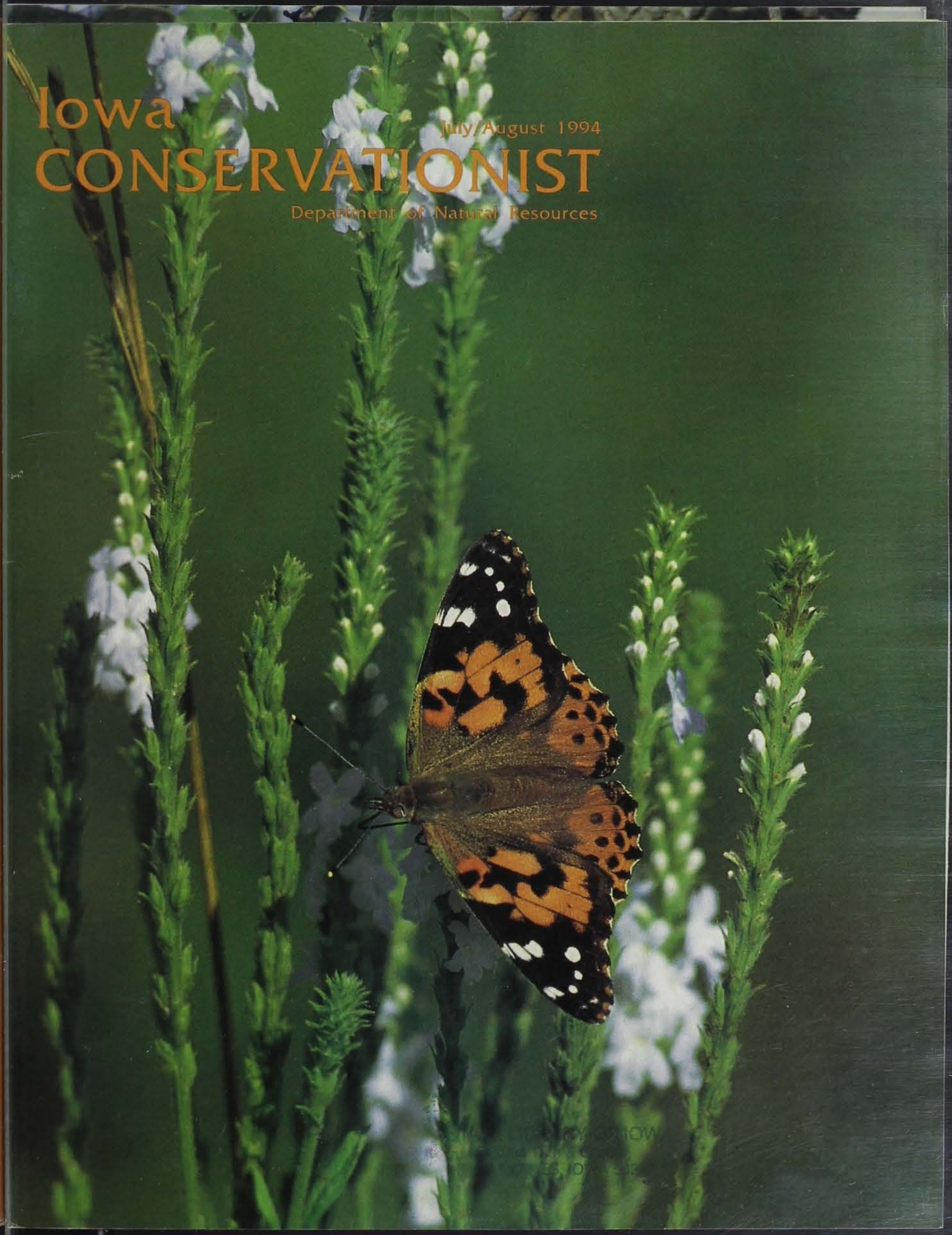
Iowa CONSERVATIONIST

July/August 1994

Department of Natural Resources



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Back -- Compass plant in sunset by Roger A. Hill.
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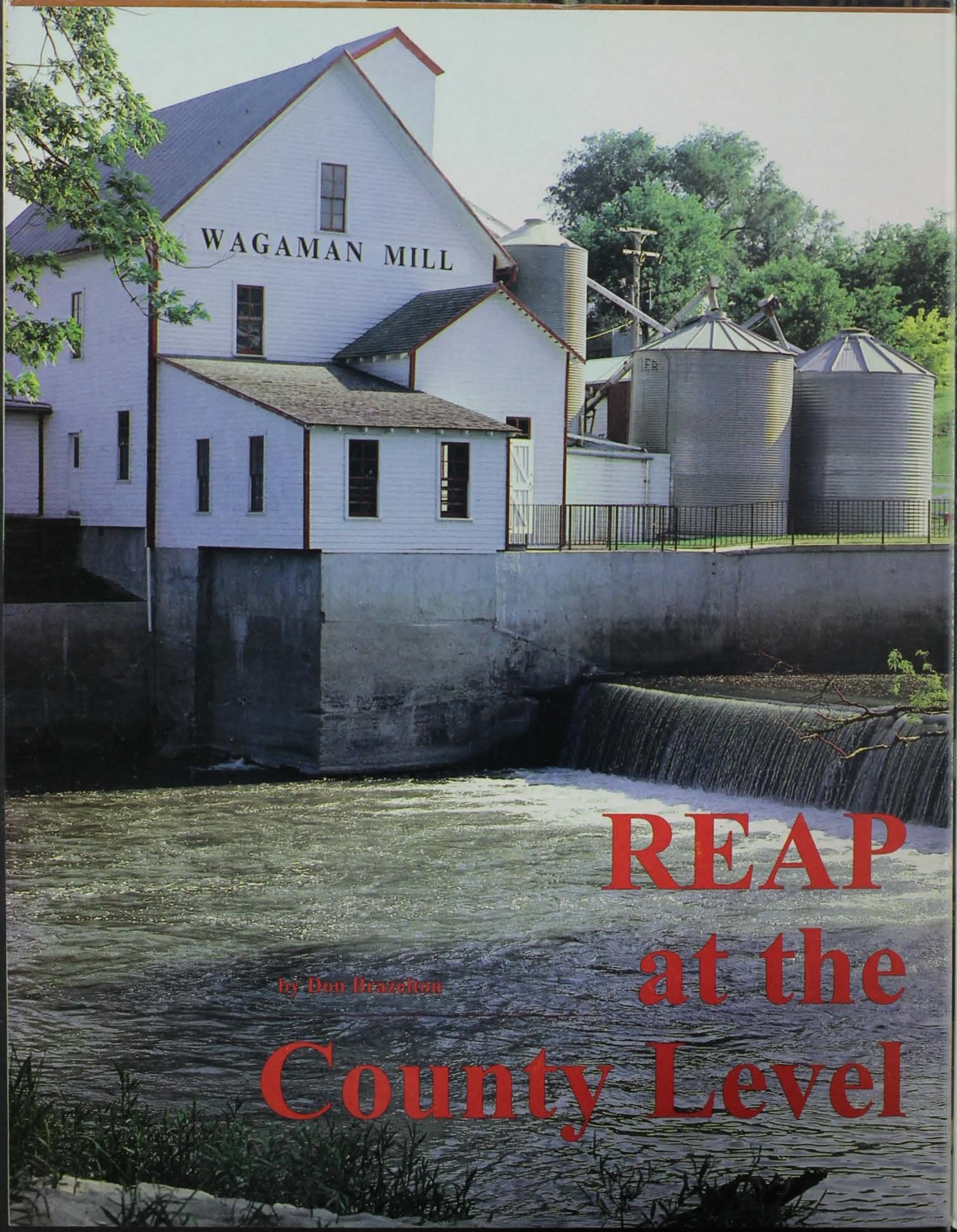

REAP at the County Level

by Don Brazelton

Iowa's nationally award-winning Resource Enhancement and Protection Program (REAP) is assisting all of Iowa's 99 county conservation boards to fulfill the state policy outlined in the REAP law. The REAP policy is to protect Iowa's natural resource heritage of air, soils, waters and wildlife for the benefit of present and future citizens. REAP is to be a long-term integrated effort to wisely use and protect Iowa's natural resources through the acquisition and management of public lands; the upgrading of public park and preserve facilities; environmental education, monitoring and research; and other environmentally sound means. The resource enhancement program strongly encourages Iowans to develop a conservation ethic, and make necessary changes in our activities to develop and preserve a rich and diverse natural environment. Those are the reasons why county conservation boards are an integral part of REAP.

Due to the basic philosophy of county conservation boards, which is developing local natural resource programs to address local natural resource needs, conservation boards attempt to target REAP funding to address unmet resource protection needs that are beyond the capabilities of existing budgets. REAP funds received by counties can not be used to fund any program or activity that was funded in prior years by other county revenues. The rules do allow counties to use REAP funds to expand previously funded programs.

County conservation boards receive a 20 percent allocation of total REAP funds after the $350,000 is deducted for the conservation education program. The allocation to county conservation boards is divided into three different segments — 30 percent is divided equally among all counties, 30 percent is divided among the counties on a per capita basis and the remaining 40 percent is allocated for competitive grants. To be eligible for the per capita and competitive grants segments, REAP requires that counties support their county conservation board program at a minimum level of 22 cents per $1,000 of assessed taxable property. This requirement reinforces the intent of the law that counties should use REAP funds to expand their program to address unmet needs and to not use state funding to subsidize county budgets by using state's REAP dollars as a replacement for county dollars. In fiscal year 1990, 72 counties were eligible for the per capita and grant segments; in 1991, 92 counties were eligible; in 1992, 94 counties were eligible; in 1993, 93 counties were eligible; and in 1994, 88 counties were eligible. With the extension of Iowa's property tax limitation law and the priority of county budgets to fund federal- or state-mandated programs, programs which county boards of supervisors have budgetary control over are more apt to be cut to keep under budget limitation guidelines.

Jasper County Conservation Board

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Wagaman Mill in Jasper County benefitted from REAP money, with a renovation of its dam.

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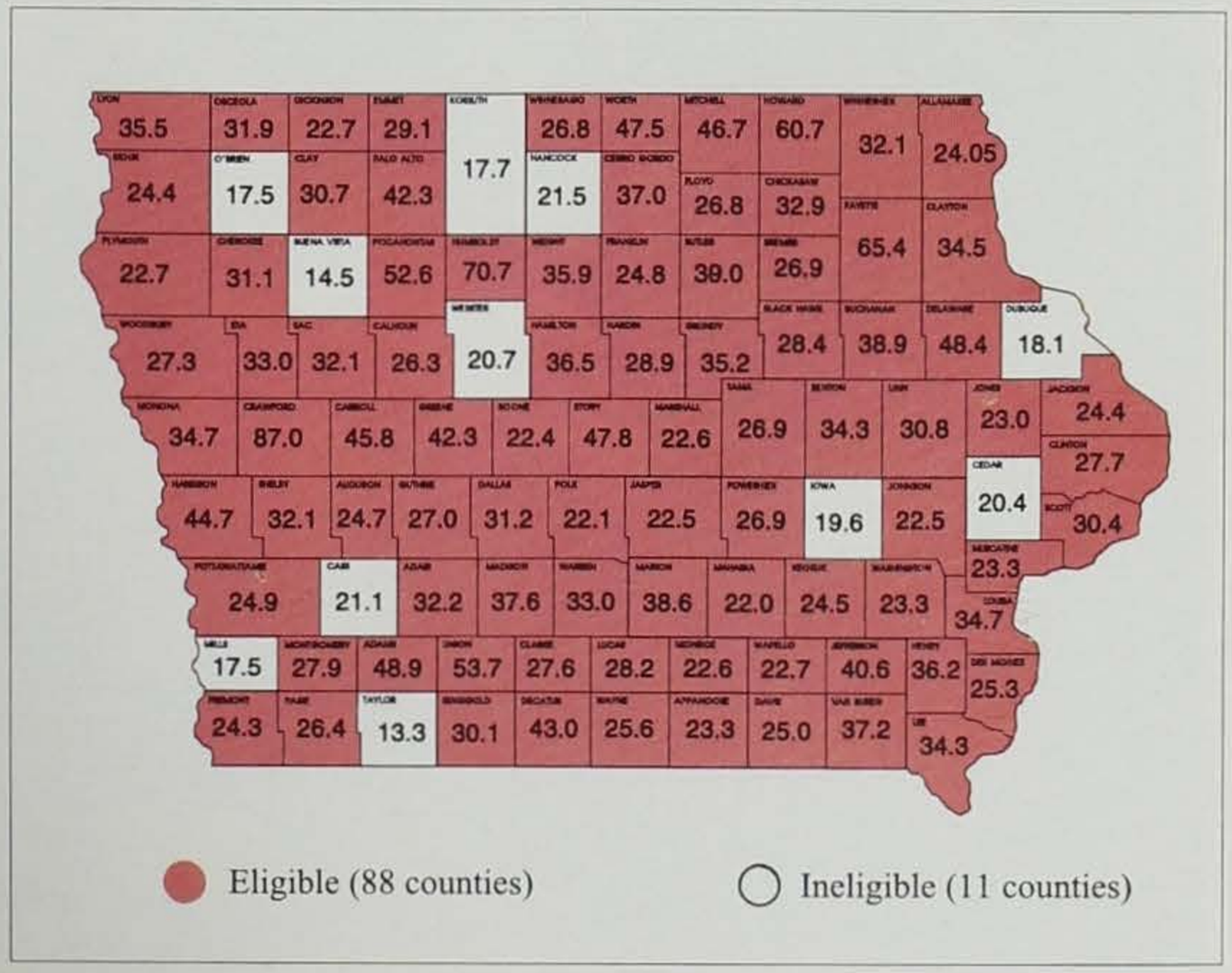
Counties eligible and ineligible for REAP per capita and grant funding. Numbers indicate the cents per $1,000 at which each county is funding their county conservation program.



Linn County Conservation Board

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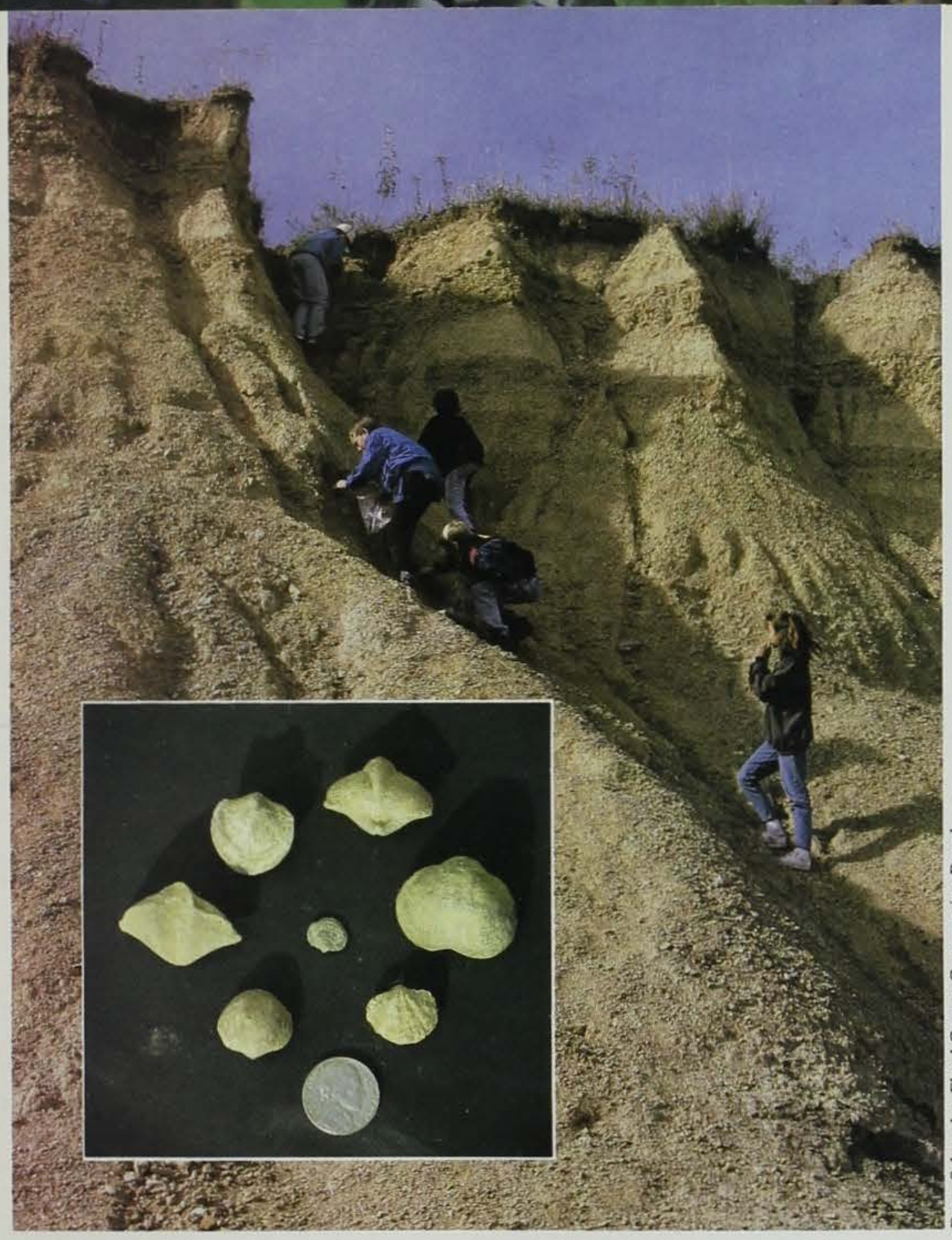
Prickly pear cactus and yellow puccoon are just two vegetative species found at Linn County's Hitaga Sand Ridge prairie. Like Linn County, several counties have acquired important areas with REAP funds.

County conservation boards have used REAP funds in many diverse ways. New facilities have been constructed and existing ones have undergone major reconstruction. Such facilities include environmental education centers and exhibits, outdoor learning centers, wildlife rehabilitation centers, picnic shelters, rest rooms, campgrounds and shower facilities, dam and lowhead dam renovations, access roads and parking lots, office and maintenance facility upgrades, fish cleaning stations and handicapped fishing docks. With the passage of the Americans With Disabilities Act in 1990, conservation boards are using REAP funds to upgrade facilities to insure access to the disabled. REAP is also helping to repair damage that occurred in the 1993 floods.

Linn County Conservation Board



Doug Schroeder, Floyd County Conservation Board

REAP funding is being used by county conservation boards for area development. Nature and multiple-use trails are being constructed and surfaced. Wetlands and prairies are being developed and improved. Future forest areas, wildlife habitat and food plots are being plated. Fish habitat is being installed and small fishing impoundments are being constructed.

REAP also assists in funding personnel. The primary focus of new personnel has been conservation education — a major component of many county conservation board programs. New conservation education programs have added full- and part-time naturalists, while existing programs have expanded their educa-

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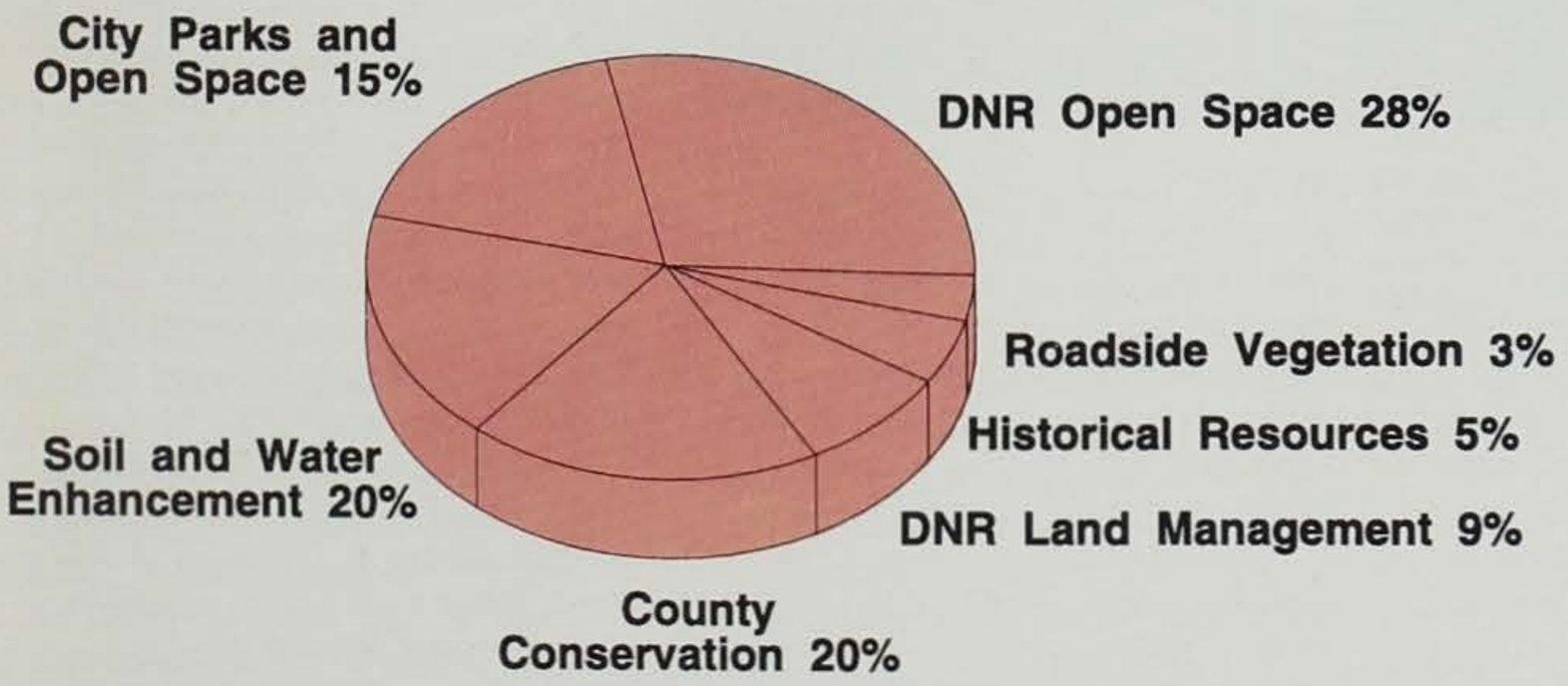
Rockford Fossil Park in Floyd County was one of the first unique county areas acquired with REAP funds.

REAP Distribution of Funds



REAP will be funded at $7.9 million in fiscal year 1995. At left is a graph of distribution after $350,000 is funded to environmental education and one percent to administration of the program. Counties in Iowa benefit from more than just the 20 percent allotted county conservation.

Palo Alto County Conservation Board

Lost Island Prairie Wetland Nature Center near Ruthven in Palo Alto County opened in 1993. Construction of the nature center was made possible with a REAP grant.

Pottawattamie County Conservation Board

Hawk watchers at Hitchcock Nature Area. Pottawattamie County used REAP money to acquire and improve the Hitchcock Nature Area.

capita allocations. The grant allocations have been used to acquire properties of regional, statewide or national significance. Forests, wetlands, river greenbelts, prairies, environmental education areas, areas of rare and endangered species, areas of geological significance and historical areas have been added to the public domain.

County conservation boards also participate in or benefit from other REAP accounts. Numerous conservation boards are responsible for their county's roadside vegetation management program and therefore use REAP funds that are transferred to the Department of Transportation's Living Roadway Trust Fund. Planting and maintenance equipment, seed and mulch, roadside plant inventories, burning equipment and plant research projects have been funded.

Several conservation boards manage historical museums, structures and/or sites and benefit from REAP's historical resource development account. These funds have been used for construction and acquisition of exhibits, climate control to preserve exhibits, interns for public education and for county archaeological surveys.

REAP's conservation education program component has provided numerous natural resource education

tion staff. Two counties that had never had a full-time staff person, hired directors and one county added a combination resource planner/naturalist/information specialist.

REAP has allowed county conservation boards to purchase equipment. Tree spades, tree planters and wood chippers for forestry programs have been acquired. Native grass seed drills, broadcast spreaders, discs, roto tillers, trailers, mowers and tractors have been added for roadside vegetation management and prairie habitat programs. Computers, vehicles and program supplies have been purchased for conservation education programs. A snowmobile and cross-country ski track setter have been purchased for winter trail grooming and maintenance.

Several counties have acquired important areas with REAP funding. Areas of local significance have been purchased with the use of equal and per

materials for county conservation board education programs. County naturalists use these materials to help Iowans of all ages understand the natural world we live in. The materials also assist naturalists to help people understand the impact of human activity on natural systems.

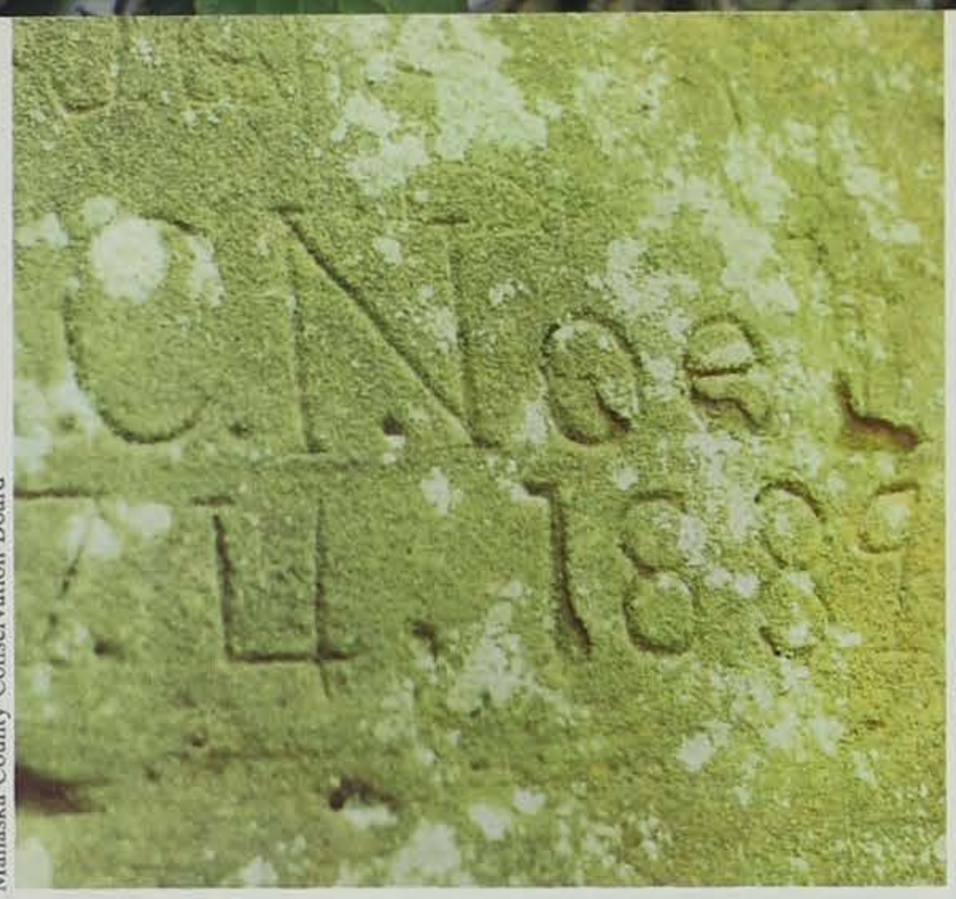
County fishing, boating and waterfowl hunting areas benefit directly from REAP's soil conservation account. Erosion is a major problem in Iowa. Sedimentation destroys fish habitat, fills in wetlands and reduces boating and swimming opportunities, which prohibits enjoyment of these areas. Efforts to keep soil in place provide continued enjoyment of water-based recreation and reduces the need to spend limited dollars on maintenance or restoration.

The public/private land acquisition cost-share portion of REAP's open space account has offered opportunities for conservation boards to join with local and statewide conservation groups to protect additional open space, usually hunting areas. Many conservation boards work closely with Pheasants Forever, Ducks Unlimited, the Izaak Walton League and the Iowa Natural Heritage Foundation to protect habitat areas while providing outdoor recreation. While the land is owned by the state, several conservation boards manage the properties as part of their county program.

REAP has also been a catalyst for conservation boards to receive additional donations of land, money, equipment or volunteer time. Local people see the value of natural resource protection. The desire to pass on quality natural resource areas and outdoor recreation experiences to future generations is important to many Iowans. Those people give freely of their talents, their time and their resources to make Iowa a better place to live, work and play. They do so because of the pride they have in their state and the confidence they have in their local county conservation boards.

The REAP program is vitally important to solidify the foundation for the protection and enhancement of Iowa's natural resource base. County conservation boards play an integral role in Iowa's natural resource conservation program. REAP has allowed counties to expand their diverse natural resource conservation efforts and enhance Iowa's quality of life today and for our future.

Don Brazelton is the executive secretary of the Iowa Association of County Conservation Boards.



Mahaska County Conservation Board

Mahaska County Conservation Board

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Turn-of-the-century inscriptions on Cedar Bluff (top). View of the Des Moines River valley from the Cedar Bluff Natural Area. This area, an example of a rare cliff-dominated valley wall along the Des Moines River, was acquired by Mahaska County using REAP funds.

Rural Development Through Forestry

by Dennis Michel and Tom O'Connor

Iowa forests are a renewable and resilient resource. The RDTF program enhances the conservation ethic in the wise use of these resources to create economic development activities in rural Iowa.

Ron Johnson

The Rural Development Through Forestry (RDTF) program was originally developed by the U.S. Forest Service Northeastern Area, to fit the diverse needs of communities where the vast majority of forest land is privately owned. This program, which is tailored to address the needs of rural America, can improve local economies through the wise use of forest resources. These resources include water, wildlife, recreation, scenic beauty and wood products. The RDTF uses rural strengths and economies at the grassroots level to build economic development programs from the bottom up.

The RDTF program began in October 1990 and has been funded through the 1990 Farm Bill. The U.S. Forest Service has coordinated the RDTF program in cooperation with the various state foresters. They have a key role in project identification, formulation and administration. The RDTF projects are funded on a cooperative basis with a minimum requirement of 50 percent match funds.

Congress appropriated about $4 million to the U.S. Forest Service, for rural development activities in the fiscal year 1991. Of this amount, $2.5 million was provided to support the RDTF program in the 20 states of the northeastern area. About $1.1 million was directed to Iowa to support forest resource development. In fiscal year 1992, Iowa received $1 million and another $800,000 in fiscal year 1993. The Forestry Division of the Iowa Department of Natural Resources administers the RDTF funds.

Iowa forests are a renewable and resilient resource. They have survived many years of exploitation, yet have retained their ability to yield many different products. The RDTF program can enhance the conservation ethic in the wise use of these resources to create economic development activities in rural Iowa.

The economic development projects, at the grassroots levels, are coordinated by the nine Resource Conservation and Development areas (RC& Ds) throughout Iowa. The nine RC&Ds include 51 counties and are locally governed by volunteer directors. The volunteer RC&D councils in Iowa receive financial and staffing support from the U.S. Department of Agriculture's Soil Conservation Service (SCS). A coordinator is assigned by the SCS to work with the RC&D councils to help them plan their activities and provide direct assistance on council projects.

Local citizens are the key to developing priorities for their communities. Through the RC&D program, citizens gain access to a network of public and private services and financing to accomplish community projects. The development of local leadership and community pride is a vital part of RC&D activities.

The Rural Development Through Forestry Program has created numerous economic development projects in rural Iowa. Here area a few.

Wood in Transportation — This project developed the infrastructure for the timber bridge laminated deck design, as an alternative to the traditional concrete and steel, to be used on the secondary road bridges of Iowa. Reports indicate that more than 50 percent of Iowa's 21,000 bridges are rated obsolete or structurally deficient. The cottonwood species was selected for the timber bridges. There are several thousand acres of cottonwood timber in Iowa and the adjacent midwestern states. It has traditionally been under-used as a marketable wood product. The engineering specifications for three separate bridge spans were completed. The fabricator for the cottonwood bridge timbers was established. Several laminated deck timber bridges were built, in cooperation with local county engineers, in southern Iowa. A soil stabilization structure (binwall) was constructed in a watershed project in western Iowa.

Wooden Pallet Recycling Business — It created three new jobs and retained five existing employees. On an annual basis, it extended the wood resource by about 400,000 board feet, and diverted more than 1,800 tons of solid wood waste from local landfills, which resulted in a tipping fee savings of about $40,000.

Riverside Pallets

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More than 1,800 tons of solid wood waste was diverted from local landfills annually through a wood pallet recycling project.

▶ (far right)

Cabins, such as this one made from local pine logs, are rented out on a weekly basis to enhance tourism in the Keosauqua area.

Dennis Michel

▶▼

Cottonwood timber in Iowa and adjacent midwestern states has traditionally been under-used as a marketable wood product. Several laminated deck timber bridges using cottonwood were built in southern Iowa, as an alternative to the traditional concrete and steel bridges.

Dennis Michel

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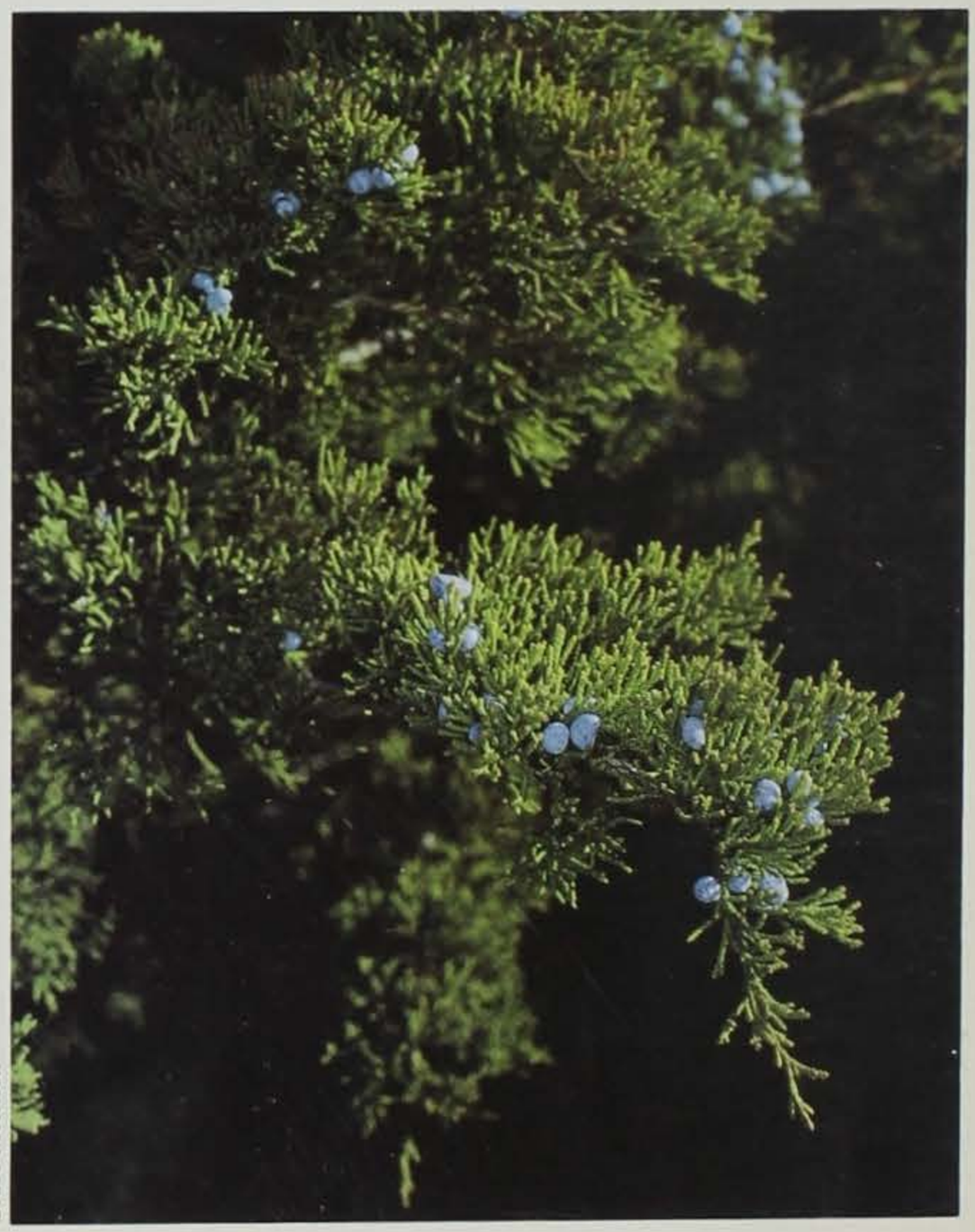
Inventory of red cedar in 15 southwest Iowa counties was completed and marketing studies analyzed to determine potential for red cedar products such as oil, lumber and shavings.



Bruce Morrison

Dennis Michel

Northeast Iowa Recreational Trail Development — The northeast Iowa Tourism and Recreation Council was organized for a five-county area known as "explore land." A bicycle/walking trail was developed to connect the five counties. Hospitality training and tourism marketing for those communities adjacent to the trail was implemented. About 80 to 100 people, from outside the five-county area, are using the trail each week and generating an estimated $2,800 per month to area businesses.

Multi-Cropping Forestry — demonstrated the feasibility of growing no-till corn and other crops between planted rows of trees in reforestation projects. the area has been used for educational tours and programs to show that tree planting costs can be reduced by maintaining some annual income form traditional row crops.

Iowa Pine Log Cabins — Pine plantation thinnings have traditionally been under-used as a wood product in Iowa. A local sawmill installed the necessary equipment to manufacture log cabin components. Various construction styles were used by local contractors to build six log cabins from four different pine species. The cabins are rented out on a weekly basis to enhance tourism in the Keosauqua area.

Red Cedar As a Resource — An inventory of the red cedar resource in 15 southwest Iowa counties was completed. Marketing studies to increase the use of this species for lumber, cedar oils, shavings and other

products were analyzed. Information and education programs were held to promote the potential of red cedar as a viable resource.

Walleye Cage Culture — This project evaluated and demonstrated the rearing of marketable walleye fish in southern Iowa farm ponds. The objectives were to provide landowners with economic alternatives to the traditional row crops and livestock production. The success of pond rearing walleye requires high quality watersheds from managed forest and grassland areas. The development of a small scale hatchery and fingerling feed training facility was completed.

Slab Wood — The objective was to develop a business that would process wood residues, such as bark, slab wood, lumber edgings and sawdust into marketable products. A "hogged mulch," processed to certain specifications, was developed and marketed in a 250-mile radius. The mulch product offers one solution to the problem and expense of wood residue disposal. The project helped to create two new jobs and retained four other employees.

Statewide Resource Planning — A questionnaire and survey of the secondary wood processors, operating in Iowa, was completed. The *Iowa Forest Products Directory* was published and represents the most accurate and current information ever compiled for this segment of wood businesses. This information will be useful in calculating the value added to the Iowa economy.

Forestry Technical and Vendor Services — There were several projects, in five of the RC&D areas, which focused on the development of professional forestry assistance to the Iowa landowner. Forestry vendors were established in these areas to provide tree planting, timber stand improvement and other general forestry practices. The project showed that there is an increasing demand for forestry services which cannot be supplied by the limited number of Iowa DNR foresters.

The Rural Development Through Forestry program has been very successful in providing economic development in rural Iowa. It has allowed nontraditional forestry projects to be completed -- projects that would not be funded through the more conventional lending institutions. The concept of community pride and local citizens, at the grassroots level and coordinated through the RC&D areas, has resulted in projects that work with people rather the for people.

Dennis Michel is a rural development forester with the DNR in Des Moines.

Tom O'Connor is a rural development forester for the U.S.D.A. Soil Conservation Service.

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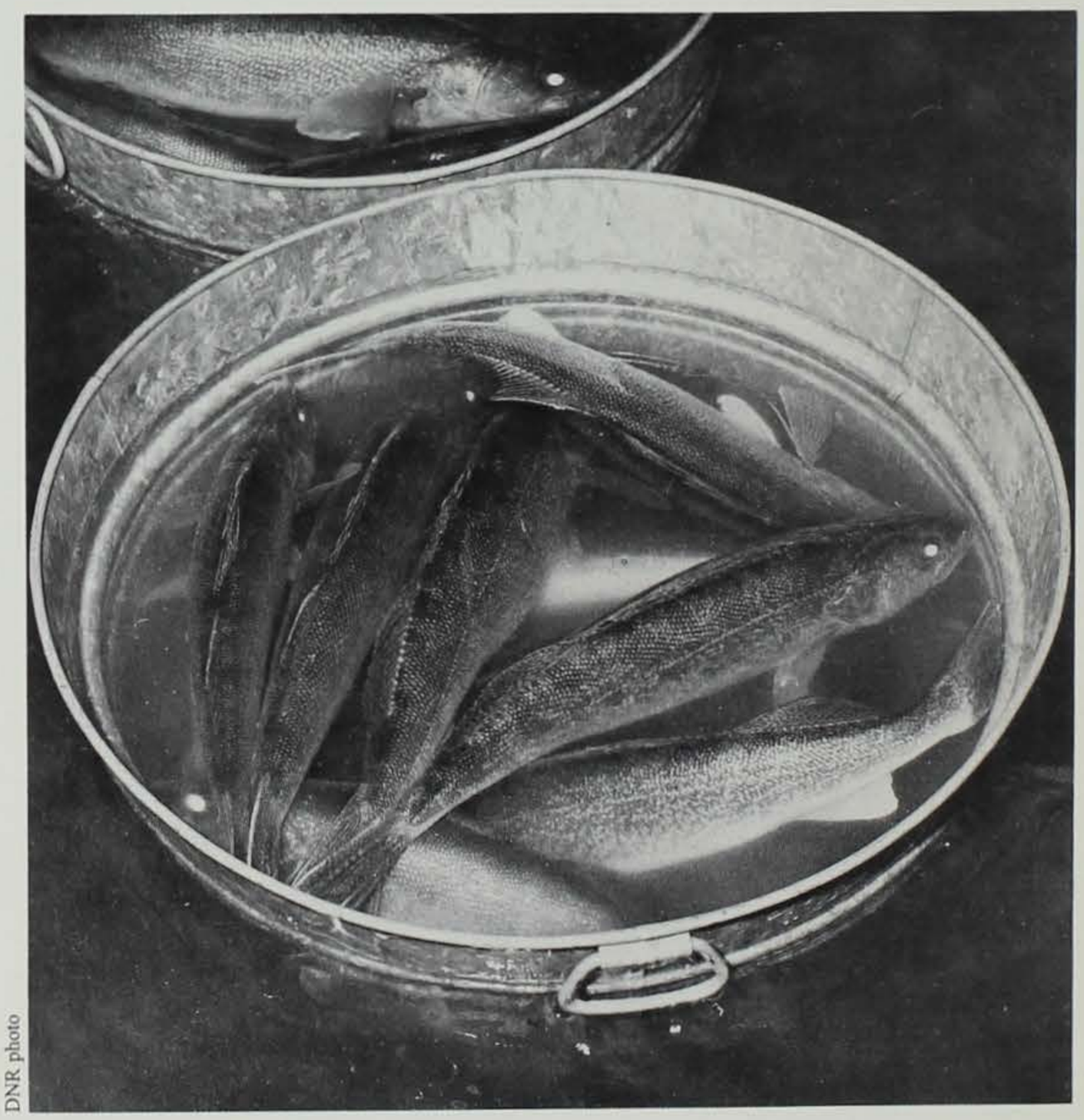
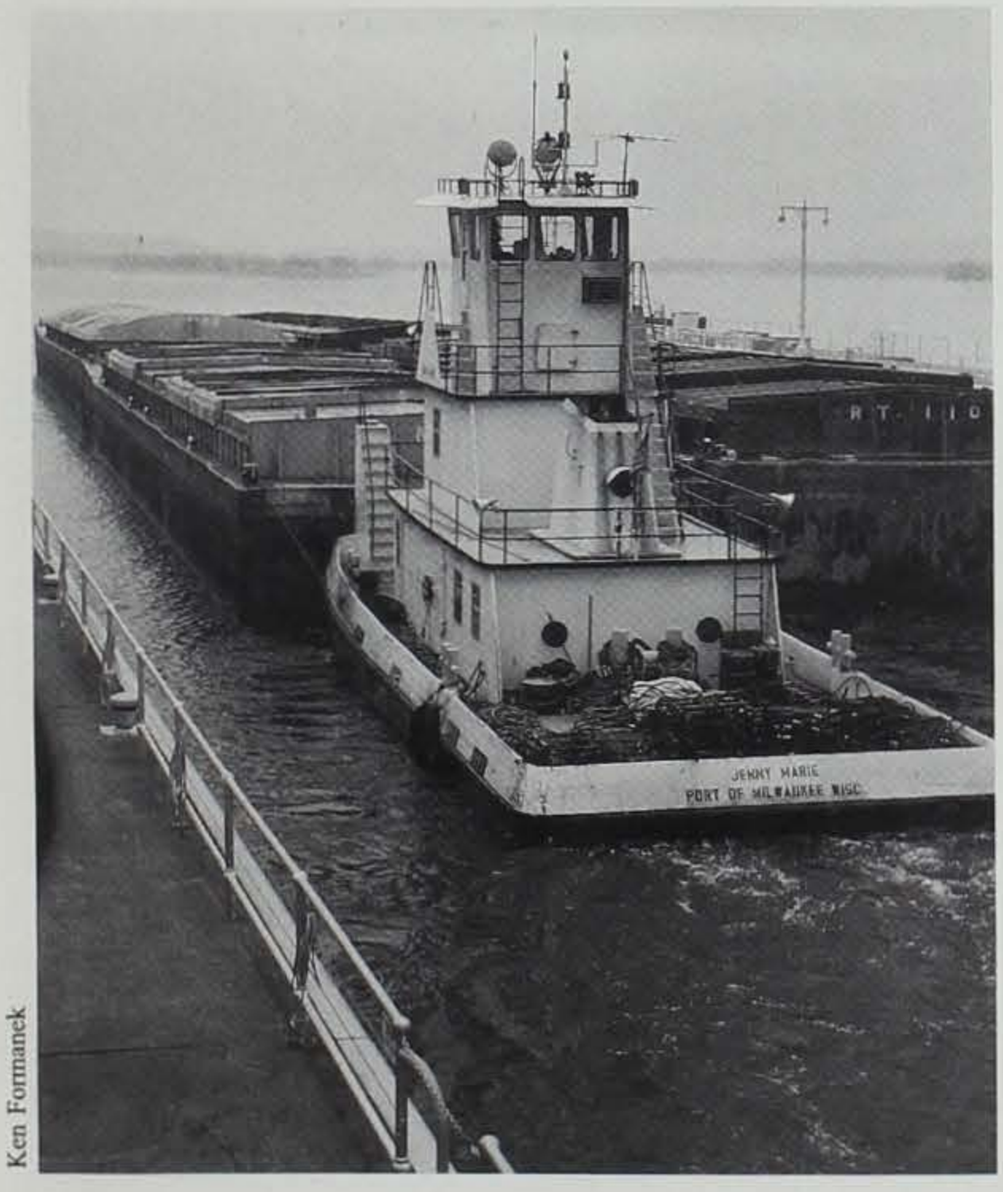
The success of pond rearing walleye requires high quality watersheds from managed forest and grassland areas.



DNR photo

Ken Formanek

mississippi river: highway to the heartland



Ken Formanek

by Mark A. Cornish

What can carry three million pounds and still float? The answer is a single Mississippi River barge. Barges carried 4.34 million tons of coal, three-quarters of a million tons of petroleum products and 24.17 million tons of grain past Burlington in one year alone. Boats this big need a river to match and the Mississippi is the largest in the hemisphere. Impressive not only for its size, the Mississippi has the greatest diversity of aquatic life forms in North America with 147 different species of fish and more the 48 species of freshwater mussels. When it comes to the environment there's nothing small about the problems created by barges. The question Iowa's fisheries and wildlife biologists ask is -- "How can barges and nature coexist?"

A "barge" consists of two parts, the barge and the tow. The actual barge is an individual container and up to 15 of these barges are lashed together and pushed by a tow boat. The tow boat has up to three nine-foot diameter propellers turned by diesel engines as large as 5,800 horsepower.

The story of commercial river navigation is an old one. Great mound cities like that at Cahokia (east of St. Louis) sprouted up on the banks of the Mississippi long before European immigrants came to North America. What led these people to build their city where they did are the same reasons that we built cities like Keokuk and Davenport where they are -- transportation. The first boats were rafts and canoes, evolving into flatboats, keelboats that were pulled by horses from the shore, steam boats and finally the diesel-powered tows of today.

Congress passed a series of rivers and harbors acts beginning in 1878 to widen and deepen the channel between Minneapolis and the mouth of the Ohio River. By using wing dams and dredging, the wandering Mississippi was tamed behind a series of 26 locks and

Jerry Leonard

Paul Kirpes

dams, from Minneapolis to Alton, Illinois, eleven of which border Iowa. By building the dams and pooling the water, a nine-foot navigational channel was created, giving barges room to navigate. This development had two costs -- monetarily, the dams project cost the taxpayer hundreds of millions of dollars; environmentally, the costs are significant but can only be guessed. Four things concern biologists when it comes to navigation effects on fish and wildlife — channelization, siltation, dredging and barge traffic.

Channelization of the Mississippi was done by a combination of building wing dams and reinforcing areas prone to erosion known as armoring. The wing dams and armored banks push the flow of the river into a narrow corridor called the main channel. The main channel is the highway that barges travel. Imagine a large crowd of sports fans trying to exit after the big game. The frame of the exit door acts like a pair of wing dams, pushing the fans through the narrow door before they can get to the parking lot. In the river, this constriction creates faster flow which acts as a scour to cut the bed of the river to a depth that barges can pass. Because of the speed of the flow and the shifting bottom sediments, few animals can live there for very long -- it takes too much energy to fight the current. As seen in the Missouri River, problems can arise. As the current increases, it cuts the river bed at a faster rate, which drains backwaters and speeds the river to a point where even barges have trouble navigating.

The interaction of fish with the floodplain was lost by the channelization of the Missouri River. Some species of fish evolved to take advantage of the normal flood cycle which existed prior to levee and dam construction. During the spring flood, fish species like the black buffalo feasted on the glut of food made available when the river expanded onto the floodplain, gorging themselves on worms and terrestrial insects, and spawning in the newly flooded areas. Now the levees strangle long stretches of the river, not allowing it to expand. Because of levees, a decline is suspected in the fish populations that rely on the floodplain for food and spawning.

Sedimentation is defined as the accumulation of solid particles which settle out of a liquid. In the river, these particles come from soil run-off from farm fields, run-off from urban areas, and streambank erosion. When this silt moves into the river it is carried via turbulent flow until the current slows enough for it to fall to the river bottom. Think about what happens when you leave the orange juice in the refrigerator for several days. All of the pulp settles to the bottom. When the navigation dams were built in the first half of this century, pools were created behind them that do the same thing to sand and sediments in the river that your refrigerator does to

Jerry Leonard

◀ Barges create a lot of turbulence in the shallow areas of the river. They also resuspend sediments as well as chop up fish with their huge propellers.

◀ (far left) The Mississippi River has been changed to fit the transportation and navigation needs of our nation, often at the cost of the fish and wildlife that call the Mississippi home.

Paul Kirpes

orange juice. Sediment collects behind the dams, behind wing dams, and most critically, in the backwaters and sloughs where many kinds of fish and wildlife live.

Some people might say -- "Well, so what? The backwaters and sloughs aren't any good for anything except breeding mosquitoes." The backwater areas are critical for the survival of fish and wildlife. Many fish species like bass and bluegill use these areas for spawning and as a nursery area. Recent studies have shown that largemouth bass use these areas to overwinter, migrating miles to reach a suitable backwater. Herons, ducks and many other birds use these as nesting and migration stopovers. And muskrats, beavers and mink make their homes in the backwaters. To alleviate the effect of sedimentation in some areas several projects have been done by the Iowa DNR, the U.S. Fish and Wildlife Service, and the U.S. Army Corps of Engineers. Brown's Lake in Jackson County and Big Timber in Muscatine County have been dredged out and deflection levees have been built to protect the fish and wildlife in these areas, slowing the rate of re-sedimentation.

The navigation dams that block the flow of the river also hinder fish migration. It is thought that some fish species like the walleye and paddlefish collect in the tailwaters of the dam because they are unable to swim any further upstream in their migration. Possibly the strongest example is the skip jack herring which once migrated north each year, but hasn't been found above Keokuk since that dam went into place in the 1920s. The dams do benefit the anglers because they concentrate fish in the tailwaters making them easier to catch. Just ask a river walleye angler where they like to fish and they will probably tell you -- "Just below the dam."

Bars of sand and silt sometimes form in the main channel, causing a barge traffic jam on the river highway. Dredges must be brought in to remove the debris so that the big boats can pass again. The problem is, what do you do with the material once it has been sucked up? You don't want to put it next to the channel where freshwater mussels and fish live, and you don't want to put it in a backwater where ducks, muskrats and herons live either. This is a problem that faces biologists and there is no single right answer all of the time. After careful study of a dredge area, state and federal conservation agents select a disposal site that is both economical and has the least impact on nature. Sometimes the material is put on the shore to build a beach, like the one at Buffalo, Iowa.

Ken Formanek

▶ (and far right)

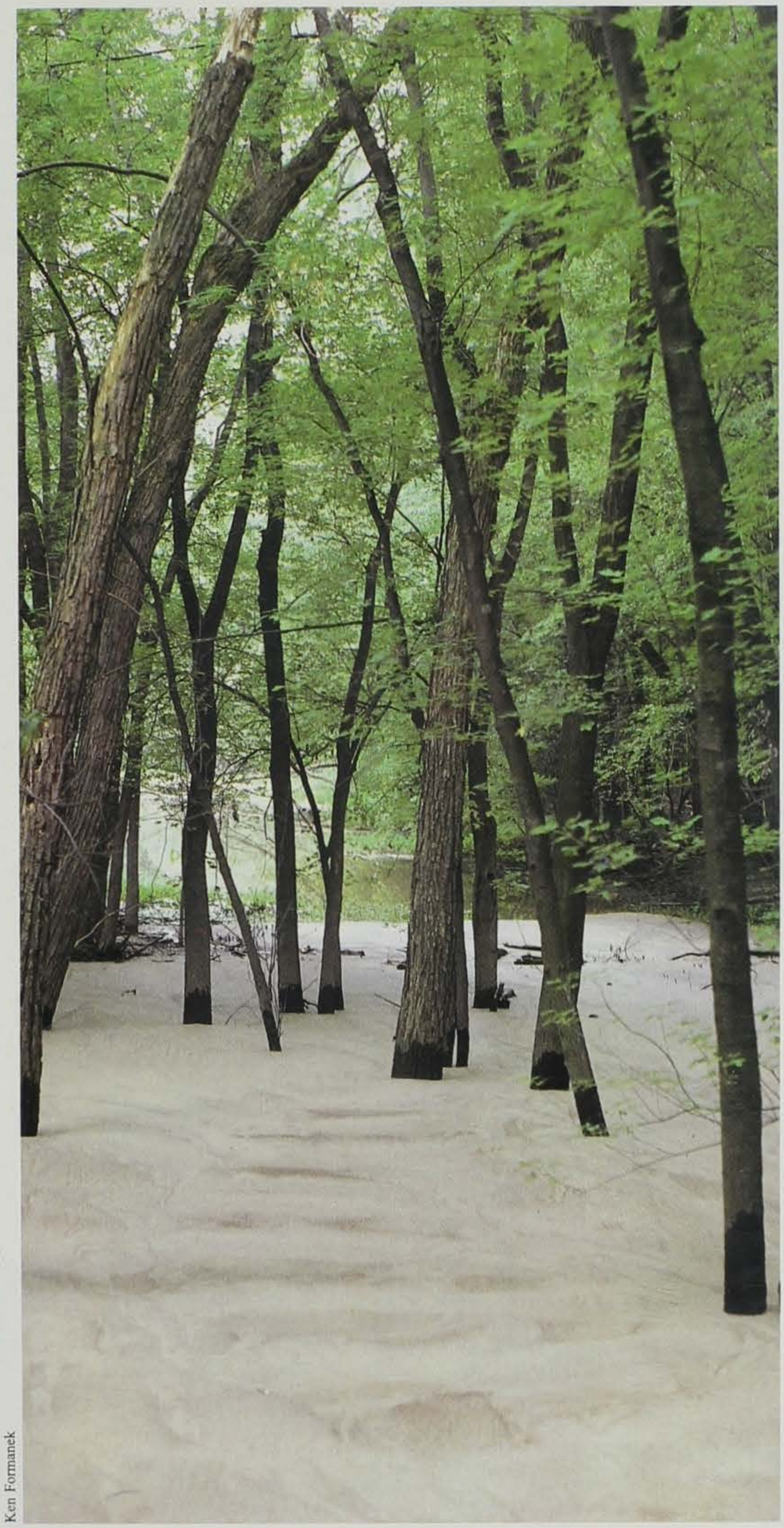
Dredge spoil being pumped on to an island site on the Mississippi.

Other times it is piled on islands to make high ground for wildlife to take refuge during flooding. And sometimes it is used to build and repair the levees that line much of the river. Once these areas are full where will we put the dredge spoil?

The movement of these huge barges has an impact on the fish and wildlife too. Last summer while fishing with my father-in-law for catfish, he noticed that the river was rising very suddenly. A barge was coming upstream at the time, and when it passed, he noticed that the river began to fall quickly. What was happening was that the barge was actually acting as a mini dam, pushing the river backwards in front of it causing the river to rise and holding the water so that the river behind it actually falls. This causes a lot of turbulence in the shallow areas of the river, turbulence that has been measured as lasting for up to 15 minutes after the barge has passed. Its kind of like changing a tire on the shoulder of Interstate 80 when a speeding eighteen-wheeler blows your hat off. The only difference for the critters in the river is that the sensation of being sucked out of your shoes lasts longer that a Bugs Bunny cartoon. Barges also stir up the bottom, resuspending sediments as well as physically chopping up fish with their huge propellers.

The river of today is much different than the river that flowed past the mound city at Cahokia thousands of years ago. The Mississippi River has been changed to fit the transportation and navigation needs of our nation, often at the cost of the fish and wildlife that call the Mississippi home. The metal and diesel giants that prowl its waters are necessary to bring goods from the Midwest to the world, but careless abuse of the river and floodplain may further destroy an ecosystem that has thrived in the waters of the Mississippi, long before the days of Cahokia. The daily challenge for biologists is to minimize the effects of barge traffic and navigation practices and to protect a very unique aquatic environment.

Mark A. Cornish is a fisheries technician for the department at Fairport.



Ken Formanek

Ken Formanek

LITTER DID WE KNOW

by Marilyn Krogulski

Fifteen years ago, discarded cans and bottles decorated Iowa's landscape; recycling was something done by scrap metal dealers; and energy conservation was just gaining momentum. "Litter" did we know in 1979, that 15 years of deposit legislation would bring so many positive changes to Iowa. Iowa adopted the Beverage Containers Control Law in order to clean up litter along roadways and in parks, saving cleanup costs.

To kick off the new Beverage Containers Control Law, Governor Ray and Energy Council Chief, Edward Stanek, made plans for a gigantic "Iowa Clean-up Day" on May 5, 1979. More than 20,000 volunteers assembled across Iowa to cleanup roadsides and parks. "IOWA CAN SHOW U.S. THE WAY" was the headline carried by the Waterloo Courier to inform readers of this massive cleanup effort which was the biggest of its kind in the United States.

Now, let's take a look at what the last fifteen years have accomplished. A highway litter survey conducted by the Iowa Department of Transportation along the same section of highway before and one year after the Beverage Containers Control Law showed a 38 percent reduction of litter. Today our roadsides, parks, and landscape are cleaner and more beautiful. Fields of green, wild flowers, banks of clover and prairie grass are not cluttered with the 1.4 billion beverage containers that are redeemed yearly.

In addition, signs are seen throughout the state identifying adoption of highways to keep our roadsides clean. Enterprising individuals scour roadways for deposit money from the comparatively few containers that litter the roadways. After football games and other functions, kids work like busy bees to collect discarded beverage containers for deposit money.

Saving Natural Resources, "Its the Real Thing"

Recovery of recyclable containers is much higher in the 11 bottle deposit states than it is in the states without a deposit system. Without a deposit system, these containers could end up in landfills wasting a valuable resource and the energy to produce them. For example, aluminum packaging is the most energy-intensive material to produce. Compared to first-time manufacturing, recycling aluminum reduces energy and water use by 95 percent. Air pollution also is reduced by 95 percent.

Reuse of refillable glass bottles also provides much less use of energy and generation of pollutants. When glass is re-manufactured, even the use of 50 percent recycled glass in the manufacturing process reduces water pollution by 50 percent, mining wastes by 79 percent and air pollution by 14 percent.

Landfills, Less Filling

The issue of landfills reaching capacity is an important one for Iowa. Disposing of containers in landfills wastes resources as well as landfill space. Designing landfills that protect our health and environment is costly but necessary. The Iowa Groundwater Protection Law of 1987 included more stringent requirements for landfills. Consequently, many landfills have closed or are closing. Presently, there are 67 municipal landfills and 30 industrial landfills in Iowa. Fifteen municipal landfills have closed since 1987 and ten municipal landfills are about to close. Sixteen industrial landfills have closed since 1987 and two are in the process of closing.

As Iowans work to decrease the amount of materials going to landfills, the Beverage Containers Control Law already has played a quiet but impressive role in this regard. When the deposit law was passed in 1979, the containers were collected at retail stores and redemption centers but no provision was made to keep them out of landfills. Unfortunately, many were disposed in landfills. In 1990, beverage containers covered by the Beverage Containers Control Law were banned from landfills. Today, through the Beverage Containers Control Law, *approximately 1.4 billion containers are recycled annually in Iowa.*

Economic Benefits are "Refreshing"

The beverage container deposit system is labor intensive. Jobs were created in the collection, handling and processing of the beverage containers, as well as administration.. Six states

RAGBRAI enthusiasts won't get as many blow outs in Iowa.
When Iowans or out-of-state guests pedal in Iowa they should have fewer accidents and less tire punctures. In 1989, the League of American Wheelmen reported a price tag of $200 million annually for bicycle tire punctures from broken bottles.

conducted studies to show the impact of the deposit law on the economy. The number of jobs created range from 365 in Oregon to 4,684 in Michigan and the annual income generated ranges from $1.3 million in Oregon to $24.9 million in Maine. New York cites an increase of $31 million in the state's economy.

Based on research conducted in other deposit law states, a conservative estimate of jobs created through the bottle bill system in Iowa would be approximately 1,200, and the amount of total income generated would be at least $17 million annually. However, actual figures may be closer to the $21 million range.

Iowa has more than 60 redemption centers that were created through the bottle deposit system. These redemption centers range from small family businesses, employing three or four people, to centers that employ 25 or more. Some redemption centers are affiliated with sheltered workshops. These redemption centers employ the handicapped and provide a little income, meaningful work, and a chance to develop motor and interpersonal skills.

The "Case" is Positive for the Impact on Recycling

Curbside recycling and deposit systems offer a comprehensive approach to recycling. Studies show that a dual curbside/deposit program will remove at less cost, more materials from the waste stream than a curbside program alone. No cost is incurred for municipalities with the deposit system. In fact, savings occur because of less litter cleanup and less tonnage costs for materials going to landfills.

Deposit systems increase the efficiency of curbside collection. For example, plastic is a high volume/low weight material. WMX Technology, Inc., the largest waste management company in the country, estimated the cost of curbside collection of plastics to be $100 to $500 a ton. Removing deposit containers from these programs results in substantial savings and allows the trucks to pick up more types of materials and service larger areas. Deposit systems provide collection of glass that is color-sorted and contaminant-free. Collection of glass through curbside programs usually does not provide this presorting.

Ken Formanek

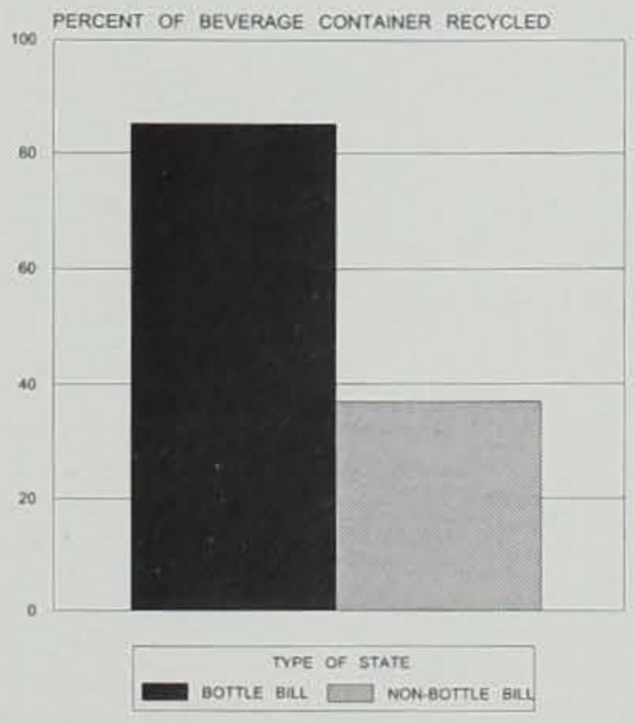
Markets "Pop Up"

The Beverage Containers Control Law has made Iowa a leader in the market for supplying used PET (the resin from which plastic soft drink bottles are made). The demand for PET continues to grow and projections indicate expansion of end markets in quantity and diversity. PET is used to make new soft drink bottles and other containers, fiberfill for sleeping bags and jackets, carpet, T-shirts, sweaters, tennis balls, automotive parts, industrial strapping and more than 60 other products.

Markets for PET suppliers may pay deposit states, such as Iowa, four times as much for their materials than non-deposit states, due to the higher quality. This higher quality is achieved because the containers are not mixed with other materials that would subject them to contamination as often happens through drop off, curbside and other collection systems. Iowa provides a stable market supply for PET due to the deposit law.

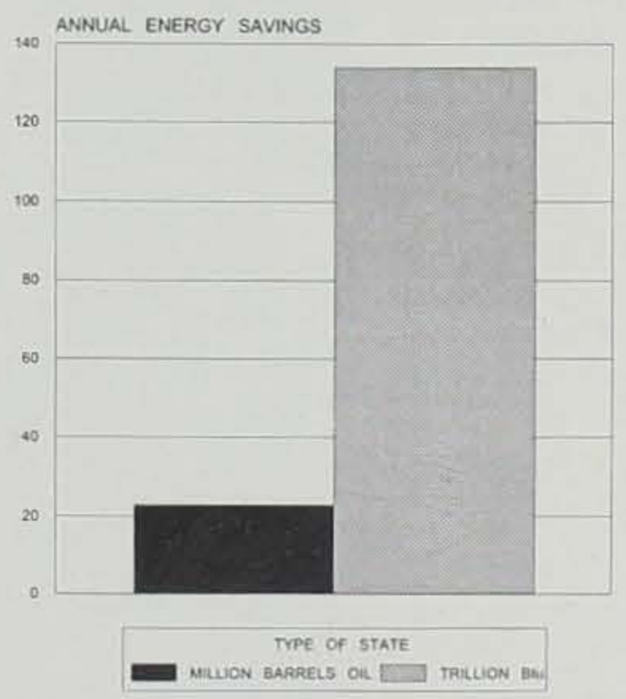
Bare feet can be more of a treat in Iowa. Regardless of parent admonishments to wear shoes, children manage to go barefoot in warm weather. In Iowa, bare feet should be less susceptible to lacerations. After Massachusetts enacted their bottle bill deposit, *The American Journal of Public Health* reported a 60 percent reduction in cuts from glass containers. In Florida, a one-year Stanford University study reported a $3 million dollar price tag for hospital costs due to 300,000 litter injuries.

Bottle Bill & Non-Bottle Bill States
Comparing Beverage Container Recycling



Figures from the National Environmental Law Center

Annual Energy Savings
From a National Bottle Bill



Oil savings are energy equivalents compiled by the National Environmental Law Center

Ken Formanek

The number of soft drink bottles available for processing and end markets is a very predictable quantity.

Iowa also provides a stable source of aluminum for recovery due to the deposit system. A study projecting aluminum supply for the years 1995 and 2000 shows Iowa and Michigan particularly strong in the Midwest due to their deposit systems. Projections for demand for the year 1995 and 2000 show markets taking all the aluminum Iowa can provide.

Consumer "Pop"ularity is High

The U.S. General Accounting Office (GAO) conducted a nationwide poll in 1990 with these findings: In deposit law states 87 percent of the citizens approved of the beverage containers law. In general, 70 percent of the American public support a national deposit law.

The Redemption of Iowa

Looking back after 15 years, the Beverage Containers Control Law has turned out to be a "Cinderella" piece of legislation that quietly made its impact on Iowa in many ways. Iowa's roadways, parks and recreation areas, and communities are cleaner and more beautiful. Iowa is a leader in providing stable markets for quantity and quality of plastic, glass and aluminum. Economic benefits provide many jobs and generate a sizable amount of revenue. Landfills no longer are the final "deposit" for beverage containers. Natural resources are saved due to the reuse and recycling of containers. Reductions in energy, water and air pollution are substantial. Compatibility of the deposit law and recycling means more materials removed from the waste stream at less cost to consumers.

Today, many of us have taken for granted the process of returning beverage containers for deposit (except, perhaps, youngsters who find it a vital source of funding when they want spending money). The Iowa deposit system is a routine part of our lives. So the next time you return containers for a refund, you might just pause to think about your role in helping make Iowa a better place to live. This little-recognized and quietly accepted piece of legislation has provided important, lasting and positive environmental impacts.

Wow! Happy 15th Anniversary Iowa. "Litter" did we know.

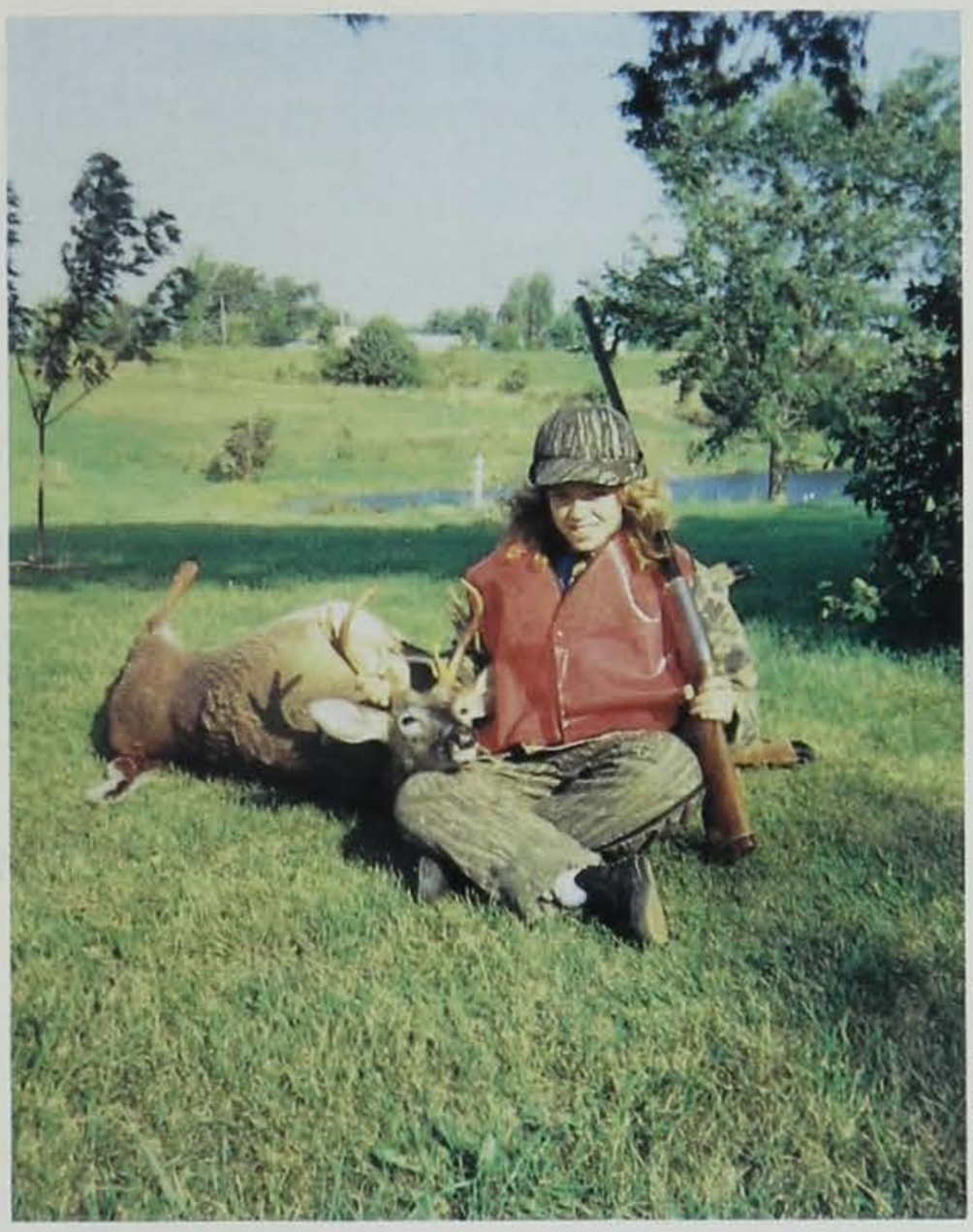
Marilyn Krogulski is an environmental specialist for the department's Waste Management Assistance Division in Des Moines.

▶ **This roadside has been beautified not only with native prairie but with a significant absence of drinking containers.**

Roger A. Hill

A "litter" reduction can help farmers.

The Virginia Farm Bureau Federation conducted a study in 1984 to determine statewide on-farm beverage container damage costs. Findings showed that container litter costs ranged between $1.2 million and $3.5 million annually. A Pennsylvania Farmers' Association assessment totaled a price tag of $37 million due to beverage container litter. Regardless of what the exact price tag is, litter costs money. Time is lost in productive farm work when discarded containers have to be picked up in fields. Farm tires cost between $400 - $1,100. Damage by container litter results in costs for tire repair or replacement as well as valuable costs in "down time" when planting or harvesting time frames are critical. If fodder, feed or harvests are contaminated, more expense is incurred. When livestock ingest undetected slivers of glass or metal in their feed, it is nearly always fatal.



Nancy Exline-Downing

▲
Jodie Martinez learned deer hunting basics during a safe, well-supurvised hunt and bagged a buck her first season. Her stepfather, David Downing escorted her in the field.

Starting Out Right . . .

Youth Deer Season:

A Great Time for Youth and Adults

by Willie Suchy

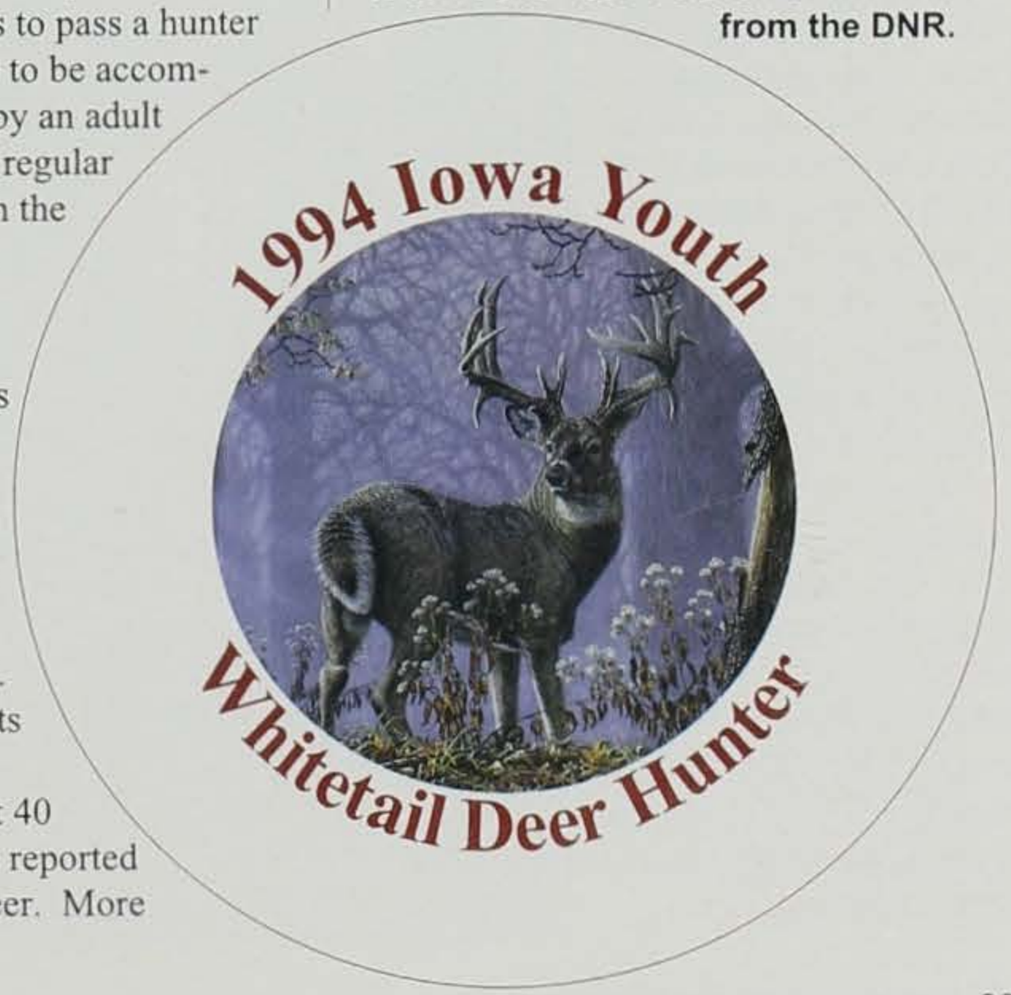
Although a few states have special hunts for young hunters, Iowa is the first to give youngsters their own deer season. This fall will be the third year for this season. Hunters during the first two years have done exceptionally well. The special deer season is set up for youngsters 12 to 15 years old and has been held the three consecutive weekends prior to the beginning of the regular bow season in October. This year the season runs from Sept. 17 to Oct. 2.

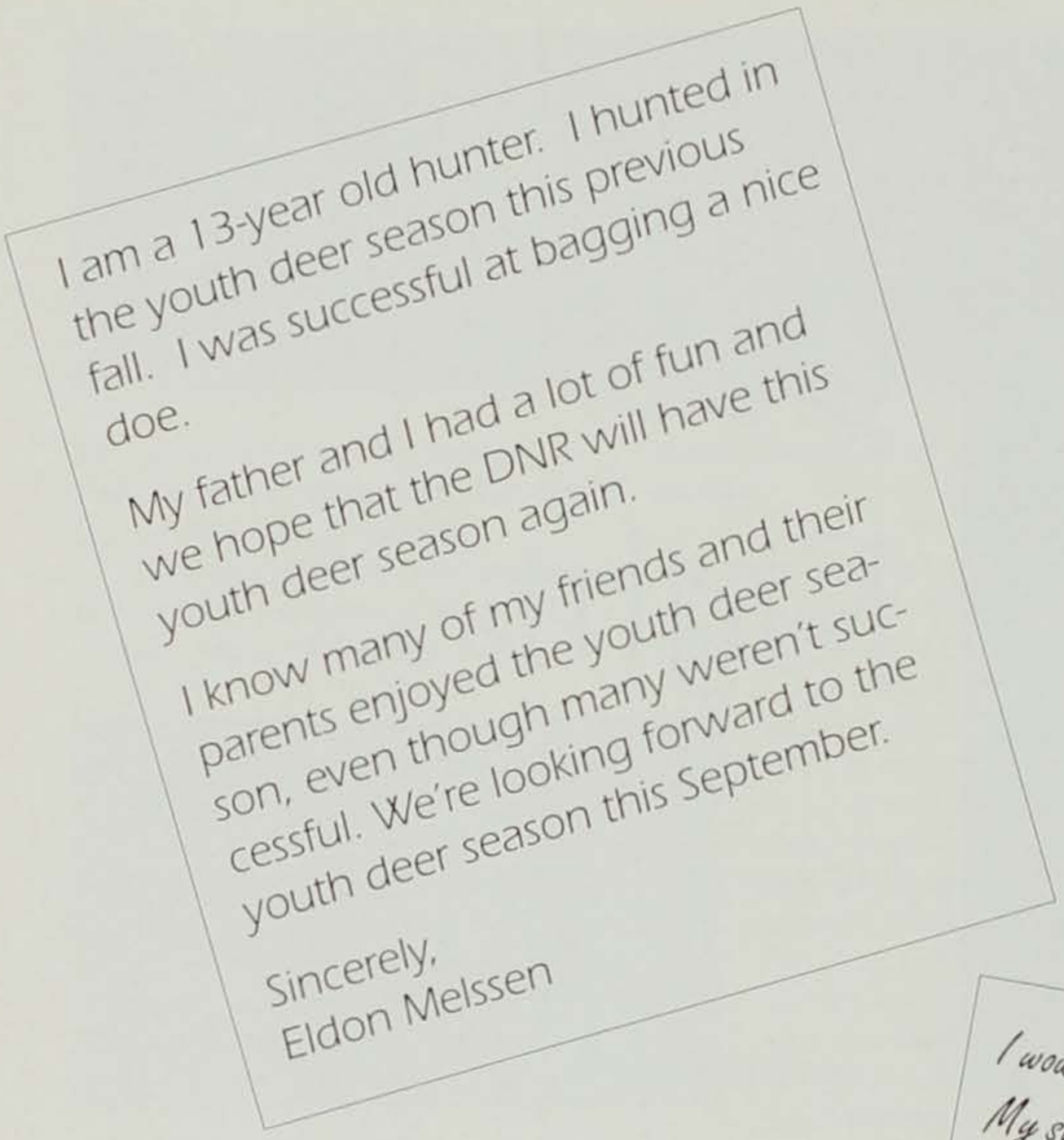
Nearly 2,000 youngsters participated during each of the past seasons and many tagged a deer, including some nice bucks. But bagging a trophy isn't what this season is all about.

The real objective of the season is to provide young hunters an opportunity to learn to hunt deer in a safe, well-supervised manner. The special season gives the young hunter the chance to be in the field with an adult who can concentrate on the youth without worrying about their own hunt. To be eligible, the youth has to be 12 (by September 1) through 15 years old. The young hunter has to pass a hunter safety course and has to be accompanied into the field by an adult who also possesses a regular hunting license. Both the young hunter and the adult have to wear hunter orange. The young hunter also has to stay in direct company with the adult at all times.

The results from the first two seasons speak for themselves. Based upon the results from a post-season harvest survey, about 40 percent of the youths reported that they bagged a deer. More

The youth deer hunt commemorative button was designed by Iowa artist Larry Zach who donated the use of his art. This year's hunters will receive the 1994 version of the button from the DNR.




I am a 13-year old hunter. I hunted in the youth deer season this previous fall. I was successful at bagging a nice doe.

My father and I had a lot of fun and we hope that the DNR will have this youth deer season again.

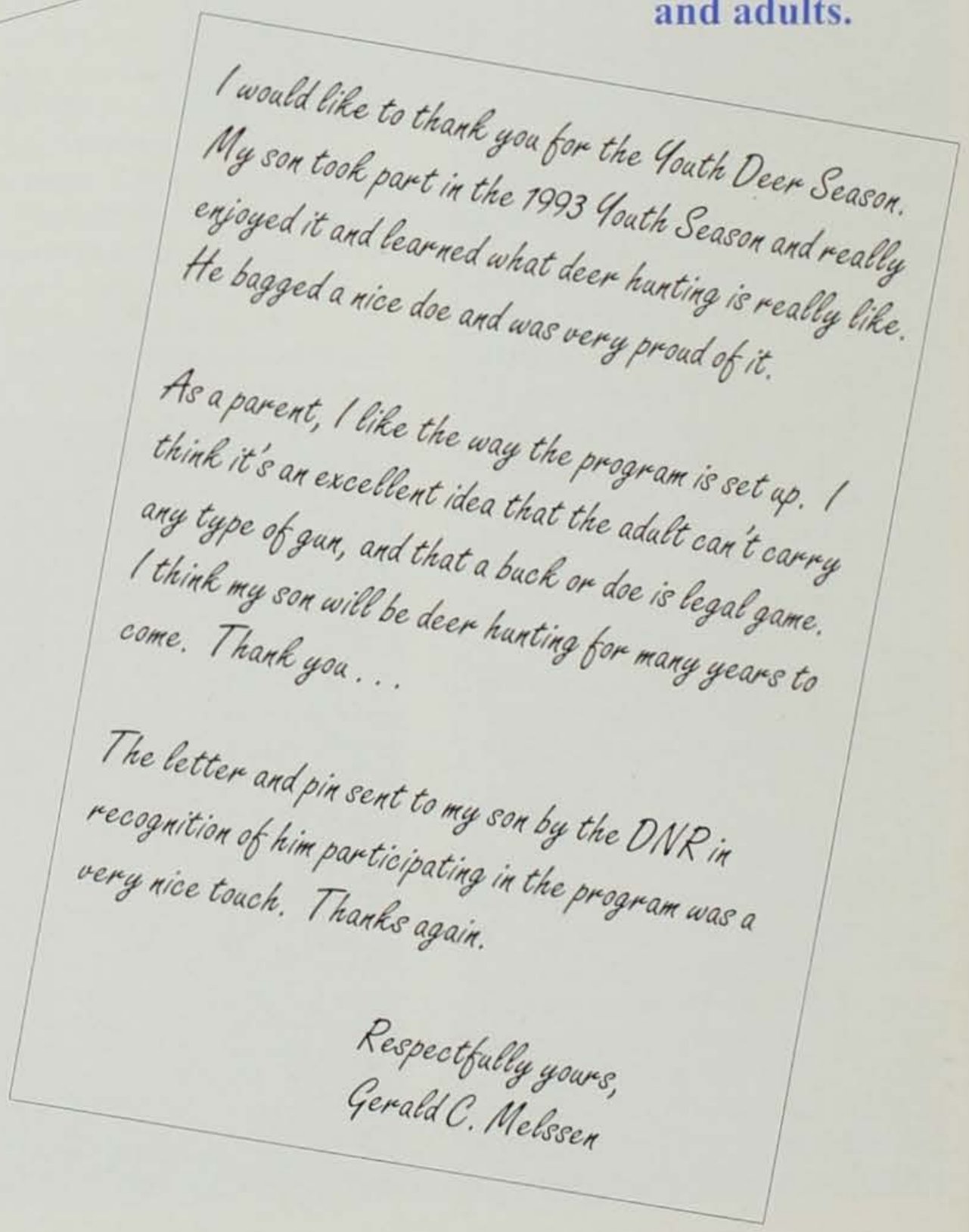
I know many of my friends and their parents enjoyed the youth deer season, even though many weren't successful. We're looking forward to the youth deer season this September.

Sincerely,
Eldon Melssen

As the excerpts from these letters show, youth deer season is enjoyable for both youths and adults.

than 70 percent of the deer taken were antlerless, but all were trophies. Although most youngsters hunted with a parent, 20 percent spent at least part of the time in the field with either a friend or other relative. These young hunters spent an average of about 3.5 days in the field, with the time fairly evenly split among all three weekends. Nearly 75 percent of the young hunters reported being either very satisfied or satisfied with their experience. This was the highest rating by any group of resident hunters.

About the only complaint registered was with the timing of the hunt. The early season can be a bit warm and bugs can be a nuisance, but this period is the only time during the fall when no other deer seasons take place. This changes slightly this year as the season begins a week later and runs from Sept. 17 through Oct. 2.


I would like to thank you for the Youth Deer Season. My son took part in the 1993 Youth Season and really enjoyed it and learned what deer hunting is really like. He bagged a nice doe and was very proud of it.

As a parent, I like the way the program is set up. I think it's an excellent idea that the adult can't carry any type of gun, and that a buck or doe is legal game. I think my son will be deer hunting for many years to come. Thank you . . .

The letter and pin sent to my son by the DNR in recognition of him participating in the program was a very nice touch. Thanks again.

Respectfully yours,
Gerald C. Melssen

Keys To Success

Patience on the part of the adult and pre-season practice by the youth may be the key to success. Remember this is a learning experience for the youngster. Emphasize safety and the positive aspects of being in the field. Don't make bagging a deer the primary measure of success. Share the outdoor experience with the young hunter. In this way it will be a positive experience for both.

Tactics that work best are those that give the young hunter as much time as possible to react to an encounter with a deer. A well-placed tree stand or ground blind near the edge of some timber gives the young hunter the best chance to see a deer and pick a safe, effective shot. A distance of about 40 to 60 yards is far enough to keep from spooking the deer but close enough for a well-placed shot. Early morning and late afternoon are the best time to catch deer on the move. Remember to keep slightly hidden as young hunters have a hard time remaining still. Make sure the young hunter has a good view of the area where the deer is supposed to appear so that they can make a good shot.

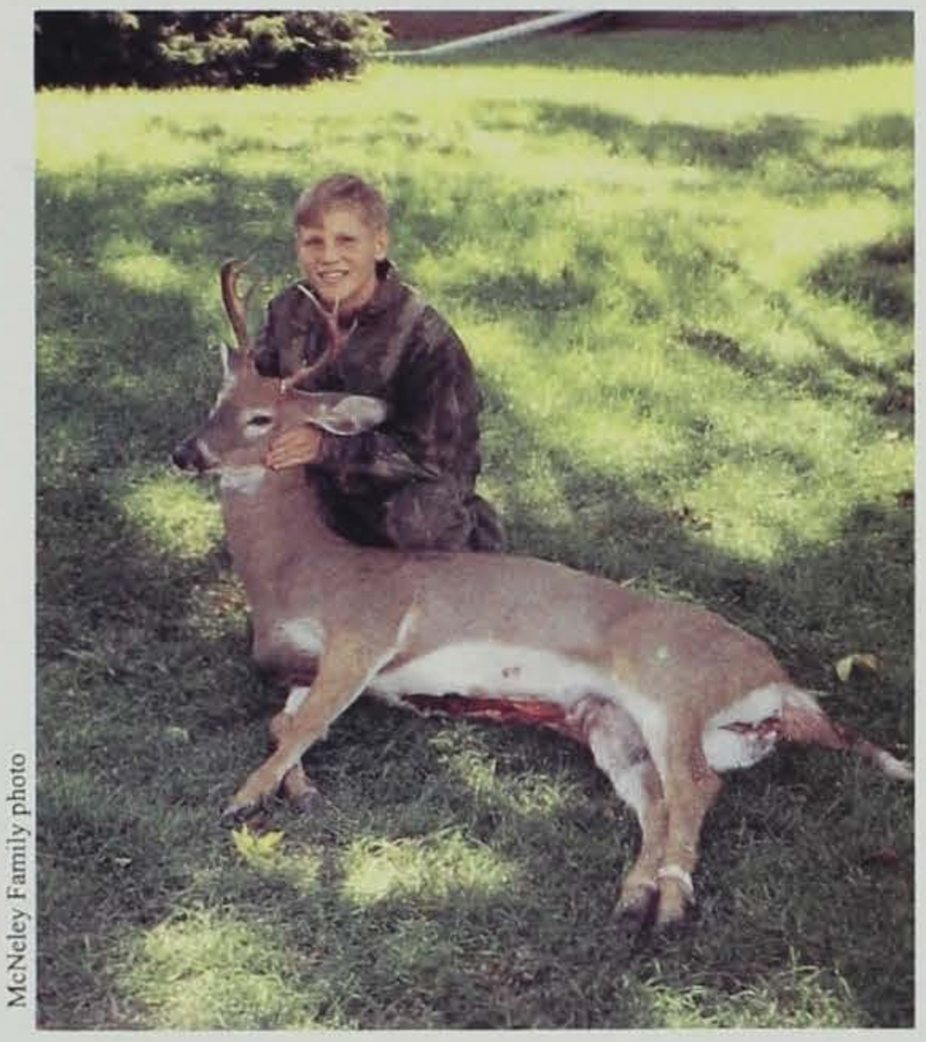
For the lucky hunter that gets a deer, a few precautions will make the job of caring for the meat a bit easier. Again, the first thing is to be prepared. Are you going to process the meat yourself or take it to a locker? If it goes to a locker, when can they take it? If not, can you find a cool spot to hang the carcass? The processing should be done as soon as possible, since warm weather can spoil meat in a hurry. Aging the meat is not usually a good idea unless you have a cooler. Keep insects away as best a possible. Remember to keep things as clean as possible for the best results.

Last year the DNR sent all young hunters a collector button to commemorate their hunt. The button was designed by Iowa artist Larry Zach who donated the use of his art. This year's hunters will receive the 1994 version of the button.

If you have a young hunter in your family, this is a good way to get them started hunting deer. If you don't, maybe you know of a young person who would like to go deer hunting but doesn't have anyone to take them. This season gives you the chance to introduce them to the sport of deer hunting in the right way. Start now and plan a hunt, it'll do you and them a lot of good.

The youth deer season application deadline is July 22. For more information regarding this year's youth deer hunt, call (515)281-8688.

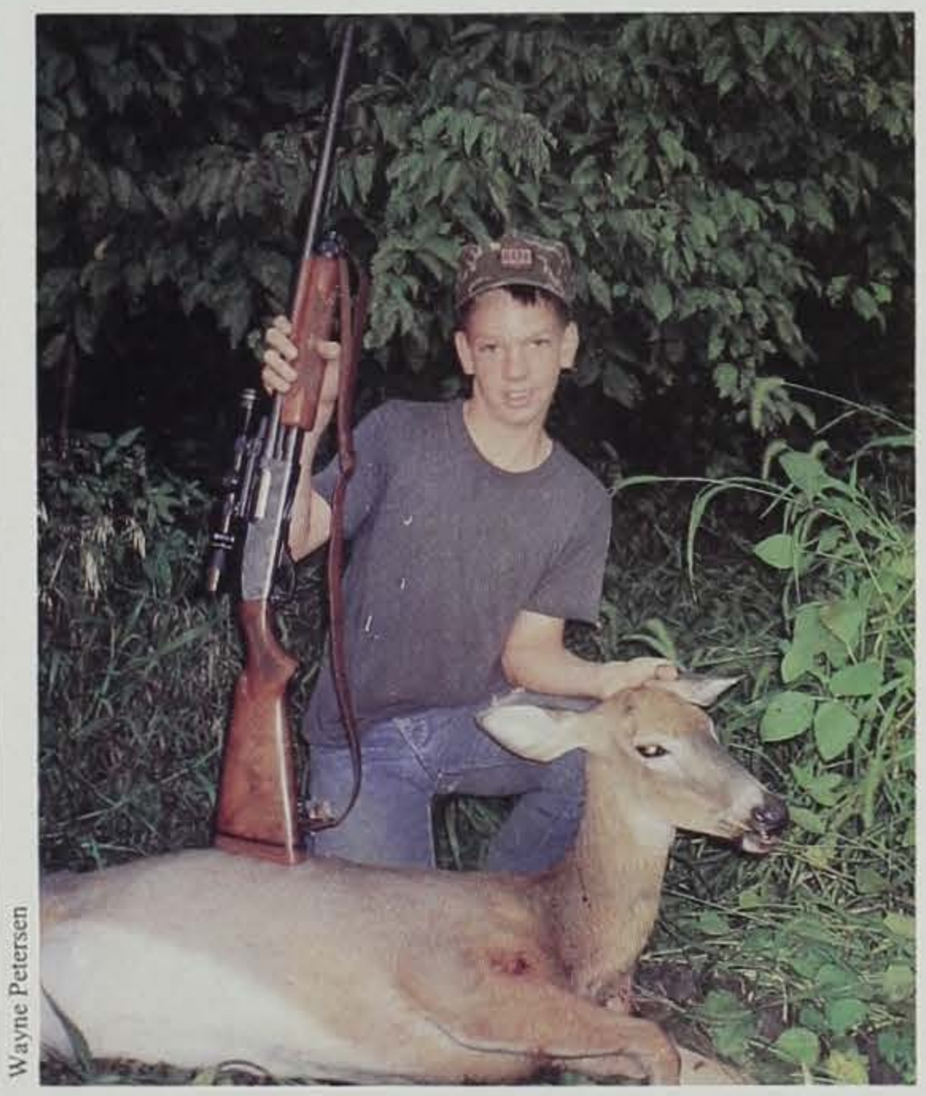
Willie Suchy is a wildlife management bioligist with the department's wildlife research station in Chariton.



McNeley Family photo

◀ **Patrick McNeley got his deer the first day of the youth deer season in 1993 on his first time out. Following a family tradition of young, well trained hunters, he was accompanied by his uncle, Dennis Williamson.**

For the lucky (and prepared) hunter, like Patrick, who gets a deer, a few precautions will make the job of caring for the meat a bit easier. Youth deer season is earlier and therefore the weather is warmer. Processing should be done as soon as possible, since warm weather can spoil meat in a hurry.



Wayne Petersen

◀ **Justin Petersen went hunting during both the 1992 and 1993 seasons with his uncle, Wayne Petersen, and got a deer each year. "Justin practiced a great deal before we went into the field," said Wayne Petersen, "and that made a tremendous difference. The experience of watching his preparation, seeing him scout the site and accompanying him on the hunt was simply great! I look forward to many years of deer hunting with him."**

BRUSHY CREEK
A PICTORIAL OF *PROGRESS*

Article by Michael Carrier
Photos by Ken Formanek

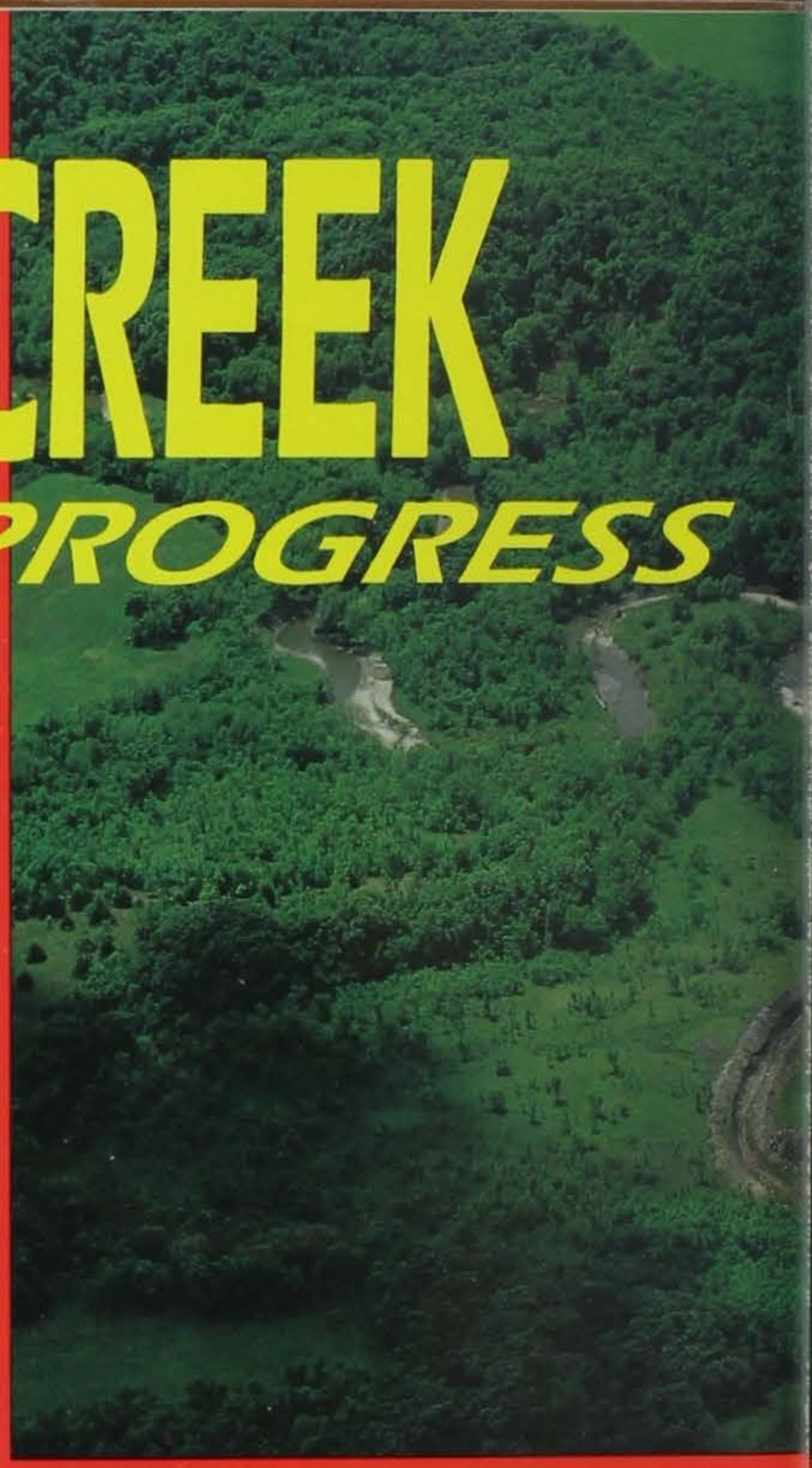
After nearly thirty years of planning, budgeting and even controversy over appropriate levels of development, the Brushy Creek State Recreation Area was launched in 1993. During that year construction began on the various facilities that will serve visitors. Consisting of 6,000 acres of scenic prairies, woodlands, and river and stream valleys, Brushy is Iowa's largest recreation area.

A final master development plan for the area was approved by the Natural Resource Commission in 1993. It calls for construction of a 690- acre lake, swimming beach, boat ramps, picnic areas, three modern and two primitive camping areas, family cabins, miles and miles of trails for horseback riding and hiking, public hunting areas, and undeveloped areas for the appreciation of nature's quiet beauty.

Construction of the lake began in 1993 and is slated for completion in 1996 or 1997. Fishing, which is projected to be excellent in the lake, should take off in 1999 or 2000. Other facilities will be developed over the next five years with the entire area being "on-line" by the year 2000.

Brushy Creek has been expanded and is being developed to meet present and future recreation demands for a large area of north-central Iowa. It is expected to become one of Iowa's most well-developed, popular and beautiful recreation areas.

Funding for the construction of the lake and facilities is coming from REAP Open Spaces, the state Marine Fuel Tax Fund, federal taxes on sport fishing equipment, and other federal funds for recreation development. Giese Construction Company, Inc. and Woodruff Construction, Inc., both of Fort Dodge, are the primary builders in the project.



Waters from the lake will flow through a concrete spillway to Brushy Creek on its way to the Des Moines River.

Michael Carrier is the department's Parks, Recreation and Preserves Division Administrator in Des Moines.

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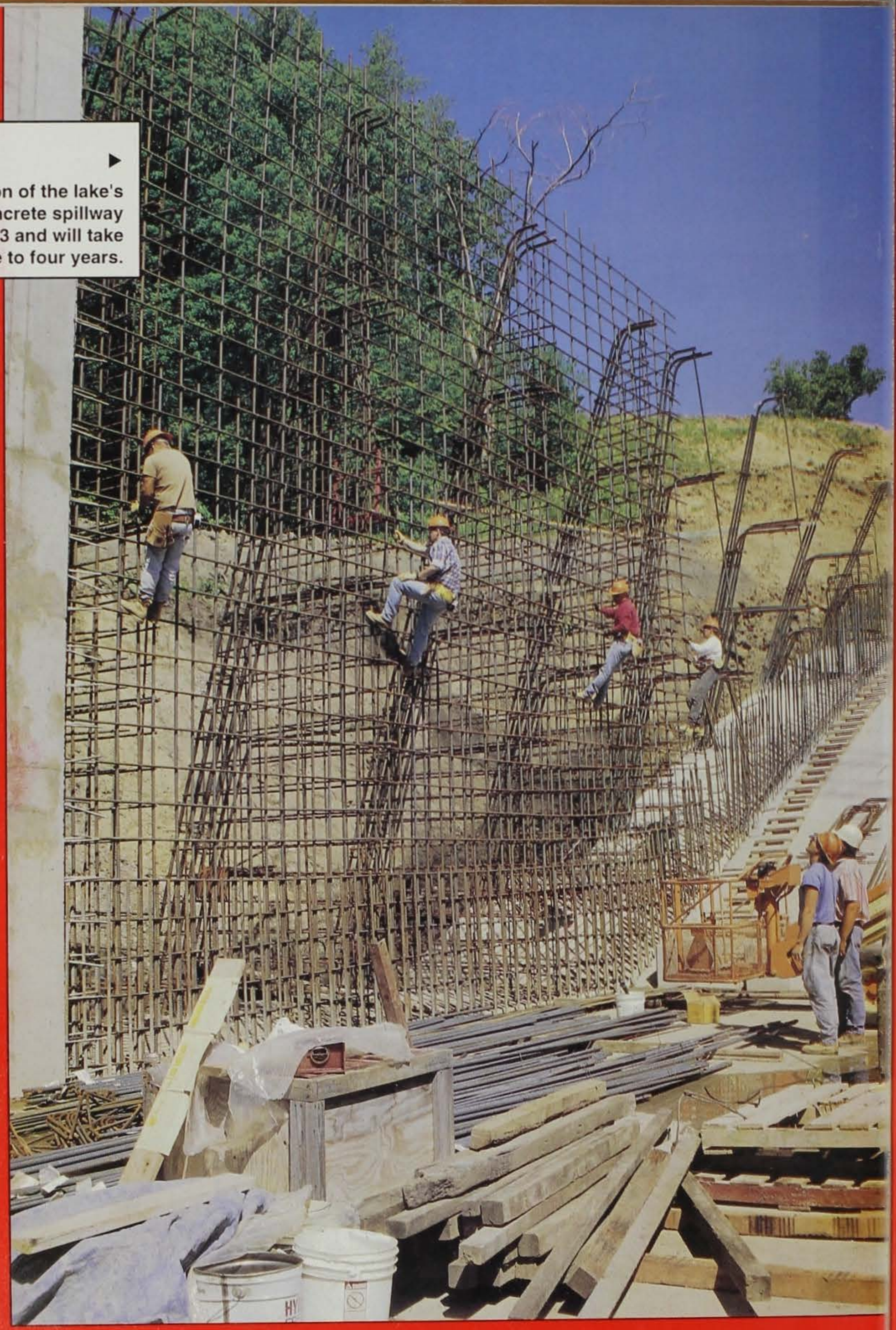
This 90-foot-high dam will create a 690-acre lake projected to be one of Iowa's best in fishing and water quality.



Construction of the lake's dam and concrete spillway began in 1993 and will take three to four years.

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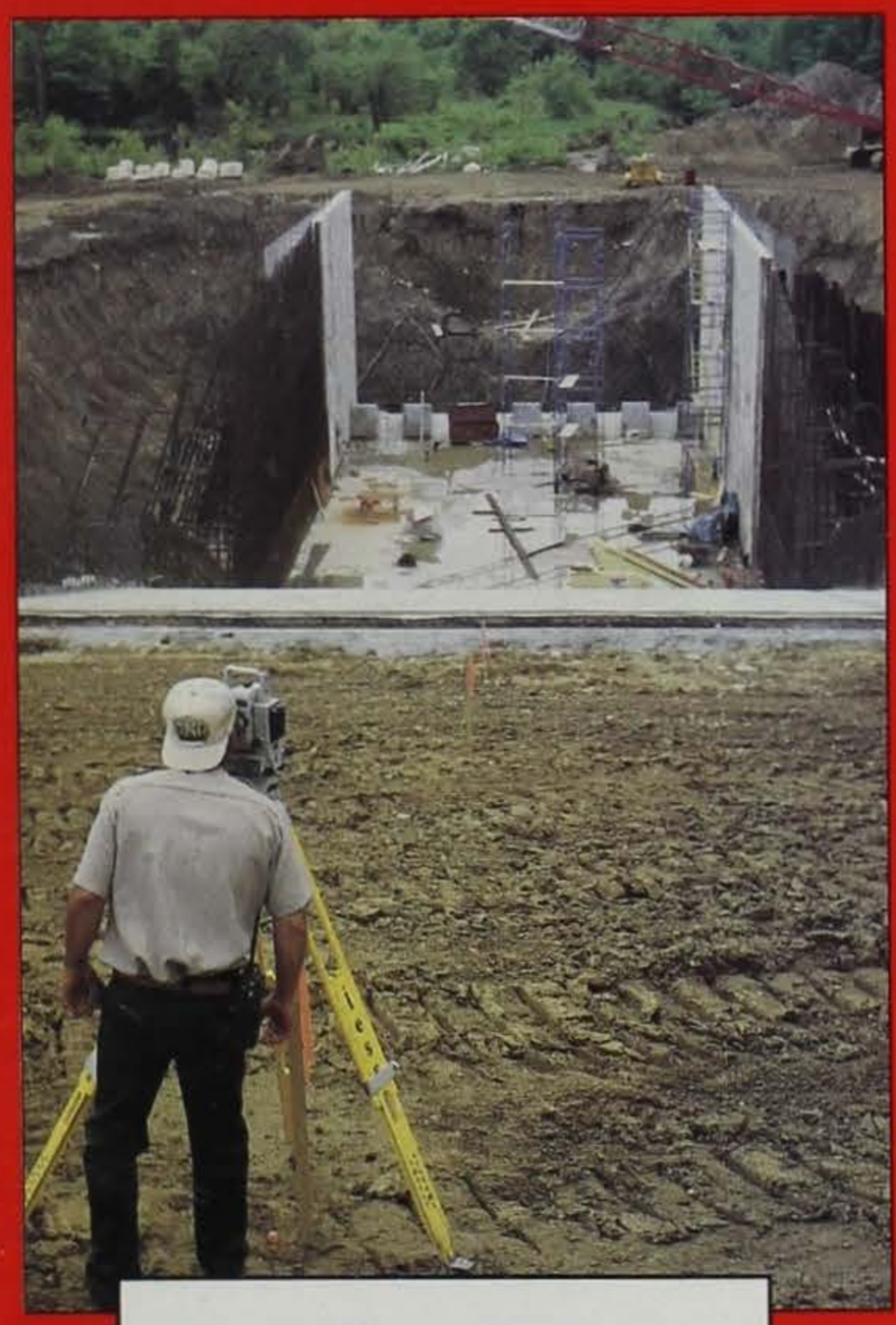
The second major development to occur is a long-awaited shower building in the campground. This is slated for completion in late 1994.



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Precise design, planning and construction standards are the "rule" as the lake and other structures are built.

▲

Earthen overburden is stripped away to expose clay material to be used on the one-million-cubic-yard dam.

Lowell Washburn

Designing for Ducks

Many factors affect duck production, and all must be considered when developing a wetland management strategy.

by Doug Harr

Since 1987, the DNR's acquisition of new wetland complexes for waterfowl has greatly increased. Most sites purchased are a product of Iowa's participation in the Prairie Pothole Joint Venture, or PPJV. To date, approximately 15,000 acres have been acquired through PPJV, using a variety of state, federal and private funding sources.

With such a large acreage of new wildlife areas, DNR personnel have hastened to meet the challenges of developing and managing these areas. Most tracts will host a large assemblage of waterfowl, upland game and nongame species. Ducks and geese stand to be the chief beneficiaries, so management plans focus upon designing the landscape to fit their needs. The needs of many other wetland species are not overlooked, however, as DNR managers strive to reconstruct the larger prairie and wetland ecosystem that existed historically. While PPJV is aimed at increasing continental duck populations, today's emphasis on "biodiversity" will assure that the needs of many other species are simultaneously met. (See "What is Biodiversity?" on page 40.)

What could be so difficult about managing for waterfowl? One might suspect all that's necessary is water and some nesting cover. While those two elements certainly are critical, it's a vast oversimplification to expect that simply purchasing a pothole and some surrounding grasslands will result in more ducks.

Many factors affect duck production, and all must be considered when developing a wetland management strategy. Among important considerations are wetland complexes, ratio of upland to wetland acreage, water levels, food supply, predation and protected nest sites. Let's examine some of these limiting factors in more detail.

Wetland Complexes

In the vast prairie pothole region stretching from central Iowa to eastern Alberta, Canada, wetlands once existed almost beyond counting. Waterfowl produced in this area, often called the "duck factory," annually numbered in the hundreds of millions.

One reason for such prolific reproduction was the complexity and sheer numbers of wetland types afforded nesting ducks. Ephemeral wetlands, very shallow areas flooded for a few days or weeks each spring, supplied explosive growth of microorganisms required by ducks to fuel their return northward and to provide critical protein needed by females to produce their eggs.

Slightly larger and deeper seasonal wetlands were used for ducks' courting and mating activities. Mallards and blue-winged teal, perhaps our most common prairie waterfowl, tend to seek out fairly secluded small wetlands for breeding and countless small marshes on the great prairies were made to order.

Still larger, semi-permanent wetlands retaining one to four feet of water in all but the driest years served yet another purpose. Besides offering more breeding habitat, it was here that new mothers could take their offspring to escape predation, feed and grow to flight stage. On these moderate-to-large marshes, diving ducks could find their habitat needs satisfied. Many divers, such as canvasbacks, redheads, ringnecks and ruddy ducks, usually prefer "overwater" nest sites constructed among emergent bulrushes or cattails, rather than on shore as do mallards and the dabbling ducks.

Finally, the largest marshes and shallow lakes were sought by ducks during their flightless summer molt period, as loafing areas for males (most of whom desert their mates once nesting is begun), and for staging areas to ready flocks for fall migration. All these various wetland types and sizes were essential to maximum duck production and were best situated in large complexes where all water bodies might be within close flying or walking distance of each other.

Ducks' requirements for wetland complexes are no different today than they were historically. When the DNR purchases tracts for waterfowl production, areas with intact complexes are most desirable. But because most Iowa wetlands were drained long ago, wildlife managers generally seek to acquire lands having drained wetland basin complexes which could be readily restored, improved or created. Often, simply plugging old field drainage tiles inexpensively restores former wetlands to their near-original condition. Larger basin restoration may require additional dikes or ditch plugs. Other basins may be enlarged or deepened by installation of more expensive water-control structures. In any case, it's up to the waterfowl manager to determine what's needed and develop appropriate plans.

Roger A. Hill

Bruce Morrison

▲

Wetland "complexes," with abundant nesting cover and many different sized marshes and shallow lakes are an important factor in producing ducks.

Hen mallard (opposite page).

Roger A. Hill

▲

Sufficient upland nesting cover is critical to good production for many Iowa ducks. Many wetland areas are seeded down with native grasses to provide cover both for waterfowl and upland wildlife species.

Nesting Cover

Here in Iowa, blue-winged teal and mallards are the major resident prairie duck species. Being upland, rather than overwater nesters, they require grasslands for their needs. Research has demonstrated that maximum production of these species requires a minimum of three grassland acres for every wetland acre. Thus, a quarter-section of Iowa land would have about 40 acres in multiple marsh basins scattered among 120 acres of native prairie or tame grass/legume cover.

In Iowa, the DNR and U.S. Fish and Wildlife Service attempt to acquire tracts of land already exhibiting this ratio, or lands which can be developed to about those proportions. Where agricultural lands must be purchased, most farmed acres are seeded to permanent nesting cover.

Once again, different ducks have varying cover requirements. Mallards prefer moderately tall grasses and legumes, or even some brush, because of the overhead seclusion this cover offers. Blue-winged teal select moderate to short grass cover and nest closer to the water's edge than do mallards. Pintails, gadwalls and northern shovelers, once common Iowa nesters now seldom found here, all prefer shorter cover types than mallards. These species generally nest north and west of Iowa, where sparser human populations result in less cover disturbance.

By keying on habitat needs of mallards and blue-wings, Iowa waterfowl managers maximize production of our predominate nester, while also allowing for some nesting by less-common species.

Water Levels

Prairie wetlands experience periodic natural cycles of drought. Before humans so dramatically altered the landscape, drought in local regions frequently was compensated by abundant precipitation elsewhere. Waterfowl production might fall in drought-stricken areas and rise in adequately wet areas. Today, however, we find that most midwestern marshes long ago fell to drainage and the plow. When drought strikes, as it did in the late 1980s, duck production in Iowa, Minnesota and the Dakotas can be devastated.

One means DNR wildlife managers can reduce drought's effects is to impound water in wetland basins. Dikes, dams, levees and various water-control devices can act to store water during plentiful water years so that at least some waterfowl habitat is maintained when drought hits.

Water level control also affords the ability to "draw down" marsh water levels. Wetlands having an equal mix of open water and emergent plants appear most attractive to ducks and other aquatic wildlife. Marshes with extensive open water can be drawn down to expose mudflats. This, in turn, yields growth of new aquatic vegetation. When sufficient plant growth is achieved, the control structure is closed and water levels allowed to return to normal. If vegetation is overabundant, controlled water levels may be raised to encourage muskrats and wave action, both of which work to open up thick stands of plants.

Draw-downs sometimes are used in late summer to decrease water depth and attract teal and other migrant birds

that prefer feeding in shallows. Raising fall water levels can deepen wetlands where hunting is an important activity. Holding water above normal levels during summer will flood shorelines beyond the vegetation fringe, creating open "loafing" areas sought by mallards and some other ducks. In practice, especially where multiple-marsh water level control is possible, biologists sometimes manage separate basins at varying depths, to provide for differing habitat needs of several species.

Several types of control structures are used across Iowa. The simplest kinds may be installed in an existing subsurface tile drainage system, allowing the tile to be opened or closed as needed. For very large wetlands, a classic concrete dam with stoplogs of a sheet-piling structure may be necessary to handle large volumes of discharge. Riverine impoundments, often enclosed by dikes, make use of mechanical pumps to add water to or remove it from the wetland.

A popular device for improving prairie wetlands is the Wisconsin tube, especially suited to marshes of about 10 to 200 acres, depending on watershed area. This structure is merely a large steel culvert to which a riser has been welded. Channel iron mounted down the inside of the riser to the culvert's base serve to hold boards which may be installed or removed through the riser top, to regulate water levels. At a price range from $1,500 to $5,000 (based on water capacity), Wisconsin tubes provide a very cost-effective means for water level management on moderate to large wetlands.

Doug Harr

Roger A. Hill

▲

A "Wisconsin tube" is a very cost-effective means of controlling water levels in medium-sized wetlands. Pictured is a new structure that will flood about 20 acres at Jemmerson Slough, near Spirit Lake.

Predation and Nest Structures

Predation is a fact of life for most wild creatures, waterfowl included. DNR wildlife management areas would, in fact, be much less diverse and interesting if all predators were eliminated.

Unfortunately, when habitat is so greatly reduced as it has been at the hands of intensive agriculture, both predators and prey are squeezed into whatever cover remnants remain. Ducks and their nests tend to become concentrated and more likely to be preyed upon by similarly concentrated predators. Chief among the wild hunters affecting our waterfowl are red fox, raccoon and striped skunk. Weasels, ground squirrels and crows or raptorial birds are also a factor, but exert less extensive pressure on waterfowl.

Perhaps the best means to decrease predation is to increase protective nesting cover. The previously discussed minimum ratio of three upland acres to each wetland acre is a step in the right direction. More available cover means more widespread duck nests. Likewise, predators are more widespread and their searching less concentrated. Another simple way to reduce aerial predators, such as crows and hawks, is to remove perch trees near prairie wetland edges and in upland nesting areas. Widely spaced lone trees can attract these avian predators to sites where they do more damage. Larger stands of trees are seldom as serious a problem and may be left for their numerous other wildlife values.

Not every DNR wetland has the luxury of extensive upland nesting cover. Many older marshes were acquired only to the water's edge, or

Lowell Washburn

with upland borders little more than a few hundred feet wide. If it is difficult to purchase additional uplands, managers must consider other options to reduce predation. At the most elementary level is construction of artificial nest structures. Giant Canada geese readily accept barrel-type overwater structures or floating platforms for hatching their young. Mallards will also respond to properly designed, elevated, overwater nests. One type, presently under agency evaluation is a cylindrical nest constructed of wire and stuffed with dried grasses. This appears to provide mallards with the overhead cover they prefer in a nest.

Trapping furbearers is another important tool in reducing predation. Unfortunately, recent low fur values and anti-trapping sentiment has resulted in greatly reduced trapping by private citizens. DNR personnel sometimes can trap special problem areas, but this use of state employees and time lost for other pressing work makes this not very cost-effective.

Electric fencing is one alternative demonstrating some usefulness. Predator-proof electric fences must be more elaborate than those farmers use to restrain livestock. Because Iowa's predators are fairly small creatures, they can easily duck under a standard electric fence. A fence design used by the DNR at Ventura Marsh near Clear Lake, uses nine, closely spaced, high-tension wires, with one ground level wire extending from the base like an outrigger. A solar panel provides battery power and lessens outages. Some periodic maintenance is necessary to keep grass and weeds from shorting out the system.

Predators must be removed from inside the fence when it is first powered up (live-trapping is possible), but this tool has proved effective for improving duck nest success. Where uplands are very limited, high duck production is desired and labor for construction and maintenance is available, electric fences may be a viable option.

Doug Harr

▲

Mallards seem to respond to this cylindrical artificial nest structure (top).

Smartweed is a favored food of many ducks in the autumn. The red-colored plant seen here is smartweed on a recently reflooded marsh basin.

Food

The last manageable item for discussion is food. During the breeding season food is seldom a problem for ducks, provided they have suitable wetland-upland complexes. In spring and summer, most waterfowl feed on aquatic plants and zooplankton (microscopic animal life). Corn and small grains are important to migrating birds, and managers often leave standing crops or knock down these cereal grains for ducks and geese to glean.

In some areas, waterfowl graze on summer crops near wetlands. Canada geese occasionally cause problems on private farmlands in northern Iowa. Wildlife managers may resort to planting lure crops on nearby state lands, thereby attracting birds away from private land.

Aquatic food plants can be manipulated for waterfowl food, as well. Marsh draw-downs that expose summer mudflats will usually result in lush growth of smartweeds and beggar-ticks,

both favored duck treats. Annual grasses such as Japanese millet or wild rice may be artificially seeded on mudflats to provide another fine food source. Any of these plants may be flooded once growth is well-established, making desirable fall feeding sites for migrants.

Wild celery, a submergent plant not to be confused with the vegetable found in the supermarket produce section, is another food which may be propagated. This plant is favored by canvasback ducks and has been successfully planted by the U.S. Fish and Wildlife Service in the Mississippi River near LaCrosse, Wisconsin. Less success has been realized with DNR celery plantings in some northern Iowa marshes. These wetlands once hosted huge celery stands and countless feeding canvasbacks. But farmland erosion and resultant muddying of wetland waters has all but eliminated good habitat for both wild celery and canvasbacks. Still, experimental use of this and similar aquatic plants may be used in the future to improve waterfowl food supplies.

Looking to the Future

Iowa's DNR wildlife biologists believe that the recent waterfowl population crash of the previous two decades may be nearing an end. Mid-continent drought during the 1980s forced us all to realize how agricultural practices adversely impact our native ducks and many other kinds of wildlife.

Renewed efforts by the U.S. and Canada are now yielding large new acquisitions of waterfowl habitat nationwide. Here in Iowa, wildlife mangers have jumped at the opportunity to acquire and develop new wetland complexes.

Restored or improved prairie marshes, increased plant nesting cover (including millions of acres seeded down under the USDA's Conservation Reserve Program), a better understanding of ecosystem management, and a return to normal precipitation all indicate that waterfowl populations are stabilizing and may soon begin increasing once again. Sharing these restored prairie wetland landscapes will be

Roger A. Hill

Roger A. Hill

American bitterns, sora rails, yellow-headed blackbirds, marsh wrens, swamp sparrows, muskrats, mink, bullheads, dragonflies, waterlilies, wild iris and countless other flora and fauna.

Gratitude must be expressed for the help, both monetary and technical, offered by Ducks Unlimited, Pheasants Forever, Wetlands for Iowa and numerous additional private conservation groups. Likewise, conservation lobbyists from organizations such as the National Wildlife Federation, Audubon Society and Izaak Walton League have helped improve the fate of wildlife in Congress and in federal government programs.

There is, then, good reason for optimism. With continued public monetary and political support, wildlife biologists can design waterfowl habitat to restore or replace that which was once so abundant in Iowa and across the upper Midwest.

Doug Harr is a wildlife management biologist for the department and is located in Rock Rapids.

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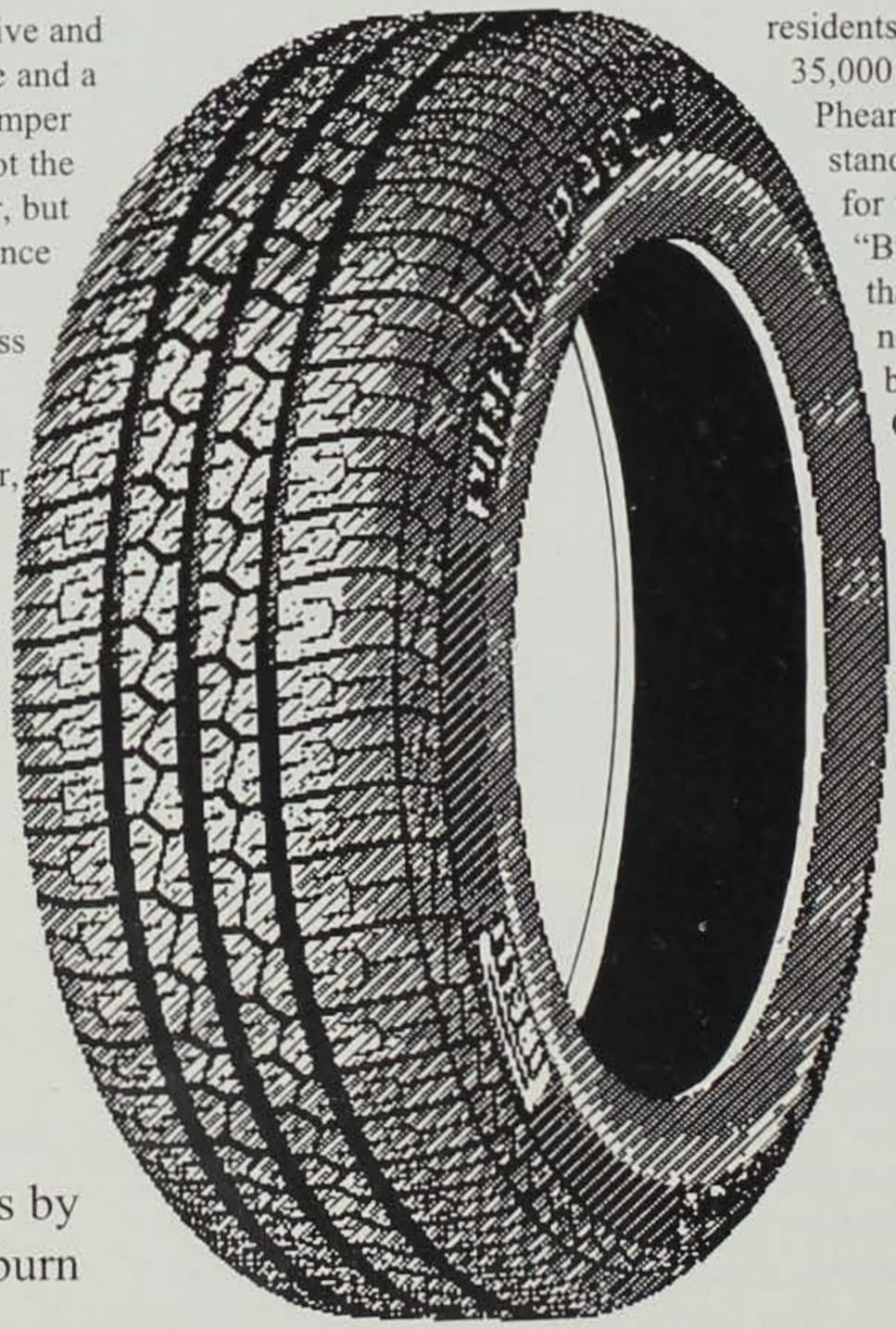
Mid-continent drought during the 1980s forced us all to realize how agricultural practices adversely impact our native ducks and many other kinds of wildlife. Biologists believe, however, that the waterfowl declines of the past two decades are coming to an end.

The Cerro Gordo County Great Tire Roundup

A grassroots effort to clean up the local environment results in saved space at the landfill while providing a new, low-cost source of industrial energy.

The line up was impressive and consisted of more than a mile and a half of stalled, bumper-to-bumper traffic. However, this was not the scene of a mid-city rush hour, but rather the peaceful side entrance to the Cerro Gordo County landfill. The event in progress was the Cerro Gordo County Great Tire Cleanup.

According to coordinator, Larry Phearman, organizers were extremely pleased by the results of the cleanup. "Although this event only lasted for one day, local residents turned in more than 35,000 worn out tires," said Phearman. "From an aesthetic standpoint that is very positive for the county," he added. "But perhaps the best news is that the waste rubber will now serve as fuel to be burned at the Holnam Cement Plant located at Mason City."



Essentially, the way the cleanup worked was it allowed residents an opportunity to dispose of used tires, completely free

Article and photos by
Lowell Washburn

of charge. Depending on size, it normally costs $2 to $10 each to landfill tires. During the cleanup's peak period, county residents were delivering and unloading tires at a rate of 7,000 per hour.

Financial assistance was provided to the county through legislation that funded one-time waste tire collection pilot projects. The DNR administered the program.

"We have a total of 10 communities in Cerro Gordo County," said Phearman, "and all 10 really got behind this effort." For example, at the town of Dougherty a total of 2,077 tires were turned in. At Rockwell, residents disposed of 1,900 tires. "Considering the fact that these are towns of 600 or less residents, I think the totals are pretty incredible," said Phearman. The county landfill itself represented the largest collection point, where more than 17,000 tires were brought in.

"Skeptics might say that the only reason people responded to the cleanup was to save the cost of landfilling," said Phearman. "While that may be true in part, I think that for a lot of folks it went a bit deeper than that," he added. "Overall, I think people were generally concerned about cleaning up the environment."

"We heard several stories of people stopping to pick up tires from the road ditches," said Phearman. "I personally saw one example of this myself, and to me that's proof that their motives exceeded personal gain."

During the past several weeks, the county's "tire mountain" has steadily dwindled to a mole hill as the car, truck and tractor tires have been taken to Des Moines for shredding. The two-inch rubber chips are then returned to Mason City to help fuel the kilns at the Holnam Cement Plant.

According to Holnam process engineer, Verne Stuessy, the production of cement is an extremely heat-intensive process. "We manufacture cement from a combination of limestone, silica and alumina," said Stuessy. The mixture is fed into huge, cylindrical kilns that measure 16.5 feet in diameter and 590 feet in length. As the material makes its way down the kiln, the temperatures become hotter and hotter until desired chemical reactions occur. Actually, the word "hotter" is an understatement.

"Our kilns may run at flame temperatures that exceed 3,000 degrees Fahrenheit," said Stuessy.

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In May, residents in Cerro Gordo County communities turned in more than 35,000 used tires.

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The National Guard's 1133rd Transportaion Company of Mason City supplied the trucks to haul the tires to Des Moines for shredding.

▶ **(and opposite page)**

The tires were shredded into two-inch pieces and transported back to Mason City where they were used at the Holnam Cement Plant to fuel their kilns.

(I was told by another engineer that the figure is roughly a quarter of the surface temperature of the sun.) The intensity of this heat results in the partial liquification of limestone and other substances into a molten, something that you and I would probably refer to as lava, but is a synthetic mineral known as clinker.

"It is this incredible level of heat that allows us to safely use tires as fuel," says Stuessy. "At those temperatures, 99.99 percent of the tires are consumed."

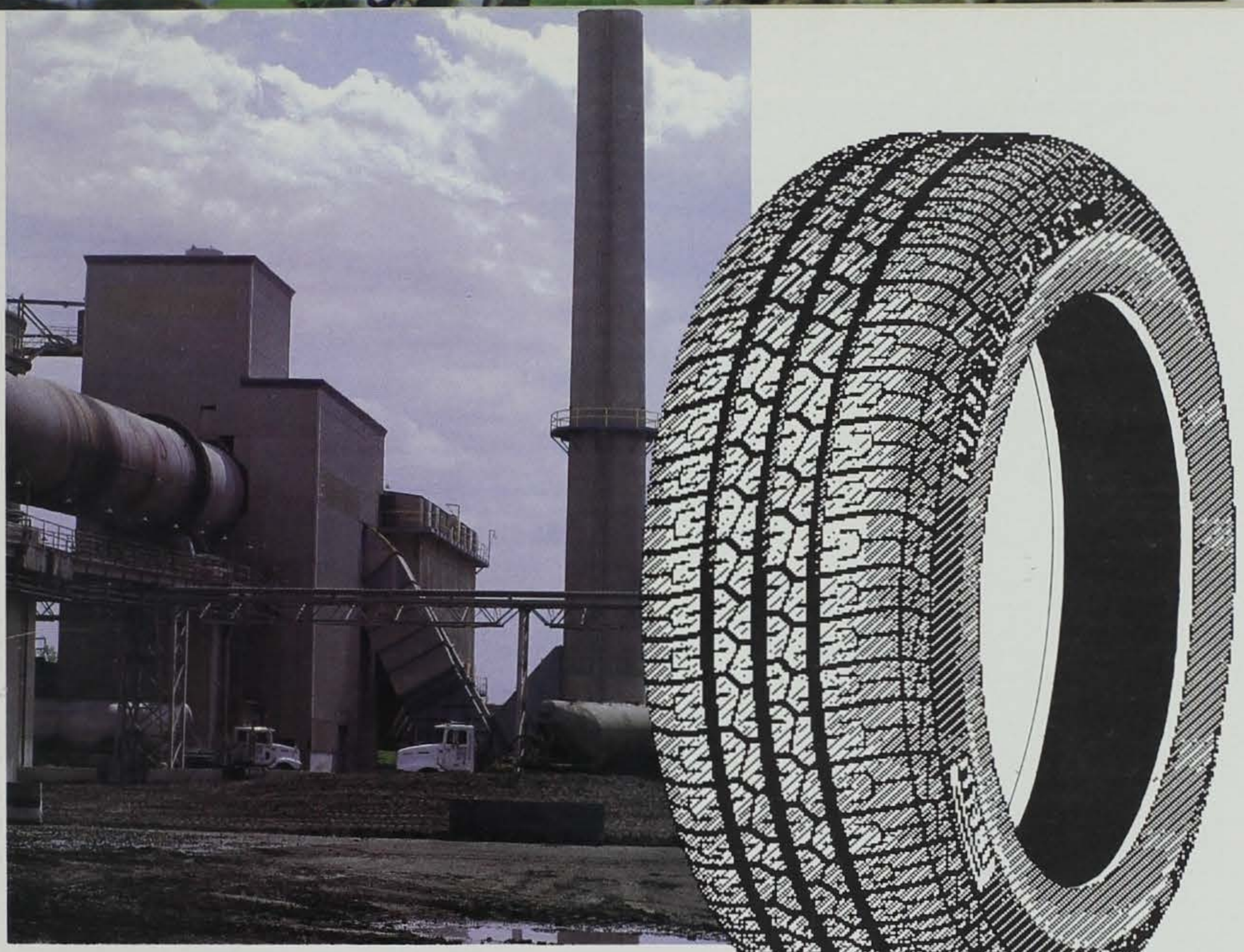
"This is considered to be complete destruction," said Stuessy. "Nothing survives, even the smoke is converted to energy."

"Initially we were concerned about the sulfur content of tires," said Stuessy. But as it turned out the tires actually had less (1.33 percent) sulfur than coal or petroleum coke which typically contain up to three percent sulfur.

"With tire-derived fuel we are receiving about 15,000 BTUs of heat per pound," said Stuessy. "With the higher grades of coal we get around 12,000 BTUs. In other words, you get more energy with a lower sulfur content by using tire-derived fuel. Based on the heat content, this means that for every pound of tires used, 1.25 pounds of coal does not need to be burned.

All told, the tires gathered in Cerro Gordo County will save or replace 423 tons of high-grade coal. "To me it's very important that we are reducing the consumption of fossil fuels," said Stuessy. "Beyond that, there is also the tangible benefit of keeping that material out of the landfills." Although the tires still need to be trucked for Mason City to Des Moines for shredding and then back again, there is still a savings in transportation costs since the coal was being shipped in from Colorado and Wyoming. Currently, Holnam is working through the DNR to seek matching funds that will allow the company to explore ways of burning whole tires. If successful, this would effectively eliminate most of the expenses and other problems associated with transportation and shredding.

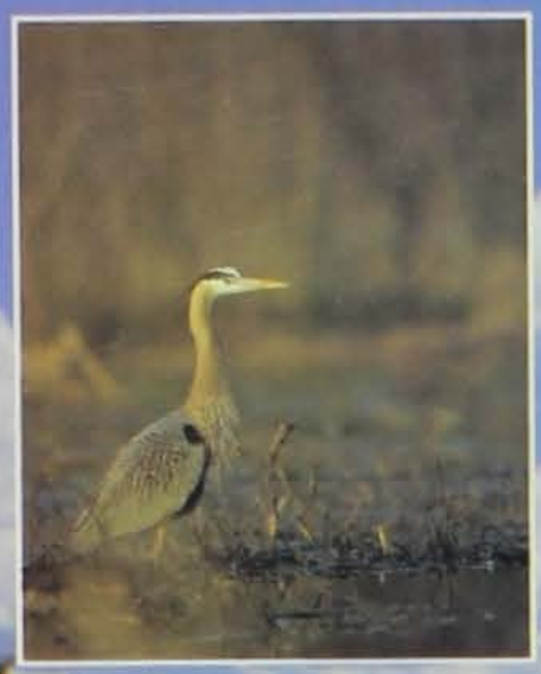
"This facility is permitted to burn a total of 23,000 tons of tire-derived fuel per year, which is the equivalent of 2.3 million car tires," said Stuessy. There



is a total of about four million waste tires generated statewide each year. The fact that a single industrial site can make a full 50 percent of those tires completely vanish from the environment is, well, one of those rare occasions when something that sounds too good to be true really is.

"I'm very proud of Cerro Gordo County and glad for what we've accomplished here," said Phearman. "To me, it is extremely positive to take waste material, like tires, and then turn it into something of real value to the community that ends up as a clean, efficient energy source."

"What we need to do now is perpetuate the cleanness of this thing," said Phearman. "We need to keep the supply of tires from ever building to this level again."



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WHAT IS BIODIVERSITY?

Recently, the Iowa Chapter of The Wildlife Society held a joint workshop, about biodiversity, with the Minnesota Chapter. Attendance was phenomenal. Personnel from state wildlife management units, research and administration were there, as were personnel from various universities and county conservation boards. They all came to learn what biodiversity is and how we can incorporate it into future plans for the state's wildlife.

Fritz Knof, from the U.S. Fish and Wildlife Service in Colorado kicked the session off and opened people's minds to the concept and application of biodiversity. "Biodiversity is the variety of life and the processes to support it," Knof said. Life varies in several ways. The difference between you and me is genetic. The difference between you and a robin is species. The difference between a wetland, prairie or forest is community. Then when you add all of the different genetic, species and community entities together you get a landscape. The processes that support life include things like reproduction, predation, decomposition, photosynthesis, nutrient recycling and so on. We rely on these processes to maintain every level of life.

Thus, biodiversity tends to look at wildlife management from a regional rather than a local perspective. Its main goal is to preserve the biotic integrity of a region. It is also concerned with all forms of life instead of just vertebrates and it is most concerned with the endemic or truly native species of a community or region. So, how can we possibly manage for something that all-encompassing, unwieldy and esoteric in the real world of limited personnel, time and funds in wildlife?

The endemic species represent the key. Endemic species are the species that evolved to meet most of their life's requirements within a particular area. This area might be defined on a landscape basis as composed of several communities, or it might be a species that is more restricted. The health of these species indicates the health of that area. If the endemics can not survive, the true biotic integrity of the area is probably also in jeopardy even though more "generalist" species might be flourishing. For example, Knof's research found that more than 330 species of birds occur at some time on the Great Plains. Trying to plan for the needs of 330 species is mind boggling, if not impossible. However, there are only about a dozen truly endemic species. This adds more focus.

Things have changed a lot though and it is not always easy to identify the endemics. It is also hard to avoid the "numbers game." As Iowa was settled, the wetlands were drained, the prairies plowed and shelterbelts, farm groves and tree-lined cities established. The altered landscape allowed cardinals to move into Iowa. Robins, brown thrashers, catbirds, house wrens and cowbirds enjoyed more brushy habitat areas, and we introduced house sparrows, starlings and pheasants. Now it is hard to envision our landscape without an abundance of these species. But, these species do not represent Iowa's native prairie or prairie pothole region.

The high number of individuals and increased number of species on the surface looks like increased "biodiversity." However, biodiversity isn't just numbers it's integrity. What about bison, elk, prairie chickens, northern harriers, bobolinks or upland sandpipers that have been extirpated or reduced? What do their numbers say about the health of Iowa's prairie-wetland communities? No we can't and don't want to rip out every tree less than 150 years old, or send cardinals and pheasants packing. We can, however, start looking at Iowa in new ways.

First we need to identify Iowa's broad "eco-regions." Then, within each region we need to identify the endemics that best represent that area. In many cases they might be extirpated, but instead of thinking of that as failure we have to accept it as a comment on the health of the region and determine if the region can ever support that species again and if so, how. The next step is the hardest. We need to drop human-

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Article by Laura Jackson
Photos by Roger A. Hill

◀

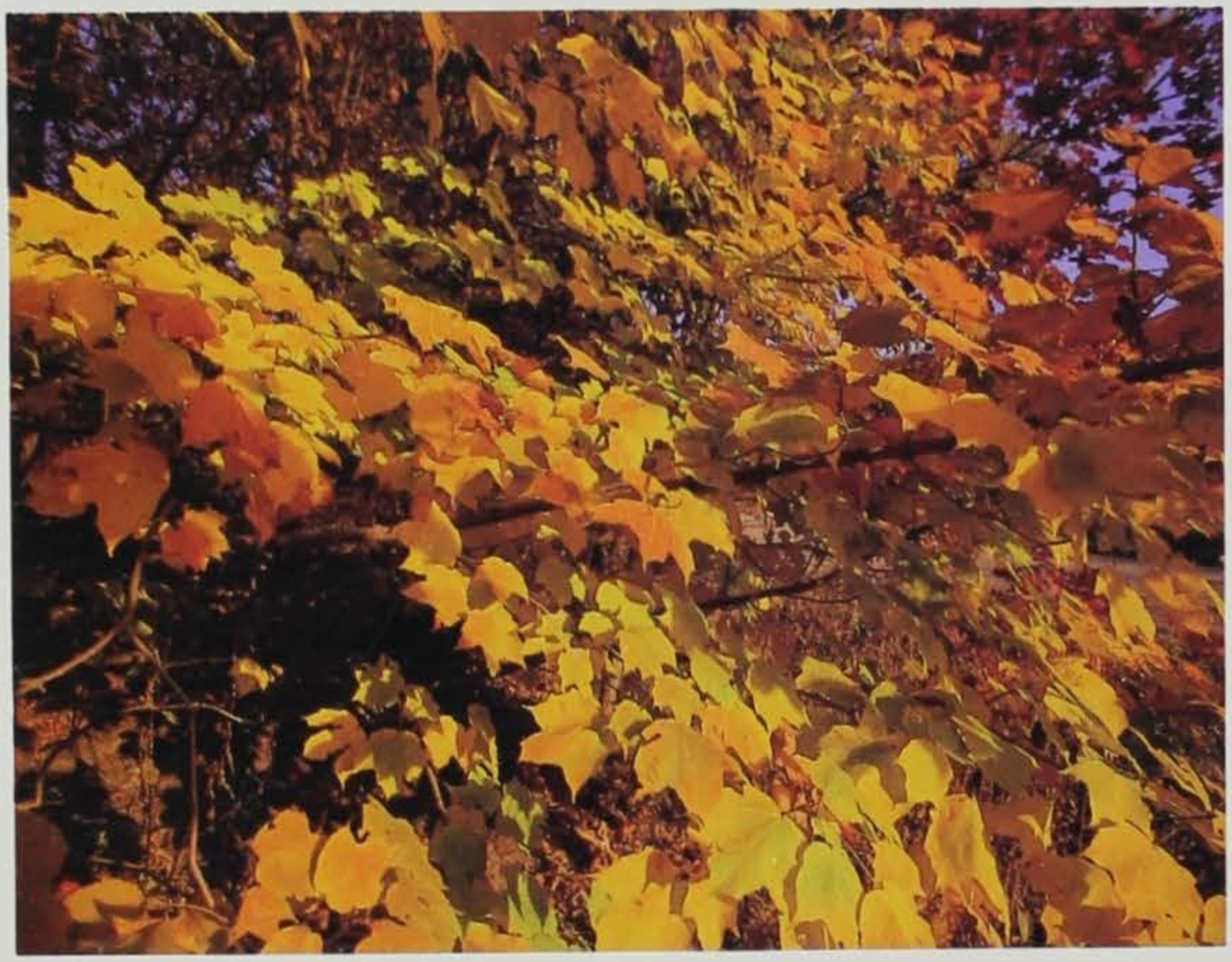
Wetland areas are possibly Iowa's richest biological community type, supporting the widest variety of species. Upper photos, (left to right) great blue heron and dragonfly. Lower photos, (clockwise from upper left) hen wood duck with brood, beaver and bullfrog. Dragonfly photo by Ron Johnson.

induced political boundaries (state lines, county lines, agency affiliations) and form biogeographic teams. The team can then determine within their region what the major watershed linkages are and where major natural areas are located. What areas have the highest quality, the potential for expansion or pending problems? Are any of the areas large enough for the endemics and what nearby land use options (zoning, development guidelines, corridors, agricultural practices) might help these species? In reality, we might discover an individual area is so small and so besieged with problems that money and time spent on that area is not going to help. This allows us to prioritize time and money to produce a greater impact.

Much of this information is already gathered. However, it is divided into small county, unit or area packages which makes it hard to see the area on a landscape scale. Looking at Iowa regionally, would allow us to determine how we could best restore processes that might be missing and promote the bio-sustainability of the region. Using a biodiversity-based management system would also help us evaluate our management and work toward the restoration of the biotic health and integrity of various regions. Some species might never return and some species need to be added to our biotic blueprints. Nevertheless, biodiversity gives all of us a way to see the "big picture," evaluate the health of our natural areas and monitor our progress.

Reprinted from Nongame News, *Spring 1994.*

Laura Jackson is a nongame biologist for the department, located in Boone.



Iowa's two other major community types include woodlands and prairie. A recent inventory of Iowa's forestland has shown, for the first time, an increase in timberland in the state. However, Iowa still has less than one percent of the prairie it had at settlement time.

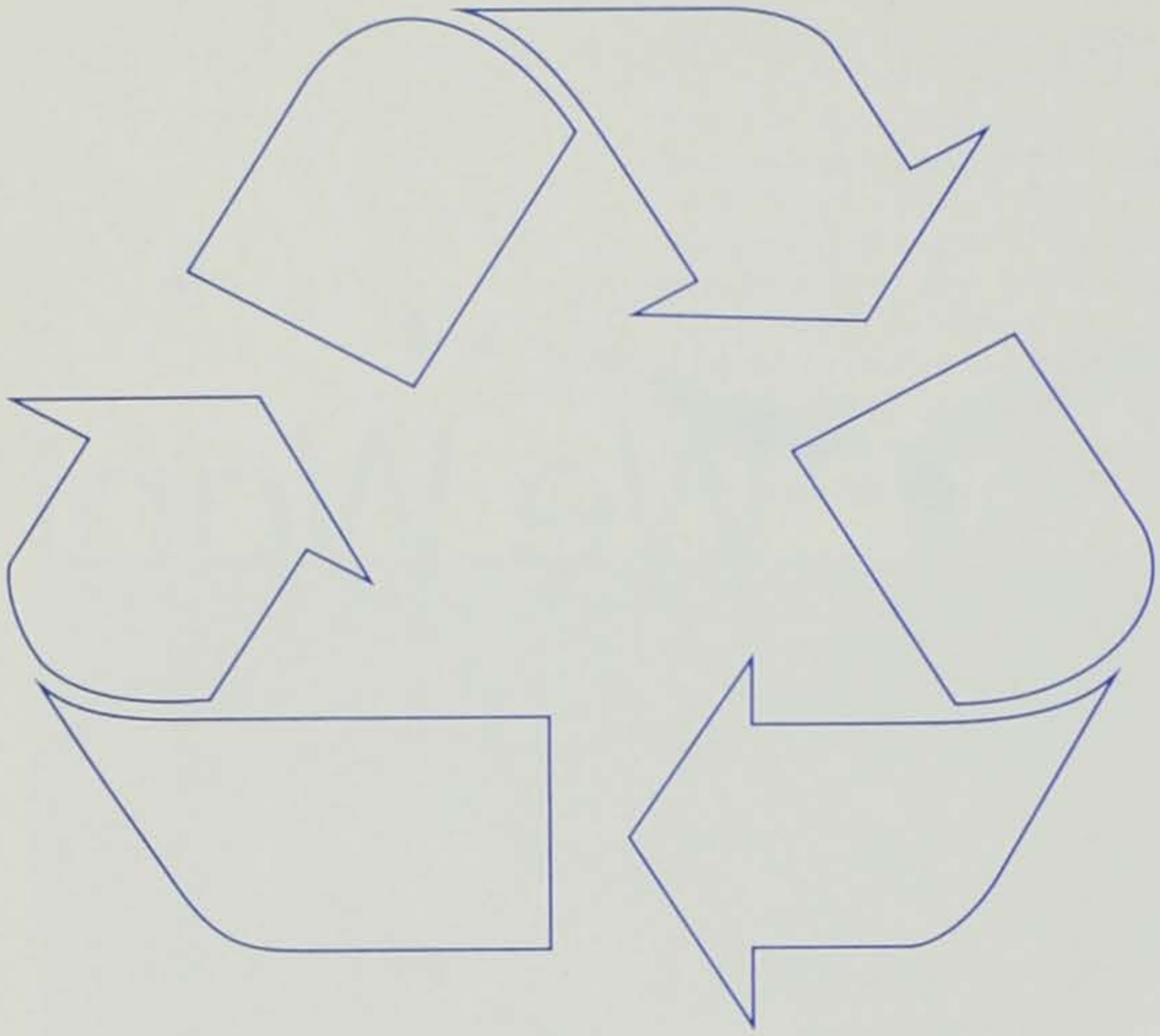
We Want YOU to "Buy Recycled"

by Scott Cahail

In 1988, the State of Iowa began a concerted effort to develop a solid waste management infrastructure that was not dependent on land disposal of solid waste; also known as garbage, trash and refuse. Significant investments are being made to change the way we manage garbage and how we use our natural resources. A primary component of this effort is recycling. Recycling has arrived in Iowa, and the U.S., in a big way. Many recycling operations have been established and most people, if they are willing to put a little effort into it, are able to recycle within a reasonable distance from their home. Even more exciting is the fact that more than 400 of Iowa's 950 communities have curbside collection of recyclables so that individuals can recycle without leaving their property.

Recycling Basics

As recycling grows and is incorporated into our everyday lives, we collect more and more material all of the time. This material finds its way to the various recycling centers, sometimes called materials recovery facilities or MRFs, where it is processed as needed to make it a marketable commodity. This usually entails lots of sorting, grinding, smashing and lashing until the contaminants are removed and the material is boxed or baled and ready for shipment. Manufacturers, also known as "end-markets," purchase the recovered materials to be used as



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As demostrated by the the recyclying symbol, in order to truly be recycling, we have to close the recycling loop by buying and using recycled products and packaging made from recovered materials.

raw materials for producing new products. Large quantities of material that had previously been sent to landfills are being collected, processed and then remanufactured into new products. These elements make-up the three-sided recycling symbol loop that has become so common. In order to truly be recycling, we have to close the recycling loop by buying and using recycled products and packaging made from recovered materials.

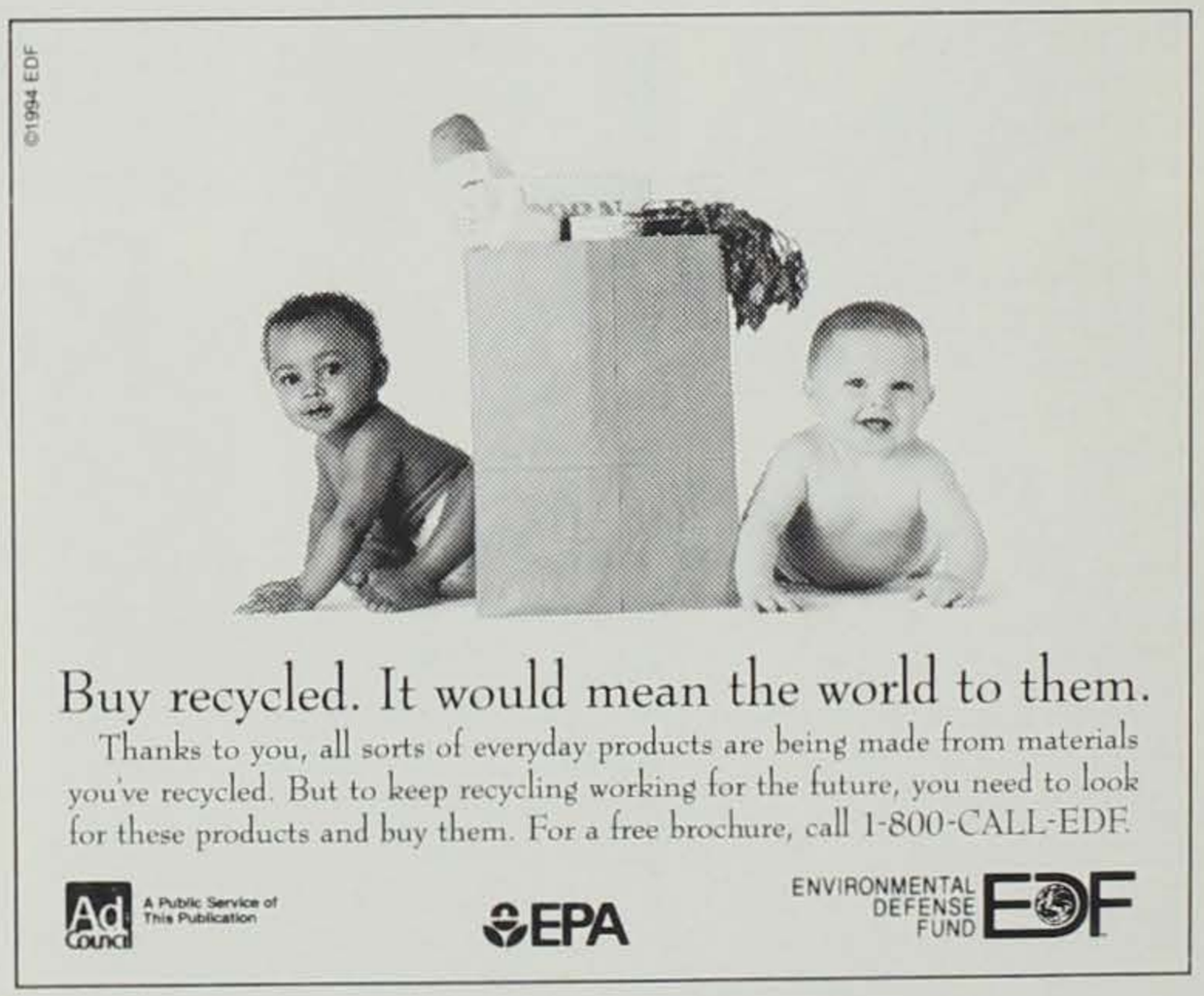
Supply and Demand

While there is still room for improvement in all aspects of recycling, there is a critical need to improve markets for recycled materials. The best way to improve markets is to stimulate demand for the products that are produced from those materials. Following the basic economic concept of supply and demand, we can see why creating a greater demand is so critical. We currently have, in general, greater supplies of material to be reused than we have demand for the products. This results in low prices for the recovered commodities, and a tough go for the recycling industry.

This is not to say that recycling is not the right thing to do, or that some recyclers aren't making money. What it does say is that we have succeeded in getting people to collect materials to be recycled, but we have not seen a corresponding increase in the ability to produce products from these materials. This lag, expected to be a temporary condition, can be overcome by increasing the demand for products made from the materials recycled at home and at work. It is important to remember -- if people want a product and are willing to pay for it, someone will produce it.

Why Bother?

The cost to dispose of our solid waste in sanitary landfills is rising. We have learned that landfills, while much better than open dumps, still



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Understanding the importance of supporting recycling by buying the products that are made from recycled materials is part of understanding the long-term benefits of recycling to society.

have the potential to pollute. They can especially be a threat to our groundwater resources. New design and operating requirements for landfills, needed to protect the environment from these threats, result in dramatically increased costs. We are building some expensive holes in the ground, so why fill them any faster than absolutely necessary? And we especially don't need to fill them with valuable resources that can be put back to beneficial use.

As people become aware of the benefits of recycling, and the consequences of not recycling, they generally decide the relatively small inconveniences to themselves are worth the benefits to society and the environment. These changes require an investment now to achieve the long-term benefits. Many people realize they have a stake in seeing recycling succeed, and the sooner the better. Therefore, they understand the importance of supporting recycling by buying the products that are made from recycled materials.

Spreading the Word

The Department of Natural resources hopes to further help consumers in Iowa see the virtues of "buying recycled," by participating in a national public service announcement campaign developed by the Environmental Defense Fund (EDF) and the Advertising Council. The Ad Council is the influential, non-profit organization that brought us the memorable phrase, "a mind is a terrible thing to waste, in support of the United Negro College Fund. Over the past six years the EDF, working with the Ad Council, has supported recycling efforts with similar information campaigns that focused more on increasing the collection of recyclables. The previous campaign slogans were:
"Recycle. It's the everyday way to save the world" and,
"Think globally. Act locally. Recycle."

You have probably seen those ads in the past in national publications or on cable TV. The difference now, other than the focus of the message, is that the Iowa DNR is financially supporting the campaign so there will be a greater emphasis placed on getting the ads into the state and local media. In other words, you probably will not be able to avoid getting the message!

The campaign was started in February, but will take some time to gain momentum. Local television and radio stations and newspapers have all received the appropriate materials to run the ads, but they are the ones that decide when and how often they will be used. The campaign will continue for approximately 18 months.

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Those who respond and call the number listed in the ads will receive EDF's new brochure about buying recycled, along with additional sources of information.

WMAD staff is also in the process of developing a database of recycled products that are made in Iowa. This database will be used as a reference to help Iowans locate recycled products that they may be able to purchase.

The Message

The basic concept of the campaign is to present the "buy recycled" message in a clear, simple, yet stylish manner in order to provoke thought and action. One desired action, besides the actual purchase of recycled products and packaging, is to get people to call the toll-free EDF phone number included with the ads. Those that do call will receive EDF's new brochure about buying recycled, along with additional sources of information.

One of the available resources is

the DNR's toll free number which will put Iowa residents in contact with the Waste Management Assistance Division (WMAD). WMAD staff in turn will provide a variety of information in support of recycling, including the innovative Environmental Shopping brochure, developed as part of the Iowa Needs a Cleaner Planet campaign from 1993. WMAD staff is also in the process of developing a database of recycled products that are made in Iowa. This database will be used as a reference to help Iowans locate recycled products that they may be able to purchase.

Scott Cahail is an environmental specialist with the department's Waste Management Assistance Division in Des Moines.

Getting Business to Buy Recycled

There are a considerable number of companies producing recycled products or packaging, and the number is increasing all the time. These companies see an opportunity to succeed by supplying items that other companies want to buy.

The National Recycling Coalition (NRC) has its own Buy Recycled campaign targeted at getting business and industry to commit to increasing their purchases of recycled products. This effort, led by many major name companies, resulted in the purchase of more than $10.5 billion in recycled products in 1993. As more and more companies join the campaign and as each company increases it's own purchases, this number should continue to climb at a rapid rate.

The Waste Management Assistance Division of the DNR, in conjunction with the Iowa Recycling Association and the National Recycling Coalition, will bring this campaign to Iowa in the coming months.

National Recycling Coalition photo

◀ **Deja Shoe manufactures its products from recycled materials including coffee filters, disposable diapers, file folders, polystyrene cups, magazines, seat cushions, cotton canvas, used tires, milk jugs and plastic soda bottles. The company's shoe boxes are made from recycled cardboard and have an attractive print on the reverse side so the box can be folded inside out and used as a storage box.**

National Recycling Coalition photo

Rosebar Tire Shredding photo

▲ ▶ **Diverse types of materials that had previously been sent to landfills are being collected, processed and then remanufactured into new products.**

Recovered materials can be used as raw materials to manufacture new office furniture. Used tires can become a new playground surface.

National Recycling Coalition photo

◀ ▲ **Paper products are one of the most easily purchased products made from recycled materials.**

GROUNDWATER STUDIES

by Jean C. Prior

Groundwater investigations in Iowa intensified as the post-World War II economic expansion included industry as well as agriculture, and more precise information on water resources was required. In 1947, H. Garland Hershey succeeded Trowbridge as state geologist, and cooperative programs with the state's water-well contractors and the U.S. Geological Survey were emphasized. This was also the watershed year in which the director of the Geological Survey and the chairman of the University of Iowa Geology Department became two separate positions.

An emerging set of resource, environmental, and energy issues faced Iowa in the early 1970s. Samuel J. Tuthill, who in 1969 followed Hershey as state geologist, applied the survey's traditional research and service functions to these contemporary problems and altered the direction of the survey along a course of diversified public service and interagency cooperation that continues today.

The application of computer technology bloomed during the 1980s and 90s and had an enormous impact on data management, improving our geologic and hydrologic assessments and services. During this period, Stanley C. Grant (1975-1980) and Donald L. Koch (1980- present) were appointed state geologists. Two other important events were the reorganization of state government in 1986, which placed the Survey into a new Department of Natural Resources, and passage of the 1987 Groundwater Protection Act.

State Historical Society of Iowa

◀ **Iowans depend on groundwater supplies for a variety of uses. (Hotel Colfax was a popular health resort built in 1884 around the presumed therapeutic effects of mineral water from Jasper County wells.)**

Reprinted from *Iowa Geology 1992, Centennial Edition, 1892-1992.*

Jean C. Prior is a geologist for the DNR in Iowa City and is the editor of *Iowa Geology*.

WATER-WELL INQUIRIES

by Paul J. Horick

The Geological Survey maintains a long-standing commitment to record keeping and well-sample curation. The benefits of this activity are especially pronounced in the area of "forecasting" the availability of Iowa's groundwater resources. Also, well samples can yield valuable information decades later, when viewed in light of new ideas and techniques. Thousands of well samples have been logged, and our knowledge of the hydrogeology of the state has made great strides. From about 1940 to 1975, the Survey shared offices with the U.S. Geological Survey groundwater personnel who also contributed much to our understanding of aquifer characteristics and groundwater flow, and many cooperative reports were published.

Today, survey geologists handle hundreds of requests per year from engineering consultants, well contractors, municipalities, industries, irrigators, farmers, real-estate developers, recreational interests, and state and federal agencies on all manner of well predictions and groundwater problems. We anticipate these requests will continue for at least the next two decades. Our groundwater resources will require further evaluation as we meet these needs and assist efforts to protect Iowa's groundwater quality.

Rosebar Tire Shredding photo

National Recycling Coalition photo

WELL SAMPLES

by Donivan L. Gordon

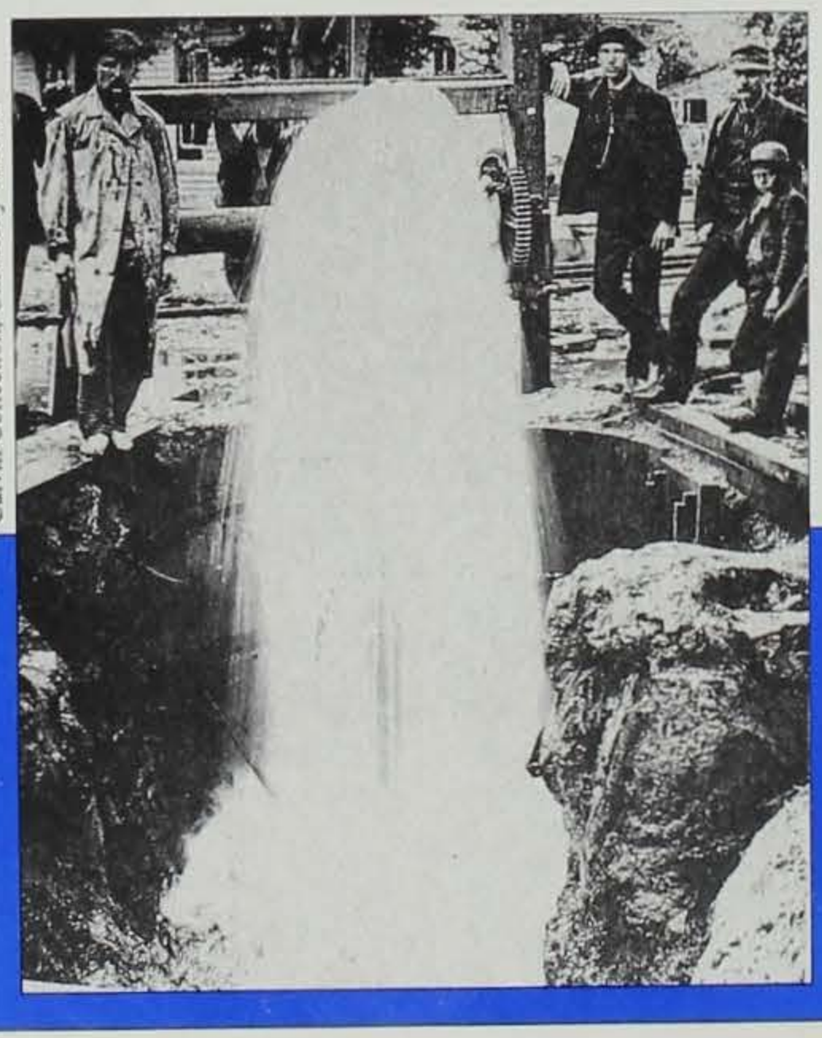
Much credit for our understanding of the subsurface geology and water-bearing condition of Iowa's bedrock formations must go to the state's water-well drillers and contractors. Much of the information used by survey geologists over the last several decades came from an ambitious sample-gathering program. The survey furnishes well contractors with cloth bags for drill cuttings and driller's notebooks for recording facts about drilling procedures, well casings, water levels, and pumping tests. In return, drillers record data on each well drilled and collect samples from each five-foot interval penetrated. Through the years, this valuable data base on subsurface geology has grown to more than 32,000 sets of samples, augmented by samples recovered from oil exploration tests and other drilling projects. Survey geologists then examine the samples microscopically and prepare graphic logs of each well. Information is also entered in an electronic data base from which records can be extracted and forwarded to clients.

Drillers and geologists have benefited immensely from this program. The state is better able to define its subsurface geologic and groundwater conditions, and well contractors have helpful information with which to predict their success in providing water supplies for their customers.

State Historical Society of Iowa

▲ **The last horse-powered drilling rig known to operate in Iowa was photographed at Fraser (Boone County) in 1955.**

Calvin Collection, University of Iowa



◄ **There is a continuing need to locate adequate sources of groundwater in Iowa. (An unexpected gush of water, known as "Jumbo," flowed out-of-control for months during well drilling in Belle Plaine, Iowa County, in 1886.)**

WATER QUALITY AND AGRICULTURE

by George R. Hallberg

As we enter the second century of the Geological Survey in Iowa, the impact of agriculture on groundwater has become a prominent issue -- one of many symptoms of the vast changes in our society over the past 100 years. Since 1950, agriculture has changed dramatically. In this transformation from rotation to fertilization and from hoes to herbicides, the productivity of the American farmer became legend, but with unforeseen consequences as well.

Beginning in the mid-1970s, it became clear that cultivating more land and applying more nutrients and pesticides was also taking a toll on Iowa's waters. Nitrate concentrations had increased regionally in shallow groundwater, and some pesticides and herbicides were detected in shallow groundwater and surface waters. Iowa's early lead to define this emerging problem gathered national attention, as other states were facing similar concerns.

Just as important as Iowa's leadership in defining these problems has been Iowa's leadership in resolving them. Many agencies and institutions came together to form the Iowa Consortium for Agriculture and Water Quality. Working at first with farm families, management practices were developed that would reduce the loss of nutrients and chemicals from crop production. The lessons learned were applied through statewide programs, and in the process, improved management and efficiency also improved our profitability and our environmental performance.

As a measure of success, we know that between 1985 and 1991 these programs helped Iowa farmers reduce nitrogen application rates on corn by about 15 percent, reducing statewide nitrogen loading by more than 1 billion pounds. These improvements saved Iowa farmers over $200 million. The special monitoring programs and demonstration projects that produced these results cost a total of $10 to $12 million over this time -- a nearly 20-fold return to Iowa's economy.

As impressive as these accomplishments are, there is still a long way to go. The dilemma of dealing with agricultural impacts on water quality is their "nonpoint source" nature -- they are diffuse, widespread and difficult to see. It took nearly two decades to see the impacts, for their growth was gradual. It will take time and diligence to monitor and measure the extent of our water-quality improvements. In the Geological Survey's second century, we must work together with agronomists, agricultural engineers and biologists on such complex problems. There are few easy problems left, and fewer easy answers.

State Historical Society of Iowa

▶ **Field notes of soil and water conditions on the farm are typed by a County Extension agent using his 1920s version of today's lap-top computer.**

Build A Bat House -- Join the Increasing Number of People Recognizing the Value of Bats and Welcoming Them As Neighbors!

Bats are among the least understood and most misrepresented animals in Iowa. Throughout most of the world, bats play important ecological roles, having both direct and indirect benefits to the ecosystems they inhabit. In fact, more than 450 products used by humans, from bananas, cashews, dates and figs, to balsa wood and tequila, all come from bat-pollinated plants.

Most bats in North America feed on various insects. The little brown bat may capture up to 600 tiny insects, including mosquitoes, in a single hour. The larger brown bat often feeds on various stages of moths and beetles such as the cucumber beetle (whose larva is the corn rootworm), that are agricultural pestse.

Bats should be considered for what they really are -- integral members of our ecosystems and as species who deserve attention from both conservationists and the general public. In Iowa, all bats in their natural habitat and outbuildings are protected as nongame species. Many people have built bat boxes in their yards to encourage bats to roost in their yard and to enjoy watching their nighttime forays and the hoped-for benefit of fewer mosquitoes.

Bats, just like humans, are picky about where they live. Some of you who already have bat boxes may feel frustrated over the lack of use of your bat box. Is it the location? Is it the direction the box is facing? Are they getting too much sun or not enough? For what ever reason, bats are choosy about where they roost. Bat Conservation International (BCI) is a nonprofit organization stationed in Austin, Texas, dedicated to promoting research and management of bats worldwide. BCI publishes a quarterly magazine for its members which is an excellent source of information. They recently conducted a bat box survey to answer some of the perplexing questions about the preferences of roosting bats in human-made bat boxes. If you have a bat box or are considering building one, this information may eventually help you successfully attract bats to your bat houses.

Interestingly, the survey showed that members of BCI who owned bat boxes had a higher success rate of attracting bats (64 percent) than non-members (44 percent). Just joining BCI may help you attract bats!

If you are having trouble attracting bats to your bat houses, the BCI bat box survey has determined some roosting bat preferences that you should note.

1. Medium (22" tall x 8" wide and deep or 21" tall x 9 1/2" wide x 2" deep) and large (25" to 36" tall x 10" to 24" wide x 5 1/2" to 11 1/4" deep) had higher occupancy rates than smaller boxes.

2. If bat boxes are not occupied after the second summer the box has been erected, change the location of the box or the direction the box faces.

3. Bats had no preference for wood type. Bats had similar occupancy rates for cedar, pine or exterior plywood.

4. Aged wood and application of guano affected only the timing of first use. Bats were significantly more likely to move into houses during the first season if the box was made of aged wood or treated with guano, however these two factors did not affect the probability of use.

5. Bats preferred houses in agricultural areas over urban areas, however the survey lacks information from areas in which a large part of the landscape is planted in one crop. There is a definite gap of knowledge about bat houses erected in the Midwest.

6. Bats preferred bat houses located a quarter of a mile or less from streams or rivers. The size of the river was insignificant.

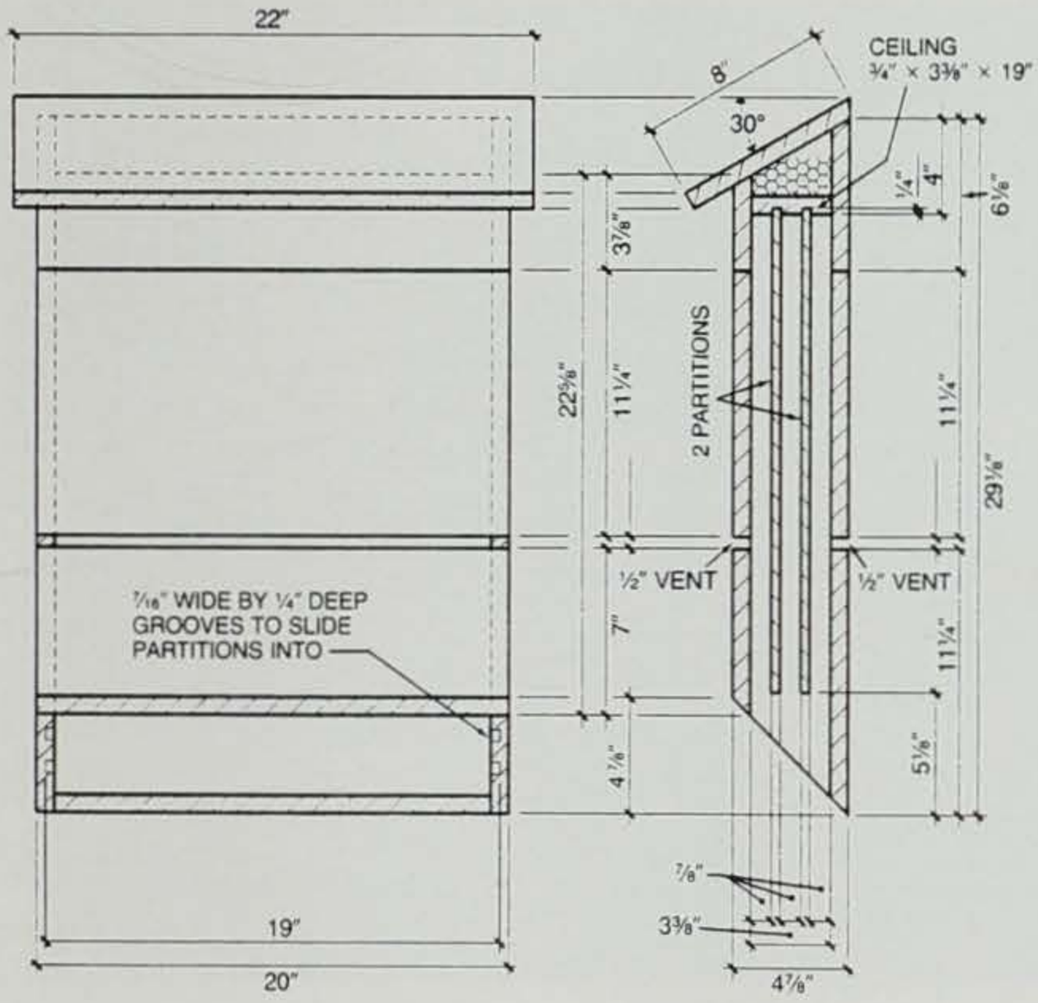
7. Bats living above 40 degrees latitude preferred boxes stained or painted a dark color. The dark coloration absorbs heat and helps warm the box. Interstate 80 is at approximately 40 degrees latitude. Information on painted bat houses between 40 and 35 degrees latitude was inconclusive.

8. Bats living above 40 degrees latitude preferred bat houses that were exposed to the sun for more than four hours. In fact, don't worry about having the box in too much sun if you are above 40 degrees latitude. Bats may come out at night but they love the sun too!

9. Bats disliked houses in which the nearest obstacle (another tree or a tree branch) was closer than five feet. Place boxes in areas in which the nearest obstacle is 20 or more feet away.

These are just a few hints to increase your chance of attracting bats to your bat house. The plans for a small nursery house at right, from BCI, should get you off to a good start. For more information on bats see past and current issues of the DNR's free *Nongame News* or the newly revised *Guide to the Bats Of Iowa* which is available for $2. The Nongame office is collecting bat managment and bat house data and will be conducting another bat house survey this fall. For more information contact the Nongame Office, 1436 255th St., Boone, IA 50036, (515)432-2823.

BCI's *Bats* is also a helpful magazine, as is the *Bat House Builder's Handbook*. For more information on BCI or to get invovled with the North American Bat House research project, write: Bat Conservation International, P.O. Box 162603, Austin, TX 78716-2603. It's only $30 to join!



Materials Needed:

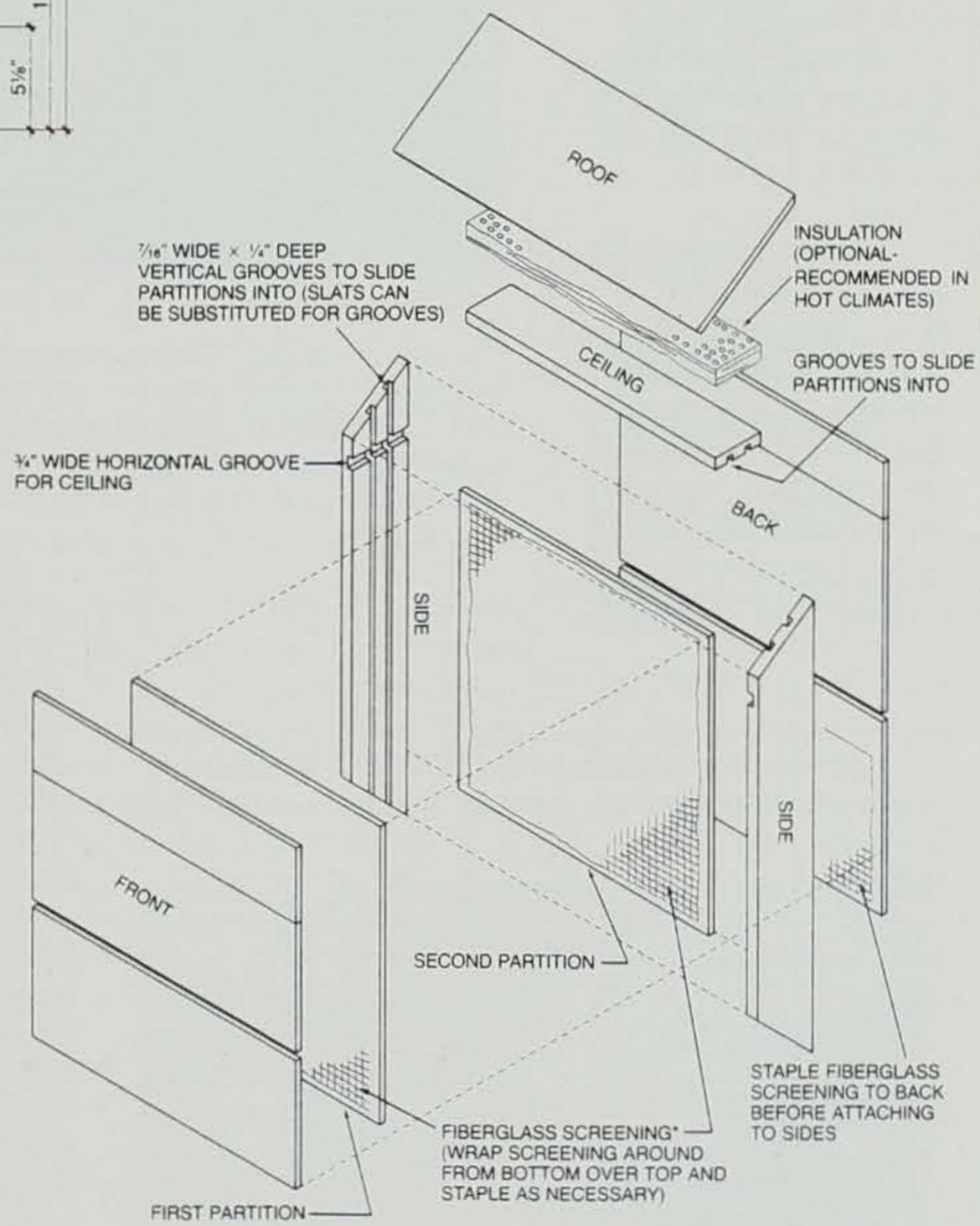
14' of 1" x 12" (3/4 x 11 1/4" finish cut) lumber, cut into 10 pieces for front back , ceiling roof and sides

One 4' x 4' piece of 3/8" T-111 no-groove exterior plywood (two partitions, 19" x 20-1/4" each)

Two pieces of 42" x 19 " fiberglass window screening (do **NOT** use metal window screening), wrapped around both sides of both partitions and one 20" X 11-1/4" piece attached to the inner surface of the lower back board.

Optional:

Two 17-1/2" x 7" pieces of Reflectix insulation, folded double (for attic)



Note: The kind of wood used is not known to affect bat use, though red cedar is the most durable. If screening is not used, vertical grooves should be cut narrower to 3/8" to ensure a tighter fit. At least one wood surface in each chamber plus the inner surface of the back board, must then be roughened or slightly grooved (horizontally) to provide a surface for bats to cling to.

Do **NOT** use metal window screening.

Bat house plans from BCI (see address at left). Art work by Glen Schineider.

BCI logo

CONSERVATION UPDATE

Threat To Waterways -- Aquatic Invader Found In Hancock County

Aquatic plant life is critical to the health of a natural lake. Active plant beds help to promote water clarity, act as fish and wildlife nurseries, and often provide locations for the best fishing.

But when the plant in question is an exotic species known as Eurasian watermilfoil, it spells trouble.

The problem lies in the fact that Eurasian watermilfoil easily out-competes desirable native plants, forming dense mats that at best hamper and often entirely eliminate popular summer pastimes such as boating, skiing, fishing or even swimming.

In other words, Eurasian watermilfoil can ruin your fun.

Although more than 45 Minnesota lakes have become infested by the pest, Iowa has managed to escape the ravages of this dreaded plant, at least until now.

Late last summer, Eurasian watermilfoil was positively identified at Hancock County's Crystal Lake. This represents the very first documentation of this plant in an Iowa lake.

According to Jim Wahl, DNR fisheries biologist for the area,

Lowell Washburn

▲
Iowans can help stop the spread of Eurasian watermilfoil by reporting any siting to the nearest DNR fisheries station and taking plant samples along for the biologist to identify. The plant has long stems with feather-like leaves in whorls of four. The leaves have 9 to 21 leaflets. The flowers are above the water at the end of the stem, and the plants form dense mats on the surface of the water. The plant can establish itself even in 30 or more feet of water.

Eurasian watermilfoil probably arrived at Crystal Lake sometime in 1992. By 1993, the vegetation had become so dominant that the lake was virtually unusable from about mid-July until fall -- pretty incredible for just one 12-month cycle.

"We [DNR] strongly suspect that the plant came here on a boat trailer," said Wahl. There is Eurasian milfoil in several lakes north of us, particularly in the vicinity of the Twin Cities, and that's our best guess."

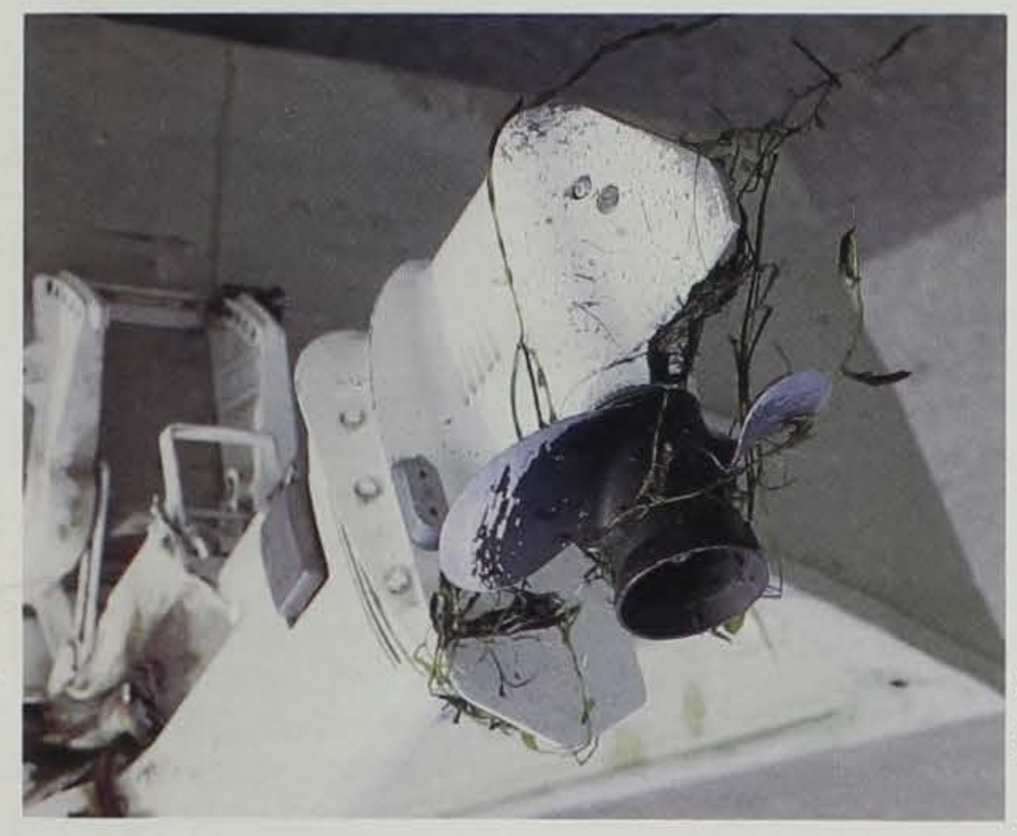
This spring, DNR fisheries personnel administered a treatment of a powerful aquatic herbicide to the lake in hopes of destroying the new invader. The chemical is slow acting and may take anywhere from 30 to 90 days to complete its task.

"Unfortunately, it will kill the desirable plant communities along with the Eurasian milfoil," Wahl said. "However, the chemical does not harm bird or fish life, and any fish taken from Crystal Lake will remain safe to eat."

The current Eurasian invasion of Crystal Lake marks a major setback for this popular north Iowa fishery. In 1986, the DNR renovated the area by poisoning and removing all rough fish and bullheads from the lake. Crystal Lake was then restocked with bass, bluegills, channel catfish and northern pike.

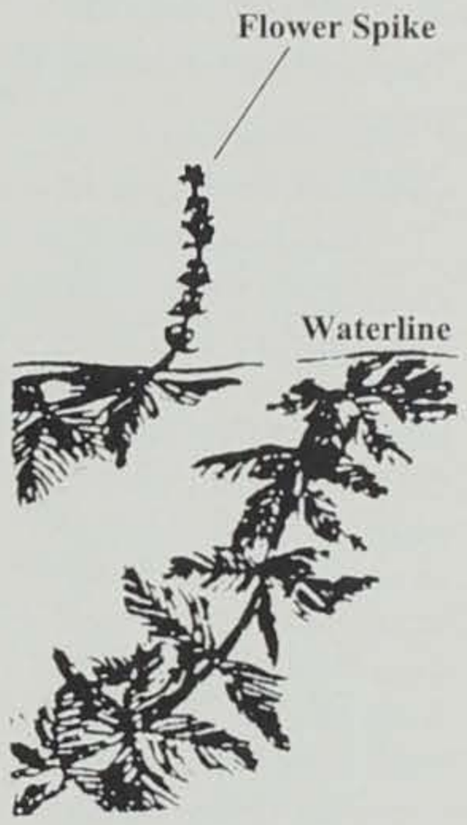
Since introducing a single plant fragment can establish the weed, the DNR's next concern is that the plant could become a problem statewide. But whether or not the plant does spread to other lakes may well depend on anglers and other resource users.

"The best way to



Lowell Washburn

◀ **Milfoil has spread to 37 states and three Canadian provinces since its introduction into the U.S. in the early 1940s. Infestations have been found in the Mississippi and in at least 45 lakes in Minnesota. Checking all boating equipment before launching into any Iowa waterway is the most effective way for Iowans to keep our water resources free of this destructive and fast-growing invader.**



Help stop the spread of Eurasian watermilfoil.

avoid spreading milfoil is to be extremely meticulous about removing every single bit of plant material from your boat motor and trailer," said Wahl. "Check the lights, axle, rollers, transom wells, propellers -- everything. I can't stress that enough."

As everyone waits for the results of the chemical treatment, fisheries biologists and conservation officers will continue their efforts to educate the public on the potential dangers of Eurasian milfoil and will monitor lakes where the plant is most likely to appear.

Playing both ends against the middle, the DNR also stocked 1,000 grass carp into Crystal lake to consume any plant life that escapes the chemical treatment.

At this point, we're at least cautiously optimistic that the combination of biological and chemical controls will solve the problem," Wahl said. "But there's no guarantee that this will work. At least we know we've done everything we could."

It cost $15,000 to treat Crystal Lake, and while the early results look promising, if milfoil gets into a large lake like Clear Lake in Cerro Gordo County or one of the Iowa Great Lakes, expense and logistics would prevent using the chemical. Whether or not the plant spreads to other lakes depends on the vigilance of Iowa anglers and boaters.

Hopefully, Crystal Lake will mark both the beginning and the end of Iowa's milfoil story.

For more information on Eurasian watermilfoil write or call the DNR at RR Box 7722, Spirit Lake, Iowa 51360, (712)336-1840 or call the DNR's 24-hour information system number at (515) 281-5145 to request the *You Can Help Stop the Spread of Eurasian Watermilfoil* brochure.

▼ **The chemical Sonar was used in an effort to kill the Eurasian watermilfoil in Crystal Lake. It costs $283 per quart and is dispensed by hose near the boat's propeller, which helps spread it.**

Lowell Washburn

CONSERVATION UPDATE

Health of Nongame Populations Linked to Responsible Pet Management

Does responsible pet care help nongame wildlife? Yes, there is a very direct link for cat owners between responsible ownership and the state of many nongame populations. According to an article by Wade Zweiner in the January 1994 issue of *Iowa Fish & Game*, domesticated cats are killing wildlife by the millions across the United States. That purring machine next to the kids on the couch may be a killing machine in the local neighborhood.

Many of our neotropical migrant birds have returned to nest in our backyards, vacant lots, ditches and woodlots. Increased habitat fragmentation, habitat degradation, nest parasitism and predation by natural predators have made nesting very difficult for many neotropical migrants. With increased urbanization and suburban sprawl, the number of cats is rising and causing additional negative pressures to nesting songbirds.

Proof of the domesticated feline's prowess comes from a study conducted by Stan Temple of the University of Wisconsin on free-ranging cats. A free-ranging cat is any cat that lives in a home, barn, or other human structure and is free to roam at will.

Domesticated cats fitted with radio collars were followed to determine home ranges and hunting habits. The results of the study showed that domesticated cats can have quite an effect on wildlife. In Wisconsin, there are approximately 1.2 million free-ranging cats.

With the results of Stan Temple's study, it was estimated that 400,000 game birds, four million cottontail rabbits, 28 million songbirds and 100 million small mammals were killed by free-ranging cats in Wisconsin on an annual basis. Because domesticated cats are not natural predators, they can be particularly destructive to wildlife populations for several reasons.

First, unlike natural predators such as fox and coyotes, cats do not regulate their densities by having territories they defend. This behavior allows a high number of cats to hunt a small area resulting in high predation rates on wildlife. Second, domesticated cats are usually fed at home. This allows the predator to always be strong and healthy, and thus always in shape for chasing prey. Third, since cats do not rely on wildlife for food, they do not regulate their numbers according to the amount of prey. For example, when rabbit populations are high, there are a lot of coyotes. When rabbit populations are low, the coyote population will decline due to lack of food. Cats will continue to apply high hunting pressure to prey even when prey numbers are low.

Ron Johnson

▲ **The number of cats is rising and causing additional negative pressures to nesting songbirds.**

Cat lovers need not despair. There are steps they can take to minimize the damage their feline might have on birds in their neighborhood or around their farm.

1. Have the cat spayed or neutered and declawed and keep it well-fed. This will discourage the cat from roaming.

2. Only let the cat out of the house after dark. Cats typically prey on birds during the daylight hours and rodents during the night time. (Of course, if you like mice this may not be an option.) If the cat is let out during the day, the owners should put it on a leash or stay outside with it so they can monitor its behavior.

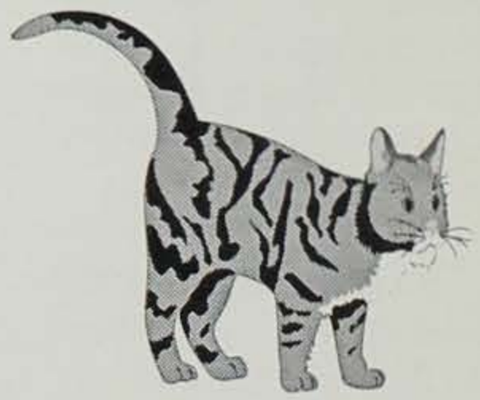
3. Place a bell around the cat's neck so that it is unable to sneak up on prey. This is a controversial method and is not highly recommended.

4. Wildlife can be protected through grassland management. By planting certain types of grasses that stay erect during the early spring nesting season (e.g., little bluestem, big bluestem, indian grass, etc.), cats and many other predators will find it difficult to hunt in the thick cover.

Cat owners must become aware of their pets' habits and become responsible for them. Do not let your cat's behavior lend itself to a "silent spring" in your neighborhood.

For more information on ways to help nongame wildlife, on landscaping for nongame wildlife or current nongame projects contact the nongame office at 1436 255th St., Boone IA 50036, (515)432-2823.

Reprinted in part from *Nongame News*, Spring 1994.



1993 Upland Wildlife Harvest Survey Numbers Up From 1992

More than 165,000 hunters took to the field last fall in pursuit of upland game and met with greater success than in 1992, according to Terry Riley, DNR's upland wildlife biologist. "Our survey numbers indicate hunters harvested an abundance of upland game despite last year's wet weather," Riley said. "Iowa remains one of the top pheasant hunting states and pheasants are still Iowa's number one game bird according to our survey results."

Pheasant hunters found large numbers of birds in the fields in 1993, compared to 1992. More than 1.2 million pheasants were legally harvested during the '93 season. Hunters averaged seven trips afield and seven birds each, during the season. According to Riley, hunters spent about $30 million in Iowa last year in pursuit of pheasants.

Ron Johnson

▲ **Iowa remains one of the top pheasant hunting states and pheasants are still Iowa's number one game bird.**

"The weather was great during most of the hunting season and hunters took advantage of the many warm autumn days to harvest about 200,000 bobwhite quail," Riley said. The numbers indicate hunters averaged five trips afield for quail hunting. That is somewhat less than pheasants but still above gray partridge.

Partridge numbers were down again for the fifth year in a row and the low population was reflected in the harvest of only 25,000 birds. "The 1993 harvest was 32 percent below 1992 and 80 percent below the 1990 Iowa all-time record harvest of 148,00 partridge," Riley said. "Partridge were imported from northern Asia in the early part of this century and do best in Iowa in dry years. Iowa has not had any dry years since 1988," Riley added, "so the numbers we are seeing are not surprising."

"We still have great rabbit hunting here in Iowa," Riley said. "Southern Iowa populations are in good shape and rabbit numbers were up slightly in 1993, compared to 1992." Hunters harvested about 334,000 animals and took an average of four trips into the field in search of rabbits during the season.

"The DNR's roadside survey, conducted in early August, should give an indication of nesting success and what upland game numbers will be this fall," Riley added.

DNR photo

▲ **The upland game roadside survey begins in early August.**

E-85 Test Results In

According to results from tests run on 85 percent ethanol-fueled vehicles, E-85-powered vehicles have a volumetric fuel economy 29 percent greater than vehicles running on 85 percent methanol.

What does it mean? It means the fuel efficiency, or miles per gallon, of ethanolpowered vehicles appears to be greater than vehicles using methanol.

The National Institute for Petroleum and Energy Research initially conducted tests on the vehicles supplied by the Iowa DNR to verify that the emissions control and fuel management systems were operating satisfactorily. Results indicated that both vehicles were within the standard range for what are called transitional low-emission vehicles. Subsequent tests showed the emissions of carbon monoxide (CO) and nitrogen oxide (NOx) were very similar for both fuels. The ethanol-fueled vehicle's emission rate, however, was slightly lower.

"It's important, given that the state has the largest ethanol fleet," said Sharon Tahitnen, an executive officer with the DNR's Energy Bureau. "This shows that increasing the use of renewable fuels has a dual benefit of being cleaner for the environment."

"The test results are consistent with results from similar tests done in other parts of the country," Tahitinen added.

Energy Survey Guide Offered

The DNR is in the process of finalizing the *Building Energy Survey Guide*. The survey guide will be used by clients who need an energy analysis for their buildings, but do not require the detail provided by an energy audit (EA) or a technical engineering analysis (TEA).

The user-friendly booklet will help small clients walk through their facilities, identify areas for potential energy savings and estimate energy savings that might be achieved. The guide covers areas of potential energy savings such as lighting, the building's HVAC (heating, ventilation and air conditioning) systems, water heaters and motors.

For more information contact Steve Repertinger at (515) 281-6559.

CONSERVATION UPDATE

Upcoming NRC, EPC and Preserves Board Meetings

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

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

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

Natural Resource Commission:

--No July meeting
--August 11, Des Moines
--September 1, Spencer

Environmental Protection Commission:

--July 18, Des Moines
--August 14, Des Moines
--September 19

State Preserves Advisory Board:

--Sept. 20, Fort Dodge

Ken Formanek

▲ **Jeffrey S. Holmes of Canoe Sport Outfitters of Indianola is shown in the grand prize of the Parks, Recreation and Preserves Division, State Fair contest drawing.**

Canoe Sport Outfitters of Indianola has donated an Old Town canoe for the grand prize at a drawing to be held at the Parks, Recreation and Preserves Division display in the Natural Resources building at the Iowa State Fair. The one-person Discovery 119K canoe is constructed of tough "space-age" materials and weighs only 43 pounds. It is designed for stability, steady tracking and resistance to cross-winds, yet is easy to portage, transport and store. The canoe has a retail value of $495.

Other prizes will include coupon books for camping at state park and recreation areas, each valued at $189. Each book contains coupons for 21 nights of camping.

State park staff will be available in the new display area to provide entry blanks as well as to answer questions about all aspects of Iowa's state parks, recreation areas and preserves, and the great variety of outdoor recreation opportunities they offer year-round.

The new display will introduce Iowa's State Parks 75th anniversary celebration. Since 1920 when Backbone State Park was dedicated, more than 70 state parks and recreation areas and 86 state preserves have been set aside for Iowans' use and enjoyment. The anniversary theme , "Places of Quiet Beauty," truly describes parks and preserve settings such as Stone Park's loess hill, majestic Stihl prairie, the natural bridge at Maquoketa Caves and the rugged hills and valleys of Lacey-Keosauqua.

A year-long anniversary celebration of these and other "places of quiet beauty," is planned for 1995. Special anniversary events are planned at parks and recreation areas throughout the state and a state park syposium is planned for April 1995 at Wartburg College in Waverly.

CLASSROOM CORNER

by Bob Rye

Gold Dust

The following activity is adapted from the draft materials produced by the Walnut Creek National Wildlife Refuge prairie curriculum team. These materials are being finalized for use at the new education center to open at the refuge in 1995.

Participants will become aware of the sources of pollen, its different sizes, shapes and colors and will note how pollen is transported. They will also view the various structures of pollen transporters.

Background:

Pollination occurs when the pollen from one flower is transferred to another flower of the same kind. One way pollen is transferred is by sticking to the body parts of visiting insects. The pollen is carried to another flower and scattered near the female flower parts. Pollination can occur in several different ways, but is most commonly done by wind, water or animals. Animal pollinators are attracted by sweet nectar, odor, shape or color. Pollen is strategically placed so that an animal cannot reach its attraction without acquiring a load of pollen. Bees, butterflies, beetles, flies and moths are common pollinators.

Roger A. Hill

▲ **Pollination can occur in several different ways, but most commonly by wind, water or animals.**

Age:

Grades 6 - 9

Group size:

Up to 28

Objectives:

1. Participants will investigate the process of pollination and some of the different ways it can occur.

2. Students will collect pollen from different pollen producers and will compare pollen size, color and shape.

3. Students will use microscopes to view insect structures for carrying pollen.

Materials:

pollen board (cardboard covered with black velvet)
microscopes
artificial bees
paper flower parts

Resources:

1. *Incredible Insects*, Nature Scope, National Wildlife Federation

2. Video: *Pollinators*, #51817, AEA 11

3. Film: *Bees*, #48723, AEA 11

4. Runkel, Sylvan and Dean Roosa, *Wildflowers of the Tallgrass Prairie*, Iowa State University Press, 1989.

Extensions:

1. The students can use diagrams and charts in the classroom to study the internal fertilization of a plant's ovary.

2. Some animals have certain color preferences. Students can visit a blooming site and keep data of the different animals visiting flowers. See if the students can discover any color preferences demonstrated by individual species.

3. Research birds and identify adaptations of different birds for gathering food from different flowers.

Roger A. Hill

▲ **Bees, butterflies, beetles, flies and moths are common pollinators.**

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

Procedure:

Part I - Collecting the Pollen

1. Choose a site where there is a variety of blooming flowers and/or grasses. Visit the site prior to the students' visit and flag the grasses and flowers that will be used. Gather the class at the site. Gently press one of the flowers or grasses against one of the areas of the pollen board. Move to another blooming flower and follow the same procedure. Ask the students to observe and note the differences in the pollen patterns.

2. Divide the students into teams. Each team of students will collect three different pollens on a separate part of the board. Have the students sketch the type of plant from which they collected the pollen sample.

3. When the teams have collected their samples, (and have finished with the field section of Part II) they return to the classroom. There they will use slides and the microscopes to observe the three types of pollen they have collected. They should illustrate their observations by showing the pollens' differences and similarities. Students should list any characteristics that would make the pollen grains easy to attach to insects, humans or other pollen transporters.

4. Students should observe pictures of insect transporting mechanisms. They can add illustrations of these mechanisms to their notes.

Part II - Observing Methods of Pollination

1. Show the students the paper flower shapes (cone, disk, cup) and ask the group to describe the differences in shape. Challenge the teams to find flagged plants with flowers that resemble any two of the different shapes. A hand lens can be used to look closely at the flowers to see what parts or structures in the flower have pollen on them. Give the students an opportunity to take their artificial bees to real flowers. Have them note where the pollen sticks to their bee's body. They should also look for insects other than bees that might be visiting their flowers and list those in their field notes.

2. Call the teams together to share their discoveries. Emphasize the methods of pollination.

Evaluation:

The students will make a chart listing the insect pollinators that were observed over a given time period. They will emphasize the methods of pollination each pollinator used.

Places to Play

by Angela Corio
Photos by Ken Formanek

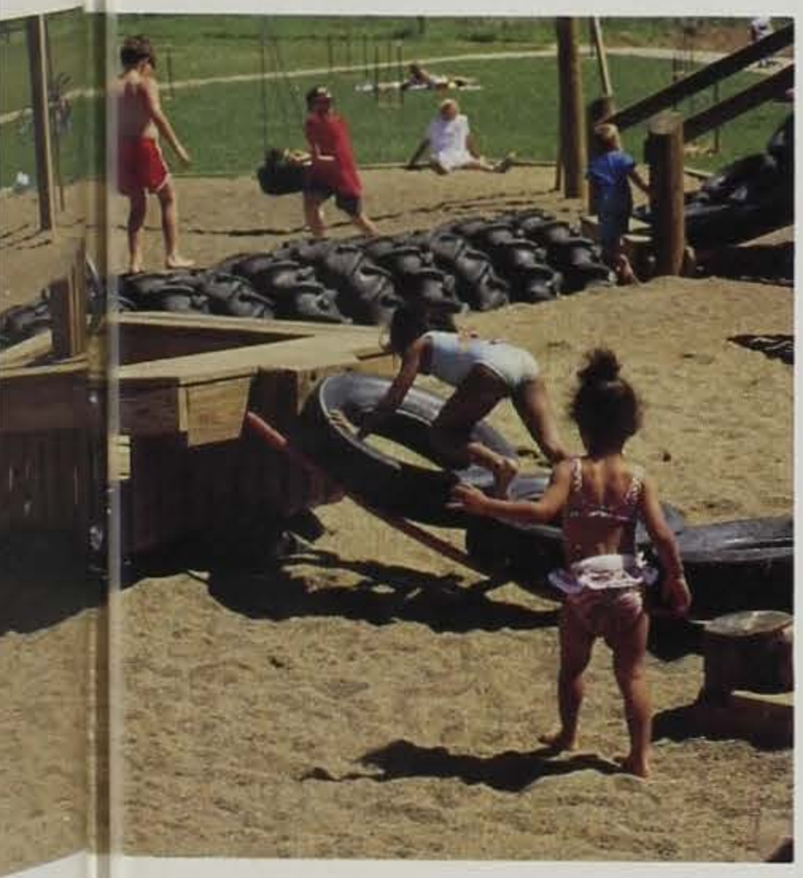
Finding a place where kids can swing and build and hang and scream and jump and sneak and hide. Making dust, skinning knees, getting dirt under fingernails, telling secrets, challenging muscles, chasing, balancing, skipping, acting out, acting up, being kids. Playgrounds give kids this, and with the beaches, boats, fish, trees, wildflowers, birds and squirrels, state parks add an extra dimension.

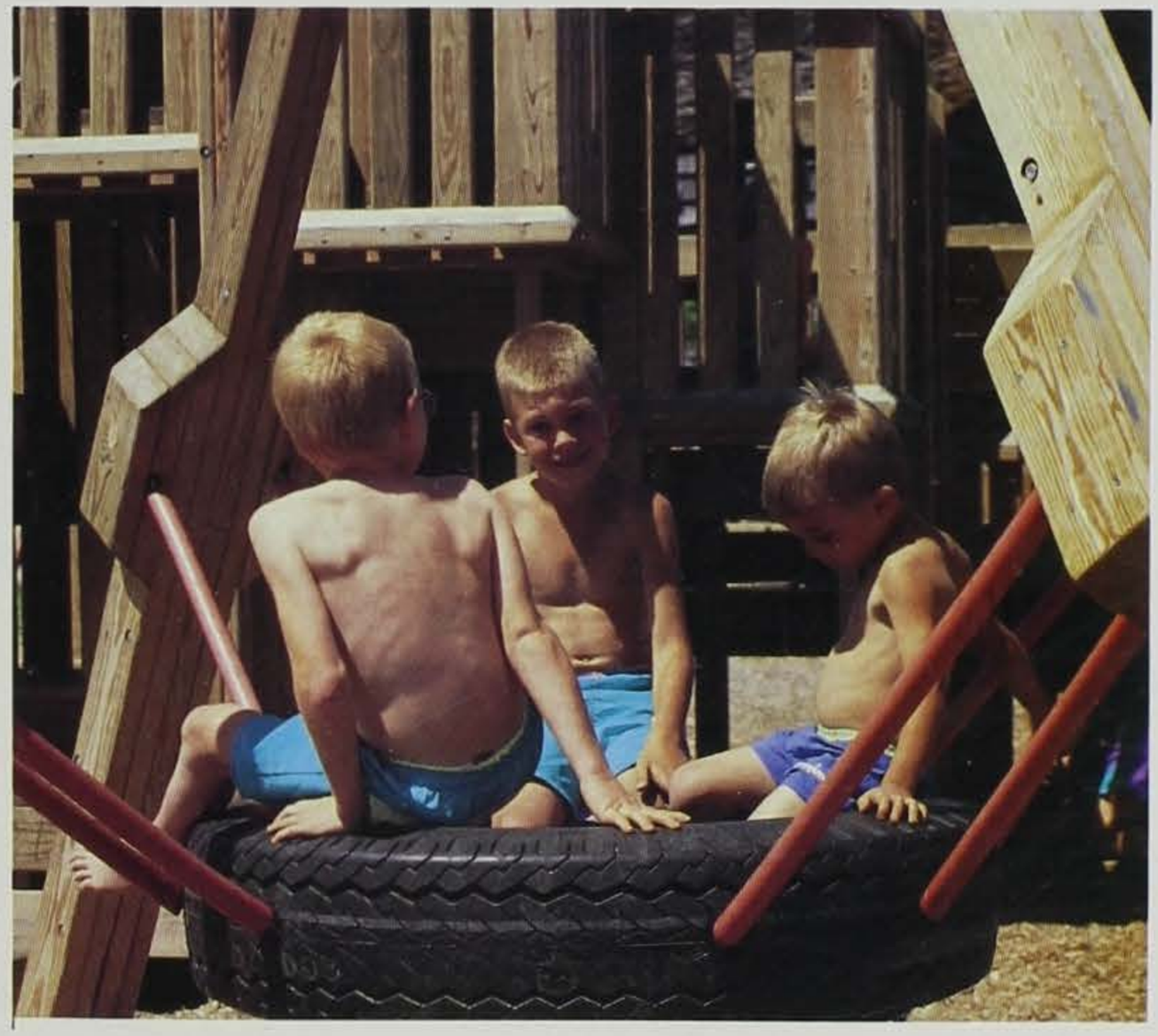
Did you know that there are play structures nestled in some of the most beautiful places in Iowa? They are located in the campgrounds, picnic areas and beaches of 24 state parks. This program, started in 1989, funded with Resource Enhancement and Protection (REAP) money, has provided opportunities for families to enjoy playing together in some very special places.

Playgrounds such as these can be found in the following state parks: Gull Point, Ledges, Lewis and Clark, Black Hawk, Clear Lake, Dolliver, Twin Lakes, Pikes Peak, Pleasant Creek, Backbone, Bellevue, Maquoketa Caves, George Wyth, Lake Ahquabi, Viking Lake, Springbrook, Lake Anita, Geode, Red Haw, Rock Creek, Macbride and Wapello.

Two very large play structures were built near the beaches of Big Creek State Park in Polk County and Lake Manawa in Pottawattamie County. Designed by local children working with a New York architect, these two structures were built by an army of local volunteers, who were also responsible for raising funds. It was an excellent example of private citizens and a governmental agency working together to build something truly wonderful for family recreation in state parks.

Visit our state parks. Enjoy the fresh air and join in the fun!





For the free booklet entitled *Your Guide to Iowa's State Parks, Recreation Areas and Forests,* write the Iowa Department of Natural Resources, Wallace State Office Building, Des Moines, IA 50319-0034.

WARDEN'S DIARY

by Chuck Humeston

"The Night I Fought the Bear"

I have people tell me they would like to do this job because they want to be close to wildlife. Usually it seems the only wildlife we get next to is the two-legged kind. But, one night I came closer than I planned to the regular kind.

Every other year, at about this time, my wife and I, along with some friends, take a canoe trip to the Boundary Waters Canoe Area in northern Minnesota. We spend about five days in the wilderness camping, canoeing, portaging and fishing. It's cured me of wanting to own the world's fastest power boat. The canoe is the ultimate boat, and the canoeist is the purist of boaters, but that's a whole other subject.

Anyway, I always enjoy it for the very fact of the area's quiet. There's nothing like lying on a big rock in the middle of the night watching the northern lights after a day of paddling and portaging. It's too bad such a beautiful, serene, area is in Minnesota! (Go Hawkeyes, *keep* Floyd the Pig for another year!)

Well, if you've ever been up there, you know one of the nightly rituals is to climb two large trees, stretch a line between them, attach a pulley system and winch all your food to a height presumably above a standing bear's reach. Night after night we did this, and never in all that time, saw or heard a bear. Bears? What bears?

One year, we came out of the wilderness and performed our tradition of swimming in the Grand Marais recreation center, followed by a long awaited (and for some needed) shower and then dinner at Birchwood Terrace. After a walk along the Lake Superior shore, we turned into our tents in the municipal campground where on this particular night, we were pitched in the far corner of the grounds next to a line of trees. No winching the food packs up tonight, we were back in civilization. No bears, no worries, right?

During the night, I awakened to a loud crashing coming from the area of our canoe trailer. Great, we survive the wilderness and the local thugs were vandalizing our canoes! "You're messing with the wrong guy!" I thought as I fought my way out of my sleeping bag and searched for my pants.

My canoeing compadre, Ron, who is a newspaperman, but otherwise a great friend, caught my attention as I started to unzip my tent door.

"Chuck!" he hissed from his tent.

"What?"

"There's a bear out here!"

"What?"

"There's a bear out here, look over there."

I stuck my head out the tent. A bear was beating on our campsite's garbage can causing the crashing and banging. I put my pants back down, hunkered down in my bag and zipped it up. "Let's not be so fast here," I thought. I considered my options.

All I could think of was the movie, *Jeremiah Johnson*, where Will Geer as the mountain man asks the nimrod Robert Redford, "You ever skin grrrizzz, pil-grim?" I was the ultimate pilgrim. Then I felt my wife touch my arm.

I looked at her. She was attempting to shrink into her sleeping bag while pointing above her head at the tent wall.

I tipped my head back until I could see the wall, my nose a couple of inches from the nylon. Silhouetted against the moon-light through the fabric, I could see a round shape with what appeared to be ears on top. Suddenly I heard and felt in my face a "SNORT!" "Arrgh, bear breath!" Bear number two!

As it turned out the tree line by our campsite masked the dumpster complex for the campground. We were by the bear interstate between the grounds and the garbage (alias bear food) and our tent was right on the interchange.

The bear sniffed the perimeter of our tent, then lumbered into the campgrounds with his friends, wreaking havoc on anyone unfortunate enough to leave their coolers or packs by their campers or tents, who believed like us, "Hey, no bears here!" Throughout the night we had more bears checking out our campsite while passing through. So *that's* why the person selling us our permit had been giggling. (Just a disgruntled Gopher fan I'm sure.)

When a Grand Marais police officer passed through on patrol, I got out of the tent and asked if this was a regular occurrence.

"Yeah, it's been a real problem this year. Bears all over town and in people's yards. We try to get the DNR to trap them, but they won't do it because of liability."

"I know what you mean," I said, "Those darn DNR officers anyway."

It all reminds me of a story I read once. To paraphrase, four game wardens are arguing around the campfire about who is toughest. The first warden picks up a burning log from the fire and squeezes it, smiling. The second warden takes a drink from a bottle and eats the glass. The third warden disappears into the forest. Suddenly the other three hear, "YEEEOOOWWW!"

The third warden suddenly crashes into the campsite and runs around the campfire trailing a bear whose jaws are clamped firmly on the warden's behind. He runs to the pickup, pulls out a tire iron and smacks the bear over the head. The bear falls unconscious. Panting for breath, bleeding, pants ripped the warden points the tire iron at the fourth warden at the campfire.

"Think you're tough enough to try that?" the third warden challenges.

"Well, I can give it a try, the fourth warden answers, "But, you promise not to hit me with the tire iron?"