominate "it."

What is "it"? "It" is the mighty Mississippi River and the Congressional action is commonly called "EMP," which stands for the Upper Mississippi River Environmental Management Program.

### History

Let's go back through history a bit -- 82 years to be exact. In 1907 Congress decided that a six-foot channel needed to be maintained in the Mississippi River for steamboats to ship people and products. The Corps of Engineers responded by building wing dams throughout the river and reservoirs at the river's headwaters. The wing dams worked to concentrate water flows in mid-channel to keep it self-

scouring to six feet deep. The reservoirs captured spring snowmelts, and the water was later released during summer low-flow periods. This work aided steamboating, but navigation on the mighty river was still full of trials and tribulations.

In 1924, Congress again took action pertaining to the Mississippi River. This time it involved protecting wildlife and fish. Congress declared much of the Mississippi between St. Paul, Minnesota, and Davenport, Iowa, a national wildlife and fish refuge. How could Congress in good faith invest so dearly in a commercial navigation channel and also proclaim its natural values as a fish and wildlife area? For example, could migrating waterfowl get along during their annual journeys with increas-

ing numbers of riverboats around them? The answer is easy — the river is mighty and has plenty of resources to serve all potential users without serious confrontations — so it seemed.

Congress sent the Corps of Engineers back to work on the Mississippi River in the 1930s, just six years after the refuge designation. This time the Corps was directed to construct a nine-foot navigation channel in place of the six-foot channel. It seems that the trials and tribulations of riverboating were making too colorful of a history to be profitable. This work resulted in the locks and dams that are at least 50 years old today.

The navigation dams changed the river's ecology dramatically. While backing up water for the navigation channel, they also

created thousands of acres of lakes and marshes. In fact, water surface area tripled when the dams were first built, resulting in massive increases in fish and wildlife populations that depend on wetlands and lake conditions for breeding, food and cover.

So far — so good. What could be better? A



DNR PHOTO

*The objectives of the Brown's Lake project are to reduce sedimentation rates, improve water quality, increase fish and wildlife habitat and increase bottomland timber diversity.*

RUSS GENT



commercial navigation channel and a great amount of fish and wildlife habitat were created in an area that Congress had designated as a national commercial waterway and a national wildlife and fish refuge. Perfect — right? It depends on what side of the fence you are on and whether you are sitting in a towboat or bass boat.

Ever since the navigation dams were built, commercial traffic on the river has been steadily increasing. Steamboats were replaced with diesel-powered push boats and barges. Every new generation of push boat has had greater horsepower, which allowed them to push more barges faster. All of this is a big plus to the transportation industry and people involved in shipping bulk commodities such as grain, fertilizer and oil. Shipment by river is the most efficient way to move these goods.

Meanwhile since the navigation dams were built, the enormous amount of fish and wildlife habitat they created has been steadily decreasing. The lakes and marshes are sediment traps that capture tons of silt eroding from farm fields and construction sights. The wing dams and navigation dams prevent the river from making new side channels and lakes to replace those that have been filled in with sediment. In other words, the dams have disrupted the river's hydraulic and ecological balance and

## Brown's Lake Rehabilitation Project

by Thomas Boland

It was a hot, dry August day and the sound of chain saws, dozers and motorscrapers could be heard across the river bottom for miles around. The work being done was contracted by the U.S. Army Corps of Engineers, but it is not a typical Corps project. The purpose of this project is to improve and hopefully prolong the life of an important 450-acre Mississippi River backwater complex known as Brown's Lake located in Pool 13, approximately 10 miles south of Bellevue, Iowa.

Brown's Lake is the first major backwater rehabilitation project undertaken in this recently authorized program known as EMP, or the Environmental Management Program, and is certainly one of the program's most visible components. Within a few short weeks, a 3,500-foot deflection dike was constructed and a 35-acre area was transformed into a huge bowl that will be pumped full of 400,000 cubic yards of fine sediments from

the shallow Brown's Lake area. The project is completely federally funded and will cost approximately \$1.7 million dollars. It is scheduled to be completed by mid-1990, but if construction continues at the present rate, it may be completed in 1989.

The Brown's Lake complex is part of the Upper Mississippi River National Wildlife and Fish Refuge. The U.S. Army Corps of Engineers has estimated that sedimentation rates within Brown's Lake have varied from 0.17 inch per year in Lower Brown's to 1.18 inches per year in Upper Brown's Lake. Much of the area has gone from a depth of six feet in the 1930s to a current 6- to 18-inch marsh complex. Continued sedimentation at the present rate could reduce the area's value from a productive Mississippi River backwater lake/wetland type of habitat to shallow marsh/terrestrial habitat in less than 25 years.

The objectives of the Brown's Lake EMP project are basically four-fold. First, sedimentation rates within the complex need to be reduced. This will be accomplished by constructing a 3,500-foot deflection dike on the upper end of the complex which will direct sediment-laden water away from the Brown's Lake area. Reduced sedimentation rates will certainly

ability to create new fish and wildlife habitats to replace the lost ones. The overall result is a river that is becoming more and more a commercial navigation channel and less a quality environment for fish, wildlife and recreation.

Now comes the salt in the environment's wound. Remember now — the navigation locks and dams are 50 years old and subjected to increasing use. Lock and Dam 26 near Alton, Illinois, was in particularly bad shape, causing large delays to river shippers. The Corps in the late 1960s decided that the old lock and dam at Alton needed to be replaced with a new dam and two locks twice the size of the old one. That is a four-fold increase in lock space. Feel the salt

stinging? Congress gave money to the Corps annually from 1970 to 1975 for designing the new locks and dams.

In 1974, the Izaak Walton League, Sierra Club and 21 western railroad companies said enough is enough and filed lawsuits to keep the Corps from constructing the new facility. These organizations contended that more information is needed to conscientiously decide whether or not to invest such a large amount of public dollars (a half billion dollars based on 1976 prices). For example, no one knows what impact more towboats and barges running up and down the river will have on the environment and on railroads. The U.S. District Court did stop the con-

struction and sent the Corps back to work on obtaining more information on environmental and economic impacts of the new lock and dam. After reading more Corps reports, Congress, in 1978, decided to authorize construction of the new dam and one 1200-foot lock. They also directed the Upper Mississippi River Basin Commission (an organization made up of people from the states of Minnesota, Wisconsin, Iowa, Illinois and Missouri, as well as from the Corps, U.S. Fish and Wildlife Service, U.S. Department of Transportation, and the Environmental Protection Agency) to prepare a comprehensive plan on how to best manage the river taking all factors and uses into account. The com-

help prolong the life expectancy of this productive Mississippi River fish and wildlife backwater habitat.

Secondly, the project is designed to improve water quality in Upper and Lower Brown's Lakes by decreasing suspended sediment loading and by increasing winter dissolved oxygen concentrations. This will be accomplished by excavating a side channel inlet on the upper end of the complex from the Mississippi River to Upper Brown's Lake with a water control structure. The control structure would be closed when a heavy sediment load was coming down the river and opened during low sediment periods. This would help provide much-needed oxygenated Mississippi River water into the upper end of the complex and should substantially help reduce winter fish kills.

The third objective of the project is to increase fish and wildlife habitat diversity in Upper and Lower Brown's Lakes and reclaim some of the aquatic habitat diversity lost due to sedimentation. This will be accomplished by hydraulic dredging of approximately 400,000 cubic yards of material from the complex. These new "deep" water areas will consist of channels 70 feet wide, six to eight feet deep, and have a minimum of five deep holes (200

feet long by 12 feet deep) placed within the complex.

The fourth objective is to increase bottomland timber diversity. This will be accomplished by establishing selected hardwoods such as oak and hickory on the 35-acre dredge spoil site. Such plantings would provide food to wood ducks, wild turkeys and some of the area's mammals such as squirrel and deer.

The Brown's Lake Project is an important first, and hopefully successful, Mississippi River habitat rehabilitation project in the new EMP Program.

It is truly a multi-agency

project involving the Iowa Department of Natural Resources' fish and wildlife bureaus, the U.S. Fish and Wildlife Service's refuge branch and the U.S. Army Corps of Engineers. The Brown's Lake EMP project construction phase will be near completion by mid- to late 1989, while sedimentation, water quality and fisheries information will be collected for a minimum of three years to help evaluate the project.

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*Thomas Boland is a fisheries research biologist for the department and is located in Bellevue.*

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#### *Brown's Lake aerial*



THOMAS BOLAND

mission submitted the plan to Congress in January 1982 and recommended a second lock 600 feet long be constructed next to the new 1200-foot lock at Lock and Dam 26, as well as recommendations to improve fish and wildlife resources, increase recreation opportunities, and monitor and analyze the environment and use of the river. Hence — the EMP was conceived.

### The Program

Congress took the recommendations and included many of them in the Water Resources Act of 1986, Public Law 99-662. Hence — the EMP was born.

The Corps of Engineers' division office in Chicago oversees the entire EMP. Project planning, design and construction is the responsibility of the Corps district

Founders of the EMP originally thought that the EMP should at least be around for 10 years and have about \$20 million a year for projects and for the Corps to run the program. Quick multiplication gives a total of \$200 million. That is a lot of money, but we are talking about a lot of river from St. Paul to Cairo, Illinois. Oh — by the way, the EMP also includes the Illinois Waterway from St. Louis to Chicago and a few other tributaries of the Mighty Mississippi that have commercial navigation on them.

Does that still seem like a lot of money? Let's look at it in a different way. The new Lock and Dam 26 at Alton will cost a little more than \$1 billion when completed. Dollar for dollar, the EMP still has a ways to go if we are to invest the same amount of money on the Mississippi's environment that is



KEN FORMANEK

*The Mississippi has been, and continues to be, a major recreation resource for its neighboring states.*

offices, which are in St. Paul, Minnesota, and Rock Island, Illinois, for the portion of the Mississippi River along Iowa. The Corps division and district offices work very closely with the U.S. Fish and Wildlife Service and the five states of Minnesota, Wisconsin, Iowa, Illinois and Missouri on all aspects of the EMP. In fact, many of the individual EMP project ideas come from the Fish and Wildlife Service and Departments of Natural Resources in the five states.

spent on navigation. Congress did spell out that such equality is its intent.

The EMP has not yet reached its designated budget of \$20 million a year, but Congress has given it more money every year since 1986. This year's budget for the EMP was about \$7.5 million and all indications are that it will get about \$15 million from Congress next year. Also, most everyone involved in the program is fairly sure, and will definitely be recommending, that the EMP be

## Monitoring the Mississippi

by Jerry L. Rasmussen

The Long-Term Resource Monitoring Program (LTRMP) is being implemented by the U.S. Fish and Wildlife Service through the cooperation of the states of Iowa, Illinois, Minnesota, Missouri and Wisconsin, and the U.S. Army Corps of Engineers.

The overall objective of the LTRMP is to provide decision makers with adequate information to ensure continuation of the Upper Mississippi River System as a viable fish and wildlife resource, while maintaining its multiple-use character. This requires an improved understanding of the interactions of ecosystem components and the long-term trends in these resources on a system-wide basis. The need for long-term monitoring is evidenced by the difficulties of predicting long-term impacts of river use activities such as expansion of commercial navigation which is currently under study by the Corps of Engineers.

Eight resource components have been selected for monitoring -- land use, water and sediment, vegetation, invertebrates, fish, waterfowl, furbearers and public use.

Seven major river reaches have

around a lot longer than 10 years.

Recognition must be given to Representative Steve Gunderson (Dem., Wisc.), who took the lead in sponsoring and promoting the EMP in Washington, D.C. Representative Gunderson has received a lot of support from congressional delegates up and down the river.

The EMP consists of five basic elements:

1. Habitat Rehabilitation and Enhancement;
2. Long-Term Resource Moni-

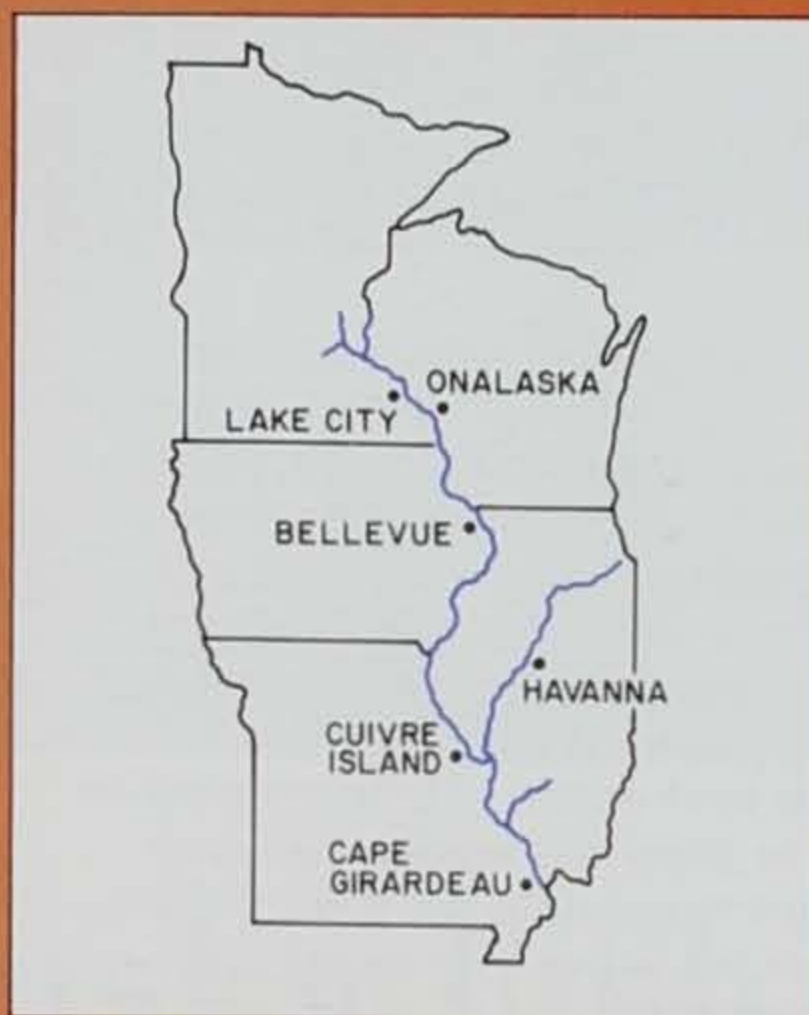
been selected for monitoring. These include Pool 4, located near Lake City, Minnesota; Pool 8, located near LaCrosse, Wisconsin; Pool 13, located between Bellevue and Clinton, Iowa; Pool 19, located between Burlington and Keokuk, Iowa; Pool 26, located just above St. Louis, Missouri; the Open River, below St. Louis; and the Illinois River, LaGrange Pool.

Six state-operated field stations have been designated to conduct monitoring activities (see map). These include the Bellevue station operated by Iowa on Pool 13, the Lake City station operated by Minnesota on Pool 4, the Onalaska station operated by Wisconsin on Pool 8, the Cuivre Island station operated by Illinois on Pool 26, the Cape Girardeau station operated by Missouri on the Open River and the Havana station operated by Illinois on the LaGrange Pool (Illinois River).

In addition to long-term trend information, the field stations will collect information for resource problem analysis related to sedimentation, navigation impacts, water level fluctuations, lack of aquatic vegetation and reduced fisheries popula-

tions; and complete evaluations of habitat construction projects such as the one being constructed at Brown's Lake near Bellevue.

*Jerry L. Rasmussen is a program manager for the U.S. Fish and Wildlife Service and is located in Onalaska, Wisconsin.*



*Studying changes in water and sediment conditions is a major part of the LTRMP.*



RUSS GENT

toring;

3. Recreation Facilities Development;
4. Economic Impacts of Recreation Study; and
5. Navigation Traffic Monitoring.

Habitat Rehabilitation and Enhancement consists of fish and wildlife projects that restore and improve habitat. Remember — sedimentation is the main culprit, so most projects involve removing some existing silt and preventing or slowing down future sedimentation in the area. Examples of projects are dredging, dike and levee construction, island construction, and reopening or closing selected side channel openings into backwater lakes and marshes.

Long-Term Resource Monitoring is designed to "take the pulse and blood pressure" of the river. Information on water quality, vegetation, fish, wildlife, land use and public use on the river is being collected at select locations and regular intervals. With the help of computers and knowledgeable scientists, this information will be used to determine what kind of "shape" the river is, and will be, in. The monitoring information will also be helpful in determining how increases in navigation traffic will effect the river's environment. Iowa DNR is very much involved in this monitoring. The U.S. Fish and Wildlife Service runs the Long-Term Resources Monitoring program and receives EMP money for it through an agreement with the Corps of Engineers.

Habitat Rehabilitation and Enhancement and Long-Term Resource Monitoring are the two major elements of the EMP. About 95 percent of the EMP budget goes to these two elements.

Recreation Facilities Development is an EMP element that to date is inactive. It was designed to make \$500,000 of federal money available per year for constructing facilities such as boat ramps, riverside parks, trails, marinas and other recreation developments. The federal money is to be cost-shared with state, county or city money on an equal basis. The Corps and Congress have not



RON JOHNSON

allocated federal funds for this element due to the low priority recreation had in the Reagan administration in Washington. We are hopeful that President Bush swings the pendulum the other way on this element.

Economic Impacts of Recreation is a study geared at determining what recreation on the Mississippi River means to local economies of river towns. It involves recreation use and expenditure surveys to identify how, where and for what people spend money to "play" on the mighty river. As you can imagine, people spend a lot of money every day to enjoy the outdoors and towns like Lansing, Dubuque, Bellevue, Princeton and Guttenberg (to name just a few) rely heavily on this spending for their economic livelihood.

Navigation Traffic Monitoring is keeping tabs on the number of barges being pushed up and down the river and what they are carrying. This information will be useful to help assure the navigation system is ready to meet future needs of shippers and coordinate these needs with environmental and recreation interests.

### Areas in Iowa Targeted for EMP Rehabilitation Work

Iowa has several projects in the EMP "hopper." One is nearing completion -- *Brown's Lake in Pool 13 near Green Island*. This project involves dredging, levee construction and a side channel reopening (see "Brown's Lake Rehabilitation Project," page 4).

*Lansing Big Lake, Pool 9, near Lansing* -- This project is early in the design phase and still fairly much conceptual. The work being considered involves blocking selected side channel openings to decrease the amount of sediment being carried into the lake. Recreation boat access will be maintained so hunters and anglers can continue to get onto the lake. Other features being considered are artificial islands designed to decrease wind fetch and to provide nesting habitat for waterfowl. Less wind fetch will make for clearer water, which will in turn grow better emergent plants for waterfowl food.

*Bussey Lake, Pool 10, near Guttenberg* -- This is basically a dredging project designed to restore fish habitat. It should become an ice fishing "hot spot" upon completion.

*Guttenberg Waterfowl Ponds, Pool 11, near Guttenberg* -- As you stand on the river bank at Guttenberg just downstream of Lock and Dam 10 and look across the river, you see an island. Old fish hatchery ponds are on that island. The EMP project involves rehabilitating the pond embankments and restoring a water control valve between a couple of the ponds. A water pipe will then be placed through the dam to allow water to be taken from Pool 10 above the dam and placed in the ponds. The water levels in the ponds will be managed to benefit migrating waterfowl.

*Molo Slough, Pool 12, near Dubuque* -- This is currently a running slough, meaning good

water flows are in it. The EMP proposal is to build a big closing dam at its upper end, turning the slough into more lake-like conditions. The intent is to add diversity in the area for fish habitat which will attract more panfish species.

*Princeton Wildlife Area, Pool 14, near Princeton* -- This area is currently managed by the Iowa DNR. The EMP project involves creating new wetland areas with earth moving equipment. The dirt will be placed on the existing levee to provide better protection of the wildlife area from turbid high water.

*Big Timber Area, Pool 17, near Muscatine* -- This project involves dredging selected water areas to improve fish habitat. The dredged material will be strategically placed to deflect water carrying high loads of silt away from the area. Ridges will also be made with dredging material and mast-producing trees like oaks and hickories planted on them for wildlife benefits. Pothole marsh areas will also be created with dynamite blastings.

*Lake Odessa, Pool 17/18, near Wapello* -- Lake Odessa is managed by the Iowa DNR and U.S. Fish and Wildlife Service primarily for waterfowl. The EMP project includes several components, such as wetland development and enhancement, lake and side channel deepening, jetty construction for fish habitat, modification of existing water control structures and construction of new ones, and levee improvements.

Rehabilitation projects like these are only a part of the big picture encompassed by the Upper Mississippi River Environmental Management Program. The EMP stands to ensure that the Mississippi's resources will be maintained at a quality for all to share.

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*Kevin Szcodronski is the department's representative to the Mississippi Environmental Management Program, and he is located in Des Moines.*

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# Musky Fishing in Iowa's Great Lakes

Story by Jim Christianson  
Photos by Ron Johnson

**M**uskellunge, one of the largest members of the esocid or pike family conjures up as many different impressions and responses as there are different angler types. To fishery biologists involved with Iowa's musky program, establishment of a "trophy" fishery is the underlying motivation; therefore, management is focused on providing a rather unique opportunity for anglers in pursuit of this trophy fish.

The term trophy, when used to describe fish, implies many different impressions and values to various anglers but usually means something to "show off," "keep and preserve," either through taxidermy or photography. Trophy also implies something unusual, either rare or large, for a particular

species and something that is difficult to acquire. These different attributes of a trophy fishery have become the foundation of Iowa's muskellunge program.

The fisheries bureau of the Iowa Department of Natural Resources has established some subjective trophy limitations through its annual "Big Fish" awards program. A musky has to be 40 inches or 15 pounds to qualify for an award. This standard of 40 to 45 inches and 15 to 20 pounds to qualify for an award is fairly common among various states with muskellunge programs.

To accomplish the goal of providing a trophy muskellunge fishery, the fisheries bureau has established specific objectives: 1) to maintain an adult musky (fish at least 30 inches) population density

of 0.10 to 0.15 fish per acre by maintenance stocking, and 2) to provide a catch rate of one fish per 70 to 100 hours of angling effort.

To meet program objectives, the fisheries bureau has been involved in maintenance stocking, tagging studies and fishing diaries filled out by cooperative anglers. With minimum natural musky reproduction occurring in any of the lakes, stocking is necessary to produce year classes to be recruited into the adult musky populations. Tagging studies have been primarily limited to Spirit Lake with approximately 500 fish tagged during each spring from 1982 to 1989. These studies have indicated a 65 to 70 percent survival rate and an average growth of two inches and one and one-half to three pounds per year for an adult

musky. Angler diaries reveal catch rates that range from 12 to 75 hours per fish with an average of 40 hours.

**A**ngler interest in muskellunge fisheries created the atmosphere for the DNR to investigate the concept of muskellunge introductions in Iowa waters. These early deliberations led to the decision that a few lakes in the state were candidates for trophy muskellunge fisheries. The program was initiated in 1960 when 40 fingerlings were stocked in Clear Lake and a similar number into West Okoboji. These fish were obtained as fry from Wisconsin and reared at the Decorah Hatchery. The initial muskellunge stocked in

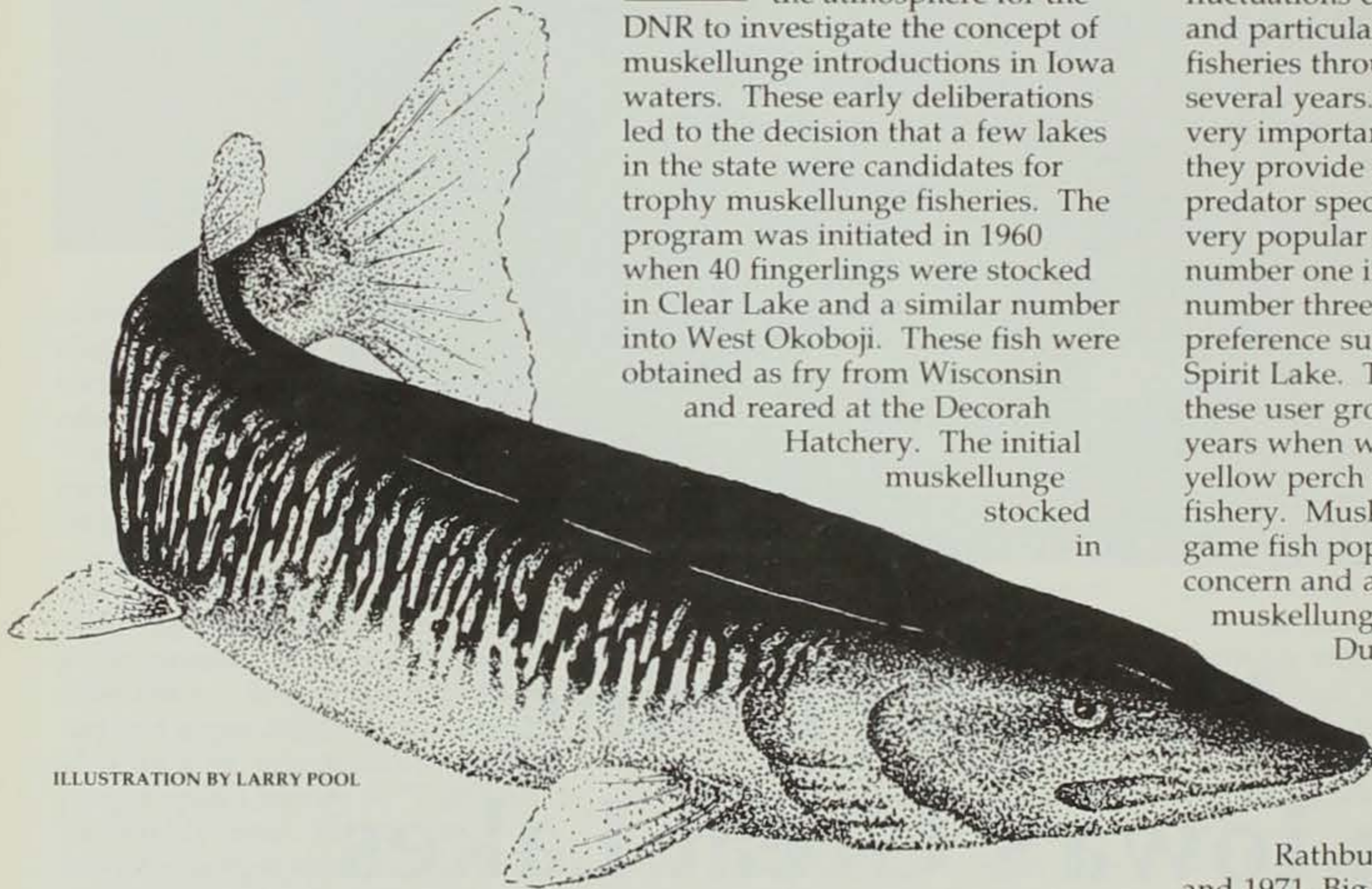


ILLUSTRATION BY LARRY POOL

Iowa ranged from seven to 12 inches.

Angler interest in these species was highlighted during 1969 when a local musky club was established which later evolved into the Iowa Great Lakes Fishing Club. This club was initially formed to promote musky fishing and to assist the DNR with muskellunge stocking. The local club purchased a total of 340 musky ranging from 9 to 15 inches which were stocked in Clear Lake and West Okoboji during a three-year period from 1970 to 1972.

In 1979, further interest was evident when the Upper Great Plains Chapter of Muskies, Inc., was chartered under the National Muskies, Inc., organization. This local chapter promotes all types of angling but focuses on musky fishing through education and club-sponsored events. The club has also been active in habitat development with the placement of

artificial vegetation in area lakes.

Special interest groups have voiced their support of the muskellunge program, but there are anglers who strongly oppose muskellunge. These individuals have used the musky as an easy explanation for the more complex fluctuations experienced in walleye and particularly yellow perch fisheries throughout the past several years. Yellow perch are a very important fish species because they provide forage for a variety of predator species and have been very popular with anglers ranking number one in 1985 and 1986 and number three in 1987 in a species preference survey conducted on Spirit Lake. The conflict between these user groups intensifies during years when weak year classes of yellow perch move through the fishery. Muskellunge predation on game fish populations is the main concern and argument against the muskellunge fishery.

During the 1970s, the muskellunge stocking program was expanded to additional lakes. Lake

Rathbun was stocked in 1970 and 1971, Big Creek Lake in 1976 and 1978, and Spirit Lake was initially stocked in 1975. Prior to 1975, stocking varied from a few fish to a few thousand fish for West and East Okoboji and Clear Lake. Since 1978, Iowa's muskellunge program has been limited to Spirit Lake, East and West Okoboji and Clear Lake. But with the development of a reliable brood stock source, recent advances in artificial feeding techniques and reduced emphasis on tiger muskellunge (hybrid), there will be expansion of the purebred muskellunge program to other Iowa lakes

**W**ith the stability of Iowa's muskellunge fishing program, angler success has been enhanced in recent years. There are some generalized fishing patterns that have emerged for Iowa's musky fishing. A few fish are usually caught in East Okoboji on rather

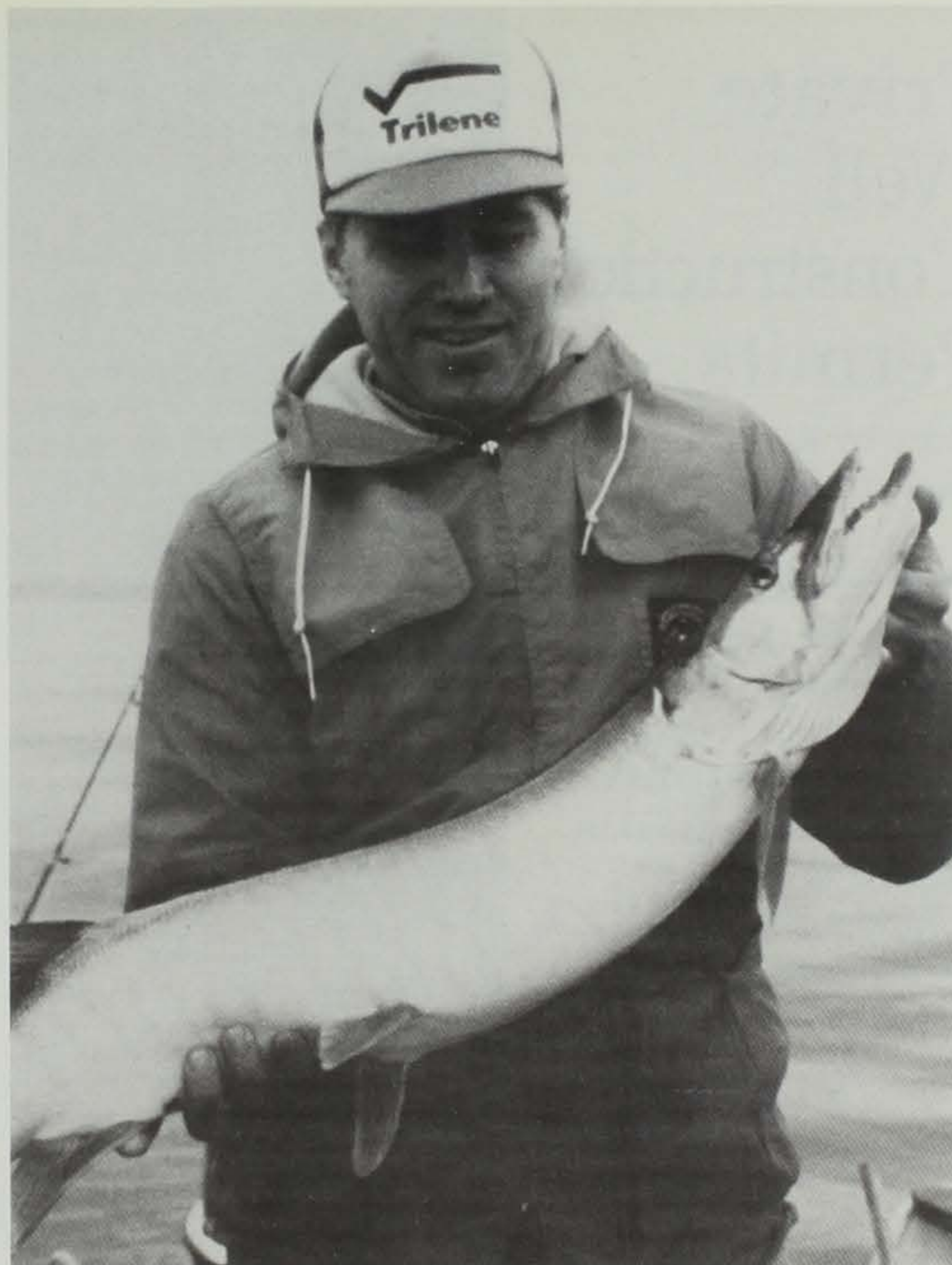
small terminal tackle. Every year there are some accidental catches on minnow rigs; but, this is the exception rather than the rule. Small tackle usually consists of small bucktails or crankbaits. Muskies are very size-selective feeders, and early in the season when water temperatures are in the 50s and low 60s, these fish are not very active and seem to prefer a smaller lure. As the water temperature warms and the vegetation becomes established, summer patterns develop and larger terminal tackle can be used -- for example, larger crankbaits like Bagleys, jerk baits like Suicks and larger bucktails. The use of these different baits depends a lot on where they are fished in relation to the lake bottom structure and vegetation growth.

Spirit Lake usually experiences some action in mid- to late June with periodic flare-ups the rest of the summer and then another peak in September. Most activity on this lake is associated with the weed beds, and casting is the preferred fishing method.

East Okoboji is a through-the-summer lake and casting or trolling are the fishing methods. A slender type of fish-imitating lure like the Cisco Kid is the preferred terminal bait, and the fish seem to associate with the rock structure (especially if vegetation is in close proximity) in the southern one-third of the lake.

West Okoboji is a late summer and fall musky lake with the fish becoming active as they move into shallower water as well as into the weed edges in the various bays. Trolling has always been a popular fishing method on this lake because more water can be covered but casting into some of the well-known muskellunge haunts has also become very effective. The jerk and crankbaits are preferred and usually fished on the edges, above and in the weed margins.

Clear Lake usually warms a bit faster than Spirit Lake and East and West Okoboji, resulting in musky action in late May and early June. Like most musky angling, early season fishing is with smaller lures like bucktails, and as the season



*The opportunity to catch a trophy musky is one vital ingredient in Iowa's muskellunge program.*

progresses and the fish become more active, larger tackle is preferred. Rock reefs and rocky points especially associated with adjacent deep water areas are favorite activity spots for Clear Lake muskies.

On the majority of these lakes, particular areas that have been hit rather hard, some of these muskies have been seen and hooked by consistently used baits. There has always been a debate as to the conditioning of some fish to certain fishing methods. If there is ever a chance for fish to get conditioned, it

would be the muskies in Iowa waters, so it might be a good idea to try something a little bit different when in pursuit of an Iowa musky.

Remember, anticipation, excitement, a thrill-of-a-lifetime, and trophy are some of the important ingredients that have been used to mold Iowa's muskellunge program.

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*Jim Christianson is a fisheries management biologist located at Spirit Lake.*

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# Private Well Construction Permits

Story by Kathryn Stangl  
Photo by Ron Johnson

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Anticipate needing a private well? Remember, a permit is necessary. Proper well construction is essential in protecting Iowa's groundwater supply.

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(Story on page 21)

# PRAIRIE FIRE

## Points of View

by Dean Roosa and Daryl Smith

Fire has been present in Iowa for a long time. Evidence of fire has been found in the fossil remains of the 300 million-year-old coal swamps of the Carboniferous Period. Fire was probably a part of the natural environment of the earth as soon as land vegetation (fuel), climate (lightning as an ignition source) and oxygen in the atmosphere were present. As prairies began to develop about 20 million years ago, it can be assumed that fires became more prevalent. Dry lightning storms in continuous grassland fields of gentle to rolling terrain could result in extensive burns when winds and temperatures were high and humidities low. Human use of fire along with lightning intensified the effect of fire on the prairie ecosystems.

There are diverse viewpoints concerning the relationship of fire and the prairie. No doubt fire was an integral part of the prairie, the difference in opinion centers around whether it was an important factor in maintaining prairie along with certain climatic factors. Prior to settlement, two types of prairie existed in Iowa. One type was derived on secondary prairie with scrub vegetation or scattered trees that occurred in areas capable of supporting forests. These usually resulted from and were maintained by naturally occurring fires that combined with climatic, soil and biotic factors to form more or less permanent grasslands existing as either open prairies or savannas. The second type was natural or primary prairie resulting from climatic or soil conditions which favored grassland species and adversely affected woody plants. The latter type was well represented in northern Iowa prior to settlement whereas the first type was probably predominant in southern Iowa. There is general agreement that fire is an important factor in the development and maintenance of derived prairies and savannas. However, no agreement exists regarding the role of fire in the origin and maintenance of natural or true prairies.

Fire benefits the prairie by increasing plant diversity and stimulating growth and flowering of individual plants, killing or stunting woody invaders, converting litter to usable nutrients, creating darkened soil that warms quickly in the spring and favors warm-season prairie species over cool-season invaders and delaying or preventing senescence of certain prairie plants.

As indicated, there are many perspectives of prairie fire. Some of the diverse points of view are represented by the native American, the pioneer, a tree, a hawk, a butterfly, a coneflower and the prairie manager.

### As seen by the native American

Native Americans realized better than anyone the value of prairie fires. They followed patterns of fire use begun by the Pleistocene "big game" hunters when they brought fire to North America across the Bering Straits some 29,000 years ago. Fires were set intentionally to remove the dead plants and stimulate the growth of grasses in the early spring. These new green grass islands in a sea of brown litter attracted herbivores, mainly bison, which could be harvested for food. So, prairie fires have been used by humans for hundreds, even thousands, of years. Accidental fires were also started when signaling or leaving cooking fires burning in abandoned camps. Early explorers often described vegetation which had been or was being burned by natives. Some scholars have surmised these fires, set by native peoples, helped to keep the prairies treeless.

### As seen by the pioneer

Historical accounts by pioneers are replete with references to prairie fire. They feared these fires, yet they learned to respect and control them. They learned to start backfires to protect their buildings and animals and to plow double strips around their cabins and burn the area between them for protection. Prairie fires form such extensive updrafts and convection currents that they create their own windstorms. The roar of these storms left such an impression on the pioneers that the "roar of the prairie fire" was often cited by them.

### As seen by a tree

Preventing fires favors forest over prairies. If an Iowa prairie is allowed to stand unburned for two decades, it will be so heavily invaded by trees that it will lose its appearance as a prairie. Over the last several thousand years, the climate has been more favorable for the growth of trees than for prairie grasses. Consequently, the trees have encroached on the prairies. Occasionally, these are nonnative trees whose seeds come from nearby farmsteads. Such species include Siberian elm, black locust and white poplar. Native tree species which may invade a prairie include quaking aspen, box elder, eastern red cedar, and eventually more stable and long-lived species such as the oaks.

Shrub invaders of prairies are legion, with the gray dogwood and smooth sumac the most detrimental. These are early invaders and modify the environment enough to permit the establishment of trees. Often spring burns stimulate these species and special prescribed burning programs must be developed to prevent encroachment and eventual loss of a prairie.

### As seen by a hawk

Often when an Iowa prairie is being burned, hawks are seen soaring above the smoke. These

are normally red-tailed hawks, but occasionally in western Iowa Swainson's hawks are sighted. The hawks are drawn from the woodlands, usually nearby, but sometimes they come from several miles away. Whether this is simple curiosity or whether it is a strategy for capturing small mammals or snakes that are driven by the flames is anyone's guess.

### As seen by a butterfly

There are species of butterfly which depend on prairie plants for their very existence. This is not the adult butterfly you see flitting about on prairies in summer, feeding on the nectar of various plants. It is rather the worm-like larva which actually utilize parts of the plant for food. We know little about what effects burning a prairie has on the life cycle of a butterfly. We feel that burning an entire prairie at one time could have a disastrous effect on the local population. For this reason, the normal procedure is to burn approximately a fourth of a prairie in a given spring. This technique will allow unburned prairie to serve as a source of butterflies to recolonize the burned part. These adults will lay eggs on the proper host plant and soon the population will increase. The fire will stimulate the host plant and thereby benefit the butterfly population over extended periods of time.

### As seen by a coneflower

There are plants which will not flower and fruit without prairie fire. In fact, most prairie species show more vigor after a fire, but there are some examples which are spectacular. One such plant is purple coneflower. Often few or no coneflowers will be present on a prairie until after a burn — then such an array of plants are present they must be seen to be believed. It is not unusual for several hundred plants to be seen in a small burned prairie opening where fewer than 10 were visible the previous year. Another plant which normally does not flower except after a burn is the prairie dropseed. The reasons are obscure, but removal of competition, removal of litter so that land can warm rapidly in spring, and rapid recycling of micronutrients are all factors, with litter removal probably being the most important.

### As seen by the prairie manager

Over the past 20 years, managers have learned to use prairie fire as a tool to maintain the integrity of the prairie. They realize that prairie fire is essential to the vigor of a prairie and that specific goals of prairie management can be achieved by burning during a certain time of the year. Exotic species can often be controlled by the use of fire.

Researchers and most managers of prairies agree that prescribed fire is a reasonable and effective way to reintroduce fire into the prairie ecosystem. Prairie management via prescribed burns is a science in its infancy. Prairie burns are exciting and they can even be fun; although if done correctly, they are rather boring. Prescribed burns generally entail a few hours of hard work possibly interspersed with a few minutes of panic. When the burn is completed, the prairie looks destroyed — black, smoldering and dead. However, within a few weeks favorable response of the prairie to fire is apparent. It shows a greater vigor, increased growth and flowering of many species — the release of the energy of a sleeping giant.

These are some of the many points of view regarding prairie fire. Fire was a natural phenomena of the prairie. Native Americans adapted to fire and used it to their benefit. In doing so, they may have contributed to the maintenance of the prairie. More recently, our society has viewed fire as harmful and fire has been suppressed. Consequently, prairies have lost their vigor and become overgrown with trees and shrubs. Prairies and fires are a part of our heritage. Prescribed fire under controlled conditions is a tool that can assist us in maintaining this heritage. You cannot have a prairie fire without a prairie, but it is also likely that you cannot have a prairie without a prairie fire.



ILLUSTRATION BY SUMNER HEMAN



ILLUSTRATION BY SUMNER HEMAN

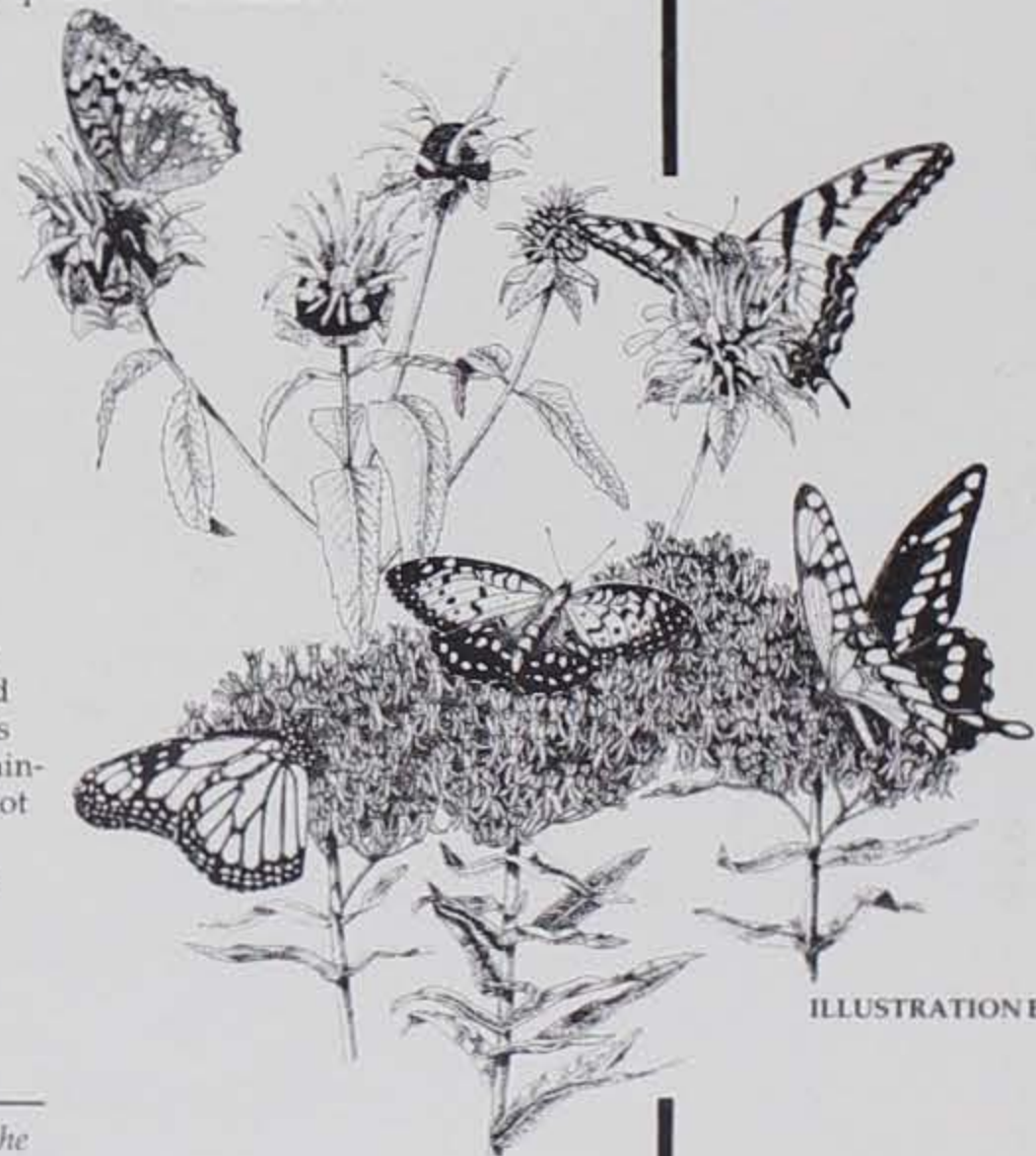


ILLUSTRATION BY ERIC VOLDEN

Dean Roosa is state ecologist for the department and is located in Des Moines.

Daryl Smith is the chairperson of the biology department at the University of Northern Iowa.



Controlled fire benefits the prairie by increasing plant diversity and stimulating growth and flowering of individual plants.



Some plants, including the purple coneflower (above), will not flower and fruit without prairie fire. Often few or no coneflowers will be present on a prairie until after a burn -- then such an array of plants are present that they must be seen to be believed.

# Iowa Prairie Heritage Week ♦ September 10-16, 1989



A prairie fire, so soft at first  
friendly, as a campfire  
Springs to life with sudden fury  
daring all in its path  
It roars with violent voice  
sending black arms toward heaven  
Pioneers huddle in a creek  
and wait for the monster to pass  
Hawks wheel overhead  
seeking an easy meal.

It's suddenly over --  
the winds abate  
Black smoldering landscape lies  
as if in death  
Fragile plant skeletons remain  
and fracture at the wind's touch  
The ground lies bare  
every rock and blemish exposed.

But soon the plants emerge  
coneflowers explode with vigor  
Bison munch the new tender growth  
so engrossed they see no danger  
The cerlew sings and settles down  
on the new prairie lawn  
The omnipresent prairie wind  
creates waves on the green sea  
Arising from seeming death,  
the prairie has overcome.

Dean Roosa

IOWA DEPARTMENT  
OF NATURAL RESOURCES  
♦  
IOWA ACADEMY OF SCIENCE  
♦  
STATE PRESERVES ADVISORY BOARD

Prairie fire photo by Daryl Smith. Prairie fringed orchid (right) by William Fusateri. Regal fritillary butterfly, DNR photo. Remaining photos by Ron Johnson.



Private well construction permits are designed not only to protect Iowa's groundwater but the health and safety of individuals using private wells.

As of July 1, 1988, owners or their agents are required to obtain a private well construction permit before a new well is constructed. The nonrefundable permit fee is \$25 if the permit is issued by the Department of Natural Resources (county fees may vary). Current regulations provide the mechanism for the permits to be issued either by the DNR or by the county if that county has been delegated the authority by the DNR.

The permit applicant should be the title holder or authorized agent of record of the land on which the proposed well is located. The permit application must be filled out completely. The permit fee and a map or aerial photograph with the locations of the proposed well and any existing wells marked on it must accompany the application. Incomplete forms will be returned.

The major steps to drilling a new private well are:

1) Contact several well contractors before entering into an agreement. Private wells in Iowa MUST be drilled by a registered contractor. You will need the well driller's registration number to complete the permit form. You should require current proof of registration to ensure that the contractor is registered for the entire period during which your well is to be constructed. This is your assurance that the well will be constructed in accordance with state standards and regulations and with county government or board of health regulations, if they are more stringent.

Do not hesitate to ask questions of your contractor and compare the range of services offered by different contractors. Make sure that you are comparing the same covered services for the same price tag.

Be sure and plan in advance of anticipated construction. While well construction permits can be granted relatively quickly, you still want to allow adequate time to gather and submit the information

as well as to have the application processed.

2) You need to obtain the well permit application and submit the completed form with all the information requested and the map or aerial photograph marking the location of existing and proposed wells to the DNR or your local county government (if it is a delegated authority) along with the appropriate application fee.

3) All counties can issue a permit in an emergency situation even if they do not have regular designated authority. For example, if the well you use to water your livestock runs dry and you need to construct a new well immediately, you must obtain an emergency well construction permit from the DNR or your county board of supervisors. The emergency permit requires the same fee and information as the regular permit, falls under all the same design and construction regulations and also requires that a registered well contractor drill the well.

The DNR encourages counties to apply for and accept delegation of the well construction permit procedure. The counties currently designated to issue well construction permits (as of June 1989) are:

Adams	Henry
Audubon	Humboldt
Benton	Ida
Boone	Jasper
Bremer	Johnson
Butler	Keokuk
Calhoun	Lee
Carroll	Linn
Cerro Gordo	Mahaska
Chickasaw	Marshall
Clayton	Monona
Clinton	Montgomery
Crawford	Muscatine
Delaware	Page
Dickinson	Polk
Emmet	Pottawattamie
Fayette	Sac
Floyd	Scott
Fremont	Story
Greene	Tama
Grundy	Taylor
Guthrie	Webster
Hamilton	Winneshiek
Hardin	Wright
Harrison	

If your county is not currently a delegated authority, well construction permit forms can be obtained by contacting: Records, Iowa Department of Natural Resources, Wallace State Office Building, Des Moines, Iowa 50319-0034, telephone (for copies ONLY) 515/281-8897.

Once you receive your permit, you have authorization to construct your well in accordance with Iowa law. Construction of the well must be initiated within one year of the issue date of the permit or the permit is no longer valid.

The permit may also be modified, cancelled or suspended in any case where its terms or conditions have been breached, any state laws pertaining to the permit are violated, or if it is found necessary to prevent substantial injury to private or public interests.

Remember, a registered well contractor is your best assurance that your well is safely designed and constructed according to all state and local codes in a manner that protects our valuable groundwater reserves.

(You should note that the well construction permit is not a water withdrawal permit. Applicants who need to withdraw more than 25,000 gallons in any one day from a source or a combination of sources must make a separate application to the DNR for a water withdrawal permit. The counties do not have responsibilities for issuance of water use permits.)

The well construction permit program and the sections of Iowa law regarding well design, permitting and construction are all designed to protect our aquifers from what may be irreparable harm. By protecting these groundwater reserves through properly plugging abandoned wells and ensuring that new, properly constructed wells are not pathways of contamination, we can safeguard Iowa's future and ensure safe, useable groundwater reserves for generations yet to come.

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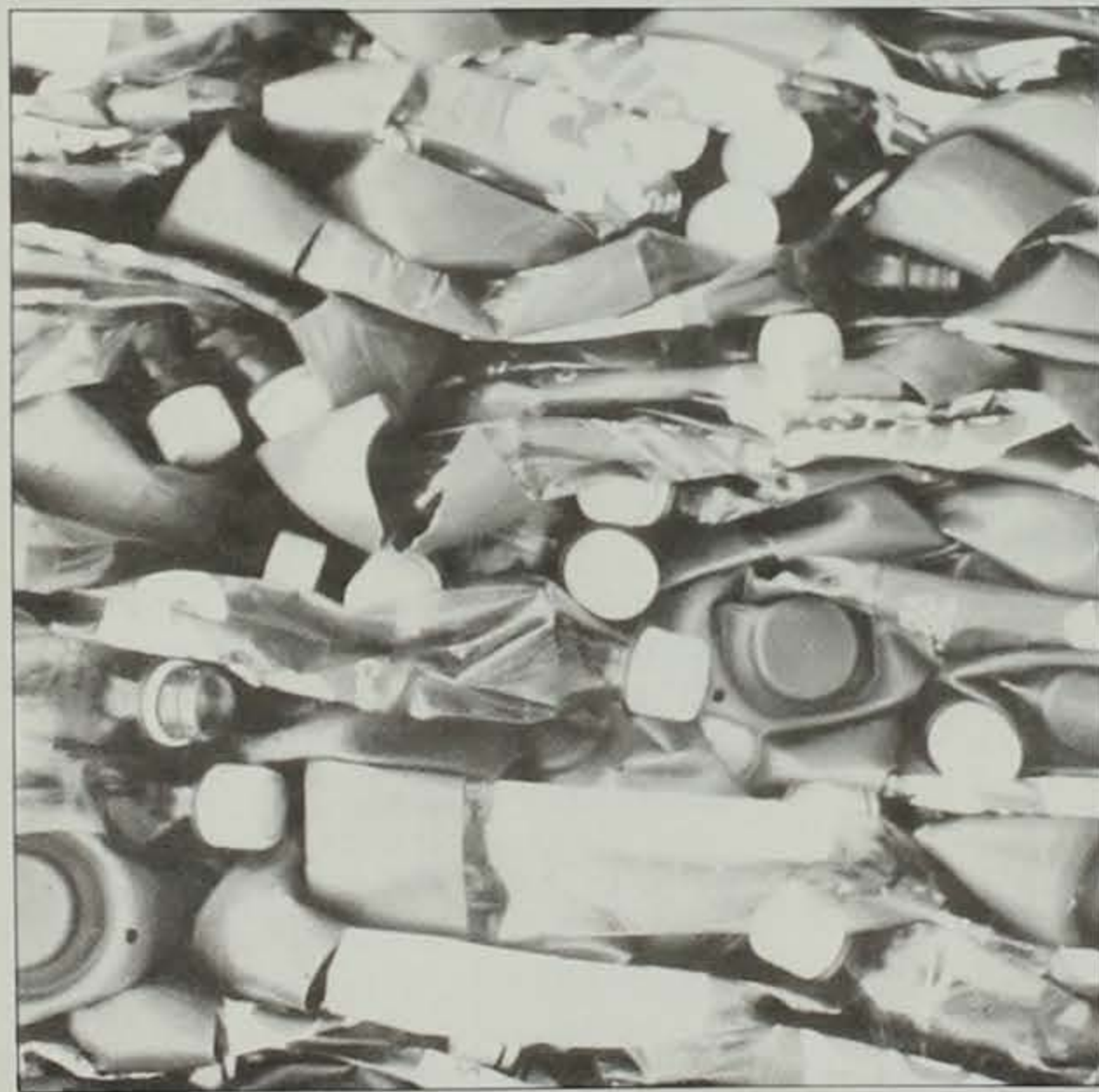
*Kathryn Stangl is an information specialist with the department and is located in Des Moines.*

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# CONSERVATION UPDATE

## Plastic Bans Proliferate, Prodding Industry Onto Recycling Bandwagon

Plastics make up about seven percent of the garbage generated in this country by weight and 25 to 32 percent by volume. Because they take hundreds of years to decompose, they are a highly visible and problematic part of the waste stream.



*Less than one percent of all plastics are recycled in this country. The biggest success has been with transparent beverage bottles -- about 20 percent of those produced each year are recycled.*

Plastic debris litters beaches and roadsides, and when discarded in the ocean, harms marine creatures that ingest or become entangled in it. Because plastics are hard to compact and degrade so slowly, they shorten the useful life of landfills. There is evidence to suggest that when burned in incinerators, some plastics give off highly toxic pollutants.

Of course, plastics are not the only materials that cause problems in the waste stream. Paper

fills landfills faster — 41 percent of our waste is paper — and is also suspected as a source of incinerator emissions of dioxin. But the use of plastic is growing rapidly, and so far, plastics have not lent themselves to recycling because of the problems of sorting, collecting and reprocessing the many different types of resins in use.

About half of the plastics in our trash come from packaging, which is designed to be used once and tossed out. Increasingly, local and state governments are considering restrictions on plastic packaging. Thirteen states have banned non-degradable plastic six-pack rings. [On July 1, Iowa became the 14th state to ban non-degradable plastic beverage connectors.] Two states have banned the non-recyclable plastic can. Berkeley, California, has prohibited polystyrene fast-food packaging; Suffolk County, New York, went further and also prohibited food establishments from selling food not wrapped in biodegradable packaging. Just recently, Minneapolis, Minnesota, passed the country's most comprehensive ban on plastic packaging. Its ordinance prohibits polystyrene and plastic containers for most food products, unless the city can develop an acceptable plastics recycling program.

A number of states have proposed or passed legislation requiring that

plastic containers be coded by resin type to make them easier to recycle, leading the Society of the Plastics Industry to institute a voluntary coding system, which it expects to be in full use by 1991.

New York, Connecticut, Rhode Island and Minnesota are among the states considering the development of state recycling symbols that would identify to consumers products that are packaged in recycled or recyclable materials.

Various proposals for taxing packaging, possibly on a sliding scale that relates to recyclability, are being considered in New York, Massachusetts and elsewhere.

The plastics industry has gotten the message and is finally getting involved in recycling.

At present, less than one percent of plastics are recycled in this country. The biggest success so far has been with PET bottles. [Transparent beverage bottles are made exclusively of *polyethylene terephthalate*, because it retains carbonation.] The nine states with bottle deposit laws have provided a steady supply to manufacturers that reprocess PET, mostly into fiberfill stuffing. About 20 percent of PET bottles produced each year are recycled, according to the Society of the Plastics Industry. Recycling of other plastic resins, at present, is minuscule.

This may soon change. The plastics



industry has begun supporting research into sorting and reprocessing technology. Although the threat of legislation has been the primary impetus, "there is a new recognition on the part of the big plastics firms that there is a real business opportunity in plastics recycling," says Susan Vadney, director of media relations for the Council of Solid Waste Solutions, a branch of the Society of the Plastics Industry.

Several companies have established projects to encourage plastics recycling. Dupont, for example, is working with the state of Illinois to identify products the state needs that could be made from recycled plastics; at the same time, the company is researching ways to make new things from post-consumer plastics. It is also working with communities to get a better understanding of the costs and problems of collecting plastics so that more efficient systems can be developed.

#### **Is Degradability the Answer?**

There has also been a lot of activity in the area of degradable plastics. Legislation to ban non-biodegradable plastic bags and other items is spreading. Advances have been made in developing plastics that disintegrate, and most of the major resin manufacturers are doing research on degradability, according to Vadney of the plastic industry's Council



#### **Telecommunication Device for the Deaf On-Line In the DNR's Des Moines Office**

*The Department of Natural Resources has installed a Telecommunication Device for the Deaf in the Des Moines office reception area. The device, more commonly known as TDD, enables DNR receptionists to communicate with deaf and hearing-impaired individuals over the phone. Instead of an audible phone conversation through voice, two callers with compatible TDDs can communicate in print via phone lines. The TDD has a typewriter keyboard, and the typed conversation of each caller appears in a read-out display panel and on paper.*

*The DNR's TDD telephone number is (515)242-5967. It is a dedicated telephone line and is answered 8 a.m. to 4:30 p.m., Monday through Friday.*

of Solid Waste Solutions. Audubon magazine has been testing a biodegradable plastic magazine wrapper.

Although degradability makes sense for some products — such as six-pack rings, which entangle birds and marine mammals, and trash bags, which prevent the garbage they hold from disintegrating — scientists are cautious about the desirability of making all plastics degradable.

One concern is that

little is yet known about how different plastics will disintegrate and how safe is the stuff they break down into, especially when combined with other chemicals percolating in landfills. Another concern is that making all products degradable could work at cross purposes to making them recyclable. Recycling ultimately conserves more resources. Further research is needed in this area, and until it is done, the use of

degradable plastics should proceed on a selective basis, says Audubon senior scientist Jan Beyea, who works on solid waste issues.

A good overview of the plastic waste issue is *Wrapped in Plastics: The Environmental Case for Reducing Plastics Packaging*, by Jeanne Wirka, published by the Environmental Action Foundation. Copies are \$10, including postage. Environmental Action Foundation, 1525 New Hampshire Ave., N.W., Washington, D.C. 20036.

--Reprint from *Audubon Activist*, May/June 1989 issue

#### **For Additional Information On Recycling . . .**

A toll-free number is available to call for more information about recycling. Callers receive a free brochure explaining how a community can benefit from recycling and describes ways citizens can recycle and reduce waste on their own. Everyone requesting information is also provided with the phone numbers of recycling programs near their home (if any exist) or local places to call for information. The number is 1-800-CALL-EDF. [You can also contact the Iowa Department of Natural Resources direct for information on recycling in Iowa. Write, Iowa Department of Natural Resources, Wallace State Office Building, Des Moines, Iowa 50319-0034, (515)281-8176.]

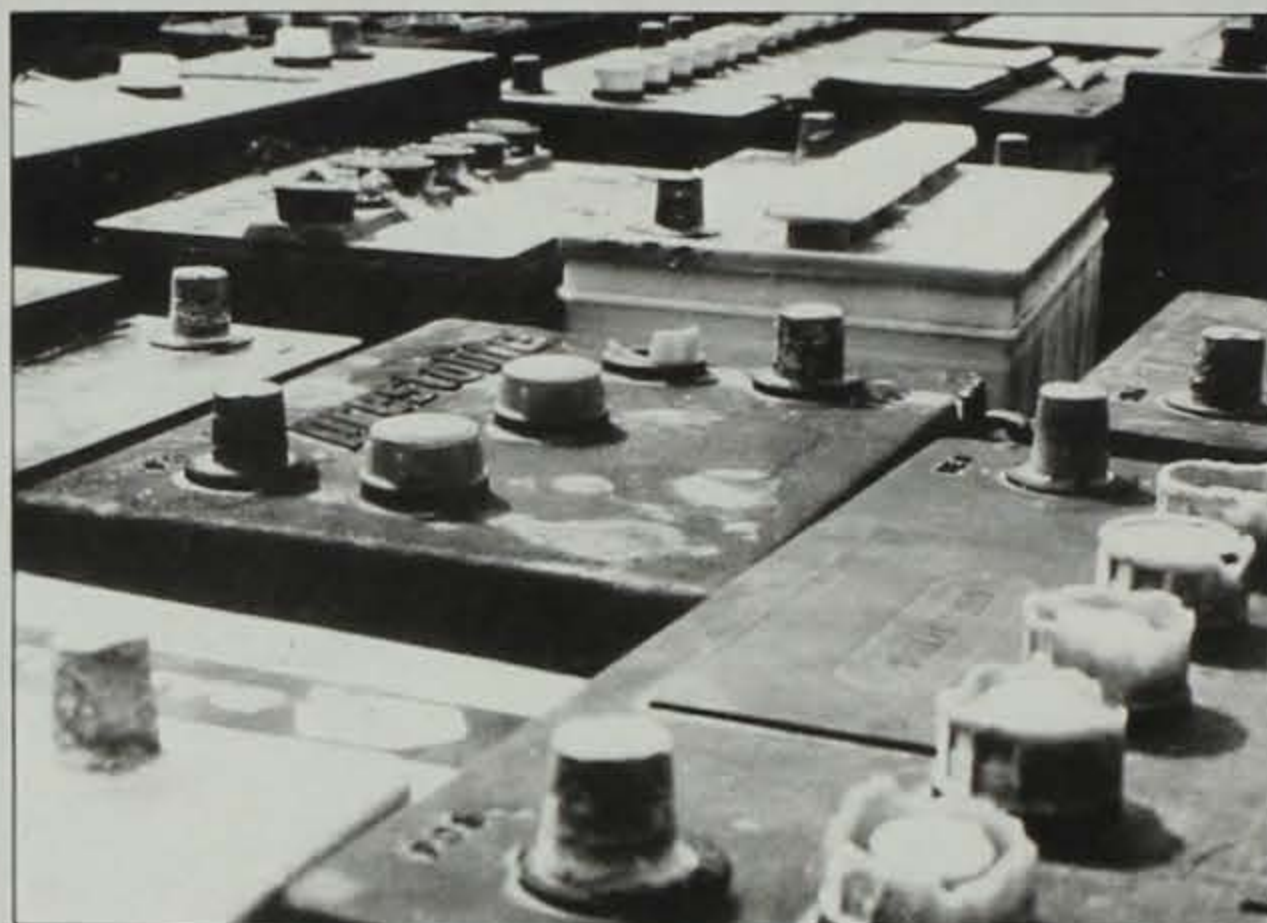
## Household Hazardous Waste Collected During Toxic Cleanup Days

More than 200 barrels of toxic household waste were collected from Iowans during the first two Toxic Cleanup Day events held this year.

Waterloo in Black Hawk County was the first collection site in the 1989 series, with 640 households participating in the event, held June 3. Residents brought in 100 barrels worth of hazardous waste. An additional 850 gallons of waste oil, 300 usable gallons of paint and 142 car batteries were collected. The oil and batteries will be recycled, and the paint will be used in low-income public service projects throughout Black Hawk County.

The second cleanup event was held June 17 in Denison in Crawford County. Residents from Crawford, Audubon and Carroll counties brought in 109 barrels worth of waste. An estimated 320 gallons of waste oil were collected and will be turned over to a Nebraska oil company for recycling. Also collected were 73 pounds and 96 gallons of various pesticides which will be redistributed and 242 car batteries which will be recycled.

The hazardous materials collected from both events were sent to GSX Chemical Services of Greenbriar, Tennessee, for disposal. Iowa



*Car batteries collected during June Toxic Cleanup Days in Denison will be recycled.*

currently has no permitted hazardous waste disposal site.

The Department of Natural Resources conducts the cleanup days to collect quantities of less than 220 pounds or 25 gallons per person of hazardous waste from households and farms. Through cleanup days, residents are able to dispose of toxic waste in a proper manner rather than by common disposal methods such as spreading on the ground, flushing down sanitary and storm sewers, sending to sanitary landfills with regular household refuse, and long-term storage.

Toxic Cleanup Days are funded through fees paid by retailers who have permits to sell household hazardous materials. Currently there are about 12,000 retailers who have such permits in Iowa.

Additional cleanup events will be held this fall. For more information on Toxic Cleanup

Days write Iowa Department of Natural Resources, Wallace State Office Building, Des Moines, Iowa 50319-0034.

## Small-Game Harvest Decreases In 1988

Iowa small-game hunters generally had poorer success in 1988 than in 1987, according to Terry Little, wildlife research supervisor for the Department of Natural Resources.

The estimated Iowa pheasant harvest for 1988 was 1.1 million roosters, down 19 percent from the 1.4 million taken in 1987. The number of pheasant hunters, resident and non-resident, decreased four percent from 1987 to 204,000. More than 96 percent of the non-resident hunters pursued pheasants.

According to DNR officials, the distribution of pheasant hunting trips and harvest differed from earlier years. More than half the pheasant kill and 43 percent of the

pheasant-hunting trips were made the opening two weekends and intervening week of the season. Usually only about a third of the kill occurs in this time period.

"An earlier than normal crop harvest caused by the drought made roosters more vulnerable than usual early in the season," said Little. "Early season hunters took a large percentage of the rooster pheasants and late season hunting was difficult as a result."

The quail harvest for 1988 declined 27 percent from the previous year to 290,000. Hunter numbers declined 13 percent to 73,000. Just under one-third of the hunters pursued quail.

Gray (Hungarian) partridge harvest declined five percent from 1987 to 104,000. The number of partridge hunters increased three percent to 42,000. About 17 percent of small-game hunters pursued huns.

Squirrel harvest in 1988 decreased only four percent from 1987 with a little more than half a million squirrels taken. The number of squirrel hunters continues to decline. Less than one-third of those buying small-game licenses hunted squirrels.

Cottontail harvest dipped to under half a million in 1988, down 38 percent from 1987. Hunter numbers decreased 13 percent.

Only 1.9 million trips were taken small-game hunting in 1988, a decline

of about 17 percent compared to 1987.

South-central Iowa small-game populations were affected the most by the drought, with good-to-excellent hunting available only in parts of northwest and north-central Iowa.

### Record Number of Deer Harvested In 1988

A record number of white-tailed deer were harvested by Iowa hunters in 1988, according to Willie Suchy, deer management biologist for the Department of Natural Resources.

The harvest estimate of 93,750 was 24 percent higher than the number harvested in 1987, making 1988 the ninth year in a row with a record harvest. "The primary reasons for the increased harvest were increased hunter numbers and excellent success rates," said Suchy. "Good weather during the hunting season also encouraged hunters to be in the field."

Shotgun hunters harvested the greatest number of deer with 80,000 deer taken. Success rates for hunters

in the field averaged more than 65 percent. Zone 9 in northeast Iowa and zone 6 in southeast Iowa had the highest rates of harvest, but zones 4, 5 and 7 also had good harvests. Success rates of nearly 80 percent were reported in zones 1, 9 and 10. About 55 percent of the shotgun harvest consisted of bucks.

Archery hunters bagged nearly 10,000 deer with success rates running close to 35 percent. About 70 percent of the deer harvested were bucks.

Interest in the special muzzleloader-only seasons continued to increase in 1988. Hunters harvested about 1,835 deer during the early season and 1,294 during the late season. Success rates were about 55 percent for early season hunters compared to 40 percent for late season hunters.

"The outlook for the 1989 season should be excellent," said Suchy. "Hunters will still have the option to select for bucks, even though almost all hunters will have any-sex tags, a sign that there are a lot of deer available."

### Classroom Corner

by Robert P. Rye

Animals are a definite attraction to visitors at the Conservation Education Center at Springbrook State Park. While at the center, visitors always find time to photograph white-tailed deer, catch fish in the ponds or watch the various small animals in the area. The following questions are about some of the animals often overlooked by visitors.

1. This animal is usually aquatic, has stalked eyes and lives in a shell.

2. This animal is segmented, subterranean and is bait for anglers.

3. This animal has eight legs, is usually terrestrial and spins webs as traps.

4. This animal is aquatic, soft-bodied and lives in two-hinged shells.

5. This animal is segmented, aquatic, has suckers and feeds on plants or animals.

6. This animal has many legs (one per segment), is soft-bodied, may be poisonous and is found in damp places.

7. This animal has many legs (two per segment), is hard-shelled, non-poisonous and is found in damp places.

8. This animal has eight legs, is tiny, burrows under the skin of people and is found in lawns.

9. This animal is terrestrial, flattened, has several body and leg segments and is found in damp places.

10. This animal has eight long legs, no antennae, and segmented abdomen.

- a. centipede
- b. chigger
- c. earthworm
- d. harvestman
- e. spider
- f. snail
- g. millipede
- h. clam
- i. leech
- j. sow bug

Apply early for your

**Deer License**

this year.

The Iowa DNR reminds you to mail your application for a deer license before

**Aug. 31.**

ANSWERS:

a. f 2. c 3. e 4. h 5. i 6. a 7. g 8. b 9. j 10. d.

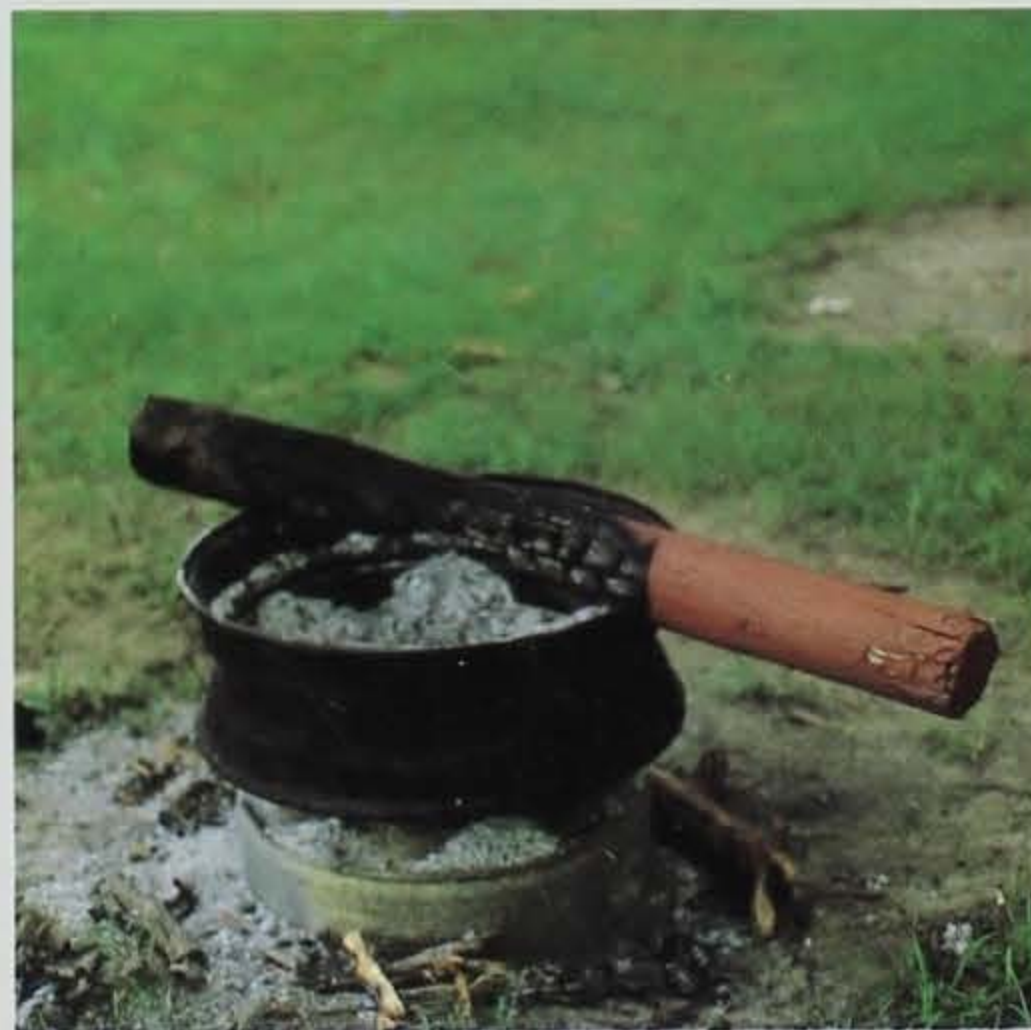
## COUNTY CONSERVATION BOARD FEATURE

### Striking Back At Vandalism by Thomas C. Bruegger



MONONA COUNTY CONSERVATION BOARD

*Vandalism costs Iowans not only in terms of dollars but also in terms of destroyed natural resources. Damaged signs and other equipment can be repaired or replaced -- at taxpayers' expense. However, damage to trees, soil and other resources is more difficult, if not impossible, to correct.*



MONONA COUNTY CONSERVATION BOARD

How often have you visited a park or wildlife area and were greeted by signs of vandalism? Too often, probably. It is a sad fact of park management that most publicly owned areas have been abused in one way or another, at one time or another.

Vandalism—the willful destruction of property—costs the taxpayers of Iowa thousands of dollars each

year. That is money that could be better spent in providing park facilities or programs. Even worse than the monetary loss is the fact that those of us who are resource managers cannot accomplish many worthwhile projects because our time is spent repairing this senseless damage.

Vandalism takes many forms. Vandalism includes overt acts like tearing off boards to a toilet entrance or burning picnic tables. But vandalism also includes graffiti scratched into walls and picnic tables, broken tree branches and trunks, bare strips of soil exposed by spinning tires, and signs damaged by shotguns and vehicles.



As resource managers, we need your help in reporting acts of vandalism. A call to the local sheriff's office with a name or vehicle license number of a suspected vandal will help tremendously. If you would prefer not to deal with local officials, the state-wide Crime Stoppers number is 1-800-532-2020. Your identity is not required.

Help us preserve the natural beauty of outdoor Iowa — let's strike back at vandalism.

*Thomas C. Bruegger is the director of the Monona County Conservation Board.*

## CALENDAR

### AUGUST 11-13

**Chichaqua Free Skinners Rendezvous.** Crafts, nature hikes, canoe rental and displays at the Chichaqua Wildlife Area, five miles east of Elkhart. For more information, contact the Chichaqua Wildlife Area at (515)967-2596 or the Polk County Conservation Board, Jester Park, Granger, Iowa 50109, (515)999-2557.

### AUGUST 12

**Whaletown Triathlon.** Swimming, running and biking event at Lake Anita State Park. For more information, contact Lake Anita State Park, Rte. 1, Anita, Iowa 50020, (712)762-3564.

### AUGUST 19 AND 20

**Prairie Harvest Festival.** Smith Lake Park in Algona is the location for this festival featuring square dancers, folk music, bluegrass band and craft demonstrations. For more information, contact Kossuth County Conservation Board, Rte. 2, Box 216A, Algona, Iowa 50511, (515)295-2138.

### AUGUST 26

**Iowa Wildlife and Hunting Photo Contest.** Contest with two classes (amateur and professional) and two categories (color and black and white). Entry fee. For more information, contact Bert Hallewas, Black Hawk County Conservation Board, 2410 W. Lone Tree Road, Cedar Falls, Iowa 50613, (319)266-6813 or (319)266-0328.

### AUGUST 26 AND 27

**Iowa Game Fair and Outdoor Recreation Show.** Black Hawk Park is the location for the fourth annual game fair. Events include shooting activities, outdoor recreation exhibits, fish and game cook-off, seminars and demonstrations. For more information, contact Bert Hallewas, Black Hawk County

Conservation Board, 2410 W. Lone Tree Road, Cedar Falls, Iowa 50613, (319)266-6813 or (319)266-0328.

### AUGUST 27

**Big Creek Triathlon.** Swimming, running and biking event at Big Creek State Park. For more information, contact Ed Wallace, Des Moines YMCA, 1000 Porter, Des Moines, Iowa 50315, (515)285-0444.

### SEPTEMBER 6

**Farming With Wildlife: A Land Management Field Day.** Tours, demonstrations, how-to seminars and exhibits at the Iowa 4-H camping center. For more information, contact Jim Pease, Department of Animal Ecology, Iowa State University, Ames, Iowa 50011, (515)294-7429.

### SEPTEMBER 9

**Iowa Bluebird Conference.** Science Center at Buena Vista College in Storm Lake is the location for a conference on bluebirds and other nongame wildlife. For more information, contact Jim Hansen, Iowa Department of Natural Resources, 1203 North Shore Drive, Clear Lake, Iowa 50428, (515)357-3517.

### SEPTEMBER 9 AND 10

**Chichaqua Wild Game Expo.** Exhibits of sporting goods and hunting and fishing areas, outdoor shooting sport events, rendezvous encampment, demonstrations and displays. For more information, contact Polk County Conservation Board, Jester Park, Granger, Iowa 50109, (515)967-2596.

### SEPTEMBER 23 AND 24

**Fort Atkinson Rendezvous.** Buckskinners, period costumes, food and crafts, military drills and theatrical productions within the historic fort walls. For more information, contact Volga River State Recreation Area, Rte. 1, Box 72, Fayette, Iowa 52142, (319)425-4161.

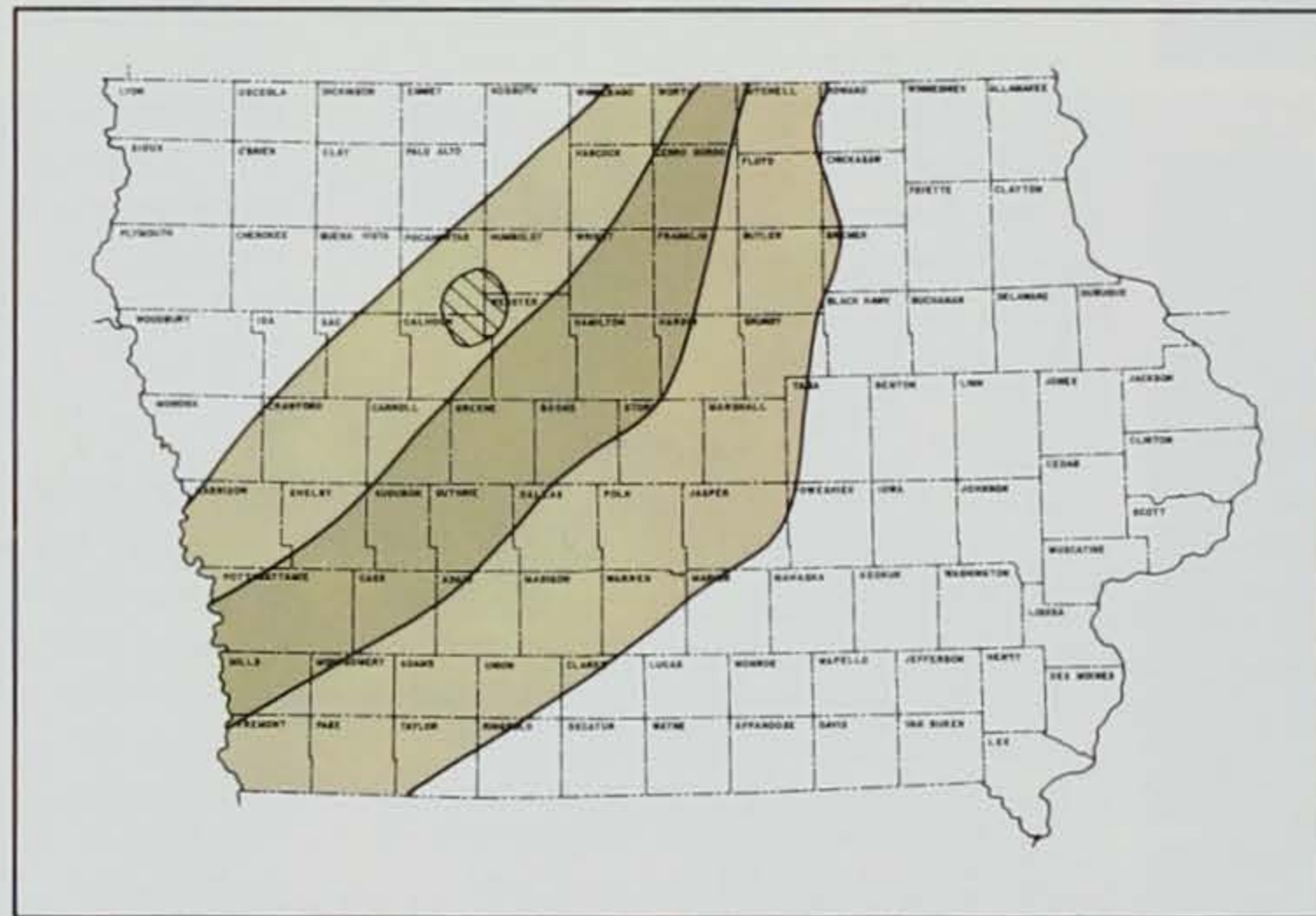
# IOWA'S MANSON CRATER




*Apparently created by the impact of a large meteoroid or asteroid, its formation may have helped trigger the dinosaurs' demise.*

One of the most unusual geologic structures known on the North American continent lies buried beneath 50 to 300 feet of glacial deposits in the productive farmlands of north-central Iowa. This pastoral landscape reveals no clues about an event that shook the area with unprecedented explosive force about 66 million years ago.

The geologic structure, now known as the Manson Crater, is roughly circular in outline with a diameter of about 22 miles and is centered north of the town of Manson near the Calhoun-Pocahontas county line.

Over the years, unexpected rock sequences have been encountered during the drilling of water wells in the Manson area. Information from these wells provided the basis for the initial recognition of the Manson structure in the early 1950s. The presence of Precambrian-age igneous and metamorphic rocks (granites and gneisses) immediately beneath the glacial deposits near the center of the



-  Manson Crater
-  Belt of volcanic rocks
-  Deep sedimentary basins

structure is especially noteworthy, as such rocks are found nowhere else in Iowa that close to the land surface. Thick sections of fossiliferous Cretaceous-age shales, which were deposited in the last seaway that covered Iowa, also are noted within the Manson structure. Similar shale deposits have even eroded from Iowa localities outside

the Manson structure, indicating that these shales were downdropped along faults and preserved within the structure prior to their regional erosion elsewhere.

Availability of groundwater from shallow bedrock aquifers remains a problem for many residents living within the crater area, perhaps because of the widespread occurrence of the thick and relatively im-

pervious Cretaceous shale and other shaly rocks within the Manson structure. However, water wells in the central area of the structure near the town of Manson produce naturally soft water from the fractured Precambrian rocks; this contrasts significantly with the harder, more highly mineralized groundwater produced from bedrock aquifers elsewhere in the state.

The basic features of the Manson structure were deduced in the 1950s: 1) a circular outline; 2) a central uplift of fractured granite and gneiss; and 3) a periphery bounded by faults, or vertical displacement of rock strata.

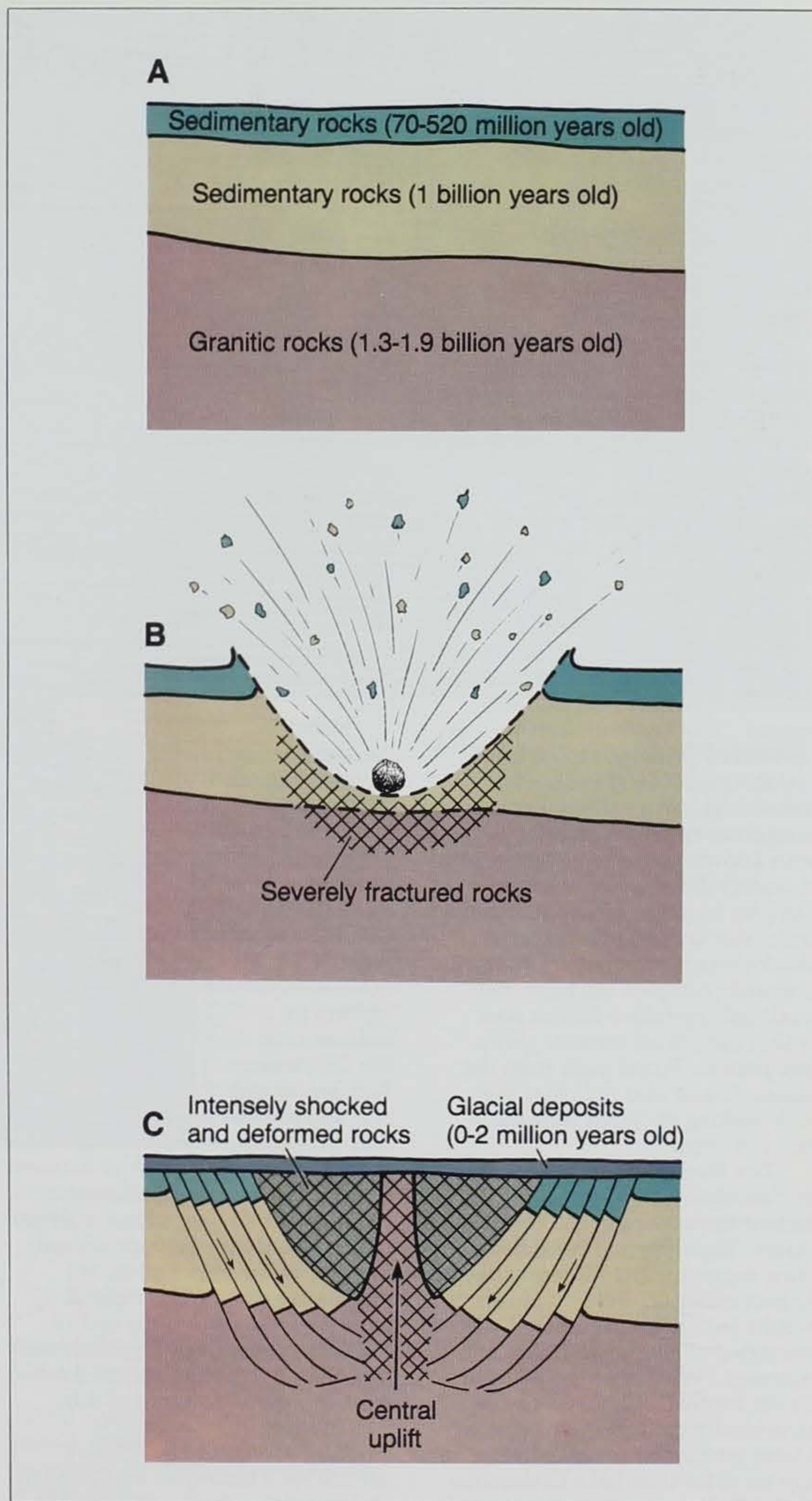
Geologists at the time proposed

by Brian J. Witzke and Raymond R. Anderson

an explosive volcanic origin for the Manson Anomaly, as it was known, but more recent studies include a non-volcanic explosive origin.

Small meteoroids rain into the Earth's atmosphere from outer space on a daily basis, but larger meteoroids, asteroids, or comets seldom collide with the Earth. Nevertheless, sites like Arizona's Meteor Crater, a relatively recent impact about three-quarters of a mile in diameter, prove that our planet is bombarded occasionally by larger extraterrestrial objects. Several meteorite falls have been documented in Iowa, including Marion, 1847; Amana, 1875; Estherville, 1879; and Forest City, 1890; but none of these were large enough to produce impact craters. Could Manson be a large meteoroid or asteroid impact site? What sort of evidence is present?

Two lines of evidence suggest that the Manson feature was created by the impact of a large extraterrestrial object. First, its circular structure resembles other known impact sites, which occur as fault-bounded features with a central uplift. The Manson Crater overlies a region characterized by deep sedimentary basins of Precambrian-age that flank a central belt of volcanic rocks stretching northeast-southwest across Iowa (see map). These ancient basins are filled with sandstone and mudstone deposits up to six miles thick and were the target of the 17,851-foot Carroll County exploration well drilled by Amoco in 1987. These Precambrian sedimentary rocks, which occur at depths of about 2,300 feet outside the Manson structure, have been encountered at much shallower depths (about 100 feet) within the Manson Crater, a result of complex block-faulting. Outside the structure, these basins overlie granitic rocks at a depth of about 22,000 feet, but in the central part of the Manson Crater the granitic rocks were uplifted an estimated two to four miles, to within 90 feet of the land surface — a dramatic uplift by any standard. Younger rocks of Paleozoic and Mesozoic age overlie the sedimentary basin and were



*Meteor impact severely deformed sedimentary rocks, caused the uplift of deep granitic igneous rocks, and resulted in a complex crater structure now covered by younger glacial deposits. Vertical exaggeration 1.5x.*

severely disrupted and deformed during crater formation. These younger rocks are fractured and faulted within the crater, and locally display fault-related (cataclastic) rock fabrics. Chaotic admixtures of Precambrian, Paleozoic, and Mesozoic rocks are encountered in many well penetrations, and may represent crater-filling (see sequential diagram, page 30).

The second line of evidence for an impact origin stems from a study of unusual, shock-induced features seen within rock samples from the Manson Crater. Two rock cores drilled by the Iowa and U.S. Geological Surveys in 1953 provided these critical samples. A large body impacting the Earth at phenomenal velocity would vaporize and/or melt the rock at the point of impact and send violent shock waves through the adjacent area. The development of shock-induced rock fabrics, also termed "shock-metamorphism," is considered prime evidence for impact origin. Intense shock-metamorphism generally has not been observed to be associated with known volcanic explosions (or is weakly developed at best). Samples from the Manson impact crater display an abundance of shock-metamorphosed features, primarily complex fractures and modified crystalline fabrics seen within individual mineral grains (see photo). Fused glass from the Mason Crater also indicates that rock melting occurred near the point of impact.

The Manson Crater, also called an "astrobleme," is the largest meteor-impact site in the United States. Experimental considerations suggest that a Manson-sized impact crater (22-mile diameter) would require an impacting body estimated at about two miles in diameter. When was the Manson Crater formed? The presence of structurally disturbed Cretaceous shales within the crater indicates an age no older than Lake Cretaceous time. Radiometric-age dates based on fission-track and argon-argon methods recently have been determined from the Manson samples by geologists at the U.S. Geological

Survey (Charles Naeser, Michael Kunk and others), and these dates average about 66 million years old. This age closely approximates the age of the Cretaceous-Tertiary boundary, an important global chronologic boundary that marks the extinction of many forms of life including most of all of the dinosaurs, and the beginning of the "Age of Mammals."

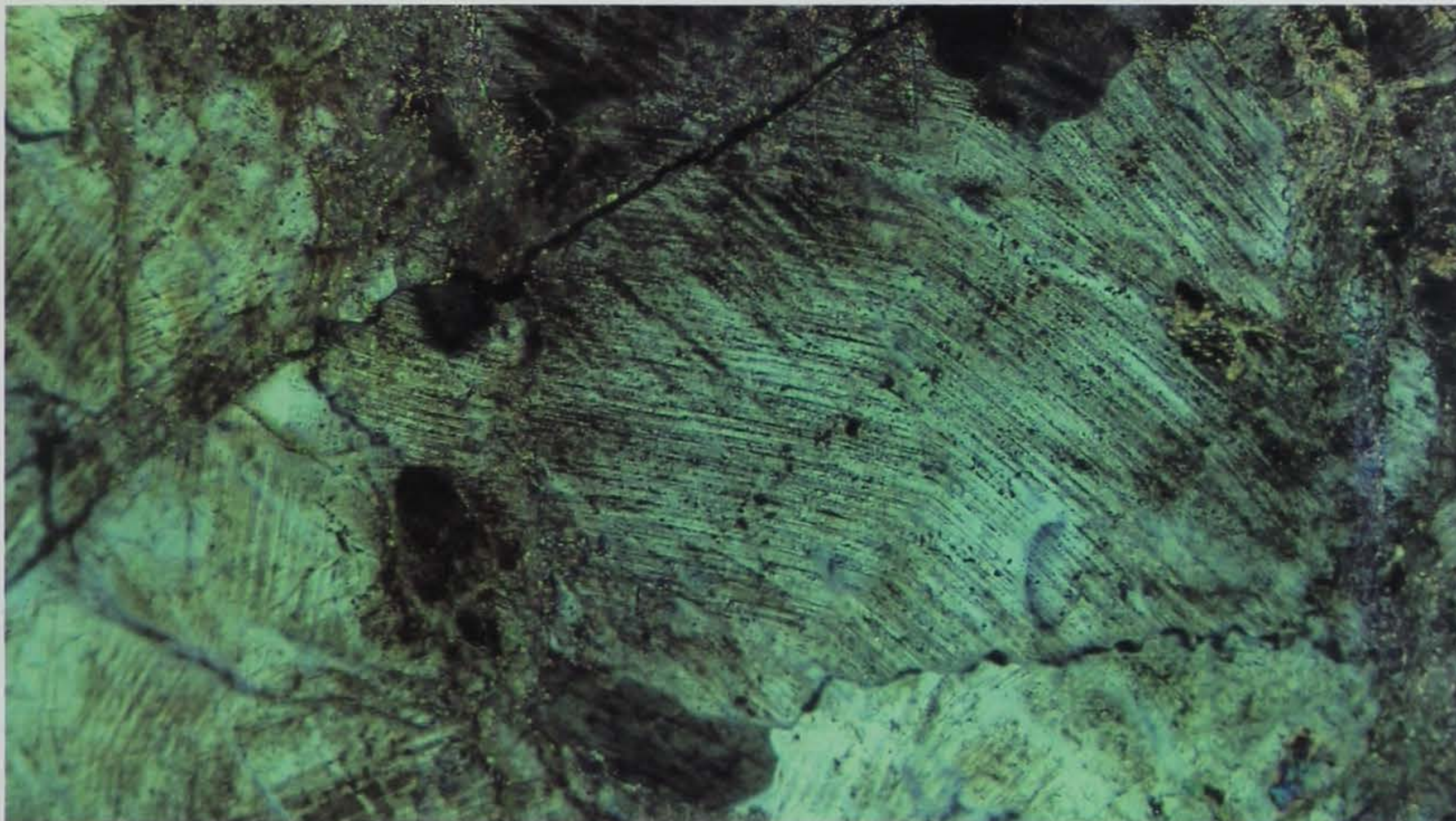
Nobel Laureate Luis Alvarez, his son Walter, and their colleagues at Berkeley, California, have recognized an unusual enrichment of the noble element iridium in sediments at the Cretaceous-Tertiary boundary, and in 1980 they proposed an extraterrestrial source for this enrichment. They further suggested that a large impact event may account not only for the iridium enrichment, but may have helped trigger global biologic extinctions at the end of the Cretaceous. They hypothesized that a large impact event would send enormous volumes of dust into the atmosphere, thereby blocking sunlight to the Earth's surface for a time span long enough to disrupt the photosynthetically based food chain and create a global biologic crisis. Although this hypothesis remains controversial, evidence for a major impact



DES MOINES REGISTER

*William and Grace Kalsow owned the property on which the first core was drilled in August 1953.*





BRIAN WITZKE

event at the Cretaceous-Tertiary boundary now seems incontrovertible. Iridium-enriched boundary layers have now been recognized at numerous sites around the world, and shock-metamorphosed quartz grains are noted in these boundary layers at many sites as well, particularly those in North America. The Manson impact crater has been proposed as a likely source for these widely dispersed, shocked-quartz grains.

Could the explosive impact that created the Manson Crater be responsible for the extinctions at the close of Cretaceous time? Current theory suggests that the Manson Crater, by itself, is probably not large enough to have produced a sufficient volume of dust to induce global atmospheric darkening. Nevertheless, the Manson Crater remains the only candidate large enough and with an age coincident with the Cretaceous-Tertiary boundary. Perhaps a swarm of meteoroids and asteroids impacted the Earth at that time, and Manson is but one of many contemporaneous impact sites. At the other extreme, perhaps the Manson impact had little effect on the Cretaceous extinctions, and

other causes need to be evaluated.

Much remains to be learned about the geology of the Manson Crater. A cooperative study program is presently the focus of the Manson Impact Structure Team (MIST), a group of 20 geologists from across the country interested in this Iowa feature. Samples from the 1950s core will be subject to further analytical studies, including age-dating, paleomagnetism, and various petrologic examinations. It is clear to all participants that a sequence of drill cores across at least the radius of this structure is essential to form a more complete picture of the impact site's characteristics.

**Reprint from *Iowa Geology*, 1988, pages 5 through 8.**

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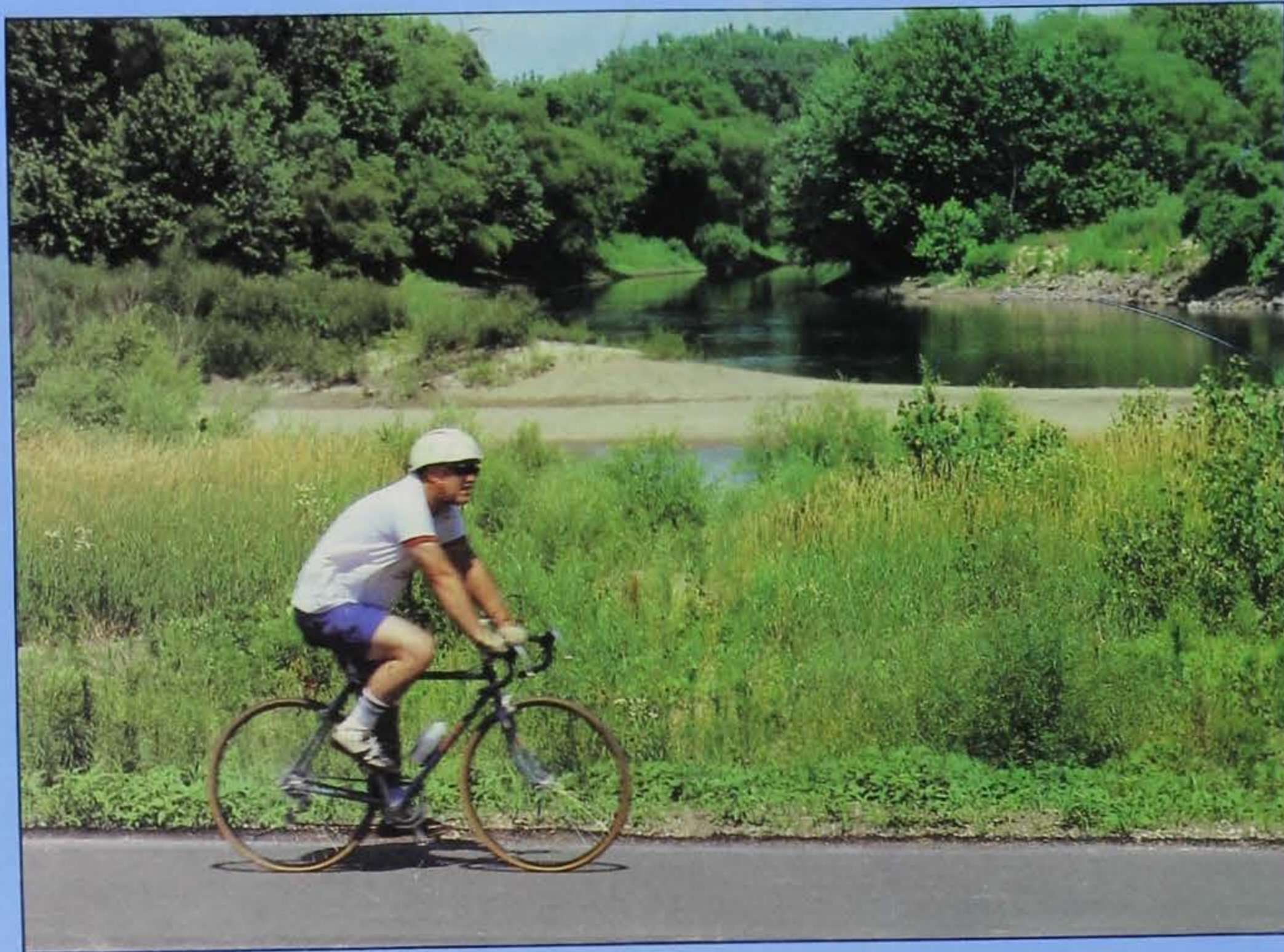
*Brian J. Witzke is a geologist for the department's geological survey bureau in Iowa City.*

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*Raymond R. Anderson is a geologist for the department's geological survey bureau in Iowa City.*

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*Microscopic fractures through this quartz grain, seen as sets of closely spaced, parallel, and intersecting lines, are unique indicators of shock-metamorphism. Field of view is 1.3 mm.*



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