Iowa CONSERVATIONIST

September/October 1993

Department of Natural Resources

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Iowa CONSERVATIONIST

September/October 1993
Volume 52, Number 5

Iowa Conservationist (ISSN 0021-0471) is published bimonthly by the Iowa Department of Natural Resources, Wallace State Office Building, Des Moines, Iowa 50319-0034. Second class postage paid in Des Moines, Iowa, and additional mailing offices. **Subscription rates: $9.97 for one year, $14.97 for two years and $19.97 for three years. Prices subject to change without notice.** Include mailing label for renewals and address changes. POSTMASTER: Send changes to the *Iowa Conservationist*, Department of Natural Resources, Wallace State Office Building, Des Moines, Iowa 50319-0034.

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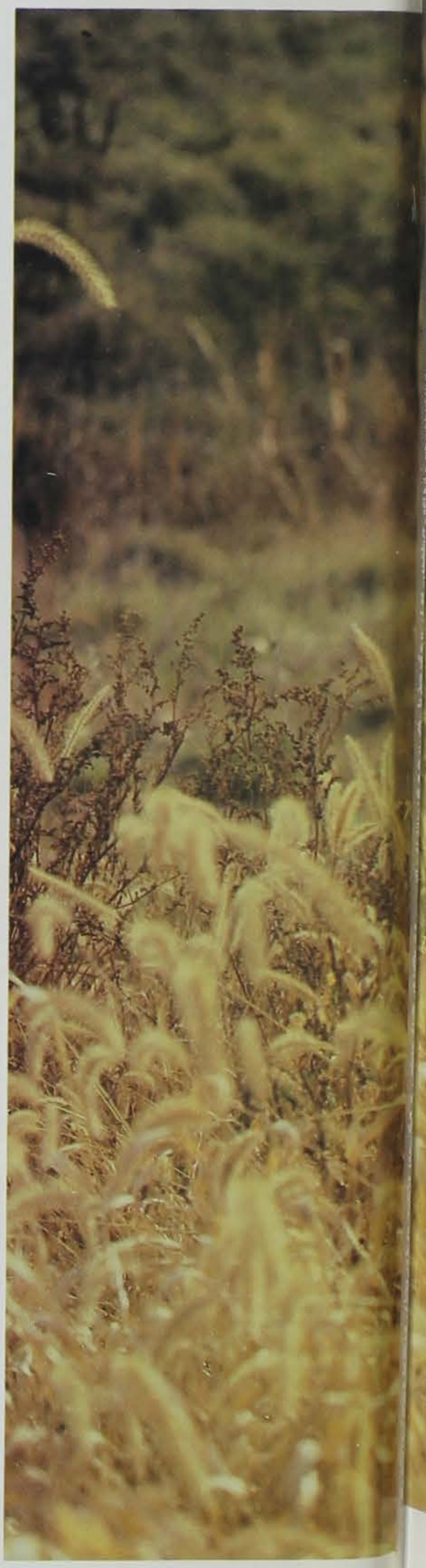
Front -- Sunrise from a duck blind by Lowell Washburn.
Back -- Fall color by Ken Formanek.
Inside Front -- Pelicans by Ken Formanek.
Inside Back -- Ledges State Park by Roger A. Hill.

Pheasants
1992: Harvest of 925,000 roosters was the lowest in seven years. Bad weather and standing crops during the hunting season and a poorer-than-expected hatch all contributed.

Outlook: Not optimistic. Monsoon rains during the nesting season have certainly hurt production in all areas of Iowa. Areas north of Interstate 80 with good brood stock will have local areas of good pheasant numbers. Final assessment in September.

CRP Having an Impact

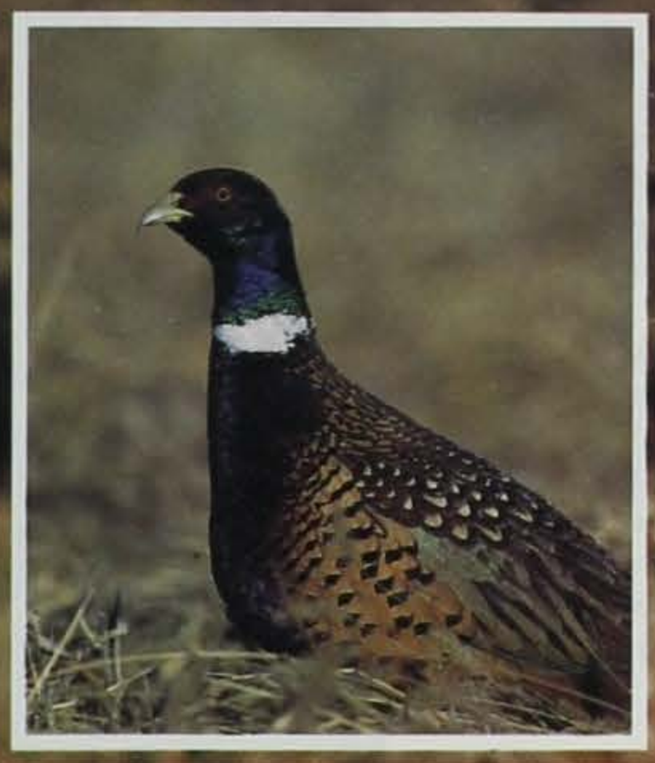
Article by Terry Little
Photos by Roger A. Hill



Lowell Washburn

NO STATE HAS SUFFERED AS DRAMATIC A CHANGE IN ITS LANDSCAPE SINCE EUROPEAN SETTLEMENT AS Iowa -- 99 percent of an original 25 million acres of prairie, 95 percent of 7.4 million acres of wetlands and 66 percent of 7 million acres of forest were plowed, drained or cleared in the first century of settlement to allow agricultural production. Many species of wildlife either disappeared from Iowa or suffered greatly reduced populations as their habitats were eliminated. Big game animals like buffalo, elk and white-tailed deer, and the larger predators like black and grizzly bears and prairie wolves, competed with humans for space and forage and were completely eliminated. Waterfowl that darkened the skies and nested in Iowa by the millions were reduced to just remnants of their former numbers.

In the mid-20th century, advances in agricultural technology led to a further intensification of agricultural practices that dealt a second, devastating blow to Iowa's wildlife. Small diverse farms were converted to larger mechanized agribusiness operations. Many weedy draws and odd field corners were cleared, most of the



Quail
1992: Harvest of 180,000 quail is the lowest on record for the same reasons as pheasants.

Outlook: Below-average season. Although production could be better than pheasants due to late season nesting efforts.

last small wetlands on private land were drained and intensive rowcrop farming was begun on ever more marginal soils. Populations of small game and nongame animals suffered dramatically.

By 1970, wildlife habitat was nearly eliminated from the north-central and northwest regions of Iowa, representing nearly half the land area of the state. Although small game and nongame populations fared better in other regions, ever-intensifying land-use practices created an ongoing loss of habitat that threatened their existence as well.

The Conservation Reserve Program

The implementation of the Conservation Reserve Program (CRP) in 1986 represented the first reversal in the trend to declining habitat for wildlife since the Soil Bank program of the 1950s. Since 1986, 2.2 million acres have been enrolled in CRP, more than 98 percent in grass or grass/legume cover types. Cool season grasses like smooth brome, orchard grass and timothy were planted on 90 percent of CRP acres. Warm season grasses, primarily switchgrass, were established on seven percent, and trees, wildlife cover, grassed waterways and filter strips comprise the remainder.

A further diversification of CRP habitats has been possible through the restoration of wetlands on land already enrolled in CRP. The DNR, in cooperation with the U.S. Fish and Wildlife Service and numerous private conservation organizations has acquired 13,434 acres of upland and wetland habitats in northwest and north-central Iowa as part of the North American Waterfowl Management Plan's Prairie Pothole Joint Venture (PPJV). Much of this was marginal cropland enrolled in CRP, subject to Swampbuster and Conservation Compliance provisions and no longer as valuable to farmers. An additional 515 wetland basins have been restored on private land, 80 percent on CRP lands.

Wildlife Benefits

How has wildlife benefited? Several research studies now being conducted by the Iowa DNR and Iowa State University (ISU) are beginning to shed some light on the effects of CRP on wildlife. While these studies are not yet complete, enough evidence has accumulated to indicate that CRP has had a tremendous positive impact on small game and nongame populations, particularly in the north-central and northwest regions where habitat was scarcest. Completion of these studies and final data analysis may change specific conclusions, but some trends are obvious at this time.

Upland Game Birds

The DNR conducts 209, 30-mile roadside survey routes annually to measure annual and long-term trends in

Furbearers
1992: good year for fox and coyote hunters because of prolonged snow cover. Poor year for trapping due to early freeze-up.

Outlook: Excellent, if weather cooperates during the seasons. Populations of most species at near-record modern levels.

populations of small game animals. A comparison of survey results with the amount of CRP acreage enrolled by county has revealed a statistically significant increase in observations of pheasants, quail and partridge as the amount of CRP increased. The effect on pheasants was greatest in those counties where the land base in rowcrops averaged greater than 66 percent of the county -- principally the intensively farmed northwest and north-central regions. Converting as little as four percent of the county from rowcrop production to CRP significantly increased pheasant numbers seen on survey routes.

The DNR and ISU are conducting an intensive pheasant research study in north-central Iowa to determine the relationship between the amount and distribution of pheasant habitat to pheasant population dynamics. Two township-sized areas are being studied. One area is in intensive rowcrop production typical of northern Iowa -- 84 percent of the land in rowcrops, 12 percent in grass (primarily road ditches and drainage ditches) and three percent in woody and wetland cover. The other area has considerable acreage in grassy cover (primarily CRP) -- 57 percent rowcrop, 25 percent grass, nine percent woody and wetland cover, and eight percent miscellaneous cover types.

Roadside surveys have been conducted on the two areas since 1985, before CRP was implemented. On the intensive rowcrop area, pheasant numbers have remained low, averaging just nine birds observed per 30-mile route annually. On the area with CRP, pheasant numbers have increased from 12 birds per 30 miles before CRP was implemented to 158 birds per 30 miles in 1992 -- more than a 10-fold increase.

Year-around monitoring of pheasant hens carrying miniature radio transmitters indicates that the primary reason for the differences in pheasant populations on the two areas has been greater overwinter survival of pheasants on the area with CRP acres. Survival of hens on this area has averaged nearly 20 percent higher than on the area with little CRP, and has been 50 to 100 percent higher in winters that were severe enough to cause above-average mortality of pheasants.

Participation in upland game hunting also provides an index to wildlife population levels. The pheasant harvest has increased from 852,000 in 1985 to 1.5 million by 1989. Hunting license sales to nonresidents have increased from 22,000 in 1985, the year

Rabbits/Squirrels
1992: Like game birds, poor hunting conditions reduced harvests 19 to 28 percent.

Outlook: Good hunting for squirrels which are largely unaffected by summer rains. Rabbits may have suffered due to drowning out nests and chilling of young.

before CRP was implemented, to 46,000 in 1991. This increase alone has provided a $15 million boost to Iowa's economy.

Upland Nongame Birds

Iowa State University, with partial financial support from the DNR's nongame program, is conducting a study on upland nesting nongame birds, comparing populations and nest success in 10, 40-acre blocks of CRP grasslands with 10, 40-acre blocks of typical rowcrop farmland. After two field seasons they report that more species of birds were observed in rowcrop fields (34 species) than in CRP fields (24 species). However, birds seen in rowcrop fields were primarily common species like red-winged blackbirds, brown-headed cowbirds, vesper sparrows, horned larks, barn swallows and pheasants. Relatively rarer dickcissels, grasshopper sparrows, common yellowthroats, bobolinks and sedge wrens were the most common species seen in CRP fields.

Just two species nested in rowcrop fields, compared to nine species in CRP fields. There was less than one nest per 40 acres in rowcrop fields, but greater than 15 per 40 acres in CRP fields.

Nest success for birds in CRP fields was 33 percent, higher than the 20 percent typically found in hay fields.

> . . . it is apparent that CRP has had a positive impact on wildlife populations, on outdoor recreational opportunity and on Iowa's economy . . . The biggest benefits have accrued in the most intensively farmed portions of Iowa, where wildlife's survival was most tenuous.

Other studies have shown that fields in hay production often attract a similar complement of nesting nongame birds, but suffer catastrophic nest losses during haying operations. CRP fields are usually not mowed during the nesting season except for spot weed control.

Wetland Nongame and Furbearers

Several studies, many partially funded by the DNR, have been conducted at ISU to determine nongame bird use of recently restored wetlands. Avian colonization begins in the first year after wetlands are created, with the appearance of American coots, red-winged blackbirds and a host of shorebirds that use newly created mudflats during migration.

By the second and third year, use of restored wetlands is nearly the same as for established wetlands that were never drained. Fifteen species were seen nesting on restored wetlands, compared to 18 on older wetlands. Relatively uncommon species like bobolinks, American and least bitterns, black and

Waterfowl 1992: Harvest of ducks and geese down slightly due to poor weather and standing crops during the season.

Outlook: Excellent season. Another year of record giant Canada goose production in Iowa and excellent weather conditions should provide many geese for hunters. Heavy rains led to excellent production of ducks in Iowa in temporary sheet water.

Ron Johnson

Deer
1992: Harvest down slightly due to poor hunting weather, standing crops and license restrictions designed to protect does.

Outlook: Good season. Deer herds mostly stable, but season format has been changed to protect more does over a larger portion of northern Iowa.

Forster's terns and upland plovers were observed on newly created wetlands. The missing species on restored wetlands were birds that nest only in emergent, cattail vegetation that had not yet had time to develop. In general, larger and older restored wetlands had the most species present.

Restored wetlands also developed a normal complement of game and nongame mammals. By the third year, mink, muskrat, raccoon, red fox and weasels appear common.

Reptiles and amphibians are somewhat slower to colonize, but by the third year painted and snapping turtles and leopard frogs were common.

Waterfowl

Since 1987, the DNR has conducted breeding waterfowl surveys on wetlands restored under the PPJV and on adjoining CRP uplands. Breeding pairs of ducks on restored wetlands have averaged two pair per acre of water -- as good or better than reported from established wetlands throughout the five-state PPJV region. Canada geese have averaged one pair per three acres of water, lower than established wetlands, but densities are expected to increase as emergent vegetation develops. Emergent vegetation effectively isolates goose pairs and provides nesting areas, allowing more goose nests per acre of water than in the open-water situations found in new wetlands.

Waterfowl nest densities on CRP lands are difficult to evaluate because much of the land is located far from wetlands. Nest success rates in CRP fields have averaged 18 percent -- as good as or better than found on wildlife management areas and good enough to double duck populations in 10 years.

Although research data is still being collected and evaluated, it is apparent that CRP has had a positive impact on wildlife populations, on outdoor recreational opportunity and on Iowa's economy. Although as little as four percent of the rowcrop acreage in some counties has been converted to grassy habitats, significant increases have been seen in both game and nongame populations. CRP's chief value has been to provide habitat where none existed for nesting and overwinter survival of game and nongame birds, mammals and amphibians. The biggest benefits have accrued in the most intensively farmed portions of Iowa, where wildlife's survival was most tenuous. Waterfowl, ring-necked pheasants and relatively rare grassland- and wetland-nesting nongame birds have been the chief recipients of the additional habitat.

Elimination of CRP acres would immediately reverse these gains, except in the few cases where land has been purchased by a public agency or where perpetual easements have been acquired. The DNR is working closely with other state and federal wildlife agencies to influence Congress to extend CRP contracts. Vocal and continued support from everyone interested in perpetuating the wildlife benefits of the Conservation Reserve Program will be essential as this issue works its way through Congress in the next two years.

Terry Little is a wildlife research supervisor for the department's wildlife bureau in Des Moines.

Fifth in a Series

REAP's Not-So-Secret WEAPON

by Ross Harrison

Scene
A West Des Moines elementary school library

With slightly biting hunger in her belly, Polly was squint-eye concentrating on the fruit-layered Jello. The first-grader was trying hard to imagine the Jello was a leaf from a tree. It was already a half hour after school and the day-care leader had promised the tantalizing treat could be eaten. But first, she and her six buddies had to play this game.

"Try to think of the grapes on the bottom of the Jello as the part of the leaf that lets in air."

"Does a leaf breathe?" Polly shot out.

The day-care leader thought to herself, "Ah ha! This does make them think."

Scene
The Raccoon River in Guthrie County, Iowa

Jerry had received his first canoe baptism just 30 seconds after he tried to get in the awkward vessel. He knew it was his own fault for not listening to the naturalist, so while he was toweling off, he was listening, intently, a little embarrassed.

If his eighth-grade PE students heard about this, he'd have to undergo another round of ribbing -- probably worse than what he had just received from his 23 fellow educators-turned-students. He and the other junior high teachers were learning about canoeing, and everything else that can be crammed into seven full days of outdoor recreation training. They had become close in the last few days.

"Keeping your weight low, knees bent, and a balanced grip on both sides of the canoe will allow you to move to stern or bow without taking a bath," the naturalist reiterated.

"That makes sense," Jerry offered, amidst the agreeing smiles of the others.

Scene
The landfill in Cedar Rapids

"That smells like money, doesn't it?" the utility engineer smiled as he replaced the methane pipe cap.

"We used to say that about odor around a hog lot, but it also applies to the garbage fermenting several dozen feet below us. As our household wastes decompose, methane gas is produced. We collect it, pipe it, clean it, then burn it almost like natural gas to run generators and make electricity."

As the engineer explained, his audience of a dozen, retired, somewhat senior but very active citizens busily filled their journals with facts they were absolutely tickled to learn. Most of them were well beyond their one-hundredth page of documenting their environmental lessons. They had visited eight, wholly different environmental-issue sites in the last four months.

The engineer mused to himself, "If only that group of sixth-graders who were out here last week had this kind of attentive enthusiasm, our future would certainly be more secure."

Scenes like these, numbering in the thousands, widely varied in content, highly diverse in audience, and scattered liberally throughout the state, share a common thread that has continued to make Iowa a national leader in environmental education.

Because of a special provision in the state's 1989 Resources Enhancement and Protection (REAP) Act to provide new funding, and because of a strongly motivated corps of environmental education professionals, Iowa has become the envy of many other states that know a sound environmental education program is a critically needed weapon in the battle for a better planet. REAP has made it so in Iowa.

The Money

Since REAP began funding Iowa environmental education programs in the summer of 1989, it has provided nearly $3.4 million to the cause.

Actually, REAP has directly contributed about $1.8 million, but an additional $1.6 million has been added to the REAP funding in the form of cost-sharing from those who were seeking REAP grants, according to figures compiled by Duane Toomsen, environmental education consultant of the Iowa Department of Education. More than 100 total projects have been funded to date, and while the number of teachers and students who have been directly benefited by these projects has not yet been tabulated, it is approaching a high percentage of the entire population.

Like most good things, the successes of the REAP environmental education program is not an accident. It has been well-planned from the beginning. And, although it is just a little complex, it is worth understanding.

REAP is a 10-year comprehensive program to enhance and protect Iowa's natural resources. Just one of REAP's many facets is environmental education. Other facets include soil and water conservation, acquisition and protection of public natural resource lands and waters, historic resource development and roadside vegetation developments. Although REAP began as a 10-year, $30 million per year effort, in its five-year funding history, it has averaged just under $13 million per year due to state budget problems.

But, each year as REAP is funded by legislative action, the first $350,000 is set aside for environmental education. While some may like that figure to be higher, at least it is a stable and predictable amount. And it has been sufficient to dramatically improve environmental education. The $350,000 is specifically ear-marked for new and innovative activities to produce environmental curriculum materials or to train and encourage teachers to bring environmental education into their classrooms. Here's how that works.

The Process

The Conservation Education Program (CEP) board, established by REAP and coordinated by the Department of Education, has five voting members representing the state departments of education and natural resources, the

▲ **Teacher training, much of it earning graduate college credit, is one of the primary REAP-funded environmental education activities.**

Ken Formanek

The "trickle-down" theory works in environmental education. After teachers learn outdoor skills, their students receive the real benefits. There is no better way to understand the outdoors than to canoe it, camp it, cook it or eat it!

Association of County Conservation Boards, the Iowa Association of Naturalists and the Iowa Conservation Education Council. Toomsen provides the staff support for the CEP board.

The board meets at least twice a year to decide where the money goes. The granting process is highly competitive. Frequently there is two or three times the requests for money as there is money available. So to assure that the letter of the law is followed, that there is equal opportunity for all to be considered, and that the best of the best programs are funded, the CEP board has implemented an extensive process to select which projects get funded.

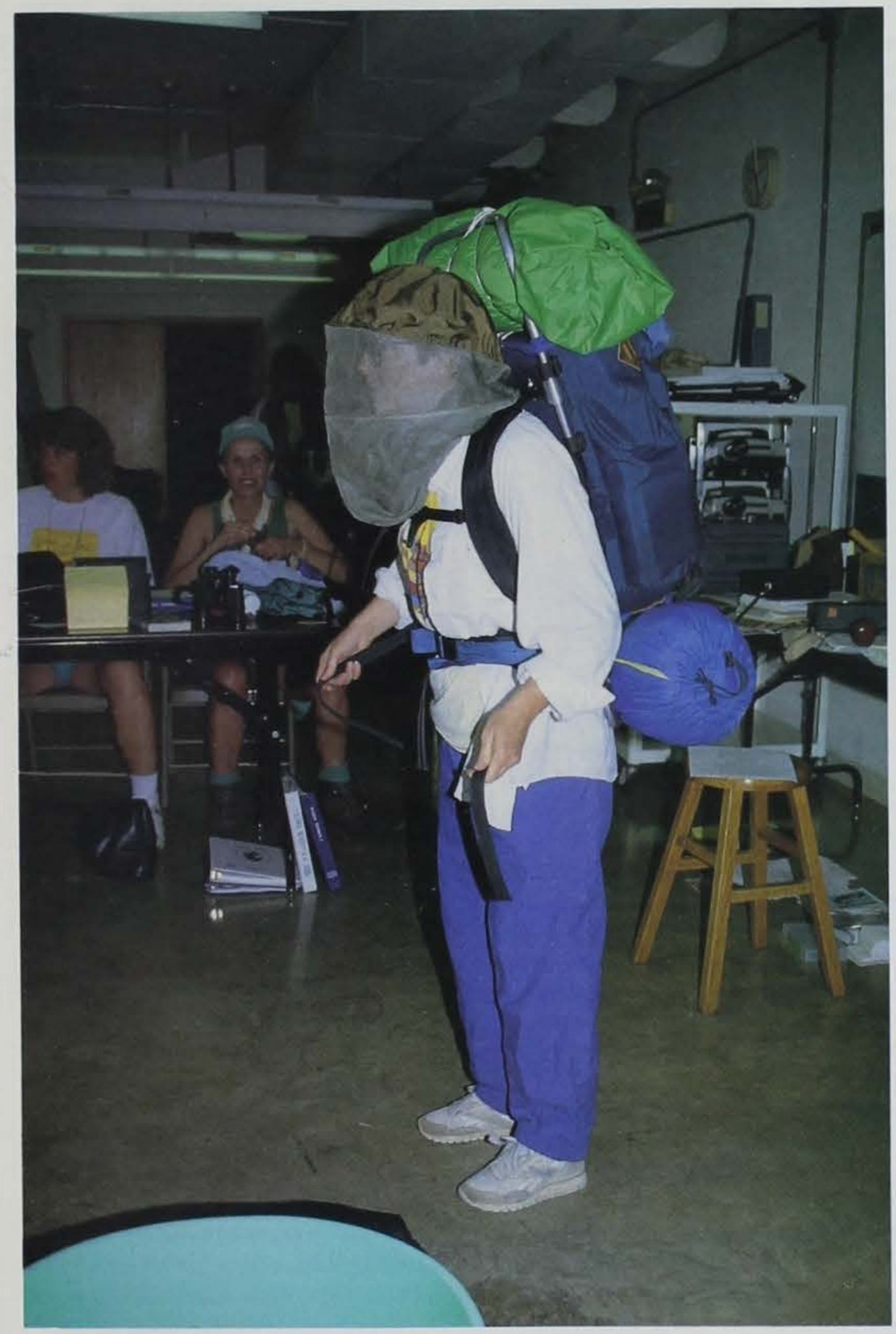
Key evaluation questions include:

Is the goal of the project to develop curriculum materials or provide teacher training?

Is the project new and/or innovative?

Does the project address the priorities that were determined at the 1990 Governor's Environmental Education Conference?

Can the project reach its intended audience, have clear and achievable goals, and be widely applied?



Ross Harrison

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REAP-funded environmental education programs have diverse audiences -- young and old, rural and inner-city.

Is there good funding support beyond REAP funds?

Will funding of the project be so expensive that it would prohibit many other good projects?

The meetings to decide to fund or not to fund projects are open to anyone with an interest in the process, and the board is open to comments and suggestions from all attending. There has been a landslide of support for the projects funded by REAP from school administrators, university professors and natural resource professionals, not to mention the educators and students directly involved.

Individuals, K-12 schools, universities, organizations or anyone else wanting a shot at getting a REAP environmental education grant can contact Duane Toomsen (Department of Education, Grimes State Office Bldg., Des Moines, IA 50319) to obtain the application forms and informational material. Deadlines for grant proposals to be submitted to Toomsen are November 1 and May 15 each year. Toomsen is also compiling a list of projects funded, to-date, and can advise anyone of opportunities to acquire curriculum materials or participate in teacher training that have been funded by REAP.

It is important to keep in mind that

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After-school snacks and games with environmental messages make Kids West an exciting learning experience for youngsters during day-care hours.

Wendy Zohrer

Wendy Zohrer

REAP money is not the only driving force behind Iowa's leadership role in environmental education. There was extensive, diverse and high-quality environmental education activities going on before REAP and many are continuing as REAP is bringing new activities on line each year. DNR's aquatic education program and the operation of the Springbrook Conservation Education Center near Guthrie Center continue with their own, separate funding, as does the 4-H Center near Madrid and the countless projects of county conservation board naturalists, ISU Extension, the Iowa Natural Heritage Foundation and more.

Still coming in the future is a coordinated effort to tie the REAP and non-REAP activities together with an environmental curriculum framework, currently under production by Duane Toomsen, the Department of Education and a comprehensive committee of educators. That framework is being funded by REAP, and will be implemented on a voluntary basis by school districts and organizations around the state as they see the value of creating an environmentally literate society that will be the state's saving grace in the years to come.

Success for REAP and environmental education in general has come from the energy of the professional environmental educators, the new money from REAP and from the diversity that REAP can now make affordable --

-- Diversity in audiences -- from little tikes to old folks, from rural to inner city.

-- Diversity in content -- from ethical outdoor recreation to studying sewage treatment, from high tech computer applications to netting a butterfly.

-- Diversity in approach -- from the classroom to the marsh, from the utility plant to the landfill.

The opening three scenes come from true-to-life, REAP-funded environmental education projects.

Scene 1 is from Kids West, a West Des Moines Community School District effort to bring environmental education into the day-care operations of its elementary schools. It has now been adopted by more than 50 other school districts and 35 other states. More than 700 kids in West Des Moines received the training that began with REAP funding but has continued on its own values since 1990.

Scene 2 is from the American Wilderness Leadership School, run by the DNR out of the Springbook Conservation Education Center. There, educators become the students to learn outdoor skills in canoeing, hiking, cooking, photography, shooting, fishing and more, then pass their lessons on to their students. More than 150 teachers have been cost-shared to attend the event-filled week, many obtaining graduate college credit.

Scene 3 is from the Indian Creek Nature Center's (Cedar Rapids) Senior's Program that REAP helped in 1991 by funding a part-time coordinator who, among other things, wrote a manual on how other agencies could establish their own similar program in other communities. The Senior's Program is still thriving and growing today, without continued help from REAP.

There will be countless more scenes played out in the coming years, thanks to REAP and the eagerness of Iowans to become environmental stewards.

Ross Harrison is the chief of the information and education bureau and has represented the DNR on the REAP CEP board since its formation.

1993 IOWA ENERGY AWARDS

DENISON

MUNICIPAL UTILITIES

"The Innovator" is the name of the employee newsletter for the Denison Municipal Utilities (DMU). This is an image DMU staff strives to live up to. It's most apparent at DMU's recently constructed service center. This 24,000-square-foot facility is not only extremely functional, but also doubles as a living laboratory for energy efficiency.

"We wanted to set an example," said DMU general manager Brad Roos. "The best way to demonstrate [building] energy management to our customers is to show them results. The municipal utilities has the unique opportunity to be creative and try new ideas." Innovative and results-oriented is exactly what DMU has been. The new service center uses walls with a four-inch thick Styrofoam core, fluorescent and natural lighting, infrared faucets and drinking fountains and a geothermal heat pumping system, to name just a few of the building's intricacies.

But DMU's spirit of innovation was put to an immediate test when Denison was ravaged by flood waters on July 8 and 9. The east and north forks of the Boyer River join at Denison and the flood waters rose fast and furious. "We had streets turned into rivers that flowed uphill. It was unlike anything that I have ever seen," said Roos.

The flood contributed to thousands of dollars of property damage, but the most serious immediate loss was a power sub-station that was flooded. Water levels in the sub-station rose two feet above the 100-year flood level, leaving Denison without power for 13 hours and the DMU scrambling.

"Many people in Denison had never seen such a flood," said systems technician Dave Bockelman. He cited the planning that the DMU had done as the key to avoiding further lost down time. "Our management team had planned for anything. That is why we built back-up units at our sub-stations, instead of adding new sub-stations. Our studies indicated that reliability was needed, not more power. This is part of our planning for the future."

DMU has also been an active member in the Tree Power program. They won the "Golden Tree" national award for achievement in June from the American Public Power Association. This award is given to those municipal utilities that reach their goal of one tree planted per residential customer.

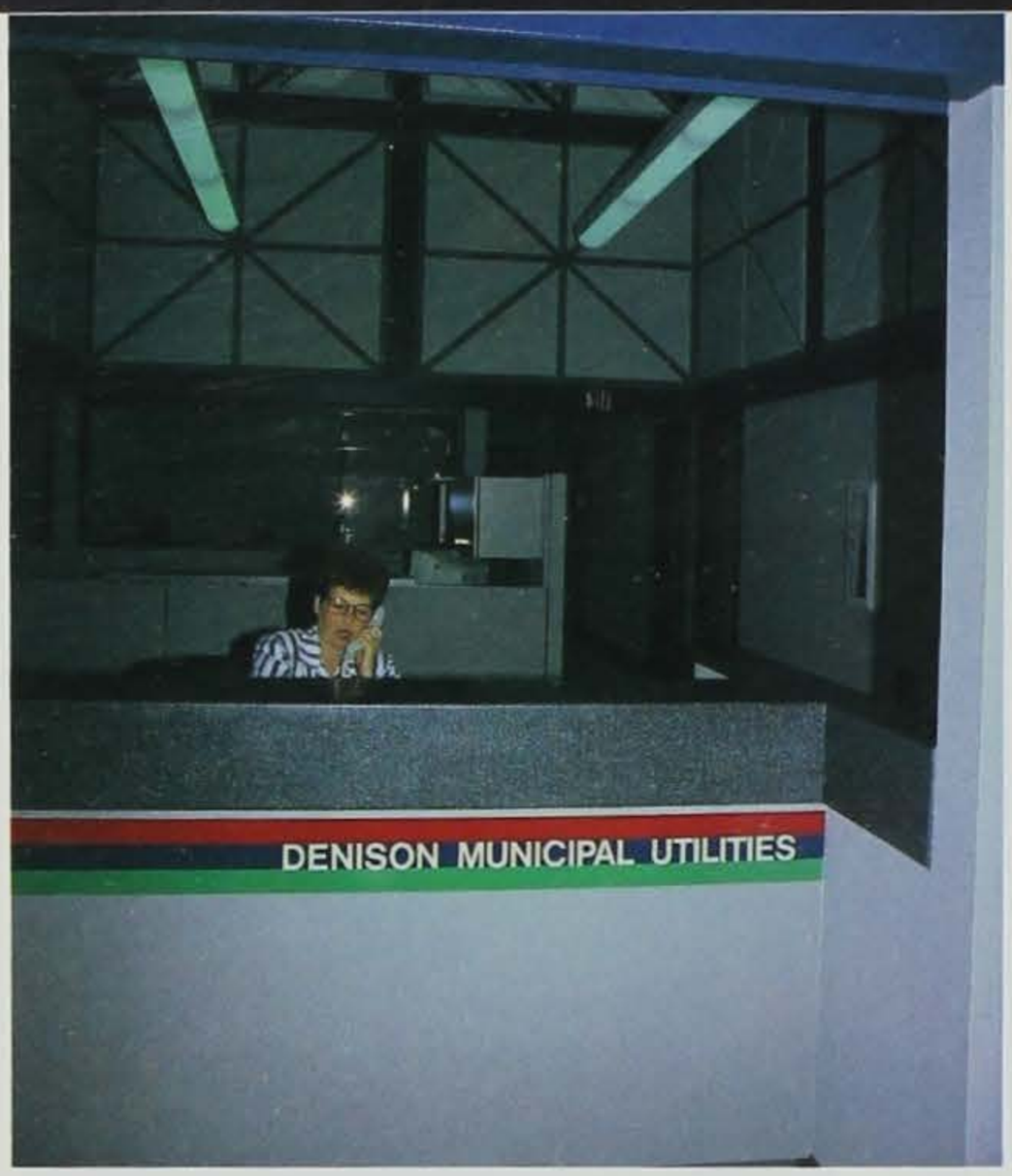
Another innovative practice is the load management program. Load management is a technique with which the utility helps the customers voluntarily manage their electric consumption during peak hours. When the overall energy load of the DMU exceeds a set point, by previous agreement with customers, the DMU will start to shut down water heaters, air conditioners or any other major energy consumer. Once the "crisis" has been averted, the systems are brought back up on line.

"The entire operation can be monitored from my office," said Bockelman. "From here I can manage the load on the entire system, along with the output from each individual sub-station. During the flooding, we were able to monitor and coordinate the re-powering of the system."

Since the load management program went into effect in 1985, it has reduced the electrical system peak by 3,000 kilowatt, or by 12 percent, annually. "The typical residential participant reduces their yearly bill by $87," said Roos.

A SCADA computer system was installed to further monitor the system on a Real Time Basis. "We have a saying here at Denison, 'plan for the future,'" said Roos. "SCADA allowed us to do this. SCADA told us our energy

by Patricia S. Cale
and C. E. Conover



Patricia S. Cale

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Judy Rhine, receptionist, at the new Denison Municipal Utilities service center. The center is not only extremely functional, but also doubles as a living laboratory for energy efficiency.

needs and our energy capacity. It has allowed us to cut our entire system energy losses to a negligible three percent."

What does all this add up to? It adds up to savings that the DMU passes along to its customers. The total dollar savings to participants and the utility for the four years 1990-1993 are estimated at more than $867,000. DMU has included the future into the present, and for that they have truly earned the name "Innovator."

HY-VEE

FOOD STORES

Hy-Vee customers know that there's a "helpful smile in every aisle." Now Hy-Vee wants them to know what's behind the walls, too. Customers can't see the high efficiency compressors or heat exchange systems in Hy-Vee stores, but the Iowa-based food store company's behind-the-scenes efforts to save energy dollars are a significant part of its success.

Every grocery stores advertises its low prices. But Hy-Vee went a step further. Last year, an advertising campaign showed the link between low prices and saving energy. Unlike most grocery store ads, the Hy-Vee ads didn't entice customers with mouthwatering food or double coupon days. Instead, the ads talked about heat reclaim and backhauling.

Heat reclaim and backhauling?! That's right. The ads featured energy-saving technologies and methods to clearly explain how Hy-Vee is saving energy and why that keeps prices low for customers. Some of the systems highlighted in the ad campaign were the heating and cooling equipment, lighting and transportation.

The largest energy cost in a grocery store is for refrigeration (about 54 percent of the total energy bill). To lower that cost in its stores, Hy-Vee uses high efficiency compressors, according to Bob Nielsen, assistant vice-president for engineering.

The heat given off by the compressors is captured and recirculated for hot water heating and space heating in the winter. "In some stores, the gas heat doesn't turn on until it gets very, very cold," said Nielsen.

Another cost-cutting measure is the use of closed freezer cases. "We used to have open cases, but decided to switch. The minute we did our energy costs dropped off," said Nielsen. Hy-Vee made the decision in spite of the fact that the doored cases are not considered quite as good for merchandising.

The lighting in Hy-Vee stores is the most efficient possible, as well. All new stores are equipped with energy-saving electronic ballasts and T-8 fluorescent tubes. In areas of high utility rates, Hy-Vee is also in the process of retrofitting their existing stores' lighting.

Other energy-saving technologies in the food stores and warehouses include computer controls, extra insulation in walls and roofs and motion sensors on some lights.

Hy-Vee doesn't only save energy in its buildings, it also uses an energy efficient in-bound system for its freight trucks, known as "backhauling." The dispatchers try to ensure that trucks don't make trips empty, often finding a load for the truck to carry back to the warehouse. "It's a simple system and there's nothing magical about it," said Pamm Fuller, In-Bound Freight Coordinator. "We make half as many trips as

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Steve VeBruyen, assistant manager of HyVee, at one of the closed freezer cases. The vents under the cases pull in the cold air that is released when customers open the glass doors. The cold air is then recycled.

Ken Formanek

normal. The trucks have to come home anyway."

Hy-Vee has been making a concerted effort to save energy since the oil embargo of the early 1970s. That was when they started closely monitoring their energy costs and educating employees about saving energy. A booklet called "Conserving Energy Makes Cents" was sent to every store and covers how to manage power usage and waste. Store managers also receive copies of monthly reports tracking their energy use, which allows them to spot trouble right away.

According to Nielsen, energy is a major cost in a retail grocery store. "We view utility costs as expenses over which we can exercise some control," he said. "Reducing these expenses helps us keep prices low for our customers."

Keeping energy costs low benefits the company, its employees (who are also the owners and who share in the profits), the customers, and ultimately, all of Iowa. Hy-Vee is the state's largest employer, with more than 15,000 Iowa associates. With 218 retail outlets in seven states and annual sales of $2.2 billion, Hy-Vee is the largest independent grocer in the Midwest and ranks among the top 20 grocery chains in the nation.

IOWA DIVISION

UNITED NATIONS ASSOCIATION-USA

Think globally, act locally." That now well-known slogan sums up "Beyond Rio: Earth Charter Iowa," the award-winning program of the Iowa Division of the United Nations Association-USA. The group is leading an effort to help Iowans realize that environmental problems will only be solved by both local action and global cooperation.

As the preamble to the Earth Charter states, "We are convinced that what we do on the local level has ramifications nationally and internationally. When solutions are possible in our own communities, they become adaptable in communities around the globe."

"What it comes down to," said Dorothy Paul, executive director, "is that we have to live together or not at all."

The effort in Iowa mirrors the Earth Summit, held in Rio de Janeiro in June 1992, which brought together government officials, business executives, educators, students and community leaders from all over the world to draft agreements on environmental policies. In Iowa, a series of public hearings, conferences and meetings held around the state will culminate in the adoption of the Earth Charter Iowa, an agenda for Iowa's environmental future.

Nine months before the Earth Summit the association began preparing Iowa's response. A public hearing was held in Des Moines in September 1991, featuring keynote addresses by now Vice-President Albert Gore, Jr., and Maurice Strong, international chair of the Earth Summit. Speakers and panelists representing business, labor, civic, agricultural and grassroots organizations testified on energy and sustainable agriculture issues. Their messages were taken to Rio by Iowa's delegation.

After the Earth Summit, the Earth Charter Iowa effort was launched in February 1993, with conferences in Ames, Oskaloosa and Des Moines, through March meetings in Davenport, Burlington and Sheldon, a Cedar Rapids session in April and a statewide conference in Cedar Falls. The grassroots effort involved more than 800 Iowans and 133 organizational cosponsors. According to Paul, several thousand volunteer hours were spent by association members, teachers, farmers, young people, community activities, environmentalists, business people and others.

The participants in the local meetings discussed issues, raised awareness, formulated strategies, talked about success stories and formed new networks and friendships. People brought concerns about energy efficiency and renewable energy, recycling, water pollution, sustainable agriculture, wildlife habitat, land use and many other issues.

In Davenport, local high school students evaluated the health status of their local community, environment and social justice. The students graded the quality of water in

Patricia S. Cale

▲

Katie Miller (left), a student intern who helped organize community forums, and Dorothy Paul, executive director of the Iowa Division of the United Nations Association-USA, examine various materials produced for "Beyond Rio: Earth Charter Iowa."

Duck Creek an "F" and access to child-care services a "B."

In Sheldon, participants started by listing their environmental concerns on the blackboard. By vote, three top priorities -- water quality, renewable energy and pesticide use and abuse -- were chosen and explored further.

Involvement in the process will also include the 800 high school student participants in the October 1993 Iowa Youth Symposium on the United Nations at the State Capitol in Des Moines. The four symposium discussion topics will be related to the Earth Charter Iowa: consumption/waste reduction and recycling; renewable energy resources; natural

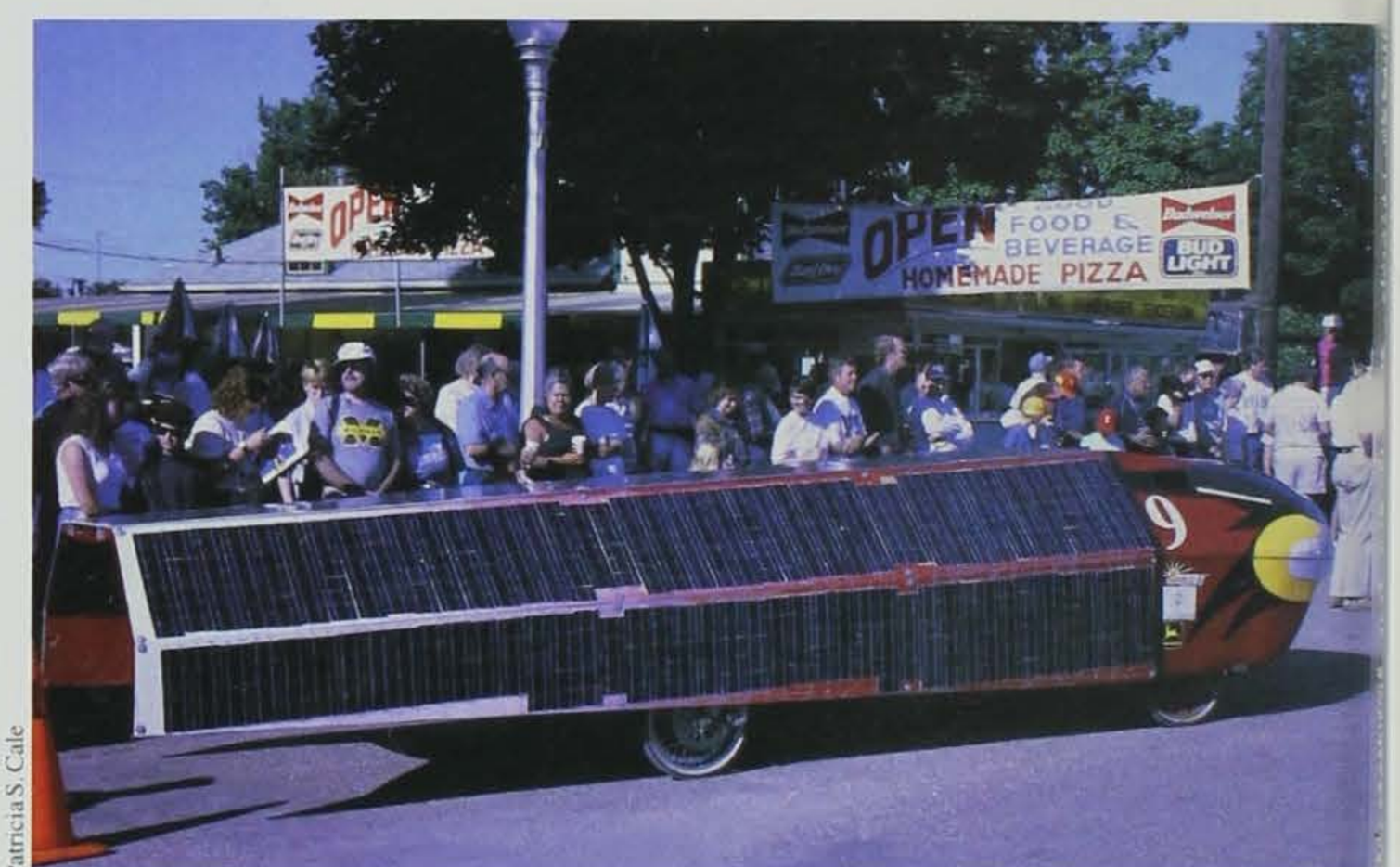
resources in town vs. rural areas and water quality; and population, land use and sustainable development.

The document that has resulted from this process, the Earth Charter Iowa, represents a view of environmental problems and solutions from the perspective of Iowans. The charter calls for greater energy efficiency and use of renewable energy, ending groundwater pollution, reducing soil erosion, increasing recycling, education on environmental responsibility and increasing citizen involvement in environmental policy-making.

After gathering more input from people around Iowa, the association will finalize the Earth Charter with two uses in mind. First, it will be presented to the State Legislature to relay the environmental concerns of Iowans statewide, and second, it will support local communities' efforts to address their own environmental problems.

The final goal of the Earth Charter process has already been reached, that is to create a network of environmentally concerned Iowans. This network is exchanging "expertise, knowledge and awareness of successes at the local level," said Paul.

As the first state UN association to conduct an Earth Charter effort, the Iowa Division is being looked to as a model by other states. And, the United Nations plans to develop an Earth Charter by 1995, the year of its 50th anniversary. Said Paul, "Iowa now leads the way!"



Patricia S. Cale

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PrISUm II at the start of race day in Des Moines, June 25. PrISUm II, which placed 10th overall in Sunrayce '93, runs on solar energy.

PrISUm II

As Iowa State University's (ISU) PrISUm II rolled across the finish line in Minneapolis for the conclusion of Sunrayce '93, there was backslapping, hand shakes and cheers from the crew members. The students had run a spectacular race and placed 10th overall (out of 34 cars), a large jump from the seventeenth place finish (out of 32 cars) of PrISUm I in the 1990 race. "We finished in the top third," said Rollie Struss of the Ames Lab, one of the faculty advisors to the PrISUm project. "We made a marked improvement with this car and I couldn't be happier."

Sunrayce '93 is billed as an event that promotes "Energy, Education and the Environment" through a competitive application of science and technology, using the non-polluting source of solar energy. By providing a forum for college students to compete, organizers encourage innovation and advancement of solar and battery technology. "But," said Struss, "most importantly is the message that we convey about renewable energy fuels. We are showing, to the average consumer, that this option will definitely occur in the future."

Struss adds, "By the year 2003, 10 percent of all cars sold in California must run on a type of non-polluting fuel. The PrISUm I and PrISUm II are prototypes of what is to come. You can compare them to [Orville and Wilbur] Wright's first plane [at Kitty Hawk]. After they proved that humans could fly everything snowballed. It was a starting point, just like the solar cars in Sunrayce are a starting point. The technology they are helping develop will be built on and refined, and I, for one, am very excited."

One of the innovations that was developed at ISU and used in PrISUm II is a "maximum power-point tracker." The tracker is, essentially, the computer brain of PrISUm II. "What the tracker accomplishes," explained project leader Matt McGuire, "is a matching interface between the solar array and the battery pack, ensuring precise, efficient charging of the batteries. This system was designed by ISU graduate students and with further development, we estimate that it can be 50 times more efficient than any such component currently on the market."

But that is just one of the improved features of PrISUm II, explained Julia McGuire, PrISUm II's business manager. "We also reworked every component on the interior of the car. This was done to both improve some of the mechanics and engineering on the parts, but to also improve reliability. We had no serious breakdowns during the race," she said.

The new design allowed PrISUm II to travel the race course at an average speed of 16 miles per hour (mph), an improvement of almost two mph over the 1990 average speed. "But, we averaged 29 mph in the sunlight and at cruising speed," said Matt McGuire.

The design also won outside accolades. The PrISUm II team was presented with the Kansas Electric Utility Research Award. "We won it for the best student design. Winning the

award meant an awful lot to us. It showed us that others recognized our efforts," said Julia McGuire.

"Most importantly," said Struss, "we need to recognize PrISUm II for its true value. It is a wonderful, educational tool. Our goal, once we have adequate funding, is to take this car on a tour of Iowa. We would like everyone to be able to learn about renewable fuels and alternative energy sources and I cannot think of a better working laboratory than PrISUm II."

SPIRIT LAKE

COMMUNITY SCHOOLS

With just a whisper of sound, the huge blades of the wind turbine at the Spirit Lake Elementary School starting turning in late July. The sound of the turbine is hardly noticeable, according to Superintendent Harold Overmann, but the project itself is getting noticed -- in town, in northwest Iowa, across the state and in national circles.

At the dedication ceremony on July 8, the range of speakers reflected the renown the Spirit Lake schools are achieving. Congressman Fred Grandy and representatives of the U.S Department of Energy traveled from Washington, D.C. State Sen. Jack Kibbie and Larry Bean from the Iowa Department of Natural Resources represented state government. And in a special part of the ceremony, the local Izaak Walton League chapter presented the school district with a plaque "in recognition of innovative ways of conserving natural resources."

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Wind turbine at the Spirit Lake Elementary School is expected to produce 400,000 kilowatt hours of electricity annually.

Ed Woolsey

Another important part of the dedication ceremony was the signing of an agreement between the Spirit Lake district and Iowa Electric Light and Power. The agreement allows the schools to generate power that will be purchased by the utility. The school will use more electricity than it generates some months, and will have excess power during other times of the year.

The Spirit Lake district is receiving notice because it is the first school district in the Midwest, and the second in the nation, to own a wind turbine. The turbine itself is also quite noticeable. An imposing figure, it stands 140 feet tall, with 87-foot blades, on land just south of the elementary school.

The turbine is expected to produce 400,000 kilowatt hours of electricity annually. Using wind instead of burning coal for that much electricity will replace 225 tons of coal and save 750,000 pounds of carbon dioxide and 1,800 pounds of other pollutants.

Saving the environment by lessening reliance on non-renewable fuels was the primary motivating factor for the Spirit Lake schools in putting up their first wind turbine. They hope to follow up this project by exploring additional wind turbines, biomass heating and solar hot water heating.

The next project, according to Overmann, may be a biomass boiler. "A technical analysis showed that we could benefit by replacing the boiler in the high school," he said. The district previously had explored putting a biomass boiler in the new middle school, but couldn't find a reliable source of fuel.

This time, it appears that green sawdust from a source in Minnesota may prove feasible. "Since this is a disposal problem, maybe by burning it we can solve a couple of problems," said Overmann. "We're starting with a lot more optimism, having already had many of our questions answered."

Further in the future, using solar power to heat water may be a possibility. "This is purely an investigation at this point, but I hope to involve students in the research," he said.

"What we can do for other school districts is to put together all of these technologies -- wind, biomass and solar -- in one place. We could become a model site for others to visit, showing them, 'Here are some possibilities,'" said Overmann.

In the meantime, the district officials, including Jim Tirevold, buildings and grounds director, will keep busy monitoring the performance of their wind turbine and dealing with the questions and interested visitors that their state and national attention are generating.

Patricia S. Cale is an information specialist for the department's energy bureau in Des Moines.

C. E. Conover is a student intern working with the department's energy bureau in Des Moines.

Article by Reza Khosravi
Photos by Jeff Geerts

THE DIRT ON COMPOSTING

Many communities in America are faced with a garbage disposal problem. Iowa is no exception with fewer landfills, adverse public sentiment, preferred uses for land and past problems associated with older landfills such as contamination of groundwater.

To ease these worries and to make waste management work better, Iowa, like many other states, has adopted an integrated approach to waste management. The 1987 General Assembly established a statewide solid waste management policy as part of the Groundwater Protection Act. The act identifies a hierarchy of preferred management options in this order -- waste reduction at the source, recycling and reuse, combustion with energy recovery, combustion for volume reduction without energy recovery, and landfill disposal. In 1989 the Waste Reduction/Recycling Act set a statewide waste volume reduction goal of 25 percent by 1994 and 50 percent by 2000, with July 1, 1988, as the baseline year.

While no single method will provide a panacea to our current solid waste problems, the potential to reduce the waste stream by diverting yard waste led Iowa to pass legislation banning the disposal of yard waste effective January 1991. Yard waste accounts for 17 to 18 percent of the municipal solid waste stream. Banning yard waste from landfilling plus reducing the cost between landfilling and composting has made composting a viable alternative. In addition, the fact that composting is a "natural process" has helped foster its popularity.

In the U.S. composting has been used for years to stabilize sewage sludge, industrial waste and municipal solid waste (MSW). Organic materials make up 70 to 80 percent of the MSW stream. Yard wastes, which are included in that category, may contain even larger proportions of organic materials. Certain industrial wastes, such as those from the food processing, agricultural and paper industries, are mostly organic in composition. Because of their large proportion of organic materials, yard wastes are ideal candidates for waste reduction by composting.

Why compost?

Composting at home can reduce personal trash volume, conserve water, increase plant growth and replace the need for chemical fertilizers. Moreover, with the accelerated rate of topsoil erosion, we can no longer afford to send valuable organic materials to landfills when we can use them to improve soil structure, texture and increase its water-holding capacity.

How to compost?

Composting is a controlled biological decomposition of organic matter. It is a natural way of returning nutrients and humus to the soil through the action of microorganisms. If you have ever walked through a forest, no doubt you have noticed the process of decomposition. The top layers under your feet are recognizable as leaves and twigs but the layers below have been transformed into rich soil. Decomposition has been happening for millions of years proving that friendly microorganisms naturally like to eat grass, leaves and food scraps. Remember, what has been going on for millions of years in the forests and woods can go on naturally in your backyard if you decide to compost. Compost can be made either in bins or open piles. However, bins will keep piles neat, while retaining heat and moisture and are probably more suited to urban areas with less space to spare. Whatever your choice, certain environmental conditions must be met in the compost pile.

Microorganisms are the key elements of the decomposition process. They are the liberators of the nutrients which make the plants grow. There are two separate families of microor-

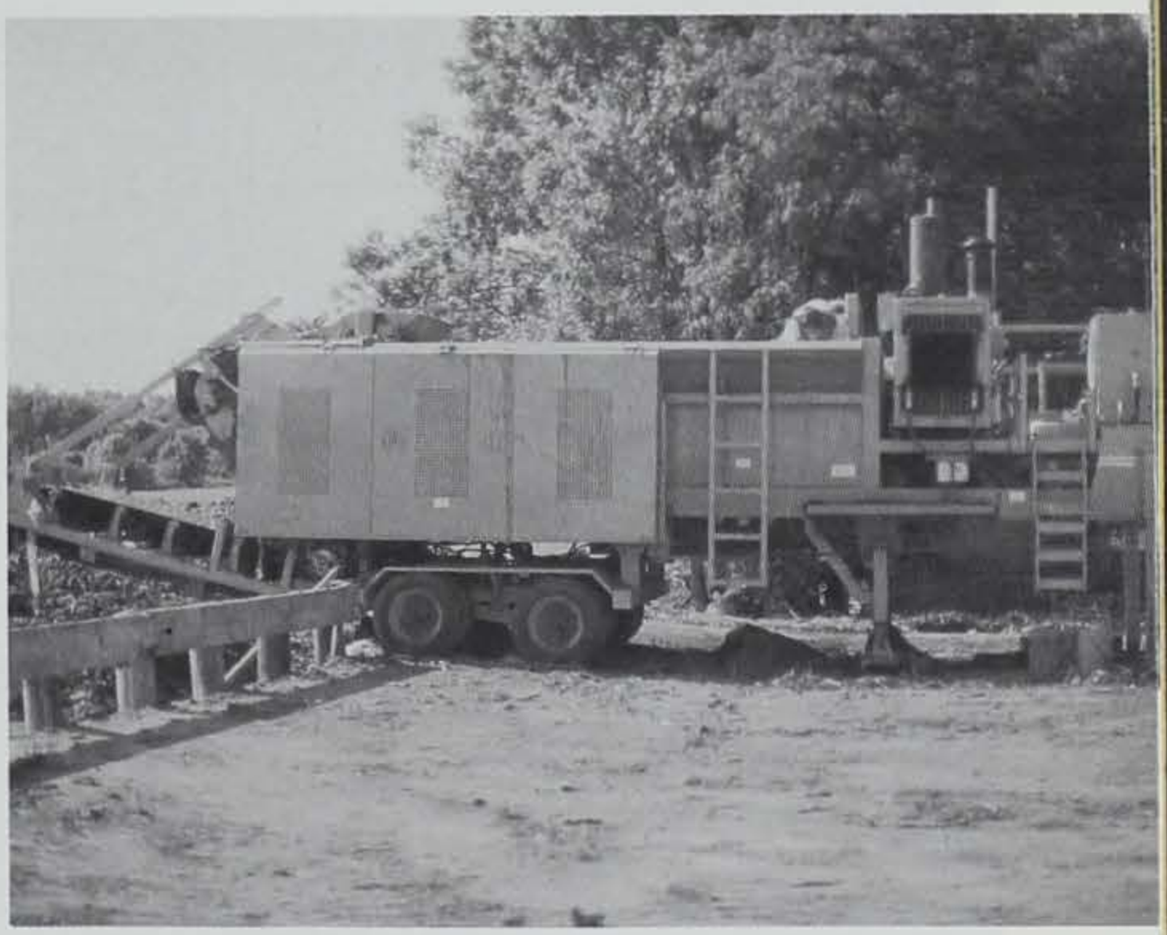
The fact that composting is a "natural process" has helped foster its popularity.

ganism distinguished by the presence or lack of oxygen in their lifecycle. Aerobic microorganisms are busy working in your compost pile when the pile is in open well-circulated air. Anaerobic microorganisms are the ones that are active under the condition of no oxygen. But amazingly both groups are specialized to do the job and break down the twigs and the leaves.

Oxygen is another important factor in the decomposition process. As mentioned before, aerobic microorganisms need plenty of air to be active. When there is enough air in the compost pile, these bacteria do the job right and decomposition goes at a much faster rate. A 5- to 15-percent oxygen concentration is considered adequate. Unless speed is your priority, frequent turning is not necessary. The purpose of turning is to let air get into the pile and increase the oxygen flow. There are several other ways to increase oxygen. Experienced compostors often place branches on the bottom of their piles to increase the air flow. Another easy way to introduce air is to use a rod or pitchfork and simply poke several deep holes into the heart of the pile.

. . . if you have ever walked through a forest, no doubt you have noticed the process of decomposition. . . . What has been going on for millions of years in the forests and woods can go on naturally in your backyard . . .

Water is needed for both aerobic and anaerobic microorganisms. It is naturally added to the compost pile during the process of decomposition. Remember that maintaining an adequate moisture level will create a friendly home for the microorganisms, earthworms and insects. The pile should be about as wet as a squeezed-out sponge. Sprinkling water on the pile will keep it moist and covering the pile with a tarp will avoid the loss of moisture. An overly wet pile is as bad as a dry pile, so excessive moisture should be avoided. Excessive moisture creates an anaerobic condition which results in the development of odors in the compost pile and can also delay the decomposition of materials.



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At Organic Technologies Corp. near Van Meter a windrow turner (top photo) is used to stir the compost pile to circulate more air into the piles.

Collected yard waste is fed through a grinding machine. The ground materials are dumped from the grinder to make a pile. This pile is left for two to three weeks before it is moved out to make windrows (bottom photo).

Composting at home can reduce personal trash, conserve water, increase plant

HOW ONE FAMILY COMPOSTS

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Myron and Kristie Hirschman in front of compost ready for use.

Farming full-time near Van Meter and raising three children, the Hirshman family started their company, Organic Technologies Corp. in early 1991. The Hirschmans capitalized on a 1989 Iowa law which became effective January 1, 1991, banning yard waste at landfills. They started the composting business as a sideline project to their 500-acre farm in Warren County. Now the "supposed-to-be-a-sideline" project has grown so much that it occupies most of their time. With a $246,000 landfill alternative grant from the DNR, Kristie Hirschman and her husband, Myron, expanded their corporation in October 1991. She believes the grant they received from the DNR's Waste Management Assistance Division helped them gain credibility and grow faster than they expected.

They use about 35 acres for their composting project. Very close to an old barn, which they insist on keeping and renovating, they have built an office, a machine shed, a truck scale, a paved dumping area and have installed a Norkot 9100 grinding machine that chews up trees, bushes, leaves and grass. They also invested in purchasing other machinery such as an endloader, windrow tuner and a screener which sifts the final product. Hirschman thinks of her composting business as "mid-level technology," yet a highly capitalized business with more than half a million dollars invested.

To make the compost, the collected yard waste is fed through the grinding machine installed at the edge of a paved area. The ground materials are dumped from the grinder to make a pile. The pile stays there for a period of two to three weeks before it is moved out to make windrows. Kristie Hirschman believes holding the ground materials as a pile for two to three weeks prevents the development of odors and is a "cooking period" which allows the bacteria to grow and reproduce. Then the ground material is moved to another area to make windrows. Windrows are approximately 200 feet long, five to seven feet wide and three to five feet high. If possible, a windrow turner stirs the piles weekly to circulate more air into the piles. Thus, bacteria can do their best at decomposing the debris into organic matter. Over several months (usually nine months) the organic matter decays, reducing its volume by 70 percent. Bacterial activity can maintain the temperature inside the pile at up to 160 degrees F.

After the windrow aging process is over and the organic matter has decomposed to a black humus, they move the material to a screening area where impurities such as small plastic parts left from the degradable bags are removed and the final product is ready to be sold. The end users of the final product are 60 percent commercial, such as landscapers, 20 percent residential and 20 percent others such as landfill operators who use the compost for the final coverage of the landfill.

Organic Technologies started by accepting yard wastes such as grass clippings, bushes and leaves. Now after almost three years in the business they are expanding the variety of organic materials they are accepting. Hirschman's operation now accepts source-separted organics such as vegetables and fruits received from a regional warehouse, extracts of marigold meals (a feed additive which increases the yellow color in yolk and chicken meat), sawdust and casing used to form hotdogs, pepperoni, etc. Some of the source-separated organics do not need grinding so they will be added to the windrows and mixed when windrow turner is stirring the

growth and replace the need for chemical fertilizers. Because of their large proportion of

piles.

They have received a developmental permit from the DNR to experiment in the composting of the above-named materials. "These materials are a good source of organic matter," says Kristie Hirshman. She believes these materials are not only rich in nutrients and protein, but helpful in increasing the quality of their final product. For example, marigold extract is very dry and can be added to the windrow pile to decrease moisture content. Sawdust is used to balance the carbon/nitrogen ratio when the amount of nitrogen in the pile is high. The amount of total materials they have received has been increasing from 3,000 tons in 1991 to 5,000 in 1992, with a goal of up to 10,000 tons per year.

Organic Technologies serves the counties of Warren, Madison, Dallas and part of Polk for yard wastes, and the entire state for source-separated organics. Under a program called "bag business," Organic Technologies handles yard waste from these counties and picks up the bags at the curb from Indianola, Norwalk, Waukee, Adel, Grimes, Winterset, St. Charles and Truro. In the cities of Altoona, Carlisle, Pleasant Hill and Perry collectors are hired to bring the bags to their site. Selling the degradable bags to the local grocery and hardware stores in those towns is a major source of revenue for the company. Organic Technologies also accepts yard waste from individuals, landscapers and contractors who pay a tipping fee of $18 per ton to dump there. The final product, compost, is sold at the rate of $36 per ton in bulk. They also make wood mulch sold at the rate of $24 per ton. Individuals as well as companies can stop by and purchase the product they need.

The Hirschmans' plans are to increase their capacity, handling more source-separated organics in terms of volume and variety. They also plan to build a large shed so they are able to protect their final product and their screening machine from the weather. Finally, they would like to be able to accomodate the windrows inside so they can have better control of the environmental factors affecting their operation.

In addition to Organic Technologies there are seven other grant-funded composting projects in Iowa -- Cerro Gordo County Solid Waste Agency in Clear Lake; ISU building and grounds in Ames; the City of Keokuk; the City of Marshalltown; the City of Postville; the Scott County Landfill in Buffalo; and the City of Sioux City. The total amount of money granted to the above-named projects is $894,715.

--RK

The heat generated within the composting pile due to the activities of microorganisms is important for maximum decomposition and production of safe compost. Most dangerous microbes are inactivated effectively at temperatures above 130 degrees F. Normally there is no need to add external heat since microorganisms generate heat in the process of decomposition.

The balance of brown (carbon) and green (nitrogen) materials is essential to a healthy compost pile as well. By having a balance of wet, green materials (grass clippings, food scraps, manure) and dry, brown materials (dry leaves and woody materials), compost piles generate high temperatures and slowly simmer to create compost. Using only brown materials in the pile will slow down the composting process because piles do not generate sufficient heat. By adding only wet, green materials without dry, brown materials, odors may develop. The microorganisms in the piles are like plants. They have more or less similar nutritional needs as higher plants (nitrogen, as supplied by green grass or manures added to the pile; phosphorous, potassium and other trace elements as supplied by either green or brown materials added). One major difference between microorganisms in compost and plants is that microorganisms rely on the brown (carbon) organic matter for their energy source, as opposed to the photosynthesis process for higher plants.

While backyard composting is a good alternative for many of us, many other residents elect to bag their yard waste for curbside pickup to large municipal or regional composting sites.

How long does it take to produce compost?

The composting process can take as little as one month or as long as two years, depending on the environmental factors discussed. However, when it is ready, you will have a compost which is dark brown or black and crumbly -- humus-rich topsoil with a sweet aroma of a good earth. Foul odors only occur where there is a lack of oxygen or too much wet, green material and too little brown, dry material. Alleviate the bad odor by turning the pile or poking the pile and mixing green and brown materials together.

While backyard composting is a good alternative for many of us, many other residents elect to bag their yard waste for curbside pickup to large municipal or regional composting sites. Organic Technologies is one of many successful large-scale composting operations in Iowa (see article at left).

Reza Khosravi is an environmental specialist for the Waste Management Assistance Division in Des Moines.

organic materials, yard wastes are ideal candidates for waste reduction by composting.

THE BOTTOM DOLLAR

In 1991 Iowans spent more than $615 million on hunting, fishing and nonconsumptive wildlife-associated activities.

Early in human occupation of this earth, the pursuit of fish and wildlife was one of food gathering. Fish and wildlife, along with a variety of plants, provided food for existence. Later, hunting and fishing was a major part of survival for native Americans and European pioneers. As farming expanded, more and more of our food needs were provided by farmers growing crops and livestock. Hunting and fishing became less a means of existence. Today, most hunting and fishing is done for recreation but is fostered by an urge to continue our ancestral heritage or to interact with the natural world. Regardless of the reason, going to the field to hunt, fish or just observe wildlife is a very compelling drive.

Today, there is another important side to hunting, fishing and nonconsumptive uses of wildlife. It is big business.

Nationally 108.7 million residents, 16 years and older, participated in some form of wildlife-related activity in 1991 and spent $59 billion doing it. In 1991, 245,000 Iowans hunted, 529,000 Iowans fished and 1,030,000 engaged in some type of nonconsumptive, wildlife-associated activity, such as viewing, feeding or photographing wildlife. These Iowans spent a total of $615,329,000 in these pursuits. These figures come from the *1991 National Survey of Fishing, Hunting and Wildlife-Associated Recreation* produced by the U.S. Department of the Interior, Fish and Wildlife Service, and the U.S. Department of Commerce, Bureau of Census. Information from this survey came from telephone interviews with 68,000 people selected from 128,000 U.S. households. These people were contacted three times during the year, and information about their activities and expenditures was recorded.

The survey reveals the importance of fish- and wildlife-related activities to the economy of Iowa. Twenty-nine percent of Iowans reported they hunted or fished and 74 percent participated in some type of wildlife-related activity during 1991. Hunters spent 4,005,000 days afield in Iowa -- 90 percent by residents and 10 percent, or 389,000 days afield, by non-residents. Anglers spent 5,888,000 days fishing of which 92 percent was done by residents. Not all of the $615 million was spent by Iowans in Iowa. This figure also includes fishing trips taken to Canada and Minnesota, and hunting and wildlife viewing trips out of state. However, those dollars spent out of state are offset by non-resident expenditures within Iowa. In 1991, non-residents spent $31.5 million in Iowa on hunting and fishing trips alone. Figures from this survey place the industry at more than $500 million annually.

Looking closer, the information shows hunters and anglers alone, spent $121 million in Iowa restaurants, gas stations and motels during 1991. In addition, Iowans spent about $256

Article by Richard Bishop
Photos by Lowell Washburn

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Unfortunately our fish and wildlife resources are mostly viewed as recreation and of little importance to development or attracting business.

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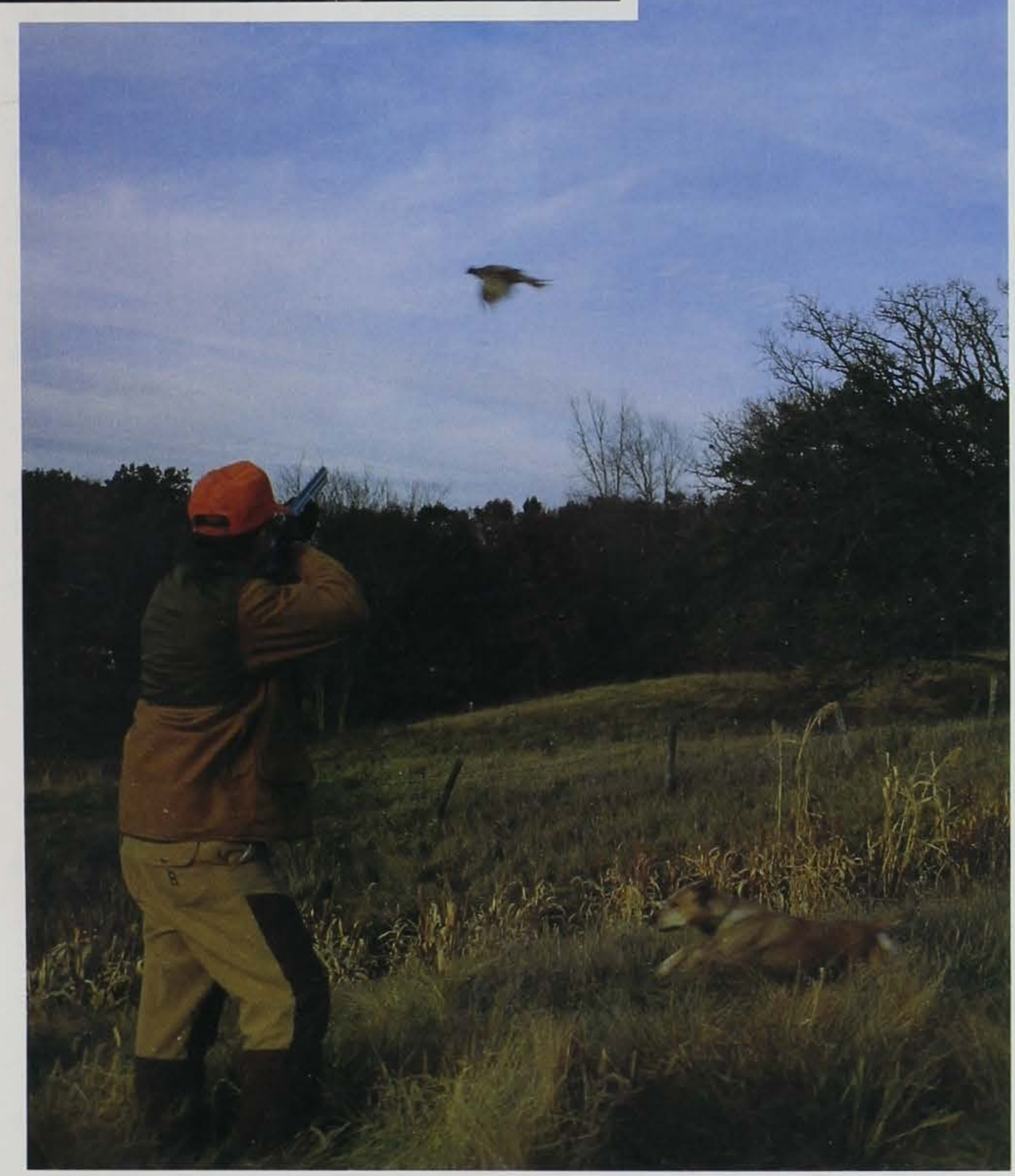
Tear at perforation



Unfortunately our fish and wildlife resources are mostly viewed as recreation and of little importance to development or attracting business.

Another significant activity, that for the most part goes unnoticed, is the nonconsumptive activities associated with watching, feeding and photographing wildlife . . . [More than a million Iowans] spend about $124 million annually pursuing these interests.

million for equipment in sporting good stores, mail order houses, boat and vehicle dealerships, and clothing and department stores for all types of hunting and fishing, viewing and photography equipment. The other large category of expenditures lumped under "other" expenses covers land bought for hunting, fishing and wildlife-associated activities, veterinarians, pet supplies, dog food, magazine subscriptions, contributions to private fish and wildlife organizations like Ducks Unlimited and Pheasants Forever, licenses and hunting fees. These expenditures totalled $63 million. License fees, incidentally, are a very small part of these expenditures. Consequently, the bulk of these dollars goes into private enterprise. The real estate market is taking an ever-increasing percentage of these expenditures. Iowans are buying land for hunting and other wildlife-associated activities and because they have a desire to be part of a good land stewardship program. Most real estate ads for timber or marginal farm land stress hunting- and wildlife-related opportunities.

The number one sporting attraction in Iowa

▲
Opening day pheasant season pancake breakfast in Ventura.

is the opening weekend of the pheasant season. Some 200,000 hunters take to the field that weekend and many social events and family gatherings are planned during that time. Most of the 45,000 non-resident hunting licenses sold in Iowa are to pheasant hunters. A DNR survey of hunters in 1984 showed non-residents spent, on average, $450 per person on lodging, gas, food, clothing and other trip expenses when they came to Iowa. Pheasant season alone creates a major influx of dollars into our economy. Some businesses advertise special meals for hunters and anglers, and some motels offer rooms for cleaning game. Businesses catering to sportsmen and women are becoming more common each year. Observe the activity in Albia and Centerville when the crappies or walleyes are biting at Lake Rathbun or the opening of the deer season. How about Spirit Lake in June when fishing is good or in October when Canada goose and pheasant hunting is a main attraction? The Mississippi River towns attract many hunters and anglers when the ducks are flying or walleyes are biting. Missouri Valley attracts many people during the spring snow goose migration. These are only a few examples of the hustle and bustle surrounding these outdoor events.

Unfortunately our fish and wildlife resources are mostly viewed as recreation and of little importance to development or attracting business. This is obvious with the new fiscal state budget where the Resource Enhancement and Protection Program (REAP) scheduled to be funded at $30 million, was scaled back to $7 million. This funding is one of the highest yielding investments the state could make. Simply, enhancing our natural resources can fuel economic growth. Fish and wildlife resources constitute big business in Iowa, but as a state we fail to realize it and promote it.

Our neighboring state of Minnesota, where many Iowans take fishing vacations, places a high priority on outdoor activities. *The 1991 National Survey of Fishing, Hunting and Wildlife Association Recreation* survey showed Minnesota attracts 367,000 nonresident anglers. Fish and wildlife are major concerns and rank high in priorities in that state.

The Iowa DNR is building four new fishing lakes that will provide considerable recreation, but this is a small part of what could be done. Twelve-Mile Lake near Creston and Little River Lake near Leon are fairly new southern Iowa lakes, and on a weekend, boat ramps are filled with vehicles with license plates from Polk, Black Hawk, Clinton, Story and Marshall counties as well as several from Illinois, Nebraska and Missouri. Some Iowa anglers, don't like the competition, but to the business people of the area, these attractions are having an impact.

Deer and Canada geese are two big attractions that provide us insight to what can really happen. As the deer population increased, hunting licenses issued went from 92,000 in 1980 to about 194,000 in 1989. Expenditures by deer

hunters increased respectively and processing deer meat has become a major economic boom to locker plants. In fact, some locker plants would have to close their doors if they did not process deer. Our increasing Canada goose population is starting to attract attention. Soon those communities in the vicinity of large goose populations will experience an influx of dollars like Spirit Lake and Lake Mills have in recent years.

Another significant activity, that for the most part goes unnoticed, is the non-consumptive activities associated with watching, feeding and photographing wildlife. More than a million Iowans -- 49 percent of our population -- engage in these activities. They spend about $124 million annually pursuing these interests. Bird feeding is a major part of this and businesses that provide bird seed, corn for squirrels, bird baths and wildlife feeders do a brisk business. Other items such as binoculars, cameras and film are purchased by wildlife watchers. State wildlife areas like Riverton and Federal refuges like DeSoto Bend in western Iowa, attract large numbers of visitors in the spring and fall to observe ducks and geese during migration. Some state parks have heavy

EXPENDITURES BY IOWA HUNTERS, ANGLERS AND NONCONSUMPTIVE USERS, 16 YEARS AND OLDER*

Trip Expenditures

	Total Trip Related	Food and Lodging	Transportation	Other Trip Costs
Hunting	$34,758,000	$ 19,172,000	$15,298,000	$288,000
Fishing	$112,612,000	$ 57,096,000	$29,448,000	$26,068,000
Nonconsumptive	$61,179,000	$ 33,454,000	$22,103,000	$5,622,000
Totals	$208,549,000	$109,722,000	$66,849,000	$31,978,000

Equipment Expenditures

	Total Equipment	General Equipment	Auxiliary Equipment	Special Equipment
Hunting	$72,515,000	$41,276,000	$7,258,000	$23,981,000
Fishing	$126,915,000	$30,238,000	$4,975,000	$91,702,000
Nonconsumptive	$56,567,000	$46,963,000	$824,000	$8,780,000
Totals	$255,997,000	$118,477,000	$13,057,000	$124,463,000

Total Expenditures

	Total Trip Related	**Total Equipment**	**Other Expenditures**	**Total Expenditures**
Hunting	$34,758,000	$72,515,000	$63,359,000	$170,632,000
Fishing	$112,612,000	$126,915,000	$81,203,000	$320,730,000
Nonconsumptive	$61,179,000	$56,567,000	$6,221,000	$123,967,000
Totals	$208,549,000	$255,997,000	$150,783,000	$615,329,000

This chart does not include $18,598,000 spent by nonresident hunters and $12,826,000 spent by nonresident anglers.
**1991 National Survey of Fishing, Hunting and Wildlife-Associated Recreation*

. . . we can no longer depend on agriculture to provide the dollars and jobs it once did . . . We must look to other areas to diversify our investments.

use during winter periods when deer concentrate and are visible to visitors. Public land also provides access to many people interested in viewing or photographing wildlife.

Our nongame wildlife program is funded strictly by contributions from interested people through the Chickadee Checkoff on the state income tax form and direct donations. The total nongame income is less than $200,000 per year to serve a million people in a $124 million business. The future for nongame programs is unlimited and the demand is steadily growing. However if programs are to keep pace with the demand, a more stable form of funding by all Iowans is mandatory. This could come from a specific tax on certain items, like bird seed, binoculars, film, and other associated items, or a line item in the budget from the state's general fund. Regardless of how this program is funded, something will need to be done in the near future to meet the demand coming from our wildlife viewing public. We simply should not ignore this asset and important business.

Our fish- and wildlife-orientated activities should not go unheeded. We should begin to treat our natural resources not just as valued outdoor sports, but as an important economic function of this state. It is amazing to me that REAP, the number one program in the State of Iowa to enhance outdoor recreational experiences, fish and wildlife, soil erosion and protection of historic sites, was funded at just $7 million this year. Necessary budget cuts, yes that's true, but what are the business people and the leaders of this state thinking when we so easily sacrifice our investment in the future economic and aesthetic stability of Iowa? State leaders and media have given major publicity to losing an important business, but an individual business is dwarfed in comparison to the importance of our natural resources to the economic well-being of Iowa. We will only attract and hold businesses if the environmental, recreational and educational systems of Iowa are in good shape. We need more foresight.

As Iowa struggles to establish an economic direction for the future, we must hope a broad vision emerges. Due to low commodity prices and technological advancements, we can no longer depend on agriculture to provide the dollars and jobs it once did. We must look to other areas to diversify our investments. In an article published in *The Des Moines Register* on the population of Iowa counties the only rural county to increase population was Dickinson County, home of Iowa's Great Lakes. This should enlighten us to the importance of natural resources and the future of Iowa's rural areas. Business people need to get involved and support good fish and wildlife programs.

If the Department of Natural Resources is going to manage our fish and wildlife resources as a major economic asset, as well as a very important recreational resource, then Iowans will need to understand the importance of investment of state dollars to provide for a dependable future. This $615 million resource should be nurtured, not cut, and the responsibility of maintaining this resource should be shouldered by more of the Iowa public, not just the sportsmen and women of Iowa. The future truly is in our hands and at our doorstep.

Richard Bishop is the chief of the department's wildlife bureau in Des Moines.

Ken Formanek

For Iowa's Main Street Cafes Hunting and Fishing Makes a Big Impact

It seems as if I have suddenly found myself living in what many folks proudly refer to as the "Age of Change." Given the reality of that situation, I take no small comfort in knowing that there are at least a few things out there that can be relied upon to remain the same.

Three of the most dependable occur in northeastern Iowa's Clayton County where, if you have both the time and the legs for it, you can count on discoving a respectable German brown lurking among the shadowy tangles of the Ol' Stump Hole in North Cedar Creek. Another rock solid proposition is that if a spring gobbler is going to be sounding off anywhere in the county, there will be one rattling up a storm atop the vertical landscape of Man Killer Ridge located three and one-half miles, as the crow flies, from the famous river town of McGregor. The third thing that you can rely on is that at 5 a.m. sharp, Rory Thoma will turn on the lights and open the front door of Thoma's Cafe.

Thoma's Cafe is located on the west wide of Main Street in Garnavillo, a rural farm community of about 700 people. Here, as is the case with nearly all of Iowa's small town main street cafes, the term "home cooking" represents much more than a flashy advertising gimmick. To the roadwise traveler, such "mom and pop" establishments simply mean good food for a reasonable price.

Except for a two-year stint as a cook aboard a Mississippi riverboat, Thoma, 35, has worked at the cafe since he was 12 years old. He finally took the place over last year when his father retired. Like all successful business people, Thoma knows who his customers are and what they do.

"Garnavillo is a very rural community," said Thoma. "Typically we have about 25 kids in the high school graduation class." (A lot of the local cash flow depends on things like Holstein cows, timber harvest and river traffic, even though the town itself is located more than five miles from the Mississippi.) "A good part of our business also comes from activities related to hunting and fishing," said Thoma. One of the most noticeable impacts comes during the winter deer season.

"[Shotgun deer hunters] show up early in the morning and by a quarter after five the place is full," said Thoma. "They talk a lot, eat a lot and before daybreak they're outta here." But by mid to late morning, the hunters begin showing up again, this time for coffee or lunch. "If they're locals, they usually have their bucks by then," grinned Thoma. "Things like the deer season are very positive for the cafe."

During the spring months, Thoma's Cafe is also a popular resort with turkey and trout enthusiasts -- so much so that those showing up wearing camouflaged fatigues and face paint or a hat full of dry flies scarcely draw a second glance from other cafe patrons.

Of course, northeast Iowa trout and turkeys draw outdoor enthusiasts from all across the state, and some groups have been chowing down at Thoma's for more than a decade.

"We've really gotten to know some of these people very well," said Thoma. "They stop in and eat at least once or twice a day, they use the local gas station and stay at the motels.

"In addition to food, they also come here for information," said Thoma. "During the fall, [hunters] talk to the local bus driver about where he's been seeing turkeys. They also talk to the farmers about everything from squirrels to grouse.

▲
Rory Thoma, owner of Thoma's Cafe

"I think most of the farmers enjoy talking to the hunters," said Thoma. "Landowners have the best tips, and if the hunters use common sense and ask first, I think they can gain access to some prime areas. The main thing is respecting the landowner and their property," he added.

"One of the best things about a business like this is that it is a place where everyone in the community can get together," said Thoma. "At one time, we'll have everything -- dairy farmers, hunters, trout [anglers], people out to see the fall foliage -- everybody all enjoying each other's company," he said. "Sometimes we do a little something extra to get people out," said Thoma. For example, every April the cafe runs a banana split special. At first the response kind of took us by surprise," said Thoma. "When it was all over, we had made more than 550 splits. We ran the town out of bananas and had to jump in the car to go find more.

"Not bad for a town of 700," he chuckled.

--Lowell Washburn

Nonpoint Source Pollution

A Challenge for Iowa

by Ubbo Agena

Kimberly K. Coulter

▲
Demonstrations are being used statewide to inform the public about the best management practices that can be used not only on agricultural land but urban areas as well.

Federal, state and local governments are involved in nation-wide efforts to clean up nonpoint source pollution in our waters. Many of the efforts are being carried out in response to the requirements of Section 319 of the 1987 Clean Water Act. In adding the Section 319 requirements, for the first time Congress specifically established a national program to control nonpoint sources. The key to the program is voluntary action by the citizens and industries of the country to correct water quality problems.

The problem

When rainfall or snowmelt carries soil, nutrients, pesticides, animal wastes, industrial or municipal wastes, or other pollutants into surface or groundwater, the pollution is called nonpoint source pollution or NPS pollution.

Nonpoint pollution originates from such diffuse sources as agriculture, forestry, mining, construction and residential activities. The contaminants from these sources are carried by precipitation, land runoff, soil erosion, or infiltration into the ground. Although nonpoint source pollution is normally thought of as affecting surface waters, such as streams and lakes, infiltration of water through the soil or entry of surface water into sinkholes or wells can also cause nonpoint pollution of groundwater.

Iowa's NPS program

In Iowa, the Department of Natural Resources has been designated as the lead agency for carrying out the nonpoint source pollution control requirements of the Clean Water Act -- Section 319. However, other federal, state and local agencies also play vital roles in this program.

Section 319 funding

Under the Section 319 program, the Environmental Protection Agency can provide funds to states that have developed NPS pollution assessment reports and management programs. First appropriated in 1990, these funds are allocated to the EPA regional offices in two parts. The first part provides a planning target to each state for support of its base-level NPS control program. The other provides a lump sum for which states in that EPA region compete against each other for project funding.

Section 319 funds received by the DNR are used to help implement the state's NPS pollution management program. The money may be used for such activities as education, training, technical assistance, demonstration projects, and regulatory and enforcement activities. Iowa's NPS pollution control program emphasizes a voluntary approach to deal with the problem and the DNR has used the Section 319 funds to support voluntary control efforts.

In the last three years, Iowa's nonpoint source program has funded more than 25 different projects. The types of projects funded and the amount of funding going to each are listed in the table on page 34.

Although the DNR is responsible for administering the overall program, other agencies often have primary responsibility for implementing the Section 319-funded projects. Agencies participating in these projects include the Iowa Department of Agriculture and Land Stewardship--Division of Soil Conservation, the USDA Soil Conservation Service, the County Soil and Water Conservation Districts, Iowa State University Extension, the University of Iowa, U.S. Geological Survey and Agricultural Stabilization and Conservation Service.

Project highlights

Several of Iowa's Section 319 projects demonstrate the best management practices (BMPs) that can be used to help control nonpoint source pollution of bodies of water. One such project, at the Amana Colonies, demonstrates the use of grass and poplar tree buffer strips grown along the stream banks to protect water quality in the streams and shallow groundwaters. University of Iowa researchers have found that poplar trees can not only reduce the levels of nitrates found in nearby surface and ground waters, but the tree strips, in combination with grasses, can help reduce sediment runoff from cropland.

According to Dr. Louis Licht, associate research scientist at the University of Iowa, the trees also provide additional benefits. "The poplar trees not only stabilize the bank," Licht says, "but they also provide shelter for wildlife, prevent soil erosion by acting as a windbreak, give off oxygen to the atmosphere and soak up carbon dioxide."

The tree's roots form an underground sponge to remove pollutants from groundwater. "They can actually absorb pollutants, especially nitrates, from fertilizers," Licht adds. "And because poplar trees grow back rapidly after being pruned to ground level, they make a good biomass fuel. The branches that have been cut off can be compacted into pellets and used as a source of clean-burning fuel."

To comply with a Section 319 requirement that demonstrations be used to educate, this project was used as a demonstration site during the 1990 Farm Progress Show and will be featured again at the 1993 Farm Progress Show.

Section 319 funds also support a number of projects to protect priority streams and lakes. One such stream project is located in Allamakee County in northeast Iowa. The project is designed to protect Coon Creek, a coldwater trout stream, from being impacted by sediment and nutrients from cropland runoff and animal waste. According to Bob Joachim, soil conservationist with the Allamakee County Soil and Water Conservation District, the main problem in Coon Creek is sediment, with an estimated 13,000 tons entering the stream each year.

The Coon Creek watershed involves 12,670 acres and more than 50 percent of that is cropland. Technical assistance and financial incentives offered under the project have resulted in increased use of best management practices such as conservation tillage and other soil conservation practices to control erosion and reduce agricultural chemical movement in the 11-mile stream corridor.

Thus far, nine farmers have built conservation structures to control sediment runoff from cropland and waste runoff from livestock operations. Terraces, sediment control ponds, manure storage basins and diversions are being constructed. In a few areas vegetative buffer strips are being planted.

In addition, the DNR manages two miles of this stream as a put-and-take trout fishery. In this area, livestock access to the stream is a concern and livestock are being excluded from the stream by fences and will be restricted to a controlled area for grazing.

Dr. Louis Licht, University of Iowa

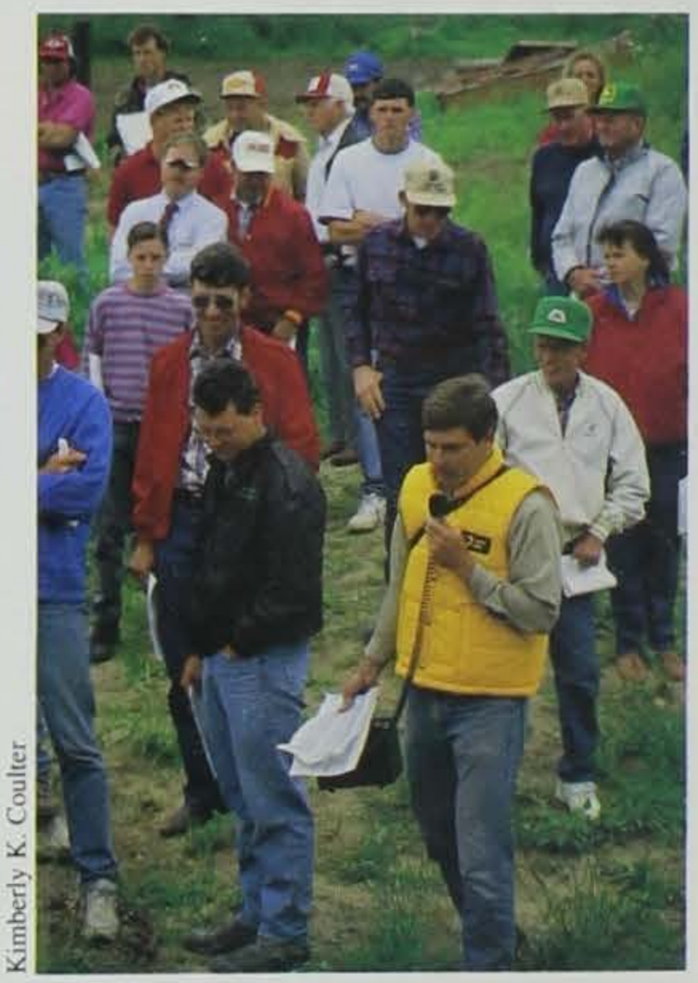
◀

These poplar trees are used as buffer strips to control soil erosion and runoff from the nearby cropland. The trees actually use the chemicals for food.

Kimberly K. Coulter

◀
Animal waste management is one component of the Section 319 demonstrations.

▼
Bob Joachim, coordinator for the Coon Creek project, explains to farmers the benefits of using control structures to divert manure runoff from feedlots.



Kimberly K. Coulter

Iowa's Section 319 Program

Project Categories	Funding FY90-92
Lake Water Quality	$1,048,247
Cold-water Trout Stream	469,242
Groundwater Protection	135,676
Animal Waste Management	573,500
BMP Demonstrations	525,297
Public Information and Education	424,160

Alternative drinking water sources are being provided to the livestock where access has been restricted. This will protect the banks from damage while maintaining the livestock operation.

This project involves a variety of agencies including Winneshiek and Allamakee counties' soil and water conservation districts, the Iowa Department of Agriculture and Land Stewardship, the USDA Soil Conservation Service, Iowa State University Extension, Luther College, the northeast Iowa RC&D, the EPA and the DNR.

Public information projects are another important element of Iowa's nonpoint source program. For example, the *Best Management Practices*, a tabloid developed by the Iowa State University Extension, was recently completed. This 24-page reference guide is reader-friendly and contains information on a variety of common sense practices which can be used to reduce nonpoint source pollution of surface and ground waters from agriculture. According to Dr. Jerry DeWitt, associate dean of agriculture at ISU Extension, this publication was mailed with the Farm Bureau *Spokesman* to more than 104,000 farm owners and operators across Iowa in hopes of increasing awareness about the current best management practices.

"We hope farmers do not throw this guide away. It was designed to be stored and saved for further study," says DeWitt. "The short articles are easy to read and are intended to be motivational, in hopes of stimulating voluntary

Ken Formanek

▲
The *Best Management Practices* tabloid is available free from Iowa State University Extension county offices or from the Extension Distribution Center, 119 Printing and Publications Building, Iowa State University, Ames, Iowa 50011.

actions. We want to communicate with those farmers who seldom attend meetings or contact the Extension or soil and water conservation districts."

According to DeWitt, profitability is the bottom line when looking at environmental improvements that affect farmers. The practices described in this tabloid are considered to be relatively low-risk or safe for farmers to use to improve water quality.

Topics covered include soil erosion, nutrient and pest management, soil testing, manure management, conservation tillage, how to measure crop residue and water well protection.

Although Iowa's initial nonpoint source control efforts were directed mainly at agricultural sources, the state has now expanded its efforts to address other sources as well. The Cedar Rapids area construction site erosion demonstration project is only one example. The DNR expects to fund the project in the near future. In recent years, the City of Cedar Rapids and its surrounding communities have been experiencing rapid growth and development. In many instances, this development has occurred without adequate control of construction site erosion, resulting in runoff of sediment and other pollutants into area streams.

This Section 319 project will demonstrate use of various construction site erosion controls in the Cedar Rapids area, and provide training to consultants, developers, contractors and builders on the design and implementation of control practices. Development of a model erosion control ordinance is also part of the project.

For Iowa to have good quality surface and ground waters, it is essential that nonpoint source pollution be controlled. Through its Section 319 projects, the DNR is trying to inform farmers and other citizens on needed control practices, including showing how the practices can be implemented and what they can do to improve water quality.

Current state and federal laws provide the opportunity to control nonpoint source pollution on a voluntary basis. Although government can provide assistance, it is ultimately up to individual citizens to act. Failure to do so will increase the likelihood of greater regulation in the future.

Ubbo Agena is an environmental engineer with the department water quality bureau in Des Moines.

. . . profitability is the bottom line when looking at environmental improvements that affect farmers.

Ken Formanek

Ken Formanek

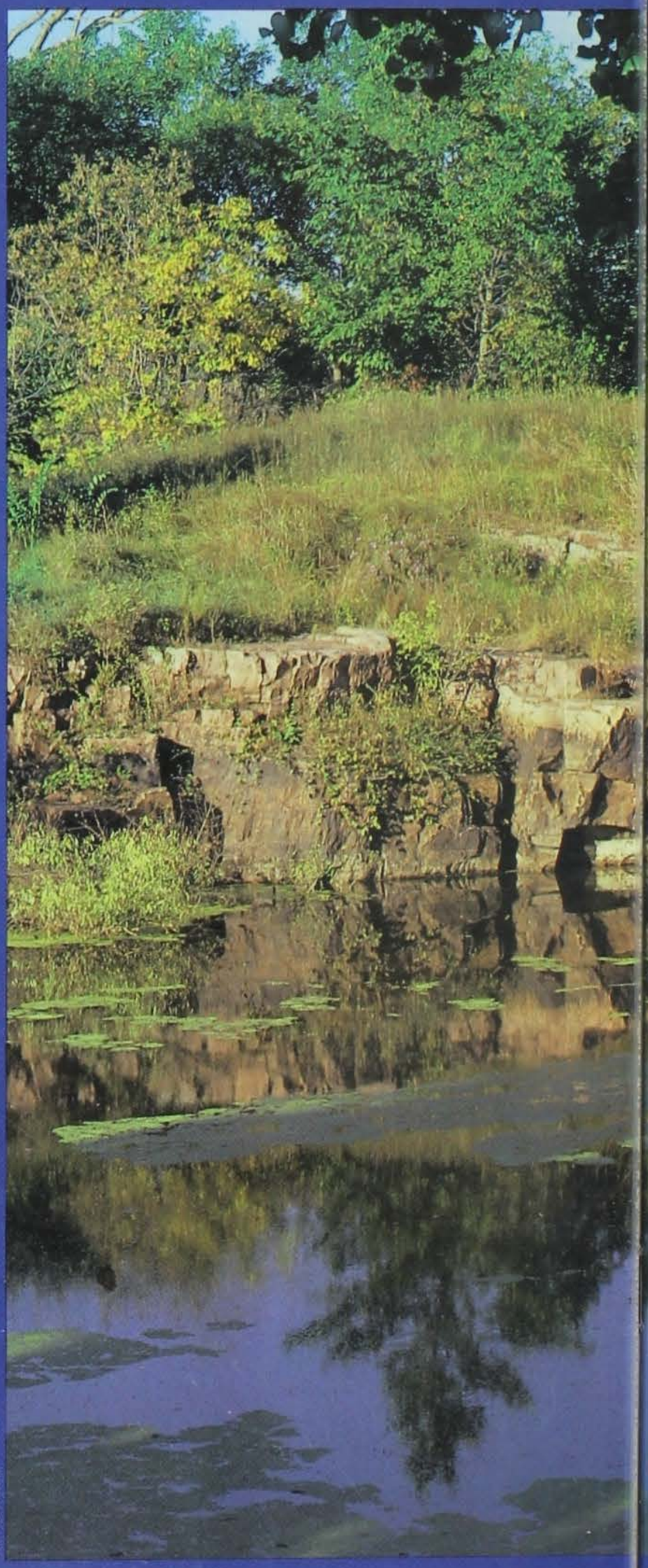
▲
Soil, grass, concrete, insulation, and scrap metal are just a few of the visible contaminants at construction sites.

◀
Fabric fences are just one of the BMPs that can be used to slow erosion of soil during heavy rains.

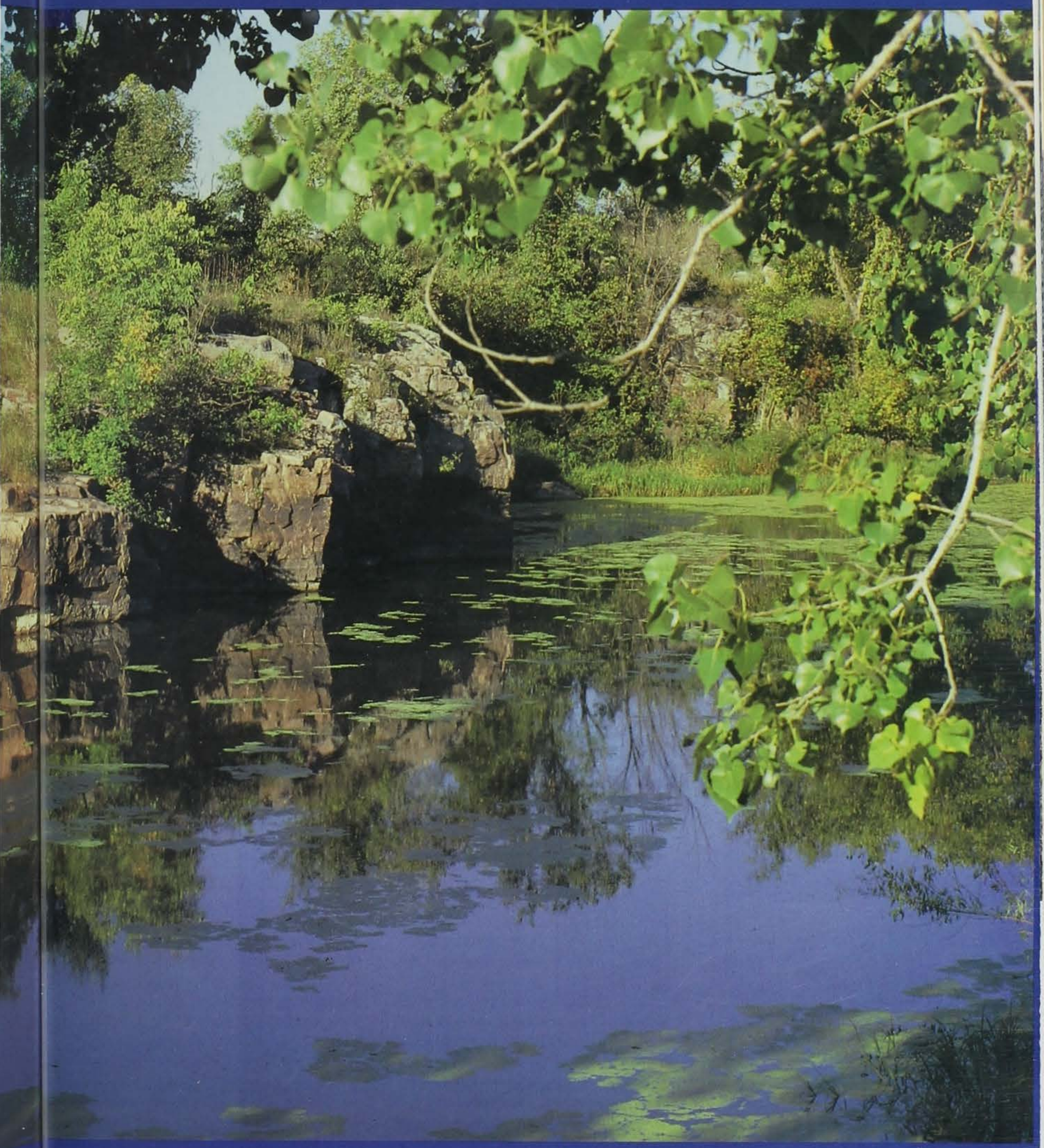
by Jean C. Prior

Geological Preserves in Iowa

There is a surprising array of natural wonders within Iowa's borders. These places are vastly different from the manicured agricultural landscapes which tend to dominate our perception of the state. Cool damp caves, steep dry ridges of wind-blown silt, massive bluffs of limestone, spongy water-logged deposits of peat, and clusters of irregular gravelly knobs are images not commonly associated with the Iowa countryside. Yet such features are among 86 select parcels of land designated as "state preserves." In these particular areas, pieces of Iowa's natural and cultural history are saved. Iowa's preserves system includes sites of historical, archaeological, biological and geological significance. Through preserve status, these sites are granted important statewide recognition and special legal protection under Iowa law.



Pat McAdams



▲ Gitchie Manitou State Preserve, Lyon County

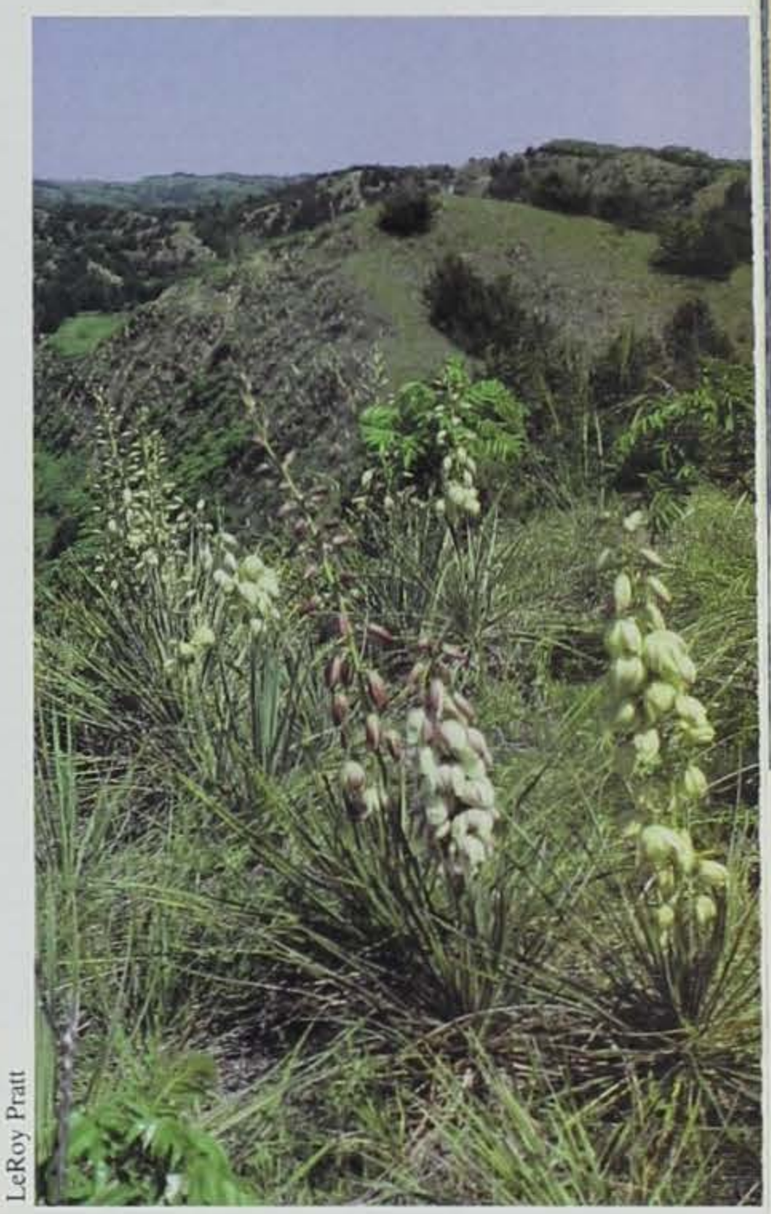
▲
Doolittle Prairie State Preserve, Story County

One category of state preserve -- geological preserves -- includes out-of-the-ordinary places that display a strong connection to some aspect of the state's geologic past. Here the physical remains of oceans, marine life, glaciers, wind and flowing water impact our present landscape. They bring Iowa's most ancient history into sharper focus. Geological preserves can include prominent landform features, outcrops of fossil-bearing strata, reference points for specific rock formations, and historic sites where mineral or rock resources were quarried.

For example, the ***Freda Haffner Kettlehole*** in Dickinson County is a deep, bowl-shaped depression which mirrors its contact with a mass of stagnant, melting glacial ice about 14,000 years ago. ***Ocheyedan Mound***, a gravelly knob rising abruptly above the Osceola County landscape, also had its origins in the grip of this slowly wasting ice sheet. The wetland features of ***Doolittle Prairie*** trace a local route taken by glacial meltwater across the Story County landscape. The promi-

Douglas Harr

Mark Engler



LeRoy Pratt

Gary Hightshoe

▲ (top)
Ocheyedan Mound State Preserve, Osceola County

▲
Freda Haffner Kettlehole State Preserve, Dickinson County

▲
Spine-leafed yucca blooming in the Turin Loess Hills Preserve, Monona County

nent south-facing slope of ***Stinson Prairie*** defines the edge of the Algona moraine across Kossuth County, marking the last stand of glacial ice in north-central Iowa about 12,500 years ago.

Another by-product of mid-continental glacial activity was the deposition of windblown silt or loess swept from the floor of the Missouri River valley, which was a major corridor channeling glacial meltwater away from the ice front. Distinctive landscapes consisting of sharp ridges, steep-sided hills, and deep ravines are the result of erosional sculpture of thick

Martha Maxon

▲
Old State Quarry, Johnson County

▲
Bluffton Fir Stand, Winneshiek County

Turin Loess Hills Preserve in Monona County and the ***Mount Talbot Preserve*** on the Woodbury-Plymouth county line.

Glaciers also left their mark in the form of parallel grooves etched into underlying bedrock. At the ***Stainbrook Preserve*** in Johnson County, glacial scouring shaped and scored the limestone surface. The resulting grooves show the direction of ice passage across Iowa during much older glacial advances more than 500,000 years ago. The Devonian-age limestones exposed at this preserve also are notable for the abundant fossil remains of marine life, especially corals, which inhabited the sea floor here some 375 million years ago. Well-preserved fossils, especially brachiopods, that also inhabited shallow tropical Devonian seas in the Cerro Gordo County area may be collected from the ***Bird Hill Preserve*** -- one of the rare preserves where collecting is permitted.

Some geological preserves are dominated by bedrock outcrops and exhibit unusually rugged terrain. For example ***White Pine Hollow, Mossy Glen*** and ***Brush Creek Canyon*** preserves consist of deep, narrow, wooded gorges nestled into the Silurian Escarpment. This is a prominent line of resistant limestone bluffs that crosses northeastern Iowa from Fayette County to Dubuque County, and then continues eastward forming a geological link with Niagara Falls, New York. The massive, weathered rock formation is fractured and creviced, conditions which produce sinkholes, springs, cold-air drainage and large tilted blocks of slumped rock. Such places often contain unique ecological habitats, which sometimes harbor rare communities of plants and animals. Other good examples of ecological niches produced by geological conditions include the creviced limestone cliffs behind ***Bluffton Fir Stand*** in Winneshiek County, the wind-blown dunes beneath ***Marietta Sand Prairie*** in Marshall County, and the groundwater seepage feeding ***Hanging Bog*** in Linn County and ***Silver Lake Fen*** in Dickinson County.

In the springtime, along the Upper Iowa River valley in Winneshiek County, a large vertical crevice in the limestone becomes coated with an unusual build-up of ice. At the

Jean C. Prior

Geological preserves are time-worn signposts, guiding visitors through Iowa's earth history . . . highlighting the physical effects of seas, glaciers, wind and rivers in Iowa's past.

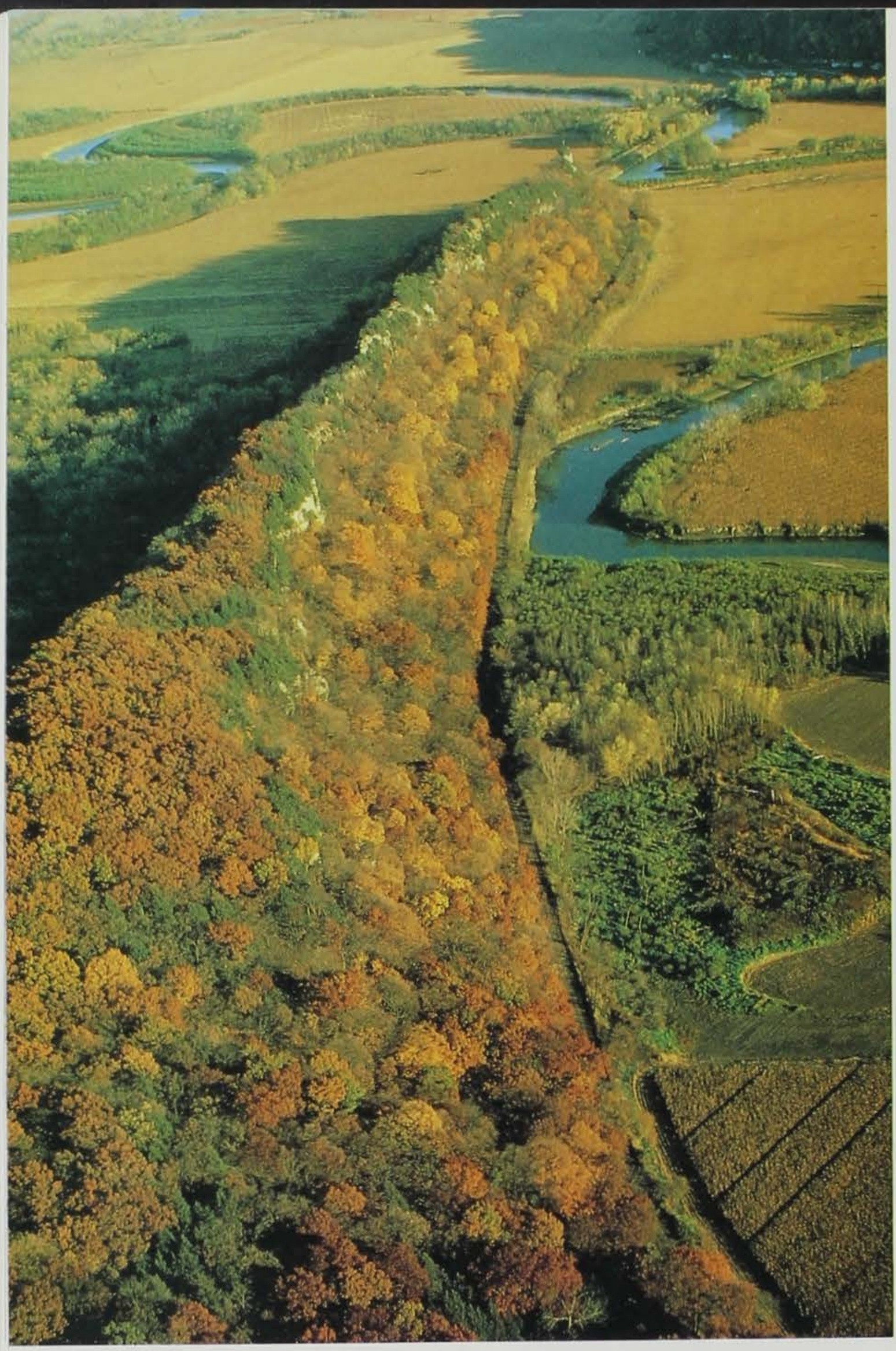
Jean C. Prior

▲
**Starrs Cave,
Des Moines County**

Decorah Ice Cave Preserve, seasonal flows of winter-cooled air and spring rains infiltrating through subterranean fractures in the limestone produce this unusual condition. Other cavern systems in Iowa recognized as state preserves include ***Bixby Ice Cave*** in Clayton County, ***Starrs Cave*** in Des Moines County and ***Searryls Cave*** in Jackson County.

Bedrock outcroppings at some preserves are significant because the sites mark where rock formations received their formal names and were first described in the geological literature. These reference points, or "type-sections" as they are known, are valuable to geologists making comparative studies of rock strata over large regions. For example, the limestone formations exposed at ***Fort Atkinson, Starrs Cave*** and ***Old State Quarry*** preserves were originally named for these geographic locations. The reddish colored Sioux Quartzite seen at ***Gitchie Manitou Preserve*** in Lyon County was named in 1870 for these exposures along the Big Sioux River. The low, wind-polished outcrops are 1.6 billion years old, and they are the oldest bedrock deposits that can be seen in Iowa.

Geological preserves often share a combined designation which acknowledges other aspects of the state's natural and cultural history. Geological influences on historic and even prehistoric human activity can be appreciated at



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Turkey River Mounds, Clayton County

Gary Hightshoe

To read more about preserves . . .

The state preserves and geological history introduced here are described more fully in the book ***Landforms of Iowa*** by Jean C. Prior. This 168-page book contains 72 color photos, illustrations and maps and is available from local bookstores or from the University of Iowa Press (Publications Order Dept., 100 Oakdale Campus, Iowa City, IA 52242-5000) for $14.95 plus tax.

Also, the ***Iowa State Preserves Guide*** includes maps, descriptions and references for each preserve. It was published in 1992 and is available from the department's preserves and ecological services bureau in Des Moines free of charge.

Turkey River Mounds, also an archaeological preserve, found on the high, narrow, bedrock divide separating the Mississippi and Turkey river valleys in Clayton County. ***Catfish Creek Preserve***, within the Mines of Spain area, focuses on the geologic occurrence of lead veins in the Galena Group rocks and on the early lead mining history near Dubuque. ***Fort Atkinson*** in Winneshiek County and ***Old State Quarry*** in Johnson County are both geologic "type sections" and are also of historic significance to the state. The plants of ***Kalsow Prairie***, a biological preserve in Pocahontas County, are rooted in the glacial deposits of the Des Moines Lobe. Of particular geological significance, however, is that ***Kalsow Prairie*** is situated near the center of the Manson Crater, the site of an explosive meteor impact 65 million years ago and now buried from view beneath about 200 feet of glacial deposits.

Like great works of art, geological preserves have an enduring appeal and an ability to communicate to those who see them. They provide visitors with perspective and enjoyment. They are important not only for their specific scientific and educational value but for developing an increased public awareness, appreciation and understanding of the Iowa's natural environment.

Jean C. Prior is a research geologist with the department's geological survey bureau in Iowa City. She is also an advisor to the state preserves board.

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pollutants carried into the lake from the watershed from no single source. These pollutants are caused by insufficient conservation practices in the watershed and too large of a watershed. Sediments are carried into lakes and deposited, filling them in, making the

◀
Fishing at Lake Anita.

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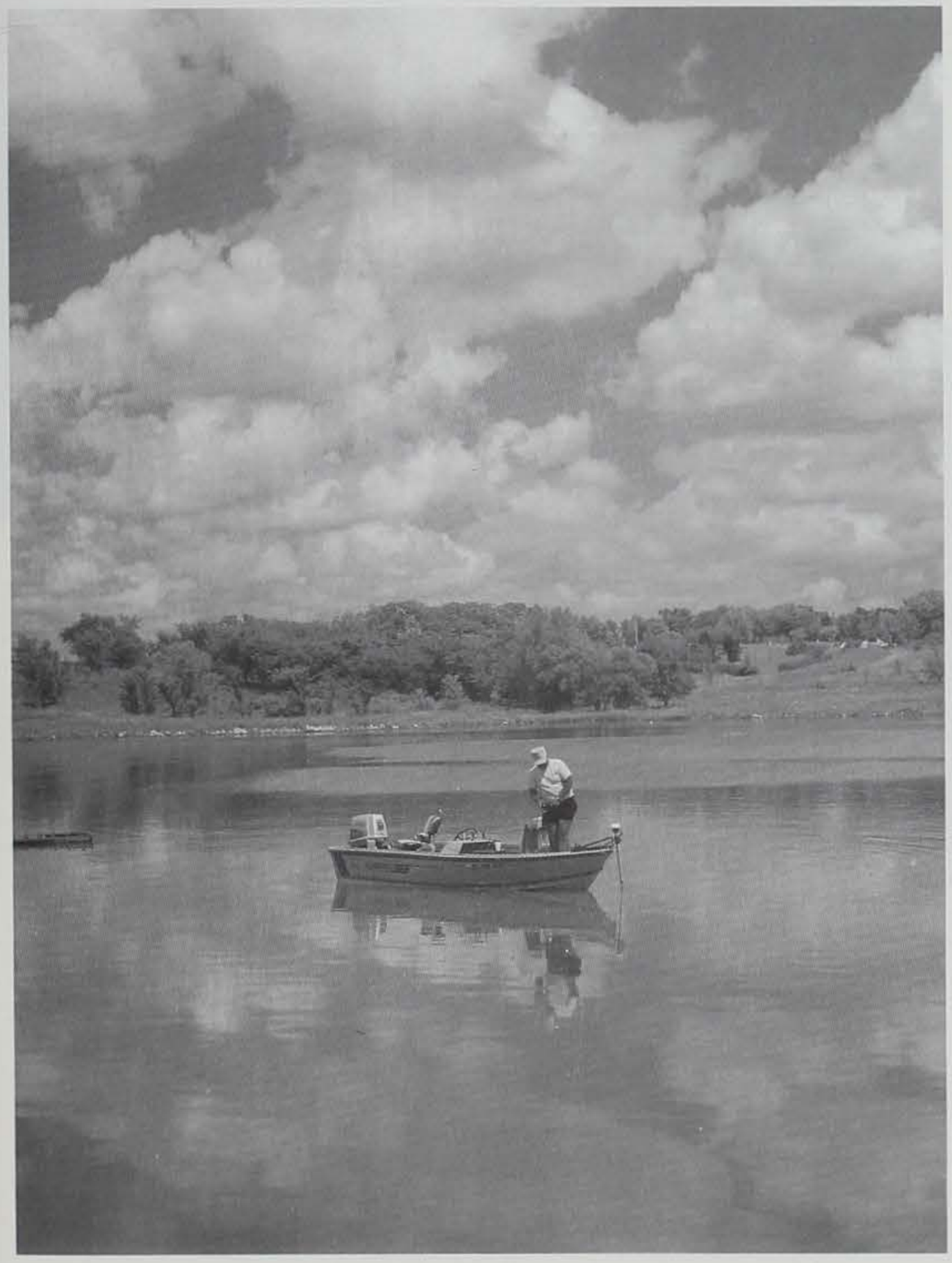
archaeological preserve, found on the high, narrow, bedrock divide separating the Mississippi and Turkey river valleys in Clayton County. ***Catfish Creek Preserve***, within the Mines of Spain area, focuses on the geologic occurrence of lead veins in the Galena Group rocks and on the early lead mining history near Dubuque. ***Fort Old State Quarry*** in Johnson County are both geologic "type sections" and are also of historic significance to the state. The plants of ***Kalsow Prairie***, a biological preserve in Pocahontas County, are rooted in the glacial deposits of the Des Moines Lobe. Of particular geological significance, however, is that ***Kalsow Prairie*** is developing an increased public awareness, appreciation and understanding of the Iowa's natural environment.

Jean C. Prior is a research geologist with the department's geological survey bureau in Iowa City. She is also an advisor to the state preserves board.

Quality Water Quality Fish



Article by Kay R. Hill
Photos by Ron Johnson

Recently I overheard two anglers talking about their next fishing trip. One angler said "I wouldn't fish that lake because the water is so muddy the fish will taste muddy." There is a slight bit of truth to that statement, but muddy water doesn't impart a muddy taste to the fish.

Muddy water or water which is high in sediment is caused by extreme runoff from a watershed too large for the lake. The watershed of a lake is any surrounding land from which water will eventually flow to the lake. In some cases the watershed area to lake area ratio may reach 100 acres of watershed to one acre of lake, but for best water quality a lake's watershed area should not exceed 30 acres for each acre of lake.

The number one killer of Iowa lakes is nonpoint source pollution -- water-borne sediment and assorted pollutants carried into the lake from the watershed from no single source. These pollutants are caused by insufficient conservation practices in the watershed and too large of a watershed. Sediments are carried into lakes and deposited, filling them in, making the

◀
Fishing at Lake Anita.

The number one killer of Iowa lakes is nonpoint source pollution -- water-borne sediment and assorted pollutants carried into the lake from the watershed from no single source.

lake shallow and shortening the life of a lake. Nutrients or fertilizers carried into the lakes result in dense aquatic vegetation growth and blooms of nuisance blue-green algae. These nutrients settle out in a lake with a small watershed, but when there is a constant supply of nutrients, the aquatic plants known as seaweed and microscopic one-celled plants called algae have readily available nutrients and grow fast enough to cause problems. These include dense rings of vegetation around the edges of lakes which completely cover the shallow bays and thin layers of green and blue-green algae which form a green scum over the entire lake surface. When the nutrients are used or bound in insoluble form, the plants die and rot using available oxygen for the fish which may cause the fish to die. Agricultural chemicals from the watershed can poison aquatic insects and kill fish if the chemical concentration is high enough.

Another problem caused by dirty water is not allowing sunlight to penetrate the water column. Microscopic plants need sunlight to grow and produce oxygen. Some kinds of algae are beneficial in the lake and are needed to provide food for tiny fish, thus starting the food chain in the lake ecosystem. Dirty water also hinders the effective predation by sight-feeding fish on smaller fish, because they can't see the forage. This also hurts fishing because the angler baits aren't as readily seen by the larger predator fish such as bass, walleye, etc.

These water quality problems can

be minimized if the lake is constructed properly. New lakes must be constructed with properly sized watersheds using a 30:1 or smaller watershed area to lake area ratio. These lakes must have watersheds in which soil conservation plans are implemented to control sediment and nutrient input to the lake. Some Iowa lakes presently exist without turbidity problems. These lakes have erosion control and other land management practices in the watershed and have watersheds of 30 acres or less to one acre of water. Classic examples of these lakes are Lake Anita in Cass County, Viking Lake in Montgomery County, Red Haw Lake in Lucas County and Nine Eagles Lake in Decatur County.

There is a future for lakes already damaged by uncontrolled sediment because these lakes can be restored. The preventative approach is controlling nonpoint source pollution by implementing soil conservation and water quality improvement practices. Watershed to lake area ratios can be altered sometimes by diverting some watershed away from the lake, and sediment and nutrient loading into the lake can be altered by constructing nutrient control structures, basins and wetland areas in the lake watershed. Examples of these nutrient-control structures are at Green Valley Lake in Union County and Lake Icaria in Adams County.

The treatment approach is removing sediment from the lake. This can be accomplished by hydraulic dredging, which occurred at Union Grove Lake in Tama County or by mechanical dredging, which occurred at Swan Lake in Carroll County. This dredging increases lake volume and will decrease the nutrient-rich deposits which promote weed and algae growth. These dredging operations must be undertaken along with other land conservation practices in the watershed to be effective. In addition to dredging, the lake shoreline should be riprapped to stabilize the shoreline and prevent wind and boating wave action.

The correct portion of the statement by the angler in the opening paragraph is some blue-green algae produced a chemical which imparts an off-flavor to some fish, so he was partly correct, but turbidity alone does not change the flavor of the fish, it just may make the fishing trip less enjoyable.

◄
Hydraulic dredging at Union Grove. Dredging operations must be undertaken along with other land conservation practices in the watershed to be effective in controlling nonpoint source pollution.

▼
Muddy water or water which is high in sediment is caused by extreme runoff from the watershed. Sediments from extreme runoff are carried into a lake and deposited, filling it in, making the lake shallow and shortening its life.

Kay R. Hill is a fisheries research biologist for the department in Lewis.

1993 Iowa Record Deer Racks

This is a list of deer racks scored between October 1992 and July 1993.
New entries into the *All-Time Top 10 Racks* are designated by an asterisk (*).
See page 47 for the *All-Time Top 10 Racks*.

SHOTGUN TYPICAL

(Minimum Qualifying Score -- 150 points)

NAME	CITY	COUNTY TAKEN	YEAR	TOTAL SCORE
*Dennis R. Vaudt	Storm Lake	Cherokee	1974	190
Mark Maynard	Castana	Monona	1992	186-3/8
Edward L. Tomas	Adel	Madison	1992	181-4/8
Ray Taylor	Ottumwa	Appanoose	1986	180-5/8
Mike Maddy	Albia	Monroe	1992	180-2/8
Jim Olson	Sioux City	Woodbury	1985	176-6/8
Corey Gwinn	Chariton	Lucas	1992	176-2/8
Lawrence E. Blatz	Dubuque	Dubuque	1992	175
Ronald J. Casel	LaMotte	Jackson	1992	174-5/8
Ken Sailors	Woodbine	Harrison	1977	173-1/8
Richard A. Bishop	Indianola	Monroe	1992	173
Tom Niedermyer	Pisgah	Harrison	1973	172-2/8
Tim Verhey	Pella	Des Moines	1992	170-7/8
Steve Kingery	Knoxville	Marion	1991	170-5/8
Steve Hood	Bonaparte	Van Buren	1987	170-2/8
Dan Swehla	Calmar	Winneshiek	1964	169-2/8
Brent DeKoning	Newton	Lucas	1991	168-5/8
Dan Starcevic	Albia	Monroe	1990	168-5/8
Rod Warren	Des Moines	Appanoose	1989	168-3/8
Brent Pumphrey	Long Grove	Scott	1992	168-1/8
Charles Wilson	Carlisle	Warren	1992	168
Melvin Carmichael	Council Bluffs	Pottawattamie	1977	167-7/8
Russell D. Burroughs	Shenandoah	Fremont	1990	167-7/8
Wayne C. Northcutt	Newton	Van Buren	1992	167-5/8
Josh Graf	Nodaway	Adams	1992	167-2/8
Rick Barker	Nevada	Story	1983	166-7/8
Jack M. Wicki	Ft. Dodge	Webster	1991	166-5/8
Brian Moore	Corydon	Wayne	1992	166
Jason Sandholdt	Oskaloosa	Mahaska	1985	165-2/8
Butch Moore	Clarinda	Page	1991	164-7/8
Chad Bissen	Defiance	Crawford	1992	164-6/8
Melvin Johnston	Smithland	Monona	1988	164-3/8
James Asher	Milton	Davis	1992	163-7/8
Scott DenHartog	Oskaloosa	Monroe	1991	163-4/8
Dennis Glaser	Bellevue	Jackson	1991	163-3/8
Gary Starr	Maquoketa	Jackson	1992	163-2/8
Bret Boone	Sidney	Fremont	1991	162-7/8
Craig Graham	Webster City	Hamilton	1991	162-1/8
Duane Reasoner	Ellston	Ringgold	1992	162
Ken Robertson	Diagonal	Ringgold	1991	162
Jerry Stillwell	Lawton	Plymouth	1980	161-4/8
Randy Schmit	Davenport	Scott	1991	161-2/8
James J. Ripperger	Chariton	Lucas	1992	160-7/8
Edwin Mumford	Chariton	Lucas	1991	160-4/8
Paul Peterson	Chariton	Lucas	1969	160-3/8
Kevin Niemer	Dubuque	Jones	1991	160-2/8
Harold Garner	Russell	Lucas	1992	160-1/8
Pat Wernimont	Hopkinton	Delaware	1992	160-1/8
Stan Moellers	Decorah	Winneshiek	1991	160
Kelly Monier	Sibley	Pottawattamie	1992	159-6/8
Ted Miller	Unionville	Davis	1992	159-5/8
Scott Leinen	Ankeny	Shelby	1991	159-4/8
Greg Hines	Dubuque	Clayton	1992	159-4/8
Dave Lerch	Martelle	Jones	1991	159
Ronald L. Valentine	Dubuque	Dubuque	1992	158-5/8
Ted Jarnagin	Des Moines	Lucas	1991	158-2/8
Anthony Zemo	Bettendorf	Appanoose	1992	158-2/8
Terry L. Marshall	Glenwood	Mills	1991	158-1/8
Justin Henderson	Bloomfield	Davis	1992	158-1/8
John Kipp	Waterloo	Ringgold	1992	157-6/8
Jim Birmingham	Des Moines	Union	1992	157-5/8
David Hemminger	Marshalltown	Marshall	1992	157-3/8
John Unternahrer	Wayland	Washington	1978	157-1/8
John Grenko	Centerville	Appanoose	1992	157-1/8
Ray Klein	Balltown	Allamakee	1992	157-1/8
Tim Schrandt	Ridgeway	Winneshiek	1991	156-7/8
Gary Skarda	Afton	Union	1992	156-7/8
Mike Rabe	Paullina	O'Brien	1992	156-6/8
Roger Haganman	Stockport	Van Buren	1975	156-5/8
Allan T. Carmichael	Council Bluffs	Pottawattamie	1979	156-4/8
Tom Klosterman	Dyersville	Dubuque	1992	156-3/8
Kelly L. Curnes	Osceola	Clarke	1992	156-3/8
Wayne Allen	Ridgeway, MO	Decatur	1989	156-2/8
Jeff Foote	Council Bluffs	Harrison	1992	156-2/8
Bo Vernon	Solon	Johnson	1991	156-2/8
Dennis Cunard	Magnolia	Harrison	1988	156-2/8
Rick Meeker	Woodbine	Harrison	1990	156-1/8
Bob Gray	Sioux City	Plymouth	1992	156
Tom Gehlhaar	Indianola	Decatur	1987	155-7/8
Danny Corbett	Promise City	Wayne	1992	155-6/8
Ken Robertson	Diagonal	Ringgold	1992	155-5/8
J.B. Marks	Allison	Union	1992	155-2/8
Paul Jones	Harpers Ferry	Allamakee	1992	155-2/8
Larry Gleiser	Sioux City	Woodbury	1992	154-5/8

Danny Stamps	Corning	Taylor	1990	154-3/8
Steve White	Guttenberg	Clayton	1992	154-3/8
Tim W. Wells	Washington	Washington	1992	154-2/8
Jeffrey C. Erb	Gowrie	Guthrie	1991	154-2/8
Dennis Grossman	Farmington	Van Buren	1970	154-2/8
Tim DeLance	Storm Lake	Monona	1985	154-1/8
Tom Flynn	Denison	Monona	1991	154-1/8
Rob Schulz	Altoona	Union	1992	154-1/8
Chris Johnson	Stanton	Montgomery	1992	154
Mike Petro	Des Moines	Marion	1991	154
Delbert Miller	Council Bluffs	Mills	1992	153-7/8
Marvin Henriksen	Corning	Taylor	1992	153-6/8
Kirk Corbin	Barnes City	Franklin	1991	153-6/8
Paul Fratzke	Janesville	Allamakee	1992	153-5/8
Mart Pruett	Pisgah	Harrison	1992	153-4/8
Lonnie Reck	Blakesburg	Wapello	1992	153-4/8
Ray Koenck	Hamlin	Monona	1991	153-4/8
Charlie Walker	Red Oak	Montgomery	1992	153-3/8
Brad Bell	Coon Rapids	Guthrie	1991	152-7/8
Dennis Lass	Decorah	Winneshiek	1971	152-7/8
Terry DeGoey	Knoxville	Warren	1992	152-6/8
Wilson O. Finney	Ottumwa	Wapello	1970	152-5/8
Chris Hughes	Merrill	Plymouth	1992	152-5/8
Steve Hood	Bonaparte	Van Buren	1989	152-5/8
Mike Blakley	Libertyville	Van Buren	1990	152-4/8
Doug Parsons	Sioux City	Harrison	1991	152-4/8
Mike Sieverding	Sioux City	Plymouth	1992	152-3/8
Dave Henry	Sioux City	Plymouth	1992	152-3/8
Gary Kelley	Creston	Union	1992	152-2/8
Mark Theismann	Decorah	Allamakee	1990	152-1/8
Todd Bebout	Allerton	Wayne	1992	152-1/8
Jeff Visek	Cedar Rapids	Van Buren	1991	152-1/8
John E. Christensen	Granger	Polk	1992	152
Jim Remmick	Mapleton	Monona	1992	152
Tim Johnson	Washington	Appanoose	1992	151-7/8
Elvin H. Dickinson	Prole	Madison	1980	151-7/8
Daryl Rote	Menlo	Guthrie	1992	151-6/8
Lonnie Storesund	Coon Rapids	Guthrie	1989	151-6/8
Dick Munoz	Des Moines	Lucas	1991	151-6/8
Jeff Aukes	Allison	Butler	1992	151-5/8
Howard Willis	Sloan	Harrison	1966	151-5/8
Kevin Kuhn	Calmar	Guthrie	1992	151-5/8
Gloria Russell	Wayland	Washington	1987	151-5/8
Kerry Pauley	Panama	Harrison	1986	151-4/8
Terry Keiser	Marengo	Iowa	1992	151-2/8
Jerry Marshal	Numa	Appanoose	1992	151-1/8
Guy Smith	Wapello	Louisa	1987	151
Lee Gladfelter	Madrid	Des Moines	1980	150-5/8
Stan Avery	Tama	Tama	1992	150-4/8
Jim Mills	Mt. Pleasant	Henry	1992	150-4/8
Dennis Clayton	Allerton	Wayne	1992	150-4/8
Dave Beaty	Humboldt	Keokuk	1987	150-3/8
Bryan Hilgenberg	Coon Rapids	Guthrie	1988	150-3/8
Mark Egan	Waukon	Allamakee	1991	150-2/8
Gary L. Brink	Postville	Allamakee	1991	150-2/8
Mark Knudtson	Dayton	Wright	1979	150-1/8
Don Gauger	Ames	Boone	1991	150-1/8
Delbert Eggers	Webster City	Hamilton	1991	150
Mike Christopher	Decorah	Winneshiek	1988	150
Dennis Graham	Clarinda	Taylor	1992	150

SHOTGUN NONTYPICAL

(Minimum Qualifying Score -- 170 points)

NAME	CITY	COUNTY TAKEN	YEAR	TOTAL SCORE
*Bill Walker	Montrose	Lee	1992	224-3/8
Randy Showers	Weldon	Clarke	1991	211-1/8
Bill Moore	Humeston	Lucas	1992	201-1/8
Dean Beyer	Osage	Mitchell	1991	200-5/8
Victor J. Buresh	Lime Springs	Howard	1990	200-4/8
Elvin H. Dickinson	Prole	Madison	1982	198-4/8
Jim L. Reid	Knoxville	Marion	1992	198
Carl Roby	Ottumwa	Appanoose	1992	197-2/8
Dennis Swarthout	Mt. Pleasant	Lucas	1991	197-1/8
Darin Holzerland	Westfield	Woodbury	1992	197-1/8
Ted Walleser	Lansing	Allamakee	1992	192-6/8
Brian W. Stickney	Smithland	Monona	1992	192-3/8
Joe Skow	Spencer	Monona	1978	191-4/8
Brad Beeler	West Des Moines	Guthrie	1986	190-3/8
Pat Ryan	Decorah	Winneshiek	1965	186
Kenneth Anderson	Ottumwa	Monroe	1991	185-3/8
Carey Atkinson	Manchester	Delaware	1992	184-6/8
John Schlautman	Council Bluffs	Monona	1992	181-2/8
Ed Kennedy	Farmington	Van Buren	1992	181-1/8
Paul Sorum	Decorah	Winneshiek	1992	180-4/8
Jim Callahan	Newton	Marion	1992	179-3/8
Kurt Espe	Ft. Dodge	Winneshiek	1992	179-2/8
Jim DeHeer	Pleasantville	Marion	1992	178
Mike E. Scieszinski	Albia	Monroe	1992	177-7/8
Mike Dennis	Cedar Rapids	Monroe	1992	177
Ron Stillinger	Carson	Pottawattamie	1982	176-7/8
Dan Starcevic	Albia	Monroe	1986	176-5/8
Ken Jones	Logan	Harrison	1977	174-7/8
Dwight Van Brocklin	New Albin	Allamakee	1992	174-5/8
Dave McAlpin	Clarinda	Montgomery	1992	173-6/8
Ivyl Ransom	Truro	Madison	1989	173-5/8
Laverne Weber	Richland	Jefferson	1980	173-4/8
Ron Drish	Brighton	Jefferson	1992	172-5/8
Larry Stark	Stockport	Henry	1979	171-4/8
Rex Dewey	Urbandale	Decatur	1992	171-1/8
Mark Baldwin	Anthon	Woodbury	1992	171-1/8
Bill Watson	Council Bluffs	Pottawattamie	1992	170-6/8
Bob Voss	North English	Iowa	1987	170-5/8
Rex Sheetz	Keota	Washington	1976	170-4/8
Wayne Allen	Ridgeway, MO	Decatur	1990	170-1/8
Keith C. Baker	Grand River	Decatur	1991	170

MUZZLELOADER TYPICAL

(Minimum Qualifying Score -- 150 points)

NAME	CITY	COUNTY TAKEN	YEAR	TOTAL SCORE
*Charles Hixson	Chariton	Lucas	1989	170
*Kevin Burge	Hamburg	Fremont	1992	167-7/8
Steve Hood	Bonaparte	Van Buren	1992	164-1/8
Brad Blatz	Numa	Appanoose	1992	162-3/8
Bruce L. Hupke	Carlisle	Warren	1993	160-7/8
Dwight Kollbaum	Sioux City	Monona	1993	159-6/8
Ed B. Weir	Johnston	Decatur	1990	156-6/8
Dale Hogenson	Decorah	Winneshiek	1989	154-4/8
Dale Charlson	Clear Lake	Taylor	1992	151-4/8
Chuck Wendt	Woodbine	Harrison	1987	151-2/8
David Sells	Washington	Van Buren	1991	150-7/8
Brad Walderbach	Leon	Decatur	1992	150-1/8

MUZZLELOADER NONTYPICAL

(Minimum Qualifying Score -- 170 points)

NAME	CITY	COUNTY TAKEN	YEAR	TOTAL SCORE
*Chuck Wendt	Woodbine	Harrison	1986	185-3/8

Roger A. Hill

Joe Then	Dyersville	Clayton	1992	178-7/8
Ron Gordon	Ventura	Taylor	1992	178-5/8
Dan Mork	Sac City	Warren	1992	171-4/8

BOW AND ARROW TYPICAL

(Minimum Qualifying Score -- 135 points)

NAME	CITY	COUNTY TAKEN	YEAR	TOTAL SCORE
*Dave Elmore	Waterloo	Bremer	1992	182-4/8
David Erdmann	Lemars	Plymouth	1987	170
Mike Noble	Wapello	Louisa	1992	169-6/8
Brad Van Dusseldorp	Pella	Marion	1992	167-2/8
William T. Alger	Clear Lake	Cerro Gordo	1992	165-1/8
Ron Schuler	Ft. Atkinson	Fayette	1957	164-4/8
Kenny Palmer	Harpers Ferry	Allamakee	1992	161-6/8
C.D. Hunter	Mapleton	Monona	1988	161
Bob McDowell	Ottumwa	Monroe	1992	160-7/8
Kyle L. Wiese	Indianola	Warren	1989	159-7/8
Bret Boone	Sidney	Fremont	1991	159-3/8
Gilbert H. Paulsen	Cedar Rapids	Davis	1992	159
Mike Grube	Cresco	Howard	1992	158-6/8
Richard Pauley	Mystic	Appanoose	1992	158-5/8
Joe Lieb	Dubuque	Allamakee	1988	158-1/8
Gerald M. Hunter	Calmar	Winneshiek	1992	157-6/8
Bart Bollie	Madrid	Boone	1992	157-4/8
Randy Robb	Shenandoah	Fremont	1992	157
Lou Vaden	Glenwood	Fremont	1992	156-4/8
Dwight Swenson	Soldier	Monona	1992	156
Dan Dickman	Woodbine	Harrison	1991	155-5/8
Brian Keuning	Postville	Allamakee	1992	155-1/8
Roger Syfert	Keosauqua	Van Buren	1991	154-4/8
Don Halligan	Ft. Dodge	Webster	1992	154-4/8
Roger Meirick	Alta Vista	Howard	1992	154-3/8
Frank M. Hashman	Newton	Marion	1991	154-1/8
Dave Rimathe	Ames	Boone	1992	153-5/8
William J. Wilson	Mt. Pleasant	Henry	1992	153-1/8
Ken Sharp	Norwalk	Warren	1992	152-1/8
Stanley E. Baughman	New Virginia	Warren	1992	152
John Reinert	Keota	Washington	1990	151-7/8
Eddie Jones	Bloomfield	Davis	1991	151-5/8
Rick Holveck	Gilbert	Story	1992	151-3/8
Douglas Ericson	Derby	Lucas	1991	151-1/8
Dick Barker	Dubuque	Jackson	1992	151-1/8
Thomas J. Brimeyer	Dubuque	Allamakee	1992	151-1/8
Mick Shelman	Washington	Washington	1990	151-1/8
William L. Tuttle	Des Moines	Clarke	1992	150-4/8
Denny Kinnsey	Jefferson	Guthrie	1985	150-2/8
Greg Springer	Oskaloosa	Mahaska	1992	150-2/8
Dave Dickman	Missouri Valley	Harrison	1992	150
Jack Donner	Knoxville	Marion	1991	149-7/8
Phillip Kimble	De Witt	Clinton	1992	149-6/8
Kevin L. Holm	Story City	Boone	1992	149-5/8
Steve Doering	Webster City	Hamilton	1992	148-5/8
Mark Motsinger	Des Moines	Warren	1991	148-5/8
Ron Frahm	Le Mars	Woodbury	1987	147-4/8
Jeff Hodges	Oakland	Pottawattamie	1992	146-5/8
Jack Bates	Mt. Pleasant	Henry	1992	146-4/8
Joe Lieb	Dubuque	Clayton	1986	146
Bob Fagenbaum	Hawkeye	Winneshiek	1992	145-7/8
Gary Knoll	Dallas Center	Madison	1991	145-7/8
Scott Pape	Little Sioux	Harrison	1991	145-6/8

Steve Woolsey	Atlantic	Cass	1992	145-5/8
Kevin Kidwell	Iowa City	Johnson	1990	145-5/8
Roy E. Glosser	Indianola	Davis	1990	145-2/8
Steven Hiveley	Madrid	Webster	1992	145-2/8
Rodney Rattenborg	Carroll	Guthrie	1992	145
Robert Knutson	Ft. Dodge	Webster	1992	144-4/8
Mike Wagner	Gilbertville	Black Hawk	1992	144-3/8
Elmer Kemp	Camanche	Jackson	1992	143-5/8
Paul Dvorak	Iowa City	Johnson	1990	143-1/8
Rocky Friend	Harrison, AR	Harrison	1992	143-1/8
Dennis Kirchner	Ft. Madison	Lee	1992	142-5/8
Phil Guy	Brighton	Washington	1992	142-4/8
Joe Lieb	Dubuque	Dubuque	1984	142
Gary W. Vasseau	Killduff	Jasper	1992	141-3/8
Dennis Covin	Clarinda	Page	1992	141-2/8
Ronald L. Simmons	Ottumwa	Wapello	1992	141-2/8
Gary Cobb	Osceola	Clarke	1992	140-7/8
Darwin McCurdy	Linden	Guthrie	1992	140-7/8
Vane Orey	Indianola	Warren	1991	140-4/8
Ron Kelley	Council Bluffs	Fremont	1989	140-1/8
Rod Mumford	Chariton	Lucas	1992	139-3/8
Mike Lanser	Monroe	Marion	1992	139-3/8
Terry Hansen	Sioux City	Woodbury	1992	139-2/8
Kyle L. Wiese	Indianola	Warren	1988	139-2/8
Jeff Fritz	Brighton	Jefferson	1992	139-1/8
Gary Westrum	Webster City	Hamilton	1992	139-1/8
Ed Fowler	Sioux City	Plymouth	1987	139-1/8
Ed Yando	Indianola	Warren	1992	139
Darrell Schuman	Cedar Rapids	Jones	1992	138-4/8
Todd A. Bermel	Muscatine	Muscatine	1992	138-4/8
Mike Tempel	Kamrar	Hamilton	1992	138-3/8
Bill Vanderpool	Adel	Dallas	1992	138-2/8
Gary Knoll	Dallas Center	Madison	1992	137-7/8
Tim Boekhout	Sergeant Bluff	Lyon	1992	137-1/8
Michael Anderson	Chariton	Lucas	1992	137
Randy Schmidt	Keswick	Keokuk	1991	137
Randy Frazier	Dow City	Monona	1992	136-7/8
Jeff L. Weigert	New London	Henry	1992	136-6/8
Lanny Herzberg	Creston	Adams	1992	136-6/8
Marvin Foster	Cedar Rapids	Henry	1992	136-4/8
Dennis Coyle	Council Bluffs	Pottawattamie	1992	136-2/8
Lonnie Storesund	Coon Rapids	Guthrie	1992	136-2/8
Gary J. Collier	Floris	Davis	1992	135-7/8
Bruce W. Geltz	Keokuk	Lee	1992	135-7/8
Joseph W. Grell	DeWitt	Clinton	1992	135-6/8
Don Murtha	Victor	Iowa	1992	135-3/8
David Wodman	Plano	Warren	1991	135-2/8
Blaine Kussatz	Cedar Rapids	Blackhawk	1991	135-2/8
Gary L. Jensen	Clive	Hamilton	1992	135-2/8
Dean Grimm	Van Wert	Decatur	1986	135

Roger A. Hill

BOW AND ARROW NONTYPICAL

(Minimum Qualifying Score -- 150 Points)

NAME	CITY	COUNTY TAKEN	YEAR	TOTAL SCORE
*George A. Smith	Monona	Allamakee	1991	217-4/8
Lonnie Ball	Knoxville	Marion	1992	178-5/8
Terry Rial	Clare	Webster	1992	173-7/8
James Steele	Libertyville	Jefferson	1992	173-2/8
Gary K. Ward	Jackson, MN	O'Brien	1991	167-6/8
Curt Van Lith	Maple Lake, MN	Harrison	1992	167-5/8
Dennis Vaudt	Storm Lake	Cherokee	1992	165-3/8
Doug Rush	Onawa	Monona	1992	163-7/8
Mark M. Muir	Dubuque	Clayton	1992	162-4/8
Mike Meyer	Goose Lake	Jackson	1992	159-3/8
Jack Ward	Lineville	Decatur	1992	159-1/8
Mike Burns	Dubuque	Dubuque	1992	155-1/8

ALL-TIME TOP 10 RACKS

(An asterisk (*) denotes a new top 10 rack.)

SHOTGUN TYPICAL

NAME	CITY	COUNTY TAKEN	YEAR	TOTAL SCORE
Harold Dickman, Sr.	Woodbine	Harrison	1964	200-2/8
Wayne A. Bills	Des Moines	Hamilton	1974	199-5/8
Kenneth Tilford	Lamoni	Decatur	1985	198-1/8
Michael R. Edle	Danville	Des Moines	1989	195-4/8
George L. Ross	Ottumwa	Wapello	1969	195-1/8
Forest N. Richardson	New Virginia	Warren	1989	194-3/8
*Dennis R. Vaudt	Storm Lake	Cherokee	1974	190
Lamonte A. Stark	Mt. Pleasant	Henry	1984	189-3/8
Gregg Redlin	Iowa City	Johnson	1983	187-6/8
DeWight E. Green	New Virginia	Marshall	1991	187-2/8

SHOTGUN NONTYPICAL

NAME	CITY	COUNTY TAKEN	YEAR	TOTAL SCORE
Larry Raveling	Emmetsburg	Clay	1973	282
David E. Mandersheid	Welton	Jackson	1977	256-7/8
Carroll Johnson	Moorhead	Monona	1968	256-2/8
Larry J. Caldwell	Des Moines	Warren	1990	248-6/8
Carl Wenke	Cedar Rapids	Lee	1972	245
Wendell R. Prottsman	Mt. Pleasant	Henry	1988	231-1/8
Edgar Shields	Grand River	Decatur	1986	229-6/8
Bob Harding	Pleasantville	Wapello	1985	229-3/8
Edgar J. Steward	Burlington	Des Moines	1990	227-6/8
*Bill Walker	Montrose	Lee	1992	224-3/8

MUZZLELOADER TYPICAL

NAME	CITY	COUNTY TAKEN	YEAR	TOTAL SCORE
Jerry W. Conover	Sioux City	Monona	1990	182
Patrick G. Burkle	Earlville	Clayton	1990	170-2/8
*Charles Hixson	Chariton	Lucas	1989	170
*Kevin Burge	Hamburg	Fremont	1992	167-7/8
Steve Carter	Washington	Henry	1987	167
David Hammel	Dorchester	Allamakee	1990	166-1/8
Jeff Kauzlarich	Rathbun	Appanoose	1989	165-5/8
Larry Cutkomp	Donnellson	Van Buren	1989	164-6/8
Ron Murray	Missouri Valley	Harrison	1987	164-5/8
Ron Hansen	Hampton	Franklin	1989	164-3/8

MUZZLELOADER NONTYICAL

NAME	CITY	COUNTY TAKEN	YEAR	TOTAL SCORE
Mike Moody	Hamburg	Fremont	1990	210-2/8
Vincent P. Jauron	Harlan	Monona	1990	209-1/8
Daniel Kaufman	Wapello	Louisa	1984	205-3/8
Denny Baum	Ottumwa	Wapello	1990	202-1/8
Dean Beyer	Osage	Mitchell	1991	200-5/8
Steve Mundell	Ottumwa	Monroe	1991	196
Dick Paul	Red Oak	Montgomery	1988	189-4/8
Nathan Giddings	Morrison	Jackson	1990	188-1/8
*Chuck Wendt	Woodbine	Harrison	1986	185-3/8
James P. Parker	Clarinda	Taylor	1991	182-1/8

BOW AND ARROW TYPICAL

NAME	CITY	COUNTY TAKEN	YEAR	TOTAL SCORE
Lloyd Goad	Knoxville	Monroe	1962	197-6/8
Robert Miller	Wyoming	Jones	1977	194-2/8
Richard B. Swim	Des Moines	Polk	1981	190-5/8
Kevin Peterson	Mediapolis	Des Moines	1989	188-1/8
John L. Kite	Farmington	Lee	1990	182-6/8
*Dave Elmore	Waterloo	Bremer	1992	182-4/8
Jeff L. Weigert	New London	Henry	1991	180-4/8
Vern Backstrom	Des Moines	Polk	1986	180-1/8
Rodney D. Hommer	Woodburn	Clarke	1990	179-4/8
Robert L. McDowell	Ottumwa	Wapello	1985	179
Glen M. Thompson	W. Burlington	Des Moines	1987	179

BOW AND ARROW NONTYPICAL

NAME	CITY	COUNTY TAKEN	YEAR	TOTAL SCORE
Jerry M. Monson	Clear Lake	Cerro Gordo	1977	222-1/8
David Propst	Duncombe	Webster	1987	219-3/8
Blaine R. Salzkorn	Sutherland	Clay	1970	218-1/8
*George A. Smith	Monona	Allamakee	1991	217-4/8
Chris Hackney	Allerton	Wayne	1983	215-5/8
Joe Rettenmeier	Dubuque	Dubuqe	1987	204-1/8
Phillip M. Collier	Burlington	Des Moines	1978	203-6/8
Ted Miller	New Virginia	Warren	1986	203-5/8
Marlin Derby	Pleasant Plain	Washington	1987	202-7/8
Bill Erwin	Sioux City	Woodbury	1966	202-5/8

The Flathead Catfish

Bullhead Terminator

by Jerry Hudson

The lake surface glistened like diamonds as gizzard shad thrashed wildly trying to escape the toxicant. Even the carp and bullheads showed signs of stress, swimming about in erratic movements still gasping for air. This was the scene in September 1981 after fisheries personnel with boats and equipment converged on Prairie Rose Lake in Shelby County and applied 450 gallons of rotenone. Application of the fish control agent was completed in several hours and already the evidence was clear -- the only good solution to the Prairie Rose dilemma was total renovation. Estimates of dead fish during the cleanup confirmed what everyone knew -- nearly 98 percent of the eradicated fish were gizzard shad, carp, stunted crappies and bullheads.

Restocking began soon after the rotenone detoxified, and by early October, largemouth bass, bluegill, channel catfish, tiger muskies and white amur were released into the lake. Approximately 2,000 adult bullheads were stocked in 1982 to provide immediate fishing while the small stocked fish grew. A second stocking of largemouth bass was also made that year. Prairie Rose was on its way to developing a new sport fishery and a return to the good fishing experienced in the 60s and 70s.

Fish population surveys in the first few years following renovation, found a rapidly expanding fishery with bullheads the most abundant fish sampled. Bluegills, crappies, channel catfish and largemouth bass were also sampled in relatively large numbers, but the bluegills and crappies lacked the growth usually seen in renovated lakes. These two species lost several year classes and never increased in numbers as much as they should have. Largemouth bass fared much better. They were able to establish several strong year classes from their initial stocking in 1982. Within several years good numbers were exceeding the 14-inch minimum size limit.

However, by 1985 a bad situation had developed. Unlike most new or renovated southwest Iowa lakes, bullheads continued to increase (rather than decline) in numbers and size. The large population of five- to eight-inch fish had a significant impact on the recruitment and growth of the desirable species in Prairie Rose. Bluegill and crappie growth and numbers declined.

An over-abundance of bullheads was the problem and early attempts were made to control the population by increasing the number of predators in the lake. Additional stockings of five-inch largemouth bass were made along with the ugliest fish in the Missouri River -- the flathead catfish. Flathead catfish were chosen as an innovative approach to bullhead control. Like bass, they are an excellent predator of bullheads. They also grow rapidly with an abundance of prey species in the lake. Other states have experimented with the flathead as a nuisance fish controller and have attributed success in bullhead control to flatheads.

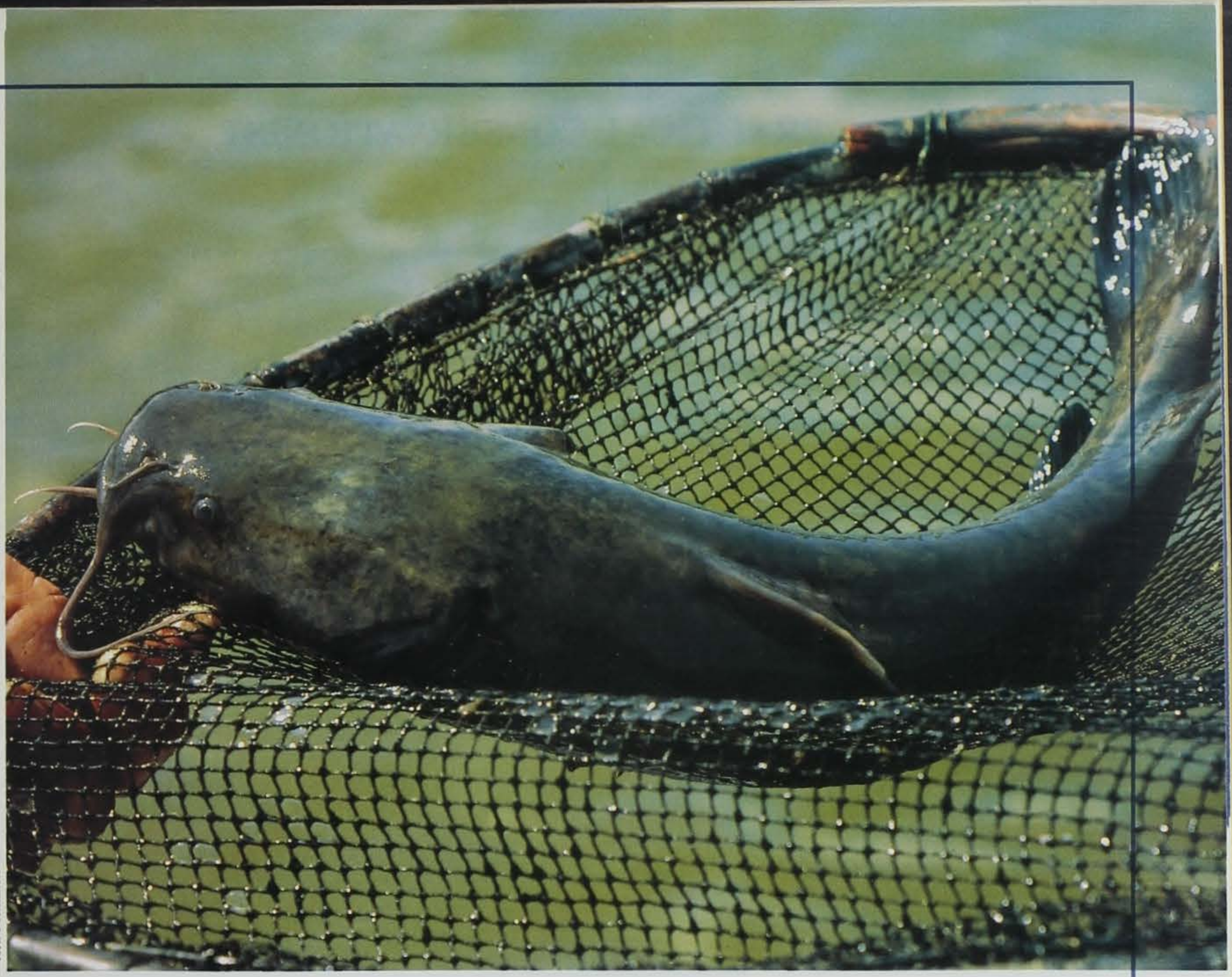
In 1987 Iowa Department of Natural Resources fish management personnel collected 2,000 flatheads from the Missouri River by electrofishing and transported them to Prairie Rose. Since then, an additional 200 to 300 have been added annually to supplement the original stock and reduce any losses that occurred through fishing or natural causes. Flathead catfish will continue to be stocked until a strong population is established in Prairie Rose.

The major question at the time of stocking was whether the flatheads were having a beneficial impact on Prairie Rose. Cove sampling studies conducted from 1987 through 1990 and fish surveys completed in 1992 have shown the bullhead population has decreased by 60 percent. Bullheads have also increased in both length and weight, with most now averaging 10 inches. Crappies and bluegills show improvements in growth and significant increases in population numbers during the last three years.

Prairie Rose is a lake worth fishing again. The improvements in the bluegill, crappie and bullhead populations probably can't be attributed solely to stocking of flatheads, even though they played a significant role. The stocking of largemouth bass in conjunction with flatheads and a bass size limit greatly improved the number and size of predators feeding on a nuisance bullhead population. Also during the late 1970s and 80s, vast improvements were made in the watershed, to control soil erosion, which helped water quality and fish growth.

Prairie Rose has turned the corner and hopefully will stay there, providing good fishing well into the future.

Jerry Hudson is a fisheries management biologist for the department located at Lewis.



Ken Formanek

Ron Johnson

◀▲
In an effort to help alleviate a bullhead problem, 2,000 flathead catfish were taken from the Missouri River and stocked in Prairie Rose Lake (left) in 1987. Although the flathead catfish (above) cannot take complete credit, it has had a significant effect on reducing an over-abundant population of its close cousin.

Nutritional Values of Wild Game Meats

Americans are becoming aware that a diet low in cholesterol and saturated fats can off-set tendencies towards heart disease, obesity and certain types of cancer. The amount of cholesterol that accumulates in your bloodstream is affected by the type of fat you eat. Generally saturated fats in your diet raise your blood cholesterol level while unsaturated fats lower it.

Cholesterol is a fatty substance contained in red meat, fish, poultry and also in wild game. Saturated fats, those that tend to become solid at room temperature, are found in meat and dairy products. Unsaturated fats stay liquid at room temperature and are either polyunsaturated (such as those found in vegetable oils) or monounsaturated (such as those found in plants, animals and seafood). While fats are necessary in the diet and make food taste good, eating too much fat of any kind is not a good idea because all fats are high in calories (45 calories per teaspoon).

To maintain healthy levels of cholesterol in your blood stream, you need to be aware of what kinds of fats you eat and cook with. In general, using oils with unsaturated fats will help lower the cholesterol levels in your bloodstream, particularly if you combine careful eating habits with regular exercise.

Naturally more lean and active than domestic animals, wild game animals' diets are free of additives to color their meat or develop fat. Wild game meat also contains none of the synthetic hormones used to increase the growth rate of domestic animals. But how does wild game meat actually compare to the meat you get at the grocery store?

Big Game

As might be expected, big game animals, compared with beef, are lower in fat. But as for number of calories, big game and domestic beef are about the same. Cholesterol content varies widely among different big game animals. For example, moose and bison have slightly less cholesterol than beef, but venison and antelope have more.

A typical venison steak or chop will provide you with a total of 149 calories per 100 grams of raw meat. Other big game animals are similar. Bison and antelope are considered highly nutritious because of the proportion of protein, fat, minerals and fatty acids compared to the number of calories they contain. Compared to lean beef, they have less fat and have more iron and a higher proportion of polyunsaturated fatty acids. Protein levels in wild game are about equal to that in beef.

Table 1 compares samples of the same cut of raw loin from various game animals and USDA quality standard grade beef, which is the most lean.

Table 1. Nutritional Comparison of Wild Game andDomestic Meat

Animals	No. of Samples	Protein gm/100gm	Fat gm/100gm	Calories kCal/100gm	Cholesterol mg/100gm
Beef	20	22.7	2.7	158	69
Pork	10	22.3	4.9	165	71
Whitetail Deer	21	23.6	1.4	149	116
Mule Deer	29	23.7	1.3	145	107
Elk	16	22.9	0.9	137	67
Moose	33	22.1	0.5	130	71
Antelope	24	22.5	0.9	144	121
Bison	30	21.7	1.9	138	62
Squirrel	15	21.4	3.2	149	83
Cottontail	26	21.8	2.4	144	77
Jackrabbit	8	21.9	2.5	153	131

Table 2. Nutritional Comparison of Wild and Domestic Fowl*
(Skinned Breast Muscle Analyzed)

Animals	No. of Samples	Protein gm/100gm	Fat gm/100gm	Calories kCal/100gm	Cholesterol mg/100gm
Chicken	10	23.6	0.7	135	60
Turkey (domestic)	24	23.5	1.5	146	60
Wild Turkey	16	25.8	1.1	163	55
Pheasant	27	25.7	0.6	148	52
Snow/Blue Goose	25	22.7	3.6	171	124
Canada (Lesser) Goose	7	22.7	3.9	171	105
Mallard	15	23.2	2.0	154	143
Dove	9	22.9	1.8	145	94

* Table contains information on species found in Iowa, nutritional information on other species is available.

Game Birds

Nutritionally, while meat from upland game birds (including wild turkey) is quite similar, cholesterol content varies greatly from one species to another.

Protein and mineral content are similar except for ruffed grouse, which contains less fat, and more sodium and calcium than other upland birds. Fat within the breast muscle appears to differ between species, but like mineral content it may also depend upon the bird's age and diet.

Because they prefer running to flying, turkeys and pheasants have proportionately less breast and more leg and thigh muscle development. For example, wild turkey breast makes up 34 percent of the carcass while pheasant breast is 37 percent. Nutritionally, turkey breast meat provides the most energy because it is high in both fat and protein. Wild turkey has proportionately more protein and less fat than domestic turkey.

Fish

Nutritional experts are increasingly expressing the positive health benefits of fish. Low in fat and cholesterol, fish has often been called the food of the 90s.

Fats in fish are highly unsaturated and have been shown to significantly lower levels of fat in the human bloodstream. These fats are called blood lipids, and when present in high levels have been linked to increased risk of heart disease.

Another health benefit of fish is the presence of linoleic acid, referred to as the essential fatty acid. This acid is responsible for keeping the body healthy through its maintenance of the immune system. When present in high enough levels, it has been shown to fend off such diseases as allergies and cancer.

Fish are lowest in cholesterol of all meats available for human consumption. Combining the low levels of cholesterol and fat present in fish, there is not a meat that can match this protein source for healthy nutrition.

Venison Burgundy

2	pounds venison, cubed in bite-sized pieces
1	pound mushrooms, sliced
1	large onion, finely diced
1	cup burgundy
1	cup beef stock
1	bay leaf
1	tablespoon rosemary
1	teaspoon thyme
	salt and pepper to taste

In a large covered casserole, mix together venison, mushrooms, onions, rosemary, thyme, pepper and salt. Pour over burgundy and beef stock. Cover and bake in 325-degree oven for three to three and a half hours (depending on cut of venison).

Serve over rice.

Information and recipes have been reprinted with permission from the *National Rifle Association Members' Wild Game Cookbook.* This 350-page hard cover publication contains more than 300 recipes selected by a panel of wild game cooking experts from more than 1,000 recipes submitted by NRA members.

Featured in the book is the most current nutritional information on wild game compiled from research by the nation's leading expert, Dr. Martin Marchello, Professor of Animal and Range Sciences at North Dakota State University.

The book is available for $12.95. To order, contact the NRA Sales Department, P.O. Box 5000, Kearneysville, WV 25430-5000. The NRA item number is HS5N5805. Credit card orders can be placed by calling toll free, 1-800-336-7402 (weekdays). Please add 5 percent Iowa sales tax, plus $3.50 for shipping and handling.

Chinese Pheasant

1	pheasant, boned, skinned, cut in bite-sized pieces
2	tablespoons cooking oil
2/3	cup sliced celery
1/2	cup sliced green onion
1	8-ounce can sliced water chestnuts
6	ounces snow peas
6	ounces pineapple chunks
1/2	cup chicken broth
1/4	cup sugar
1	tablespoon cornstarch
1/2	teaspoon powdered ginger
2	tablespoons vinegar
2	tablespoons soy sauce

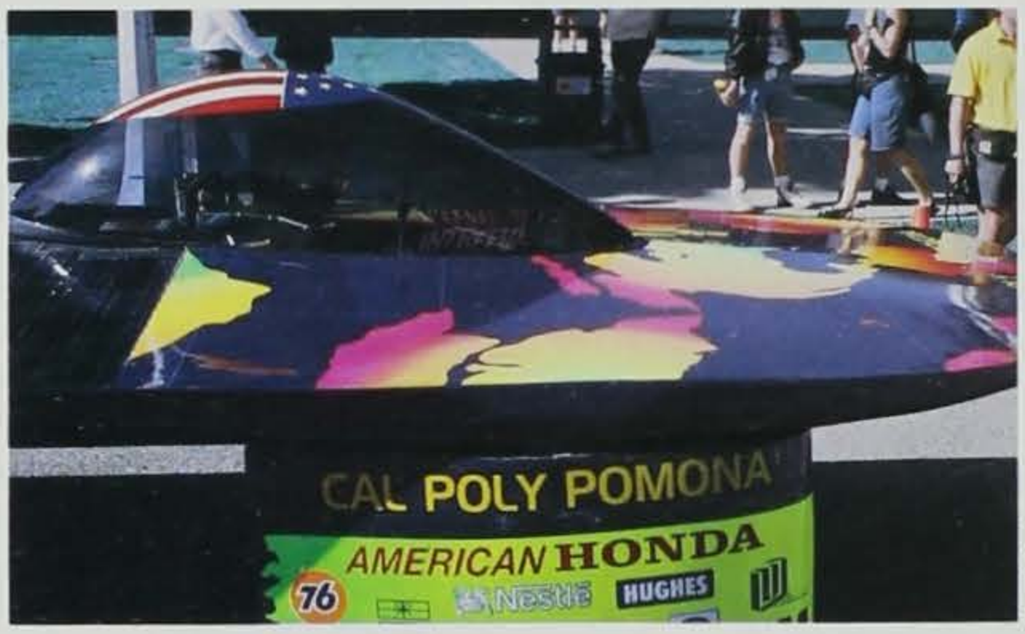
Add oil to hot wok or large iron skillet. Add pheasant and stir fry for five minutes. Add celery, onion, water chestnuts and stir fry two more minutes. Add pea pods, pineapple chunks and broth, stir fry for two more minutes. In a small bowl, mix sugar, cornstarch, ginger, vinegar and soy sauce and pour over pheasant and vegetable mix. Reduce heat, stir and simmer until sauce thickens, about two minutes.

Serve mixture over rice.

Wardens' Cookbook

For more wild game recipes the *Wardens' Cookbook* can be purchased for $12 plus $2 shipping and handling by writing to Iowa Fish and Game Officers Association, George Hemmen, 2277 250th St., Guthrie Center, Iowa 50115. A supplement to the book may also be purchased for $5.

CONSERVATION UPDATE



Patti Cale

▲ **Cal Poly Pomona's entry, called the *Intrepid*. The car placed second overall and won the award for the top paint design. It was one of the crowd's favorite cars.**

A RACE FOR THE FUTURE

By C. E. Conover,
Energy Bureau intern

Harnessing the energy of the sun, 34 solar-powered cars resumed their northbound journey. Just after noon the leaders crossed the Iowa-Missouri line, preparing for a mandatory rest stop in Lineville, Iowa, before resuming their day-long trek towards the Iowa State Fairgrounds in Des Moines.

The vehicles were in day five of the seven-day odyssey known as Sunrayce '93. With the motto "A Race for the Future," the contest, held June 20-26, brought together some of the brightest young engineers from across the United States and Canada. Sunrayce '93 was sponsored and organized, in part, by the General Motors Corporation (GM) and the United States Department of Energy (DOE), as a way to encourage the development of electrically powered vehicles and to train technicians in critical energy fields.

This race was the second such collegiate, solar car challenge. The inaugural contest, held in July of 1990, was called the GM Sunrayce USA. That year the cars met in Orlando, Florida, and traveled northward to the finish line in Detroit, Michigan. The entry from the University of Michigan, aptly named the *Sunrunner*, won the 1,600-mile event.

Three years later found the entry field, and the number of contributing sponsors, larger, as the prestige of the race grew. Active participation by governmental agencies such as the DOE, the Environmental Protection Agency, and the Canadian Department of Energy, Mines and Resources helped to provide additional funds for Sunrayce '93 and its participants. The race competition is now touted as a permanent fixture and a way to promote DOE and corporate America's commitment to renewable resources.

This year's race began in Arlington, Texas and followed a 1,100-mile, northerly route to the finish line at the Minnesota Zoo in Minneapolis. The race zig-zagged through the states of Oklahoma, Kansas, Missouri and Iowa along the way.

One of the features of this year's race was the route traveled. Sunrayce '93 traversed the state south to north, making an overnight stop in Des Moines at the Iowa State Fairgrounds.

Sunrayce '93 is more, than just a car race, it is an on-going educational experience in science, engineering and applied technology. The intent of the competition is to provide a forum to show off the results of the students' efforts. Or, as one of the team t-shirts proclaimed, "Brain Power is More Important than Horse-power."

Racing began at 9 a.m. each morning and was over by 6:30 p.m. each evening. Any vehicle not across the finish line by then had to be loaded in a trailer and towed in, which would result in a four minute per mile penalty. The Sunrayce '93 winner was the race team with the least cumulative elapsed time.

Each day's leg was approximately 160 miles in length, following secondary state and county roads in normal traffic.

The end of each day saw the teams scrambling to set-up their solar arrays and beginning to charge their

Patti Cale

▲ **The driver for McGill University of Canada's *Ra Power* car enters to begin day six. There were four Canadian and one Puerto Rican entry in Sunrayce '93.**

Patti Cale

▲
The view down top of the *Intrepid*. Notice how the solar cells are molded into an aerodynamic shape, purposely done to create less wind drag, increasing fuel efficiency.

depleted battery stores, turning the staging area into a large solar collector. The teams had to be at the starting line by 8:45 a.m. the next day. The cars were "started" one at a time, at one-minute intervals.

Winning strategies required not only a fast car, but a good understanding of how much energy the solar car is collecting and using to power itself and what lay ahead in terms of weather and terrain. If the next day's route was particularly hilly or if the weather forecast called for limited sunlight, a decision was made on how to proceed. A team that wasted energy would fall behind.

"Experience may be the biggest asset of all," said Iowa State University (ISU) team captain Chad Lingenfelter. ISU's entry, *PrISUm II*, was built using the knowledge of the original *PrISUm* car.

"We altered the design of the original car when we built *PrISUm II*," said Lingenfelter. "We copied some of the design dimensions of the *Sunrunner* car. The design improvements allowed us to increase our average speed and improved handling. It was part of the reason for capturing tenth place overall. When we start to build the new car for Sunrayce '95, we will do the same thing. We will go back and look at other school's designs, combine them with our own advancements and mold it all into building an even better vehicle. We are on the cutting edge of solar technology. Everything we are doing is new. We have to make our own blueprints."

Part of the appeal of Sunrayce is the "hands-on approach that is required," said Tom Hanely, a former ISU team member who is now with HDR Engineering in Omaha. "When we were designing the suspension system, we had to start from scratch. We only had our theories to build on. That was the fun of *PrISUm II* -- you were taking your ideas and making them work."

ISU's race finish met the team's goal. "We were ecstatic," said Lingenfelter. "A top 10 finish is very prestigious, not only for the school, but also to help us raise the sponsorship money for the next car."

Michigan's *Maize and Blue* won the Sunrayce '93 competition, the second consecutive win for Michigan. They will now compete in the World Solar Car Challenge in Australia.

This new collegiate sport provides exciting entertainment for spectators and participants alike. This was evident by the large crowds and high media exposure that followed the event. A large crowd gathered at the fairgrounds to watch *PrISUm II* outlast the *Maize and Blue* and win Day 5. And a crowd of more than 1,000 showed up for the 9 a.m. start of Day 6. The young and old alike stared in amazement at the cars, with their exotic color schemes and space-age designs.

The cars, though, are much more than just a folly. These innovative advances may provide a glimpse of transportation that will rely on a more efficient, cleaner fuel -- solar energy.

CONSERVATION UPDATE

The Floods of 1993

The widespread flooding of the spring and summer of 1993 has, and will continue to have, a widespread significant effect on DNR operations and facilities.

Wildlife management areas and public access sites suffered varying amounts of damage. Many public hunting areas will have to be reposted with new signs. All public waterfowl areas, except Sweet Marsh, sustained damage and may require removal of heavy silt deposits.

Across the state, production of young, primarily in ground-nesting species, is down due to excess rain, as well as the cooler-than-normal temperatures. Turkey populations may be the most severely affected, but loss of young may also prove to be significant in other small game and in many songbirds.

Generally speaking, the more water there is in Iowa's lakes and streams the more fish there are. Higher water levels in lakes and increased flows in streams provide more habitat and food for fish life. The biggest drawback to all the high water this year, in addition to damage to docks and boat ramps, has been finding a place to fish. The upside of the high water is that as water levels return to normal, those fish that had refuge in the flood waters will be available to the angler. Fish populations that expanded to new habitats will be compressed and hungry which will lead to good fishing.

However, fish for stocking were lost in ponds at Fairport and Spirit Lake hatcheries. All of the fish for the display at the State Fair were lost into East Okoboji from the Spirit Lake hatchery ponds. Pond dikes and pumps have been damaged or destroyed. There is also damage to buildings and property such as the potable water supply at Fairport Hatchery. The Templar Park water patrol station sustained a great deal of damage.

The epic rains of spring and summer not only disrupted many outdoor recreation activities but caused a great deal of damage to parks and recreation areas.

Record flood levels occurred at Ledges, Dolliver and Walnut Woods state parks. At Dolliver, the ranger and his family had to move out to higher grounds six times by the middle of July. The raging Des Moines River also severely damaged the Des Moines River Trail between Des Moines and Saylorville Lake. Extensive and costly repairs will be needed and may not be completed for some time.

At Walnut Woods the ranger and his family had to flee the Raccoon River Flood waters which, for the first time, actually entered the park residence. This was the same flood "event" that so affected Des Moines and West Des Moines.

Further west, campers at Springbrook State Park were trapped by a sudden rise in the Raccoon. At Wilson Island State Recreation Area, the Missouri flooded much of the park and also temporarily trapped campers. On the state's "east coast," the Mississippi knocked out the popular Fairport campground and boat access near Muscatine. And, at George Wyth State Park a levee broke, causing severe road and parking lot damage.

Damage was not confined to rivers. At Yellow River State Forest, the ranger watched a camper and fifth wheel trailer float by during a flash flood of the nearby creek. Luckily, the couple and their dog escaped injury. At Backbone State Park, flooding caused the closing of a portion of the park for a while.

Lakes across the state rose out of their banks, causing many problems. In the Great Lakes area, record levels caused tremendous shoreline damage. In eastern Iowa, Coralville Reservoir rose so high that, for the first time, it backed into Lake Macbride causing damage to facilities and shoreline.

Across the state DNR staff are faced with a real challenge of cleaning up the muck, repairing facilities and doing what can be done to restore the areas and facilities to full public use. There will be new budget impacts that will be felt for some time into the future.

Fall '93 Toxic Cleanup Days

The fall '93 toxic cleanup days (TCDs), counties and dates are listed below. Watch local newspapers for phone numbers to call for appointments.

◆ **September 11**

Mahaska County, Mahaska County Recycling Facility, 905 M Avenue West, Oskaloosa

Marion County, Marion County Fairgrounds, off Hwy. 14, Knoxville

◆ **September 18**

Lucas County, Lucas County Shop, west edge of Chariton

Monroe County, Monroe County Fairgrounds, off Hwy. 5, Albia

◆ **September 25**

Mitchell County, Mitchell County Fairgrounds, 10th and Chestnut, Osage

Scott County, Mississippi Valley Fairgrounds, Locust Street, Davenport

◆ **October 2**

Cherokee County, Cherokee County Fairgrounds, U.S. Hwy. 59, Exit Linden Street, Cherokee

Buena Vista County, Harold Rowley Separation/Recycling Facility, County Road C-65 west of south U.S. 71/IA intersection, Storm Lake

◆ **October 9**

Franklin County, Franklin County Fairgrounds, off Hwy. 3, Hampton

Hardin County, Hardin County Fairgrounds, Hwy. 175, east edge of Eldora

DNR Photo

▲
Members of the Iowa Falconers Association (left to right) Mark Washburn, Lowell Washburn, Lance Christensen, Dan Belknap, Russ Berkland, Rick Woods, Rob Kirkman and Ross Dirks.

Peregrine Donation

For the first time since the 1950s, endangered peregrine falcons have successfully nested in Iowa. One nesting effort produced three young in Des Moines. A second peregrine pair hatched two young in a nest box located on the Firstar Bank in Cedar Rapids. Unfortunately, one of the young in Cedar Rapids succumbed to hypothermia after being soaked in a thunderstorm. In order to reverse this situation, members of the Iowa Falconers Association (IFA) paid $1,000 for the purchase of a captive-bred falcon produced by group member Rick Woods of Hazelton. On June 29, the IFA donated the captive-bred chick to the DNR which added it to the wild nest.

"Augmenting the site by providing the extra chick will help insure the success of this nesting effort," said IFA president Mark Washburn. "We felt with just one surviving young that the chance of failure was too great," he added.

According to Washburn, it is essential that the first year peregrines experience success during their initial effort. "If they are successful at rearing a family this year, then the bond will become very strong for this site," he said. "If they fail, it works just the opposite.

"We were willing to work hard at keeping the birds right here where they were because the nest box provides an ideal, safe site," said Washburn.

Editor's Note: When this issue went to print in late July, both chicks were flying with their parents and learning to hunt.

Migratory Bird Harvest Program

The U. S. Fish and Wildlife Service (USFWS) is in the process of introducing a new Migratory Bird Harvest Program to help state and federal wildlife biologists better manage migratory bird populations.

The program, which began on a pilot basis in three states in 1992 will be phased in nationwide by 1998. Iowa is expected to join in 1996 or 1997. The USFWS says the program will improve harvest estimates not only for waterfowl but also for all other migratory game birds. However, success of the program depends on the cooperation of hunters. As human populations grow and pressures on wildlife resources increase, accurate harvest estimates will become even more critical.

The program is based upon a survey of all migratory bird hunters. Hunters who pursue any type of migratory birds will be required to provide their names and addresses to their state wildlife agency. Hunters are already required to complete license applications, so in many cases the program will not require any additional information.

To protect hunters' privacy, the USFWS will use the names and addresses only for conducting hunter surveys and for no other purpose. A representative sample of migratory bird hunters will be asked to voluntarily participate in the program. If a hunter's name is selected, they will receive a hunting record form, and be asked to keep track of the number of all types of migratory birds harvested during the season.

Scientific management of wildlife requires a thorough knowledge of wildlife populations and it is often very difficult for biologists to count populations directly. For some migratory game birds, harvest surveys are the only sources of reliable information on population status. Through the cooperation of hunters, this program will provide reliable, standardized information on the number of migratory birds harvested throughout the country. These estimates will give biologists information they need to make sound decisions regarding hunting seasons, bag limits and population management.

The USFWS has conducted waterfowl harvest surveys since 1952 but the new program will improve survey information.

CONSERVATION UPDATE

Upcoming NRC, EPC and Preserves Board Meetings

The dates and locations have been set for the following meetings of the Natural Resource Commission, Environmental Protection Commission and the Preserves Advisory Board of the Iowa Department of Natural Resources.

Agendas for these meetings are set approximately 10 days prior to the scheduled date of the meeting.

For additional information, contact the Iowa Department of Natural Resources, Wallace State Office Building, Des Moines, Iowa 50319-0034.

Natural Resource Commission:
--September 2, Shenandoah

Environmental Protection Commission:
--September 20, Des Moines
--October 18, Des Moines
--November 15, Des Moines

State Preserves Advisory Board:
--September 7 and 8, Fayette County

Clean Lakes Program -- A Federal, State and Local Partnership

Iowa and other states have benefited from the U.S. Environmental Protection Agency's Clean Lakes Program. Established as part of the nation's Clean Water Act, the Clean Lakes Program provides, to the states, grants designed to identify lake water quality problems and make the necessary improvements. Each year, Congress has appropriated $5 to $10 million to the program. This money is then provided through a competitive grant process, and monies provided by the federal government must receive a state or local match.

The program has been especially beneficial to improvement of lake water quality and associated recreation in Iowa. Prior to the program, Iowa spent little to maintain and improve water quality in its nearly 200 lakes. The initial study completed in 1979 and funded through the Clean Lakes Program evaluated 107 of Iowa's most significant public-owned lakes.

The study determined present water quality of each lake and the major problems impacting water quality and associated recreation of each lake. It was no surprise that nonpoint source pollution was the major factor affecting lakes in Iowa and that the majority of lakes were being impacted by excessive siltation.

PROJECT ACCOMPLISHMENTS
Statewide Lake Assessment
The 1979 evaluation of 107 most significant Iowa public lakes resulted in the following renovations.

Blue Lake* -- Dredging
Lenox Lake* -- Dredging
Lake Oelwein* -- Dredging
Lake Manawa* -- Dredging
Green Valley Lake* -- Soil conservation in watershed and sediment/nutrient dikes.
Swan Lake* -- Dry lakebed excavation, lake aeration, jetty construction, supplemental water supply and riprapping shoreline.
Union Grove Lake* -- Dredging, sediment/nutrient basins, riprapping, jetty construction and lake aeration.
Black Hawk Lake⁺ -- Dredging
Lake Ahquabi⁺ -- Dredging, sediment/nutrient basins, jetty construction and riprapping.
Five Island Lake⁺ -- Dredging
Pine Lakes --Dredging and soil conservation in the watershed.
Little Wall Lake -- Diagnostic/feasibility study
Miami Lake -- Diagnostic/feasibility study
Iowa Lake -- Diagnostic/feasibility study
Storm Lake -- Diagnostic/feasibility study

*Renovation Completed ⁺Renovation Underway

In an effort to improve lake water quality in Iowa, the DNR developed a priority list of lakes being impacted by siltation and in need of improvements. With the assistance of Iowa State University, the DNR began to study the highest priority lakes. The study determined the major factors affecting water quality, alternatives that could be used to improve water quality, cost of implementing the best alternatives and impacts on recreation if a renovation program were implemented.

Iowa has had a great deal of experience with lake and watershed improvements funded through the Clean Lakes Program. These improvements have resulted in improved soil conservation, cleaner water and increased recreational use of many Iowa lakes. Lakes are a major investment worth protecting and improving.

The lake studies resulted in applications to Environmental Protection Agency for Clean Lakes grants to improve the lakes listed in the chart above.

CLASSROOM CORNER

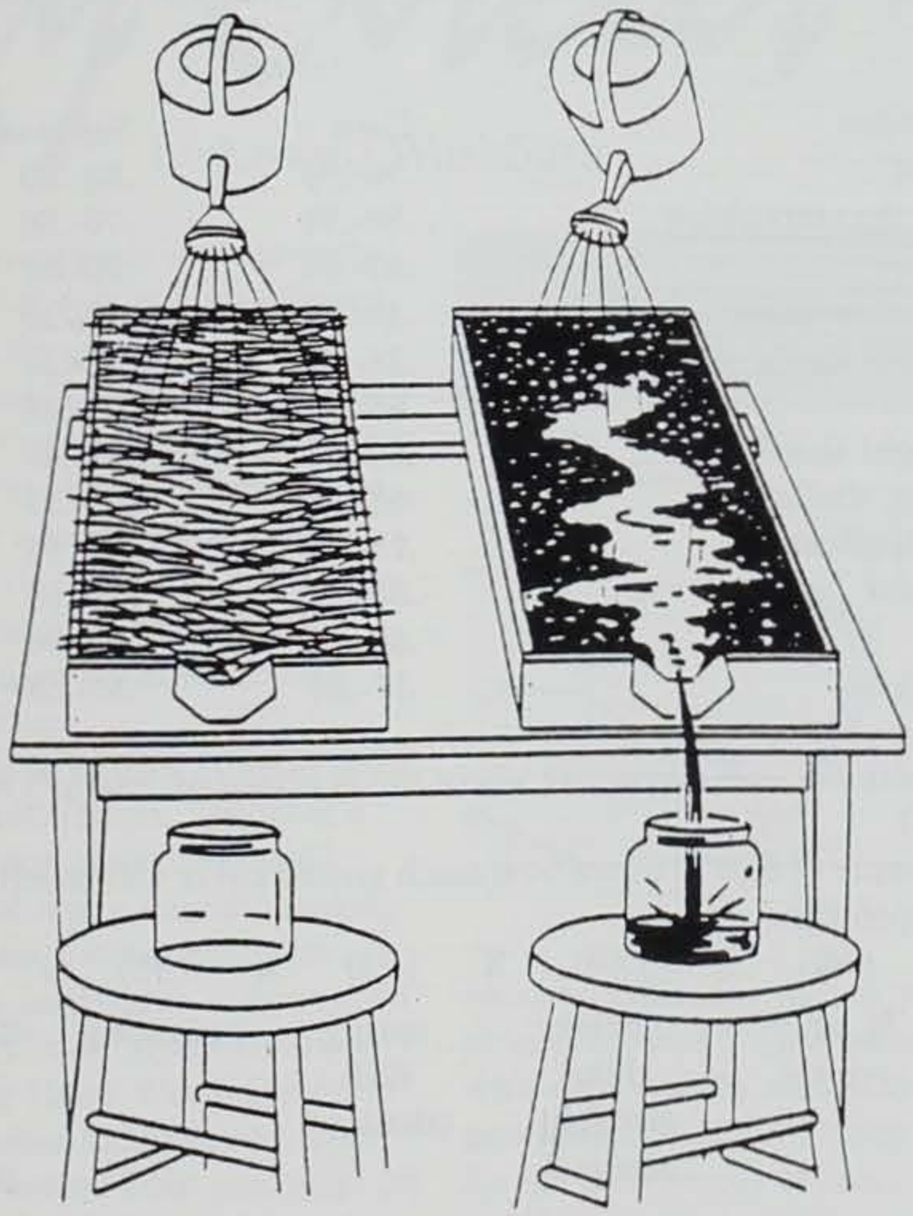
by Barb Gigar

Tillage Practices

The following activity is adapted from *Sustainable Agriculture Field and Laboratory Exercises*, a set of 31 activities designed for use in high school- and junior college-level agriculture classes by Iowa State University's Department of Agricultural Education and Studies. The activities are currently being refined and should be available for use in the classroom next year.

Background:

Iowa farm land is a precious resource. Loss of soil via water erosion costs the state more than $30 million each year in damages -- ditches, waterways and lakes all fill in with sediment. These damages do not include the increasing cost of fertilizing and tilling fields that have less topsoil.



Age:

Grades 6-12

Objectives:

Students will be able to:

1. evaluate the usefulness of crop residue in reducing soil erosion; and

2. (extension) select appropriate tillage practices which will reduce erosion on a farm and provide profit to the farmer.

Method:

Students will create simulated field conditions where they can witness the benefits of crop residue to decreasing the erosion of topsoil.

Materials:

Pages 6-7 of the *Conservation Catalog for the 1990s*, Soil Conservation Service (1991), available from your local SCS; two boxes, approximately 16" long x 12" wide x 4" deep (wooden boxes are best because you can re-use them); a saw to cut a "v" notch in one end (see diagram); two buckets or tubs to place below the boxes to catch water; soil (enough to fill both boxes); straw, grass, wood shavings or sawdust and a watering can.

Other Resources:

Iowa State Extension publications can be obtained free or for a small fee by writing: Publication Distribution Center, Printing and Publications Building, Iowa State University, Ames, Iowa 50011.

Conservation Tillage, Fertility Practices, AE-3054; *Conservation Tillage, Ridge-Till Systems*, AE-3052; *Conservation Tillage, No-till Systems*, AE-3052; *Conservation Tillage, Effects on Water Quality*, AE-3051; *Conservation Tillage, Effects on Soil Erosion*, AE-3050; *Conservation*

Other Resources (continued):

Tillage, Planning, AE-3049.

Teaching Soil and Water Conservation: A Classroom and Field Guide (1986); Soil Conservation Service.

Fundamentals of No-Till Farming. American Association for Vocational Instructional Materials.

Extensions:

1. Precisely measure the amount of water poured onto each "field" (box). Measure the amount of runoff for each box. After measuring, pour the runoff back into the containers and allow the water to evaporate.

Weigh the soil left in each container. Figure the area of each of the boxes of soil (length x width) and convert it to square feet (divide by 144).

How much soil would erode from a field that is 5000 x 1000 feet if no crop residue is left? How much is eroded if crop residue is left? Students should convert this to square miles of crop land that may be in their county and then the entire state? (Remember: the slope of the land also plays a major role in the rate of runoff; water will run off steeper land more quickly.)

2. Lay out tillage plots using both conventional and conservation tillage practices. (See the activity "On-farm Research"in the *Conservation Catalog for the 1990s*.) Record operations on both plots, including time and fuel used on each of the plots. Record weather conditions each week. At the end of the season, record yield and price data. Estimate the profit made on each plot and the differences in soil conservation.

Barb Gigar is the department's aquatic education coordinator located at Springbrook Conservation Education Center in Guthrie County.

Procedure:

Turn to page 7 of the *Conservation Catalog for the 1990s* (Tillage Operation Chart) or see below. Ask students how much residue they think would remain after typical tillage operations. Then, give them the answers from the chart. Ask students what some of the benefits of leaving crop residue on fields might be.

Set up the two boxes on a table. Fill both boxes with soil and cover one of the boxes of soil with residue (sawdust, grass, etc.). Use several boards or blocks to elevate the top (un-notched) end. Place a container to catch water below each of the the "v" notches. Fill the water can and sprinkle half the water on each box, pouring the water at the same rate and from the same height over each box.

Instruct the students to observe how quickly water runs off each box of dirt into the containers below. The rate at which water runs off each box is easily observed. The students should measure the amount of water in each of the containers and the amount of sediment in each. Discuss the implications of their findings.

Tillage Operations Chart

Predict your percent ground cover after field operations! Here's how.
An estimate of the ground cover remaining with a tillage and planting system can be predicted by multiplying the percentages for each operation shown in the chart.

Tillage operation	*Corn*	*Soybeans*
After harvest	**.90-.95**	**.80-.90**
Over winter decomposition	**.80-.90**	**.70-.80**
Plow	**.02-.07**	**.00-.02**
Chisel (twisted shank)	**.40-.50**	**.10-.20**
Disk (off-set, deep)	**.25-.40**	**.10-.20**
Paraplow	**.65-.75**	**.35-.45**
Chisel (straight shank)	**.50-.60**	**.30-.40**
Disk (tandem, shallow)	**.65-.75**	**.25-.35**
Anhydrous applicator	**.75-.85**	**.45-.55**
Field cultivator	**.80-.90**	**.55-.65**
Plant	**.80-.90**	**.80-.90***
Till-plant	**.55-.65**	**.55-.65***

**When these are the only operations where soil is disturbed, multiply by .75.*

Here's an example of how to figure how much ground cover will be left after each tillage operation.

(.95)	**X**	**(.90)**	**X**	**(.60)**	**X**	**(.75)**	**X**	**(.95)**	**=**	**(.36)**
% after harvest		**% after winter**		**spring chisel (straight shanks)**		**spring disk (shallow)**		**planting**		**% ground cover after planting**

Lazy Circles in the Sky

by Lowell Washburn

Each year during the last weekend of September, outdoor enthusiasts from across the Midwest gather at Effigy Mounds National Monument located in extreme northeastern Iowa near Marquette. Their ranks consist of people from all walks of life and every level of expertise. Each autumn they arrive, rain or shine, to converge for a single purpose -- the first-hand opportunity to view the southward passage of North America's birds of prey as they move down the corridor of the Upper Mississippi River.

Properly known as the Effigy Mounds Hawk Watch, the outing has come to be regarded by participants as one of "Iowa's premier outdoor events." "We are really amazed and pleased at how this event has caught on and remained strong," says Pat Schlarbaum, a hawk watch coordinator and nongame wildlife technician with the Iowa Department of Natural Resources.

Pat Schlarbaum

▲
Turkey vulture on its fall migration along the Mississippi River.

During recent years we have annually had around 4,000 people attend the Hawk Watch," says Schlarbaum. "Some come as families with a picnic, while others arrive en masse on tour buses. We also see a lot of car-pooling, and several county conservation board naturalists usually bring groups.

"What we have to offer is really quite unique," says Schlarbaum. "Without a doubt, we have one of the continent's finest displays of raptor migration taking place in one of the most magnificent outdoor settings imaginable -- the rugged timbered bluffs of the Upper Mississippi."

Many of the Hawk Watch activities occur in and around the Effigy Mounds Visitor's Center where DNR personnel set up viewing areas complete with spotting scopes and binoculars to aid in the identification of various species. "We do keep scores or tallies on what we see each year, but collecting data is not our main objective," says Schlarbaum. "Instead, what we are really after is to instill a general appreciation among participants for our native birds of prey. We want people to go away with a positive understanding of the predator's role in the natural scheme of things and in wildlife management.

Effigy Mounds Visitor's Center

"We want people to ask questions of themselves -- Where are these birds coming from? Where are they going? What are their habitat needs? How do they live? If we can get people thinking in that direction, then we're on our way to a broader educational experience," says Schlarbaum. "We have plenty of room to spread out here, and if you just take the time to observe and tune in, then you'll be taking home some very significant memories."

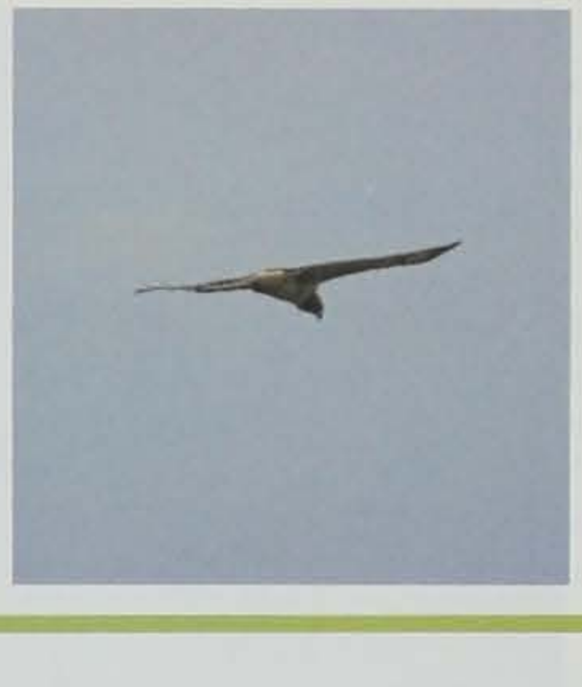
By keying in on the proper habitats, the viewing opportunities are limitless. By using trails that meander along timbered ridges, you may catch a darting glimpse of a Cooper's hawk twisting its way through dense autumn foliage in an effort to convert a blue jay to breakfast. Down on the bottoms, the odds are at least fair that you'll see an endangered peregrine falcon -- especially near mud flats where they are drawn by concentrations of shorebirds and waterfowl. In the open water, ospreys and bald eagles can

often be seen catching fish.

But for most folks the main draw is up "on top" where migrating raptors of all species can be seen taking advantage of the rising thermals created by the steep bluffs. "There have been times when we've seen broad-winged hawks kettling in groups of anywhere from 50 to more than 500 birds," says Schlarbaum. "Broadwings migrate through a very narrow window of opportunity, but when they move through, you'll see lots of them."

Ridge-top observers are also likely to see good numbers of osprey, eagles and redtails. The bluffs above Effigy Mounds also serve as an excellent viewing point to observe migrating falcons such as merlins, kestrels and peregrines. "We are beginning to see more and more peregrines each year," says Schlarbaum. "People really get excited over that, and a cheer goes up every time a crowd spots one.

"To me, that's a perfect example of what this event should be all about -- people getting excited over the resource. When everything clicks and we hit the right combination of wind, weather and migrating birds, the enthusiasm that this event generates is really incredible," says Schlarbaum.



DeWaine Jackson

◄
The red-tailed hawk is probably the most common soaring migrant seen at the hawk watches.

▼
Pat Schlarbaum with Hawk Watch participants. According to Schlarbaum, Iowa has one of the continent's finest displays of raptor migration taking place in one of the most magnificent outdoor settings imaginable.

Lowell Washburn

IF YOU GO

The Effigy Mounds Hawk Watch began in 1985. Today, upwards of 4,000 visitors annually attend the event which is always held during the last weekend in September. The Hawk Watch is hosted by the National Parks Service and is coordinated by the Iowa DNR, the U.S. Fish and Wildlife Service and the Northeast Iowa Audubon Club. If you've never attended this event, you're missing out on one of the state's most beautiful, educational experiences. Here are some tips for this year's Hawk Watch.

Date: Hawk Watch '93 will take place on September 25-26.

Time: The Hawk Watch will run from 10 a.m. to 5 p.m. each day.

Location: A good starting place is the main visitor's center at the Effigy Mounds National Monument. DNR personnel will be on hand with the latest information on the hawk migration. Viewing areas are set up to aid in observation and raptor identification.

Another great observation station is located on Fire Point Lookout. Located 900 feet above the surrounding countryside, Fire Point offers an excellent bird's eye view of the Upper Mississippi Flyway. Here migrating hawks can often be seen at eye level or even flying below the observers.

Programming: This year's hawk watch will feature a slide presentation on the hawks and owls of Iowa. There will also be a number of programs featuring live birds of prey. A special emphasis will be made on the Mid-continent Peregrine Recovery Program. Hawk banding stations will be operated during this year's event, providing another opportunity to view raptors up close.

Other: In addition to viewing a wide diversity of raptors, participants can expect to see a variety of woodland birds as well as shorebirds, waterfowl and wading birds, such as herons and egrets. Autumn foliage is often nearing its peak during this weekend.

What to Bring: Binoculars and field guides are great assets. Although these are available on site, bringing your own avoids waiting. Don't forget your camera. Also, autumn weather is unpredictable, so dress appropriately.

How Hawks Migrate

During the past several months, television reports have referred to the Mississippi River as the continent's drain pipe." Unfortunately, it has been a fact proven all too often during the floods of '93.

However, in addition to conveying water to the Gulf of Mexico, the Mighty Mississip' serves yet another critical function. For migrating birdlife, it is one of North America's most important arteries of travel. During the autumn months, the river is famed for its concentrations of aquatic birds that include waterfowl and wading birds of all shapes and sizes. But perhaps less well-known to the general public is that for a brief time each year, the rugged valley of the Upper Mississippi also harbors one of the nation's best displays of our native birds of prey.

They, too, come in all shapes and sizes, ranging from huge bald eagles, ospreys and vultures all the way down to the diminutive sharp-shinned hawks and kestrels. Of the 16 raptor species that regularly travel through Iowa, all can be viewed along the Mississippi River during some point of the migration cycle. The reason they are here can more or less be summed up in a single word -- thermals.

Thermals are columns of rapidly rising air that form over forest openings (such as hayfields) or along shorelines where dry land heats faster than the adjacent water. For migrating hawks, they are a critical component to survival.

Thermals provide the same benefit to hawks that escalators provide people, which is a free ride to the top. Hawks do the same thing as they catch a thermal and effortlessly soar to several hundred, or even thousands of feet above the earth. Once a thermal has been tapped out or the cloud ceiling has been reached, the birds simply break away and glide in the direction they wish to migrate. When the next thermal is located, the whole process starts over. By hopping from thermal to thermal, a bird such as the red-tailed hawk can migrate for hundreds of miles on a breezy day with only slight expenditures of energy.

During the autumn migration strong thermals do not usually form until at least mid-morning. That is one reason why many hawks spend the early morning hours either perched or engaged in hunting activities. However, along the Mississippi River, low-grade thermals (obstruction currents) are often provided by the wind shear effect of cliffs and ridges, allowing for at least some soaring even during cold fronts.

All birds of prey have many difficult lessons to learn during their first year of life. The most important challenges are learning how to hunt and successfully capture prey and learning how to migrate.

The fast learners are the birds that will survive to travel the Mississippi north next spring.

--LW

Lowell Washburn

▶
Juvenile northern goshawk. This uncommon migrant is most likely to be seen along the ridges or marsh/slough edges of the Mississippi River in extreme northeast Iowa.

WARDEN'S DIARY

by Chuck Humeston

The Amazing Headless Deer

By now it's probably no secret that conservation officers have started using a new tool for hunting enforcement. For some time, other states had been using "decoys," or "wildlife replicas," in order to apprehend violators. These have been particularly effective for detecting deer hunting violations such as shooting from the windows of vehicles, or from the roadway, or by use of a spotlight.

At first, there was some resistance to the use of this tool in Iowa, but when all fears concerning entrapment or being "unfair" were put to rest, we began using the decoys last fall. We weren't asking anyone to shoot at a decoy. That was up to the person.

The results were mixed, but as with anything related to hunting enforcement, it made for some memorable experiences.

I worked in a three-officer team with Dave Tierney of Marshalltown and with Mark Edwards of Boone. Our first attempt at this operation was with a pheasant decoy placed field near a roadside. It started out slowly, but finally the bait was taken and the hook set!

I was down the road from the decoy, hidden away in my "chase car" when Dave called me to drive up. Upon my arrival, I found Dave had come out of his blind where he had been observing the decoy with a video camera. He had a car stopped with a man and woman inside. Dave was holding a .22 pistol. The couple had driven by the decoy, stopped, then backed up. The passenger stuck his arm out of the window and began blazing away at the pheasant. It seemed odd to him that the pheasant never flushed or flinched. He told us he was only shooting at a fencepost. Somehow, we found that hard to believe.

Our next attempt was with a deer replica purchased for us by the Marshalltown Izaak Walton League.

Vehicles would come by, stop, back up . . . then the slow creeping crawl, then the shots . . .

Now, this set up is a little different. For one thing, now it was cold! So, the coveted assignment became sitting in the warm chase car, not hunkered down in the blind with the camera.

We had set up the decoy in the woods near a bridge over the Iowa River. We had just gotten into our cars when a pickup pulled up behind me. The back of my car was covered with snow, so it wasn't readily identifiable. I slipped down in the seat and watched the occupants of the pickup in my mirror. The passenger pulled the shotgun out of a case, slowly opened the door, and began slowly and lowly tip-toeing along the bridge. He set the gun on the bridge railing and fired! Then, he just stood there. He just stood there while I ran up to him and another of our cars approached him. I asked for his gun, and he still just stood there staring into the timber. Then, I looked at what he was staring at.

His shot had hit the decoy in the head, knocking the head off and sending it spinning several yards through the air into the snow. But, of course, the body was still standing there. The poor guy was staring in disbelief.

"Sir," I told him, "you shot a decoy."

"I shot a WHAT?," he asked.

"Your shot a deer decoy."

"Noooooo . . .," he said shaking his head. He was still in a state of disbelief as we cited him for shooting a slug from the bridge.

Dave came walking up the hill with the decoy head. A slug wound through the side. Poor Dave, he looked like someone had shot his close friend.

That's the way it went. Vehicles would come by, stop, back up . . . then the slow creeping crawl, then the shots -- only the shots were from the road, which is illegal. We even had two people fly out of the car and charge the deer yelling and screaming to scare it away.

Most seemed to be a little embarrassed they had shot a decoy. A few were angry their actions had been caught. But it proved to be effective, and it disproved one statement I heard . . .

We had notified a county attorney we would be using the decoys. Apparently he said, "You've got to be kidding! Nobody would be dumb enough to shoot at one of those."

Well, maybe not dumb, but let's just call it unwilling to resist.