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Iowa

August 1991

CONSERVATIONIST

Department of Natural Resources



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AUGUST 1991

VOLUME 50, NO. 8

Iowa CONSERVATIONIST

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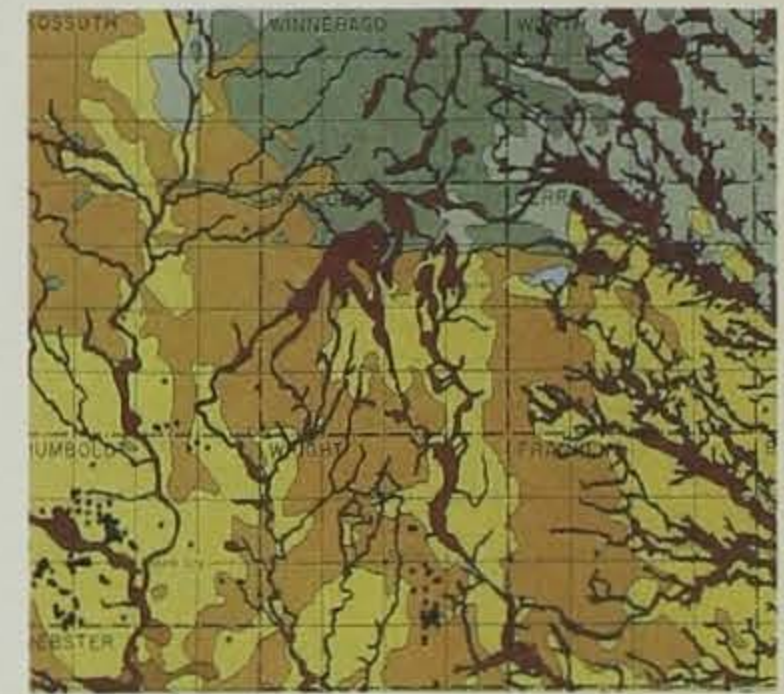
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Iowa Conservationist (USPS 268-780) is published monthly by the Iowa Department of Natural Resources, Wallace State Office Building, Des Moines, Iowa 50319-0034. Second class postage paid in Des Moines, Iowa, and additional mailing offices. **Subscription rates: \$6 for one year or \$12 for three years.** Include mailing label for renewals and address changes. **POSTMASTER:** Send changes to the *Iowa Conservationist*, Department of Natural Resources, Wallace State Office Building, Des Moines, Iowa 50319-0034.

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Blooming Beauties

by Mark J. Leoschke

It is a clear, cool October morning. Most plants are in their dull winter dress of browns and golds, but ahead I see a patch of royal blue on the ground. All too soon I'll be caught up in writing reports and other paperwork in the office. But for my final field day this growing season, I'm rewarded with one of the last plants to bloom -- the fringed gentian.

Gentian season in Iowa opens in May with the appearance of the ornately fringed flowers of bogbean, *Menyanthes trifoliata*. As the common name implies, this is a plant of wetlands, including shallow marshes, lakeshores and fens. Bogbean (or buckbean) has three-parted leaves that resemble a soybean leaf, but without the fuzz. Later in the season you might find the fruits, which have shiny, orange seeds. Bogbean is considered an endangered species in Iowa, but it is found in other states and countries. Bogbean has a circumpolar distribution, which means it is found in the colder parts of the northern hemi-

sphere. I have seen it growing in a shallow, calcareous marsh in the New Forest of southwest England.

The prairie rose gentian, *Sabatia campestris*, has beautiful pink flowers and blooms in June and July. It grows in upland woods, prairies and roadsides. The prairie rose gentian once occurred in Jackson and Lee counties in southeast Iowa, but it has not been seen in the state since 1931. It can still be found in states adjacent to Iowa -- it is common in southern Missouri, but is considered endangered in Illinois.

Perhaps the most recognized gentian in Iowa is the bottle or closed gentian, *Gentiana andrewsii*. The species portion of the scientific name honors Henry C. Andrews, a nineteenth century English botanical artist. The common name comes from the bottle-shaped, pale to medium blue flower, made of fused petals. The petals are pleated, and the tips touch, making entry to the inside of the flower difficult for all but the strongest of pollinators, like



Kay Klier

▲ The bottle, or closed, gentian, perhaps the most recognized gentian in Iowa. The species' scientific name -- *Gentiana andrewsii* -- honors Henry C. Andrews, a nineteenth century English botanical artist. The bottle gentian can be found in moist prairies, sedge meadows, fens and roadside ditches.



Mark Leoschke

▲ Bogbean leaves resemble soybean leaves, but without the fuzz.

▼ The ornately fringed flowers of bogbean. Bogbean is considered an endangered species in Iowa, but is found in other states and countries.



Mark Leoschke



Kay Klier

bumblebees. The bees sometimes tire of the effort required to enter a flower and simply cheat by chewing a hole at the base of the flower to reach the pollen inside. Bottle gentian blooms from August through October, even after a hard frost. It can be found in moist prairies, sedge meadows, fens and roadside ditches.

Pale or yellow gentian, *Gentiana alba*, looks very similar to bottle gentian, but its flowers are pale yellow rather than blue. It can be a large plant, exceeding two feet in



Kay Klier

Mark Leoschke

▲ Fringed gentian, which grows in fens, can also be found in moist prairies.

◀ Small fringed gentian is a threatened species in Iowa, but it can be found in areas north and east of the state.

▶ Lisianthus, prairie or tulip gentian, a native of the southern Great Plains, can now be grown in gardens.

height. It blooms in August and September and can be found in open, upland woods, rocky slopes, prairies and roadside ditches. It is not as common in Iowa as the bottle gentian.

An ankle-high beauty of the fall prairie flora is the prairie or downy gentian, *Gentiana puberulenta*. Unlike the previous two species, the flowers of the prairie gentian are open and bell-shaped. The flowers close towards evening or on an overcast day. The prairie gentian is rather demanding in its habitat requirements -- look for this species in some of our better dry to moist prairies.

Stiff gentian, *Gentianella quinquefolia*, has small, light





purple flowers. The species is an annual, a plant that starts out as a seed in spring and produces flowers, fruits and mature seeds by late fall. Stiff gentian breaks a general plant identification rule used by botanists. Plants with square stems and opposite leaves often belong to the mint family, but stiff gentian has these features also. Stiff gentian blooms in August and September and can be found in dry to moist prairies, fens, cold-air slopes and open woods.

Fringed gentian, *Gentianopsis crinita*, has gorgeous blue flowers and gets its name from flared, fringed petals. It can be a large plant, exceeding two feet

in height and having more than 100 flowers. Fringed gentian is a biennial, a plant that does not produce flowers until its second growing season and then dies. Its flowers only open up under relatively strong light -- they close at night or on an overcast day. Fringed gentian grows in fens, but it is occasionally found in moist prairies. It flowers from August to October, even after a hard frost.

A close relative of the fringed gentian is the small fringed gentian, *Gentianopsis procera*, a biennial like its cousin. It is similar in appearance to fringed gentian, but it has linear rather than triangular leaves, fewer flowers per plant and shorter fringes on the petals. The petals of both fringed gentians are twisted when they first appear above the sepals. Over time the petals unwind, revealing their pretty blue color. Most Iowa members of the gentian family have five petals, but the fringed gentians have four petals. Small fringed gentian occurs primarily in fens in Iowa, although it rarely occurs in the same fen as fringed gentian. Small fringed gentian blooms from August to October. It is considered a threatened species in Iowa, but is more common north and east of the state.

A number of gentians are found in cultivation, though these tend to be natives of Europe and Asia. Some of our native species are difficult to grow or seed is hard to obtain. However, Japanese plant breeders have recently provided an opportunity to grow a North American gentian in gardens. The prairie gentian or tulip gentian, *Eustoma grandiflorum*, is a species native to the prairies of the southern Great



Kay Klier

▲
Prairie or downy gentian can be found in Iowa's dry to moist prairies.

Plains. The Japanese recognized its beauty and developed a cultivar that is fairly easy to grow, even in rather dry soil. The prairie gentian can be up to two feet tall and is topped with long-lasting pink, white or lavender flowers that are two to three inches across. Many seed companies offer this plant as *Eustoma* or *Lisianthus*.

Several of Iowa's native gentians, such as bottle and prairie gentians, are relatively common in the state. Fall is a good time to look for them on state prairie preserves such as Cayler, Hayden, Kalsow, Sheeder and Steele. They can also be found on some state parks and wildlife management areas, as well as land owned by county conservation boards.

Mark J. Leoschke is a botanist with the department's preserves and ecological services bureau in Des Moines.





Happy Trails

Article by Mark Edwards and Bob Walker
Photos by Ron Johnson

To honestly experience a natural setting, you must become a part of that setting. Imagine yourself traveling down a trail, any trail, your favorite trail. It is only by immersing yourself into the surroundings that you can completely appreciate its beauty and desire to insure its future.

With the advent of the "health awareness" generation and increased leisure time, trail use has skyrocketed. Trails that once saw little use in urban and rural areas are now heavily used recreation facilities. The Department of Natural Resources provides 411 miles of trails on state park and recreation areas. Of these, 388 miles are available to hikers, 295 miles to cross-country skiers, 243 miles to snowmobilers, 159 miles to horseback riders and 110 miles to bicyclers. The public supply of trails does not presently meet the demand and yet long-range planners predict trail use will double within the next 10 years.

The presence of the multitude of trail users enjoying these trails raises a paradox. We are literally "loving our trails to death!" Regardless of the use by people on foot, skis, horses, bicycles or snowmobiles, we all must realize our use impacts the trail and environment and we must take responsibility for that impact. Compared to other states, Iowa has a very limited amount of public land, consequently concentrating impacts. Public land users and managers must make it a priority to plan for and manage this impact. We must not only restore old trails and build new ones, but we



must also inform and remind users of trail and resource ethics. The Department of Natural Resources has been investing more time, money and energy into trail improvements. We are working to provide quality trail experiences that are compatible with our limited resources.

Trails have existed on state parks since the early 1900s. Monumental efforts by the Civilian Conservation Corps in the 1930s produced long-lasting, resource-compatible improvements to trails and facilities. These improvements made many of our state parks unique and presented a legacy that we are still enjoying today. In 1980, a prototype to protect these "gifts from the past" began at Ledges State Park. Miles of trail constructed of native stone were renovated. Wood tie steps were incorporated and soils were restored on slopes that had been scarred by erosion and unauthorized off-trail uses. Scenic vista viewing platforms were carefully placed to allow the visitor to become a part of this unique environment. The techniques developed and the lessons learned at Ledges State Park are now being implemented on trail renovation projects at the Mines of Spain Recreation Area, Pikes Peak and Pine Lake state parks. These undertakings, in conjunction with numerous smaller projects, have established and restored many miles of trails and are serving as examples to other public trail managers in Iowa and throughout the country.

Public trail managers and users must adopt as a first priority a philosophy of trail ethics. Trail managers must carefully plan the initiation of new trails or the renovation of old trails with the environment and long-range impacts to the resource in mind. Proper trail routing and a basic understanding of trail construction and erosion control is the most important first step in the renovation and development of trails. With this done, minimal maintenance and monitoring can preclude problems before they negatively impact the environment and require major rehabilitation.

*The Department
of Natural
Resources
provides 411
miles of trails on
state park and
recreation areas.*



**Construction on the
Ledges State Park
trail.**

Just a few examples . . .

Backbone State Park -- 16 miles hiking, 5 equestrian, 5 cross-country skiing and 8.5 snowmobile.

Big Creek State Recreation Area -- 20 miles hiking, 7.8 biking, 8 cross-country skiing and 17 snowmobile.

Brushy Creek State Recreation Area -- 40 miles hiking and equestrian, 25 cross-country skiing and 30 miles snowmobile.

Lacey-Keosauqua State Park -- 12.4 miles hiking, 12 cross-country skiing and 7 snowmobile.

Lake MacBride State Park -- 15 miles hiking, 7.5 biking, 15 cross-country skiing and 14 miles snowmobile.

Stone State Park -- 14 miles hiking, 8 equestrian, 14 cross-country skiing and 8 snowmobile.

Volga State Recreation Area -- 25 miles hiking, 16 biking, 21 cross-country skiing, 22 equestrian and 18.4 snowmobile.

Waubonsie State Park -- 11 miles hiking, 5 biking, 5.5 equestrian, 5 cross-country skiing and 5.4 snowmobile.

For additional information, contact specific state parks or recreation areas.

Trail managers should always keep in mind the following parameters of trail design ethics:

- Design trails to exemplify the natural wonders while not destroying them.
- Design trails to prevent soil erosion, following natural contours.
- Provide a safe trail experience.
- Design trails for the most compatible uses, compatible to the environment and among users.
- Certain natural elements deserve to be left undisturbed.
- Signage should assure safety, reassure the user, and identify allowable uses.
- Provide for full accessibility whenever possible.

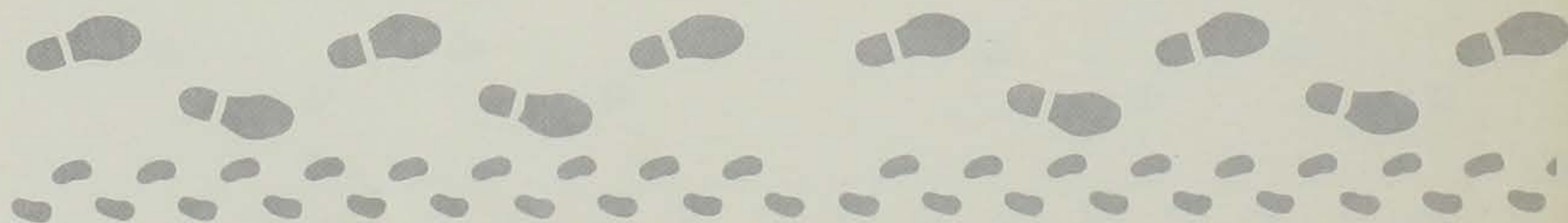
Trail users should respect the environment and their trails by following these user ethics:

- Educate yourself by reviewing trail maps, reviewing regulations and following signs.
- Respect the rights of other users.
- Use designated trails approved for your particular activity.
- Stay on trail treadway.
- Enjoy the flora, fauna, geological and archeological wonders. Leave them for others to appreciate.
- Avoid excessively wet, muddy trails.
- Lend a helping hand — volunteer. Trail managers need assistance in providing quality trail systems.

Parks were originally established to preserve the natural environment. They were to be a reminder of what Iowa was like before the changes imposed by humans. There is much work to be done to maximize the benefits of our public lands. The department's trail program is one illustration of our intention to give future generations the legacy that we have inherited.

Mark Edwards is a trail construction supervisor for the department in McGregor.

Bob Walker is the trails coordinator for the department in Des Moines.



Digging for Data

You probably won't find the word garbologist in the dictionary, but the word is becoming common in discussions about waste management. Garbologist is a popular term for an anthropologist who studies garbage. While this may not seem to be a glamorous occupation, the work of garbologists has provided many insights — and some surprises — about our culture in general, what happens to waste after we throw it "away," and how we can improve waste management methods.

It is evident that environmental, economic and political problems with landfilling wastes have created local and national concern. In 1987, in the middle of this concern, a team of anthropologists at the University of Arizona discovered that, despite the attention to the landfill problem, no one had actually dug into a landfill to see what was inside. According to the anthropologists, "We could not resist the opportunity." Thus, the "garbage project" was born.

The goal of the project was to find out what happens over time to materials deposited in landfills. With that in mind, the garbage project team excavated seven landfills across the United States. Excavated materials were carefully sorted, documented and analyzed in laboratory situations.

by Gaye Wiekierak

Digging through a landfill can be compared to digging through geological strata or slicing through the layers of a cake; layers of garbage are identified and dated. Discarded telephone books, for example, provide conspicuous layers, as do newspapers.



Digging through the refuse is revealing in many ways. For example — do you remember that family reunion 10 years ago? You were stuffed with turkey and couldn't finish that corn on the cob. The corn was thrown in the garbage and was carted "away" to the landfill. But has the corn really gone away? Has it somehow degraded? According to samples taken by the garbage project, chances are it has hardly degraded at all. In fact, it is probably still sitting in the landfill, corn intact, taking up space. Consider the following garbage project findings from landfill excavations:

- ▼ Newspapers dated 1952 were still readable.
- ▼ A 10-year-old corn cob with corn still attached.
- ▼ A usable 10-year-old dollar bill.
- ▼ "Preserved" hot dogs from 1972.
- ▼ Ten-year-old green grass and leaves.
- ▼ Identifiable steak, 25 years old.

While we usually think of garbage such as food, paper and yard waste as being "degradable," the garbologists' findings challenge the myth that such waste will degrade in an expedient way in a landfill. According to a garbage project expert, "What we think is in a landfill and what happens to it over time may be based more on fantasy than on fact."

People often think that

Ron Johnson

landfilled waste "rots" then "goes away." However, unlike compost systems, which are designed to break waste down, the design of landfills can actually preserve waste for long periods of time, even if the garbage is paper, food or yard waste. Composting waste breaks it down because of two key ingredients: air and water. Landfills, however, are designed to be airproof and waterproof. Regulations require landfills to be lined with impermeable sheets and covered with waterproof material. The reason for this design is to prevent groundwater contamination.

Iowa, as well as many other states, relies heavily on groundwater for its drinking water, so a properly designed landfill is extremely important. However, it also means that the waste will stay in the landfill for very long periods of time.

What implications does the garbage project's research have for consumers and policy-makers? According to the garbologists, we need to carefully examine the "degradability" issue. While the concept of attempting to manufacture degradable products is laudable, these products, such as degradable plastic bags, will not

solve the landfill problem. Degradables are still being studied in Iowa for uses, such as in compost systems. Under these conditions, degradables have potential. For example, if yard waste is put in degradable bags and those bags break down adequately in a compost pile, compost operators would be spared the additional task of separating the bags from the yard waste. However, if the material is destined for the landfill, even degradables probably will not break down for long periods of time, so other options are more desirable — an integrated system of waste



▲
Chicken bone with meat after 10 years in a sanitary landfill.

►
Other food waste, textiles and clothing, and paper waste after 10 years in a sanitary landfill.



Photos courtesy of the Garbage Project,
University of Arizona.

management is the best approach.

What are the other options?

First, the garbage project found that paper waste occupied about 50 percent, by volume, of 1985-86 landfilled municipal solid waste in the landfills sampled. This represents a great opportunity. Paper waste can not only be reduced through such methods as using two-sided copies, it can be recycled into a variety of products, as well. To aid market development, the State of Iowa procures recycled paper and encourages all local governments to do so. In several areas

of the state, various types of paper are recycled into such products as livestock bedding, cereal boxes, grocery bags, corrugated cardboard and paper towels.

Secondly, the garbage project found that yard waste occupied about six percent, by volume, of the 1985-86 landfilled waste studied. Recognizing that yard waste fills much of Iowa's landfill space (typically 18 to 20 percent), and that there are proven alternatives to landfilling yard waste, the Iowa General Assembly banned yard waste from landfills, effective January 1,

1991. Yard waste is one of the easier wastes to reduce from the waste stream or to recycle.

Home compost piles are effective ways to reduce yard waste. Neighborhood or municipal yard waste recycling efforts are both technologically and economically feasible, and the compost product can be used in a variety of applications.

Food waste was found to comprise two percent, by volume, of 1985-86 landfilled solid waste, according to the garbage project. More careful management of what we buy and what we consume can reduce food waste, as well as other types of

waste, considerably. While technological advances in waste management methods are important, changes in our purchasing and disposal behavior can have equal or greater impact on diverting waste from landfills.

Results of the garbage project indicate that "Modern landfills are the largest and most numerous monumnets humanity has ever built to any lifestyle or civilization." That is quite a legacy to leave for future generations! The good news is that we can all act now to reduce our "monuments of garbage" and to erect more positive monuments in their place.

Gaye Wiekierak is chief of the planning and grants bureau for the department's Waste Management Division in Des Moines.





MUSSEL CONTROL

*It is only
a matter of time
before the
zebra mussel
invades
Iowa's waters.
What is the
zebra mussel
and what
impacts
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aquatic
ecosystem?*

Zebra mussels were unheard of until 1985. By 1989, zebra mussels had colonized the surface of nearly every firm object in lakes St. Clair and Erie and the Detroit River. Lakes Ontario and Huron are expected to be colonized during 1990.

Where did they come from? How will they impact Iowa's streams, lakes, aquatic life and human use? Are there controls available? How is the problem being handled and studied? These are but a few of the many questions about zebra mussels. The answers, however, are more difficult.

The Invasion

The first known U.S. introduction of zebra mussels occurred in 1985 when transoceanic ships discharged ballast water into Lake St. Clair. By the autumn of 1989, zebra mussels invaded Lake Erie, the western edge of Lake Ontario, the Maumee River in Ohio and the Green Bay region of Lake Michigan.

Zebra mussels originated in the Caspian and Black sea region near Russia and have slowly spread to eastern Europe. By the 1830s, the mussel had covered all of Europe and invaded Britain. The mussels are small -- the largest found in the Great Lakes was approximately one and one-quarter inches. The mussel has alternating light and dark bands on the shell surface, hence the name "zebra mussel."

The zebra mussel reproductive strategy is one of the keys to its rapid spread and abundance. The egg production period runs from early May through October, as long as the water temperature is above 54 degrees. Eggs are fertilized outside the shell and hatch within several days into free-swimming larvae. A mature female mussel can produce more than 30,000 eggs per season.

The free-swimming larvae are called veligers. They suspend in the water column for at least eight days which allows

BY JOHN PITLO



them to be scattered and dispersed by currents. These larvae must settle on a firm surface during this time or die. Attachment to a surface is by a unique tuft of fibers known as byssal threads. These threads produce an adhesive secretion which anchors the mussel in place. Any firm surface that is not toxic can be colonized by zebra mussels -- wood, rock, plants, metal, glass, fiberglass, vinyl, rubber and other mussels. Beds of mussels in Lake Erie now contain more than 27,000 and up to 64,000 mussels per square yard.

Biological Concerns

The feeding method and impact on the food chain is of

concern -- each adult animal can filter one gallon of water per hour. Nearly all plankton is strained from the water; however, mostly algae is eaten. Instead of passing unused plankton back into the water to be used by larval fish, the mussel creates a mucous pellet called psuedofece. The psuedofeces, containing unused plankton, is ejected from the mussel's siphon and accumulates among the shells of the colony. There is concern that high densities of zebra mussels may be able to filter nearly all the water in a stream or lake in a short period, thereby removing the food source

▲ **Zebra mussels on a clam shell. Any firm surface that is not toxic can be colonized by zebra mussels.**

*After 200
years, the
Europeans
have not
been able
to develop
a control
that is not
deadly
to other
important
aquatic
animals.*

upon which larval fish depend.

Additional areas of concern arise regarding reefs, shoals and other rocky areas. These habitats provide very good zebra mussel attachment sites and most rocky areas on Lake Erie are completely covered with mussels, up to 10 inches thick in some places. The accumulation of pseudofeces creates an environment that is acidic and devoid of oxygen. Currently, it is not known if these conditions are detrimental to the hatching success of reef fishes -- walleye, white bass and smallmouth bass. Eggs of rock rubble spawning fish must incubate and hatch among the mussels and the anaerobic and acidic environment created by pseudofeces.

In many Iowa lakes and streams, the rocky substrate provides attachment sites for numerous aquatic insects which are a very important food source for both young and adult fish. In the Mississippi River, up to 80,000 insects per square yard have been found on the surfaces of rocks which make up wingdams or riprap. It is unknown what changes might occur in the aquatic insect community because of competition for attachment sites with zebra mussels.

Commercial Concern

The mussels' liking for hard surfaces as attachment sites has made water intake structures, those used for power plants or municipal water treatment plants, susceptible to clogging. Plants located on the Michigan and Ontario shoreline of Lake Erie reported 20 percent reductions in pumping ability due to clogging by zebra mussels.

Mussel control at intake structures have been investigated, but only chlorine and heating the water to 104 de-

grees for 15 minutes have resulted in 100 percent mortality to zebra mussels.

Recreation has also been impacted as unprotected docks, breakwalls, boat bottoms, engine outdrives and cooling systems are rapidly colonized. Approved antifouling paints containing copper and slow-release polymers of tributyltin have been effective in resisting infestations on boats and outdrives. However, numerous boat engines have overheated due to cooling water inlets being clogged by colonies of zebra mussels.

Beaches are also likely to be impacted by zebra mussels. Extensive deposits of mussel shells have been seen on Lake Erie beaches. The sharp-edged shells have caused many cut feet and most beachgoers now wear shoes.

Zebra Mussel Control

System-wide control of mussels where they have become established appears to be out of the question. After 200 years, the Europeans have not been able to develop a control that is not deadly to other important aquatic animals.

In some parts of Europe, large populations of diving ducks have changed migration patterns in order to feed on beds of zebra mussels. On some areas of the Rhine River, overwintering diving ducks and coots ate 97 percent of the standing crop of mussels. In the Point Pelee region of Lake Erie, sightings of lesser scaup have increased from 20 birds in 1987 to 14,000 birds in 1989. This increase is believed to be due to zebra mussel colonies in the area. However, it is unknown if diving ducks can ever be an effective control because of depressed duck populations.



◀ This car, which was lying on its top in water, was colonized by zebra mussels.

▼ Young zebra mussels on a crayfish.

Freshwater drum (sheepshead) have been documented to feed extensively on zebra mussels during certain periods. It is unknown if this feeding is periodic or on certain life stages of the mussel. Much needs to be learned about natural predators.

Potential For Spreading To Iowa

Zebra mussels can potentially spread from the Great Lakes to inland waters either as veligers in water or as newly transformed young attached to boat hulls, engines, trailers, live-wells or any number of other items. Waterfowl and other wildlife may also aid in the dispersal by carrying veligers in wet fur or feathers. Mussels resist drying very well and can live out of water for up to 10 days. With zebra mussels already documented in Lake Michigan, the mussels are expected to enter the Mississippi River system via the Chicago diversion and the Illinois River. Most biologists believe zebra mussels will be widespread throughout the Midwest, South and Southeast.

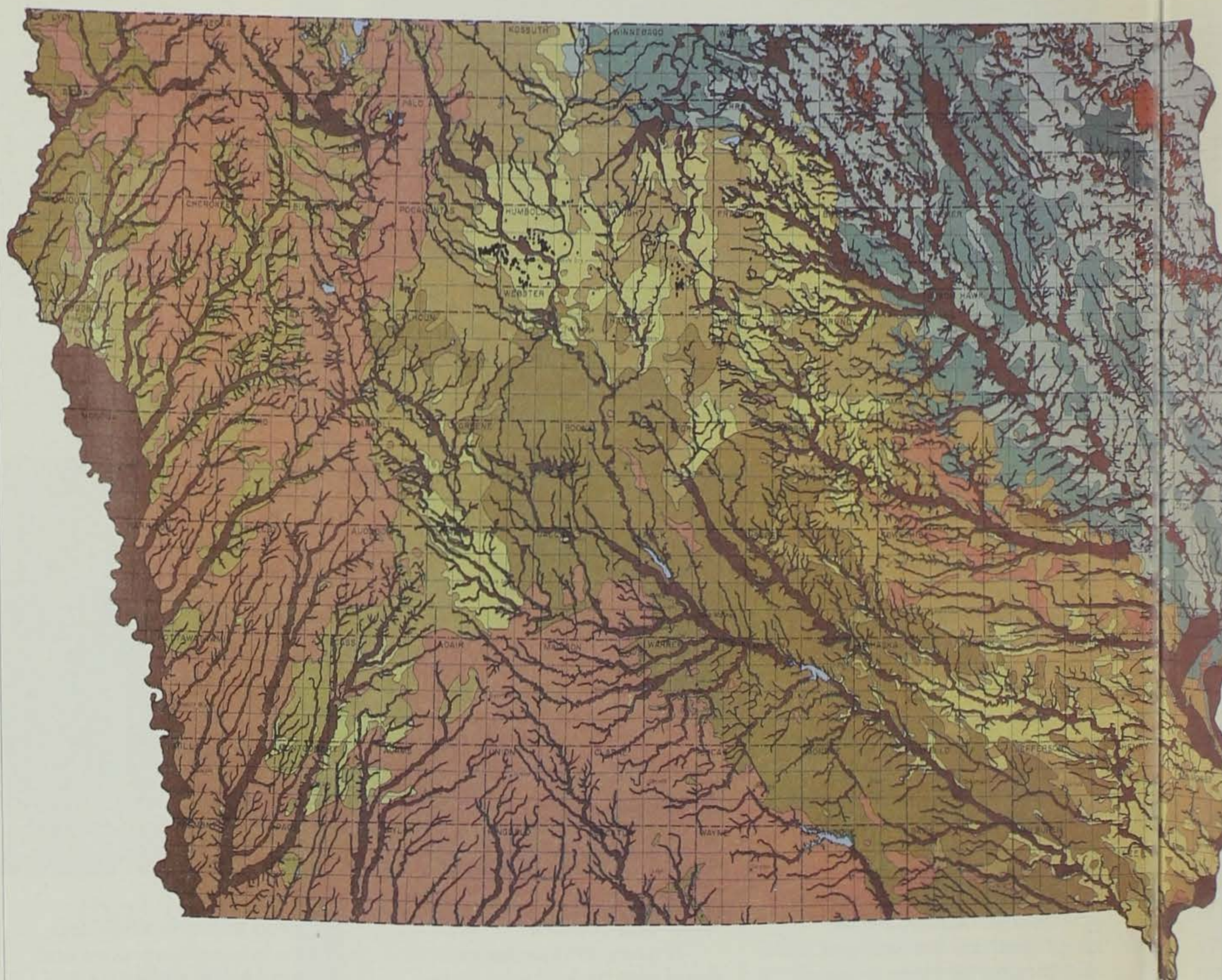


What Can You Do?

Anyone towing personal boats and trailers from Lake Erie, Michigan, St. Clair, Ontario, Huron or the Detroit River are urged to clean boat hulls, trim tabs, outdrives and outboard lower units. In addition, disinfect live wells, outboard motor cooling systems and live bait buckets with bleach (one part bleach to 10 parts water) before using on inland waters. Don't forget your anchor and boat trailer. If you happen to collect what you believe is a zebra mussel, please arrange for a Department of Natural Resources' biologist to see it.

We need to know when and where infestation occurs and document the spread and response of other aquatic organisms. The full impact of the zebra mussel on Iowa's aquatic ecosystem is unknown; however, by delaying infestation as long as possible, we can learn more about this animal and possibly handle it better when the mussel does arrive. There is little doubt that the zebra mussel's impact will be felt by a great many Iowans.

John Pitlo is a fisheries biologist for the department at Bellevue.



ALLUVIAL AQUIFERS: Most wells very shallow; high potential for aquifer and well contamination.

GOOD BEDROCK AQUIFERS:



Thin Drift Confinement: Most wells deep and completed in bedrock aquifers; high potential for aquifer and well contamination.



Moderate Drift Confinement: Most wells deep and completed in bedrock aquifers; low potential for aquifer and well contamination.



Shale Confinement: Most wells deep and completed in aquifer; moderate potential for aquifer and well contamination.

VARIABLE BEDROCK AQUIFERS:



Thin Drift Confinement: Most wells deep and completed in bedrock aquifers; moderate to high potential for aquifer and well contamination.



Moderate Drift Confinement: Many wells deep and completed in bedrock aquifers and many are shallow and completed in the drift; low potential for aquifer and bedrock well contamination; high potential for drift well contamination.



Shale Confinement: Most wells are shallow and developed in the drift; some wells deep and completed in bedrock aquifer; low potential for aquifer contamination; high potential for drift well contamination; moderate potential for bedrock well contamination.



DRIFT GROUNDWATER SOURCE: Most wells are shallow and completed in the drift; low potential for bedrock aquifer contamination; high potential for well contamination.

GROUNDWATER VULNERABILITY

by Joe Wilkinson



- Special Features Affecting Potential Contamination:** Sinkholes and agricultural drainage wells.
- Other Map Features:** Lakes.



treaks of purple stand out against the greens, tans and pinks shading the just-completed Iowa groundwater

vulnerability map. A product of the 1987 Iowa Groundwater Protection Act, the color-coded map helps identify where the possibilities for groundwater contamination lie. "It is our first attempt at trying to make this complicated, partially understood topic easier for people to understand," said project director Bernard Hoyer of the Department of Natural Resources' geological survey bureau. Why should people care about groundwater, which is often hundreds of feet below them? "Because it is their water," said Hoyer. "I see people involved in any kind of water resource planning using this."

In Iowa, four out of five people rely on groundwater for their drinking water. With the appearance of human-introduced contaminants -- synthetic

organic compounds (such as pesticides), volatile organic compounds (such as gasoline) and excess nitrates over the past two decades -- the vulnerability of the water we drink has become a major environmental concern. In a study this spring, the Iowa Natural Heritage Foundation discovered that 86 percent of the people questioned statewide list drinking water contamination as a "very serious" or "serious" environmental issue.

By now, you have probably targeted your hometown on the map. So which area is the most vulnerable to groundwater contamination? "We have tried hard not to say that," explains Hoyer. "We have attempted to describe the hydrogeologic situation from region to region, but it is not site specific. How do you compare the vulnerability of the agricultural drainage wells (common in north-central Iowa) and sinkholes (northeast Iowa) to the person in southwest Iowa with a well that is only 30 feet deep?" Hoyer says each instance represents the potential for significant con-

tamination. For sinkholes and drainage wells, that potential is for nearly immediate contamination -- following a heavy rain, for example. A large bored, shallow well faces a different vulnerability. Such wells are typical across southern and western Iowa,

back years of drought squeezed many wells dry in 1988-89. Now that they are recharged, Hoyer points out that we need to ask whether contaminants which percolate down into the shallow alluvial aquifers feeding those wells might be appearing in significant quantities.

There are generalities that apply from region to region, however. Hoyer says the depth to the water supply is the most important factor going into development of the vulnerability map. Intervening rock and soil layers impede the movement of contaminants into the underlying water supply. According to Hoyer, the map and supporting information point to the *susceptibility* of contamination. That susceptibility is based not only on where the water lies, but where the wells are located and the behavior of people. That "human behavior" factor includes a look at where people live and what decisions they make in regards to their water supplies. Hoyer points to the "medium" green section of east-central Iowa, below the red-dotted sink-hole region. "There, perhaps, is the least potential for contamination," he says. "They have more than 100 feet of glacial till (protecting the bedrock aquifer from surface contamination) and they are

using the water that is being protected." To contrast, Hoyer shifts to the tan area south and west of there. "Here, you have the same glacial till, the same depth to water, the same protection, but fewer people are using it." Many wells in that region are completed in the shallow drift aquifers,



vulnerability is not simple. It's a combination of factors. It's the protection of the resource. It's where the resources are. It's where people are putting the wells."

rather than extending down to bedrock water confinements. Hoyer speculates that where the water might not be as good -- in terms of dissolved solid levels, lower yields and lower reliability -- fewer people have been willing over the years to make the financial commitment to drill deep wells. Shallower, less expensive wells have served the purpose over the years. "The less attractive it is, in terms of depth and natural quality, the less attractive it is, economically, to use deeper wells," Hoyer summarizes.

In the future, planners will need to look at that "human behavior" factor which is built into the map, not just the geology beneath Iowa's surface. "It is no coincidence," points out Hoyer, "that the highest population density in the state lies in the blue-green section of the map, where groundwater is abundant. Vulnerability is not simple. We wish it was. It's a combination of factors. It's the protection of the resource. It's

where the resources are. It's where people are putting the wells."

It is the inclusion of the "people" factor which helps make the groundwater vulnerability map unique. Data from hundreds of wells sampled in the late 1980s for the Statewide Rural Well Water

program are a key component of the map. It also provides information on the glacial drift (the soil covering from surface to bedrock) for all of Iowa. Previously, only a section of northeast Iowa had been mapped for that. Hoyer

says that is the single most requested information as state geologists work with engineering firms. Such firms need to understand geological features as they plan future development. The map also marks the first attempt to establish the location of alluvial aquifers -- the sand and gravel deposits beneath flood plains across the state.

Water. It is essential for all living things. Geographers, environmental experts and social scientists agree that the availability of good quality water will become a major component of life in the next century. With that availability, the *vulnerability* of that component will also play a key role. This map then becomes a valuable planning tool, as we work to protect Iowa's groundwater resource during growth in the coming decade.

Joe Wilkinson is an information specialist for the department at Iowa City.

WARDEN'S DIARY

CHUCK HUMESTON

HOW TO GROW PHEASANTS

I was working while on training with former conservation officer, Glen Angell, now retired, during the pheasant hunting season. Everything had been pretty routine until we stopped the pheasant factory.

Seeing someone in a pickup who appeared to be hunting, we turned on the lights, and the driver responded by pulling over to the side of the road.

I walked up to the side of the pickup and looked inside. Yes, the driver had a shotgun, and he had been hunting, but something caught my eye. On the floor in front of the seat was a 12-pack of beer. Unfortunately that really isn't too unusual, but something was different about this one.

As I looked closer, I realized this 12-pack had tailfeathers! We opened the door for a closer look and could hear something moving inside the 12-pack. We opened it and looked inside to see not cans, but a hen pheasant! Now that is something you don't see every day, particularly considering the pheasant was alive and healthy.

I don't know if we ever figured out how the gentleman had managed to capture

the pheasant alive, but we asked, "Do you realize it's illegal to have a hen pheasant?"

"Yes," he answered.

"Then what are you doing with it?" we inquired.

"I was going to take it back to my land and release it," he explained. "That way I'll have pheasants on my land."

Hmmm . . . an interesting theory, but two problems popped up in my mind.

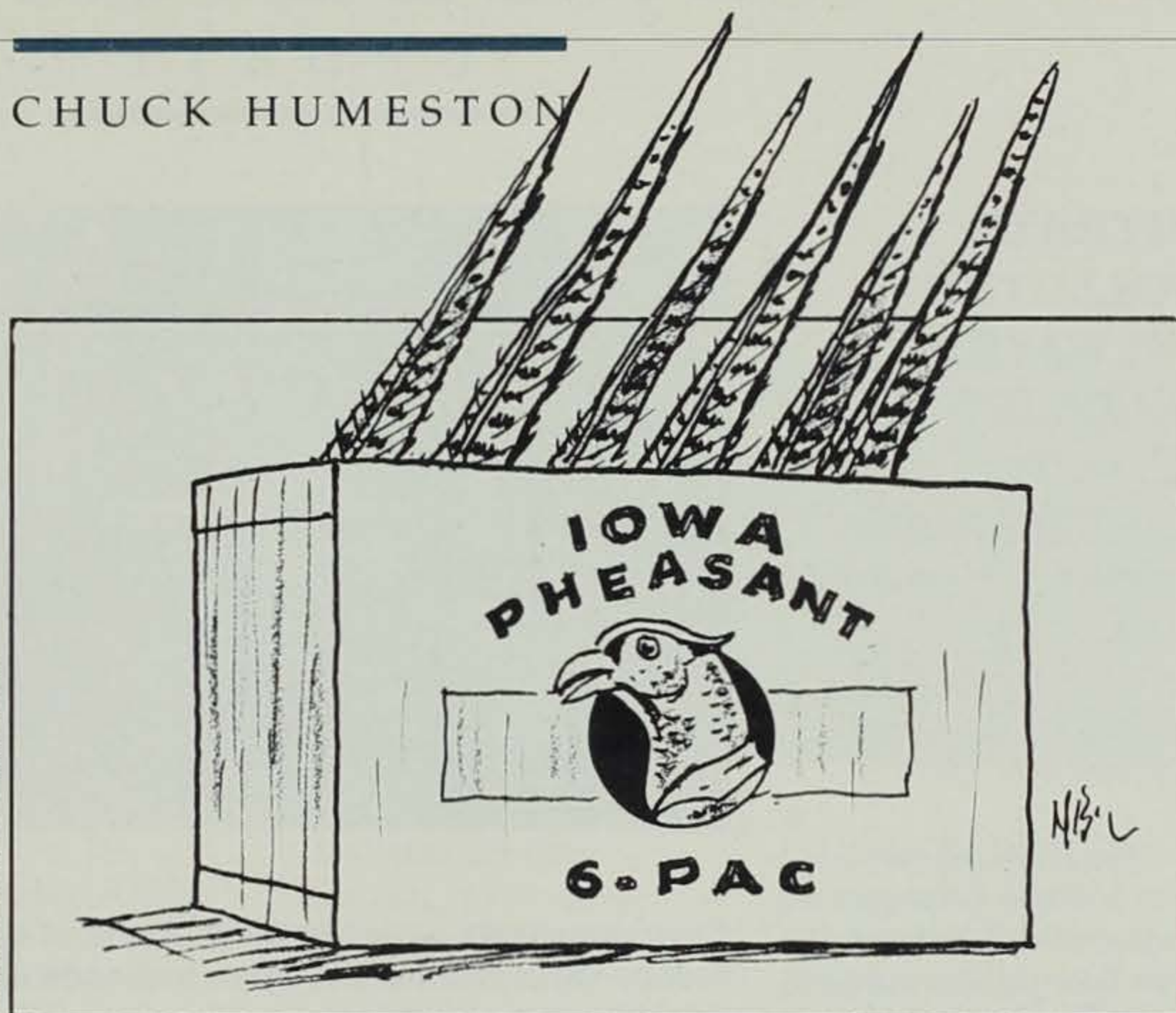
First, it appeared the land was a little short on habitat. We explained how wildlife is dependent on food, water and cover to survive. If he had no pheasants on his land, it was probably lacking in one of those three areas, and no amount of artificial stocking would solve the problem.

On the floor
in front of the seat
was a 12-pack of beer.
As I looked closer,
I realized this 12-pack
had tailfeathers.

We suggested getting involved in setting aside some area for cover to help his situation.

But it was the second problem he failed to take into account which really perplexed me. I believe in equal rights and abilities, but there are some things a hen can't accomplish without a rooster!

Illustration by Newton Burch



CONSERVATION

UPDATE

NITRATE POLLUTION OF WATER SUPPLIES IS NOT INEVITABLE

by Dennis R. Keeney, director, Leopold Center for Sustainable Agriculture, ISU

On April 15, the Des Moines River at Saylorville Reservoir was flowing at a rate of 13,410 cubic feet per second and had a concentration of 13.5 milligrams of nitrate-nitrogen per liter. That means that during those 24 hours, nearly one million pounds of nitrogen as nitrate flowed into the reservoir.

This sounds like a lot of nitrogen. It is. It means that the river was carrying an average of one-fourth pound of nitrogen from every acre in the Des Moines River watershed. Much more came from cropland areas, much less from natural areas and pastures. One million pounds of nitrogen are worth nearly \$150,000. It is enough to fertilize 7,600 acres of corn at 1989 average rates,



Ron Johnson

▲ **Environmentally sound farming practices can help reduce the amount of nitrogen that ends up in drinking water supplies.**

and it has the same energy as 250,000 gallons of diesel fuel. (Nitrogen fertilizer production requires considerable amounts of energy from natural gas.)

Throughout the year, at least 33 million pounds of nitrate-nitrogen flow into the Saylorville Reservoir. On average, each acre in the watershed loses about nine pounds. Spread out over the year, this is a relatively small amount compared to what is needed to grow corn. But nitrate loss is seasonal -- most leaches into water in the spring.

It's no wonder that nitrate has become a household word. Part

of the reason has to do with the problems and the low cost of fertilizing corn with nitrogen.

Corn, one of our miracle crops, needs a lot of nitrogen. On an August day, an acre of corn contains about 220 pounds of nitrogen in the tops, grain and roots. But the grain harvested from that acre contains only about 90 to 100 pounds of nitrogen.

The other 100 pounds or so stay behind in the corn-stalks and the soil. In the fall, and even more so in the spring, soil microbes convert some nitrogen to nitrate, which is mobile. Intense spring rains move this nitrate

deeper into the soil. Over time, it ends up in water supplies.

Further complicating the problem is how farmers drain fields. Northern Iowa was once a native prairie filled with wetlands. To farm the land, water had to be drained with underground tiles. This lets Iowa farmers grow food and fiber on some of the richest soils in the world. But it also is a direct pathway for contaminants to reach surface water supplies.

Water in remote tiles flows into large drainage systems that collect runoff and drainage from entire watersheds. All this water flows into straightened channels that speed the water downstream.

Iowa has few wetlands left to slow the movement of water and allow nitrate to be converted to nitrogen gas, completing nature's nitrogen cycle. (See *Mini-Wetlands Make Waves*, page 26) Thus, the nitrate moves through the watershed to streams, rivers and lakes.

Much of the land in the Des Moines River watershed is tile drained, intensively farmed and flat. Row crop and livestock farming in this area,

particularly corn and hogs, is some of the most productive and most intensive in the nation.

But nitrate pollution is not inevitable. More steps can be taken to help farmers protect the environment and their profits. The Leopold Center devotes a large portion of its research dollars to find ways farmers can use less fertilizer without cutting yields.

Nitrogen must be managed by field and soil type. Fertilizer recommendations must account for all sources, including that added by manures, legumes and organic residues; that left over from the previous fall; and that formed in the spring.

Fortunately, agronomists have made considerable progress in developing soil tests and sophisticated computer models to help decide the most efficient forms and amounts of nitrogen to apply. These recommendations need to be tested and developed in ways that can be used by sellers and users of fertilizer.

Precision farming, which uses nitrogen in the most efficient and environmentally sound way, will still not allow

the Des Moines River to run nitrate-free. But it can go a long way toward addressing one of the major concerns with present-day farming practices.

--Reprinted from
Leopold Letter, Vol. 3,
No. 2, Summer 1991.

Converting CRP Acres to Trees

Changes in the Conservation Reserve Program (CRP) now permit extension on CRP payments for an additional one to five years if pre-1991 grass contracts are converted to hardwood trees. Cost-share assistance is available for this conversion. "This provides a great opportunity to extend CRP payments and establish a hardwood forest on highly erodible land," said William Farris, state forester for the Iowa Department of Natural Resources.

The Conservation Reserve Program is a federal program designed to take highly erodible land out of row crop production by paying landowners to leave the area idle.

"Trees provide



Ken Formanek

excellent erosion control and wildlife habitat, while they enhance the landscapes and improve water quality," said Farris.

Up to 50 percent of the first-year costs of the conversion may be cost-shared, according to Farris. Eligible costs for cost-sharing include site preparation, seedlings, plantings, labor and weed control for the first year.

Landowners with current CRP contracts may sign up for conversion from grass to hardwood trees at any time during the contract period.

For more information, contact your local DNR district forester, your county ASCS office or the State Forest Nursery, 2404 S. Duff Ave., Ames, Ia. 50010, (515) 233-1161.

▲
Landowners currently participating in the conservation reserve program are eligible for cost-share assistance to convert their land to hardwood trees.

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:

--Sept. 5, Anamosa
--Oct. 3, Guttenberg

Environmental Protection Commission:

--Sept. 16-17, Des Moines
--Oct. 21-22, Des Moines

State Preserves Advisory Board:

--Sept. 10, Des Moines

Disposing of Yard Waste in a Landfill Doesn't Cut It

With the heavy spring rains and warm temperatures making growing conditions ideal for lawns, Iowans are finding that mowing just once a week doesn't seem to cut it anymore.

With the increased mowing, comes increased yard waste. And where does this yard waste end up? "Not in a landfill," said Teresa Hay, administrator of the Waste Management Division of the Department of Natural Resources.

In 1989 the Iowa Legislature passed the Waste Reduction and Recycling Act. Among the many provisions of the act is a ban on the disposal of yard waste in sanitary landfills as of Jan. 1, 1991. According to Hay, yard waste can comprise a considerable percentage of the solid waste stream, between 10 and 20 percent, with urban areas typically generating higher amounts.

"Yard waste can be managed in environmentally sound

ways and need not take up valuable landfill space," said Hay.

"The best alternative for much of the yard waste is to simply leave it on your yard," said Scott Cahail, environmental specialist with the DNR. According to Cahail, if a lawn is mowed frequently enough, the grass clippings can easily be "absorbed" back into the lawn and provide valuable nutrients. The new mulching mowers improve this process by chopping the clippings into smaller pieces.

"Another good idea is to build a backyard composter for yard waste," said Cahail. "The compost can be used as a soil conditioner for gardens and other plantings."

If you are unable to manage your yard waste on your own property and are not familiar with how your city or county is managing yard waste, Cahail recommends contacting your local public works department or county solid waste officials. Cities and counties are required by Iowa law to provide a disposal option for all solid wastes.

For more information on composting your yard waste, contact the DNR for a free brochure.

Motorcycles Can Be Registered as ATVs

A motorcycle owner will be able to register their machine as an all-terrain vehicle, according to a new law which went into effect July 1.

According to Department of Natural Resources' officials, a motorcycle owner who registers their machine as an ATV will be permitted to operate on an ATV public facility or in an ATV special event on public property. The owner must comply with the laws and rules that govern the operation of ATVs.

"An owner of a motorcycle registered as an ATV can participate in all programs established for ATVs, except the safety instruction and certification program operated by the DNR," said Bob Walker, trails coordinator for the DNR.

A motorcycle registered as an ATV may also be registered and operated as a motor vehicle. "This means the machine can have



New State Record Muskie Taken From Lake Okoboji

A new state record muskellunge has been caught from the Iowa Great Lakes. According to the Iowa Department of Natural Resources, the fish was taken from Miller's Bay at West Okoboji on June 21 by Dennis Heidebrink of Rushmore, Minn.

two registrations," said Walker.

The fee for registering a motorcycle as an ATV is \$21, which is valid for two years. Fees collected are used for purchasing, developing and maintaining public ATV recreation areas.

For more information on registering a motorcycle as an ATV, contact your local county recorder.

The muskie weighed 40 pounds, five ounces and measured 50 and one-half inches in length.

According to Paul Magnussen, conservation officer for the DNR, the muskellunge is renowned for their elusive traits, and although Heidebrink has been actively pursuing muskies for four years, he had yet to land one until he caught the record muskie.

"It hit in only five or six feet of water and came within a couple feet of the surface to strike," said Heidebrink. "I knew it was a good one."

The new state record beat the old record set in April. Richard Schmitz of Ankeny, Ia., caught a 39-pound, 13-ounce muskie from Big Creek Lake in Polk County.

CLASSROOM CORNER

by Robert P. Rye

Trees are necessary for making the forests which are homes for wildlife. Their roots help reduce soil erosion. Trees are a wonderful way to reduce your home cooling costs.

Tree species have uses to humans. Match up the products and tree species.

Tree Specie	Product
1. Maple	a. Berries; large shade tree; some used for millwork.
2. Oak	b. Shingles.
3. Cedar	c. Construction lumber; fallen cones serve as food for wildlife.
4. Black cherry	d. Pulp wood, crates; beavers feed on these.
5. Willow	e. Shovel and rake handles; curved furniture parts.
6. Hackberry	f. Syrup and sugar; furniture lumber.
7. Hickory	g. High-quality furniture lumber; fruit eaten by birds.
8. Walnut	h. Tool handles; baseball bats (high resistance to shock); edible nuts.
9. Ash	i. Gun stocks; high-quality furniture lumber of striking grains and color; edible nuts.
10. Pine	j. Acorns; furniture lumber.

ANSWERS:

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

COUNTY CONSERVATION

BIRDS OF A FEATHER: CONSERVATION AND TOURISM

by Gary Speckmann
and Michael Jones

Places still exist in Iowa where, unfortunately, people consider "tourism" and "conservation" to be opposites at worst and wary partners at best. The residents of Jackson County, however, believe that quality tourism and conservation share the same ethic of protection and preservation. To believe otherwise is not only outdated; it is actually harmful to the growth and development of conservation programs.

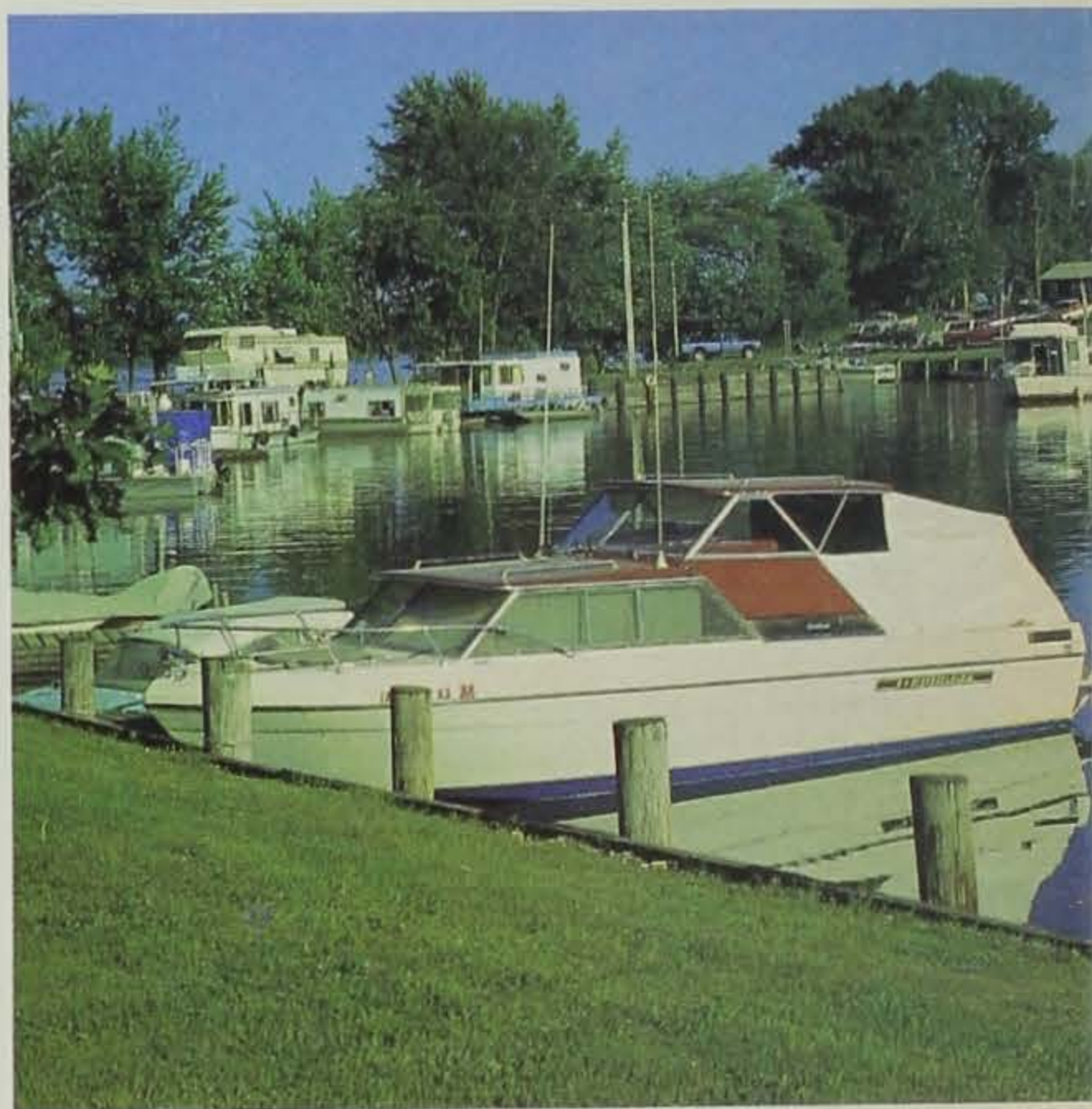
The Jackson County Conservation Board began to promote tourism as part of its program in 1984. Full-time tourism development came to the county in 1987 under the auspices of the Jackson County Economic Development Commission. As one tangible result of these promotional activities, county campground attendance has increased 110 percent since 1984, and campground attendance records are annually broken. More than 75 percent of the campers are out-of-county visitors, and surveys indicate that these tourists contribute \$150,000 annually to the local economy.

But Jackson County soon discovered a tourism and conservation bonus. As out-of-county interest and visitation grew, so did participation, awareness and support by

county residents. Jackson County residents supported a doubling of the conservation budget, and more than 350 acres of natural areas have been purchased in recent years with the support of the general public. Major campground and boat harbor development has occurred, a county naturalist and forester were hired and environmental education programs have grown dramatically. Jackson County has discovered that the relationship between conservation and tourism benefits both programs and that conservation programs which ignore this relationship hurt themselves.

Jackson County's tourism development program is built upon several precepts. For one thing, tourism is based on the simple beauty and elegance of Jackson County's natural and historical resources. The county's slogan, "Jackson County is simply beautiful," reflects this concept. The Jackson County Conservation Board is an active partner in preserving historical, as well as natural, treasures, sharing management with the county historical society at four sites.

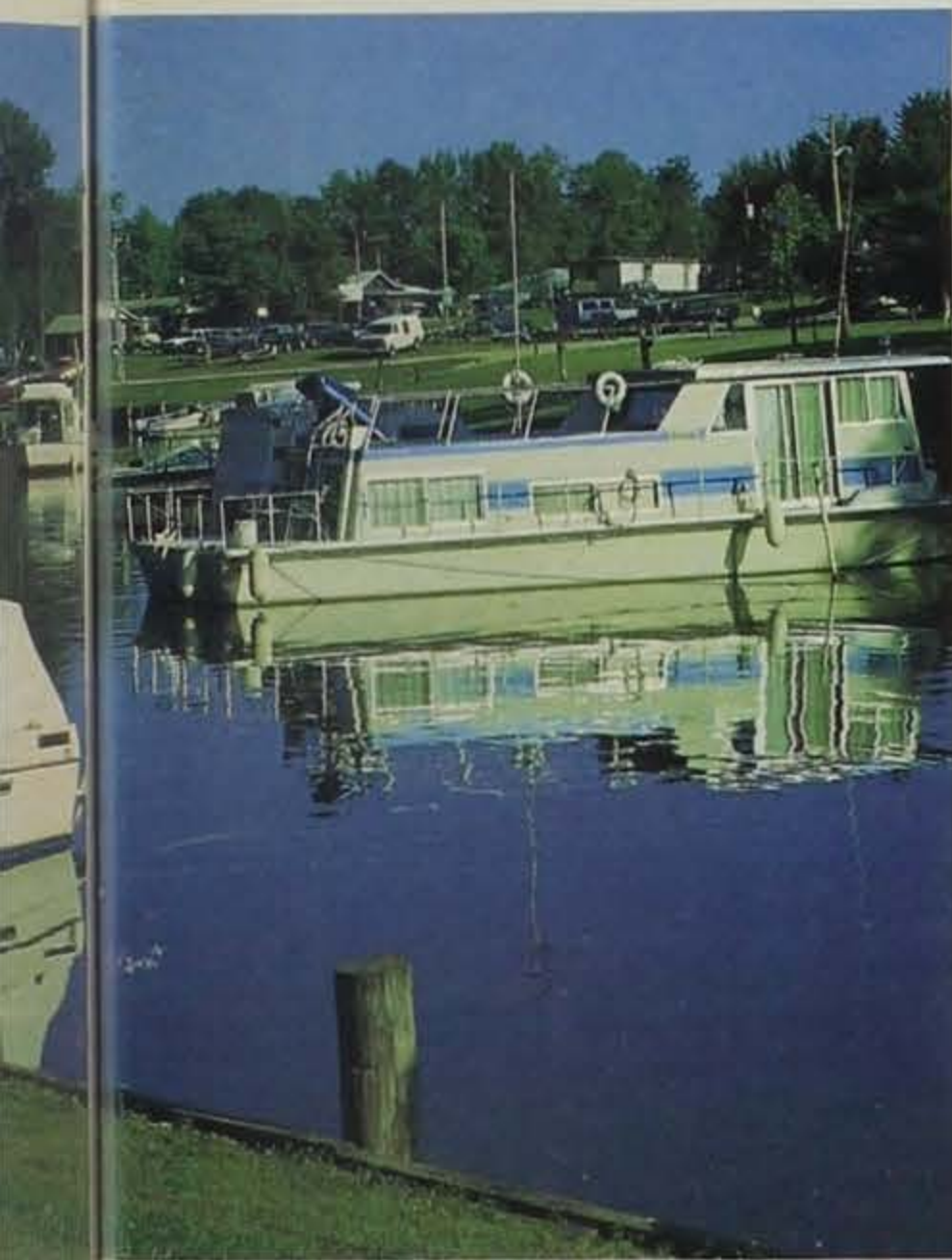
Secondly, Jackson County makes the common-sense assumption that the county's



▲ Spruce Creek Park near Bellevue.

greatest asset is nature and marketing that natural beauty is crucial. That is primarily the province of the Jackson County Economic Development Commission. At present, Jackson County hosts one-half million visitors per year, a number which doesn't strain the county's resource base.

Thirdly, Jackson County believes that tourism is the last and best hope for rural economic development. It is the best way to keep small towns and villages vibrant and its countryside populated. The National Trust for Historical Preservation says this about rural conservation: "Rural conservation is the protection of the countryside and includes the



Jackson County Conservation Board

preservation of buildings and villages of cultural significance, the protection of their surroundings, and the enhancement of their local economies and social institutions. In rural areas, historic resources are inseparable from their setting."

Another aspect of the Jackson County tourism and conservation program recognizes that conservation, as demonstrated by county parks, recreational areas, canoe accesses, fishing, hunting, photography, birding, nature hikes and prairie restorations, is a major lure to out-of-county guests seeking a quality tourism experience. And tourist dollars can be used to protect and develop more local natural resources. "Economics"

Related to this last principle is the fact that when Jackson County does something for tourists, it is really doing something for the county, also. Whenever a park or canoe access is developed or a historic mill or storefront is renovated, those things remain for residents of Jackson County when the tourists leave town. They are a legacy to future generations, and they are certainly conservation in the very best sense of the word.

The "big picture" view of conservation and tourism shows protection and preservation, as well as development, as two sides of the same coin, perhaps not in every case, but certainly as a comprehensive planning ethic and model. Protecting our rural heritage, our natural as well as built environment, will ultimately mean clean water and air, beautiful scenery, historic sites and villages, and productive farmlands.

These things mean economic development and a high quality of living. In Jackson County, residents are working together to make that vision a reality. They urge traditional conservation groups to work together with local, regional and state tourism organizations. Together, we can ensure that Iowa remains, like Jackson County, "simply beautiful."

Gary Speckmann is director of the Jackson County Conservation Board.

Michael Jones is director of the Jackson County Economic Development Commission.



Jackson County Conservation Board

▲ Canton Church, built in 1877 of local limestone, was used as both a church and a school. Today, it is managed by the Jackson County Conservation Board as an historical area.

is a rationale for greater protection, not less. In Jackson County, campground revenues are used to both develop and conserve many other sites and to host environmental awareness programs.

by Eileen Gannon Williams

Mini-Wetlands



Roger A. Hill

In a day when nearly everyone in agriculture is treading water when it comes to the issue of wetlands, some Iowa State University researchers are showing that wetlands are more valuable than ever. Besides their benefits to wildlife and the ecosystem, wetlands may hold one key to unlocking the problem of nitrate pollution of water supplies.

Wetlands naturally remove excess nitrate that can otherwise leach into groundwater by slowing the movement of water and allowing nitrate to be converted to harmless nitrogen gas.

Iowa State University botanists Bill Crumpton and Arnold van der Valk have shown that it takes about one acre of wetland to filter the excess nitrate leaching from 100 acres of corn.

By building mini-wetlands, called mesocosms, these researchers are finding out what happens to nitrate when it enters the murkiness of the wetlands. The researchers are primarily interested in the organic matter in the sediment, which is where nitrate is converted to gas.

They have established 48 mesocosms that are 11 feet in diameter. Each one is a cattail marsh filled with soil from a natural wetland. The site is one of just a few mesocosm research projects in the nation.

Make Waves

The Leopold Center funded the initial 36 mesocosms in the summer of 1989 on an ISU research farm in central Iowa. Wetlands Research, Inc., a not-for-profit organization in Chicago, funded an additional 12 mesocosms to study sediment loads on wetlands.

The researchers are part of a wetlands research group in ISU's Department of Botany. Their next step is to determine how much fertilizer and pesticides flow into wetlands near crop fields. They will then use the same amounts in experimental mesocosms. They hope to involve a hydrologist and an animal ecologist in future experiments to expand the scope of their study.

Because fertilizers and pesticides do not follow the same pathways underground, separate studies on the herbicides atrazine and alachlor are being conducted in microorganisms — even smaller wetlands — in the lab. Once the breakdown rates and pathways of the herbicides are better understood, they will become part of the field studies.

Although it is unrealistic to have a wetland filter water from every field, these findings are shedding new light on the value and restoration of wetlands.

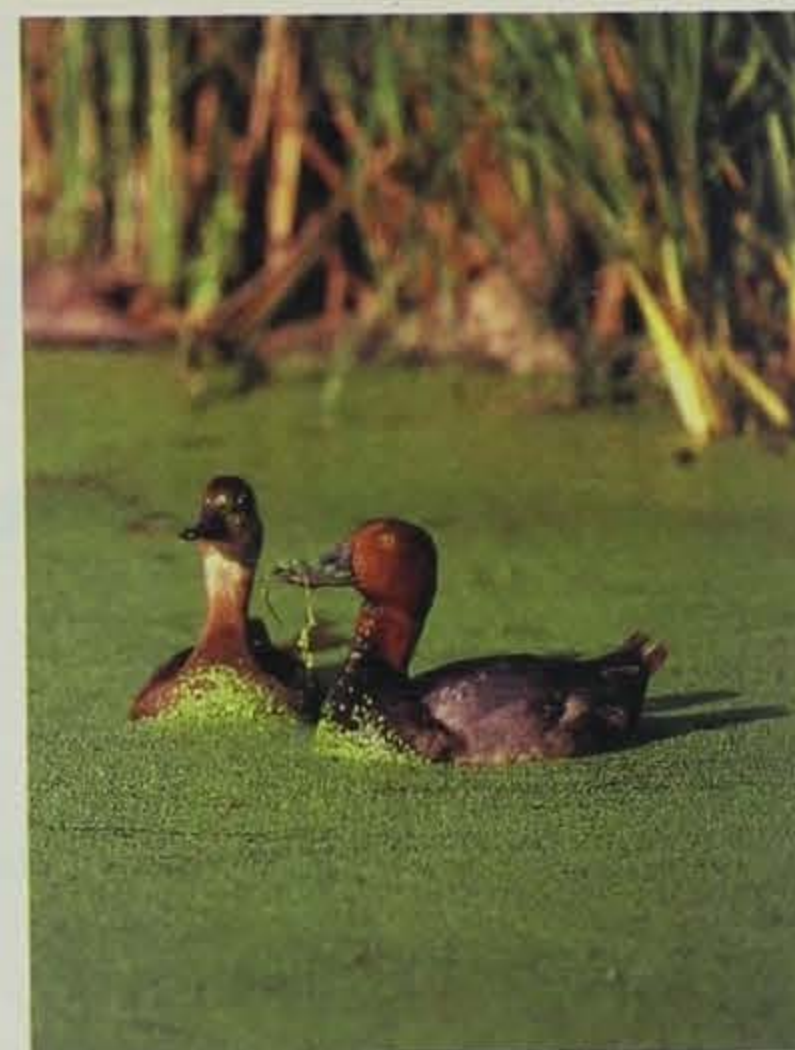
Because the mesocosms allow for experimental manipulation, they have attracted the

attention of the U.S. Environmental Protection Agency and the U.S. Department of Agriculture. Both agencies, as well as several state agencies, are changing the way they study and restore wetlands.

A lot of wetland restoration is in the prairie pothole region, which extends northward from central Iowa through western Minnesota and the eastern Dakotas into southern Canada.

Wetlands in the region generate between 50 and 75 percent of North America's waterfowl. So most restoration projects are designed to improve waterfowl habitat, not to filter water. But the Iowa Department of Natural Resources and the USDA Soil Conservation Service are beginning to restore wetlands in northwest Iowa with water quality in mind. In most cases, the inlet and outlet pipes in restored wetlands are placed close together. This works for waterfowl habitat, but it can short-circuit water quality benefits. For nitrate to be converted to gas, the water needs to stay in the wetlands long enough for the bacteria in the bottom to convert the nitrate. Thus, for water quality purposes, the inlet and outlet pipes need to be moved far apart.

The rate at which nonpoint-source nitrogen flows into surface waters in the Midwest is among the highest in the na-



Lowell Washburn

▲ **Restoration projects are being designed not only to improve waterfowl habitat, but to filter water.**

tion. Agricultural use of fertilizers and pesticides has more than doubled since the mid-1960s, and the impact of these chemicals on water quality is posing serious environmental problems for wetlands and the life they support.

This pollution comes at a time when most native wetlands are gone. In Iowa alone, 99 percent of the native wetlands have been drained. And more than 90 percent of the total land area is used for agriculture.

But all hope is not lost. With the Leopold Center's research, and redesign of wetland restoration projects, wetlands will play an important role in cleaning up the waters in the prairie pothole region.

--Reprinted from Leopold Letter, Vol. 3 No. 2, Summer 1991.

Eileen Gannon Williams edits and designs the Leopold Letter.

PEAKS AND VALLEYS OF FURHARVESTING



Ron Johnson

by Ron Andrews

The state slogan promotes Iowa as "a place to grow" and of course, refers to, among other things, fertile soils — with agricultural products such as corn, beans and livestock doing very well on this rich land. A little-known business in this state is the fur industry. During the past quarter century Iowa has ranked among the top 10 states in the nation in fur production — that is fur production measured by animals taken per square mile. And it's not bad for a state with less than two percent of its land in public ownership and where intensive agriculture has so drastically altered the landscape.

The quality of Iowa's fur also ranks at or near the top, especially when it comes to raccoons and northern Iowa red foxes. The very thing that makes Iowa a good place to grow — its fertile soil — is the same thing that makes for good quality pelts. Rich soils produce ample food for the furbearing animals and the end result is good thick luxurious quality fur in most species. Fur buyers in Canada often search large lots of fur looking to buy Iowa raccoon hides.

Interestingly enough it is not the U.S. or Canadian fur industry that determines the value of Iowa pelts. The European fur industry determines what is in fashion and promotes those furs that men and women like to wear.

Historians tell us the fur trade was responsible for the early settlement of this country. Traders survived cold harsh winters because the fur they caught kept them warm. The fur also was as good as cash when it came to trading for food or other items needed for sur-

vival. Actually, in many cases, early pioneers were able to eke out a living only because of the fur trade.

However, it has actually been the past two decades that were truly the heyday of the fur industry, especially if we look at total fur value. During the 1979-80 season, a record \$15.5 million worth of fur was purchased from Iowa fur hunters and trappers. The "long hairs" — raccoons and red fox, were in the biggest demand. However, the short-haired muskrat also brought record fur values. In the late 1970s and early 1980s, raccoon hides averaged between \$27 and \$32 with a few large heavily furred raccoons bringing more than \$50 each. Red foxes averaged \$42 to \$65 with a few quality "reds" bringing \$100 a piece. Muskrats brought between \$4 and \$6 with a few cashing in around \$8.

Fur animals were pursued with intensity during this era and a few folks began to believe some species might even be overharvested. Ironically those species in greatest demand are those that thrive with resiliency during periods of high harvest. Both raccoon and red fox populations were healthier because of their high harvest. The survivors generally produce more young per litter and the incidence of mange in foxes, distemper in raccoons and other furbearer diseases is practically nil.

The late 1980s has brought a return of the doldrums in the fur industry. Low demand for fur, reduced furharvester pressure and pelt value has seen the fur market plummet from the early 1980s level. In 1989-90 a little more than \$1.2 million

worth of fur was purchased — a drop of 92 percent. The number of furharvesters has also sunk to near-record lows. Increasing numbers of raccoons and foxes have brought about more reports of distemper. And with increasing numbers of foxes come more sightings of nearly naked foxes dying slow agonizing deaths from mange. High populations lead to death, disease and starvation, and the more the animals are harvested, the healthier the survivors become.

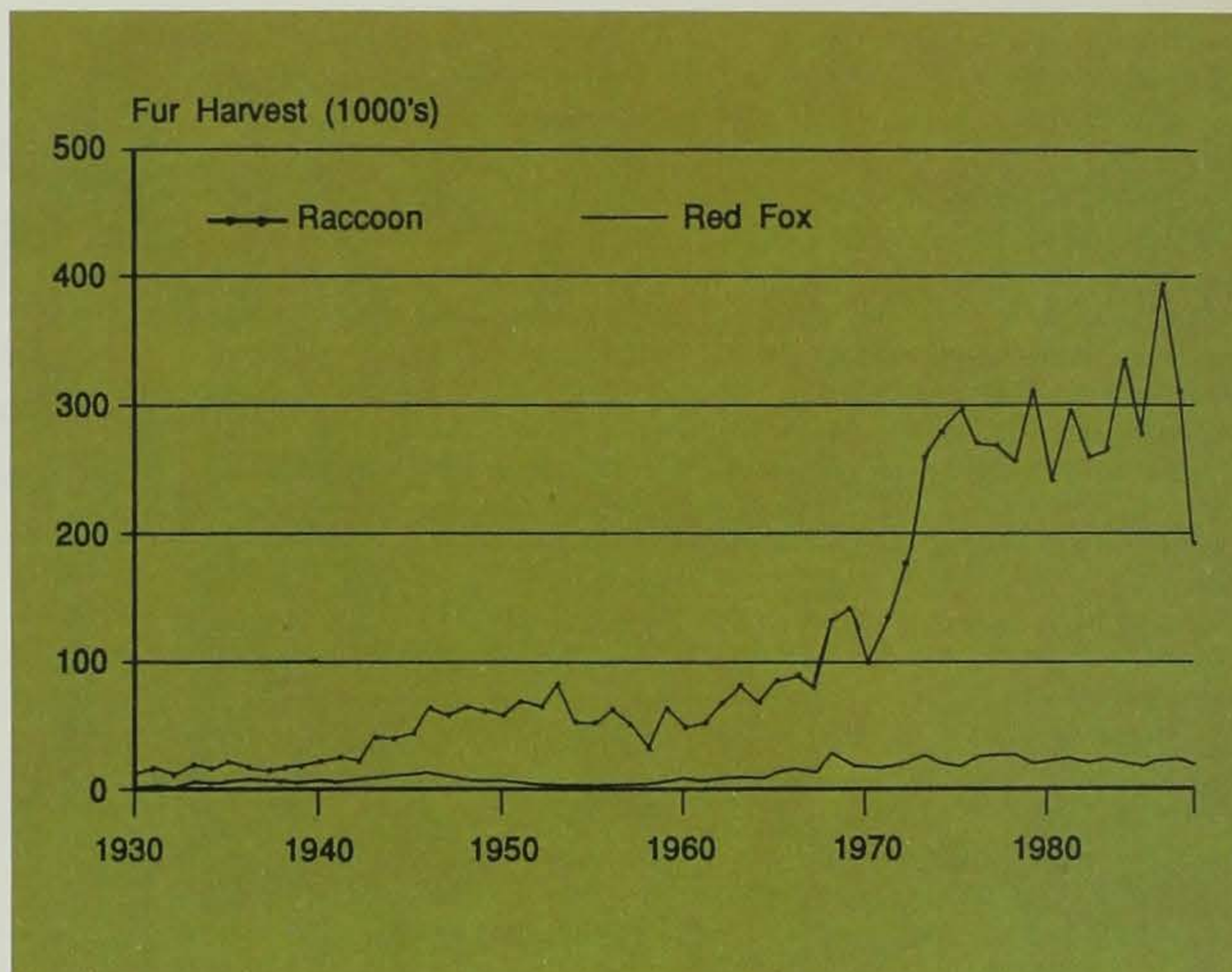
Coupled with this current lull in the fur market is the animal rights movement — people trying to outlaw the hunting and trapping of furbearers and the killing of all animals. Many animal rightists believe animals are equal to hu-

**The very thing
that makes Iowa
a good place to grow
— its fertile soil —
is the same thing
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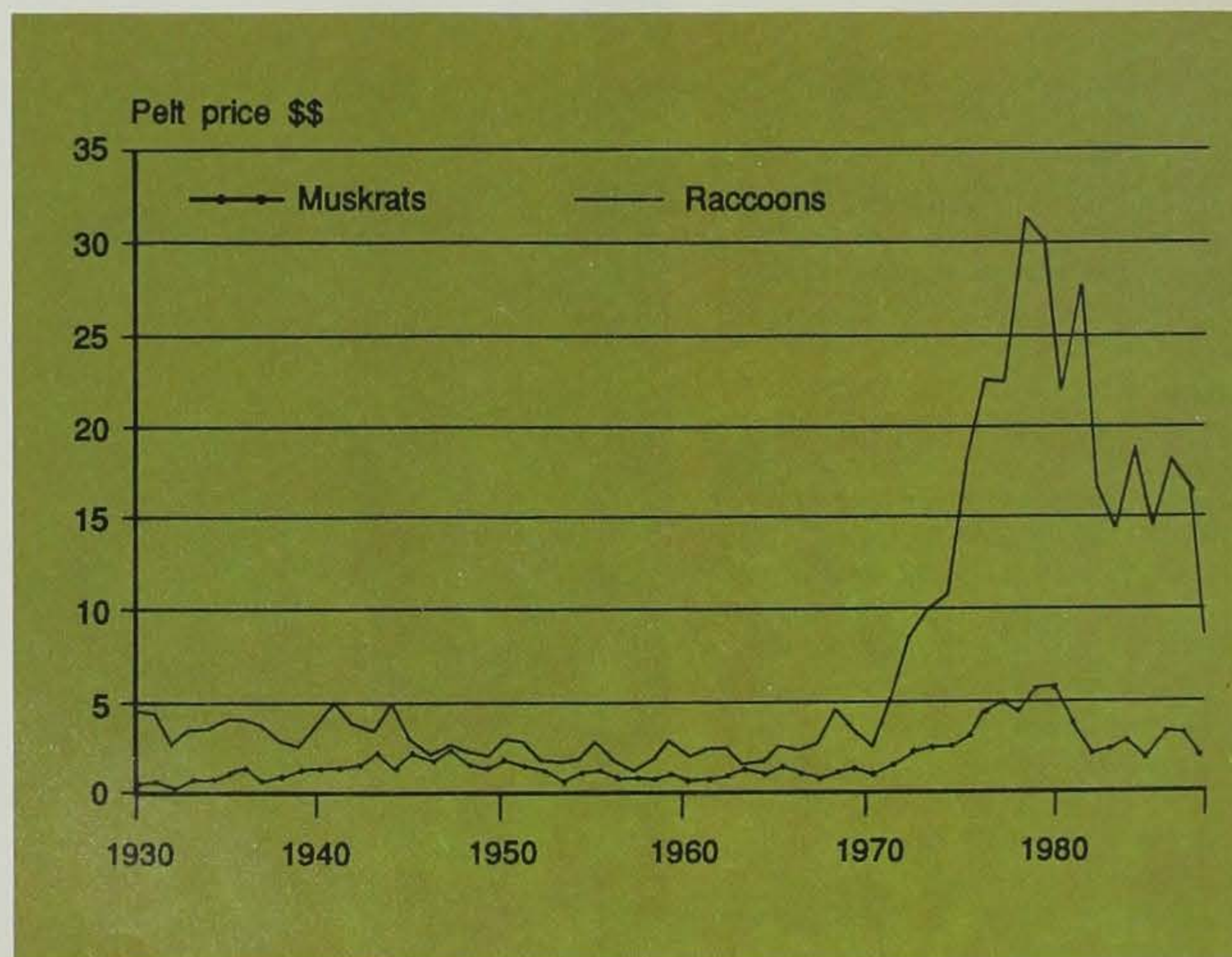


Roger Hill

Iowa raccoon and fox
harvest, 1930 to present.



Pelt price fluctuations of
muskrats and raccoons.



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Jim Zohrer

**Ironically
those species
in greatest demand
are those that thrive
with resiliency
during periods
of high harvest.
Both raccoon and
red fox populations
were healthier
because of their
high harvest.**

mans and should be treated as such. And many people believe this movement will keep the fur market suppressed for years. There is belief the market will never again cycle upward and, in fact, animal right's activists may be the death knell of the fur industry.

Even though the animal rights movement is changing the way some people think, fur is a renewable resource and some are optimistic enough to believe the market will again respond upwards. Certain fur will again be in fashion. History will repeat itself and once again the

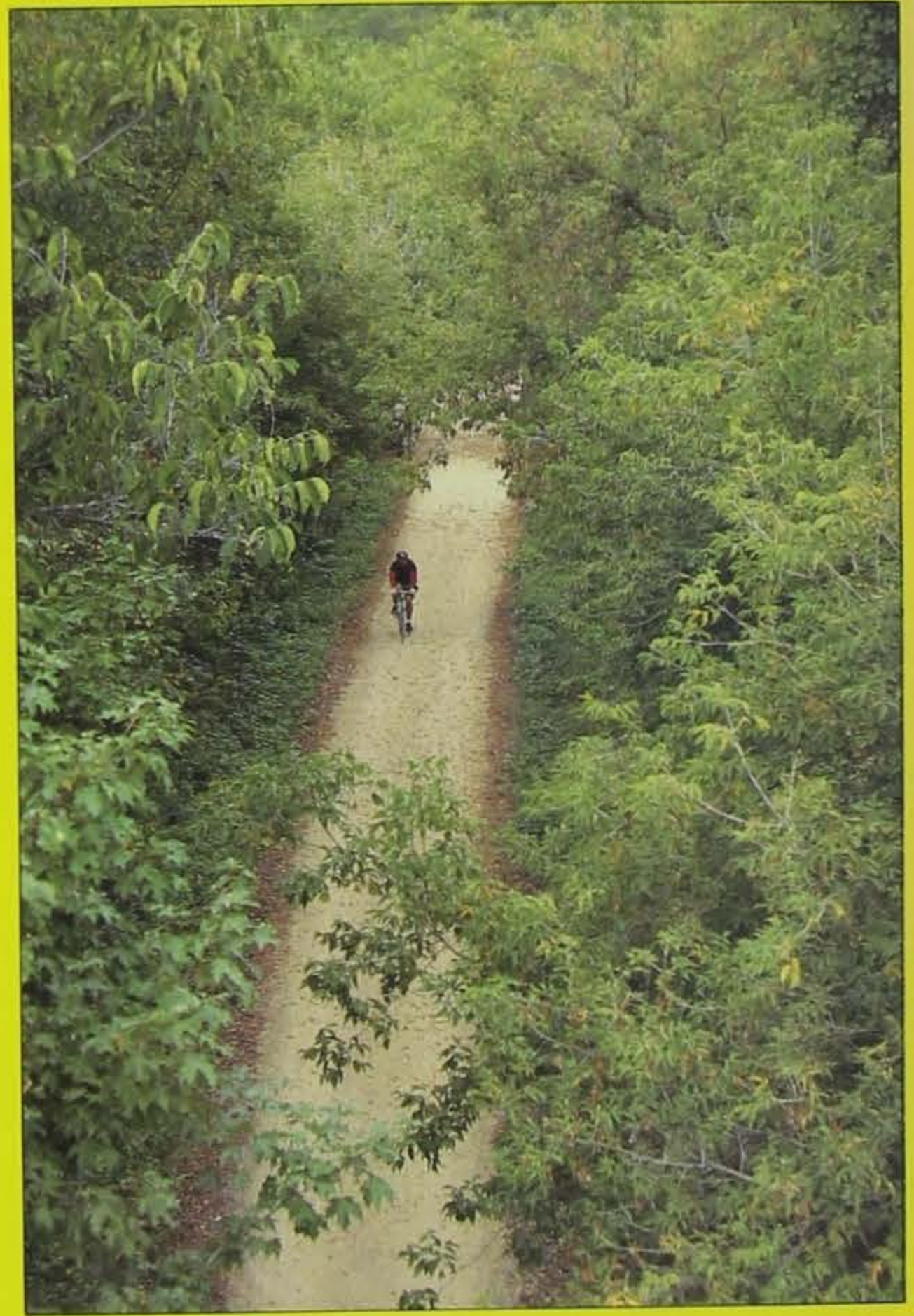
market will spiral up to another peak before falling. Laws of economics tell us this is true with anything that has monetary value. The old economic adage of the law of supply and demand will dictate that cycle.

Furharvesters should be encouraged to continue to pursue their quarry in both the good and lean years. Think about the priceless value of the recreation associated with the challenge and pursuit of various furbearers. One cannot put a price tag on the experiences associated with nature.

In spite of human influ-

ence on the environment and habitat, Iowa will probably continue to be among the top ten producers of fur both in pelt quality and furbearers per square mile. The peaks and the valleys have historically been and should always be the mainstay of the little-publicized Iowa industry. Iowa will likely continue to be "a place to grow" — for furbearers — in both quantity and quality.

Ron Andrews is the furbearer research biologist for the department in Clear Lake.



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