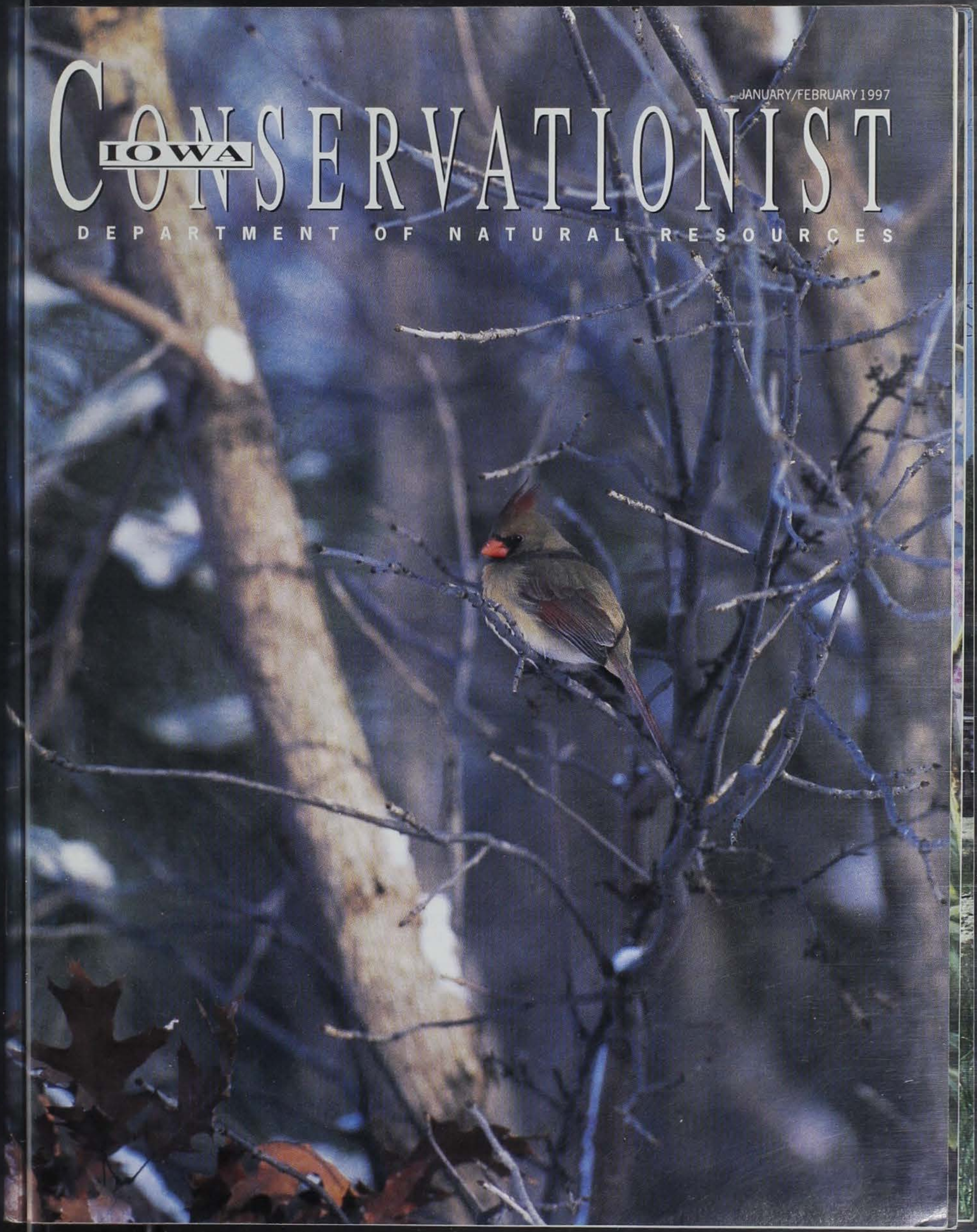
JANUARY/FEBRUARY 1997

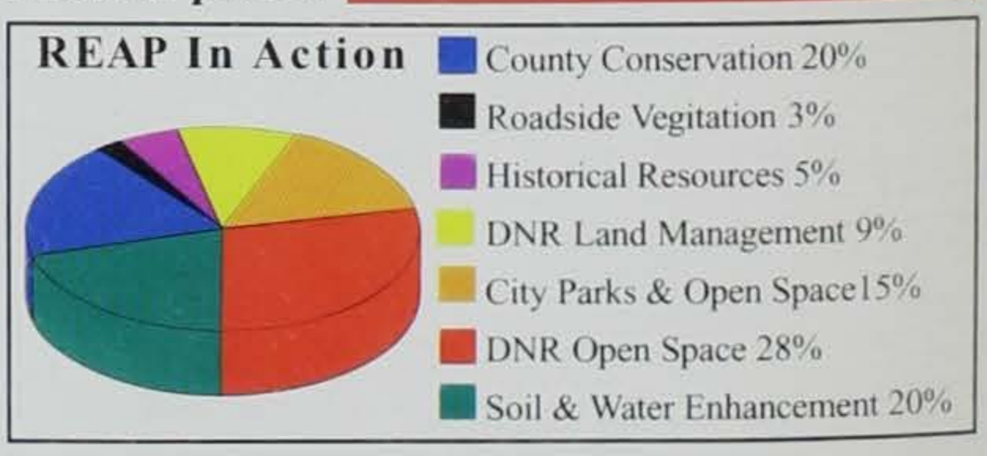
IOWA CONSERVATIONIST

DEPARTMENT OF NATURAL RESOURCES



more than just a pretty plate

The money from natural resources license plates goes to the Resource Enhancement and Protection fund -- REAP. Created in 1989, REAP has received the highest national award for conservation programs. So far, it has generated $70 million and rising. To buy a set of the $35 plates, take your current plates and registration to your county treasurer and request the natural resource plates.



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COVERS

Front -- Female cardinal by Roger A. Hill.
Back -- Sledding by Ken Formanek.

FEATURES

DEPARTMENTS

TEAMING WITH WILDLIFE:

A Matter of Dol

Roger A. Hill

ollars and Sense

by Lisa Hemesath

Wild turkeys gobbling in the woods on an early spring morning, a pair of Canada geese leading a line of goslings across the open water of a prairie marsh, an alert doe and her twin fawns watching you as you take your early morning walk . . . all sights and sounds Iowans share and take pride in. It's no secret that Iowa has been blessed with an abundance of game animals. But it wasn't always like this . . .

By the early 20th century, game species, such as wild turkeys, Canada geese, and white-tailed deer had become extirpated due to unregulated hunting and habitat loss. Iowans had taken for granted the abundance of game and subsequently lost this precious resource. In the 1930s hunters and manufacturers of hunting equipment decided to reverse the trend by supporting the Pittman-Robertson Act and *investing in their outdoor interests*. This Act was pivotal legislation in restoring game animals throughout the U.S. The Act placed a 10 percent (later changed to 11 percent) manufacturer's excise tax on sporting arms and ammunition as a means to help pay for wildlife programs. Just by purchasing ammunition or a shotgun, hunters were able to support their state's wildlife program, thus ensuring management of game populations. And it worked! The abundance of game in Iowa has created thousands of hunting opportunities. As a recent example, in 1995, 26,000 duck hunters crouched among cattails watching in anticipation for a flock of waterfowl to appear out of a slate-grey sky. Nearly 32,000 turkey hunters sat motionless against a tree waiting for that gobbler to come 10 yards closer. And with 177,000 deer licenses issued, not only Iowans but also nonresident hunters from across the U.S. were able to enjoy the pursuit of Iowa's big game. In later years, the Wallop-Breaux Act of 1950 placed an excise tax on fishing equipment and boat fuel for the support of state fishing programs.

While the Iowa Department of Natural Resources' wildlife bureau has funds to provide land and management for its 60 or so game species, it lacks funds for the protection of Iowa's 400 species of nongame wildlife -- wildlife that is enjoyed for its viewing opportunities only. Just as Iowa's common game species were extirpated by the beginning of the 20th century, some of Iowa's once-common nongame species are currently facing extirpation.

Today, 44 species of birds, mammals, reptiles and amphibians are on the state endangered and threatened list. Species that once used to be common in Iowa such as the northern harrier, bobcat, wood turtle and mudpuppy are now on the verge of extirpation. Who knows who will be added next to this growing list? Perhaps the bobolink — a songbird that graces our grasslands and has undergone a population decline of 93 percent from 1966 to 1991. Or maybe the cricket frog — once found statewide, this species has disappeared from wetlands in the northern part of the state. Or perhaps the black tern — a bird who has specific habitat needs in wetlands of the prairie pothole region and is already a "species of special concern" for the U.S. Fish and Wildlife Service.

How do we find the funds to protect these species and the habitats they need? The answer is to expand the successful programs of Pittman-Robertson and Wallop-Breaux to nonconsumptive outdoor enthusiasts

■ The DNR lacks funds to protect Iowa's 400 species of nongame wildlife, one of which is the bobolink — a songbird that graces our grasslands and has undergone a population decline of 93 percent from 1966 to 1991.

DeWayne Jackson

allowing them to also give something back to the outdoors.

Teaming with Wildlife is a proposal initiated by the International Association of Fish and Wildlife Agencies (IAFWA) to place a user fee on the wholesale price of outdoor equipment such as backpacks, sleeping bags, cameras, bird feeders, binoculars, wildlife guidebooks and sport utility vehicles — equipment typically used by birders, hikers, canoeists, campers and other nonconsumptive users of wildlife. The fee would vary from one-fourth of one percent to five percent depending on the price of the product. The increase in product price due to the user fee would be minimal. For example, a $100 pair of binoculars that wholesales at $50 would have a surcharge of $2.50. A $10 field guide that wholesales for $2.50 would retail at $10.13 with the surcharge included. The average outdoor enthusiast would invest *$5 to $11 annually* on the user fee. An *investment* that would ensure the protection of nongame wildlife and their habitat needs nationwide.

Approximately $350 million would be generated annually from the user fee. The monies would be passed on to the U.S. Fish and Wildlife Service who would funnel the dollars back to state nongame programs for nongame conservation efforts — a method used successfully for more than 60 years to fund fish and game programs. The return on this *investment* will be:

- the conservation of our nation's fish and wildlife by preventing species and their habitat from becoming endangered,

- increased recreational opportunities in the form of more and better wildlife viewing sites, photo blinds, observation towers, hiking trails and wildlife education projects, and

- the advancement of public education on important wildlife issues.

From these funds, Iowa could receive a federal grant of $4.7 million annually for the conservation of its 400 species of nongame wildlife (see *The State Initiative*, page 9). Currently, the Chickadee Checkoff's declining contribution rate has provided only $150,000 annually for nongame conservation efforts in Iowa. This low contribution rate has caused The Wildlife Diversity Program to cut back on the number of public programs, decrease its participation in research and survey projects, limit its ability to reprint informational booklets (*Iowa's Frog and Toads, Iowa's Lizards and Turtles, A Guide to the Bats of Iowa*), and reduce the number of *Wildlife Diversity* newsletters printed from four to two a year. It is obvious that the Chickadee Checkoff has become obsolete and the Wildlife Diversity Program needs increased funding from a more reliable funding source.

The Iowa Department of Natural Resources believes that *Teaming with*

Iowa Endorsements for Teaming With Wildlife Initiative *(150 to date)*

Please join Iowa's growing list of coalition members. If your organization or business would like to hear more about *Teaming With Wildlife*, please call The Wildlife Diversity Program at 515/432-2823. We can arrange a presentation at your convenience with one of our county coordinators. Your support is important to the future of wildlife conservation nationwide, so call us today!

KEY: CCB — County Conservation Boards; *Italic — Outdoor Manufacturers or Retailers;* Others — Conservation Organizations and Special Interest Groups

Adair CCB
Adams CCB
Ames Chapter Izaak Walton League of America
Audubon CCB
BioDiversity, Inc.
Big Bluestem Audubon Society
Big Marsh Bowhunters
Big River Specialty Company
Black Hawk CCB
Boone CCB

Wildlife is the answer to our funding problems. Since 1994, Iowa has joined forces with IAFWA to build a national coalition that supports the user fee on outdoor equipment. To date, the national coalition list totals more than 1,200 members, 150 from Iowa (see bottom of pages). Many of the members include conservation organizations such as the National Audubon Society, The Wildlife Society, National Wildlife Federation, and local chapters of Ducks Unlimited. In Iowa, much of the credit for our large list of coalition members goes to our 91 *Teaming With Wildlife* county coordinators. Their efforts have helped us gain statewide support and has made Iowa a national leader in the *Teaming With Wildlife* campaign.

Much of the support for *Teaming With Wildlife* has been from traditional conservation organizations such as Ducks Unlimited, the Iowa Chapter of the Ruffed Grouse Society, the Izaak Walton League, and The Wild Turkey Federation. Members of hunting organizations realize that "habitat is the connecting link" between game and nongame animals. Monies generated from the user fee will be used toward habitat enhancement and land acquisition for nongame animals, actions that will also benefit game animals in those areas, thus increasing hunting opportunities. *Teaming With Wildlife* is a win-win situation for both consumptive (hunters and trappers) and nonconsumptive users of wildlife (hikers, bird watchers, canoeists, outdoor photographers). *Teaming With Wildlife* simply gives nonconsumptive users a mechanism to help share with hunters the financial burden of wildlife conservation — a burden traditionally shouldered by hunters through the Pittman-Robertson Act.

While the conservation community is sold on the idea of a user fee, many of the manufacturers of outdoor equipment are reluctant to become members of the coalition. They are afraid that the user fee will increase the prices of their products to the point that they will suffer decreased sales. Many of these manufacturers don't realize that the user fee is an *investment* in their company. The user fee helps fund nongame conservation which in turn increases wildlife viewing and recreational opportunities, which will ultimately lead to *increased demand* for their products. Some manufacturers and retailers of outdoor equipment realize the long-term benefits of *Teaming With Wildlife* and have become coalition members: Bass Pro Shops, Inc., Carl Zeiss Optical, Swift Instruments, Inc., Falcon Press, and Pet Food Warehouse (manufacturers of bird seed and bird houses), among others. Some retailers in Iowa who have joined the Coalition include Pete Petersen's Wild Bird Shop, R&R Sports, Inc., Fin and Feather, Inc., C&R Sporting Goods, and Ty Smedes Nature Photography. Along with this long list of coalition members comes the endorsement of 10 governors nationwide.

While the number of coalition members is growing at a steady pace, ***we need your help*** to promote the Teaming With Wildlife proposal. We ask all outdoor enthusiasts to do the following:

Inform your organization or business about Teaming With Wildlife and join the coalition! We have supporters throughout the state who can visit with your local conservation organization, garden club, retail business, or wholesale business and give you a presentation on *Teaming*

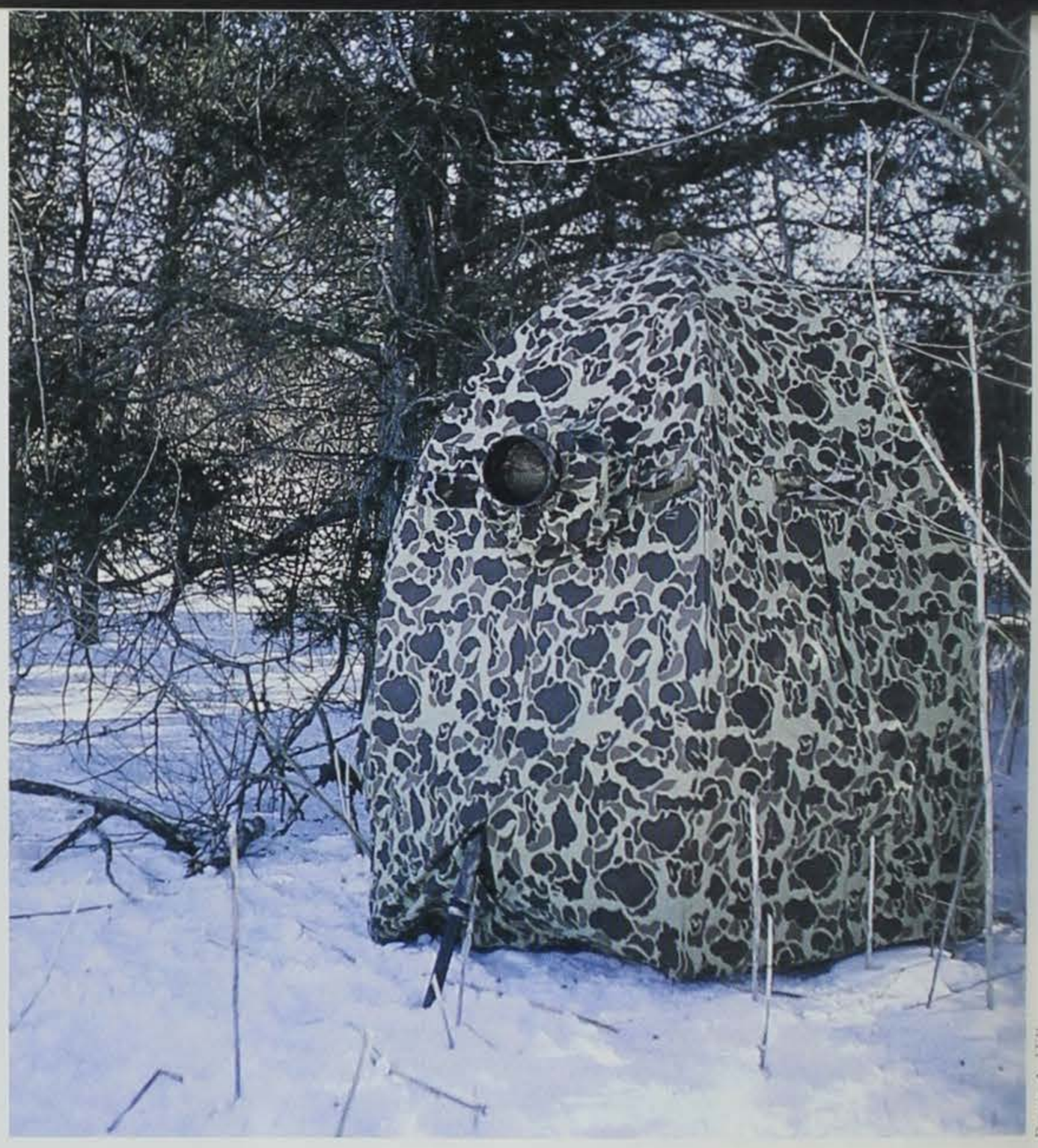
Ken Formanek

■ ***Teaming with Wildlife*** **is a proposal initiated to place a user fee on the wholesale price of outdoor equipment such as backpacks, sleeping bags, cameras, bird feeders, binoculars, wildlife guidebooks and sport utility vehicles.**

Boyer Valley Environmental Foundation
Bremer CCB
Bremer County Soil and Water Conservation District
Buchanan CCB
Butler CCB
Calhoun CCB
Cedar CCB
Cedar Prairie Group Sierra Club
Cedar Rapids Audubon
Central Iowa Sierra Club
Cerro Gordo CCB
Chickasaw CCB
Chickasaw County Chapter of Ducks Unlimited
Clay CCB
Clayton CCB
Clear Lake Friendly Garden Club
Clinton CCB
Clinton County Ducks Unlimited
Clinton County Pheasants Forever Chapter
Conservation Explorer Post 171
Crawford CCB
Critter Company
C&R Sporting Goods
Dallas CCB
Delaware CCB
Department of Biology and Environmental Science, Simpson College
Des Moines Audubon Society
Dickinson CCB
Dubuque Audubon Society
Dubuque CCB

■ The increase in product price due to the user fee would be minimal. For example, a $100 pair of binoculars that wholesales at $50 would have a surcharge of $2.50. The average outdoor enthusiast would invest *$5 to $11 annually* on the user fee.

Ken Formanek



Roger A. Hill

With Wildlife. We want your support, so if you are interested in a face-to-face presentation, please contact the Wildlife Diversity Program at 515/432-2823. We want you on our coalition list!

Write letters to outdoor equipment manufacturers and suppliers to express support of the five percent user fee. While it is beneficial to have broad support in the conservation community, it is imperative that we gain the support of manufacturers and retailers of outdoor equipment. Wholesalers and retailers need to realize that the user fee is an *investment* that will lead to more wildlife viewing and recreational opportunities which in turn will increase the demand for their products. Please write to manufacturers and retailers of outdoor equipment and tell them that as a customer the small increase in the price of their products is worth the large increase in conservation, education and recreation opportunities provided by the user fee.

Write letters of support to your congressional legislators. Building a large grassroots coalition is only the beginning. For *Teaming With Wildlife* to become a reality, we need to convince our congressmen and women to vote for the user fee on outdoor equipment. Legislation for *Teaming With Wildlife* will be introduced into congress this year. Please write a letter of support to your congressional representatives in early 1997.

Please support *Teaming With Wildlife*. Your annual *investment* of only $5 to $11 will generate millions of dollars to help protect more than 400 species of wildlife in Iowa and 1,800 species nationwide, while increasing your outdoor recreational opportunities.

Lisa Hemesath is a wildlife biologist for the department's wildlife diversity program and is located in Boone.

Emmet County Chapter of the Izaak Walton League of America
Emmet CCB
Environmental Studies Program, Iowa Lakes Community College
Fin & Feather, Inc.
Fort Dodge/Phil Fox Chapter of the Izaak Walton League of America
For Our Birds
Franklin CCB
Friends of the Wapsi River Environmental Education Center
Furharvesters Club of ISU
General Federated Women's Club of Clarksville
Guthrie CCB
Guthrie County Ducks Unlimited
Hamilton CCB
Hancock CCB
Hook-N-Shot
Howard CCB
Ida CCB
Iowa Audubon Council
Iowa Academy of Science
Iowa Association of County Conservation Boards (IACCB)
IACCB, District II
IACCB, District VI
Iowa Association of Naturalists
Iowa Chapter of the American Fisheries Society
Iowa Chapter of the National Wild Turkey Federation

TEAMING WITH WILDLIFE:

The State Initiative

by Pat Schlarbaum

Iowans have distinguished themselves as national leaders in coalition building efforts designed to pass the Fish and Wildlife Diversity Funding Initiative, *Teaming With Wildlife*.

For the federal initiative of *Teaming With Wildlife* to succeed, support at the state, grassroots, level is imperative. Each state fish and wildlife agency is responsible for organizing support within its state. Here in Iowa, this responsibility belongs to the Iowa Department of Natural Resources (DNR). The Wildlife Diversity Program within the DNR wildlife bureau has taken on the primary coordinating responsibility, and has made passage of *Teaming With Wildlife* the number one priority of the bureau. This strong commitment recognizes the advances in wildlife conservation that Pittman-Robertson legislation has provided for game wildlife species since 1937, and Wallop-Breaux legislated dollars has provided for fisheries in Iowa from 1950. It is now time to provide adequate funding for the nonconsumed wildlife species — that vast array of wildlife that provides so many Iowans with wildlife viewing enjoyment.

In order to break coordination activities into more manageable units, Iowa has been divided into five coalition regions (NW, SW, Central, NE, and SE) with one or more regional coordinators. These coordinators are responsible for organizing support efforts within their region.

County coordinators have been established in 95 of the 99 counties in Iowa. Hopefully, Allamakee, Madison, Monroe, and Washington counties will be establishing a county coordinator by the time of this printing and before the next legislative session. The county contact person is in some ways the backbone of the state initiative for *Teaming With Wildlife*. These volunteer and professional individuals are forming the grassroots fabric of the initiative. The county contact person distributes information within their county in order to gain individual supporters, and then works with the individual supporters to identify local

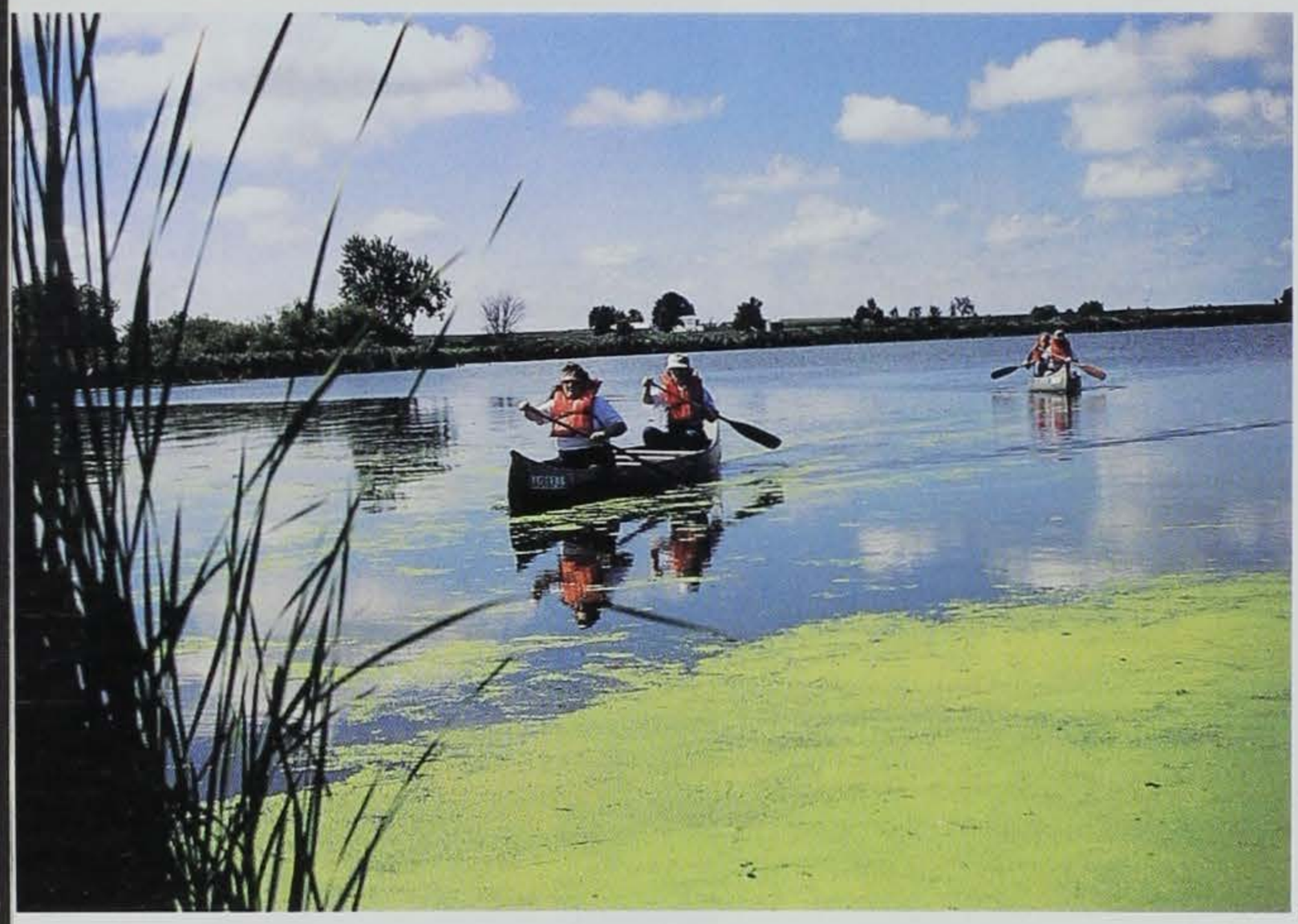
Ken Formanek

■ When the *Teaming With Wildlife* initiative succeeds on the national level, Iowa will qualify for approximately $4.7 million. However, each state will be required to match federal dollars at a ratio of one state dollar for every three federal dollars. Thus, Iowa will be challenged to secure approximately $1.5 million to qualify for available federal dollars.

Wildlife biologists working with peregrine falcon chick (above).

Iowa Chapter of the Ruffed Grouse Society
Iowa Chapter of the Wildlife Society
Iowa City Bird Club
Iowa Conservation Education Council
Iowa Cooperative Fish and Wildlife Research Unit
Iowa Division of the Izaak Walton League of America
Iowa Ducks Unlimited
Iowa Environmental Council
Iowa Falconers Association
Iowa Lakes Community College Conservation Club
Iowa Natural Heritage Foundation
Iowa Naturalist Club
Iowa Ornithologists Union
Iowa Prairie Network
Iowa State Coonhunters Inc.
ISU Fisheries and Wildlife Biology Club
Iowa Wildlife Federation
Iowa Wildlife Rehabilitators Association
Iowa Women in Natural Resources
Jackson CCB
Jasper CCB
Jefferson CCB
J.N. "Ding" Darling Foundation
Johnson CCB
Johnson County Songbird Project
Jones CCB
Kirkwood Ecology Committee
Kossuth CCB
Ladage Photograpy
Lake Region Photography Club

■ Your continued support of the Chickadee Checkoff is needed.
Look for it on Iowa's 1996 tax forms.
A contribution of $5 or more will get you a free nongame poster (right).
This year's poster features a gray treefrog by Roger A. Hill.



Ken Formanek

■ How do we find the funds to protect nongame species and the habitats they need? The answer is to expand the successful programs of Pittman-Robertson and Wallop-Breaux to nonconsumptive outdoor enthusiasts allowing them to also give something back to the outdoors.

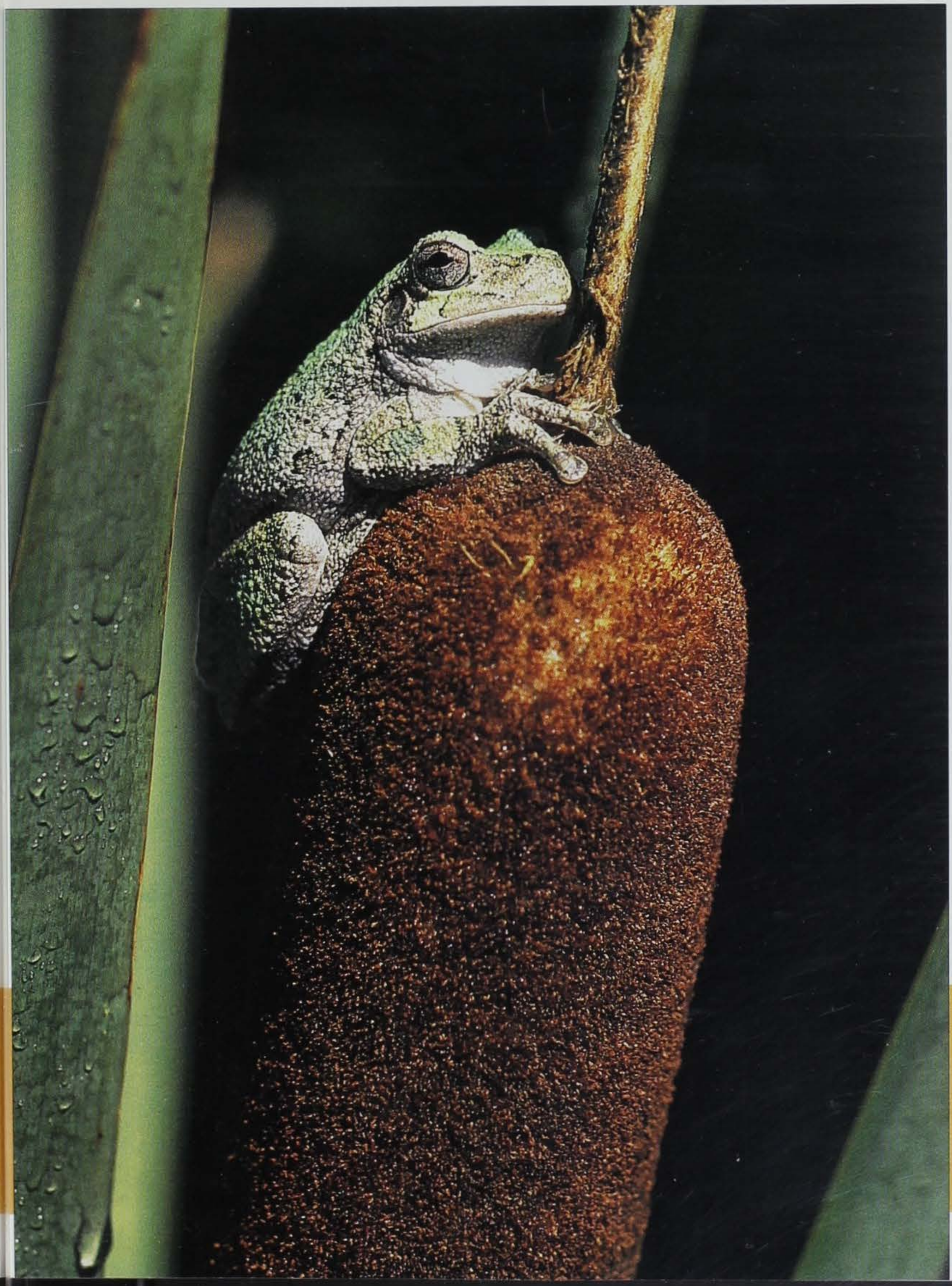
conservation-related organizations who will benefit from *Teaming With Wildlife*.

Private citizens need to voice their support for the state initiative within their local communities and help spread awareness to other individuals. Through letter writing campaigns to manufacturers of outdoor equipment, private citizens and county coordinators actively promote *Teaming With Wildlife*, by persuading the manufacturers that the user fee is an *investment* to the nation's wildlife resources. And it is obvious Iowans enjoy viewing wildlife — recent surveys show that 70 percent of Iowans want wildlife and wildlife viewing areas in our state, thus the citizens and wildlife both stand to gain from success of *Teaming With Wildlife*.

In 1996, Iowans have responded to the call — to date, there are 150 wildlife conservation organizations and businesses endorsing *Teaming With Wildlife*. This is an impressive proportion of the 1,200 groups and businesses that have endorsed the initiative nationally.

When the *Teaming With Wildlife* initiative succeeds on the national level, Iowa will qualify for approximately $4.7 million. However, as is the case in most federally funded programs, each state will be required to match federal dollars at a ratio of one state dollar for every three federal dollars. Thus, Iowa will be challenged to secure approximately $1.5 million to qualify for available federal dollars. Currently, only Chickadee Checkoff dollars would qualify for the match of the proposed federal dollars. This checkoff, also known as the Fish and Wildlife Protection Fund, on Iowa state income tax forms, provides an inadequate amount for the federal match — only $150,000 were received for the 1994 tax season. Clearly, if Iowa is to qualify for the eventual federal dollars, a more realistic funding match will need to be created. The 1996 Iowa General Assembly discussed this challenge in the Senate

Lasso-E-Camper Sales
Laurens Federated Women's Club
League of Women Voters of Cedar Rapids/ Marion
Lee CCB
Leopold Center for Sustainable Agriculture
Lime Creek Nature Center Foundation
Linn County Chapter of Izaak Walton League of America
Linn CCB
Linn County REAP Alliance
Loess Hills Audubon Society
Louisa CCB
Lucas CCB
Lyon CCB
Maquoketa Valley Chapter of Izaak Walton League of America
Men's Garden Club of Des Moines
Men's Garden Club of Mason City
Midwest Raptor Research Fund
Mills CCB
Montgomery CCB
New Pioneer Co-Op
Northern Iowa River Greenbelt Association
Northern Iowa Prairie Lakes Audubon Chapter
O'Brien CCB
Outdoor Escape
Palo Alto CCB
Pete Petersen's Wild Bird Shop
Polk CCB
PVL Minnow Mart
Quad Cities Audubon



Roger A. Hill

■ **Currently, only Chickadee Checkoff dollars would qualify for the match of the proposed federal dollars, and it provides an inadequate amount for the federal match — only $150,000 were received for the 1994 tax season. Clearly, a more realistic funding match will need to be created.**

appropriations subcommittee where it was pointed out that Iowa's wildlife and wildlife viewing opportunities were like Iowa's other infrastructure maintenance challenges. Just as our bridges, roads, and other public facilities enhance the quality of all our lives and require periodic maintenance or emphasis, so do our wildlife areas. Also, dollars that improve these facilities increase the potency of our efforts to attract business and tourism dollars to Iowa.

Wildlife Diversity funding could potentially secure some of the most important help for wildlife in our lifetimes. This is the era when your voice can make a tremendous difference for wildlife. Stand up for the *Teaming With Wildlife* initiative and speak out for the wildlife we cherish. If you're unfamiliar with your county coordinator, please contact the Wildlife Diversity office at 515/432-2823, In the mean time, we must remember and support the Chickadee Checkoff, until alternative funding is secured.

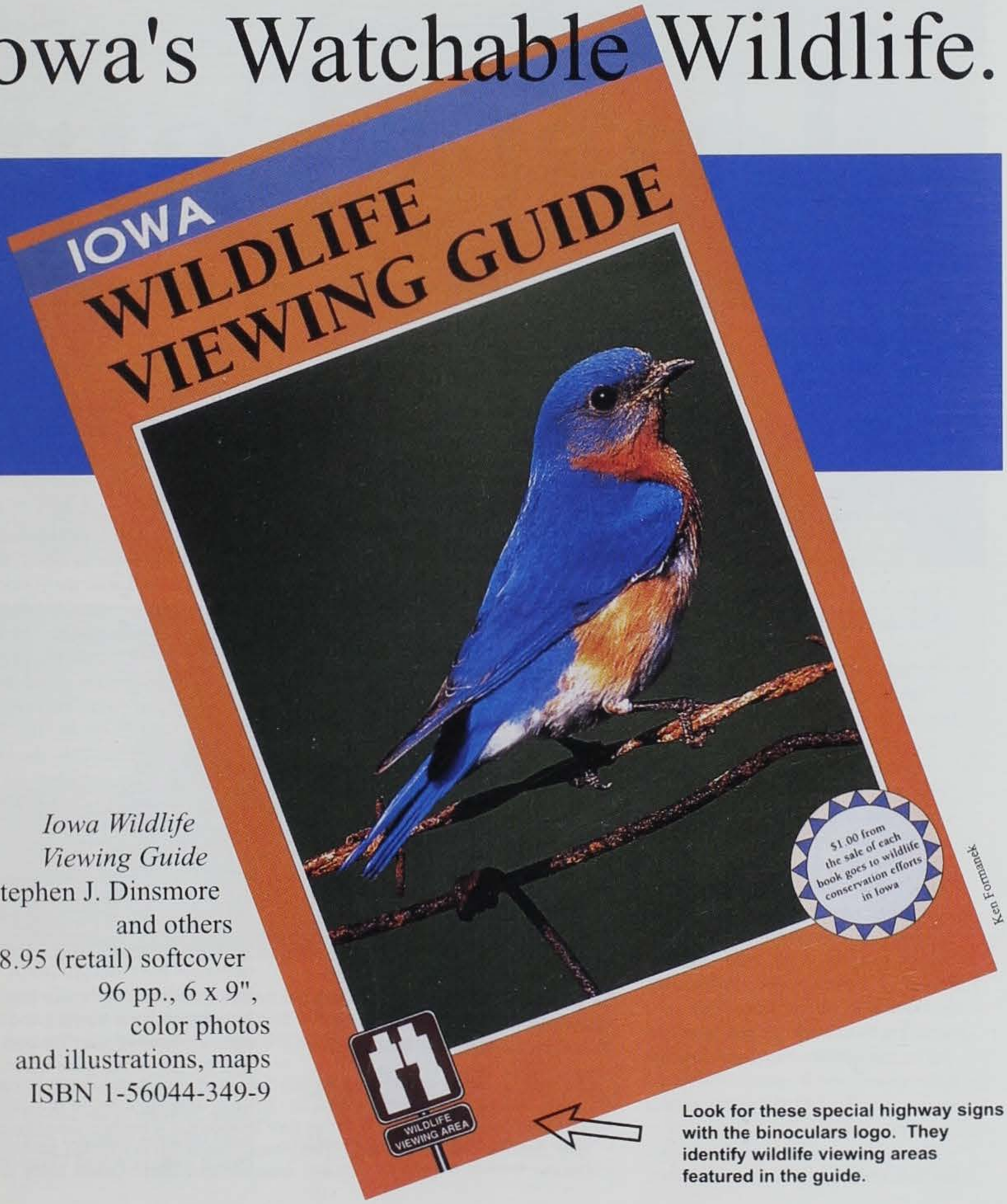
Pat Schlarbaum is a wildlife technician for the department's wildlife diversity program and is located in Boone.

Ron Johnson

Reflective Images Photography
Rolling Hills Audubon Society
R&R Sports, Inc.
Scott County Soil and Water Conservation District
Sibley-Ocheyedan High School Wildlife Biology Class
Southwest Iowa Birders
Sportsmans Atlas Co.
Story CCB
Student Environmental Council at ISU
Three Rivers Chapter of the Izaak Walton League of America
Three Rivers Resources
Trees Forever
Ty Smedes, Nature Photography
U of I Environmental Health Sciences Research Center
Upper Iowa Audubon Society
Upper Mississippi River Conservation Committee
Van Buren CCB
Webster CCB
Whitetails Unlimited Inc.
Wilderness Photography
Winnebago CCB
Woodbury CCB
Woodbury County Conservation Foundation
Woods Sporting Goods
Wright CCB
Zion Lutheran Church, Environmental Task Force, Iowa City

It's Here!

Take a Closer Look at Iowa's Watchable Wildlife.



Iowa Wildlife Viewing Guide
by Stephen J. Dinsmore and others
$8.95 (retail) softcover
96 pp., 6 x 9",
color photos and illustrations, maps
ISBN 1-56044-349-9

Look for these special highway signs with the binoculars logo. They identify wildlife viewing areas featured in the guide.

Thank You, Uncle Sam!

by David Marolf

If you grew up in a close Iowa family like I did, I'm sure you can't thank your devoted relatives enough for giving you guidance and assistance as you matured. Likewise, as the Iowa Department of Natural Resources has "grown up" over the past 25 years, the anglers of Iowa too, have a close relative to thank — Uncle Sam.

1996 marks the culmination of nearly 25 years of negotiations between state and federal officials in a complex land swap involving three fish hatcheries in eastern Iowa, a wildlife reserve and two public hunting areas in north-central Iowa. This form of "wheeling and dealing" between state and federal agencies is not uncommon and is undertaken to benefit both agencies and all citizens involved. In this particular instance, both the anglers and hunters of Iowa have benefited enormously.

The process began in the early 1970s when the U.S. Fish and Wildlife Service decided to downsize the number of fish culture facilities across the United States for reasons ranging from budgetary constraints to fish disease problems. State officials in Iowa got wind of the Federal Government's plan and made requests through the proper channels for our DNR to use the three hatchery facilities within our borders to produce fish for Iowa. The three culture facilities were the Fairport, Guttenberg and Manchester hatcheries. In its own unique way, each facility has been an integral part of the Iowa fish and wildlife bureau for the past 20-plus years.

The Fairport Hatchery was established by Congress as a U.S. Biological Station in 1908 after the Association of Button Manufacturers donated the land to the U.S. Government. Originally set up for freshwater mussel research (important to the button industry at the time), Fairport didn't become a fish hatchery until 1929. In 1973, suffering from severe budget cuts, the Fish and Wildlife Service abolished the federal farm pond stocking program and turned over operation of the hatchery to the Iowa Conservation Commission (now the DNR). If you fish farm ponds in Iowa, it is very likely the fish you harvest originated from Fairport. During the past 23 years, state fisheries personnel have stocked nearly 10,000 farm ponds within Iowa's borders with largemouth bass, bluegill and channel catfish. Interestingly, Fairport Hatchery was the last of the three federal hatcheries to be deeded to the State of Iowa. After 23 years of on-and-off negotiations between state and federal agencies, it took an Act of Congress in 1996

Lowell Washburn

DNR

■ Federal and state agencies have joined together to the benefit of Iowa citizens. Today, three state hatcheries and a federal wildlife area operate more efficiently and provide better service to the public than ever before.

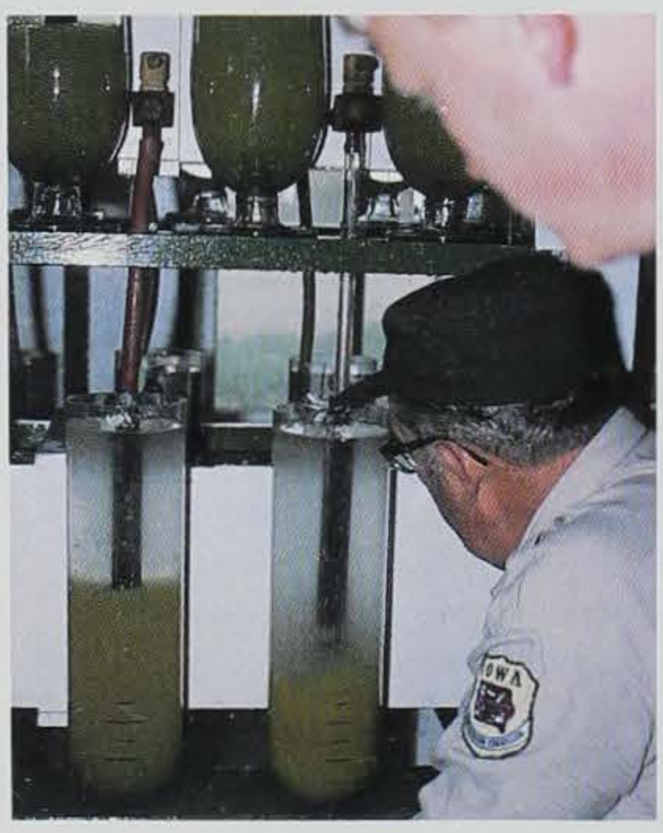
■ Operation of the Fairport Hatchery was turned over to the State of Iowa from the U.S. Fish and Wildlife Service in 1973. In addition to stocking farm ponds, hatchery personnel culture a number of fish species including largemouth bass, bluegill, channel catfish, white amur (grass carp), northern pike, walleye, and saugeye for state lakes, rivers and streams.

to complete the transfer of title to the State of Iowa.

Today, the Fairport Hatchery, located on the scenic banks of the Mississippi River, between Muscatine and Davenport, is Iowa's primary extensive warm-water fish culture station. In addition to stocking farm ponds, hatchery personnel are responsible for culturing a number of fish species including: largemouth bass, bluegill, channel catfish, white amur (grass carp), northern pike, walleye and saugeye for state lakes, rivers and streams. Literally millions of these species have been cultured at Fairport, then transported into Iowa waters from border to border. Personnel at Fairport are also important contributors to the Upper Mississippi River Conservation Committee (UMRCC). This is a team of individuals representing numerous state and federal agencies that make important decisions to protect fish and

DNR

■ **Pond draining at the Fairport Hatchery. Interestingly, Fairport Hatchery was the last of three federal hatcheries to be deeded to the State of Iowa.**



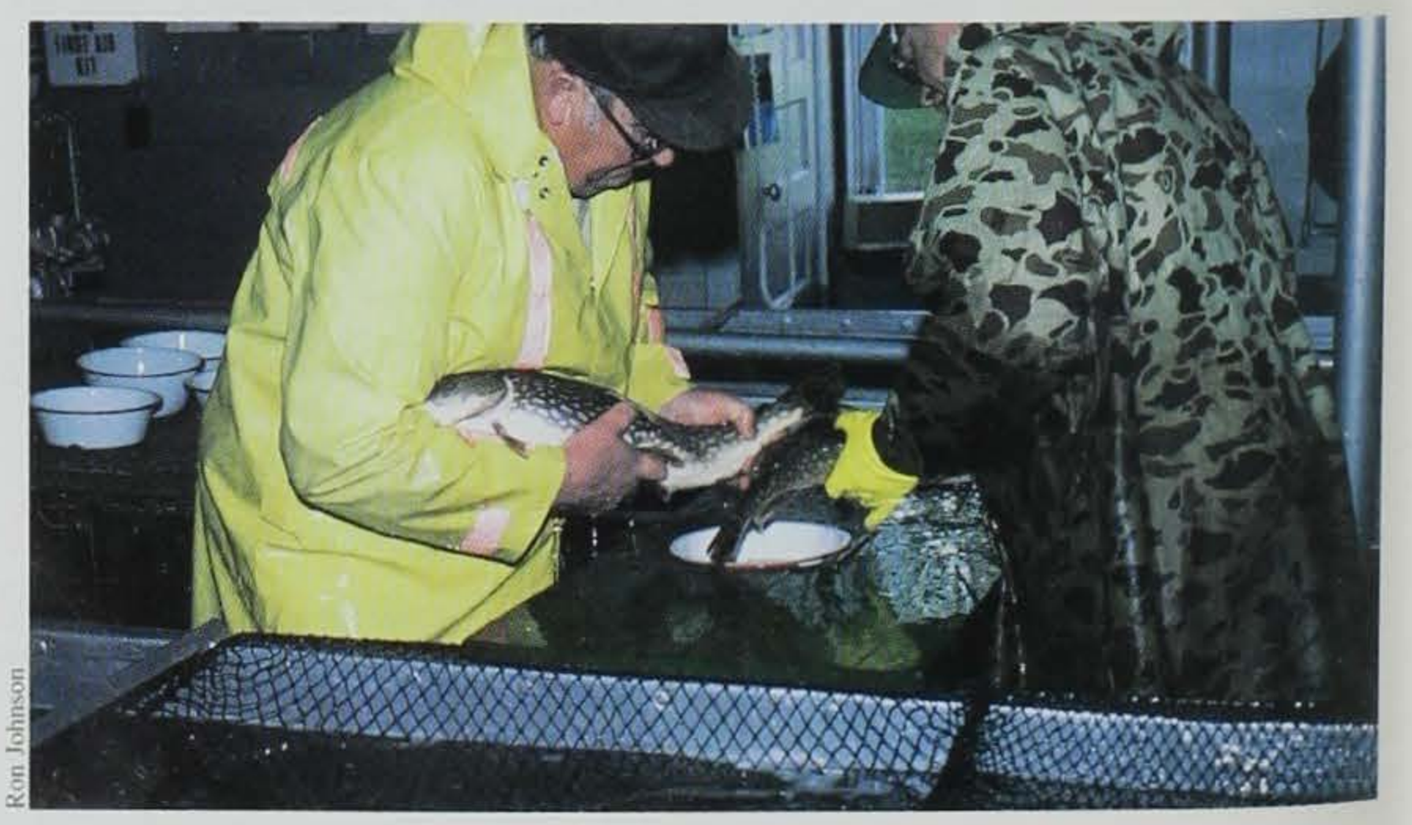
Ken Formanek

■ **Today, the Guttenberg Station operates only as a seasonal hatchery for taking northern pike during the spawning season. Each spring, eggs are stripped from adult northerns (right), fertilized and incubated in the basement of the station (above).**

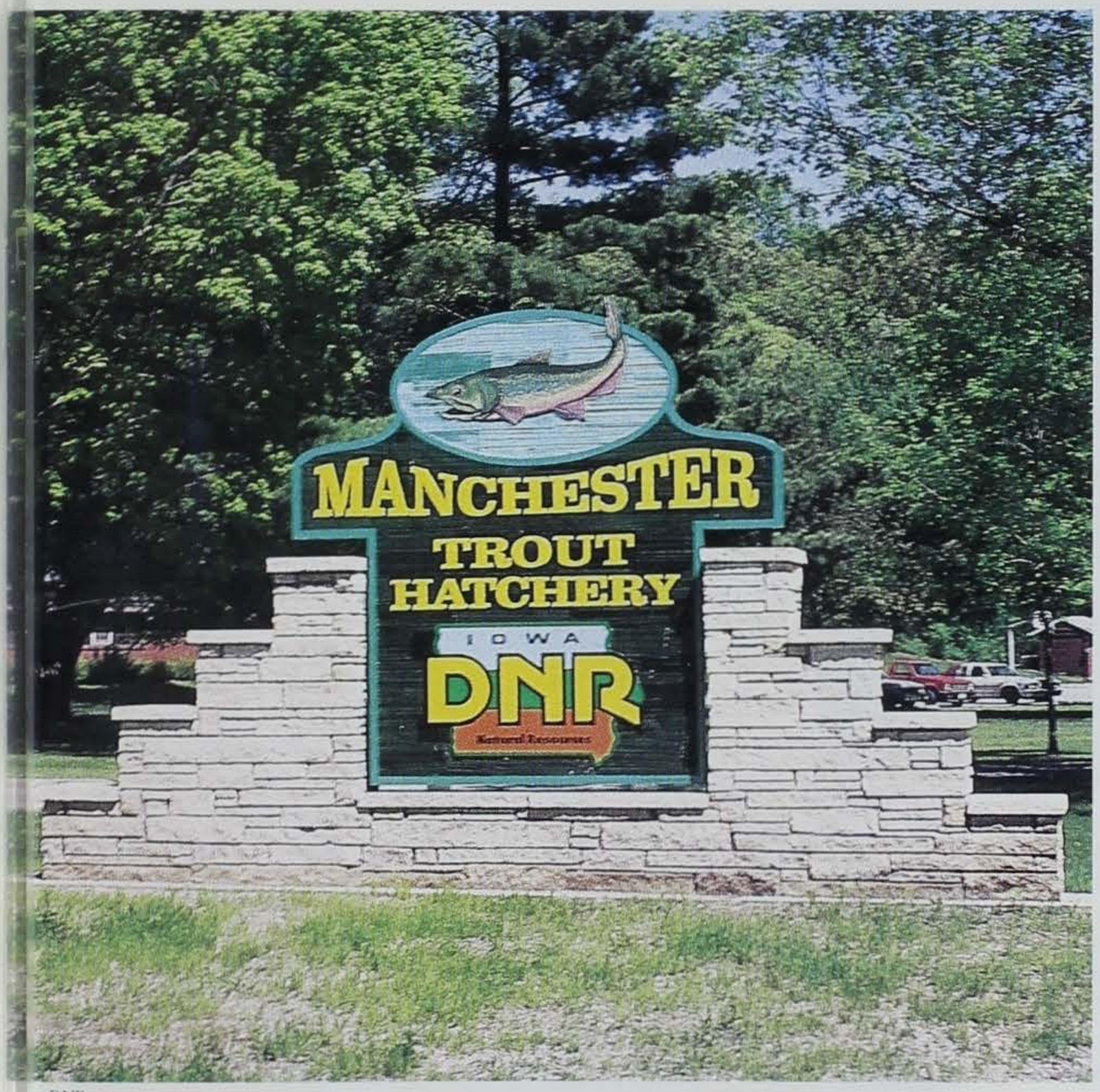
wildlife interests regarding one of North America's most important natural resources — the Upper Mississippi River.

The Guttenberg Station's long history of fisheries lore began in the late 1880s as one of the early fish rescue stations. This concept of "rescuing" young game fish from flooded river backwaters (nature's culture ponds) lost favor as a legitimate form of fish culture when the U.S. Army Corps of Engineers, in the 1930s, installed a lock-and-dam system on the Upper Mississippi River to maintain a commercial navigation channel. The Corps' dams permanently flooded many of the backwater culture ponds, rendering them useless for fish rescue. At that time, a series of federal hatcheries were built, some say through political dealings, to mitigate the adverse impacts on river fish populations caused by the lock-and-dam system. Like Fairport, one of these hatcheries was to be located at Guttenberg. Several fish culture ponds were built on an island below Lock and Dam 10 and a hatchery building, aquarium and residence was constructed at the west end of the dam in downtown Guttenberg. The first fish were produced there in 1939.

From its onset as a hatchery, Fish and Wildlife Service raised primarily largemouth bass and bluegill for various military installations and other federal waters across the Midwest, until 1974 when state personnel assumed management of the facility. The old culture ponds below the dam have long since been converted to migratory waterfowl habitat and today they are under federal jurisdiction in the Fish and Wildlife refuge system. Today, the Guttenberg Station operates only as a seasonal hatchery for taking northern pike during spawning season. Each spring, eggs are stripped from adult northerns, fertilized and incubated in the basement of the station. After



Ron Johnson



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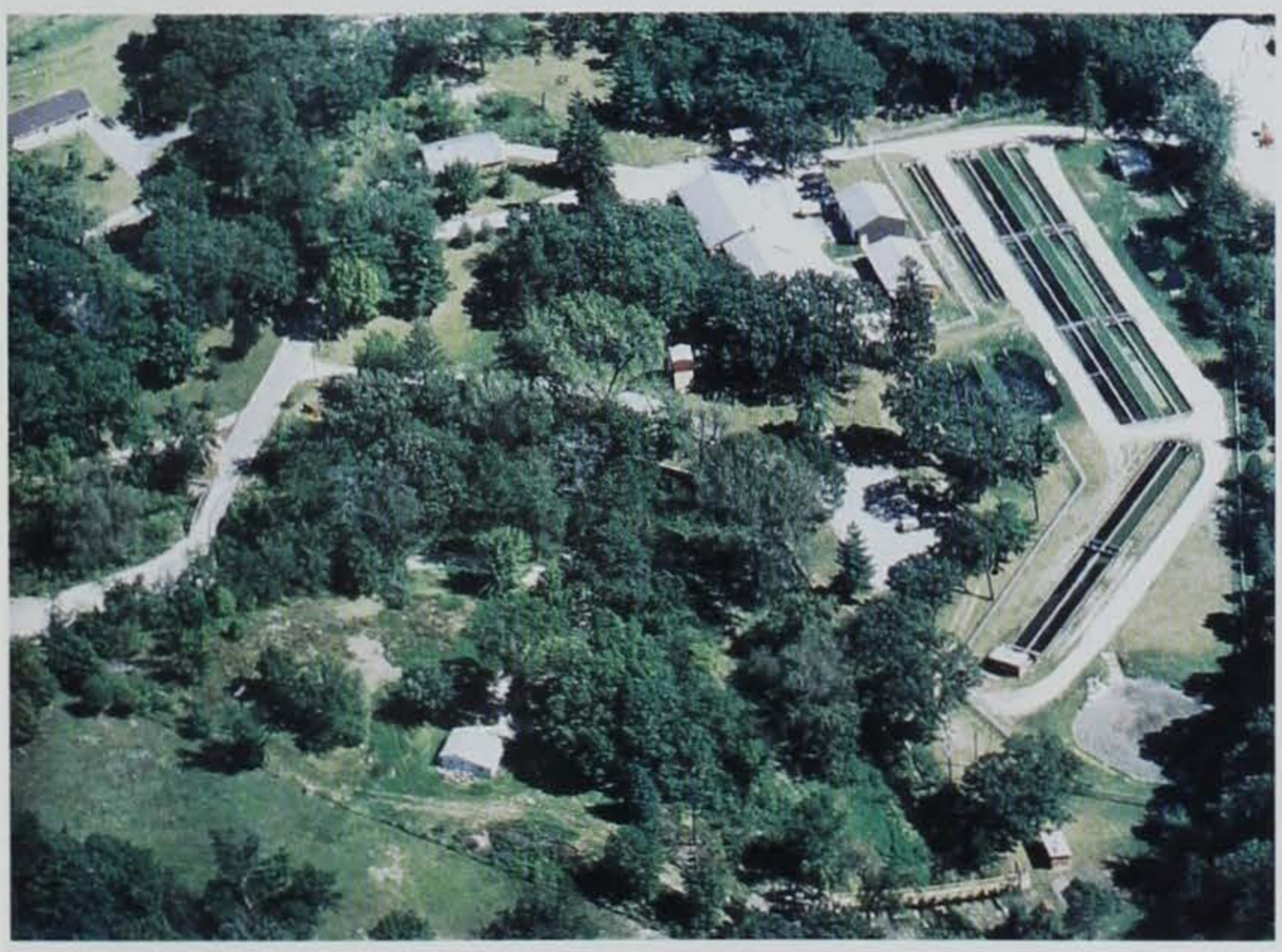

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■ **Upwards of 500,000 trout originating from the Manchester Hatchery have been stocked in Iowa. In addition, thousands of people have enjoyed visiting the hatchery grounds (below) to feed the fish or angle for a lunker in Spring Branch Creek.**

hatching, many of the young fish are stocked as fry across the state and several thousand are transferred to the ponds at the Fairport Hatchery to be raised to a larger, fingerling size before being stocked. Millions of northern pike find their way into Iowa waters via the Guttenberg Hatchery. Again, like Fairport, Guttenberg is much more than a hatchery as DNR personnel stationed at Guttenberg manage fish and wildlife populations and their habitat on the Mississippi River and are major contributors as liaisons in the UMRCC. To the benefit of thousands of tourists annually, the state still maintains an extensive aquarium display viewing fish species native to the region.

In the later part of the 19th century, when the upper Midwest was still considered part of the Northwest Territory, 52 locations were considered as possible sites to build a federal hatchery. The U.S. Government settled on a 25-acre site four miles southeast of Manchester, Iowa, along Spring Branch Creek in Delaware County. According to Federal Agent Professor Barton Everman of the U.S. Fish Commission (1892) this location provided "several of the best cold water springs that could be found anywhere in the state." An Act of Congress on August 18, 1894 established the Manchester Trout Hatchery and construction was completed in 1896 with the first eggs

DNR

■ **Aerial view of Buffalo Creek Bottoms at the south end of Union Slough.**

■ **Spring Branch Creek, flowing through the Manchester Hatchery property, has long been a popular trout fishery and is home of legendary lunker trout.**

DNR

(200,000 lake trout) arriving late that year.

For the next 80 years, the U.S. Department of the Interior's Fish and Wildlife Service used the Manchester Hatchery as a broodstock station where trout eggs were collected from adult fish and shipped, mostly as eggs, to neighboring states including Minnesota, Wisconsin, Indiana and Illinois. Iowa also benefited from the federally operated hatchery at Manchester for many years, with trout eggs for the state trout rearing facility in Backbone State Park near Strawberry Point. Because the Manchester Federal Hatchery was a brood station, Spring Branch Creek, flowing through the Manchester Hatchery property, has long been a popular trout fishery and is home of legendary stringers of lunker trout.

Although the fisheries station at Backbone State Park hatched the trout eggs received from the Manchester Federal Hatchery and then supplied fingerling trout to rearing facilities at Elkader and Decorah, it offered little room for expansion and even less of a water supply for trout production beyond the fingerling size. In addition, the Backbone Hatchery's demand for water was detrimental to the fish population in the park's trout stream, Richmond Springs. Due in part to these constraints to Iowa's trout fishing program, it became very important to Iowa's trout anglers that other options be explored.

While Iowa's trout fishing program was expanding beyond the holding capacity of our available hatcheries, the federal hatchery was experiencing problems of their own—bacterial kidney disease (BKD). BKD is an egg transmissible disease with a curious triggering mechanism commonly called water hardness. The softer the water, the more this disease affects a fish's health. Eggs could not be shipped to other disease-free hatcheries or hatcheries with soft water where the potential for high mortality after hatch was great. In an attempt to eradicate BKD, the Manchester Hatchery was completely dewatered in the early 1970s and chlorine was used to disinfect all water lines and fish rearing tanks, raceways and ponds. This attempt at sterilization proved to be ineffective as lab tests indicated the presence of BKD shortly after the hatchery was repopulated with trout the following year. Because of the BKD problem, the Manchester Federal Hatchery no longer qualified to ship fish out of state, and was placed on low priority to keep in operation by the U.S. Government. In 1975, the federal employees were transferred to other hatcheries and on January 1, 1976, State of Iowa fisheries personnel assumed management of the hatchery with a lease agreement devised for the first decade.

In 1986, representatives for the Fish and Wildlife Service and State of Iowa worked out a land trade involving two tracts of land totaling 645 acres owned by the State of Iowa near Union Slough National Wildlife Refuge in north central Iowa, and the Guttenberg and Manchester hatcheries owned by the U.S. Government. The state lands were public hunting areas (Schwob Marsh at the north end and Buffalo

Creek Bottoms at the south end of Union Slough). A trade of titles would benefit both agencies and sports enthusiasts alike, so the paperwork was finalized in 1986.

On the surface, one might think Iowa got the "short end of the stick" with an incurable fish disease! It's not as bad as it sounds. The Manchester Hatchery and northeast Iowa trout streams have extremely hard water, so the causative bacteria is dormant and trout stocked from Manchester, even though carriers, showed no ill effects and were perfectly safe to harvest and eat. Disease in fish, just as in people, is usually compounded or activated by stress. Many of the stresses that affect fish health at Manchester were environmental — involving improper levels of dissolved gasses like oxygen and nitrogen in the water supply. These environmental stresses were eliminated in the late 1980s by installing water treatment equipment for incoming water to the hatchery. With the major stresses eliminated, the trout at Manchester have tested free of BKD since 1992.

Upwards of 500,000 trout originating from the Manchester Hatchery have been stocked in Iowa trout waters to benefit 25,000 to 30,000 licensed trout anglers each year. In addition, thousands of people have enjoyed visiting the hatchery grounds to feed the fish or angle for a lunker in the cold, clear waters of Spring Branch Creek.

At Union Slough, the former state public hunting areas have remained just that under Federal jurisdiction to benefit thousands of outdoor enthusiasts annually who use the marsh to view nature at its best.

Hopefully you can see how the federal and state agencies have joined together to the benefit of Iowa citizens. Today, the three state hatcheries and the federal wildlife area with two public hunting areas operate more efficiently and provide better service to the public than ever before. Who deserves the accolades? Names are too numerous to mention. During three decades, many individuals have contributed to the complex bureaucratic process of transferring titles. To Iowa's outdoor enthusiasts, it doesn't matter. What matters is there are fish in Iowa's farm ponds, lakes and rivers, trout in our streams and ducks in the sky.

Please join the sports men and women of Iowa in thanking Uncle Sam and his relatives in the state of Iowa who have made this progress possible.

David Marolf is a fisheries biologist and manages the department's Manchester Hatchery.

Lowell Washburn

■ At Union Slough, former state public hunting areas have remained just that under Federal jurisdiction to benefit thousands of outdoor enthusiasts annually who use the marsh.

Uses of Geologic Materials by Prehistoric Cultures

by E. Arthur Bettis III and William Green

Modern society relies heavily on geologic materials for survival. Many of these materials are processed so that their natural form is no longer evident and their geologic origin not apparent. Prehistoric Native Americans also depended on geologic materials for survival. However, their use of various minerals, deposits and landscape elements did not alter these materials to the extent that modern technology does. Ancient Iowans used geologic materials for everyday tools as well as in symbolic and ceremonial contexts. In many instances, these uses reflect a pervasive Indian view of unity with the environment.

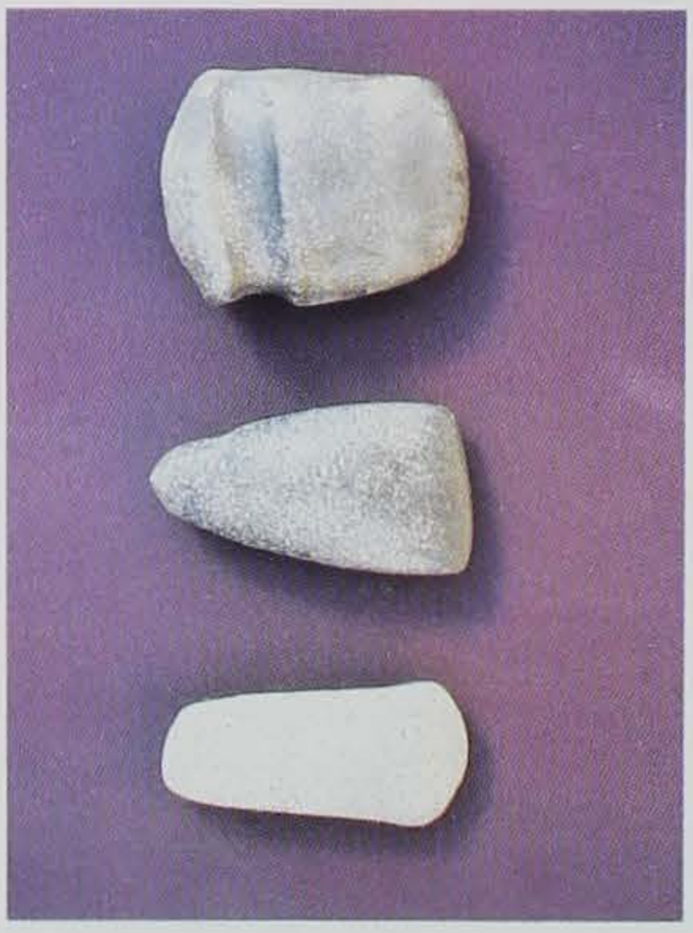
Native Americans have lived in Iowa for more than 11,000 years. Until about 2,500 years ago, small bands lived by hunting game and gathering wild plants. These people, referred to as Archaic cultures, relied on stone, bone, shell and wood for tools, and they made containers, rope and clothing from vegetation and animal hide. Some Archaic groups built hide or mat-covered huts with floors dug into the earth.

About 2,500 years ago, Native Americans (Woodland cultures) began cultivating native plants in the rich soil along Iowa's streams to supplement their hunting and gathering. They also began to make pottery from local clays, and soon afterward they established trade networks for exotic items such as marine shell, obsidian (volcanic glass), copper and mica. The following pages show some of these imports as well as local geologic materials used by Native Americans.

E. Arthur Bettis III is a geologist with the department. William Green is the State Archaeologist of Iowa. Both are located in Iowa City.

Paul VanDorpe

■ **(Above): Mineral and rock material traded into Iowa between 100 B.C. and A.D. 300 includes** mica **from the Appalachians,** hematite **from the upper Midwest,** catlinite **from southwest Minnesota,** copper **from the Lake Superior region, and** obsidian **from the Yellowstone National Park area.**



Paul VanDorpe

■ Stone tools **(right) were ground from igneous and metamorphic rocks collected from glacial deposits or stream gravels. Durable axes (top) and celts (bottom two) were attached to wooden or bone handles and used to break firewood, smash large bones and girdle trees.**

Paul VanDorpe

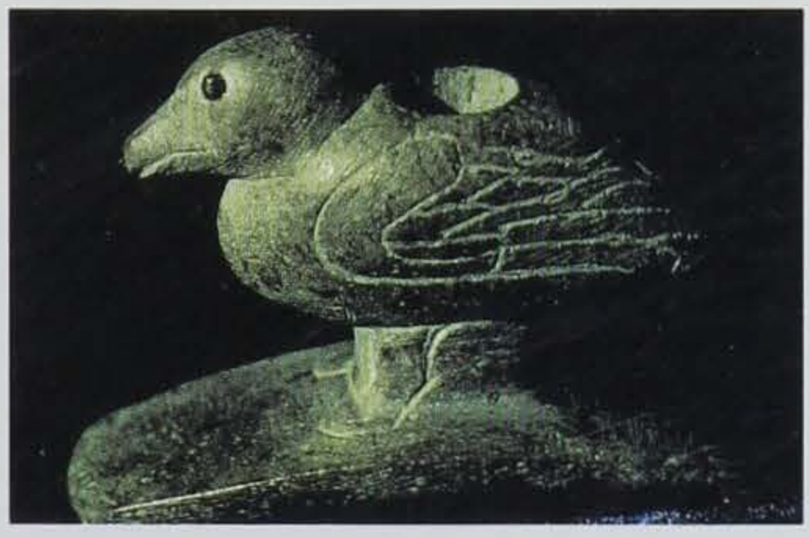
■ **(Above):** Projectile points **were made from chert (flint), a form of silica present in many Iowa rock units. Smaller points were used on arrows and larger points on spears, darts or knives.**

Dave Bell

■ Pottery clays were obtained from stream deposits or shale bedrock. Tempering materials such as sand, crushed rock, and burned clam shell strengthened the ceramic vessels. The surface of the large vessel (left) from northwest Iowa (ca. A.D. 400) has been roughened by twisted cords; the smaller vessel (below) from northeast Iowa (ca. A.D. 600) has crescent-shaped designs on the body and (close-up) twisted-cord or fabric impressions on the rim.

Paul VanDorpe

■ This rare copper celt (above) from a southeastern Iowa site was probably used for ceremonial purposes by a person of high status (Woodland culture).



■ Ceremonial and religious objects were made from a variety of materials. This platform pipe (above), dating to ca. A.D. 100, is a bird effigy from southeast Iowa made from a northern Illinois claystone.

■ (Left): This eastern Iowa platform pipe was carved from a crystal of calcite (ca. A.D. 100).

■ Images of humans, animals and other forms were carved on sandstone cliffs and cave walls and on resistant outcrops of reddish Sioux Quartzite. A notable figure found on rock faces across northern Iowa is that of a thunderbird or a human portraying a hawk or eagle. Petroglyphs such as these probably had ceremonial importance (A.D. 1100-1200).

■ Around A.D. 1400 to 1700, Indians in Iowa engraved elaborate depictions of bison (above), birds and other creatures on flattened and polished catlinite tablets. Catlinite (also called "pipestone") is a soft claystone unit within the Sioux Quartzite Formation.

■ (Right): Reconstructed earth lodge in Mills County. (Below): An excavated floor shows an extended entrance, interior storage pits, a central fire pit and the location of support poles and wall posts (A.D. 1000-1300).

Reprinted from Iowa Geology, *1993.*

Non-credited photos from the Office of the State Archaeologist, The University of Iowa.

For questions concerning artifacts or possible archaeological sites contact Office of the State Archaeologist, Iowa City.

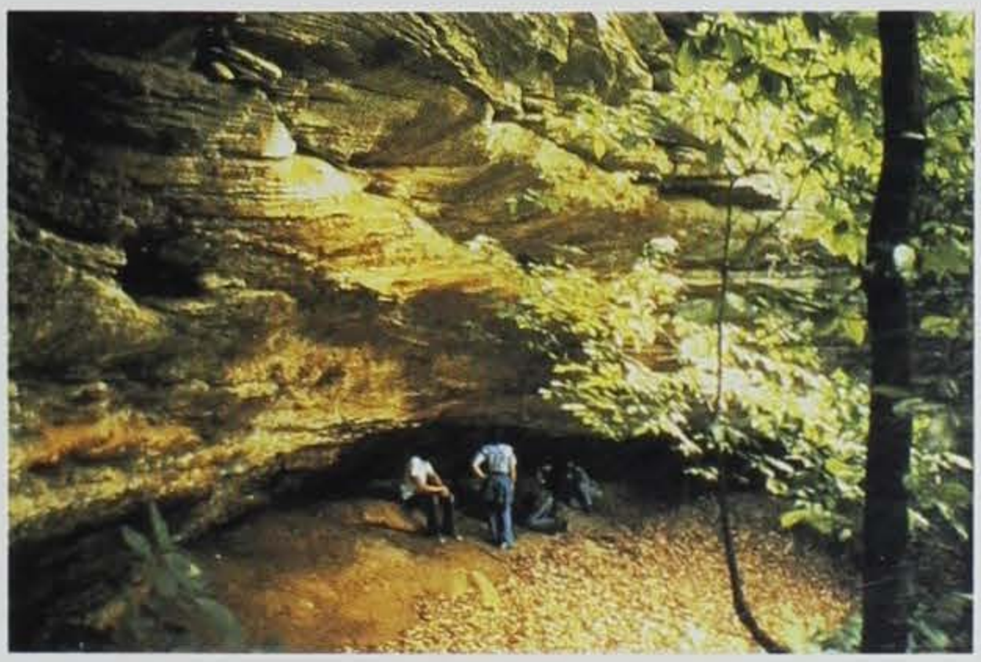
■ Utilizing easily tilled soils in river valleys and in the Loess Hills, Iowa's ancient farmers raised food crops, as shown by the tiny seeds of goosefoot (top) and a 2.5-inch corn cob (left). Both were recovered from 800-year-old storage pits.

■ (Above): People of the Mill Creek (A.D. 1000-1300) and Oneota (A.D. 1100-1700) cultures grew crops in mounded rows, as shown in these rarely preserved ridged field patterns in O'Brien County. Note sets of parallel ridges.

■ (Left): At the fish weir near Amana, stream cobbles were arranged across the Iowa River channel. Fish could be speared or netted as they passed through the narrow downstream opening of the "V."

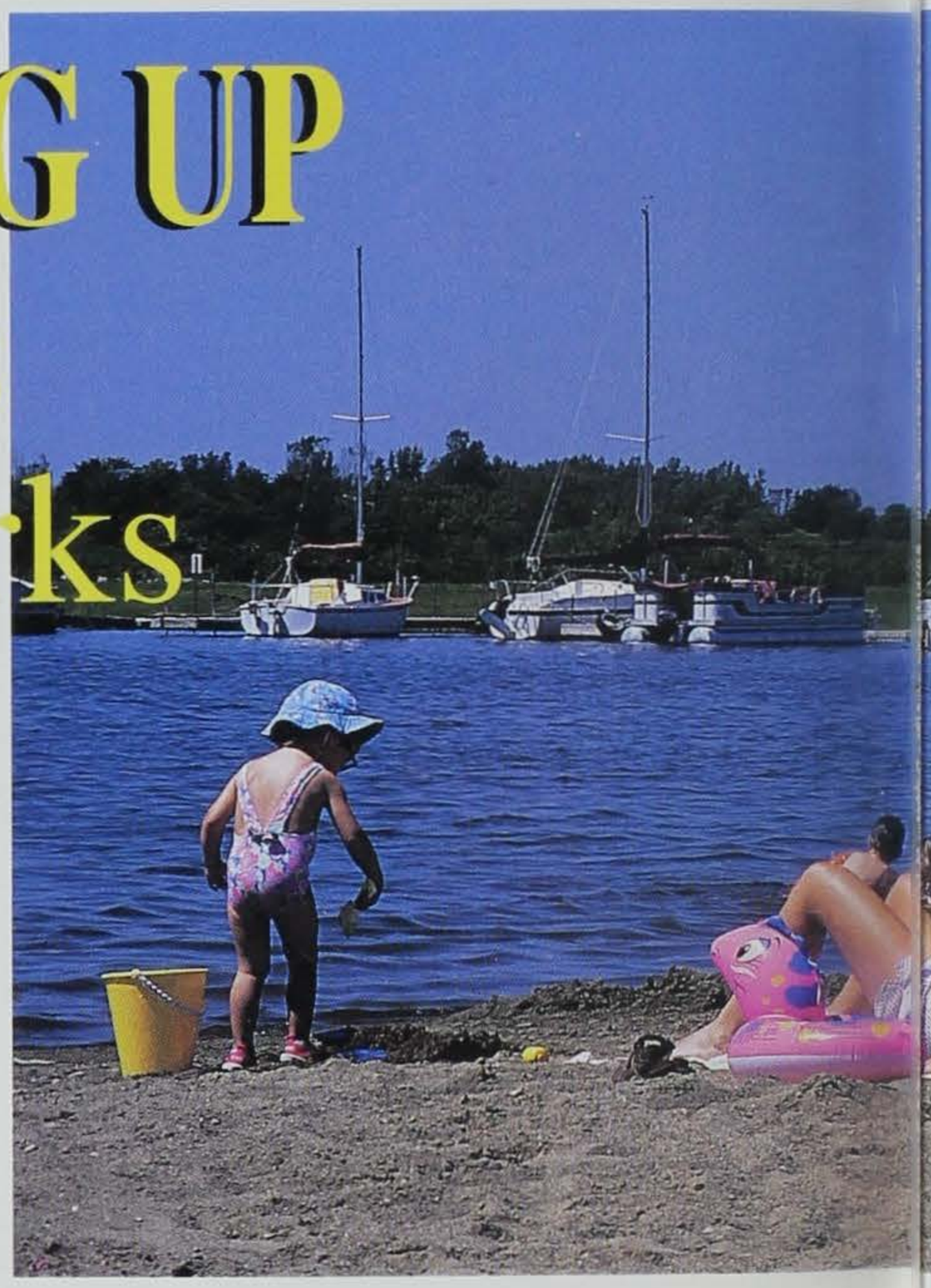
■ (Above): Woodland groups built burial mounds on high ridges or on terraces overlooking junctions of river valleys. Mounds may have also served to mark hunting territories, and as spiritual links with the Earth (Fish Farm Mounds State Preserve, Allamakee County).

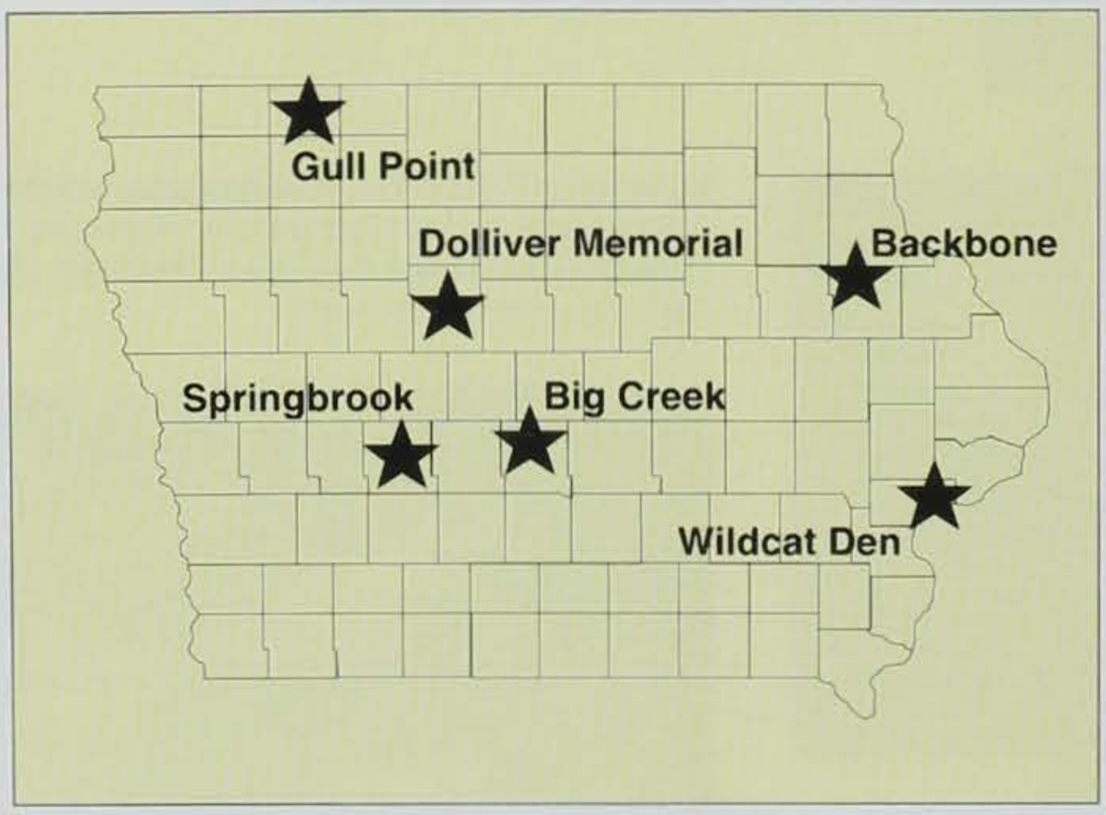
■ (Below): Protective, overhanging ledges along valley walls (rockshelters) were frequently inhabited by Native Americans (Wildcat Den State Park, Muscatine County).



WRAPPING UP Iowa's State Parks

Article by Brent Laning and
Bob Madison
Photos by Ken Formanek



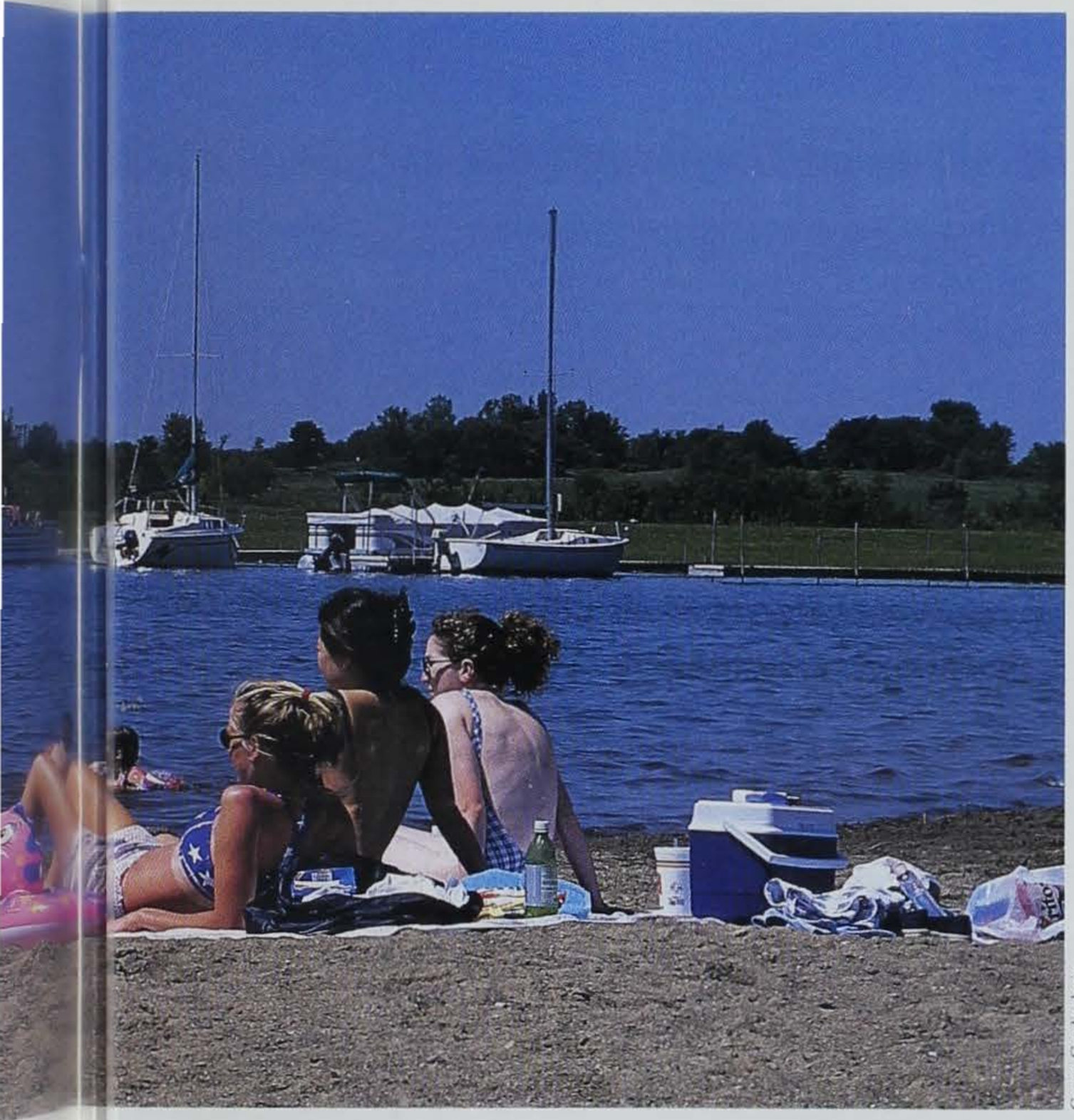


Six parks participating in the WRAP assessment.

Iowa's State Parks have been around for more 75 years. One reason for that longevity is the practical use of resources. Those resources include land, tools, budget — and waste. Many people do not realize that waste can be considered a resource. The Waste Reduction Assistance Program (see page 29) of the DNR's Waste Management Assistance Division undertook the task of assessing how Iowa's state parks are managing wastes. Goals were to observe waste management within the parks system, to determine practices that are working, and to make recommendations for improvement.

Why Waste?

Many people don't think much about waste. Once waste leaves the home or business it is no longer considered a problem. This could not



Casey Gradischnig

■ Big Creek was one of six parks selected for a waste management assessment.

be farther from the truth. Someone, somewhere, must handle our wastes. Whatever its form (gas, liquid or solid), the costs of waste both to the bank account and the environment are often very high.

Can reducing waste really make a difference? The Iowa Department of Natural Resources Waste Reduction Assistance Program (WRAP) says, "You bet!"

WRAP's experience with assisting large businesses and institutions shows there are several ways businesses can reduce waste. The bottom line is companies can improve their profit margin (make more money) while they improve our environment.

State parks are in the same boat. By reducing waste before it is generated and managing waste more effectively, savings are realized, and the quality of services available to the visiting public are increased.

Parks Assessment

WRAP found Iowa's state parks and recreation areas doing a good job handling wastes, but as with any system, there are a few areas that could be improved. WRAP recommended several changes based on the waste streams reviewed in the assessment.

WRAP's assessment of Iowa's state parks and recreation areas included looking at the amount of waste, the disposal methods and the costs associated with disposal. The process began in December 1995. WRAP contacted the DNR's park operations bureau offering their services. The no-cost aspect of the assessment process was appealing to the parks staff.

It was agreed that because of the number of state parks it would be impossible to assess each one, so a sample was chosen. Criteria for selection included: proximity to population centers, geographical location, size of the area, types of facilities available and average attendance. The six parks selected were: Big Creek, Backbone, Springbrook, Gull Point, Dolliver Memorial and Wildcat Den.

Waste Streams

The major waste streams found throughout the parks are trash and wood waste. Iowa's state parks also deal with relatively large amounts of automotive wastes such as used oil, used antifreeze, and tires.

Trash

State parks are unique in that much of the trash they must handle is not created by the park itself. Trash is generated and deposited mostly from picnic waste by the visiting public. In 1991, to implement a "Carry-in Carry-out" garbage policy, most garbage cans, dumpsters and other refuse containers were removed. Iowa's state parks ask all visitors take their trash with them when

■ **Iowa's state parks ask all visitors to take their trash with them through a carry-in carry-out policy.**

they return home. The policy intends to accomplish two goals: To reduce costs of garbage hauling contracts, and to increase public awareness of reducing the amount of trash brought to state parks.

Two areas within parks still provide refuse containers. One is camping areas. Campgrounds often have visitors residing in the park for up to two weeks. The second is swimming beaches, as sunbathers and swimmers often leave large amounts of litter. These areas continue to provide refuse containers for the visitors.

Illegal dumping of household garbage is also a problem in state parks. At more urban areas, nearby residents often dump their home garbage in the park. Not only is this practice illegal, but also costly. Fines for dumping in state parks can be $500 or more. The cleanup of the mess is another strain on already tight budgets, and takes away from other important activities.

Wood Waste

The majority of waste produced within parks is wood, primarily from tree branches or used lumber. Wood is obviously not a toxic substance when used properly, but often large amounts of wood waste are burned as a method of disposal. With the proper tools, wood can be beneficially used for other purposes. Chipping or grinding creates a usable material for erosion control, tree and plant mulching, foot trail cover, etc.

Activities that increase the amount of wood are repairing picnic tables, trimming trees and shrubs, cleaning up storm damaged trees, demolishing structures (used lumber) and replacing wooden parking posts.

At Big Creek and Gull Point there were large amounts of wood waste piled for disposal. Much of this wood waste is burned because the facility lacks a chipper or shredder. WRAP recommended those parks with large wood waste amounts be provided with a mechanical chipper to reduce the material to usable wood chips and to establish a program for their use.

Used Oil

One of the main duties of parks staff is to maintain the area for public use. To accomplish this, a variety of motorized tools are used. Routine service on this machinery results in a large amount of used motor oil. On

■ **Parks with large amounts of wood waste, such as Big Creek, invested in chippers and have put the valuable mulch to use (top).**

average, motor oil is changed in each piece of equipment twice each year. A park with five tractors and assorted small engine equipment creates several gallons of used motor oil with each change. Other used automotive fluids of concern include hydraulic oil, transmission oil, power steering fluid and power brake fluid. Each of these products should be kept separate and sent to processors that can recycle them.

WRAP was pleased to find that all of the parks reviewed have a system of taking used motor oil to a recycler. Used oil from crankcases, transmissions and hydraulics can be re-refined. There are more than 950 sites throughout Iowa that accept used oil (contact the Waste Management Assistance Division for a list). WRAP recommended that each park sending oil to a recycler confirm what happens to the oil. Many used oil recyclers legally sell used oil to be burned as a fuel. Even though burning used oil is legal, the better option is to have the oil re-refined. WRAP also recommended that state parks consider purchasing re-refined oil to help close the recycling loop, if warranty coverage would allow such use.

Oil filters are another by-product of oil changing that can and should be recycled. One used oil filter has the capacity to hold up to one quart of used oil. When landfilled, oil will leach from the filter into the ground, contaminating the water. The material that makes up oil filters is almost entirely recyclable. Oil filter recyclers across the state will

Along with trash and wood waste, the parks deal with a significant amount of automotive wastes.

take used oil filters. WRAP recommended that Iowa state parks make an attempt to recycle used oil filters.

Antifreeze

Antifreeze is another engine waste product that can be a disposal problem. Ethylene glycol, the major component of antifreeze, is highly toxic and should be handled as such. Pouring used antifreeze on the ground or down storm sewers is not an option. Iowa's state parks also do a good job handling used antifreeze. Most of the parks studied, successfully dispose of their used antifreeze in an environmentally safe manner -- by taking it to a dealer that recycles it. New antifreeze products have been developed that are more environmentally friendly and less toxic. WRAP recommended they be considered.

Other Waste Streams

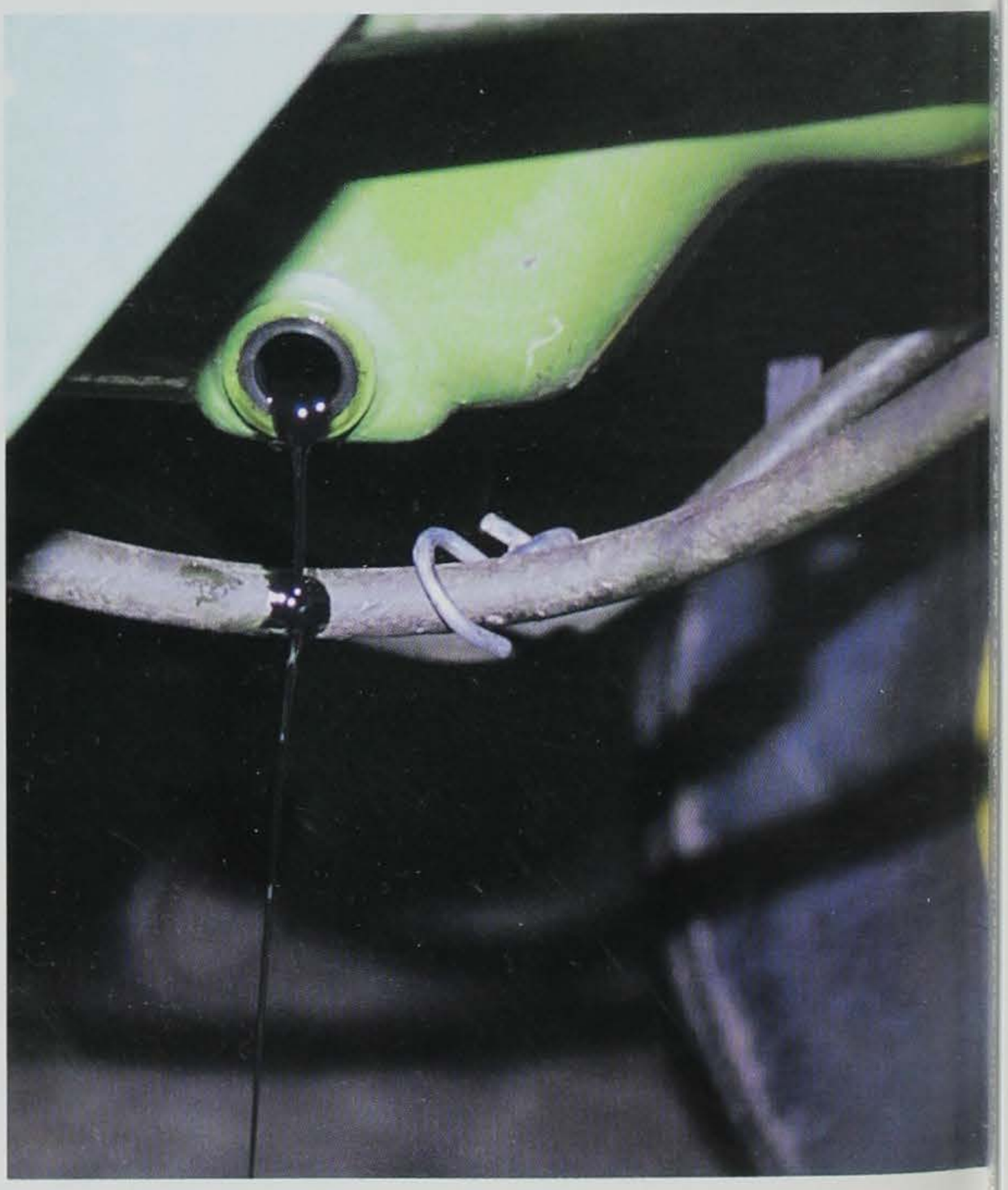
Metals

WRAP observed that some state parks have "bone yards" containing salvageable materials. Among the scrap materials are various types of metal. Metal salvage businesses will often pay to remove metals that are recyclable. WRAP recommended parks pursue contacting local salvage yards for information.

Tires

As mentioned earlier, illegal dumping is a problem in state parks. Used tires are a common item in illegally dumped loads. Annually, a large park will pick up

A park with five tractors and assorted small engine equipment creates several gallons of used motor oil with each change. WRAP was pleased to find that all of the parks reviewed have a system of taking used motor oil to a recycler.



50 or 60 used car tires that have been dumped in the area. Many people erroneously think tires are used in state parks for a variety of projects. It is true that the DNR once used tires for fish habitat construction, however, that practice was stopped more than 10 years ago. Experience has shown that trees, stumps and other wooden structure works best for fish habitat. Parks are trying to find uses for old tires. Playground surfacing and floor matting are a couple of considerations, but the tires must be processed to be used. To legally dispose of the used tires, the park must pay $2 per tire, and then pay a processor for a finished product. This hurts everyone. The added cost must then be passed along to the park visitors in reduced services and excessive personnel time spent on cleanup activities.

Waste Reduction Practices

Of the parks sampled, all use virtually no agricultural chemicals in the management of the areas. Noxious weeds are controlled with spot mowing and planting dominant ground cover species. Mowing is done on an as-needed basis, and mowed areas have been reduced, consequently, this reduces the amount of fuel burned, used oil and antifreeze generated, and allows park staff more time to manage other areas within the park. WRAP commended parks for their limited use of pesticides and other chemicals.

WRAP congratulates the public park users and Iowa's state parks staff for their efforts to preserve the environment with waste reduction practices, and looks forward to continued success with additional waste reduction activities. For more information on WRAP contact Beth Hicks, Program Manager at 515/281-8927. Call 515/281-TENT for state park information.

Brent Laning is an executive officer for the department's Waste Management Assistance Division. Bob Madison is the senior WRAP team member who did the parks' assessment.

Waste Reduction Assistance Program (WRAP)

The Iowa Waste Reduction Assistance Program (WRAP) aids industry and business in reducing the amount and toxicity of wastes they generate, thus protecting human health and the environment. The basic premise of the program is that pollution prevention can be achieved with both benefits to the environment and to the company's profitability.

A team of retired industry professionals and consultants conduct on-site assessments of operations to identify waste reduction opportunities. WRAP team staff are chosen for their knowledge of manufacturing. Currently the team consists of nine individuals with combined experience totaling more than 350 years. Areas of expertise include energy efficiency, chemical engineering, foundries, metallurgy, paint and coatings, plastics technology, failure analysis, fabrication and much more.

WRAP has served 160 Iowa clients, identifying more than $40 million in cost savings and one million tons of waste diversion through waste reduction/pollution prevention opportunities.

Assessments are no cost, confidential and non-regulatory.

By developing comprehensive, sustainable pollution prevention programs a company can experience the following benefits:

Economic (cost savings)

Environmental (cleaner land, water, and air) and

Regulatory (potential to stay within permit requirements).

Pollution prevention and Iowa's waste management hierarchy are based on the following priorities for achieving waste reduction, reduced toxicity of waste, and lower waste management costs:

Source Reduction -- Reducing or eliminating the generation of wastes, including releases to water, air and land, at the source.

On-Site Reduction -- Beneficially recycling or reusing materials by reintroduction directly into on-site processes.

Off-Site Recycling -- Beneficially recycling, reclaiming or reusing waste material at off-site locations to minimize the net wastes generated, and maximize recovery and reuse.

Treatment -- Minimizing the amount, toxicity and hazardous qualities of waste materials by on-site or off-site treatment.

A WRAP assessment intends to identify opportunities and alternatives for waste reduction, rather than to design or implement potential reduction techniques and processes identified. WRAP does not identify or report on regulatory considerations of current or proposed procedures and technologies. Regulatory compliance is solely the responsibility of the company and facility.

In addition to the on-site assessment, WRAP offers tailored facility workshops and follow-up technical assistance to its clients.

For more information please contact Beth Hicks, WRAP Program Manager 515/281-8927 or E-mail ehicks@max.state.ia.us.

Capturing the Sun's ENERGY

Article and photos by Patricia S. Cale

In a building that once housed a nuclear reactor, a new Iowa company is producing an innovative material that converts sunlight to electricity.

Iowa Thin Film Technologies, Inc. has developed from a dream in the minds of two physicists, to a university-based program, to a viable, growing company.

Iowa Thin Film, founded by Dr. Derrick Grimmer and Dr. Frank Jeffrey, is one of the success stories of Iowa's economic development efforts and Iowa State University's business incubator program. Startup funds, facility space and research support initially came from ISU and the State of Iowa. The company now has become successful on its own, outgrowing the need for assistance. The company also has outgrown its current headquarters in the former nuclear research reactor building at ISU, and plans to move to a newly constructed facility in Boone, Iowa.

"We owe a debt to the State of Iowa," said Grimmer. "As an Iowa high-tech company, we also provide benefits to the state, in the jobs we've created and in the high-tech training we provide."

Grimmer and Jeffrey have spent the last ten years developing and refining a solar photovoltaic module. Photovoltaics capture the sun's energy in the form of electricity. Unlike most photovoltaics that are made of crystalline silicon and are therefore hard, brittle and breakable, the amorphous silicon cells developed by Grimmer and Jeffrey are thin, flexible and lightweight.

The demand for such a material is growing around the world, and Iowa Thin Film is rapidly expanding to try to meet that demand. Orders are pouring in from the Netherlands, Japan,

■ **Demand for the thin film solar material is growing around the world. Brochures from the U.S., Japan and the Netherlands advertise its benefits.**

Australia, Wales, Denmark and other countries. In the Netherlands, for example, the photovoltaic modules, called "Lichtcel Materiaal," are being installed on rooftops to generate electricity. A Japanese company called "Space Age Japan, Inc.," because it specializes in NASA spin-offs, is marketing the material throughout Asia. "We just can't produce it fast enough," said Grimmer.

The process of producing the amorphous silicon thin film modules requires complicated, precision equipment and highly skilled staff, the definition of a high-tech industry. A 13-inch-wide roll of plastic film passes through a succession of machines.

■ A thin film array has been in operation at the Indian Creek Nature Center outside of Cedar Rapids since 1992. The panels, on the roof of the sugar house, provide about 200 watts of electricity, enough to run the low-wattage, energy efficient lights. Indian Creek Nature Center demonstrates the use of energy efficiency and renewable energy techniques throughout its facilities as part of its commitment to environmental education.

■ Iowa Thin Film engineer Sara Partee monitors the progress of zinc deposition. Plastic sheets pass through several machines specially designed to deposit microscopically thin layers of metal, silicon and zinc oxide.

First, a thin layer of aluminum is deposited on the plastic, followed by a layer of amorphous silicon. Next, a laser inscribes through these layers to provide an electrical pathway. Insulator ink is applied, followed by a coating of zinc oxide. Screen-printing of conductive ink provides electrical contact between the cells. Finally, another laser inscribes the zinc oxide layer and welds the conducting ink to the underlying aluminum, forming a pathway for electrical current throughout the cell.

The solar modules produced by Iowa Thin Film have a variety of uses, from supplying electricity in space to powering camping equipment. The company has already supplied photovoltaic material to companies sending up satellites, and later this year NASA will send the cells into space for testing. The modules are also useful for the consumer market, and Iowa Thin Film has designed units for lanterns, two-way radios, fence chargers, electronic wildlife trackers and other items.

"It has the potential for being very beneficial to the world as a whole. You kind of win all ways with this."

--Frank Jeffrey

One array of the thin film cells has been in operation at the Indian Creek Nature Center outside of Cedar Rapids since 1992. The panels provide about 200 watts of electricity to light the center's sugar house. The solar cells, along with the use of energy efficient lamps, have helped reduce the nature center's electrical consumption by 42 percent.

Similar types of solar arrays could be used in developing countries where electrification has not reached many rural areas. This is a special interest of

■ Conductive inks are printed onto the shiny material to provide the electrical connections.

...electrical

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WATER

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Iowa Water
A Decade of Progress

This supplement to the January/February 1997 issue of the *Iowa Conservationist* magazine is published in commemoration of Iowa's 1997 Year of Water Celebration.

DNR

WATER

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Iowa's Groundwater Protection Act is now 10 years old. The Act is still noted as one of the most important environmental laws ever passed by a state. This is one piece of legislation that deserves a birthday party, and its anniversary has inspired *Iowa's 1997 Year of Water* celebration.

by Larry Wilson, Director, DNR

Those who designed the Act used good sense and wisdom. Unlike most laws aimed at helping the environment, this one employed more demonstration and education than it did regulation. A major premise within the Act is that most people would do the right thing for the environment if they knew what the right thing was, and could be shown how to do it in an affordable and practical manner.

The Act is extraordinarily broad in its coverage. From landfills to sink holes, farm fields to gas stations, virtually anything that would have an impact on groundwater quality is addressed in the Act. In the articles that follow, the diversity of the legislation is apparent.

Of substantial credit to the Act are the many environmentally positive "institutions" that were conceived by it and have thrived since: the Leopold Center for Sustainable Agriculture at ISU, the Iowa Waste Reduction Center at UNI, the Center for Health Effects of Environmental Contamination at the U of I are good examples.

The Groundwater Protection Act stepped up the need for partnerships in Iowa to address not only groundwater, but environmental issues in general. History may show this, alone, to be the Act's most significant impact. Recognizing all the accomplishments that have been made in the last 10 years, *Iowa's 1997 Year of Water* is as much a celebration of cooperation as it is in achievement. Much has been accomplished but much more is necessary to provide sound, natural resource conservation for generations to come.

THE PARTICIPANTS

Agribusiness Association of Iowa◆Aldo Leopold Foundation, Inc.◆Cedar River Festival◆Cedar-Wapsie Group Sierra Club ◆Center for Health Effects of Environmental Contamination◆Clean Water Alliance for the Protection of the Iowa Great Lakes◆CLEAR Project◆David Dahlquist Associates Inc.◆ Dickinson County Soil and Water Conservation District◆Hawkeye Community College◆ Iowa Agricultural Youth Institute◆Iowa Association of Soil and Water Conservation District Commissioners◆Iowa AWWA Children's Water Festival◆Iowa Chapter, Soil and Water Conservation Society◆Iowa Department of Agriculture and Land Stewardship◆Iowa Department of Education◆Iowa Department of Natural Resources◆Iowa Department of Public Health◆Iowa Division, Izaak Walton League of America◆Iowa Environmental Council◆ Iowa Farm Bureau Federation◆Iowa Great Lakes Clean Water Project◆ Iowa Groundwater Association◆Iowa Lakeside Lab◆Iowa Natural Heritage Foundation◆Iowa Renewable Energy Association◆Iowa Rural Water Association◆Iowa Soybean Association ◆Iowa State Water Resources Research Institute◆Iowa Student Environmental Coalition◆Iowa Waste Reduction Center◆ Iowa Water Pollution Control Association◆ Iowa Water Quality Association◆Iowa Water Well Association◆Iowa Watersheds◆ISU Agricultural Education & Studies Department◆ ISU College of Agriculture & Information Office◆ISU Department of Journalism and Mass Communications◆ISU Extension Service◆ISU President's Office◆ISU Student Chapter, Soil & Water Conservation Society ◆ Kirkwood Community College Environmental Training Center◆Leopold Center for Sustainable Agriculture◆Midwest Sustainable Agriculture Working Group◆National Soil Tilth Laboratory◆Office of the Governor◆Practical Farmers of Iowa◆Project Wet◆ Raccoon River Watershed Project◆Southern Iowa Forage and Livestock Committee◆Trees Forever◆ U. S. Environmental Protection Agency, Water, Wetlands and Pesticides Division◆U. S. Geological Survey◆University of Iowa Hygienic Lab◆University of Okoboji◆USDA Natural Resources Conservation Service◆ USDA Rural Development

Iowa's Water Resources

Clean, usable water is one of our most precious resources. Life depends on water. People can only survive a matter of days without water. Running water and glaciers shaped much of the "Land Between Two Rivers" by cutting the river bluffs of the northeast, scattering lakes and bogs in the north-central region, and eroding the rills that lattice much of the state. The network of rills and valleys that characterize Iowa's countryside lead to one of the major rivers that border our state, the mighty Mississippi River or the great Missouri River.

From the earliest evidence of Native Americans, to the establishment of Iowa's towns and villages over the past 150 years, rivers and streams were a key factor influencing settlement patterns. Streams provided water, power and transportation necessary to society until the mid-1800s. The moldboard plow allowed Iowans to claim the rolling prairie. Water pumps tapped the seemingly endless supply of groundwater from aquifers beneath the vast, open prairie, freeing settlers to leave the river valleys.

Precipitation varies across state, with more in eastern Iowa than western Iowa. Iowans enjoy a relatively ample water supply compared to our western neighbors. Only two percent of the water used in Iowa goes to irrigation while our western neighbor, Nebraska, must invest nearly three quarters of its water usage for irrigation. On the other hand, less than one percent of Iowa is covered by water. Compared to a state such as Michigan where nearly half of its surface is covered by water, Iowa appears to be a dry state. Most of Iowa's water flows into and through the state instead of residing in lakes.

Streams provide about three quarters of the nearly three billion gallons of water used daily by Iowans. That use averages 960 gallons of water per Iowan. The remaining one quarter of the water supply comes from groundwater, still a very important resource for Iowa.

Public water supplies for residential, agricultural and commercial needs are about a fifth of the water use in Iowa. The largest use is thermoelectric power. Thermoelectric generation uses surface water but most of the water goes back to its river sources. In contrast, agriculture and public consumption rely more heavily on groundwater and return virtually nothing back to their sources. Water use has doubled over the past decade. Experts estimate that water use will increase another 25 percent by the turn of the century, even as the population of Iowa declines. Residential use has fueled these increases coupled with a small increase in commercial use. These demands have left planners concerned for the future of our public water supply.

Of course, no year is exactly "average." We have seen the driest years in Iowa's recorded history —1988-89 — coupled with crop failures and water shortages. We also have seen the wettest years on record, culminating in the "great floods of 1993."

Surface water supplies are readily effected by droughts, surpluses, and pollution releases, but groundwater responds slowly and can be a more reliable water source if carefully managed. When groundwater is removed too quickly it can take years for aquifers to be replenished. Natural systems are adaptable to the ebb and flow of water. Social and economic systems are not as resilient. Our economy requires long term stability in water supply. Temporary surpluses or extended droughts pose difficulties for the farmer, industrialist and other water users.

Eastern Iowa enjoys a readily available supply of groundwater where major bedrock aquifers are close to the land surface and wells can easily tap into them. These aquifers, called the Jordan and Silurian-Devonian, reveal themselves in northeastern Iowa as rock bluffs. They then plunge to great depths toward central and southwestern Iowa, where they are less accessible under other rock formations and glacial deposits.

The Dakota aquifer of western Iowa is deeply buried by glacial deposits, causing groundwater to be

less available. Stream flow is not as dependable in western Iowa, either, as the shallow groundwater ("water table") flow which seeps into the streams is less available from less precipitation.

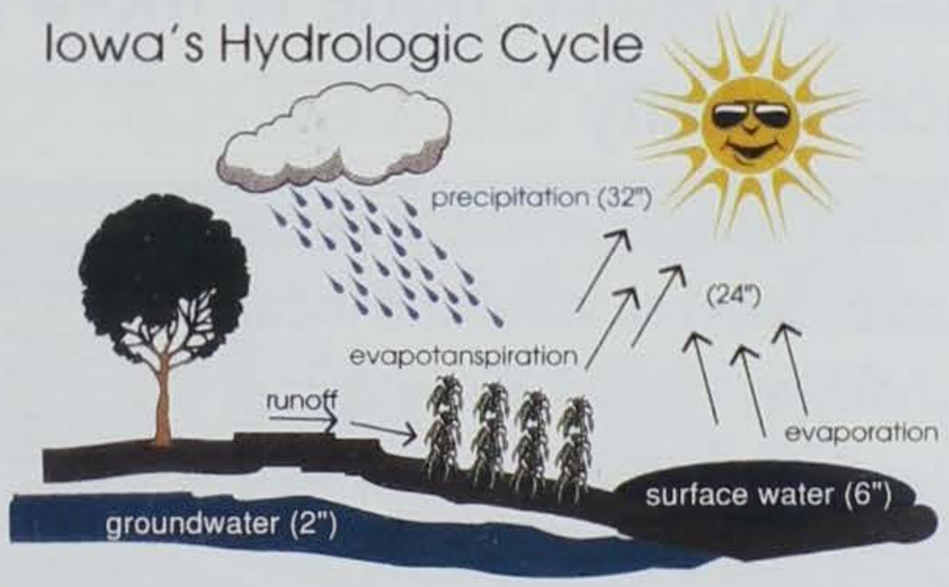
The quality of water affects its uses. Where ever major bedrock aquifers are deeply buried in Iowa, the water becomes mineralized. The type of bedrock also affects water quality. Such is the case in southern Iowa where many public water supplies must rely upon surface water stored in reservoirs. Sulfate and iron, although not necessarily harmful to drink, affect the taste and may limit the commercial uses of water. Some of Iowa's deep aquifers have high amounts of natural radioactive elements, such as radium, creating a public health concern.

The most widespread water quality concerns are those created by all of us. Wastes from our homes, our businesses, and agriculture can contaminate surface and groundwater supplies. In response, Congress enacted the Clean Water Act more than 25 years ago. Since then, industries have significantly reduced the amount of pollution they contribute to our waterways. Now, the major threat to water quality comes from what is called nonpoint-source pollution. Nonpoint-source pollution includes the more than 80 million households and farms across our nation that each contribute soil, fertilizer, pesticide, wastes and other chemicals to water. We all contribute to these problems, we all need to be part of the solution.

32" Annual Precipitation

24" or 75% is lost through evapotranspiration and evaporation

8" or 25% enters the streams and ground water



Of the average 32 inches of annual precipitation that falls on Iowa , 24 inches returns to the air as it evaporates or is given off by plants. The other eight inches flows out of Iowa through rivers or sinks into the ground to recharge aquifers.

While we often focus on chemical pollutants, microbes that cause disease can also be a major threat to public health. To control the majority of these microbes, we chlorinate our drinking water. But we have learned recently that chlorination by-products may cause long-term health problems. Yet we must still treat our drinking water because the pathogens that cause disease pose an immediate and certain health threat. Streams and shallow groundwater are the most susceptible to contamination.

Iowa has many challenges to face with both water quantity and quality. The State of Iowa enacted the Ground Water Protection Act 10 years ago to address these challenges. Programs set in place by the act helped to improve and protect Iowa's water supply. The act clearly states that all Iowans have a right to clean water but it also noted that all Iowans have a responsibility to protect our water resources. On this tenth anniversary, we should reflect on the fact that we all live in a watershed and are connected by a fragile ribbon of water. We all must contribute at home, at school, and at work to conserving, improving and protecting Iowa's precious water resources.

Sherry Middlemis, environmental educator; George Hallberg, University of Iowa Hygienic Laboratory; Rob Brown, United States Geological Survey

DRINKING IT

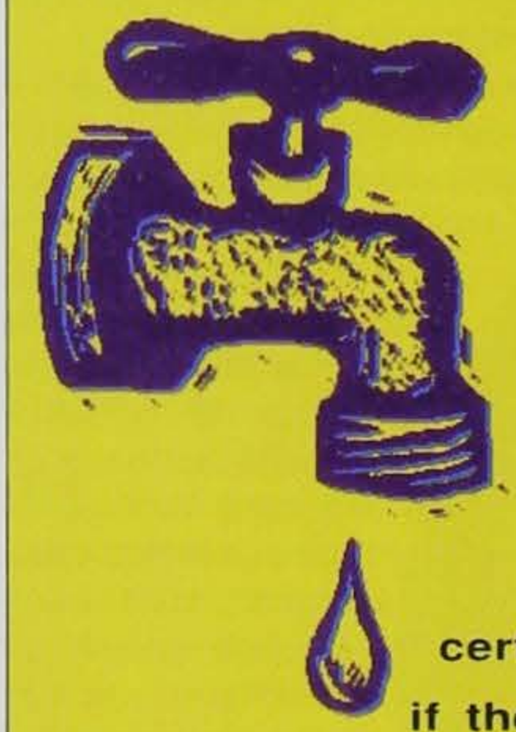
We play in and on it. We spray it on lawns and food crops. We cool electric generators with it and make a million other uses of our most precious resource — water. Of all the uses of water, none is more personal, more immediate, or more quality demanding than drinking it.

Much of how water is regulated by federal, state and local authorities has to do with the potential that someday we may have to drink it. That is particularly true with groundwater. Eighty percent of Iowans depend on groundwater for drinking. The lessons of the past are clear that if we contaminate our groundwater, it is costly, sometimes impossible to clean up.

On the 10-year anniversary of Iowa's Groundwater Protection Act, it is a good time to think about our drinking water — where it comes from, what is being done to protect it, what it costs, and more.

DNR HELPS

Since 1993, public water suppliers have been paying new fees to the DNR for staff and programs that are actually saving those suppliers more money in the long run.



New federal requirements for testing drinking water could have cost local water suppliers about $6.7 million a year. With DNR assistance, however, roughly $2.7 million of that has been saved -- here's how.

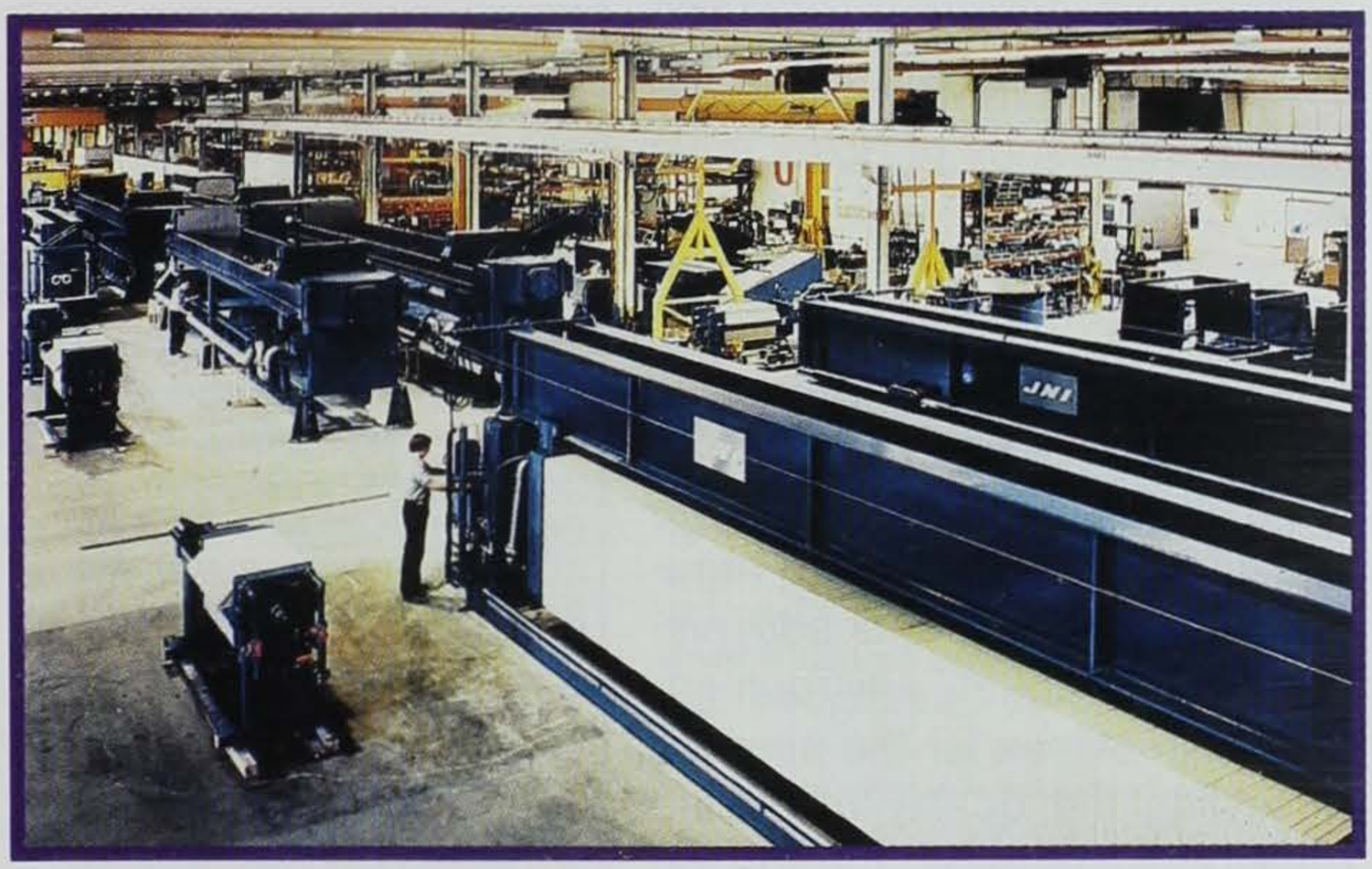
The new federal laws allow certain water tests to be waived if there has been no history of contamination by certain pollutants. With the assistance of the water suppliers, the DNR has been able to document a strong history on drinking water quality. As a result, many water quality tests were found to be unnecessary, and their costs have been avoided.

Des Moines Water Works

As the state's most populated city has evolved and grown over the years, so has its water supplier — the Des Moines Water Works. Back in 1919, the Des Moines system's capital investment was about $3.5 million; today it is about $115 million. The water works current annual budget is just shy of $20 million; income is around $25 million. Big numbers for a big job.

From its creation in 1919 until the 1950s, the Des Moines Water Works relied solely on a groundwater source called the infiltration gallery. A mixture of rainwater, groundwater and water filtered through the bottom of the Raccoon River contributed to the gallery. Natural filtration was the primary treatment, along with chlorination.

Since the early 1900s, the water works has improved the gallery's capacity by pumping river water into recharge basins located over the top of the infiltration gallery, and by directly accessing both the Raccoon and Des Moines rivers. And, as demand increased from an average daily pumpage of 10.45 million gallons per day in the 1920s, to today's 43.5 million gallons per day, the water works has improved water purifications systems as well. Most recently, a $4 million ion exchange, nitrate removal facility was built.



The rates charged to customers have changed also. For the few who had water meters in 1922, their rate was 30 cents for the first 1,000 gallons per day. Today it ranges from $2.15 to $8.93, per 1,000 gallons (for the first 5,000 gallons), depending on where you live. In 1922, most homes had rates such as $3 per month per bathroom; additional tubs were $2 each. A barber shop with one chair paid $3 per month.

The first public health drinking water standards in 1914 focused on coliform bacteria, taste and odor. Current standards, in comparison, are a complex mix of technical rules requiring vast amounts of personnel and equipment. Water works staff are alert for more than 100 possible contaminates, requiring about $355,000 each year in monitoring costs. With growing interest and concern for contamination from microbes and synthetic organic compounds (such as pesticides), monitoring and treatment will always be a principal customer service concern.

From 205 miles of pipeline and 117,000 customers in the 1920s, to today's water works at four times that size and serving a four-county area, times have changed, considerably. Now, more than ever, the influences of the Raccoon River watershed on the quality of water in Des Moines is a topic of intense interest. The Des Moines Water Works is partnering with agriculture and other stakeholders in the watershed to improve the quality of water before it reaches the treatment plant, knowing full well that landuse more than 50 miles away has a direct impact on the water we drink.

Leigh R. McGivern, Des Moines Water Works

DRINKING IT

IOWA'S PRIVATE WATER WELL PROGRAM

This spring's legislative session will mark the tenth anniversary of the Iowa Groundwater Protection Act. With that landmark 1987 act, Iowa committed to cease allowing degradation of the state's groundwater. One of the goals was to begin to get some control over the holes put into the ground that impact the groundwater. Groundwater is the source of water for consumption for more than 80 percent of the population of Iowa. Therefore, over the decades, thousands of holes have been dug, bored, drilled, driven or augered into the ground to gain access to groundwater.

For the last eight years two programs have operated in Iowa in an attempt to impact this large situation. The first is a non-regulatory program of grants administered by the county environmental health offices for the purpose of testing the quality of private drinking water wells and to plug those private wells which are abandoned or no longer in use. The second is a regulatory program which has certified all commercial water well contractors working in Iowa, required a permit for the construction of any new private well, and required a record of the construction details of each of these wells be sent to the DNR.

GRANTS-TO-COUNTIES

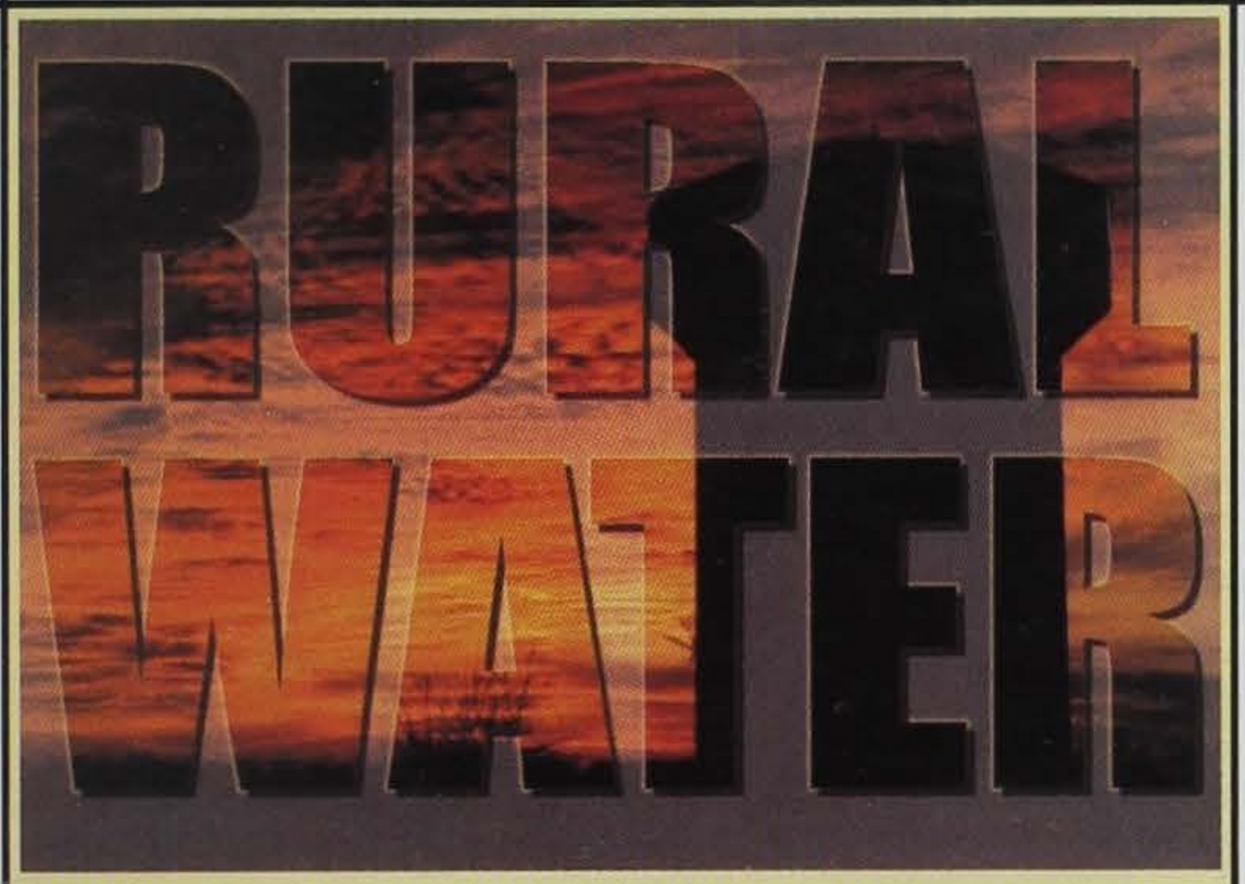
Under the grants-to-counties program, during fiscal year 1996, nearly 13,000 well water samples were tested for the presence of Coliform bacteria and the level of nitrates. These are considered health contaminates and should be of concern to the consumers of this water. About 40 percent of these water samples tested unsafe for one or both of these contaminates. Each well owner whose water was considered unsafe was contacted by the county environmental health specialist to offer information on possible remedies for the specific situation. Advice was offered, but any actions taken were purely voluntary, hopefully motivated by the information made available by this program. Last year, 97 counties participated in this program. Since 1989, when the program got started, some 60,000 water samples have been tested, resulting in the improved safety of the drinking water for a large number of the rural residents in Iowa.

Likewise, during fiscal year 1996, this grant program helped pay for the cost of plugging more than 4,000 private wells in Iowa. These were wells that were no longer in use and in many cases in an advanced state of disrepair. Such wells pose a serious physical threat if a child were to fall into one that was poorly covered. More commonly, however, these wells serve as a conduit for contaminated surface water to flow into an underground aquifer. Properly plugging these wells solves both potential problems. To this point, this has been operated as a voluntary program with excellent participation and interest. The Groundwater Act put a deadline for closure on previously abandoned wells. For large diameter shallow wells this deadline was reached on July 1, 1995.

Although these large diameter wells are now required to be filled, the program is continuing rapidly on a voluntary basis. Since 1989,more than 22,000 private drinking water wells have been plugged using Grants-to-Counties funds. An additional 5,000 wells, such as monitoring wells and municipal wells, have also been properly plugged at the owners expense. It is estimated that, so far, this program has been responsible for the plugging of about 25 percent of the abandoned wells in Iowa. There are very likely more out there, sometimes hidden or out of sight by weeds or remoteness. If you become aware of one, contact your local county environmental health officer.

Starting this year, this grant program will also be available for use to share in the cost of renovating an existing well. Just as many abandoned wells are in such a state of disrepair that they contribute to the contamination of groundwater, actually so are many wells which are presently in use. By encouraging people to repair or upgrade their old well, we hope to continue to minimize the opportunities for groundwater contamination and continue to improve this irreplaceable resource.

For information on participating in this grant program, contact your county environmental health specialist or DNR Water Supply Section.



Much as electricity changed life on the farm in the 30s, the assurance of an abundant, continuous and healthful water supply is changing the future in many areas of rural Iowa, today. Rural water systems, and the safe water they provide, are partners in this change — bringing about growth and economic revitalization.

From the very first rural water system in northwest Iowa about 25 years ago, Iowa's rural water industry has grown to 27, not-for-profit water systems. Each year, these systems deliver treated water to more than 157,000 people living on farms, in rural settings or in one of the 225 small communities served by rural water systems. Livestock, alone, consumed 1.2 billion gallons of treated rural water in 1995.

Rural water's thousands of miles of underground piping are lifelines that bring affordable water to people and small communities that lack other sources, or the financial capability to produce their own.

In Westphalia — population 144 — costs to replace the old water lines were out of reach. But, an agreement with Regional Water, a neighboring rural water district, provided a viable option. Today, Regional Water furnishes treated water in new service lines and keeps the city's system in sound operating condition. The cost per Westphalia customer is $31 per month for 5,000 gallons — about 20 percent less than it would have been for the city to re-do and operate its own system.

In Irwin — population 394 — the water supply failed after the floods of 1993. The West Central Rural Water Association agreed to supply treated water at the affordable price of $2 per 1,000 gallons and a federal grant covered costs to connect the two systems. In addition to a reliable water supply, Irwin residents benefit from improved taste compared to the city's old wells.

By bringing together the resources of different groups, Iowa's rural water systems are catalysts for economic development activities in rural areas. A high quality water supply is not only essential for domestic water use, but an economic necessity for business, as well.

Mary Ann deVries, Iowa Rural water Association

NEW WATER WELL CONSTRUCTION

At the same time that we are trying to eliminate old well hazards, it is equally important that we properly construct new wells so as not to add to the problems. With strong endorsement from the professional well drillers, Iowa passed a water well contractor certification program. Everyone who commercially works on a well in Iowa must have gained some related work experience, passed a competency test on Iowa well regulations, and maintain competency in the field by obtaining continuing education. These certified well contractors construct and plug wells. A well owner in Iowa is still allowed to perform these well services on his own well without being certified.

In addition to this contractor certification, before any private well is constructed, a permit must be obtained. Seventy of Iowa's 99 counties contract with the Department of Natural Resources to issue these permits. In the other 29 counties, the permit is issued by the DNR. Where the counties issue the permit, there is some supervision and inspection of well location and construction to oversee and reinforce the well contractors. Where the DNR issues the permit, we at least get an indication of what is happening to the groundwater in each area of the state.

After a well is constructed, a well log must be submitted to the Iowa Geological Survey Bureau in Iowa City. This ensures that there is a permanent record of the location and construction details of every well. This data base can be very important if there are ever any groundwater problems or water quality concerns in an area. Anyone studying potential water contamination and its effects will be able to access information on possible points of impact.

This regulatory program applies to new well construction. Information can be obtained from your local certified well contractor, your county environmental health officer, or the DNR, Water Supply Section. Information on data filed under this program can be obtained at the Geological Survey Bureau in Iowa City. Information on the voluntary grants-to-counties program can be obtained from the same sources.

Brent Parker, enviromental engineer, DNR

DRINKING IT

Privatization... an option

Above: State-of-the-science superpulsator clarifiers used in the water purification process.
Below: Iowa-American's raw water pump station houses raw water in-takes, traveling screens, raw water pumps and natural gas standby generator.

There are about 60,000 water systems in the U.S. supplying water for 238 million people. Ninety percent of them are small, serving about 3,000 people each. One-half of the U.S. population receives public water from only 280 systems. Of all the water supply systems, just over half are private, investor-owned utilities. In Iowa, Iowa-American Water Co. serves Bettendorf, Clinton, Davenport, Panorama Park and Riverdale, 160,000 people in all and is the only water utility that is regulated by the Iowa Utilities Board.

In the coming few years, water systems can expect to spend billions of dollars to comply with government regulations, expanded markets, rehabilitation and just plain maintenance.

Such major costs and the increasing complexity required of water services encourage many local officials to look to private water service as one of the possible answers.

For this discussion, privatization is the sale or transfer of government-owned water and/or wastewater treatment assets to an investor-owned, state-regulated utility company. Investor-owned water utilities have been around a long time. For example, Iowa-American's operations were founded about 120 years ago.

Privatization can provide greater and easier access to money, which enables the utility to address the water system's construction needs, especially when some communities are hard-pressed to come up with needed funds. Investor-owned corporations can issue bonds and sell stock to finance a major project easier than a city, which may have to consider its credit limit or unpopular decisions to raise taxes or water rates. Privatization may provide new cash to a city and a new source of tax revenue. Privatization often improves compliance with water quality needs and frees the municipality to apply its staff and budget resources in other operations of city government. Finally, economies of scale can lower costs of supplying water, depending on a large set of other conditions.

With these advantages, customer rates from investor-owned utilities are still competitively comparable to public water suppliers.

Financial concerns about new construction and maintenance, and concern over big rate increases can make privatization an attractive option for more and more communities.

K. Brock Earnhardt, vice president and manager of Iowa American Water Company

WATERSHEDS The Big Spring Basin

In the beautiful rolling countryside of northwest Clayton County, northwest of Elkader, is the 103-square-mile area, the Big Spring Basin. You won't find it on a road map, yet most people in the territory can direct you to it. The Big Spring Basin is a watershed, but a unique one; it is a "groundwater-shed."

The geology of the area is such that the water, underground, has been mapped and shown to move from one end of the watershed to the other....much like water does on the surface. "Tracers" have been added at points within the groundwater-shed, that clearly demonstrate pollution at one point can contaminate the aquifer in other areas, "down-stream."

The Big Spring Basin Demonstration Project has played an important role in understanding water quality issues in Iowa and for the nation. It has been labeled by some as the "granddaddy" of watershed projects.

During the 1970's, well drillers, farmers, particularly dairy operators, and home owners in northeast Iowa were reporting problems with increasing nitrate concentrations in their well waters. Concerned local soil and water conservation leaders joined forces with teams from the Iowa DNR Geological Survey Bureau, the Iowa Department of Agriculture and Land Stewardship, federal agencies from the USDA, EPA and USGS, and Iowa State University to establish the Big Spring Basin studies to try to unravel these problems.

Landuse in the basin is almost exclusively agriculture. That and the comprehensive water records of DNR's Big Spring Trout Hatchery made a unique opportunity to study groundwater that could not be done elsewhere.

The studies quickly revealed and confirmed nitrate and some pesticides from farming operations were getting into the groundwater. In the basin area, some of this occurred because sinkholes allowed surface water a direct connection to groundwater, but most of this occurred because of the movement of water and contaminants through the soil. Most of the findings were pertinent to all of Iowa, and were verified by studies in other parts of the state.

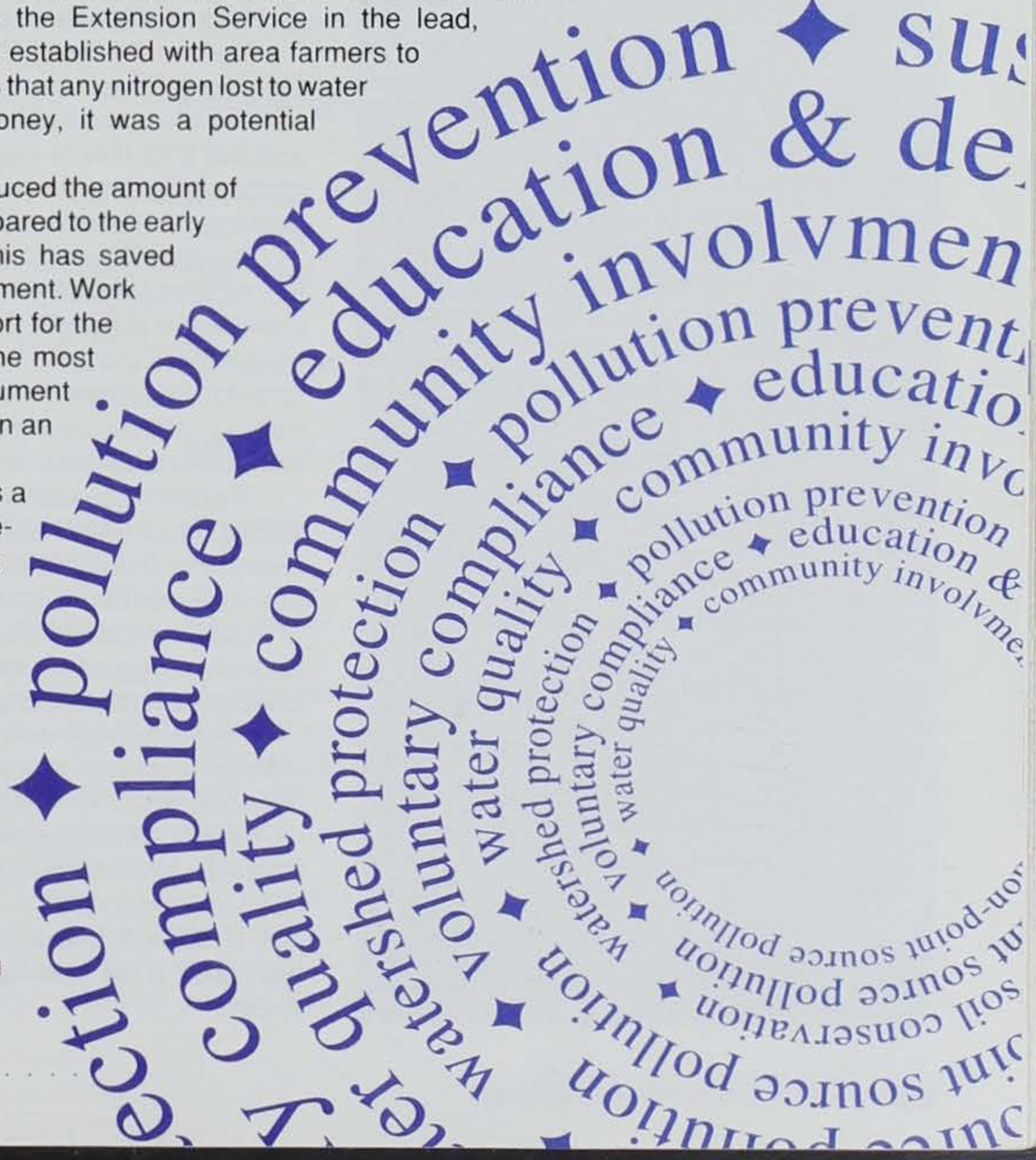
The findings helped energize the development of Iowa's Groundwater Protection Act and a team-approach to finding solutions. With the Extension Service in the lead, education and demonstration programs were established with area farmers to improve nitrogen management. The focus was that any nitrogen lost to water supplies was not only wasting farmers' money, it was a potential pollutant.

Since then, farmers in the basin have reduced the amount of nitrogen fertilizer by more than 3 percent compared to the early 1980's; yet crop yields haven't suffered. This has saved farmers' money, and improved Iowa's environment. Work in the area continues today and needs support for the future. The record of Big Spring is one of the most important illustrations the nation has to document that we can resolve environmental problems in an economically viable manner.

The Big Spring Basin programs served as a model, not only for understanding the link between land management and water quality, but also as a model for how agencies and citizens working together, in voluntary programs, could improve their water quality and their economic well-being as well.

We all live in a watershed; we all contribute to water quality problems; and we all must contribute to solving them, whether from farming, underground storage tanks, household waste, abandoned wells or whatever we find tomorrow.

George Hallberg, associate director, University of Iowa Hygienic Laboratory



Underground Storage Tanks

About 10 years ago, the DNR discovered about half of the older underground storage tanks in Iowa were leaking into the groundwater. Most of these tanks were old petroleum storage tanks at gas stations, school bus barns, just about anywhere. In response, two programs were initated: one to prevent leaks and one to deal with contamination.

To prevent petroleum contamination of groundwater, tank systems must now detect leaks quickly, prevent steel tanks from corroding, and prevent spills and overfills. Tank owners and operators must also have insurance or other financial resources to deal with leaks.

Most of the 5,000 Iowa sites with petroleum contamination have been assessed. Of those, 30 percent were classified high risk requiring some form of cleanup 30 percent were high risk and required monitoring; 30 percent were low risk and 10 percent had no action required. Most high-risk sites should take some action to clean the contamination or reduce the risk. Low-risk sites must monitor contamination.

Last year, the DNR worked closely with affected organizations to develop rules that take a new approach called risk-based corrective action. This approach allows cleanup levels based on site-specific conditions. For example, if there are no drinking wells within 1,000 feet, drinking water standards would not apply.

Iowa is moving toward having less petroleum contamination and finding leaks through leak detection rather than waiting for accidents to happen, such as contaminated drinking water or an explosion from gasoline vapors.

Agricultural Drainage Wells

Farm land in north-central Iowa is some of the most productive in the world. Much of this part of the state is flat, and as a result, there are few problems from water erosion. But flat lands and the type of soils in this region do cause farmers some problems. They tend to hold surface water in low lying areas. Without systems to drain excess water, farming can be next to impossible.

Realizing this, farmers in the early 1900s developed two main types of systems to drain their land. The most widespread was a network of underground, 4-inch diameter, cylindrical tiles. Surface water and water in the upper few feet of soil drained into these tile lines which then emptied into constructed drainage ditches or natural creeks.

Another system, agricultural drainage wells (ADWs), was also effective. ADWs were built almost as a shallow well would be — a hole, 5-to 10 inches in diameter, straight into the ground, 50 to 300 feet deep, leading to geological formations that could take in the surface water that collected in the low areas.

Most ADWs in Iowa are in the north-central area, which is generally flat and lacks natural surface drainage. We have identified approximately 340 ADWs in Iowa draining an estimated 25,000 cropland acres. The Groundwater Protection Act of 1989 required ADWs to be registered with the Iowa Department of Agriculture and Land Stewardship. Because of the threat they pose in polluting groundwater, ADWs have been illegal to install since 1957.

ADWs are direct pathways from the surface to underground aquifers. As a result, they can deliver fertilizer and pesticides directly to the groundwater. Land drained by ADWs in Iowa is typically used for corn and soybeans, with fertilizers and pesticides applied to achieve top production.

The Iowa Groundwater Protection Act established a research and demonstration project for the Iowa Department of Agriculture and Land Stewardship to identify farm practices which address groundwater contamination from ADWs. Project studies, underway since 1989, in cooperation with Iowa State University, have been aided by advisory committees composed of ADW landowners, county government, drainage organizations, researchers, conservation groups and other agencies.

The studies have and are still providing recommendations to farmers on managing their fertilizers and pesticides to minimize groundwater contamination threats. Studies also looked at plugging 225 ADWs and using other ways to drain the land, even at converting the undrained land to wetland habitats. Mandatory closing of ADWs, statewide, would result in very high costs to their owners, and it is not anticipated. However, voluntary closing of ADWs is a recommended practice where practical alternatives are available.

The DNR has regulatory authority over diversions of surface water to underground aquifers, through use of ADWs as well as other types of injection wells. Future rule-making by the DNR is anticipated concerning the permitting and use of ADWs. Until that time, there have been a number of program efforts underway concerning ADWs.

Landowners with ADWs in Humboldt, Pocahontas and Wright counties have been assisted in using good management practices for fertilizers and pesticides. Cost-share assistance was provided to assist the voluntary closing of 22 ADWs in Floyd County.

The research and demonstration approach — versus the hard-core regulatory approach — continues to be an equitable manner in dealing with groundwater contamination through ADWs. Studies are continuing to serve all Iowans by evaluating new technologies and practices which can minimize the environmental impacts of agricultural production, while maintaining and often improving the economic efficiencies of our food production system.

Dean W. Lemke, P.E., Iowa Department of Agriculture and Land Stewardship, project coordinator of the Iowa Agriculture Draining Well Research and Demonstration Project.

KEEPING TOXINS OUT

Consumption of groundwater in the U.S. nearly tripled between 1950 and 1980. In Iowa, about 80 percent of our drinking water is from groundwater. Here is another big number: 40 percent of Iowa's wells show contamination by pesticides. This is proof-positive that chemicals can leach (or migrate) through the soil and contaminate our groundwater. Another set of numbers: Iowans generate 17 million pounds of household hazardous waste a year. That's about 15 pounds of household hazardous waste per household. The improper disposal of this waste is one contributing factor to the contamination of Iowa's groundwater and the drinking water that comes from it.

During the 1970s, Iowa landfills came under increasing regulation to reduce their leakage to nearby groundwater. But recognizing that this was not enough, more recent laws began restrictions on what is allowed to be dumped in landfills. And, now, there are more laws that are aimed at consumer education, and they may be the most effective of all.

The Iowa Waste Reduction and Recycling Act of 1989 has set goals for reducing the amount of waste going to landfills. As a result, Iowans have already reduced landfill waste by 29 percent. We will have to strive even harder to meet the 50 percent reduction goal by the year 2000.

Through the Groundwater Protection Act of 1987, the Household Hazardous Materials Program focuses on reduction in use and proper disposal of household hazardous waste — defined as: unused or leftover portions of household hazardous materials. Household hazardous materials (HHMs) are characterized by items that are:

Caustic -- if it destroys human tissues or corrodes metal. Examples of caustic household hazardous materials include: toilet bowl, drain and oven cleaners.

Flammable -- if it can be easily ignited by a flame. Liquid oil-based paint, gasoline, motor oil and aerosols are examples of flammable household hazardous materials.

Radioactive -- if it gives off radioactive particles. Some smoke detectors contain a mild radioactive element.

Toxic -- if it is poisonous. Antifreeze and pesticides are representative of toxic household hazardous materials.

The HHM Program includes informational materials for retailers and consumers on household hazardous materials and waste, Toxic Cleanup Days, and Regional Collection Centers that will receive HHMs and hazardous wastes from households and small businesses.

Retailers in Iowa that sell HHMs are required to obtain a permit and participate in the Retailer's Consumer Education Program. Approximately 12,600 retailers recently renewed or obtained permits to sell HHMs. Revenues to support all HHM program activities are derived from the $25 permit fee and a portion of the landfill fees we all pay for our garbage (called tonnage fees). An ongoing activity has been contacting retailers and working through corporate offices to improve compliance at each retail outlet.

The Regional Collection Center (RCC) grant program establishes centers to provide education for the public on HHMs, and to provide a facility for proper disposal of hazardous materials from households and small businesses. The materials collected at RCCs are temporarily stored until they can be recycled or properly disposed of by a licensed, hazardous waste contractor. The program provides grants to local governments to cover construction, education and some assistance with final disposal. Four centers are currently open in Bondurant, Clear Lake, Clinton and Davenport. Others will open soon in Muscatine, Dubuque, Waterloo, Cedar Rapids and Council Bluffs.

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Toxic Cleanup Days are one-day collection events, coordinated by the DNR to provide urban and rural residents an opportunity to bring household hazardous wastes from their homes for proper disposal by a hazardous waste contractor. Since Toxic Cleanup Days began in 1986, their successes of have resulted in 110 events, serving 84 Iowa counties.

The organization, education, publicity and staffing of a Toxic Cleanup Day is provided by volunteers, with technical assistance by the DNR. By involving local citizens, a heightened awareness of HHM issues occurs. The events are a great opportunity to educate Iowans on proper management of HHMs and how to shop for safer alternatives to those products. To date, more than two million pieces of educational materials have been distributed at Toxic Cleanup Day events.

Public education about household hazardous materials is also very important. A key component of this education is "source reduction." Through source reduction we are taught to use up what we have, purchase only what we need, give products to others if we cannot fully use them, or purchase a safer alternative. Source reduction means a decrease in household hazardous waste managed through Toxic Cleanup Days.

So far, about 1.4 million pounds of hazardous waste have been properly disposed of through Toxic Cleanup Days; those wastes may have otherwise ended up in landfills, possibly contaminating our groundwater. Voluntarily, Iowans are "cleaning up their act" to reduce groundwater contamination through proper waste management.

Roy DeWitt, environmental specialist, Waste Management Division of the DNR.

WATER QUALITY PROJECTS

"Natural resources are sacred to me — water, air, land. They are all interconnected. Someone took care of them for us. Now it's our turn." Three Mile Lake area resident John Tapken reflects the concerns of many.

Tapken is aware that Iowa's more than 280 lakes and 10,000 miles of streams serve as a resource for drinking and industrial water, swimmers and boaters, fish and wildlife, and just plain beautiful scenery. The water that flows into those surface water areas from the surrounding watersheds supplies Iowans with a natural resource like no other. Many Iowans, like Tapken, have made a strong commitment to keeping these resources clean and plentiful for the future.

Tapkin is more aware than most that water pollution, in particular, *non-point source* (NPS) pollution, is Iowa's number one environmental problem. NPS pollution occurs when rainfall or snow runoff carries soil and other contaminants from large land areas, such as farm fields, into surface or groundwaters. Compared to *point-source pollution* — where pollution comes from a single point, like a factory pipe or water treatment plan — non-point pollution has a much larger source and impact.

In Iowa, efforts to control NPS pollution and soil erosion focus more on agricultural areas because of their large influence on Iowa's water quality. The benefits to NPS control are both environmental and economic.

To improve the management of NPS pollution, more than 50 water quality projects are in operation. The intent of these projects is to restore, protect, and improve specific water bodies and watersheds. Most of the projects give money to farmers to try new, and some old, techniques to keep soil, livestock wastes and farm chemicals out of the water. Once in place, these techniques, called "best management practices," or BMPs, are then demonstrated to neighbors, near and far, as examples of what any farmer can do to reduce NPS pollution.

BMPs are alternative farming practices. They include such things as terraces, strip cropping, wetland and prairie restoration, livestock waste management systems, rotational grazing, and more. New and better applications are under constant development. BMPs provide environmental benefits but they also make economic sense. And by cost-sharing or offering financial assistance to a few farmers to demonstrate BMPs, others can better see their value and understand better how they operate.

These water quality projects are funded through federal, state and local grants as well as private donations. On a federal level, agencies such as the Environmental Protection Agency and the Department of Agriculture provide millions of dollars to water quality projects around the country, every year. State agencies, including the DNR and Department of Agriculture and Land Stewardship also provide funds. Even groups like Trees Forever, Lions Club and Ducks Unlimited help pay for these projects. Following are some examples of how Iowa water quality projects are making a difference.

Karen Meinders, information specialist, IDNR

WATERSHEDS

Pro-action for Pro-tection

THREE MILE WATER QUALITY PROJECT

It was 1989, the second year of a severe drought over several southern Iowa counties. Water was constantly brought in with the help of the Iowa National Guard. Farmers were selling livestock as ponds dried up at an alarming rate. No relief was in sight. "We were totally out of water. It was almost chaos," said Earl Hanthorn of the Southern Iowa Rural Water Association.

Compare that with a scene from there today.

Residents of Adair and Union counties developed a plan to construct and protect a new source of water. A few years and $45 million later, Three Mile Lake, near Afton, was born. The 880-acre lake is now a source of municipal, industrial and rural water for 30,000 people in seven southern Iowa counties.

Recognizing the need for a clean as well as a full lake, residents and local officials also initiated a comprehensive watershed improvement project, the Three Mile Water Quality Project, to clean up and protect the 23,000-acre watershed that drains into Three Mile Lake.

"When we were planning this project, I told the County Conservation Board that we should look at the 'mistakes' of other watershed improvement projects," said John Tapken, director of the Union County Conservation Board about the pro-active approach to build the lake. "We looked at what had gone wrong with other lakes. It seemed the mistake made most often was focusing only on the lake and ignoring the watershed."

The objective of the project was to protect the lake and save future water treatment costs by encouraging agricultural conservation practices in the watershed prior to filling the lake.

Today, with the help of local, state and federal funding, there are 32 conservation structures on the lake's watershed protecting it from sediment runoff and NPS pollution from nearby agricultural areas. The highly erodible areas surrounding the lake are protected with terraces, rotational grazing systems, and several other BMPs.

"We set priorities on projects as we went along," said Dennis Schrodt of the Natural Resource Conservation Service (NRCS). "Those closest and with the most impact were completed before the lake was filled."

By shielding the lake before it was filled, the Three Mile Water Quality Project is an innovative example of how Iowans are working to protect and conserve their natural resources. Pro-action instead of reaction illustrates the commitment to water quality Iowans have acquired throughout the last 10 years.

Making Something Out of a Little

SOUTHERN IOWA GRAZING PROJECT

"When a farmer starts something new, everyone watches for a few years. At first they may think, 'What is he doing? That looks crazy!' Then when they start to see positive results, they change their minds," said Rebecca Harris about the changes in farming practices encouraged by the Southern Iowa Grazing Water Quality Project.

Because of the varied topography and soil conditions, much of the land in southern Iowa is not as good for crop production as it is in other parts of Iowa. However, it is ideal for livestock grazing. While usually not as severe as erosion from corn and beans, overgrazed pasture land can also threaten water quality.

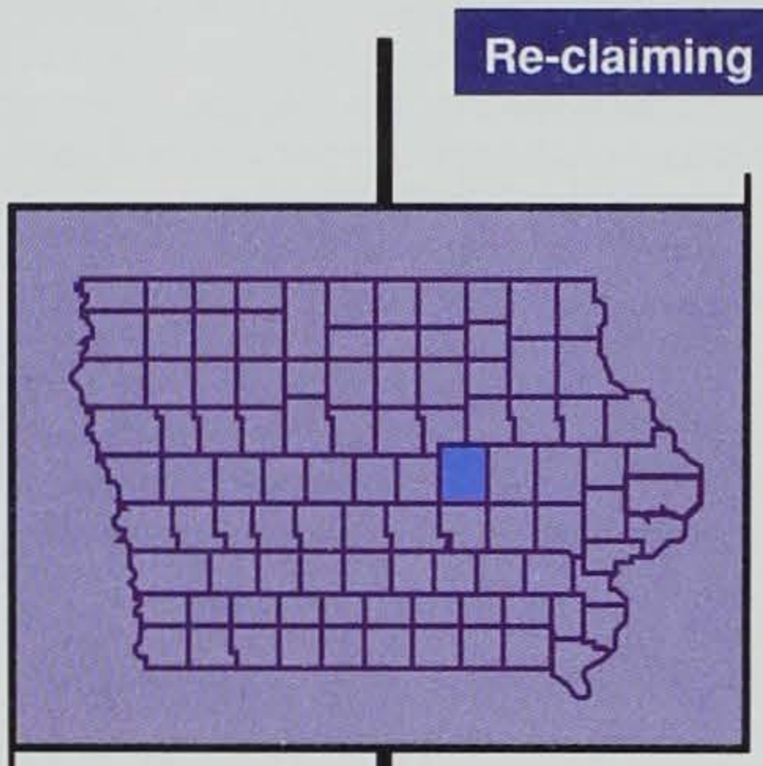
"There was a lot of concern about the contributions of southern Iowa farms to non-point source pollution because of the many pasture streams that empty into our water reservoirs," said Harris.

The Southern Iowa Grazing Project encourages pasture management practices for grass production, keeping livestock out of the streams, and planting trees, shrub and grass on streambanks and areas close to streams. These practices decrease sediment running off fields into waterways and reduce streambank destruction. This creates a win-win situation by minimizing the impact of livestock on the stream and improving conditions of the pasture.

Corwin Fee of Marion County has altered his production to incorporate these practices on his farm. Rather than allowing his cattle to wander through the stream, Fee built 12 paddocks to rotate the animals through the pasture. The rotation of livestock through the paddocks reduces the destruction of pasture vegetation which improves grazing and holds the soil in place. "This stuff is good for me and for the environment," said Fee. "I have been able to gain better access to some of my land and made some areas productive that before were not. My neighbor told me that he thought that we had made something out of nothing in those areas."

WATERSHEDS

Re-claiming a Lost Lake



UNION GROVE

WATERSHED PROJECT

In 1935, the 118-acre area behind a dam in Tama County filled up with water and was named Union Grove Lake. For more than 45 years, the lake was a favorite recreation spot for thousands of visitors. That all began to change in the early 1980s.

Visitor numbers dropped more than 20 percent between 1980 and 1989 because the lake's water was getting so bad. Union Grove's size and depth had decreased and an excessive growth of algae overtook the water. In addition, a 1983 study documented that excessive erosion and field runoff were causing sediment and nutrient pollution in the lake. It soon became clear to the residents of the watershed there was a problem.

Almost immediately, the Union Grove Watershed Project came to life.

Restoring the quality of the lake was the first issue to be addressed. The study showed the lake was in such bad shape that dredging was necessary. Dredging involves draining the water and mechanically removing excess sediment from the lake's basin. This is a last resort measure for declining lakes.

"Just dredging the lake was not sufficient. It was a band-aid approach," said Dan Brainey who worked with property owners during the project. "We had to clean up the watershed, otherwise the problems would have come right back. You can't just dredge a lake and call it clean."

With the help of state and federal funding, all 48 farmers residing in the 6,895-acre watershed in Marshall and Tama counties made major changes in their farming practices. Fine-tuning crop production programs and putting in conservation practices reduced soil erosion by an estimated 31,325 tons per year. These same practices resulted in an average savings of $15.79 per acre to the farmer.

"This was one of the first projects where the restoration of the lake and protection of the watershed went hand in hand," said Brainey. "You can easily see the results of that, today."

In 1990, the project expanded when it was selected as one of the first 37 Hydrologic Unit Areas (HUA). As a HUA, the project received substantial funding through the U.S. Department of Agriculture's Water Quality Initiative.

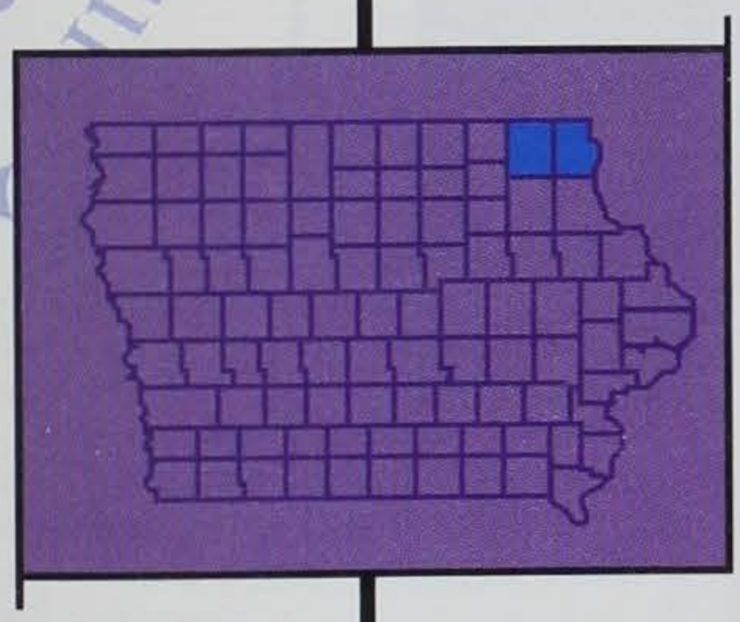
Three years later, all of the farmers in the watershed had implemented their conservation plan as required by the 1985 Farm Bill — two years before the federal deadline.

Through the project, 100,000 feet of terraces, 160 acres of grassed waterways, 30 water and sediment control basins and 80,000 feet of field borders were installed in the Union Grove watershed. Erosion potential has decreased from 50 tons per acre per year on some farms to 5 tons or less on all of the watershed's farm fields. Recreational use of the lake increased nearly 25 percent and is now back to its previous level.

"There were a lot of changes in the watershed as a result of this project," said Project Coordinator Craig Tordsen. "Many of the causes of the lake's problems were reduced or eliminated because of these changes."

Bad Trout Gone Good Stream

COON CREEK WATER QUALITY PROJECT



A stream is a reflection of its watershed. Significant progress in controlling soil erosion in the watersheds of many of Iowa's cold-water streams in scenic northeast Iowa reflects the hard work of many Iowans to protect these precious trout habitats from non-point source pollution (NPS).

"Livestock waste, low spring flows and sediment gave Coon Creek the image of a trout stream that needed a lot of work," said Bob Joachim, Natural Resource Conservation Service coordinator of the Coon Creek Water Quality Project. "Farmers in the watershed wouldn't even allow their livestock to drink out of the stream because of the pollution."

The Coon Creek Water Quality Project in Allamakee and Winneshiek counties aimed to restore and protect this natural, cold-water stream that is stocked twice weekly in spring and fall with rainbow and brown trout by the DNR.

The three-year project encouraged farmers to voluntarily carry out practices to reduce soil erosion, control animal waste entering the stream, and demonstrate the technical and economic feasibility of these practices. Over a ten-year period, the changes in agricultural practices decreased the sediment moving into Coon Creek by 9,445 tons or 38 percent per year.

"We've also seen some positive results in other habitat studies," said Joachim. "It will take awhile to flush everything out. I know we'll see future improvements in water quality because of this project."

How Soil Erosion and Non-point Source Pollution Can Destroy Trout Habitat

● Trout, in fragile cold water streams, face two environmental threats from their watershed — soil and livestock wastes that are washed into the stream.

● Of these, the eroded soil is the most common. Soil becomes sediment when it is carried into the stream by watershed runoff. It cripples trout habitat by:

● Covering gravel beds and rocky areas used by aquatic organisms that are an important source of food for trout

● Filling deep holes used by trout as cool, resting and escape areas

● Causing physical damage to trout gills

● Reducing the vision of trout, making it difficult to feed

● Sediment not only eliminates trout habitat, but alters the overall characteristics of the stream. As streams become wider and shallower, they warm, making conditions hard for trout survival.

● Livestock wastes can reach streams from inadequate storage, improper land application of wastes, feedlots too close to the stream, and from grazing livestock. Livestock access to the stream, or just the stream bank, has the dual damage of eroding banks and direct deposit of animal waste. Livestock waste increases the harmful ammonia in the stream and decreases oxygen for aquatic life.

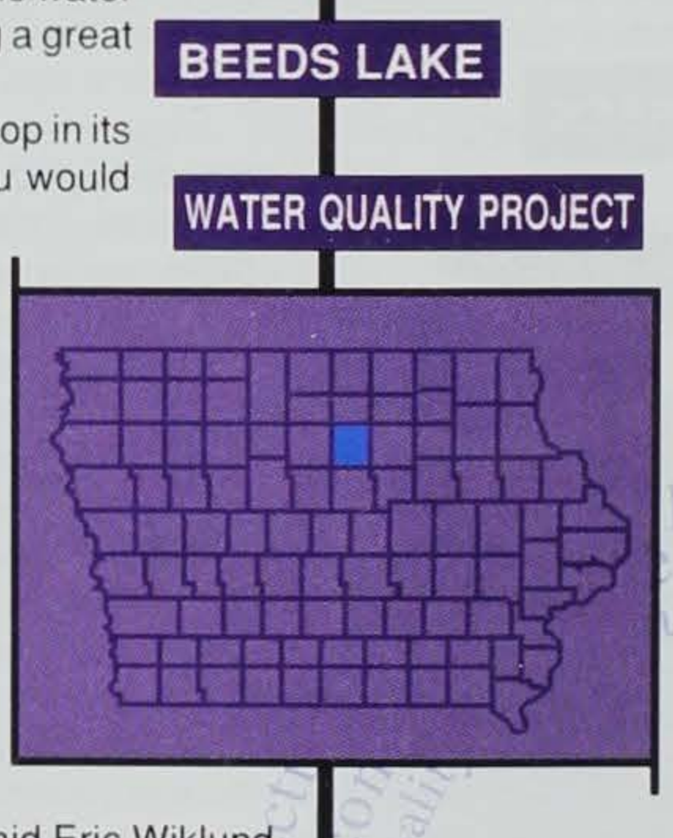
It Takes a Community to Raise a Lake

More than 32 acres of lake has been lost at Beeds Lake near Hampton. In the last 60 years, the equivalent to an area the size of 40 football fields was lost from the lake.

To make matters worse, as the size of the lake decreased, the algae content increased. The beach had to be closed periodically because of overgrown weeds. The once beautiful, blue, 130-acre lake had turned into a 98-acre green swamp.

"Beeds Lake is a central tourist draw to Franklin County," said Brad Hicks, editor of the *Hampton Chronicle and Times*. "As the water quality declined, we were concerned that we were losing a great treasure."

Local users of the lake were also frustrated by the drop in its recreational use. "The lake was getting so bad that you would throw out your fishing line and pull it back with a hook full of weeds," said Hampton fisherman and veterinarian Dr. C.W. Sprugel.



Sprugel's concern for the health of the lake prompted him to contact other community members and organize an association to improve the lake. Friends of Beeds Lake (FOBL) held its inaugural meeting in October 1992. One of the first items on the group's agenda was to re-apply for federal money to initiate the Beeds Lake Water Quality Project. The original application had been rejected due to a lack of community support and involvement.

"If it were not for Friends of Beeds Lake, this water quality project would not have gotten off the ground," said Eric Wiklund, coordinator of the Beeds Lake Water Quality Project.

Through publicity in the newspaper, news of FOBL and the new water quality project spread quickly through the Hampton community and Spring Creek watershed. "We're not shaking a fist or pointing a finger at anyone," said Sprugel. "We simply want to improve the lake."

There are no "members" of FOBL. All who show up at meetings are considered a part of the small, but active group, according to Sprugel. Special events like an all-day 4th of July celebration and banquet dinners have raised funds which go directly into lake improvements. New shelter houses, tree plantings, grills, an information gazebo and general clean-up of the lake have all been a result of the work of FOBL.

Wiklund and others involved in the Beeds Lake Water Quality Project work with farmers in the 18,966-acre watershed to find ways to decrease soil erosion and runoff from their land.

"We've had phenomenal success with landowners in the watershed. They have been very willing to adopt the changes they can to decrease their farm's impact on the lake," said Wiklund. "Through several demonstration sites, we hope people will look at the practices and realize that these farmers are conserving their natural resources, extending the life of their farm and still making money."

New Waves to Protect Their Old Ones

On a cold January night in northwest Iowa in 1991, more than 100 residents assembled to discuss the future of one of the area's most valuable natural resources and their town's namesake, Storm Lake.

"That night, the Storm Lake Preservation Association (LPA) was born," said Steve Roth, president of the LPA. "For so many people to come out on a night like that showed strong community support." Today, the LPA has a membership of up to 400 town and watershed landowners, amounting to five percent of the population of Storm Lake.

The community support comes from all segments of Storm Lake's population, even its most diverse members including Hispanic and Laotian residents. Renee Braun, coordinator of the Storm Lake Watershed Project has developed some unique information and education materials to communicate the goals of the project and importance of a clean water supply to these non-traditional audiences.

Headlines like "Envuelvete en la proteccion de tu lago," which means "Get in tune to your lake" were used in one brochure for the recently established Spanish-speaking community in Storm Lake. The brochure outlined the activities readers can do to "be a part of the solution to storm water pollution."

"We distributed the brochures to local Spanish businesses," said Braun. "Then with the help of Puerto Rican-native Damarys Mortenson of the Ingham-High Lake Complex Water Quality Project, we visited with the owners to explain the project and left extra brochures to hand out to their customers."

Other materials are currently being translated for distribution among Laotian residents. Addressing non-English speaking, diverse audiences is a non-traditional approach to educating urban residents. These materials make the Storm Lake Watershed Project unique to Iowa.

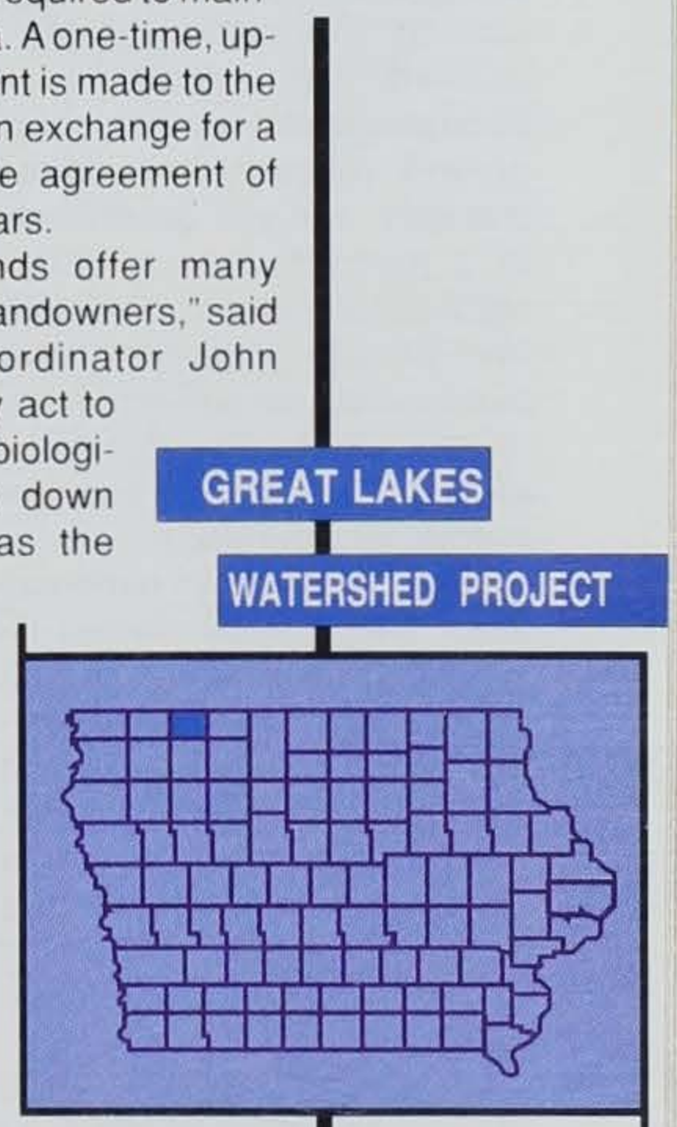
Other aspects of this project include: agricultural demonstration sites for farmers to view and gain information about conservation practices, a float in the town's 4th of July parade and visits by the Teenage Mutant Ninga Turtles (who live in storm drains) to area school children.

Meanwhile, the activities of the LPA continue to grow with fund-raising projects, political campaign involvement and support of other projects and initiatives to improve the lake and surrounding watershed. Working closely with the Storm Lake Watershed Project, the LPA recently raised $15,000 to analyze the lake's problems and possible solutions.

"It's an absolutely delightful thing to look at," said Larry Braby about the created wetland on his farm in Dickinson County in northwest Iowa. "It has really added to the beauty of the land." Braby's enthusiasm about his participation in the Iowa Great Lakes Watershed Project for wetland restoration and enhancement, is obvious.

At one time, Iowa's wetlands totaled about 1.5 million acres and were the dominant feature of the landscape. As the need for cropland increased, many wetlands were artificially drained and farmed. Today, 98 percent of Iowa's wetlands are gone; about 35,000 acres remain. There once were about 5,400 acres of wetlands located within the watershed of the Iowa Great Lakes. Of those, 3,800 acres have been drained.

Once wetlands are restored through plugging existing tile, diking surface outlets, excavation or other methods, landowners are required to maintain the area. A one-time, up-front payment is made to the landowner in exchange for a maintenance agreement of 10 to 20 years.



"Wetlands offer many benefits to landowners," said project coordinator John Wills. "They act to filter out or biologically break down pollutants as the water moves through the wetland. They aid in flood control, and waterfowl and other wildlife also depend on wetland habitat.

"Another benefit is the aesthetics of the wetland. It adds a unique beauty to the land. Tourism may also increase as a result of these unique areas."

WATERSHEDS

PASTURE MANAGEMENT

Jim and Nanette Carroll of Bagley look at their 26-acre pasture differently, now. The landscape changed last summer when the Carroll's set up a management-intensive grazing system for 40 head of their cattle.

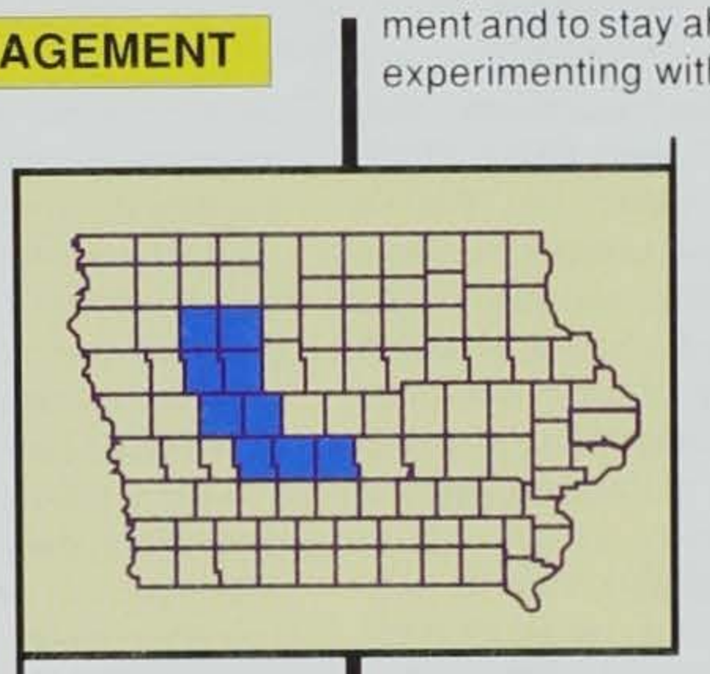
Management-intensive grazing involves controlling the damages caused by grazing through careful scrutiny of plant growth patterns, weather changes, and soil conditions in a pasture, then altering herding patterns as needed. Roots from pasture plant growth hold the soil in place to reduce soil erosion and silt in the nearby creek. The Carroll's site demonstrated the system's economic and environmental advantages.

"We have seven paddocks in this pasture," said Carroll. "When the conditions were right, we rotated the herd from one paddock to another."

Carroll created this demonstration site through the Raccoon River Watershed Project. The project promotes voluntary adoption of land management practices to protect and improve the water quality of the Raccoon River watershed in west-central Iowa.

"In the late 1980s, the Des Moines Water Works was continually finding high levels of nitrates in the water. A lot of the blame was going to the ag community," said Roger Wolf, executive director of the Raccoon River Watershed Project. "In response to these concerns, several commodity groups formed the Iowa Nutrient Task Force. This was the first time they really scrutinized what they were doing."

"The task force decided that the private sector should be proactive and voluntarily adopt conservation practices to improve water quality. The project is a coordinated effort among eight organizations to encourage farmers to adopt these practices," said Wolf.



RACCOON RIVER WATERSHED PROJECT

FARMERS WORK PRO-ACTIVELY TO PROTECT THE RACCOON RIVER WATERSHED

Lisa Henry, communication director, Raccoon River Watershed Project

Bill and Joe Horan of rural Knierim believe in taking advantage of every available technology to protect their watershed, the environment and to stay ahead of the competition. They believe in voluntarily experimenting with new practices to show farmers are environmentally conscious.

This duo brother team is experimenting with several new practices in an effort to protect the Raccoon River watershed while maintaining, if not increasing yields. The Horans are working with Roundup Ready Soybeans, *Bacillus thuringiensis* (Bt) corn and no-till drilled soybeans. Another innovative technique they are experimenting with is Narrow-Row High Population (NRHP) corn. The Horans planted a plot of NRHP corn in 7-inch rows at a rate of 47,000 plants per acre. Bill Horan said they are monitoring this technology by looking at yields, how quickly canopy development controls weeds and the effect NRHP has on soil erosion. USDA research suggests that decreasing row spacings and doubling the number of plants may allow for reduced herbicide use, while reducing erosion and maintaining yields.

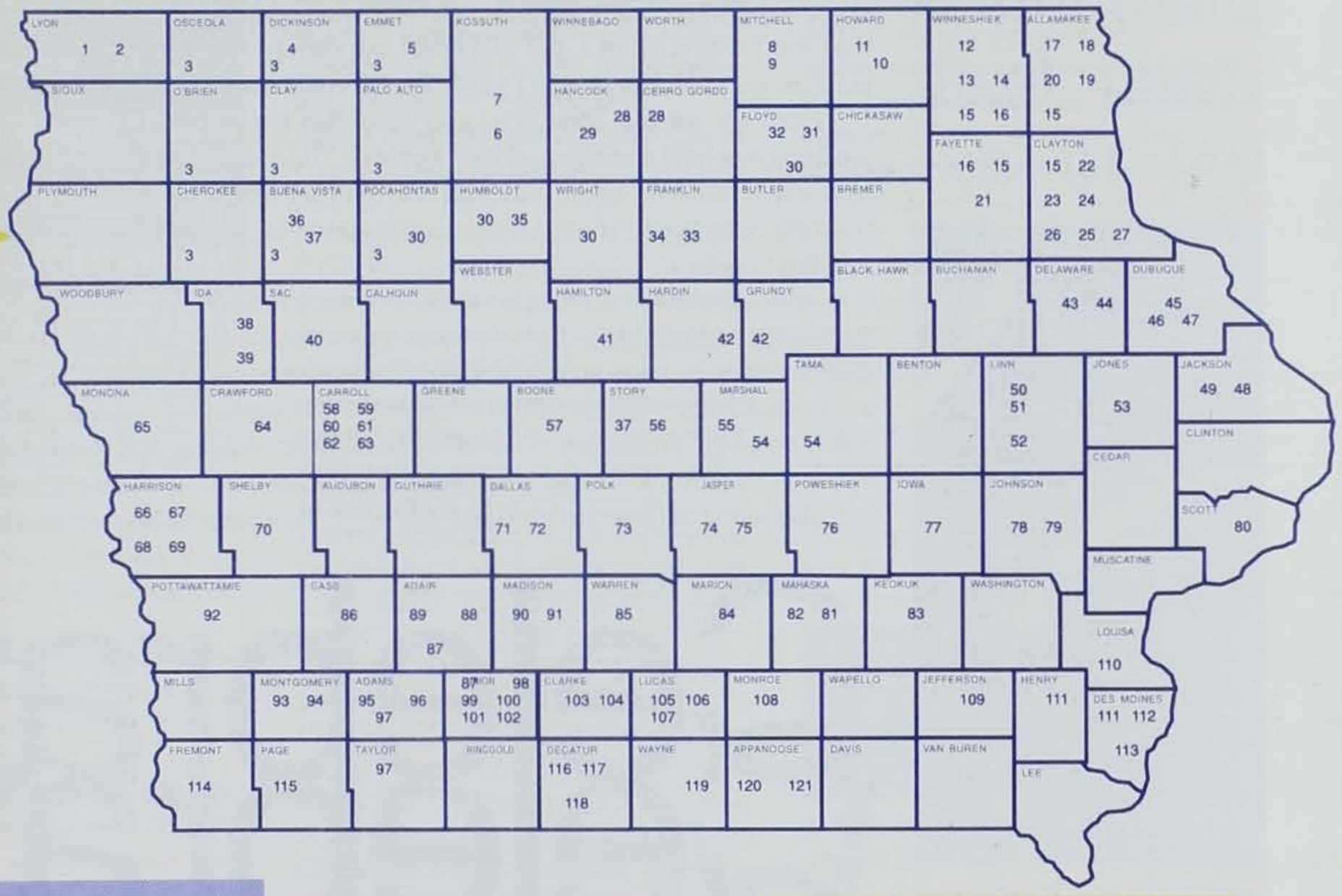
"If we can voluntarily try some practices that positively impact the watershed, it will have lots of spinoffs down the road," said Bill Horan. "If we can show we're making an effort to farm in a more environmentally positive way, it's going to prevent rules and regulations that force us to do things we may or may not want to do and may not be good for the bottom line. We are willing to do whatever we can to positively impact the watershed."

Jim Bradford of rural Guthrie Center planted two acres of NRHP in 1995 to test how it would hold up on soil erosion and weed control. Results from this first-year trial showed a 30 percent yield increase compared to adjacent conventional corn. Bradford harvested this plot using a soybean grain table head on his combine. Bradford was so impressed with the first year trial, he planted 33 acres of NRHP in 1996.

The plot of land used for the trials was in alfalfa for four years and used for calving and grazing for several seasons. Bradford prepared the plot with a Roundup burn down, followed by another burn down a few weeks later.

These farmers and organizations are experimenting with NRHP in cooperation with the Raccoon River Watershed Project. The RRWP is an alliance of agricultural organizations, conservation groups and the Des Moines Water Works. This alliance is striving to speed the voluntary adoption of technologies to protect water quality in the ten-county watershed of the Raccoon River. To receive a results summary of the 1996 NRHP plots, contact the project office at 800-797-4322.

QUALITY PROJECTS



1 - Lake Pahoja Water Quality Project
2 - Lake of the Hills Project
3 - Agribusiness Pollution Prevention Demonstration Project
4 - Iowa Great Lakes Protection Project
5 - Ingham/High Lake Complex Water Quality Project
6 - Union Slough/Smith Lake Project
7 - Kossuth County ICM Demonstration
8 - Mitchell County Supplemental Evaluation Methods
9 - Mitchell County Devonian Aquifer Protection Project
10 - Bigalk Creek Water Quality Project
11 - Lake Hendricks Watershed Project
12 - Coon Creek Water Quality Project
13 - Trout Run Water Quality Project
14 - North and Middle Bear Creeks Coldwater Stream Protection Project
15 - Northeast Iowa Demonstration Project
16 - Yellow and Turkey Rivers Water Quality Incentive Project
17 - Little Paint Water Quality Project
18 - Allamakee County Sinkhole Project
19 - French Creek Project
20 - Hickory Creek Project
21 - Glovers Creek Water Quality Evaluation Plan
22 - Ensign Hollow Watershed Water Quality Project
23 - Sny Magill Watershed Protection Project
24 - Sny Magill Monitoring Project
25 - North Cedar Creek Project
26 - Big Springs Demonstration Project
27 - North Cedar Creek Project
28 - Clear Lake Enhancement And Restoration Project (CLEAR)
29 - Crystal Lake Project
30 - Agricultural Drainage Well User - ICM Assistance Program
31 - Floyd County Monitoring Agricultural Drainage Well Closure Effects
32 - Floyd County Groundwater Protection
33 - Beeds Lake Water Quality Project
34 - Spring Creek Watershed Project
35 - Humboldt County Agriculture Drainage Well Project
36 - Storm Lake Water Quality Project
37 - Iowa State University Tree Buffer Strip Demonstration on Storm Lake and Bear Creek -
38 - Battle Creek Watershed Groundwater Protection Project

39 - Crawford Creek Project
40 - Black Hawk Lake Watershed Water Quality Project
41 - Little Wall Lake Project
42 - Pine Lakes Water Quality Project
43 - Spring Branch Creek Water Quality Project
44 - Little Turkey River Project
45 - Bloody Run Creek Watershed Project
46 - Catfish Creek Project
47 - Bankston Park Project
48 - Upper Big Mill Creek Water Quality Project
49 - South Fork of Big Mill Creek Water Quality Project
50 - Dry Creek Supplemental Evaluation Methods Project -
51 - Dry Creek Water Quality Protection Project
52 - Cedar Rapids Area Urban Water Quality Project
53 - Dutch Creek Project
54 - Union Grove Water Quality Project
55 - Greene Castle Lake Project
56 - Elliot Watershed Project
57 - Don Williams Watershed Project
58 - Hazelbrush Water Protection Project -
59 - Carroll County Livestock Pollution Abatement Project
60 - Swan Lake Project
61 - Dedham Watershed Project
62 - Willow Creek Watershed Project
63 - Willow Lake Recreation Area Project
64 - Yellowsmoke Lake Project
65 - Soldier River Project
66 - Willow Lake Project
67 - Schley Park Project
68 - Pleasant View Park Project
69 - DeSoto Bend Project
70 - Prairie Rose Project
71 - Beaver Lake Project
72 - Raccoon River Watershed Project
73 - Des Moines Metro Area Urban Water Quality Project
74 - Walnut Creek Monitoring Project
75 - Mariposa Lake Project
76 - Diamond Lake Project
77 - University of Iowa Tree Buffer Demonstration Project
78 - Johnson County Urban Water Quality Project
79 - Kent Park Lake Renovation and Water Quality Project
80 - Duck Creek Water Quality Demonstration Project

81 - Lake Keomah Project
82 - Hanthorne Lake Project
83 - Keokuk County Special Project
84 - Roberts Creek Lake Project
85 - Lake Ahquabi Project
86 - Turkey Creek Project
87 - Three Mile Creek Watershed Project
88 - Meadow Lake Project
89 - Greenfield Lake Project
90 - Cedar Lake Project
91 - Badger Creek Watershed Project
92 - Pigeon Creek Watershed Project
93 - Pilot Grove Park Water Quality Protection Project
94 - Pilot Grove Park
95 - Lake Icaria Water Quality Project
96 - Adams County Three Lakes Water Quality Project
97 - Lenox Watershed Reservoir Project
98 - McCann Creek Watershed Project
99 - Highline Project
100 - Spaulline Project
101 - McCann Creek Project
102 - Twelve-mile Creek Watershed Project
103 - Southern Iowa Grazing Project
104 - West Lake Water Quality Protection Project
105 - Williamson Pond Project
106 - Red Haw Lake Project
107 - Lucas County Lakes Water Quality Project
108 - Miami Lake Project
109 - Jefferson County Water Supply Reservoirs
110 - Whiskey Hollow Project
111 - Lake Geode Project
112 - Big Hollow Water Quality Special Project
113 - Bonus for Trees Project
114 - Anderson Well and Groundwater Water Quality Project
115 - Pierce Creek Lake Project
116 - Little River Lake Project
117 - Hanthorn Watershed Water Quality Protection Project
118 - Little River Project
119 - Corydon Lake Project
120 - Centerville City Reservoirs
121 - Lake Rathbun Project

Thinking of planning a water festival to expand water education in your community? Probably not.... but maybe you should.

There is no better way to garner the attention of your community than to put on an event that is fun and educationally, very rich.

You need not look far for assistance. As organizers of the Johnson County Water Festival, we quickly learned of many groups and individuals with the desire and ability to help produce an event to improve our community's understanding of water's many roles in our daily lives. You could do it, too. We're doing it, again. We hope to attract even more than the 1,600 we had in our first effort last spring. And we hope community support is at least as good as it was with more than 90 volunteers making it all happen.

First, we set our objectives and identified the target audiences — elementary and junior high school children and their families. Then we recruited volunteers and presenters with experience in water curricula and natural resource issues. A partnership, rich in diversity, was assembled between public agencies, private businesses, academic groups and the public.

Your local water utility is an excellent place to begin recruitment. At the county level, the health department will have knowledge of rural water supplies. The Natural Resource Conservation Service and County Extension offices can provide expertise on landuse and water resources. The state DNR has personnel in parks, fish, wildlife, forestry, geology and environmental protection. The U.S. Geological Survey and National Wildlife Refuge systems have personnel who are experts on water-resource and conservation issues and are frequently involved in outreach activities. Agribusinesses, water well drillers, plumbers, residential water treatment services, and bottled water distributors can be excellent resources for programming and presentations. Don't overlook the opportunity for students and their teachers to offer activities, as a wealth of curriculum material is available, easy to learn, and fun to present.

While the physical science-related activities are the obvious focus for many presentations, water festivals are an excellent opportunity to integrate and adapt the entire educational curriculum around one theme. Public officials at all levels can offer unique and practical views on local water issues. Art and music projects involving water can be fun and can easily be incorporated into the event. Worldwide water resource issues are an excellent springboard into global geography. A bit of creativity, flexibility and effort can generate a dynamic program and broaden the scope of festival activities. Remember, hands-on activities are the most popular and best remembered, rather than those of observation only.

A network of information is available from throughout the country. The Groundwater Foundation, originator of the water festivals, can be reached at 800-858-4844. For more information on the Johnson County Water Festival, call (319) 335-4550.

Dave Riley, drinking water quality programs, Center for Health Effects of Environmental Contamination, University of Iowa

Following are agencies and organizations with staff available to provide guidance in water related technical assistance and information:

Center For Health Effects of Environmental Contamination, water-related health effects from contaminants, referral service, water quality research related to exposure and risk-assessment grant program
Contact: 100 Oakdale Campus, W310 Oakdale Hall, University of Iowa, Iowa City, IA 52242-5000, Phone 319/335-4014

County Conservation Boards
water recreation, wetlands, and information and education
Contact: County Conservation Board staff located in most county seat towns

Extension Service
nonpoint pollution prevention, watersheds and water quality
Contact: Gerald Miller, 2104 Agronomy Hall, ISU, Ames, IA 50011
well construction, water supplies, drinking water quality
Contact: Tom Glanville, 2004A Davidson Hall, ISU, Ames, IA 50011
County Contact: Extension Service Office located in most of the county seat towns

Iowa Association of Soil and Water Conservation District Commissioners (IASWCDC), nonpoint pollution prevention, education, watershed development, erosion control, flood prevention, water conservation, and soil survey
County Contact: NRCS or Soil and Water Conservation District Office (SWCD) in each county with two offices in Pottawattamie County -- one in Council Bluffs and one in Oakland
State Office Contact: PO Box 649, Johnston, IA 50131, 515/278-5362

Iowa Department of Natural Resources, nonpoint pollution prevention, waste management, water quality, forestry, fish and wildlife management, governmental/regulatory, safety, pollution control, water recreation, research, information.
State Office Contact: 900 East Grand, Des Moines 50319-0034, Phone 515/281-5918
(For education, contact Springbrook Conservation Education Center, Phone 515/747-8383; for geology, contact Geological Survey Bureau, Phone 319/335-1575.)

Iowa Division of Soil Conservation, Agriculture and Land Stewardship Department, nonpoint pollution prevention, education, watershed development, wetland development, erosion control, flood prevention, water conservation and soil survey
County Contact: NRCS or Soil and Water Conservation District Office (SWCD) in each county with two offices in Pottawattamie County -- one in Council Bluffs and one in Oakland
State Office Contact: Wallace State Office Building, Des Moines, IA 50319-0050, Phone 515/281-5851

Iowa Rural Water Association, treated rural water
Contact: 100 Court Ave., Suite 409, Des Moines, IA 50309, Phone 515/283-8214

Iowa State Water Research Institute, research and information
Contact: 2401 Agronomy Hall, ISU, Ames, IA 50011 Phone 515/294-8921

Iowa Waste Reduction Center
pollution prevention, education, technology information, (small business-compliance assistance and pollution protection)
Contact: 75 Biology Research Complex, Cedar Falls, IA 50614, Phone 319/273-2079

Leopold Center for Sustainable Agriculture, water-related research, education and grant program
Contact: 209 Curtiss Hall, Ames, IA 50011, Phone 515/294-3711

US Environmental Protection Agency (EPA), regulatory, technical and financial assistance, water quality protection, wetlands, watershed protection
Contact: Region 7, Water, Wetlands and Pesticides Division, 726 Minnesota Ave., Kansas City, Kansas 66101, Phone 913/ 551-7030

USDA Agriculture Research Service (ARS) National Soil Tilth Laboratory, research and information
Contact: National Soil Tilth Laboratory, ISU, Ames, IA 50011 Phone 515/294-5723

USDA Natural Resources Conservation Service (NRCS), nonpoint pollution prevention, education, watershed development, wetland, erosion control, flood prevention, water conservation and soil survey
County Contact: NRCS or Soil and Water Conservation District Office in each county with two offices in Pottawattamie County -- one in Council Bluffs and one in Oakland
State Office Contact: STE 693 Federal Building, 210 Walnut St., Des Moines, IA 50309-2180, Phone 515/284-4261

University of Iowa Hygienic Laboratory, water quality monitoring, education and research
Contact: 102 Oakdale Campus, H101 OH, Iowa City, IA 52242-5002 Phone 319/335-4500

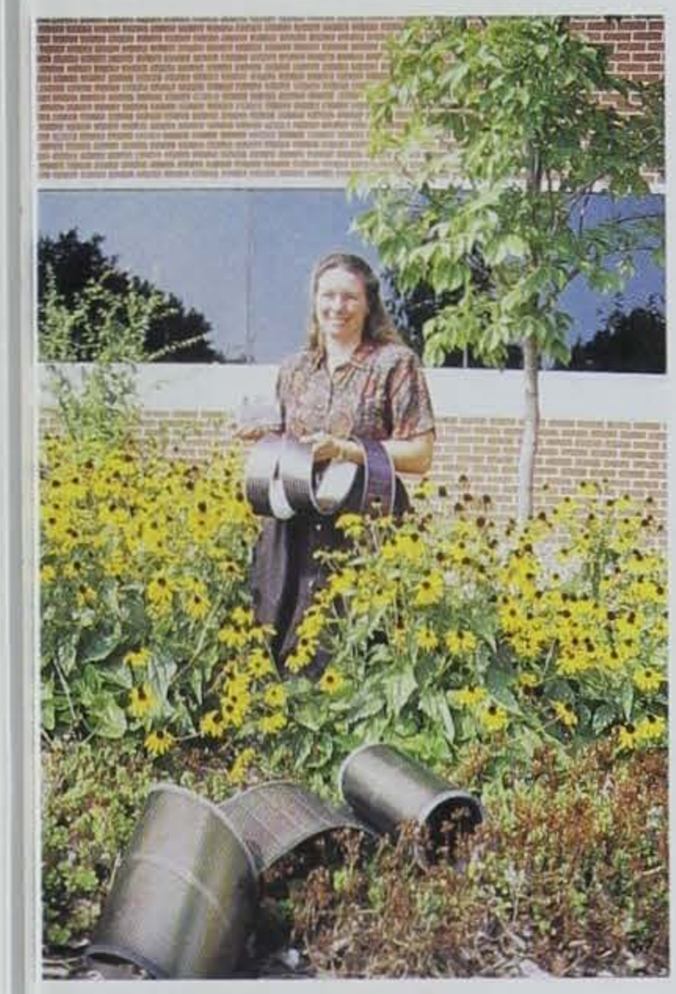
US Geological Survey (USGS)
research, education, data collection and dissemination, hydrologic investigation
Contact: PO Box 1230, Iowa City, IA 52244 Phone 319/358-3600

soil ✦ point source pollution ✦ non-point source pollution ✦ sustainable agriculture ✦ erosion & demonstration ✦ pollution prevention ✦ community involvment ✦ education ✦ water quality ✦ voluntary compliance ✦ watershed protection

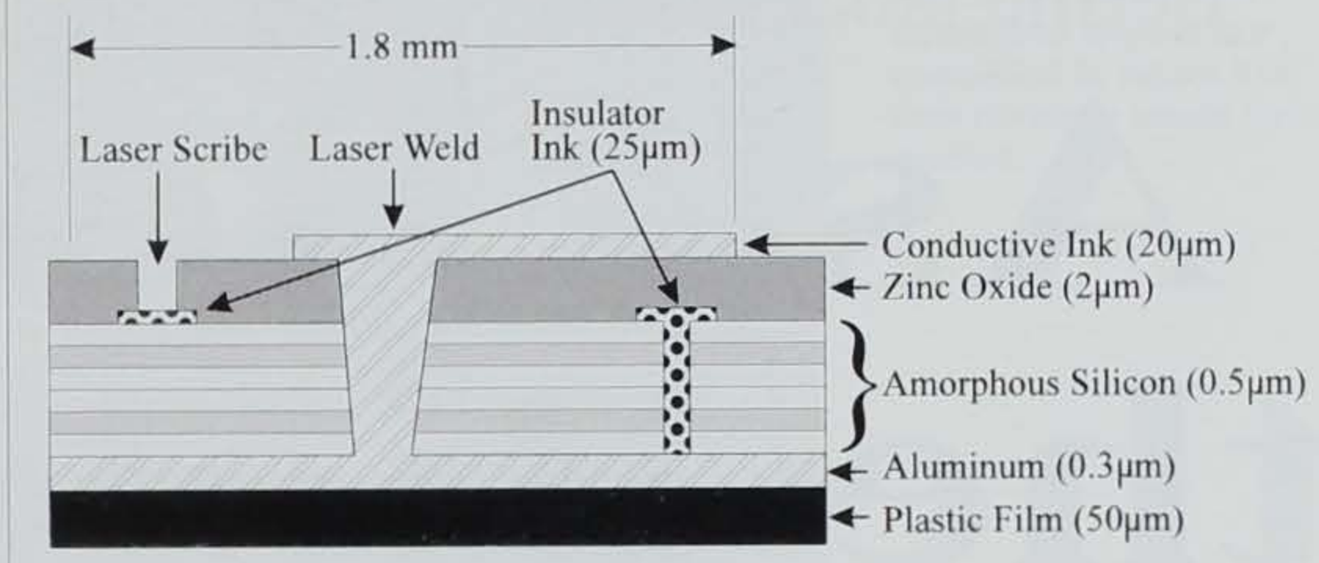
sustainable agriculture ✦ soil conservation ✦ point source pollution ✦ non-point source pollution

Iowa Thin Film's executive administrator Lynne Brookes, who has worked in Central America. "If we can get the material onto people's roofs," she said, "they'll have electricity and light."

Incorporating photovoltaic panels into roofs or building facades could work anywhere in the world, according to Grimmer. "That would avoid the double cost of building and adding solar cells," he said. The high cost of electricity in Europe and Japan make the solar materials most cost-effective there.



■ **Kneeling in a patch of sunflowers, Lynne Brooks, Iowa Thin Film administrator, shows off newly produced reels of the film that converts sunlight to electricity.**

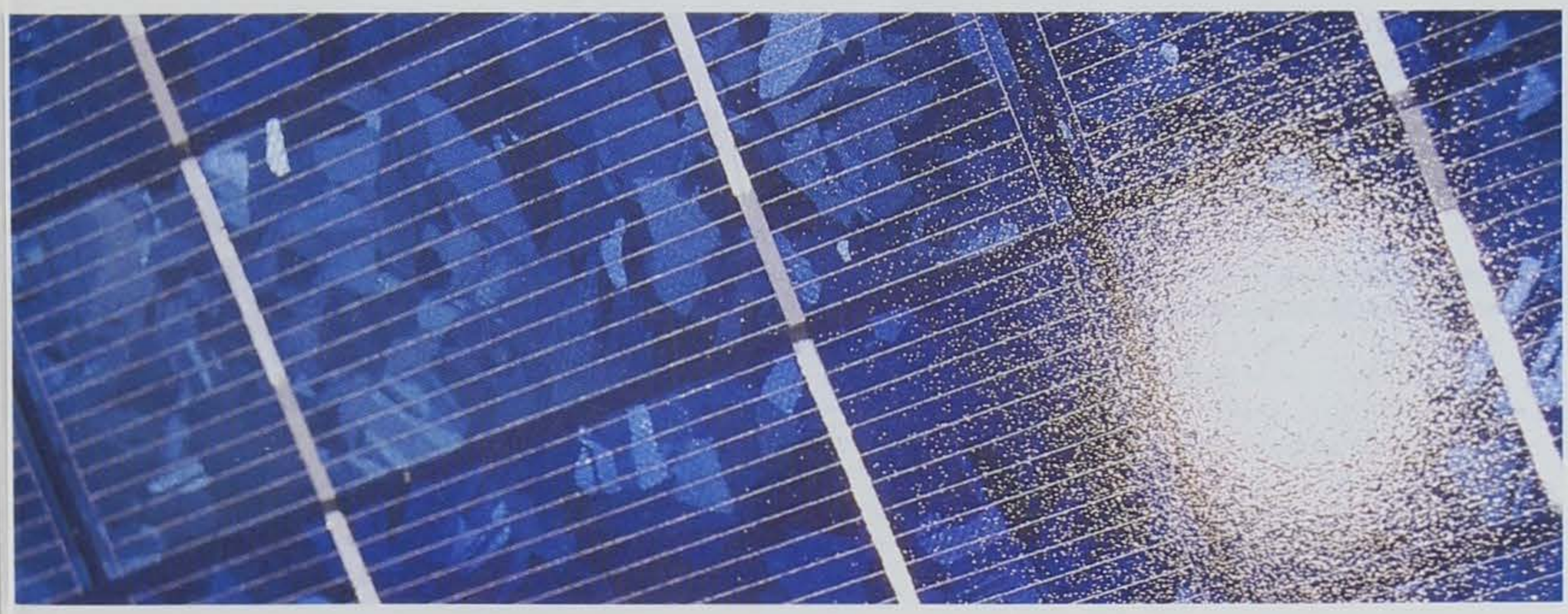


■ **The process of producing the amorphous silicon thin film modules requires precision processes and highly skilled staff, the very definition of a high-tech industry. The layers of plastic, aluminum, silicon and zinc oxide are measured in microns (there are 25,400 microns to the inch).**

Increasing the scale of production, thereby cutting costs, will be necessary before the product becomes competitive in the United States. That is why Iowa Thin Film's goal is large-volume manufacturing. Two new grants, totaling $3.7 million, will help the company improve its processes and a new production line in its new building will increase efficiency.

Iowa Thin Film Technologies has gone from being the dream of two scientists to employing 28 people full and part time. It has moved from a business incubator to competing in the world marketplace. And, it has exemplified the move from electricity sources such as nuclear power to clean, renewable power from the sun.

As Frank Jeffrey stated in an interview with the *Iowa State Daily*, "It has the potential for being very beneficial to the world as a whole. You kind of win all ways with this."



Bernie talks panfish creel limits and horned pout?

Ask Bernie the Biologist

by Bernie Schonhoff

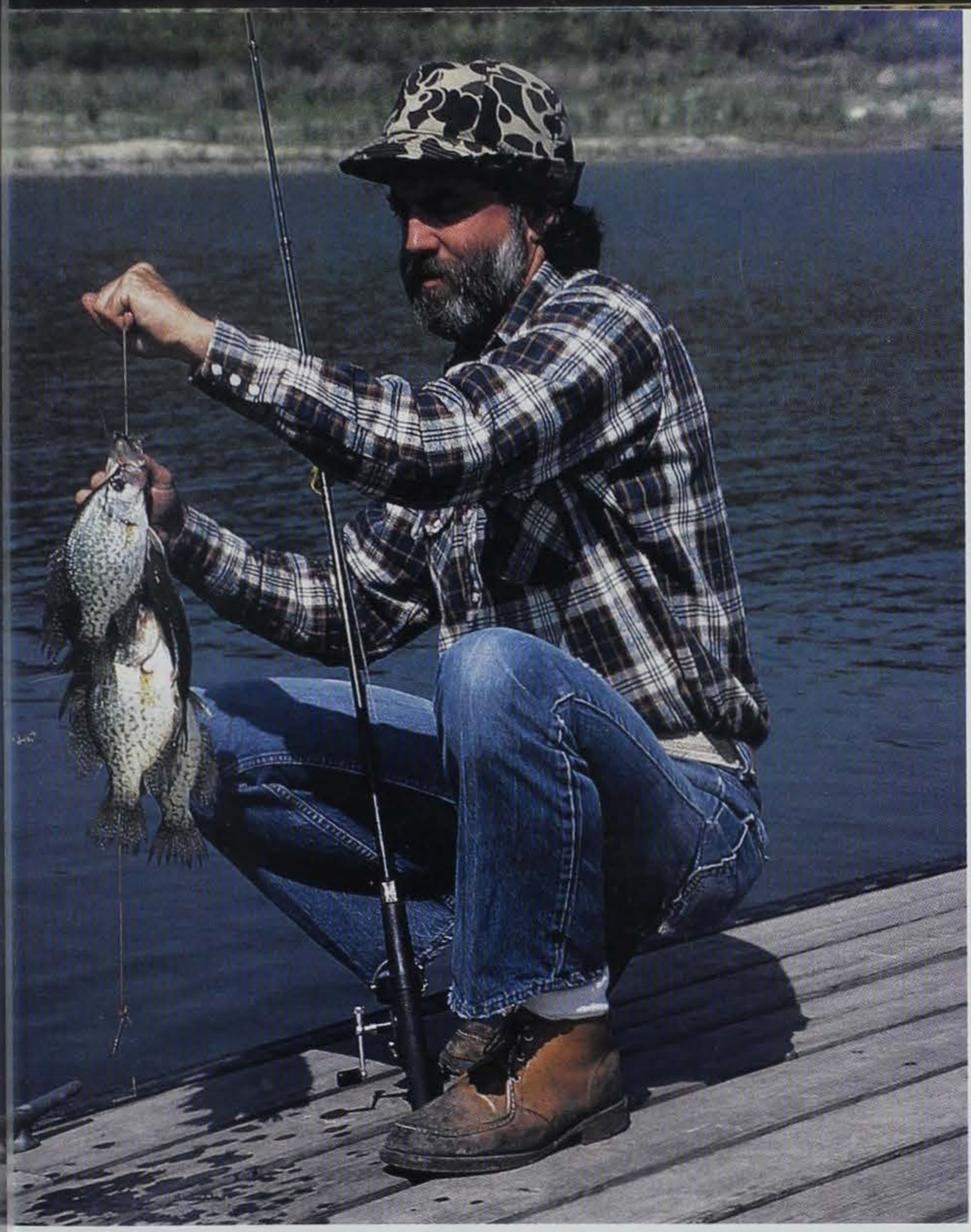
Ron Johnson

■ Panfish fishing has traditionally been more of a meat fishery, meaning most anglers anticipate taking some home to be eaten.

Well I don't know how it happened but its been more than a year since I sat down to try and answer some of the question you fine folks have asked. I guess what our bug-eating friends the frogs say is true "Times fun when you're having flies." Well, you know what I mean. Anyway, I was down at the café the other day having breakfast and talking to some of the coffee clubbers. It seems a couple of them were on vacations this summer and those trips generated some interesting questions.

Q *I was on vacation doing some fishing in Minnesota this summer on a lake with a bag limit on crappie and sunfish and the fishing was pretty good. Would something like that work in Iowa?*

A Yes, bag limits could work in Iowa. But there are a lot of misconceptions about bag limits and how they work, and how much they can improve fishing. Many anglers think if a bag limit of 25 to 50 fish were used, fishing would dramatically improve, however, there are several reasons why fishing may not improve. For some species, such as largemouth bass, bag limits have been around for decades and used in conjunction with other regulations quite successfully. Part of the reason for this success is the fact enough anglers are willing to harvest fewer bass knowing the bass population will be improved because of these actions. Panfish fishing has traditionally been more of a meat fishery, meaning most anglers anticipate taking some home to be eaten. Now, if we had a 25- or 50-fish limit that wouldn't be a problem, because almost all anglers would be satisfied with that many fish. However, our research shows panfish are not normally harvested 50 or even 25 at a



Ron Johnson

■ Socially, bag limits can spread the harvest out a little more equitably, but only to the extent that successful anglers are compelled to return fish they normally would have creeled.

time, but usually 5 or 10 at a time. So, that means a 25-fish limit would have no effect on 99 percent of the anglers. Our research biologist in Spirit Lake has found that a panfish bag limit would have to be as low as two or three fish to make much difference in the population. Most panfishers would not be satisfied with so few fish.

So why would the bag limit have to be so low in order to work?

There are a number of factors that come into play. I'll try to go through a few of them. Bag limits are one of the least restrictive regulations because they do not prohibit an angler from keeping smaller fish like a size limit would do. Therefore, the actual total harvest of panfish from a lake may not change significantly, unless very restrictive creel limits are imposed. Research done on the crappie population at Rathbun Lake determined a 25-crappie limit would only reduce the harvest by eight percent -- not enough to make a real difference in the population. Even with a creel limit of only 10 crappie, research shows harvest would only be reduced by 20 percent. Similar results are reported out of Missouri where they have had crappie bag limits for a few years. Also, environmental factors may totally mask the influence of a bag limit. Again, research done on the Rathbun Lake crappie population indicates water levels in the spring and summer accounted for as much as 90 percent of the variation in the number of young crappie produced in a year. Other environmental factors such as water temperature, turbidity (how clear the water is), wind and even the hardness of the lake bottom

all affected the crappie population on a much larger scale than would a bag limit.

Anglers expect a regulation change to improve fishing, meaning either the size of fish caught should be larger or the number of fish caught should increase, or both. However, just putting a bag limit on a species of fish does not guarantee fishing will improve. There are many factors, some biological and some environmental, influencing the growth of fish in a lake. Factors such as the amount of food available would significantly influence the results seen. Again, studies out of Missouri show in some lakes with a 10-crappie bag limit there was a decrease in growth, meaning the average size crappie in the creel did not change, even though this change in growth was not related to the change in regulation.

One thing bag limits may do is redistribute the harvest, meaning instead of one angler taking 50 crappies home, two anglers could each take 25 crappies or five anglers could take 10 crappies apiece. This would work only if enough of the successful anglers are compelled to return fish they would have kept without the regulation. But again, if the limit is not low enough very few anglers will be compelled to return fish they would have kept without a bag limit.

Another thing bag limits do is give anglers a target to shoot at. Some people enjoy "catching their limit" and without an established daily bag limit this is not possible. Still other anglers believe the DNR should set a liberal bag limit of say 25 to 50 panfish because "25 to 50 crappies or bluegill are enough for anyone and nobody needs buckets full of fish." These are valid social concerns, but have nothing to do with fish biology.

Biologically, bag limits for panfish have limited application because the

■ **Biologically, bag limits for panfish have limited application because the positive effect to the population is often overcome by biological and environmental factors not influenced by the regulation.**

Sonny Satre

positive effect to the population is often overcome by biological and environmental factors not influenced by the regulation. Fisheries managers may therefore be reluctant to impose a limit when they are not certain the fish population will react as expected. Socially, bag limits can spread the harvest out a little more equitably, but only to the extent that successful anglers are compelled to return fish they normally would have creeled. Also, panfish bag limits may make some anglers feel better about things, but in reality not improve their fishing to any appreciable degree.

Q *While I was in Maine, the locals kept talking about catching horned pout from the lake nearby. What in the world is a horned pout?*

A Well, these Maine anglers were catching bullheads. Probably brown bullheads which are more common in Maine and the northeast portion of the U.S. than they are in Iowa. In the book *Iowa Fish and Fishing* other local names for the brown bullhead are speckled bullhead, common bullhead and red cat. This variety of common names for the same fish is one of the reasons biologist use the scientific name of *Ictalurus nebulosus* when talking and writing about brown bullheads. That way, even a scientist in China will know exactly what species of fish is being discussed. Just for fun, I've listed a few of the more unusual local names for a fish and the more accepted common name. Try covering the right side of the page and see how many of these you know.

Fulton Cat ——— Blue Catfish
Stinger ——— Black Bullhead
Dory ——— Walleye
Jack Salmon ——— Sauger
Grinnel ——— Bowfin
Shellcracker ——— Redear sunfish
Sac-a-lait ——— Black Crappie
Goggle Eye ——— Rock Bass
Rubber Tail ——— Green Sunfish

■ **Just do it! Even this time of year, fishing can be an exciting family activity.**

Ron Johnson

The discussion on bag limits took quite a while, but this is a difficult question without a straight forward answer for all situations. Keep those questions coming in and maybe next time I can get to more of them. Until then, why not listen to the advertised suggestion "Just do it." That's right, dust off that old rod, chop some ice and go fishing.

Bernie Schonhoff ia a fishery biologist for the department at the Fairport Fish Hatchery.

BLACK BULLHEAD
Ameiurus melas melas
(Rafinesque)

■ **Black bullheads are Iowa's common bullhead and are sometimes referred to as stingers.**

Photos by
Roger A. Hill

1996 Record Deer Racks

This is a list of deer racks scored between October 1995 and July 1996.

BOW, NONTYPICAL

(Minimum Qualifying Score -- 155 pts.)

NAME	CITY	COUNTY TAKEN	TOTAL SCORE	YEAR
*Terry M Long	Des Moines	Polk	229 4/8	1995
*Jack Schuler Jr	Indianola	Decatur	227	1995
Kenneth R Jones	Lamoni	Decatur	203 2/8	1995
Chris Hanna	Algona	Kossuth	202 2/8	1995
Jim Evans	Fruitland	Muscatine	196 5/8	1995
Tony Thomas	Morning Sun	Louisa	196 2/8	1995
Steve Wagner	Camanche	Clinton	195 1/8	1995
Matthew A Trexel	Burlington	Lee	180 6/8	1994
Les Bauman	W Burlington	Des Moines	179 4/8	1995
Richard Clouas	Rathburn	Appanoose	170 6/8	1995
Terry L Hammond	Ventura	Winnebago	170 5/8	1995
Ike Lind	Camanche	Jackson	168 7/8	1995
Ken Snyder	Muscatine	Muscatine	165 5/8	1995
David Walker Jr	Eddyville	Mahaska	163 1/8	1995
Matt Van Meter	Sioux City	Woodbury	161 4/8	1995
Dennis Oltrogge	Maynard	Fayette	159	1995
Patrick Mescher	Dundee	Delaware	157 3/8	1989
Michael D Wolter	Dubuque	Dubuque	156 2/8	1995
Dean Dempster	Delhi	Delaware	156 2/8	1995
Tom Chebuhar	Des Moines	Appanoose	156	1995
Charles Allen	Council Bluffs	Pottawattamie	155 2/8	1991

BOW, TYPICAL

(Minimum Qualifying Score -- 135 pts.)

NAME	CITY	COUNTY TAKEN	TOTAL SCORE	YEAR
*Roy Allison	Knoxville	Monroe	193 5/8	1995
*Randy Schmidt	Keswick	Keokuk	183 7/8	1995
Michael C Mott	Keosauqua	Washington	181 7/8	1995
Joe Pitzen	Cedar Rapids	Linn	180 2/8	1994
Gary Stauffer	Muscatine	Muscatine	178	1995
Jeremy Frieden	Waukon	Allamakee	171 1/8	1995
Leroy Hansaker	Melcher	Marion	166 4/8	1995
Chad Huschka	Cedar Rapids	Linn	166 3/8	1995
David L White	Cedar Rapids	Clayton	166 3/8	1996
Al Chapman	Ollie	Washington	166 1/8	
Larry Alexander	Stuart	Guthrie	165 4/8	1995
Bob Cross	Charles City	Floyd	165 4/8	1995
Rick Yates	Sidney	Fremont	164	1995
Rob Kovacevich	Centerville		162 5/8	1995
James Cluney	Washington	Washington	162 3/8	1995
David Hyman	Keota	Washington	160 7/8	1995
Steve Snow	Kasson	Decatur	160 4/8	1995
Mike C Weiss	Park Hills	Farmington	160	1995
Bill Cowan	Centerville	Appanoose	159 4/8	1978
David Thormsberry	Milton	Van Buren	159 3/8	1995
Ben Withers	Baxter	Jasper	158 7/8	1995
Kenneth Caylor	Chariton	Lucas	157 7/8	1995
Mark Backstrom	Woodburn	Clark	156 4/8	1992
Spencer Seeberger	Osceola	Clarke	156 4/8	1987
Rodney Stalder	Blue Grass	Scott	156 1/8	1995
Russ Stratton	Fort Dodge	Webster	156	1995
Jeff Conger	Agency	Monroe	155 3/8	1995
Darrel Ballantyne	Solon	Solon	154 7/8	1995
Larry Porter	St Ansgar	Worth	154 2/8	1995
Mark Armstrong	Council Bluffs	Cass	154 1/8	1995
Steve Finegan	Cedar Falls	Black Hawk	154 1/8	1993
Dennis Weisz	Sioux City	Woodbury	154	1995
Kevin Bills	Creston	Union	154	1995
Kevin Walter	Lovilla	Monroe	153 5/8	1995
Todd E Castle	Adel	Guthrie	153 4/8	1995
D Greiffendorf	Fairfield	Jefferson	152 7/8	1995
Randal J Willey	Mount Vernon	Linn	152	1994
Randy Waschkett	Waterloo	Allamakee	151 6/8	1995
Aaron Abbas	Russell	Lucas	151 5/8	1995
Tim McDonough	Monticello	Jones	151 5/8	1995
Rusty Emery	Burr Oak	Winneshiek	151 2/8	1995
Rick Hoppe	Lake View	Sac	151 2/8	1995
Darle Myers	Lehigh	Webster	150 7/8	1995
Jason Gallup	Charles City	Floyd	150 1/8	1995
Rocky Friend	Harrison	Harrison	149 7/8	1995
William Deck Jr	Keokuk	Van Buren	149 5/8	1995
Jamie Washburn	Cedar Rapids	Linn	149 3/8	1995
Daniel G Putz	Dyersville	Delaware	149 2/8	1995
Vern Milburn	Centerville	Appanoose	149	1995
Dan Brauns	Inapello	Van Buren	148 7/8	1992
Mark Weber	Waterloo	Henry	148 6/8	1994
Dale Kline	Hamilton	Monroe	148 4/8	1991
Chad Koehn	Chariton	Lucas	148 3/8	1995
Kyle Goodwin	Knoxville	Marion	148 2/8	1995
David H Lincoln	Dubuque	Jackson	148 2/8	1995
Dana Bourquin	Blue Grass	Muscatine	148 1/8	1994
Daniel J Brimeyer	Dubuque	Clayton	148	1995
Larry L Brus	Churdan	Greene	147 7/8	1995
Ralph Mc Conaughey	Ottumwa	Wapello	147 7/8	1995
Ed Yando	Indianola	Warren	147 4/8	1995
Jeff Springer	Cedar Falls	Black Hawk	147 4/8	1996
Brent Schroder	Pella	Marion	147 4/8	1995
Greg Gravert	Sabula	Jackson	147	1995
Pat Robinson	Lenox	Taylor	147	1995
Denny Dolash	Tama	Davis	146 6/8	1995
Russ Meyer	Waukon	Clayton	146 3/8	1995
Lynn Moeller	Crafton	Centerville	146 3/8	1995
John Flanagan	Ryan	Delaware	146 2/8	1995
Robert Walker	Morning Sun	Louisa	146 2/8	1994
Waylon Byers	Milo	Warren	146 1/8	1994
Robert J Mc Clemons	Lacona	Warren	145 6/8	1994
Jon T Saunders	Sioux City	Pkymouth	145 3/8	1996
Dennis Palmer	Pittsville	Centerville	145	1994
Steven Millius	Marion	Linn	145	1995
Rod Smed	Waukon	Allamakee	144 4/8	1992
Larry M Mc Duffey	New Virginia	Warren	144 3/8	1994
Todd Collins	Indianola	Polk	144 3/8	19/88
Jeff Nibbelink	Rock Valley	Sioux	143 6/8	1995
Charles Allen	Council Bluffs	Monona	143 5/8	1995
D Greiffendorf	Fairfield	Jefferson	143 2/8	1992
Mike Prince	Churdan	Dallas	143 2/8	1995
Gary Roberts	Pulaski	Davis	143 1/8	1995
Roy Allison	Knoxville	Marion	142 7/8	1991
James D Pendroy	Monroe	Marion	142 6/8	19/95
Robert Lane	Rogers	Lee	142 4/8	1995
Richard Delanty	Sunrise Beach	Fremont	142 4/8	1995
James Kimpston	Riverton	Fremont	141 7/8	1995
Bill Morgan	Muscatine	Muscatine	141 7/8	1995
Joe Hammond	Hartford	Warren	141 7/8	1995
Larry H Thumann Sr	Blue Grass	Muscatine	141 6/8	1995
Gerald T Dowell	Pella	Marion	141 5/8	1995
Dennis Bradley	Ottumwa	Wapello	141 4/8	1995
Larry Porter	Saint Ansgar	Worth	141 4/8	1994

Dennis L Kirchner	Fort Madison	Lee	141 3/8	1995
Jim J Oberfoell	Hanlontown	Allamakee	141 2/8	1995
Jerry D Brunow	Mondamin	Pott	141 2/8	1994
Harold Dickman Jr	Missouri Valley	Harrison	140 7/8	1995
Joseph B Hahn	Chariton	Lucas	140 7/8	1995
Arnold Cue	Fayette	Fayette	140 3/8	1995
Rick Cooper	New Virginia	Madison	140 1/8	1995
Mary Leonard	Raymond	Delaware	140 1/8	1995
Jeff Coonts	Buffalo	Scott	140	1993
Richard Pauley	Mystic	Appanoose	140	1994
Shane Marvelli	Newton	Warren	139 7/8	1995
Shawn Ryan	Washington	Louisa	139 6/8	1995
Kenneth Baxter	Ottumwa	Wapello	139	1993
Dave Messner	Maryville	Mills	139	1995
Mike Theis	Sherrill	Dubuque	138 7/8	1995
Jeff Cesar	Keosauqua	Van Buren	138 7/8	1995
Larry W Miller	Dubuque	Dubuque	138 4/8	1995
Mark Mincks	Bloomfield	Davis	138 4/8	1995
Milt Olson	Sioux City	Woodbury	138 2/8	1996

Scott Bunnell	Corydon	Wayne	138 2/8	1995
Mike Schweitzer	Wellman	Jefferson	137 5/8	1995
Jim Van Sickle	Keota	Keokuk	137 3/8	1995
Larry Hevern	Inwood	Lyon	137 3/8	1995
Larry M Mc Duffey	New Virginia	Clarke	137 1/8	1995
Terry Abell	Creston	Union	137 1/8	1995
Mike Buckley	Fort Dodge	Webster	137	1995
Vince Jauron	Harlan	Shelby	137	1995
Ryan Platt	Emerson	Montgomery	136 7/8	1995
D Greiffendorf	Fairfield	Jefferson	136 7/8	1994
Boe Echard	Monona	Allamakee	136 6/8	1992
Brad Heuvelmann	Burlington	Des Moines	136 5/8	1995
Norman P Cloud	Ames	Boone	136 3/8	1995
Jeff L Warden	Humboldt	Humboldt	136 2/8	1995
Duane Baumler	Decorah	Allamakee	136 2/8	1995
Tim Baird	Ottumwa		136 1/8	1995
Randy Russell	Burlington	Des Moines	136 1/8	1990
Scott W Hawk	Mount Pleasant	Henry	136	1995
Charles H Walter	Knoxville	Marion	136	1995
Larry Gilliland	Clare	Webster	135 6/8	1995
John Bantz	Glenwood	Mills	135 5/8	1995
Lonnie Ball	Knoxville	Marion	135 5/8	1996
Michael Barkhaus	Le High	Webster	135 4/8	1995
Philip A Varndell	Chambersberg	Montgomery	135 2/8	1995

MUZZLELOADER, NONTYPICAL

(Minimum Qualifying Score -- 170 pts.)

NAME	CITY	COUNTY TAKEN	TOTAL SCORE	YEAR
*Jim Evans	Muscatine	Muscatine	196	1995
Mike Reittinger	Dyersville	Delaware	189	1995
Dallas Peterson	Mc Clelland	Guthrie	178 4/8	1995
James Sheriff	Greenfield	Adair	174 1/8	1995

MUZZLELOADER, TYPICAL

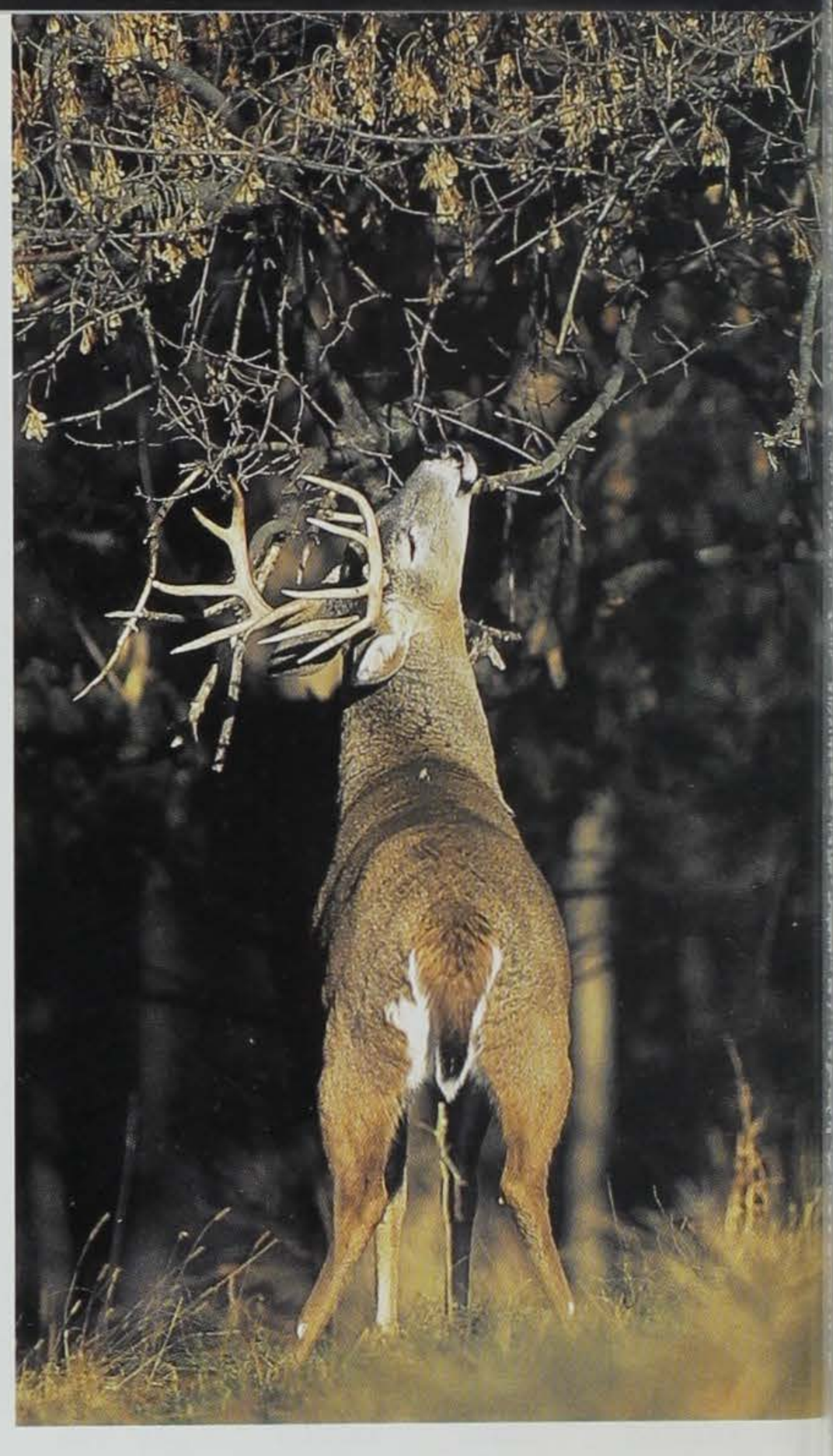
(Minimum Qualifying Score -- 150 pts.)

NAME	CITY	COUNTY TAKEN	TOTAL SCORE	YEAR
*Rick Barnes	Carlisle	Decatur	166 2/8	1994
*Todd Massner	Mediapolis	Des Moines	164 6/8	1996
Tom Henline	Norwalk	Madison	160 3/8	1996
Justin Miller	Fairfield	Jefferson	159 2/8	1991
Mike Semke	Grand Junction	Greene	158 7/8	1989
Charles Allen	Council Bluffs	Mills	155 3/8	1996
Mick Wade	Washington	Washington	154 2/8	1996
Gene Baskett	Ottumwa	Wapello	151 2/8	1995
David Winwood	Williamsburg	Iowa	152 6/8	1989
Rick Malone	Adel	Monona	151 1/8	1995
Randy Mc Pherren	Unionville	Appanoose	150 1/8	1995
Joseph Hahn	Chariton	Lucas	150 1/8	1995

SHOTGUN, NONTYPICAL

(Minimum Qualifying Score -- 170 pts.)

NAME	CITY	COUNTY TAKEN	TOTAL SCORE	YEAR
Ronald H Junck	Sioux City	Plymouth	226 4/8	1995
Kevin Reints	Clarksville	Page	212 5/8	1995
Tom La Pointe	Mason City	Worth	211	1995
Mike King	Pleasnatville	Warren	206 6/8	1995
Steve M Loban	Oelwein	Fayette	203 3/8	1995



Bruce Pettyjohn	Hamilton	Monroe	203 2/8	1995
Jesse M Tink	Waterloo	Allamakee	201 1/8	1995
Steve Kirk	Center Point	Allamakee	198 2/8	1994
Raymond Hinkel	Norway	Monroe	197 5/8	
Carl A Bell	West Point	Lee	197 4/8	1995
Mike Perkins	Corydon	Wayne	195 7/8	1995
Kenneth Norris	Blockton	Taylor	195 4/8	1995
Raymond Hinkel	Norway	Monroe	193 7/8	1995
Brad Moore	Centerville	Appanoose	193 1/8	1995
Don Brady	Cedar Rapids	Guthrie	193 1/8	1956
Joey Ballard	Indianola	Warren	192 7/8	1994
Charles Brooks	Knoxville	Lucas	192 4/8	1965
Stanley Simmons	Fairfield	Jefferson	191 1/8	1990
Todd Godfrey	Mason City	Webster	190 7/8	1996
Bill Jon Black	Leon	Decatur	190	1992
Darin Schrader	Sumner	Fayette	188 6/8	1995
Noland C Johnson	Malcom	Monroe	186 4/8	1995
Rex Pollock	Humeston	Wayne	185 2/8	1995
Mark Lawson	Waverly	Ringold	184 4/8	1995
Jack Hack	New London	Henry	184 2/8	1986
David Steeve	Clarinda	Taylor	184	1996
Gary Cobb	Osceola	Clarke	183 3/8	1995
Ted Halls	Murray	Clarkk	179 5/8	1996
James Gipple	Wapello	Louisa	179 2/8	1995
Chad Garmon	Bloomfield	Davis	179	1995
Mike Steele	Evansdale	Winneshiek	178 2/8	1995

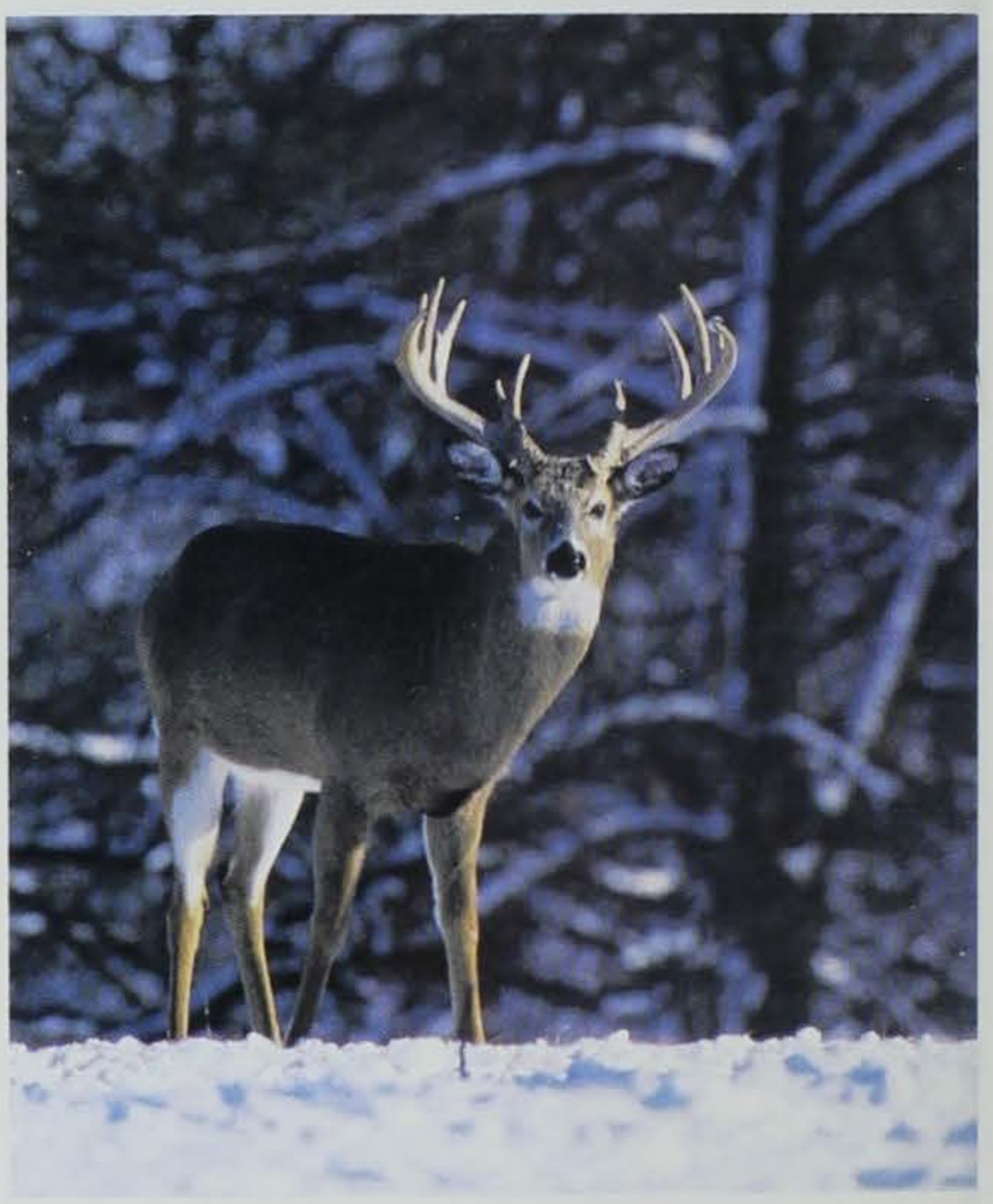
Samuel Huerta	Council Bluffs		177 7/8	
Dan Weitzenleap	Des Moines	Howard	177 6/8	1994
Todd Determan	Clinton	Allamakee	175 5/8	1995
Gale Mecham	Knoxville	Monroe	175	1993
Greg Mohr	Spirit Lake	Clayton	174 5/8	1985
Chad Laabs	Guthrie Center	Guthrie	174	1995
Frank Shively	Bloomfield	Davis	172 7/8	1959
Shane Hass	Mc Gregor	Clayton	172 1/8	1990
Jeff Brownfield	Clarinda	Taylor	171 7/8	1995
Eric Morgon	Bloomfield	Davis	171 2/8	1995
Mike Jasper	Burlington	Jefferson	170 4/8	1995
Randall D Rieken	Wellsburg	Hardin	170 3/8	1989
Kevin Breeser	Ridgeway	Winneshiek	170 2/8	1995

SHOTGUN, TYPICAL

(Minimum Qualifying Score -- 150 pts.)

NAME	CITY	COUNTY TAKEN	TOTAL SCORE	YEAR
*Arlen Meyer	Clarinda	Page	190	1995
*Chris Jimerson	Clarinda	Union	189 3/8	1995
Darin Schrader	Sumner	Fayette	188 6/8	1995
Dennis Gruss	Carlisle	Adair	186 7/8	1995
Roger Corry	Birmingham	Van Buren	186 1/8	1995
Roy Mikesell	Des Moines	Madison	183 4/8	1995
Bill Walstead	Swea City	Emmet	183	1974
Gale D Johnston	Greenfield	Adair	181 3/8	1995
Ron Richards	Eddyville	Mahaska	181	1995
Glenn Farrington	Olin	Cedar	180 7/8	1994
David L Goedert	Dubuque	Allamakee	180 2/8	1995
Gary Roland	Fairfield	Jefferson	179 3/8	1995
Stan Jarosh	Cedar Rapids	Allamakee	178 3/8	1976
Glen Gienau	Tripoli	Winneshiek	177 5/8	1995
Michael White	Bloomfield	Davis	177 1/8	1995
Bruce Spiller	Des Moines	Van Buren	176 4/8	1995
Monte Carlson	Ogden	Boone	175 7/8	1995
Tom Shea	Postville	Clayton	175 2/8	1995
Gerald Gress	Waterloo	Fayette	174 4/8	1995
Brian Cox	Grand River	Decatur	174 2/8	1994
Mike Raskie	Exline	Appanoose	174 2/8	1992
Matt Lobdell	Montpelier	Van Buren	174 2/8	1995
Godfrey Rhyme	Duncombe	Johnson	173 6/8	1968
Wayne Bueltel	Lacona	Warren	173 6/8	1989
Scott Doerring	Monona	Clayton	173 2/8	1995
Kenny White	Ridge Way	Winneshiek	173 1/8	1995
Chris Schiller	Donnellson	Lee	172 2/8	1995
Rodger Johnson	Dubuque	Jackson	171 6/8	1995
Gregg Klein	Waukon	Allamakee	171 6/8	1995
Justin Adams	Chartion	Lucas	171 3/8	1995
Van Lucas	Indianola	Warren	171 2/8	1995
Dell Wolhers	Logan	Harrison	171 2/8	1996
Steve Wearmouth	Waukee		171	1996
Rod Woodward	Moravia	Appanoose	170 6/8	1995
Marty Gehringer	Saint Marys	Warren	170 5/8	1995
Eric Thorstenson	Waukon	Allamakee	170 1/8	1995
Kenny Archer	Ottumwa	Wapello	170	1995
Garry G Brown	Charles City	Floyd	169 7/8	1995
Rick Petersen	Wheatland	Clinton	169 5/8	1995
Jay Graham	Muscatine	Louisa	169 4/8	1995
Arlen Meyer	Clarinda	Page	169 3/8	1993
John Mineart	Fairfield	Van Buren	168 7/8	1995
Brent Ludwick	Ottumwa	Davis	168 6/8	1995
Ken Van Fossen	Boone	Boone	168 2/8	1993
John F Miculinich	Oelwein	Clayton	168	1995
Doug Blegen	Decorah	Winneshiek	168 1/8	
Mike Leu	Hastings	Mills	167 4/8	1995
Brian Septer	Lockridge	Jefferson	167 1/8	1994
Layton Miller Sr	Mingo	Decatur	166 6/8	1995
Mike Zerba	Center Point	Clayton	166 6/8	1994
John M Pratt	Fort Madison	Lee	166 6/8	1995
Jim Bohr	Wellman	Monroe	166 3/8	1995
Greg Kent	Osceola	Clarke	166	1995
Nick Boyd	Des Moines	Lucas	165 7/8	1995
Scott Brown	Peterson	Clay	165 5/8	1995
Tony Greiner	Keota	Washington	165 3/8	1995
Shane Morse	Sigourney	Keokuk	165 3/8	1995
Kevin Gast	Sheffield	Franklin	165 2/8	1994
Dean Black	Ottumwa	Davis	165 2/8	1995
Ray A Quint	Dubque	Dubuque	165 1/8	1995
Richard Swanson	Lockridge	Jefferson	164 7/8	1995
Wayne Thornsberry	Cantril	Van Buren	164 5/8	1972
Rick Barnes	Carlisle	Warren	164 5/8	1993
Donnie Sandifer	Blakesburg	Wapello	164 3/8	1995
Marvin Boyd	Lucas	Lucas	164	1985
Ryan P Law	Duncombe	Webster	163 6/8	1995
Alan Norton	Fairfield	Jefferson	163 3/8	1989
Pat Perry	Mondamin		163 2/8	1994
Paul Nowachek	Maquoketa	Jackson	163	1995
Todd Sievers	Albert City	Taylor	162 7/8	1994
Ryan P Lan	Duncombe	Webster	162 7/8	1995
Eron Prevo	Bloomfield	Davis	162 6/8	1993
Jeff Chase	Williamsburg	Lee	162 4/8	1994
Jeff Seuferer	Lacona	Lucas	162 3/8	1992
Bob Griffith	Blakenburg	Monroe	162 3/8	1995
Quentin Holkesvik	Decorah	Winneshiek	162 2/8	1995
Wendell Woldruff	Carlinda	Cass	161 5/8	1973
Kelli Confer	Omaha	Montgomery	161 4/8	1994
Alan Katko	Eddyville	Wapello	161 3/8	1985
Scott Hoch	Knoxville	Marion	161 2/8	1995
Gary De Wolf	Washington	Washington	161 1/8	
Dan Greiner	Washington	Washington	161	1995
Jason Sothman	Ottumwa	Wapello	160 7/8	1995
Harp Pettyjohn	Hamilton	Marion	160 7/8	1995
Lynn Forrest	Hedrick	Jefferson	160 7/8	1995
Scott Huebener	Marion	Clayton	160 7/8	1995
Lonnie Stringer	Norwalk	Warren	160 7/8	1995
Craig Harvey	Iowa City	Louisa	160 4/8	1991
Mark Simms	Albia	Monroe	160 3/8	1995
John Jamenson	Mystic	Monroe	160 1/8	1995
Tadd Andrle	Fairfax	Appanoose	159 7/8	1995
Bill Dunkelberger	Dike	Marshall	159 3/8	1995
Louis Reed Jr	Castana	Monona	158 7/8	1995
Larry R Brewster	Mount Pleasant	Henry	158 7/8	1996
Jerry Marlay	Albia	Monroe	158 6/8	1995
Aaron Sudbrock	Lacona	Warren	158 6/8	1995
Robert D Wilson	Ottumwa	Monroe	158 6/8	1995
Harry G Allsup	Quasqueton	Taylor	158 5/8	1995
Richard Rieson	Battle Creek	Ida	158 5/8	1994
Tom Rotert	Afton	Union	158 3/8	1994
Brian Maloney	Saint Charles	Warren	158 2/8	1988
Mark Philby	Red Oak	Montgomery	158 2/8	1995
Mike Campbell	Burlington	Des Moines	157 6/8	1995
Scott Hoch	Knoxville	Marion	157 5/8	1995
Steve Wild	New Albin	Allamakee	157 4/8	1994
Dan Burkhart	Hornick	Monona	157 4/8	1992
Jim Thomas	Centerville	Appanoose	157 2/8	1986
James Cluney	Washington	Van Buren	157 1/8	1988
Gary Walberg	Centerville	Appanoose	157	1989
Dr M. W. Karber	Grand Junction	Greene	157	1970
Harold Nelson	Clearfield	Taylor	156 7/8	1995
Loras Stillmunkes	Preston	Jackson	156 5/8	1994
Bill Brenning	Waterloo	Montgomery	156 5/8	1995
Mike Wells	Sigourney	Keokuk	156 5/8	1995
Larry D Kelley	State Center	Marshall	156 4/8	1995
Mike Feeney	Council Bluffs	Pottawattamie	156 4/8	1993
Richard C Morse	Sigourney	Keokuk	156 4/8	1993
Mike Stuart	Thayer	Union	156 4/8	1994
Harry Ellis	Earlham	Madison	156 4/8	1995
Jeff Powell	Casey	Guthrie	156 2/8	1994
Dennis Bayless	Shenandoah	Page	156 2/8	1996

Kerry Hackett	Oakland	Pottawattamie	156	
Dan Buck	Cherokee	Cherokee	156	1995
Tracey Johnson	Red Oak	Taylor	155 7/8	1995
Rodney Norman	Van Wert	Decator	155 6/8	1993
Gary Beck	Fort Dodge	Webster	155 6/8	1996
Dan Adamson	Creston	Union	155 6/8	1994
Steve Weighner	Harpers Ferry	Allamakee	155 5/8	1995
Kent Kluver	Manchester	Clayton	155 5/8	1995
William Heintz	Lamoni	Decatur	155 4/8	1995
Noah Smith	Hartford	Warren	155 3/8	1995
Tom Brown	Corning	Adams	155 3/8	1995
Ben Gatton	Delta	Keokuk	154 7/8	1994
Mark Peden	Ottumwa	Wapello	154 6/8	1995
Dave Woods	Humeston	Wayne	154 6/8	1993
Reggie Vanderhoof	Red Oak	Page	154 5/8	1995
Robert Tully	Des Moines	Decatur	154 5/8	1995
B J Gandy	Indianola		154 5/8	1995
Vern Bedford	Douds	Van Buren	154 4/8	1995
Craig Palme	Promise City	Wayne	154 4/8	1994
Brad Reints	Clarksville	Butler	154 4/8	1983
Roger Cook	Weaver	Lee	154 3/8	1995
Brad Wolterman	Carroll	Ida	154 3/8	1995
Dan White	Garden Grove	Decator	154 2/8	1995
Daniel Lenstra	Dubuque	Jackson	154 2/8	1992
Rick Shearer	Little Sioux	Harrison	154 1/8	1990
Donald Sadler	Marion	Alamakee	154	1994
Dean Gunderson	Monona	Clayton	154	1995
Howard Adrian	Fairfield	Jefferson	154	1995
Everett C Smithburg	Fairfield	Jefferson	153 7/8	1995
Tony Decoster	Brooklyn	Appanoose	153 6/8	1995
Jack Schuler Jr	Indianola	Decatur	153 6/8	1992
Kevin Raddatz	Walker	Linn	153 5/8	1993
D Todd Durflinger	Ottumwa	Davis	153 5/8	1995
Gregg Voegtlin	Runnells	Polk	153 5/8	1995
Rich Briner	Creston	Ringgold	153 5/8	1995
Tim Erickson	Lorimor	Union	153 5/8	1995
Bill Evans	Leon	Decatur	153 4/8	1993
Max Sommers	Maquoketa	Jackson	153 3/8	1995
Jason Mootz	Dubuque	Jackson	153 2/8	1995
Chris Nielsen	Dike	Marshall	153 2/8	1995
Dave Steil	Colesburg	Clayton	153 1/8	1995
Blaine Myler	Missouri Valley	Harrison	153 1/8	1994
Larry Burkett	Rippey	Greene	153 1/8	1995
Martin Meador	New Virginia	Warren	153 1/8	1995
Herm Wyatt	Oskaloosa	Monroe	153 1/8	1995
Mike Fields	Milton	Van Buren	153	1993
Jim Schaefer	Monroe	Warren	152 7/8	1994
Arnold Carkhuff	Mount Pleasant	Henry	152 5/8	1994
Rick Young	Des Moines	Wayne	152 5/8	1995
Larry Harmon	New Albin	Allamakee	152 4/8	1995
David Brown	Earlham	Madison	152 4/8	1994
Kermit Exline	Corydon		152 3/8	1995
Martin T Pieper	Adel	Guthrie	152 1/8	1995
Lowell Iburg	Marengo	Jefferson	152 1/8	1995
Andrew Mitchel	Dunlap	Crawford	152 1/8	1995
Gary Mc Kinney	Creston	Union	152 1/8	1994
Andrew Mitchel	Dunlap	Crawford	152 1/8	1995
Chris Bauer	Stratford	Hamilton	152	1975
Glen D Hanson	Greenfield	Adair	151 7/8	1995
Dean Glascock	Cincinati	Appanoose	151 6/8	1993
Todd Alisiani	Indianola	Warren	151 5/8	1995
Robert Wood	Waterloo	Franklin	151 5/8	1995
Todd Cook	Van Wert	Decatur	151 4/8	1993
Tony Westercamp	Bonaparte	Van Buren	151 4/8	1989
Joe Grossman	Webster City	Madison	151 4/8	1995
Ryan Hammond	Creston	Union	151 4/8	1995
Rick Van Dusseldorp	Oskaloosa	Wayne	151 3/8	1995
Ken Reynolds	Woodbine		151 2/8	1991
Jim Consbrock	Burlington	Des Moines	151 2/8	1979
Tim Root	Creston	Union	151 2/8	1994
Justin Kneczinski	Marion	Buffalo WI	151 2/8	1988



Roger Vannausdle	Red Oak	Montgomery	151 1/8	1995
Larry Sivill	Chariton	Lucas	150 7/8	1995
Jason Howe	Waukon	Allamakee	150 7/8	1994
Mark Preston	Prescott	Adams	150 6/8	1994
Jeremy Foglesong	Moulton	Appanoose	150 5/8	1994
Shawn Sturtewagen	Elkhart	Decatur	150 5/8	1995
Kenny Hawkins	Salem	Henry	150 4/8	1995
Greg Roben	Rockwell	Cerro Gordo	150 3/8	1995
Gory Lamfers	Goodell	Hancock	150 2/8	1995
Milo Fred Brown Jr	Le Claire	Jones	150 2/8	1995
Tom Anderson	Stuart	Guthrie	150 2/8	1992
Richard J Hess	Dubuque	Dubuque	150 1/8	1986
Luke Brown	Moulton	Appanoose	150 1/8	1995
Scott Weimerskirch	Bellevue	Dubuque	150	1995
Jon Thornsberry	Cantril	Van Buren	150	1994
Cory Snyder	Halbur	Green	150	1995
Clint O'Day	Bonaporte	Van Buren	150	1988
Trent Schuldt	Van Wert	Decator	150	1994
Allen Backensted	Strawberry Point	Clayton	150	1989

** indicates a new entry into the* All-Time Top 10 Racks.

A list of the All-Time Top 10 Racks can be found on page 58 of this issue.

Iowa's Energy Leaders

Iowa Energy Leadership Awards

Article and photos by Patricia S. Cale

From students learning how to construct houses, to a resource center for engineers and contractors, to an architectural firm that specializes in beautiful and functional designs, Iowa's Energy Leaders are building in energy efficiency. From a small rural electric cooperative to the largest investor-owned utility in the state, Iowa's Energy Leaders are helping communities. In companies and organizations throughout the state, Iowa's Energy Leaders are showing us how energy efficiency and renewable energy contribute to a clean environment and a healthy economy.

Each year the Iowa Department of Natural Resources recognizes Iowa's Energy Leaders for their innovations in efficiency and renewables. We now present the 1996 Iowa Energy Leadership Awards.

Building Bridges
Charles City Be Energy Efficient Project

■ **The Charles City Be Energy Efficient Project built bridges between public and private institutions in the community, just as this bridge connects two sides of the city park.**

A suspension bridge linking two sides of the city park is one of the memorable symbols of Charles City. A recent energy project has built a different kind of bridge in the community, a bridge between the public and private sectors. The effort resulted in new public-private partnerships, energy and dollar savings and a new community spirit, in the largest community-wide energy efficiency project west of the Rocky Mountains.

The Charles City Be Energy Efficient (BEE) project was initiated by MidAmerican Energy at the request of city officials who saw energy efficiency as a tool for economic development.

"A MidAmerican study showed that if all commercial and industrial customers would implement a comprehensive energy retrofit, it would require an investment of $1.4 million and would create over $5 million in economic activity," said Jeff Newburn, who developed the project for MidAmerican.

With interest from the city, business owners, school officials, residents and the utility, the project was kicked off in November 1994. MidAmerican hired The Energy Group to coordinate the project and offered energy audits, lighting retrofits, rebate packages and special financing, and local businesses lined up to make energy improvements.

Solvay Laboratories, the city's largest employer, was an early supporter and also took part in the project, making lighting improvements through-

out its lab, office, manufacturing and warehouse facilities. According to Rick McDonald, director of pharmaceutical production, their participation resulted in better light, more pleasant surroundings and higher morale, besides the energy and dollar savings.

"We won't realize the full benefit to the bottom line for a few more years, but I think it's important for us to be part of the community," said McDonald. "We're probably the single biggest user of electricity in town and so it was important for us to get on the bandwagon and be part of that whole effort."

In all, 68 commercial/industrial customers had lighting retrofits, 32 commercial customers made other improvements and nearly 1,000 residential customers signed up for programs. According to Jim Wubbens of Wubbens Electric, the local contractor that did most of the lighting retrofits, all the fluorescent tubes placed end-to-end would stretch 10 miles!

Another project funded by MidAmerican helped children plant trees around their school and an Eagle Scout develop an Adopt-A-Tree program. More than 400 trees were planted with the help of hundreds of community volunteers.

"The kids at the school sites have a lot of ownership in watching those trees grow and branch out, and they take a lot of pride even still," said Superintendent Marty Lucas. "It's been extremely successful in getting community folks working with kids."

MidAmerican Energy considers the project very successful because, "we were able to provide a valuable service to our customers by bundling many smaller projects into one large one," said Newburn. "Marketing to the whole community created synergies which resulted in greater participation and strengthened MidAmerican's relationship with the community."

The bridges built in Charles City through the BEE project "showed that we can succeed at a very extensive public-private partnership," said Mayor James Erb. "And I think that's all to the good because that's the way in the future we're going to have to go to succeed as communities."

■ **Jim Wubbens of Wubbens Electric in Charles City installed most of the new electronic ballasts and fluorescent lamps. The fluorescent tubes laid end-to-end would stretch 10 miles!**

■ **Tree-planting projects at the elementary school brought together kids and community members.**

■ **The Energy Resource Station, on the DMACC Ankeny campus, is a one-of-a-kind research, testing, demonstration and training facility. It was designed by FEH Associates to showcase energy efficiency.**

Waste Not, Want Not
The Energy Resource Station

Waste not, want not. That's the message the Iowa Energy Center's Energy Resource Station wants to send to building owners, architects and engineers. "If you're running an industry or a business, waste is a loss of potential profit. Inefficiency in the use of energy is waste," said Floyd Barwig, Energy Center director.

The Energy Resource Station, located on the Ankeny campus of the Des Moines Area Community College, is designed to promote energy efficiency, and therefore higher productiv-

ity and greater profitability, in commercial and industrial buildings.

"One of the major users of energy in this state is commercial buildings," said Barwig. "So it's very clearly part of our mission to work with the owners, the operators, the designers of commercial buildings to improve energy efficiency and do that in a way that has meaning to them."

■ **John Webster checks gauges on the Station's chilled water system. All of the building's systems also serve as teaching tools.**

The key to the facility is the hands-on approach. The Resource Station is a one-of-a-kind research, testing and demonstration center. It provides building owners and operators, architects, engineers and contractors with the chance to see equipment and systems in operation in a real-world setting.

"It's easy to look in a catalog and see tables and tables of data, " said Curtis Klaassen, Energy Resource Station manager. "All that data may be meaningful to a highly technical person, but what does it mean to the building owner or the building occupant who has to live or work in that space? We're able to provide a hands-on demonstration."

The Energy Resource Station succeeds with building owners and designers because the staff recognizes their concerns and their priorities. According to Barwig, building designers and operators have to keep current on safety and health issues, new technologies, building codes and many other issues in addition to energy efficiency. "It's very difficult to keep up with all of the information on all of these subjects," he said. "What we want to be is the place where they can find their energy information."

■ **An ice storage system takes advantage of off-peak electric rates for cooling needs, as shown by Curtis Klaassen.**

Visitors to the Energy Resource Station will find testing rooms; displays of state-of-the-art technologies, such as geothermal heat pumps; publications, case studies and manufacturers' literature; a technical library; and computer information center.

"It's all here for people to see," said Klaassen. "We'll visit with them about the energy-saving aspects and try to give them the information they need to make an energy-wise choice."

As the old, wise saying goes, waste not, want not. The Iowa Energy Center's Energy Resource Station can help.

■ **The Great West Casualty headquarters in South Sioux City, Nebraska, has rows of solar collectors incorporated into the building face. A fountain also serves as an evaporative cooling system for the building.**

Form Follow Function

FEH Associates Architects Engineers

In architecture, the golden rule is "form follows function." If one of the functions of the buildings FEH Associates design is to save energy, then the forms they take follow perfectly. Buildings such as the MidAmerican Energy office in Sioux City, the Great West Casualty headquarters, and the Denison Municipal Utilities building are examples of beautifully designed, well-functioning and energy-saving constructions.

FEH Associates, a firm of architects and engineers based in Sioux City

Balthazar Korab

■ **Skylights in the MidAmerican Energy office in Sioux City bring in the outdoors.**

and West Des Moines, has pioneered the use of passive solar building designs and high-efficiency energy systems in these and other buildings. From ice storage, to active solar collectors to an earth-heat transfer system, FEH Associates have made highly innovative energy technologies work to meet their clients' goals of efficient buildings.

According to James Champion, AIA, FEH architect and vice-president, Great West Casualty's owner came to him in 1979 to design a building that would be a statement of the company's principles. "The owner, Joe Morton, wanted to do something that expressed to the public a degree of energy consciousness and demonstrated good corporate citizenship," he said.

The insurance company's building, located in South Sioux City, Nebraska, embodies those principles. Its north side is earth-bermed, while the south side is lined with solar collectors. Thermal mass provided by 16-inch-thick concrete walls and the passive solar design mean that the building requires very little mechanical heating or cooling.

FEH Associates

■ **Denison Municipal Utilities' headquarters uses innovative, all-electric heating and cooling systems.**

The earth-heat transfer system also helps. In the summer, a system of pipes running through the earth cools outside air before it enters the building to about 60 degrees. In the winter, the colder air is warmed as it passes through the earth, requiring very little heat to bring it up to the desired indoor temperature.

Heating needs not met by the passive systems are supplied by pumps circulating water heated in the active solar collectors. A computerized control panel tracks temperatures

Balthazar Korab

■ **An energy-efficient building can also be an attractive and livable building. Employees of MidAmerican Energy enjoy working in their offices.**

■ **James Champion shows ice being made in MidAmerican's ice storage system. The system, the first of its kind in Iowa, has been operating since the early 1980s.**

throughout the building and directs heat where needed.

"The biggest problem we've had with the solar collectors is getting too much heat. The excess is routed to the reflecting pond, which looks like a fountain but is actually an evaporative cooler," said Champion.

In utility company buildings, FEH also has had the opportunity to build showcases of energy-efficient design and operation. The MidAmerican Energy office building in downtown Sioux City and the Denison Municipal Utilities headquarters incorporate innovative uses of ice storage, heat exchangers, skylighting, super insulation and passive solar.

Energy efficiency "is just something we always try to keep in mind on every project. Sometimes we're successful and sometimes we're not. But we make the effort and it's paid off in the long run," said Champion. "We've developed some good projects and some good clients." Form follows function, and energy efficiency follows innovative design.

More Than Bargained
Iowa Central's Carpentry Program

People are getting more than they bargained for from the Iowa Central Community College Carpentry Program. Students are getting a better education, homeowners are getting better homes and the Fort Dodge community is getting a better environment, thanks to Bill McAnally's approach to teaching home construction.

The carpentry program is the only one in the state to emphasize energy efficient construction techniques. The 20 students who participate in the program gain skills that will give them an edge in the job market. The curriculum is hands-on -- each year the students design and build a house from the ground up.

■ **The houses built by Iowa Central students are quick sellers, and owners are pleased with their comfort, affordability and quality construction.**

"They have the advantage of trying new methods and technologies that the average home builder may shy away from because of cost or unfamiliarity with certain materials or techniques," said McAnally.

The energy efficient methods work. The house the 1994-95 group built achieved a 95.5 score under the Home Energy Rating System, the highest score to date in Iowa.

Students in McAnally's program aren't the only ones learning about energy efficient construction, however. Builders, realtors, building officials, utilities and homeowners in the area also benefit from McAnally's instruction, through seminars and programs or just by visiting the building sites.

"We're trying to focus on cost-effectiveness," said McAnally. "We want to be able to show people that the best way to build is the way we're building."

The owners of the homes built by McAnally's students also gain an edge in lower energy bills and more comfortable and valuable houses. "The owner of the house we built two years ago was so happy with his energy bills that he came and gave us a turkey on Thanksgiving! So I'm really happy that he's happy," said McAnally.

A cleaner environment, both indoors and outdoors, is another goal of McAnally's techniques. "Many of the products used in the homes were selected for environmental sustainability," said McAnally. This includes recycled newspaper for wet-blown cellulose insulation, siding made of cement and wood fibers, young-growth plantation lumber for floor joists, heat-recovery ventilation systems and low-formaldehyde, low-emission materials and paints.

People are getting more than they bargained for from the Iowa Central carpentry program because Bill McAnally believes in continually learning, experimenting, improving and teaching. His approach is having an impact on the energy efficiency of Iowa's homes.

■ **Students in Bill McAnally's carpentry program gain real world skills in energy-efficient construction, giving them an edge in the job market.**

■ **The house just started by the program will be monitored through a grant from the Iowa Energy Center for temperature differentials, humidity levels and moisture content, carbon dioxide, carbon monoxide and radon. The data will be available to the public through the Iowa Central Internet Home Page.**

Exceeding Expectations
Linn County Rural Electric Coop

Linn County Rural Electric Cooperative (REC) wants to exceed its customers' expectations. After all, the 13,000 customers are also cooperative members. So, to find out what the members wanted, Member Services Director Kathy Trump asked them through focus groups and surveys.

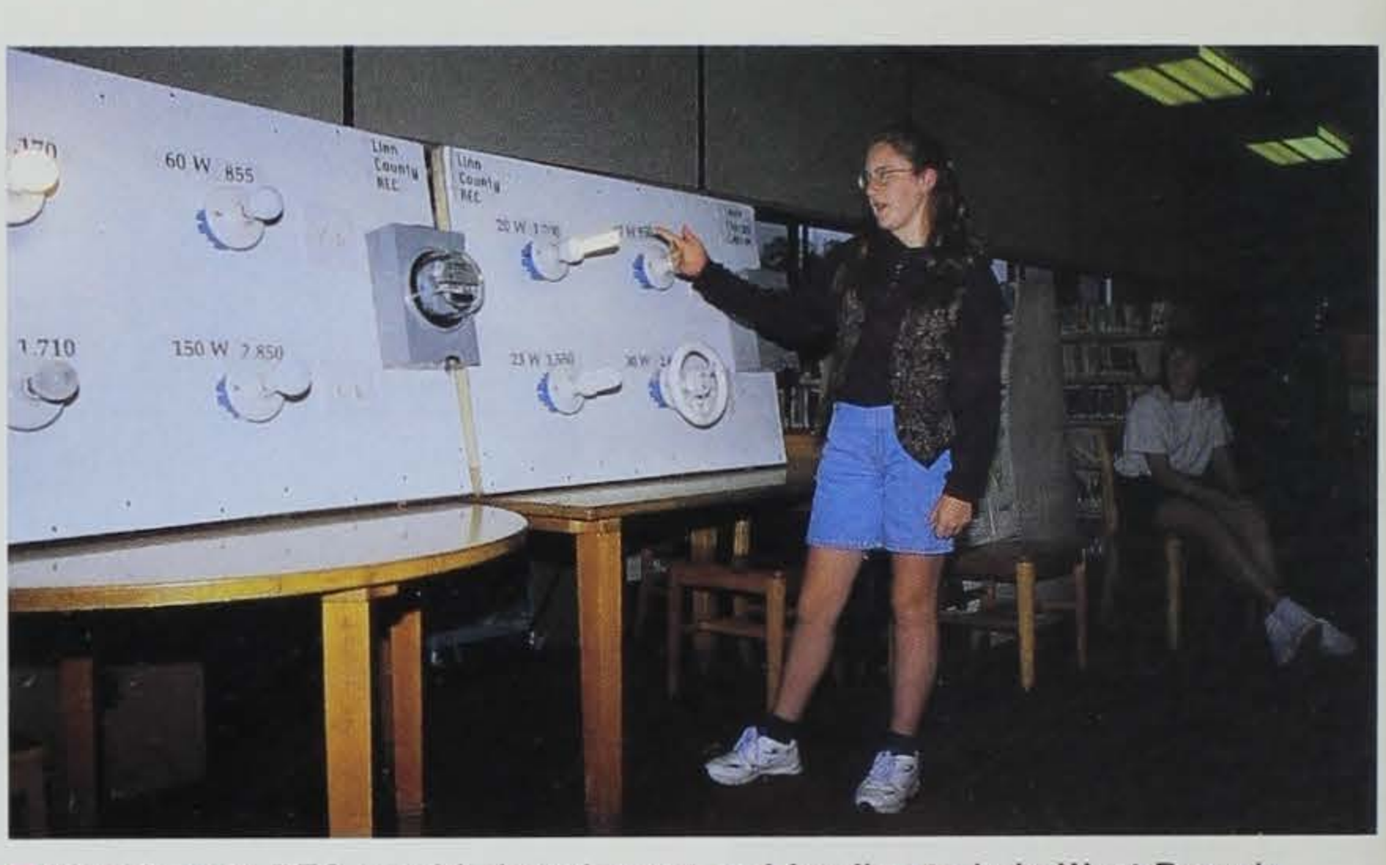
"We heard from the members that safety and energy efficiency are two of the main issues they would like to hear from us about, and they want programs and services related to these areas," said Trump. The information confirmed that the utility's energy efficiency efforts were on track.

The REC offers a variety of programs for residential and commercial customers, from business energy audits to rebates to installing an insulating blanket on a home water heater. "We actually go out and install compact fluorescents, high-efficiency

■ **Member satisfaction is what the REC, located in Marion and serving parts of Linn and Johnson counties, strives for.**

showerheads, sink aerators and water heater blankets. It gives us an extra chance to educate," said Trump.

Educating the community about energy efficiency is an important part of Linn County REC's mission. One of the most effective ways of educating both current and future energy users is through the schools, according to Trump. "We believe in getting to students early to help make a difference in their life decisions," she said.



■ **Linn County REC provided equipment and funding to help West Branch Middle School students conduct energy research. This experiment compared incandescent to compact fluorescent lamps.**

■ **Adding 500 services a year keeps staff busy calibrating electric meters.**

The REC had a strong effort in place to teach pre-school and elementary school students about electric safety and energy efficiency when they were approached by West Branch Middle School in 1992. Science instructor Hector Ibarra was seeking equipment and funding for hands-on research programs on energy and water conservation. Linn County REC has been a steadfast supporter since then, providing electric meters, compact fluorescent lamps, high efficiency showerheads and faucet aerators, as well as funding.

"The students take home the equipment, install it, and do analyses. They measure the savings in kilowatt hours and in emission reduction," said Trump. "The program is multi-disciplinary and that was one thing that impressed us."

Looking toward the future with educational programs is just one of the ways Linn County REC plans ahead for change. Its membership is changing, from predominantly rural to more suburban in character. Its membership is growing, with 500 new services added every year. And, changes in the utility industry will affect this member-owned organization as utilities struggle to compete.

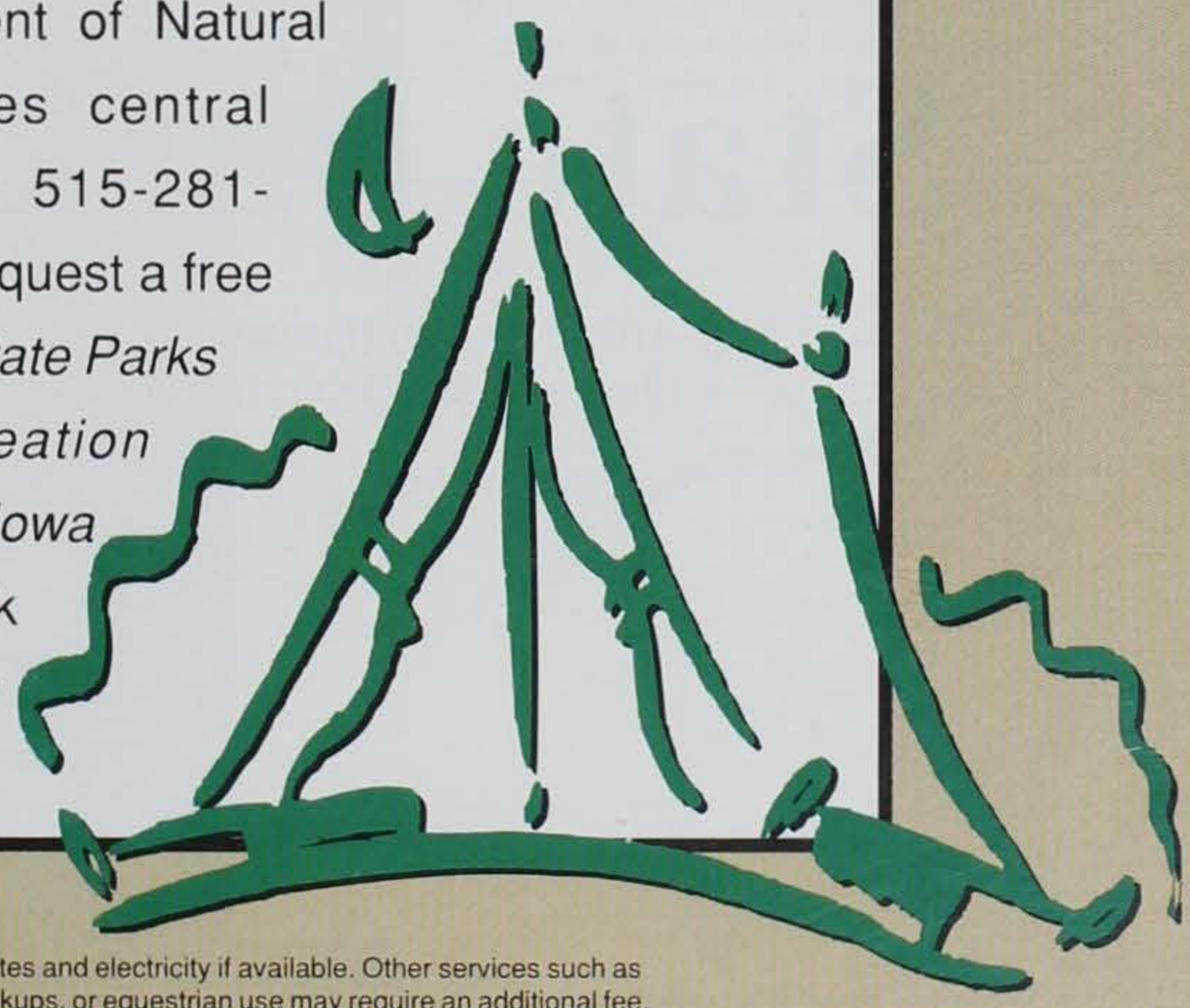
One thing that won't change is Linn County REC's commitment to energy efficiency and to exceeding its members' expectations. "Linn County REC will continue to provide energy efficiency programs, even in light of legislation that has changed some of those mandates. The interaction we've had with our members has proven to be a valuable asset to both Linn County REC and our members," said Trump.

■ **Linn County REC's service territory has changed from mostly rural to more suburban.**

a gift as big as all Outdoors

State Park Camping Coupons

A gift for Christmas or anytime of year, camping coupons redeemable at all DNR operated state parks and recreation areas. Choose between individual one-night camping coupons for $12 each, or purchase an entire coupon booklet good for 14 nights of camping* for only $126 -- a savings of three dollars per night. All coupons come with an attractive gift envelope and are available at most state parks or by contacting the Department of Natural Resources central office at 515-281-5918. Request a free copy of *State Parks & Recreation Areas of Iowa* guidebook with your order.



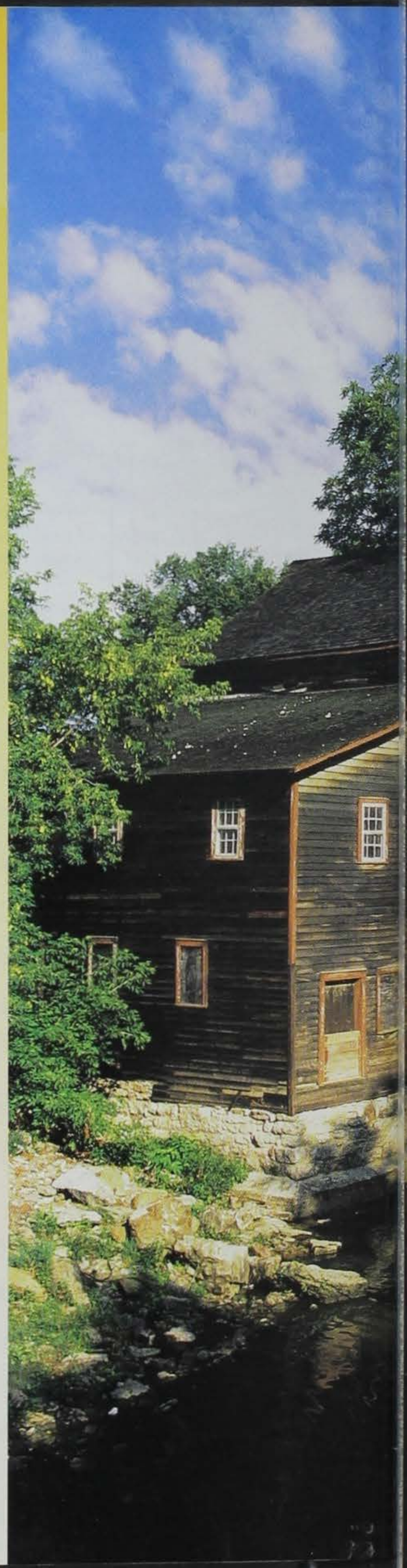
*Coupons good for campsites and electricity if available. Other services such as water, cable and sewer hookups, or equestrian use may require an additional fee.

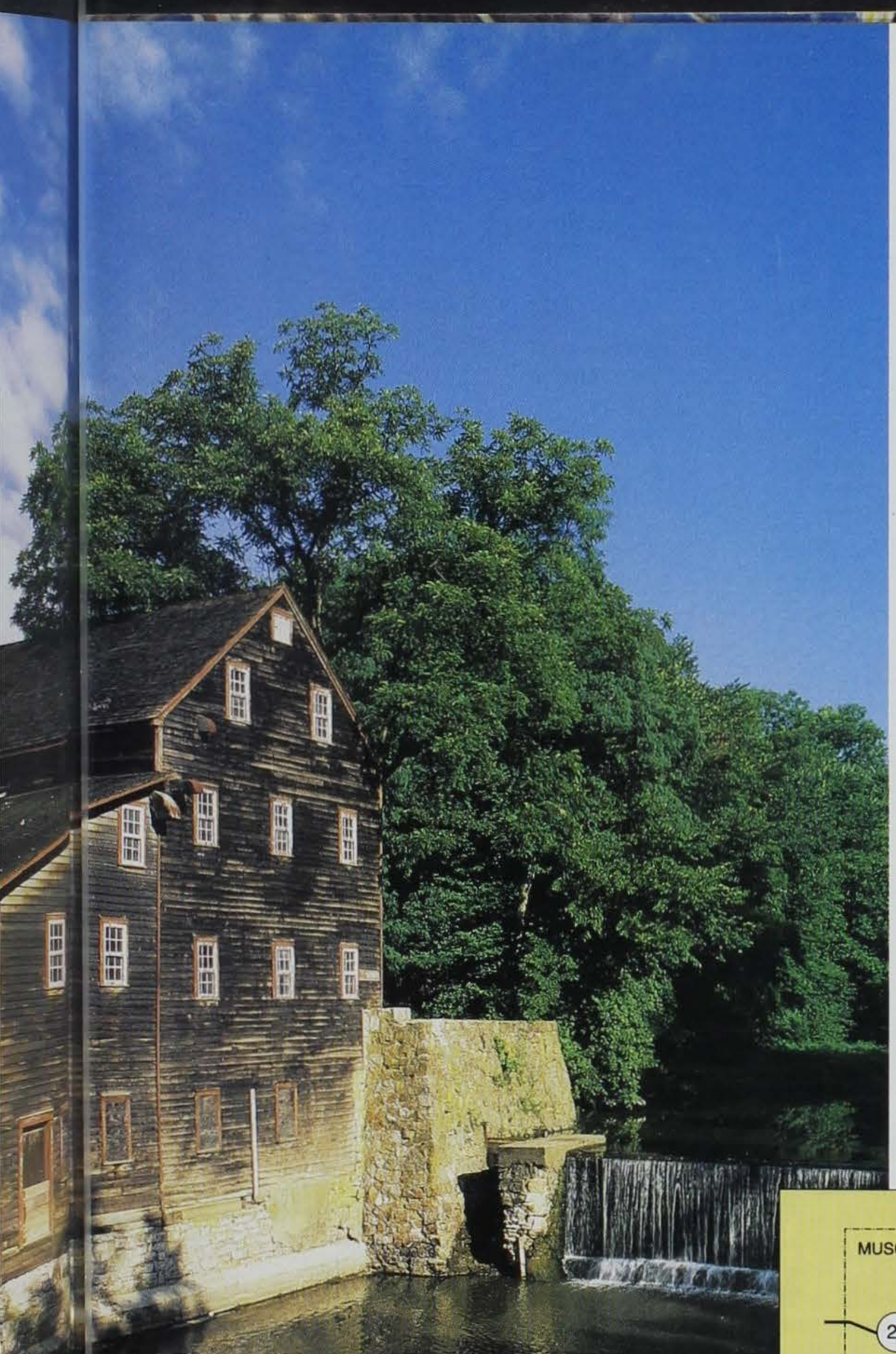
Parks Profile

With a variety of natural, geological and historical features, Wildcat Den has a wealth of recreational opportunities to offer the people of Iowa including picnic areas, a campground, two shelters and an extensive trail system.

Wildcat Den State Park

Article by Ken Hyman
Photos by Ron Johnson



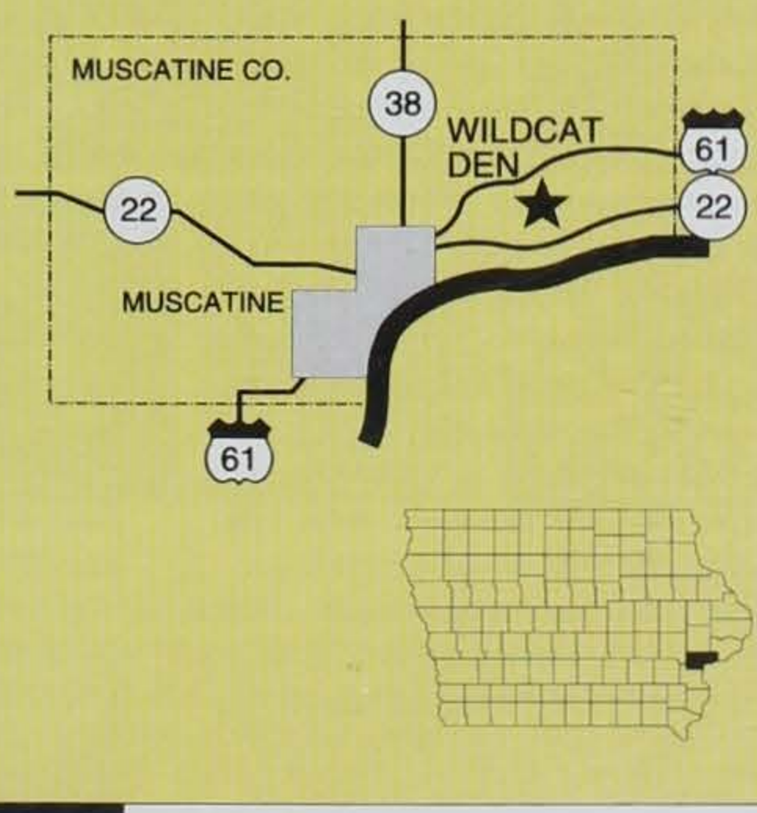


Iowa's state parks serve the recreational needs of Iowans in many ways -- by giving people a place to hike, a place to sit in the woods, a place in the outdoors to gather with family and friends. Iowa's parks have also been described as visual oases in a sea of corn and beans.

Wildcat Den State Park in far eastern Iowa is just such a place. Nestled in a wooded landscape complete with towering oaks, mossy logs and quiet dells filled with ferns, this quiet beauty is within 30 miles of 300,000 people, most of those, in the Quad Cities. The park preserves a natural area in this increasingly urban landscape, giving people a place to enjoy the outdoors.

When Iowa's park system was starting in the 1920s, Wildcat Den was one place conservationists of the time wanted to include. The area had been known far and wide for its scenery and plant life, however, it took a while for the park to become a reality. The first tract of land was donated in 1926 and during the next few years additional acres were purchased. The core of park was established by the early 1930s, but additional land was added to the park as late as 1978.

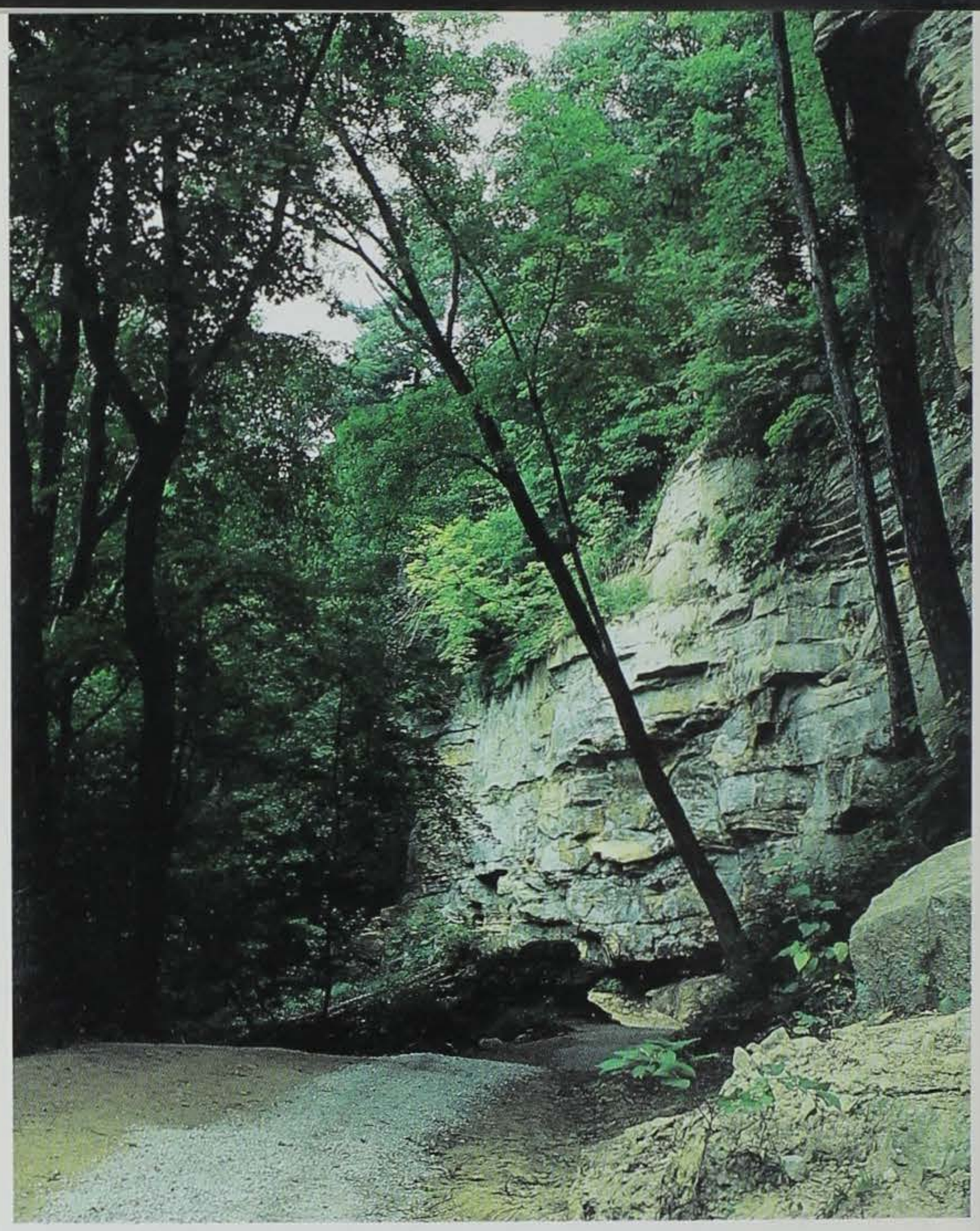
Harbored within the park are several rare and threatened plant species. The plants are protected to ensure their survival, but most people do not come to the park to look for rare plants but instead to enjoy the massive oak trees, wildflowers and lush herbaceous growth.



■ (preceding page) The 1848 grist mill at Wildcat Den State Park is a beautiful and unique historic site.

■ (right) Water seepage at the base of the cliffs forms an ideal habitat for many ferns and wildflowers.

■ (below) The grist mill contains a variety of old milling machines and in the future may be restored so it can again grind grain.



Another reason for the park's establishment was the geology of the area. Massive sandstone formations, originally laid down 300 million years ago by ancient rivers are exposed within the park. As modern streams cut down through the ancient formations, the sandstone formed immense vertical bluffs and steep-walled box canyons. The resulting 80-feet-high cliffs are now topped with towering white pines and oak trees.

To make this natural area easily accessible, there are several trails winding along the cliffs and through the woods. Extensive trail work has been done during the last ten years to improve the trails and make them safe and enjoyable. Some of the trails are relatively flat, but there are also extensive series of steps and stairways to allow hikers to get up and down the cliffs. The trail system is not complete and more work will be done in the years ahead.

The area was made into a park not only because of its botanical and geological features, but because Wildcat Den preserves some of Iowa's historical heritage. Two historic buildings are located in the park.

The oldest building is the 1848 grist mill. This site is truly unique because while there are a number of old, surviving mills, most of them are just the shells of buildings. The grist mill in the park retains not only the building, but the old milling machines. Included in the list of remaining machines is a run of stone burrs, early steel roller mills, bolters, bucket elevators, a water turbine, a very early steam engine and belts and pulleys literally "all over the place."

At the present time, parts of the mill are in bad shape. However, just last fall, a volunteer organization, Friends of the Mill, was formed to begin raising funds, doing research and developing a plan to repair the mill so it once again can grind grain. By next summer, Friends of the Mill hopes to replace some of the massive 12- by 12-inch beams and fix the water turbine. With continued support, the mill will be open as a living history site within a few years.

The other historic structure in the park is a country school. Classes were held in the school, built in 1877, until the 1960s. Another volunteer organization, Friends of the School, was organized to restore and preserve the history of this school and interpret the role of country schools in the educational heritage of the state.

Visit Wildcat Den — a unique oasis among the fields of grain. Come and enjoy a night of camping, a hike in the woods or simply a place of quiet beauty.

Ken Hyman is the park ranger at Wildcat Den State Park near Muscatine.

Winter Bird Feeding Tips

Bird feeding is one of the most popular wintertime "outdoor" activities. Observing birds through your window from the warmth of your house can bring the outside in while leaving the frost outdoors. It is better to begin feeding early in the autumn so birds can place your feeder on their "list of best dining spots" but it is never too late to get started.

The quickest way to begin feeding birds is to toss some birdseed on the ground. Keep in mind however, severe weather with additional precipitation and predation by ground dwellers such as cats are two reasons to provide an assortment of feeding elevations at different sites. Food at various levels will also attract particular kinds of birds. Be patient. It may take three or more weeks for the first birds to appear. Birds establish a "feeding circuit" and begin to make the rounds to those feeders they already know. If you are offering food appealing to the type of bird you wish to attract and have a variety of feeder locations and heights, your feeder will be added to the route.

Unusually warm weather or extremely cold, severe weather can also affect the number of birds at your feeder. If the weather is warm, birds do not need to eat as much and do not visit feeders as frequently. During severe weather birds may perish. You can encourage more bird survival and more birds at your feeder by good habitat management. Planting conifers for shelter and other food sources such as fruits, berries and nuts can make your site a more appealing spot on the bird "fine dining" circuit. (See the forest nursery order forms for songbird and wildlife seedling packets. Call 800/865-2477.)

Year round, birds must eat large amounts of high-energy foods and this is even more critical in winter. Studies have shown in summer, at around 85 degrees, small birds can survive about 67 hours without food. In winter, however, at an average of five degrees, they can only last about 15 hours without food. In most northern states (as we are only *too* aware this time of year) 15 hours is about the length of the winter night. Small birds need to feed during the winter daylight hours every day to maintain high body heat.

During the winter, songbirds must eat 30 to 80 percent of their body weight each day. Imagine a 150 pound person sitting down and consuming *75 pounds* of food. While many of us are looking for ways to cut calories and increase calorie-burning after the holidays, birds are also very calorie conscious — about maximizing calorie retention. If you locate your feeders near trees, bushes or structures where birds can perch as they wait for their turn to feed or in areas receiving sunlight and protected from the wind you can also help them save calories. However, locate your feeders several feet away from dense shrubs and keep brush piles under feeders fairly loose so there is not complete "cat cover."

While you want to enjoy observing the birds at your feeder, do not place all of the feeders at the same distance from the house. Vary the distance so birds too shy to come directly to your window can still be fed. Keep binoculars and a bird guide close to the window, especially if you are just "learning" your birds. Differences in body size and bill shape make different species prefer distinct types of food, just as habitat preferences affect the type of feeder each species selects.

Here are some basic types of feeders:

Ground feeding birds -- juncoes, some sparrows, cardinals, blue jays and even quail or pheasants -- like grassy patches next to a loose cover-providing brush pile. The smaller of these birds prefers white or red proso millet and the larger birds favor sunflower seeds and whole kernel corn.

Tray feeders include basic hopper or platform feeders raised off the ground and mounted on a fixed object like a fence or pole. These feeders host ground-feeding birds as well as chickadees, finches and nuthatches. While a simple, flat tray filled with seed attracts a wide variety of birds, the food is not protected from unwanted species, moisture or wind. By choosing a hopper feeder with a roof you can slowly dispense the feed and protect it from excess water.

Hanging feeders swaying freely in the wind work well on trees, branches, eaves or even clotheslines. The swinging does not bother finches, chickadees and

■ **The majority of birds in the fall and winter are attracted to seeds, but the seeds must be purchased carefully to avoid attracting unwanted birds and to reduce waste. Identifying seeds is the first step in careful seed selection. Some of the more common seeds are (top row from left) black oil-type sunflower, stripe sunflower, cracked corn, (bottom row from left) white proso millet, niger thistle, wheat and milo (sorghum).**

Feeding Areas and Preferred Food for Common Winter Birds in Iowa

Species	Feeding Area	Food
dark-eyed junco	1,2,3,	white and red proso millet sunflower seeds
chickadee	2,3,5	black oil and striped sunflower seeds
cardinal	1,2,3	all types of sunflower seeds
American goldfinch	2,3,5,	hulled and oil sunflowers, niger seeds, suet
downy woodpecker	3,4,5	beef suet, peanuts
purple finch	2,3,5	all types of sunflower seeds
woodpecker	3,4,5	beef suet
nuthatch	2,3,4,5,	black-striped sunflower seeds, peanuts, suet
pine siskin	2,3,5,	niger seed, all types of sunflower seed
tufted titmouse	2,3,5	peanuts, black-striped and oil sunflower seeds
evening grosbeak	2	all types of sunflower seeds
bluejay	1,2,3,	peanuts and sunflower seeds

1 - ground, **2** - tray, stationary hanger, **3** - large hanging, perches, **4** - tree trunk, **5** - cling, no perches

woodpeckers but makes the feeder less appealing to squirrels and house sparrows. Sunflower seeds are a favorite of birds preferring hanging feeders. Large feeders accommodate cardinals, while smaller feeders are geared toward species such as tufted titmice and nuthatches. Goldfinches and house finches love niger seed and placing it in a small-hole tube feeder makes it accessible to them while keeping other species out.

Tree trunk feeders are secured directly to the trunk or a log and attract insect eaters such as nuthatches and woodpeckers. These birds prefer food rich in protein and fat such as peanut butter and suet. This type of food can be pressed into the bark of a tree or placed in a feeder securely attached to the tree.

Clinging feeders dispensing suet, peanuts or peanut butter are made of hardware cloth, mesh bags (such as an onion bag), pine cones or even an empty coconut shell. The feeders lack perches and are excellent for attracting many insect-feeding birds such as downy, hairy and red-bellied woodpeckers. A clinging tube-type feeder formed from coated hardware cloth can also dispense sunflower seeds to nuthatches, finches and chickadees while discouraging starlings and house sparrows.

You can try to exclude "nuisance" birds by adapting your feeders. House sparrows and starlings are nonnative and can dominate your feeders. Neither of these birds are adept at eating from clinging feeders. Some feeders are protected by a mesh guard allowing finches and chickadees in to feed but excluding nuisance birds. On hanging feeders you can cut perches to less than one inch to deter unwanted species. You can also use suet feeders allowing access only from underneath the feeder. Woodpeckers, nuthatches and chickadees can hang upside-down to feed but starlings cannot. Eliminate perches from tree-mounted feeders and blackbirds or starlings will not be able to land and feed continuously.

If you are using a wire suet feeder, be sure the wire is coated with a rubberized or plastic coating. Anything moist can freeze to bare metal including birds' eyes, tongues or feet. If your feeder is uncoated you can purchase rubberized coating in a spray can at most hardware stores. Do not provide suet in warm weather as it quickly becomes rancid.

Ron Johnson

Different species frequently follow distinct feeding patterns. If using different types of feeders has not solved any problems with "bullies" (squirrels and unwanted species), you may want to try timing your feeding. When you are home during the day, observe the normal feeding pattern for your feeders. For example — goldfinches and cardinals may feed at dawn, the bluejays and squirrels an hour later and goldfinches may be back just before dusk. If you fill your feeders in the late afternoon the species you want to see will have plenty of food for their afternoon and dawn feedings, and there will be less for the unwanted species.

Filling your feeders with high-quality seed is less expensive in the long run. Feed which is too dusty, full of stems, or low-priced foods such as flax, white rice and oats are picked over and left behind as birds search for the most desirable food. Bulk purchases of food are often least expensive but be sure to keep your feed dry to prevent the growth of *apspergillosis*, a fungus causing a potentially fatal disease to birds.

Regular feeding makes little or no difference to the survival rates of bird species but probably does make a difference to a number of individual birds. While feeding them, you have the joy of observing and photographing them up-close. Remember your own enjoyment is the most important function of a feeding program.

Also, remember contributing to the Chickadee Checkoff on your Iowa income tax form benefits all nongame species including the songbirds at your feeder.

For a packet of information on bird-feeding contact the DNR's Wildlife Diversity Program, 1436 255th St., Boone, IA 50036, 515/432-2823.

Using Topographic Maps by Don Sievers

Background:

A topographic map provides us with a way to observe 1) variations in the surface of the land, 2) woodlands, lakes, marshes, and other natural landscape features and 3) buildings, mines, roads, wells and other cultural points of interest. Variations in elevation are shown by brown contour lines. Water is blue and woodlands are green, while roads and human-made features are black or red. Contour lines connect points of equal elevation along the land surface. The darker contour lines (index contours) have the elevation (in feet above sea level) recorded on them. By looking at the arrangement and spacing of contour lines, it is possible to get a view of Iowa's watersheds.

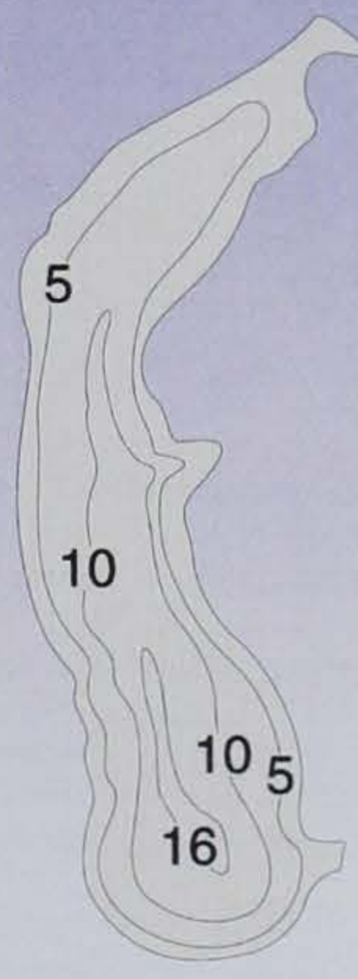
Maps are an essential part of ecosystem management, geologic research and surface and groundwater investigations. They are also essential for flood control, soil conservation and reforestation projects in watersheds. Other basic uses include planning airports, highways, livestock confinements, wastewater treatment plants, lakes, pipelines, wetlands, wind generator placement and almost any type of construction project necessary to modern life. The sustainability of Iowa's natural resources depends on the availability and use of good topographic maps.

Accurate topographic maps show clearings, relief features, watercourses, wooded areas and other features of great value to the bicyclist, hiker and outdoor enthusiast.

More than 1,100 topographic maps showing portions of Iowa are available. An index of maps is available from the DNR's Geological Survey Bureau, 109 Trowbridge Hall, Iowa City, IA 52242-1319, 319/335-1575.

Key Words:

Contour Line
Ecosystem Management
Geologic Research
Groundwater
Livestock Confinement
Natural Resources
Reforestation
Relief
Sustainable
Topographic Map
Watershed



■ Topgraphy of Springbrook Lake

Age:

Grade 5 and up

Objective:

Using a topographic map students will:

1. identify symbols used on topographic maps;
2. locate major natural features around Springbrook; and
3. locate major cultural features around Springbrook.

Season:

All

Length of Activity:

One hour

Equipment:

Map Symbols Handout
Topographic Map of Springbrook
Waterproof Marker
Pencil
Worksheet

Resources:

Topographic Maps. 1986. U.S. Government Printing Office 0-160-430.

Topographic Map Symbols. Department of the Interior U.S. Geological Survey National Mapping Division.

Project WILD Aquatic Education Activity Guide. 1987, 1992. Council for Environmental Education.

"IOWA WILD" K-6 Aquatic Supplemental Teacher's Resource Manual. 1990. Iowa DNR.

Project WILD K-12 Activity Guide. 1983, 1985, 1992. Council for Environmental Education.

An Iowa Supplement to Project WILD. 1985. Iowa DNR.

Classroom Corner

Previsit Suggestion:

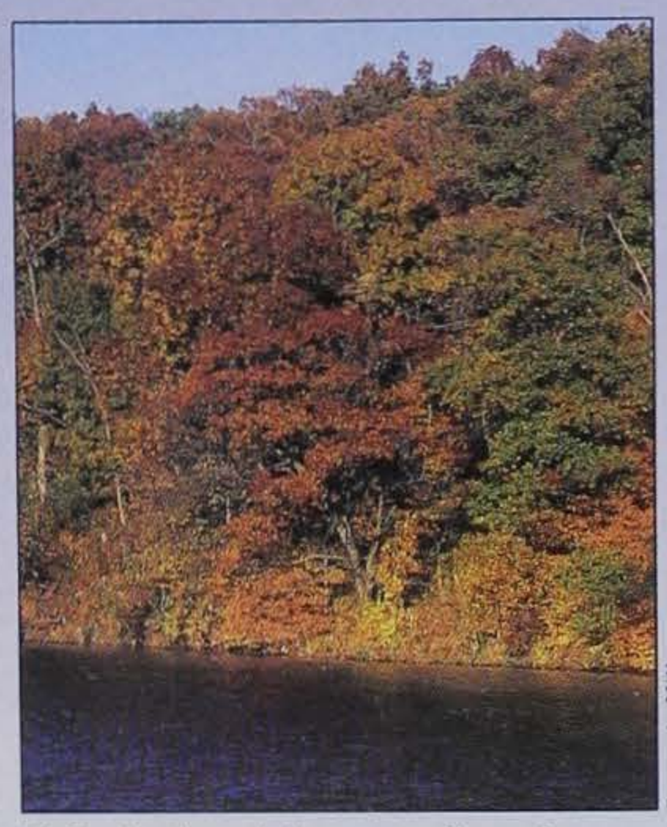
Contact the local NRCS office and invite the district conservationist or conservation technician to visit your classroom and explain how to use topographic maps.

Watershed (from *Project WILD Aquatic*)

Postvisit Suggestion:

New Land

Planning for People and Wildlife (from *Project WILD*)



Roger A. Hill

■ **Springbrook has a varitey of places to fish, canoe, bike and hike. Look at the diversity of the terrain on the topographic map.**

Don Sievers is a training officer at the department's Springbrook Conservation Education Center in Guthrie County.

Procedure:

1. Divide into small groups and give each group a topographic map to examine.
2. Use the map symbols handout to find major features on the map.
   - **a.** What colors are used on the map to identify: contour lines, vegetation and water?
   - **b.** Find the tallest hill in Springbrook State Recreation Area (called Springbrook State Park on the map). What is its elevation?
   - **c.** Using an erasable marker trace Springbrook Creek from its mouth to its origin.
   - **d.** In what direction do streams flow on your map?
3. Have the students complete the worksheet (below).

Topographic Map Worksheet

Natural Features:

1. How many lakes or farm ponds are there on the watersheds that run through Springbrook?

2. What is the difference in elevation from the highest point in Springbrook to the mouth of Springbrook Creek?

3. What is the difference in elevation between two light brown contour lines?

4. What groundwater feature is located west of Bagley along Highway 141?

5. What is the name of the creek that flows north of Springbrook?

6. What is the waterflow feature identified west of Springbrook along Highway 25?

7. Using the magic marker identify locations that would be good for:

- **a.** building a marsh
- **b.** camping
- **c.** canoeing
- **d.** fishing
- **e.** hiking
- **f.** picnicking

8. What is the longest stream shown on the map?

Cultural Features:

1. How many sewage treatment facilities can you find?

2. What are the names of two cemeteries on your map?

3. What important energy feature is shown?

4. What is the name of the small town shown on the map?

5. In which section (identified by a red number) can a sand pit be found?

6. There are two livestock confinements (identified by a series of symbols identifying barns) shown on the map. Which sections are they in? Are either within the Springbrook watershed?

Conservation Update

"Hooked On Fishing - Not On Drugs" Debuts In Iowa

Thirty educators, naturalists, youth leaders, and D.A.R.E. officers recently attended a weekend introductory workshop to learn about the *Hooked on Fishing - Not On Drugs* drug prevention program, according to DNR aquatic education coordinator Barb Gigar. Workshop participants will implement the program at 19 statewide locations this school year, through schools, camps and residential youth programs. These sites will then be used as models for others wishing to implement the *Hooked on Fishing - Not on Drugs* program.

"The *Hooked on Fishing - Not on Drugs* program uses sport fishing and aquatic education to teach life skills to youth, to help them develop positive self esteem and stay drug free," Gigar said. "The program provides a new avenue to introduce youth to fishing, providing them a fun activity which will also help them develop critical life skills. Fishing helps students and families by creating open lines of communication, getting parents involved in their children's education, and getting youth outside."

The workshop, cosponsored by the DNR Aquatic Education Program and the Dept. of Education's Substance Abuse Prevention Education Office, was presented by representatives from the Future Fisherman Foundation. The Iowa *Hooked on Fishing - Not on Drugs* program is funded through Sport Fish Restoration funds; the pilot workshop was funded with a Resources Enhancement and Protection (REAP) education grant. Gigar said program materials designed for K-12 will also be incorporated into *Fish Iowa!* training sessions by fall 1997. More than 100,000 Iowa students participate in the *Fish Iowa!* program each year.

For more information on *Hooked on Fishing - Not on Drugs* and *Fish Iowa!*, contact: Aquatic Education Program, DNR, 2473 160th Rd., Guthrie Center, IA 50115-8518; phone/fax: 515/747-2200.

1996 Wild Turkey Production Down

Iowa's 1996 wild turkey production was slightly lower than last year, according to DNR wildlife biologist Dale Garner. He said both the percentage of turkey hens with broods and the number of poults per hen were lower than production estimates developed from survey information collected in the summer of 1995.

Each summer, in cooperation with private individuals interested in Iowa's wild turkeys, the DNR conducts a survey to estimate wild turkey production the following spring. "Participants complete survey cards noting their observation of wild turkey flocks during July and August," Garner said. "The completed cards are returned to the DNR, the information analyzed and production estimates determined. Information from more than 1,500 returned cards was used to develop the production estimates for this past spring."

"We divide the state into seven large regions, and use the survey information to make estimates for each region and for the entire state," Garner explained. "Our *production index* is an estimate of the number of poults produced per 100 hens, and on the long-term, Iowa's average is six poults per hen. This year, five of the regions had small decreases in the percentage of hens with broods compared to the past five years, and all seven regions showed decreases in the number of poults per hen. This year's statewide average of 4.4 poults per hen in 1996 is only slightly lower than the production during the last five years, however, this is more than 1.5 poults per hen below the long-term average. On a statewide basis, last year's turkey production established a record low."

"Although the survey indicated low poult production this past spring, it's important to remember that our statewide turkey population going into summer was very good," Garner said. "With the large number of hens available for production next spring, there will continue to be good wild turkey populations in every region of the state."

Roger A. Hill

■ While Iowa's 1996 wild turkey production was slightly lower than last year, with the large number of hens available for production this spring, there will continue to be good wild turkey populations in every region of the state.

Conservation Update

ALL-TIME TOP 10 RECORD RACKS

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	196-4/8
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	190-0/8
*Arlen Meyer	Clarinda	Page	1995	190-0/8
*Chris Jimerson	Clarinda	Union	1995	189-3/8
Lamonte A. Stark	Mt. Pleasant	Henry	1984	189-3/8

SHOTGUN, NONTYPICAL

Name	City	County Taken	Year	Total Score
Larry Raveling	Emmetsburg	Clay	1973	282-0/8
Lyle Spitznoggle	Wapello	Louisa	1982	258-2/8
David 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	245-0/8
Robert Wonderlich	Oskaloosa	Monroe	1970	244-6/8
Wendell R. Prottsman	Mt. Pleasant	Henry	1988	231-1/8
Frederick A. Becker	Guttenberg	Clayton	1993	230-0/8
Edgar Shields	Grand River	Decatur	1986	229-6/8

MUZZLELOADER, TYPICAL

Name	City	County Taken	Year	Total Score
Jerry W. Conover	Sioux City	Monona	1990	182-7/8
Bruce L. Hupke	Carlisle	Warren	1994	170-3/8
Patrick G. Burkle	Earlville	Clayton	1990	170-2/8
Charles Hixson	Chariton	Lucas	1989	170-0/8
Kevin Burge	Hamburg	Fremont	1992	167-7/8
Steve Carter	Washington	Henry	1987	167-0/8
*Rick Barnes	Carlisle	Decatur	1994	166-2/8
David Hammel	Dorchester	Allamakee	1990	166-1/8
Jeff Kauzlarich	Rathbun	Appanoose	1989	165-5/8
Larry Cutkomp	Donnellson	VanBuren	1989	164-6/8
*Todd Massner	Mediapolis	Des Moines	1996	164-6/8

MUZZLELOADER, NONTYPICAL

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
Jeff Tussey	Creston	Union	1995	205-0/8
Denny Baum	Ottumwa	Wapello	1990	202-1/8
Dean Beyer	Osage	Mitchell	1991	200-5/8
*Jim Evans	Muscatine	Muscatine	1995	196-0/8
Steve Mundell	Ottumwa	Monroe	1991	196-0/8
Ed Banks	Letts	Muscatine	1994	194-1/8
Ken Uhl	Sioux City	Woodbury	1994	192-2/8

BOW, TYPICAL

Name	City	County Taken	Year	Total Score
Lloyd Goad	Knoxville	Monroe	1962	197-6/8
Robert Miller	Wyoming	Jones	1977	194-2/8
Steven E. Tyer	North Liberty	Johnson	1994	194-0/8
*Roy Allison	Knoxville	Monroe	1995	193-5/8
Jeffery L. Whisker	Clinton	Scott	1993	191-0/8
Richard B. Swin	Des Moines	Polk	1981	190-5/8
Kevin Peterson	Mediapolis	Des Moines	1989	188-1/8
Garry W. Rasmussen	Independence	Buchanan	1994	186-1/8
*Randy Schmidt	Keswick	Keokuk	1995	183-7/8
John L. Kite	Farmington	Lee	1990	182-6/8

BOW, NONTYPICAL

Name	City	County Taken	Year	Total Score
Russ Clarken	Desoto	Dallas	1994	236-7/8
Mike Hobart	Prole	Madison	1993	229-5/8
*Terry M. Long	Des Moines	Polk	1995	229-4/8
*Jack Schuler Jr.	Indianola	Decatur	1995	227-0/8
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
Bob Humpal	Crecent		1994	206-2/8

* *indicates a new entry into the* All-Time Top 10 Racks.

Deer And Turkey Fall Harvest Surveys

Each fall, many deer and turkey hunters receive a postcard from the DNR asking them about their hunt. These survey cards are used to determine how many people actually hunted during the fall seasons, where they hunted, and how many animals were harvested.

"Not all hunters receive a survey card," said DNR wildlife biologist Anjeanette Perkins, "and some express concern members of their hunting party got a card but they did not. These cards are sent to a random sample of the hunters, not to every hunter. The process is similar to political polls and other surveys of the public's experiences and opinions. Pollsters do not talk to everyone in a group to find out what the group thinks or did; sampling information and statistics are used to make an estimate."

According to Perkins, most hunters are very willing to spend the few minutes necessary to fill out and return the postage-paid cards to the DNR. She said some of the postcards get misplaced or forgotten, however, and a few people are just not interested in filling them out.

"I strongly encourage anyone who receives a survey card to fill it out and return it, even if they did not hunt," Perkins said. "Information gathered from these questionnaires helps us to set hunting regulations and hunters' information is very important."

Conservation Update

Remodeled Aquariums Big Hit at State Fair

Visitors to the DNR's building at the 1996 State Fair enjoyed the newly refurbished aquariums and got an "up-close-and-personal" look at some of Iowa's "best" fish. "One of the biggest attractions at the Iowa State Fair got better in 1996," said Ross Harrison, the DNR's information-education chief. "A major facelift was completed on the state's largest and best native fish display housed a block west of the grandstand on Grand Ave. Our lunker fish — and you name it, we had it — bass, trout, walleye, flathead catfish — all looked better this year."

"The totally new aquariums, supported by totally new plumbing, gave everyone a better view of the types of fish we all want to catch," Harrison said. "In the past, some glass at the old aquariums would cover with condensation and viewers had a tough time seeing the fish. The new plexi-glass tanks eliminated condensation and the new plumbing kept the fish in better condition."

Harrison said fair visitors will also find a bumper crop of lunkers at next year's fair as well as staff to answer any fishing questions. During the fair, the DNR State Fair building is continually staffed with more than a dozen DNR experts from every aspect of natural resources.

Ken Formanek

■ **The new aquariums, shown for the first time at the 1996 State Fair are supported by totally new plumbing. They will provide enhanced "lunker" viewing opportunities for many years.**

Ken Formanek

■ **Governor Branstad fueled one of the new flex-fuel fleet vehicles, the 1997 E-85 Taurus.**

E-85 Refueling Stations Open in Council Bluffs and Ames

The first of western Iowa's E-85 refueling stations opened Nov. 8 at the Bach Oil Fill and Food, 701 32nd Ave. in Council Bluffs. E-85 fuel is a blend of 85 percent ethanol and 15 percent gasoline. The Council Bluffs' station is the second retail location in Iowa offering the E-85 fuel, which can be used in flexible-fueled vehicles.

The opening of the refueling site was celebrated at a ceremony attended by Council Bluffs' mayor Tom Hanafan, state officials, corn growers, Ford Motor Co. and federal government representatives. The Council Bluffs' E-85 station is one of many being established in Iowa and throughout the Midwest including Burlington, Ames, West Des Moines and Atlantic. The goal is to create an E-85 refueling infrastructure that will support the network of public and private flex-fuel vehicle fleets. E-85 pumps are already open at retail stations in Burlington.

Earlier in the day on Nov. 8, to encourage the purchase of flex-fuel vehicles by private companies, Ford Motor Co. and the Iowa Corn Promotion Board also demonstrated to fleet managers the use of the 1997 model E-85 Taurus.

On Dec. 3, Governor Branstad dedicated central Iowa's first E-85 pumps at the Ames Kum & Go store at 2801, 13th St. (off I-35) in Ames.

The Krause Gentle Corporation, which just opened the Ames Kum & Go and installed the E-85 refueling site there, also operates an E-85 pump at its Kum & Go store at 5308 University Ave. in West Des Moines. Both stations featured promotions and customer incentives during the day on Dec. 3.

Ethanol is a homegrown, renewable resource which enhances air quality and reduces dependence on imported petroleum. The use of ethanol in higher blends such as E-85 contributes to the goal of increasing domestic energy sources and promoting energy independence.

Conservation Update

Iowa Energy Poster Contest

The 1997 Iowa Energy Poster contest, open to Iowa student in first through sixth grades, provides Iowa teachers a way to incorporate energy concepts into their curriculum.

The contest awards a trophy and $100 savings bond for each of two winning posters in each grade level, and all entries receive a certificate. The contest is sponsored by the DNR, University of Northern Iowa Center for Energy and Environmental Education, Iowa Energy Center, Iowa Association of Electric Cooperatives, Iowa Association of Municipal Utilities and the Iowa Utility Association.

Only one entry is allowed per student, each poster must be 18" by 24" with no matting and the deadline is March 1. Entries must be labeled on the back lower right corner with the student's name, grade, school, teacher's and principal's names, mailing address and phone number. The posters will be judged on a variety of criteria including the accuracy of information, creativity and originality in design, color and effectiveness.

For more information contact the Director, Iowa Energy Poster Contest, UNI Center for Energy and Environmental Education, Cedar Falls, Iowa 50614-0293, 319/273-6912.

Plan Spring Habitat Planting Now

As you watch the birds and wildlife from the warmth and safety of your home in the next few months, you may marvel at their ability to endure the deep snow and brutal cold of an Iowa winter. The unfortunate truth is that many of them will not survive. You can help provide food and cover for wildlife next winter, however, by planting habitat this spring. You will not only increase the wildlife's chances for survival, you will have the opportunity to observe wildlife all year long.

The benefits of trees and shrubs to wildlife cannot be overemphasized. Conservation plantings of more than a half-acre should use a diversity of trees and shrubs for maximum benefit. Trees, especially evergreens such as red, white, jack and ponderosa pine, Norway spruce and red cedar, provide critical winter cover for much of Iowa's game and nongame wildlife. Densely planted conifers can greatly reduce wind-chill temperatures and allow wildlife to conserve body heat, offer good browse, and provide cover and protection from predators.

Jim Bulman, DNR forestry bureau chief, said the State Forest Nursery is now taking tree and shrub orders for spring delivery. Conifer seedlings such as pine and spruce sell for $15 per 100, while deciduous trees such as oak, ash and walnut are $23-$26 per 100. The minimum order is 500 seedlings in units of 100. Tree and seedling stock must be planted and used for establishing or improving existing forest, erosion control, game or water conservation, and is not to be used for shade, new windbreaks or ornamental purposes.

The nursery also offers songbird and wildlife packets that are perfect for landowners wanting to provide additional wildlife habitat. The songbird packet, containing 20 tree and shrub seedlings, is designed especially for urban landowners and sells for $20. The wildlife packet, developed for rural landowners, contains 200 tree and shrub seedlings and sells for $45.

For more information, or to place an order, call the State Forest Nursery at 800/865-2477 or 515/233-1161; fax 515/233-1131. Information on ordering, choosing and planting the trees and shrubs, is also available on the Forestry Division's home page on the web at http://www.state.ia.us/government/dnr/organiza/forest/forest.html. Orders can be charged to Visa or MasterCard. In April, a refrigerated truck will deliver the orders to a drop-off point in each county.

Feeding Feathered Fliers Big Business

More than 60 percent of all Iowans feed wildlife, and the practice is more than just a popular hobby; the economic benefits to the state amount to more than $320 million each year. The money is spent on feed and feeding equipment, books, viewing equipment and accessories, and travel expenses including gas, food, and lodging.

Bird feeding is the most favorite and widespread form of wildlife feeding. Starting to feed birds in November or December can be somewhat more difficult than in October, but it can still be done successfully. (See the *Practical Conservationist* article on pages 53 and 54 of this issue for ways to get started on a bird feeding program.)

A free packet of general information on bird feeding is available from the DNR, as well as a winter bird feeder survey conducted by the Iowa Ornithologist Union each winter. This year, survey data will be recorded on two consecutive days, between Jan. 23-26.

To receive the general information packet or winter bird feeder survey form, contact: DNR Wildlife Diversity Program, 1436 255th St., Boone, IA 50036, 515/432-2823.

Ron Johnson

■ Wildlife feeding brings economic benefits to the state amounting to more than $320 million each year. Bird feeding is the most popular form of wildlife feeding.

Conservation Update

Fish and Wildlife Fund

With a supporting vote of 88 percent "yes," the voters of Iowa passed an amendment to the Iowa constitution requiring the hunting, fishing and trapping license fees and money designated for fish and wildlife programs be spent only for those programs. The overwhelming support will allow these funds to be safeguarded and used only for the intended programs.

The full text of the amendment was: "All revenue derived from state license fees for hunting, fishing and trapping and all state funds appropriated for, and federal or private funds received by the state for, the regulation or advancement of hunting, fishing, or trapping, or the protection, propagation, restoration, management, or harvest of fish and wildlife, shall be used exclusively for the performance and administration of activities related to these purposes."

Public Asked To Report Marked Trumpeter Swans

In its quest to restore trumpeter swans in Iowa, the DNR has released 49 across the state during the past three years, according to DNR wildlife biologist Ron Andrews, and he is encouraging the public to report any trumpeter swans sightings.

"In addition to the standard U.S. Fish and Wildlife Service bands, all of the swans released in the past three years have green, plastic neck-collars and leg bands with a white letter 'F' followed by two numbers," Andrews said. "Swans marked before 1993 have neck bands of other colors marked with black letters. Although several other states have released swans with green collars, they have used different letter and numbering systems, and the Minnesota DNR uses colored wing markers on the swans they release."

"Last year, some of Iowa's trumpeters migrated to Missouri and Kansas before returning north in the spring," Andrews said. "One of these birds, after spending nearly a month in the vicinity of Swan Lake, MO, was killed when it flew into utility wires. Reports of the swan sightings are essential to the success of the trumpeter swan restoration in Iowa and the entire Midwest. Tracking the timing and patterns of swan migration, as well as the mortality factors, will help us determine an appropriate management plan for the restoration of trumpeter swans throughout North America."

Trumpeter swan restoration coordinators Ron Andrews and Dave Hoffman are asking the public to report any trumpeter swan sightings to them at the DNR's Clear Lake office, 1203 N. Shore Dr., Clear Lake, IA 50428, 515/357-3517.

Resident Spring Turkey Applications Available

1997 Iowa resident spring turkey hunting applications are now available at county recorders' offices and most DNR offices. The booklet contains the application envelope and information about all Iowa resident spring turkey licenses — combination gun/bow, archery-only and landowner/tenant licenses.

The first application period for combination gun/bow licenses is Jan. 13 to Feb. 7. The archery-only application period is Jan. 13 to March 7. If all paid combination gun/bow license quotas are filled after the first drawing, there will be no second application period for any application, paid or free, in any zone or season.

For the spring turkey license season dates, zones, license quotas and information on free landowner/tenant licenses see the eight-page application booklet.

Ken Formanek

■ Darling Etching Donated

In 1930, famed editorial cartoonist and conservation activist Ding Darling created a poster-sized rendition of his 1919 cartoon, "The Long Trail," which commemorated the death of Theodore Roosevelt. The etching has now been donated to the State of Iowa by the Des Moines Chapter of the Questers to hang in the Wallace Building lobby. Larry Wilson, DNR Director, left, and Doug Smalley, Natural Resources Commission Chairman accept the gift from Questers Kathryn Nicholson, left, and Carol Adams.

Warden's Diary

"Faux (or Should I Say "Fake") Wildlife" by Chuck Humeston

It's probably well known by now we use deer replicas from time to time.

In other words, this involves setting out a robot deer to see if anyone will succumb to the temptation to shoot at it by illegal methods. And, yes, from time to time, someone really will.

But, it's not just deer and it's not just in Iowa. For example, Minnesota has been known to set out a stuffed grouse by the side of the road once in a while. The pheasant you suddenly see ducking and running across the gravel in South Dakota might be pulled by a South Dakota warden hiding in a box culvert. You just never know anymore.

Some people may be getting on to the game. Not very long ago, while working with team of officers stationed by a deer replica, we watched a pickup full of deer hunters cruise slowly by the deer replica *(twice!)* only to have them lean out the window yelling, "Nice try guys!" as they sped away.

Well, I had received various complaints concerning shooting at pheasants out of pickup windows at an area I call the "Merry-Go-Round." This area was a triple-section planted to almost all bluestem, containing a marsh and a sparse human population. But, it was absolutely pregnant with pheasants. "Merry-Go-Round" referred to the people I had seen driving around and around the sections waiting for a pheasant to fly over the road.

Because of complaints I had received about loaded guns in vehicles and late shooting, I got together with three other officers, and we put a stuffed pheasant by the side of the road. I climbed to the top of a hill overlooking an uninhabited road, and my three partners hid their vehicles nearby at a cooperative resident's acreage.

It didn't take long. A car drove by the decoy and suddenly the brake lights flashed. It proceeded a little further and stopped. A man opened the car door, got out, took a shotgun out of the case, loaded it and started stealthily tiptoeing toward our pheasant.

The problem with this project is one well-placed shot to your stuffed pheasant can quickly put you out of business. It's true it's a sacrifice for the greater good of Iowa on the part of the pheasant but that doesn't get you another decoy. Because this man was doing everything by the book, it became necessary for me to prevent him from shooting the decoy.

Just as he raised the gun to his shoulder, I yelled, "Don't shoot! It's a decoy!"

The poor guy just froze. Now, put yourself in his place. He thinks he's alone out there and all of a sudden an invisible voice from the sky booms again, "Game warden, don't shoot!"

He didn't even look up. He didn't even lower the gun. With the gun still pointed to the ditch, he started walking slowly backwards until he reached his car, he unloaded and cased his gun and the hunting party drove slowly away. I called my partners on the radio. One of them came from the other direction, stopped them and checked licenses. Everything was in order so he smiled, thanked them, wished them good hunting and sent them on their way.

We repositioned ourselves and waited for the next "contestant."

The driver of the next car got close to the decoy, slammed on the brakes and the driver's side door immediately opened. Again, the hunter uncased a shotgun, and, on the run, loaded it. This guy was too fast for me.

"Don't shoo". . . Kaboom!

Uh-oh. Too late.

He walked up to the decoy and stood there looking at it, then he got in the car and quickly drove away. I had already called in the backup who just as quickly stopped him. This hunter's problem was not having a license *or* stamps with him for which he received a citation.

Funny how people can remember the gun, shells, sandwiches, chips, dip, sodas and dog, but forget the license which they have to have with them. Evidently this hunter, according to the officer, also had a small child as a passenger in the vehicle.

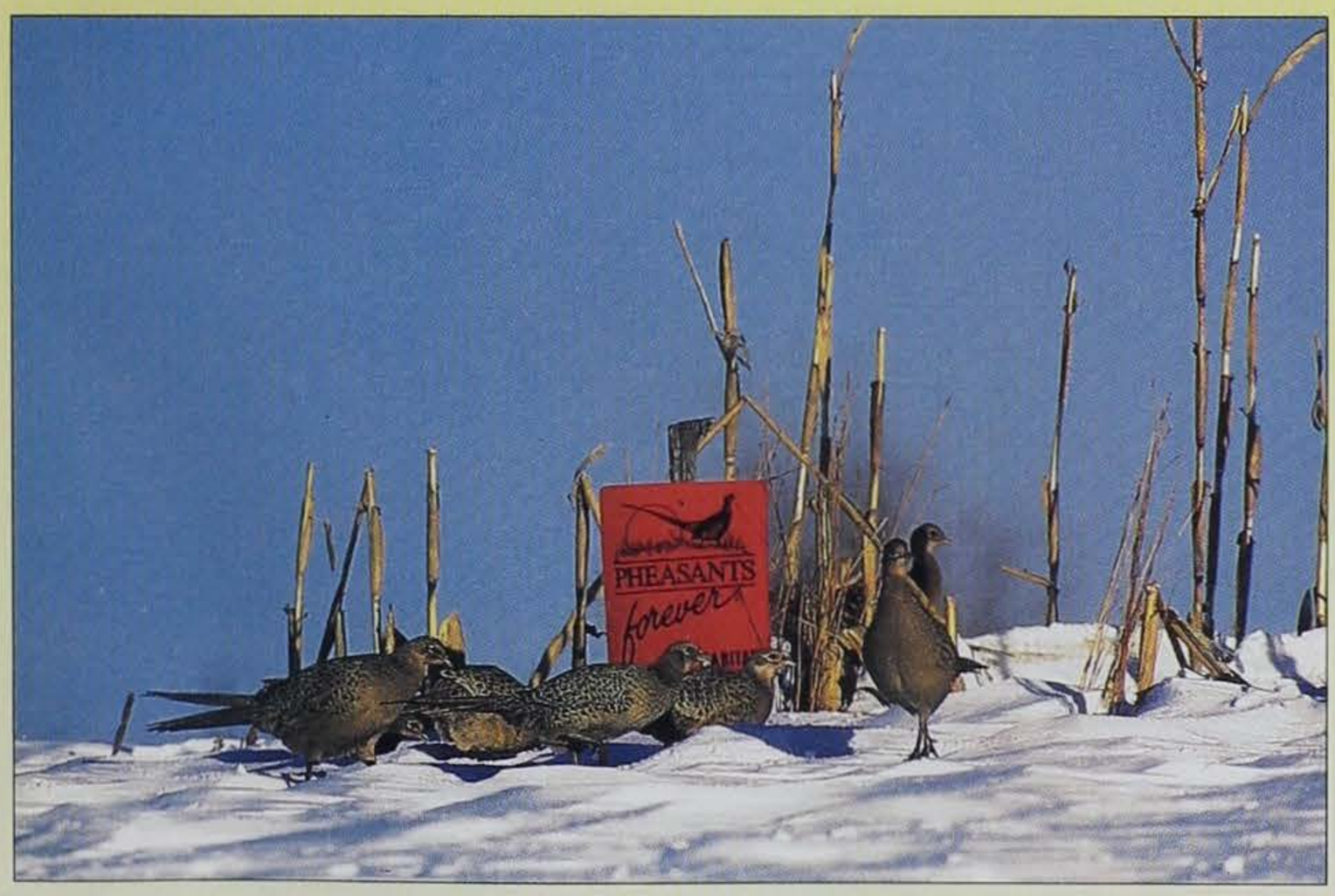
I ran downhill to the decoy. It was a direct hit — tailfeathers blown away, head at an odd angle. Dave Tierney held a moment of silence for the bird's sacrifice, then got out the "hundred-mile-per-hour duct tape" with which he reattached the feathers and pressed the pheasant back into shape (and service).

I climbed back to the top of the hill. Lo and behold the first car by the pheasant this time was the person who had just shot it. Again, the driver slammed on the brakes, only this time the *passenger* door opened. The little child got out, ran up to the pheasant, kicked it with all of her might, and got back into the car which sped away.

"You aren't going to believe this," I called into the radio.

Guess the hunter didn't like to ticket, blamed the bird and sent his child out for a little retribution! Oh well, it's all in a days work (including multiple deaths) for the DNR's fine "faux" wildlife. Our enforcement tools just "take a lickin' and keep on tickin', . . .uh standin' , . . . uh attractin' . . ." Well, you *know* what I mean!

Parting Glance



Roger A. Hill

"They're talking about welfare reform . . . I wonder if that means wildlife welfare."


PARIS PD