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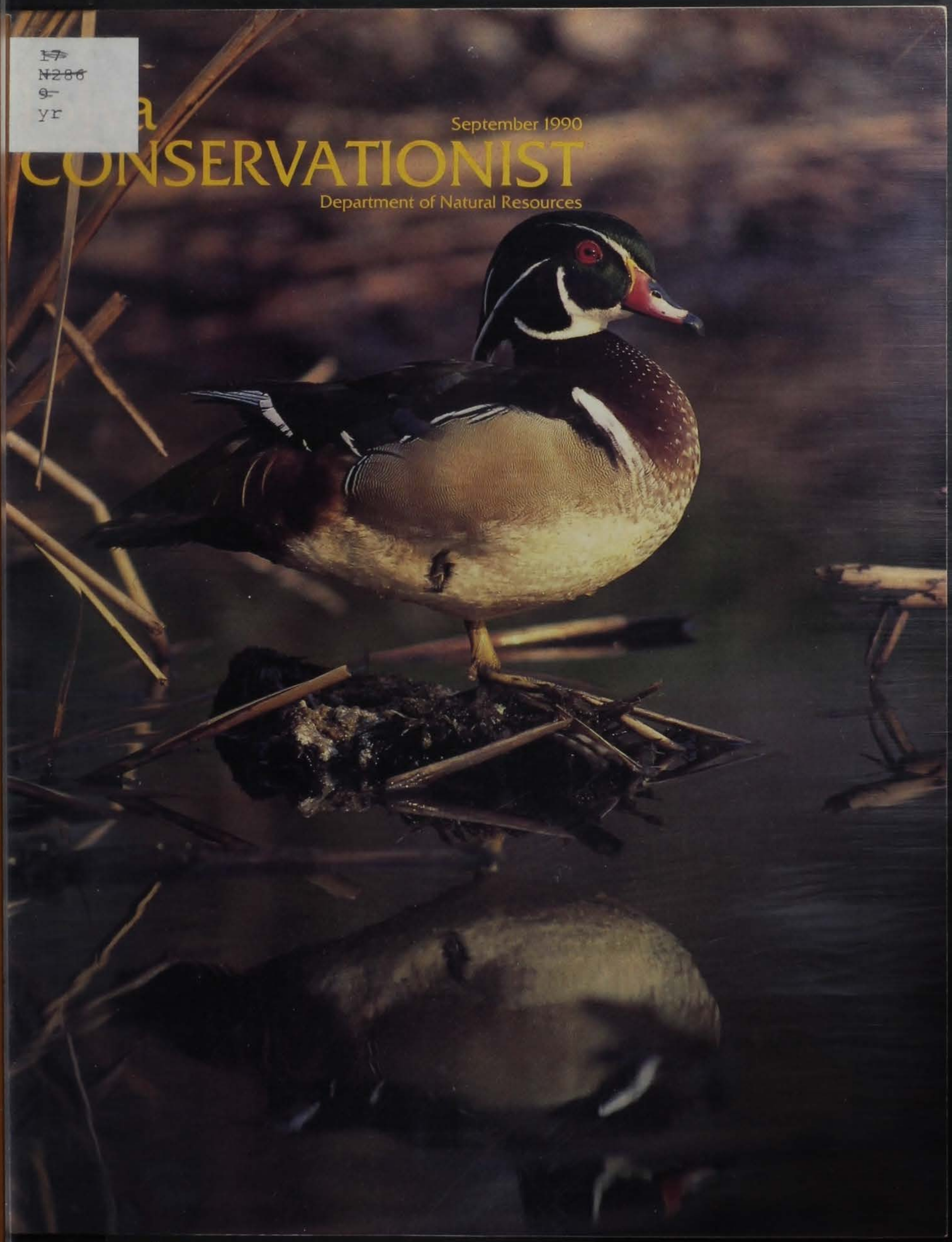
September 1990

Department of Natural Resources



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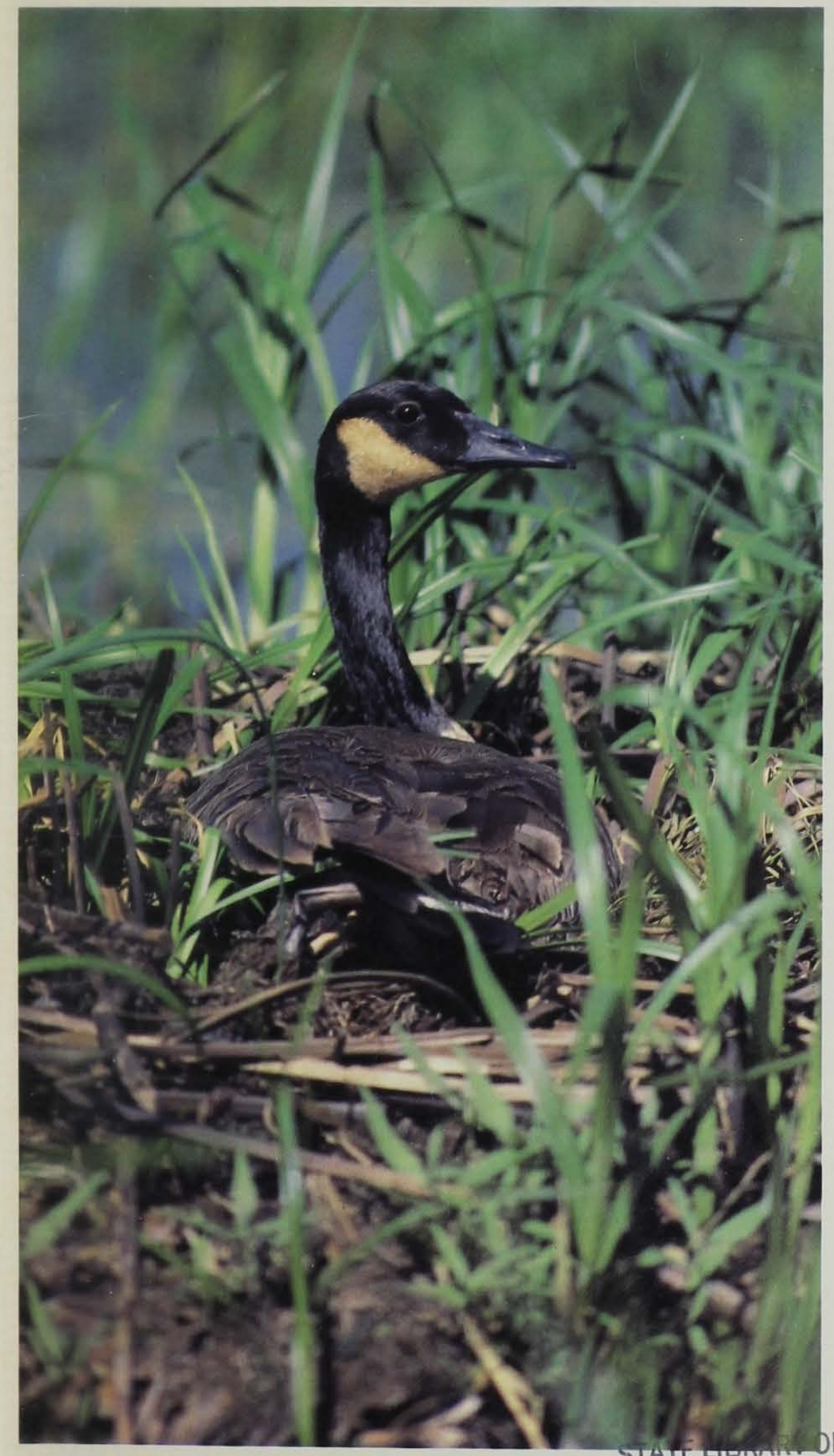

Wetlands For Waste Treatment

In Central Iowa, the progressive community of Granger is giving new meaning to the word marsh.

About a mile south of the central Iowa community of Granger, you will find a small cattail marsh. Like all other Iowa marshes, it is a busy place. Look closely and you may see a mallard family paddling single file across a duckweed-carpeted opening while nearby a brilliantly hued yellow-headed blackbird noisily proclaims its territory from atop a swaying stalk of vegetation. From behind a curtain of bulrush a marsh wren is heard but not seen, and a popping splash alerts us the resident muskrat population is hard at work. In other words, it would be tempting to describe this marsh as pleasantly typical.

But first impressions can be deceiving and in actuality, the Granger Marsh is anything but typical. In reality, it is a vital working component of the local sewage treatment plant.

The artificial, two-cell wetland has been quietly and effectively performing tertiary (final) treatment of the community's municipal sewage for the past four years, says

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Article and photos by Lowell Washburn

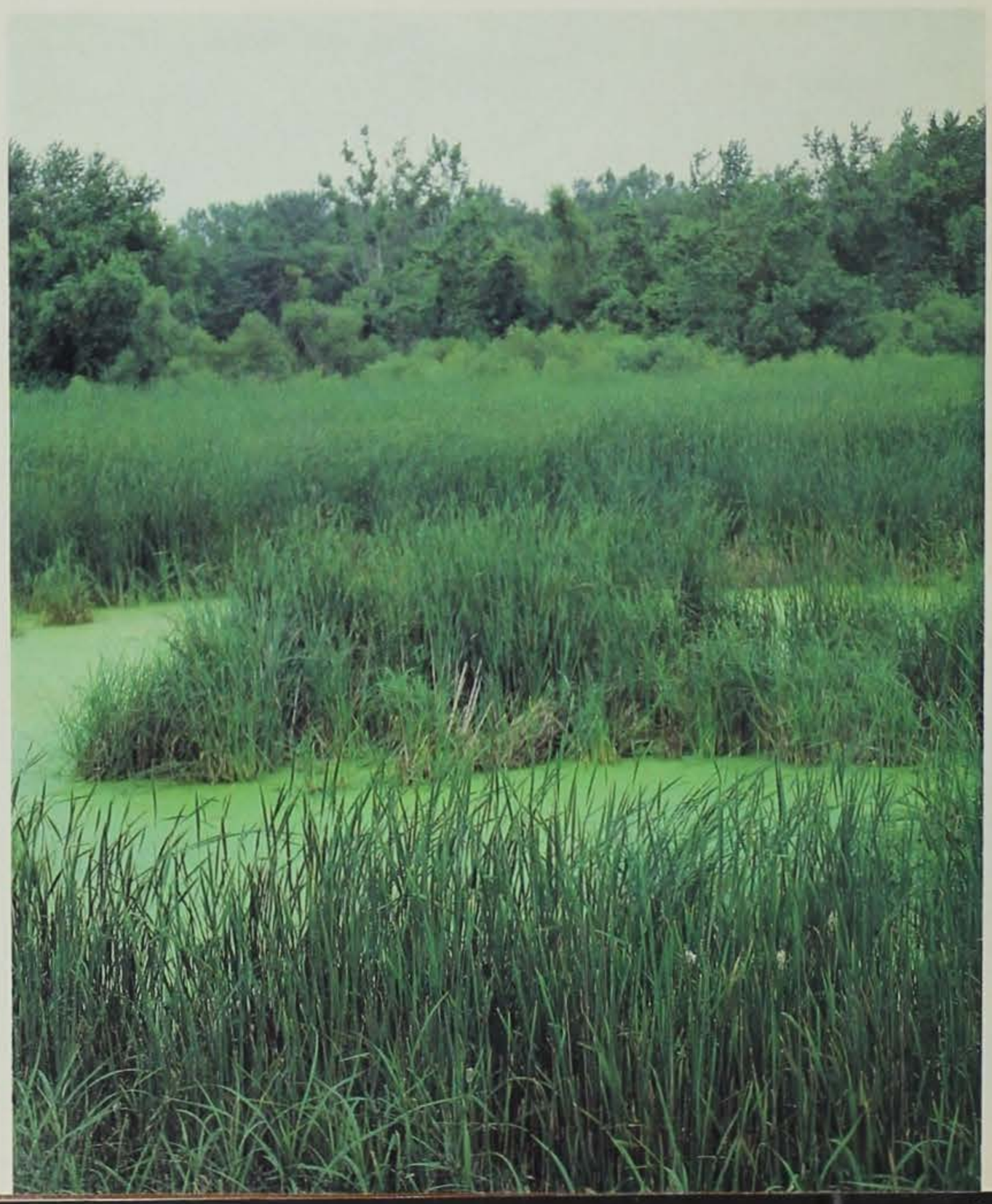
project designer Bob Veenstra, Jr., of the West Des Moines-based Veenstra and Kimm Incorporated. Veenstra noted each wetland cell measures 3.2 acres in size. The cells are not sealed and water is contained by using dikes. Both wetlands were stocked with native marsh vegetation. A total of 2,800 cattails and 11,150 bulrush (three-square) were planted. The cells can service the needs of approximately 900 people. (The current population of Granger is 700 people.)

According to Veenstra, the treatment operation occurs as a two-stage process. Sewage is initially moved through two aerated lagoons, the type of which are very typical of most midwestern treatment facilities. But this is where any similarity to "typical" treatment facilities ends. During phase two, the partially treated sewage is dumped into the marsh. And in a process not fully understood by science, marsh vegetation effectively turns bad water into good water.

"When we designed the wetland cells, we focused on the primary consideration — to remove ammonia nitrogen," said Veenstra. How the marsh has responded to this objective has been amazing and then some.

A full 95 percent of the ammonia is disappearing. Current ammonia standards established by the EPA have a numerical value of six. At Granger wetlands, ammonia levels are "undetectable" during the summer, says Veenstra. The highest average winter value have been counts of 5.

Under the cleansing influence of the small wetlands the biological



Mike Grief, city engineer for Granger, checks the outflow level from the marsh (top). The effluent of the Granger sewage plant (above) discharges into Beaver Creek -- a typical Iowa stream. At times the effluent is noticeably cleaner than the water in the creek itself.

oxygen demand (BOD) has averaged a mere six parts per million (ppm). The current EPA standard allows 25 ppm.

Veenstra also noted, as an added bonus, the wetland cells have served as effective agents for the removal of fecal coliforms. Under traditional, lagoon-type treatments, wastewater needs to be chemically disinfected at the point of discharge. The customary treatment is to add chlorine.

"But with the wetlands we're getting a natural disinfectant effect from the aquatic plants," said Veenstra. "We totally eliminate the need for chlorine treatment and do not need to add chemicals that may be 'carcinogenic' in nature," he added.

In Iowa, the maximum number of suspended solids allowed for a treatment plant at the point of discharge is 120 ppm. In spite of the fact that organic solids will occur naturally in any cattail marsh, the Granger wetland system has a total average of 30 ppm during the summer months, and just five to eight ppm during the winter.

"People tend to worry a lot about biological systems being able to function during the winter months," says R. Ted Payseur, senior manager for Veenstra and Kimm Incorporated. "So far, that hasn't been a problem," he said. Payseur speculated that allowing the marsh to maintain a greater water volume might even step up

Miracle of the Marsh

There's an old and popular saying that states "garbage in - garbage out." The phrase is currently very much in vogue with my computer wiz friends. Overall, I must admit that I'm a subscriber to that philosophy and find it applies to many aspects of life.

However, I have found an exception to the rule. In central Iowa, it's "garbage in," but "clean water out" as the community of Granger uses wetlands to treat municipal sewage (See, *Wetlands for Waste Treatment*).

Emergent marsh vegetation provides the catalyst for this amazing process. Although this new technology is still in its infancy, outdoor types such as duck hunters and trappers have long realized the importance of cattails and bulrush to the wetland community. Simply put, marshes with healthy stands of vegetation are good places to hunt and trap, while areas that resemble bald, open ponds are not.

In essence, cattails and bulrush are the base of marsh economy. Muskrats use the plants to construct winter lodges. With the arrival of spring, geese see "rat" houses as nesting platforms. Yellow-headed blackbirds hang their nests in the rushes and hunters hide their boats there. Take away the vegetation and you will find few, or none, of the above-mentioned life forms.

People are currently putting the wetland system to work in new ways. In Iowa, the use has been the tertiary, or final stage, treatment of sewage. But in Mississippi, NASA's National Space Technology Laboratory has found broader applications.

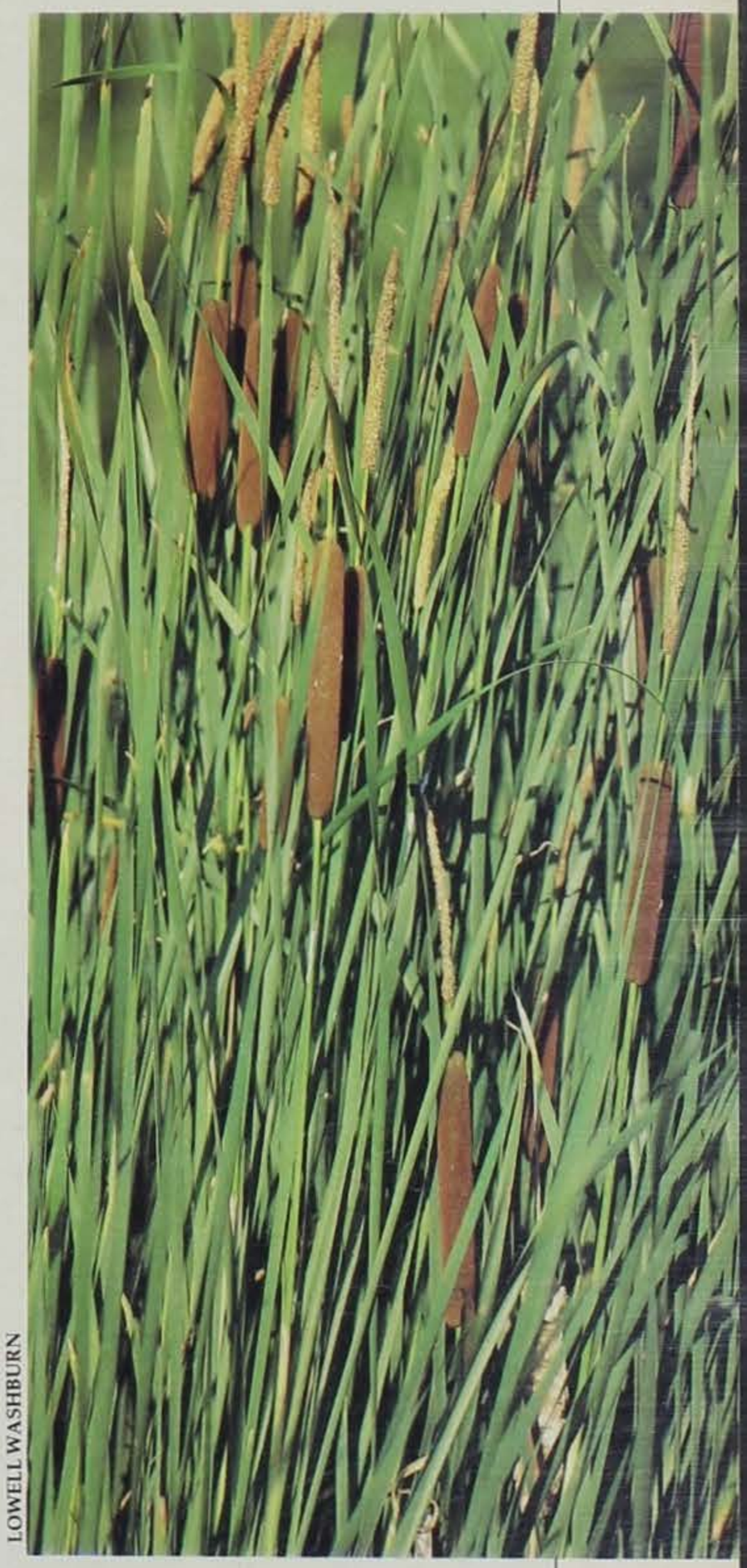
The laboratory employs more than 5,000 people and all waste (human and industrial) is treated by means of eight artificial wetlands, the largest of which is seven acres.

During the past 11 years, the project has saved several million dollars by using wetlands as opposed to conventional treatment procedures. In addition to removing such things as nitrogen and phosphorus, the NASA marshes are also being used to effectively remove heavy industrial wastes including benzene, toluene, p-xylene and biphenyl. These toxins are being removed from waste water at a value of 81 to 99 percent.

According to B. C. Wolverton, head of NASA's Environmental Research Lab, a marsh of 17 to 20 acres can effectively treat up to one million gallons of sewage lagoon effluent per day.

"Too often facilities proposed by engineering firms are overly sophisticated, costly and energy intense," said Wolverton.

Cattails and water. Certainly the most elemental of combinations. Yet, as wetland proponent, Bob Veenstra, Jr., points out, it is a system that "easily out-performs the best of human technology."



LOWELL WASHBURN

by Lowell Washburn

efficiency. With an average water depth of only nine inches, the wetland cells have never "froze up."

Payseur's belief that natural system wetlands can be used year-round seems to be supported by the fact the city of Humboldt, Saskatchewan, uses two artificial wetland cells for the tertiary treatment of its municipal sewage. The Humboldt facility, also stocked with cattail and bulrush, averages an 88 percent removal of nitrogen. Tests also revealed the wetland cells had "significantly less smell and significantly less mosquitoes than normal lagoons." Also, at the point of discharge, about 61 percent of measured coliform counts conformed to standards for potable water.

But perhaps the most interesting aspect of the Humboldt experiment was the comparison of costs between treating sewage with traditional methods versus wetlands. The cost of treating sewage in artificial wetland cells was four cents per cubic meter. The cost for tertiary treatment in the "traditional sewage plant" of a nearby community was 34 cents per cubic meter.

In early 1990, the Iowa Environmental Protection Commission approved new and tougher standards that will ultimately impact the sewage treatment facilities of approximately 200 Iowa communities. And it is very possible that many municipalities will be unable to meet the new ammonia and nitrogen standards with existing plants.

"I believe in our lifetime environmental agencies will likely set a zero discharge standard, " said Payseur. Many systems will need to comply over the next several years. "We need to be preparing for the future, and wetlands for some communities may be the only affordable, cost-effective solution," he added.

Both Veenstra and Payseur point out that using wetlands to treat sewage is not practical in all cases. For very large communities, wetland size would have to be much greater, and cities may be unable to find suitable acreage.

However, both enthusiastically agree that wetlands treatment in Iowa has virtually unlimited potential. They say in addition to serving municipalities, tertiary marsh treatment could be used to purify industrial waste and sewage from state and county parks, campgrounds and mobile home parks. "What we need to keep in mind is that this is a totally natural process. All we do is povide the container (dikes), and the wetland just silently chugs along doing its job," said Payseur.

The marsh's attraction to wildlife is another added and obvious benefit. "We're up to our eyeballs in muskrats and mallards here," says Payseur. "It's waterfowl habitat and sewage treatment rolled into one. I mean, what could possibly be better?"

The effluent of the Granger sewage treatment plant discharges into Beaver Creek, which is a very typical central Iowa stream. When I visited the facility in July, the water discharging from the wetland cell was noticeably cleaner than the water in Beaver Creek.

"What we're seeing is a natural marsh system that is easily outperforming the technology of traditional treatment methods," said Veenstra. "We find that to be extremely exciting."

The attraction of wildlife is another added benefit of the marsh. "We are up to our eyeballs in muskrats and mallards here," says R. Ted Payseur, senior manager for Veenstra and Kimm Incorporated.

LOWELL WASHBURN

LOWELL WASHBURN

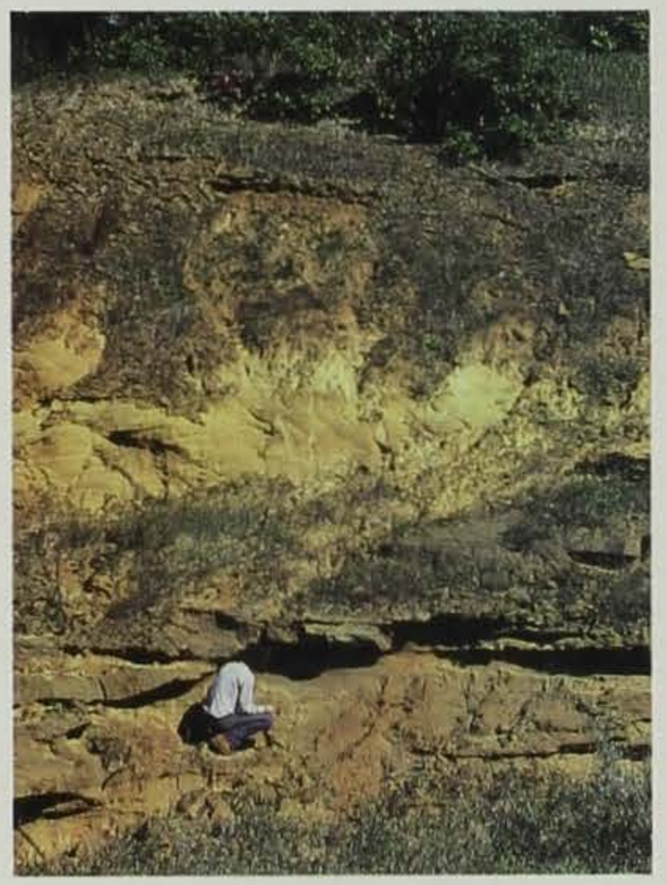
State Parks:

Crossroads with the Geologic Past

Visitors to Iowa's state parks follow road signs and trail markers to guide them through a variety of picturesque settings, perhaps little realizing that each park is also a crossroads with a geologic past of immense duration and variety that previously occupied the same space. That past is packaged in the depths of the Earth, with the latest events in the geologic record still seen in the shapes of the landscape and in the types of materials exposed at the land surface.

In some of Iowa's state parks, these landscapes and materials reflect the passage of glaciers, the accumulation of wind-blown deposit, or the sculpture of flowing water. For example, state parks in the lakes region of north-central Iowa contain abundant wetland habitats often surrounded by irregular, knobby hills composed of the stony debris left behind by melting glacial ice. Parks along Iowa's western border are nestled in steeply pitched hills carved from wind-deposited silt, the product of fine-grained glacial outwash blown from the Missouri Valley below. Still other parks are located on flat-floored valleys, landscape corridors excavated by flowing rivers and underlain by their water-sorted deposits. South-central Iowa parks are set in billows of well-drained hills and often contain artificial lakes that store water in the network of drainageways that have dissected and reshaped these old glacial plains.

Those state parks, however, where bedrock is exposed reach much farther back in geologic time and bring visitors into direct contact with the remains of those ancient bodies of tropical sea water described in the previous article. Though Iowa's land surface may appear topographically modest, a result of its glacial past, the rocks beneath these gentle contours are not. They are warped, tilted, fractured and eroded with an overall incline downward to the southwest, toward basin centers in Kansas and Oklahoma. What this particular structural framework does for park visitors across Iowa is to reveal not just the remains of the last marine environment to submerge Iowa, but to display a whole sequence of ancient environments that span geologic time from about 90 million years to 500 million years ago — an impressive interval of earth history.



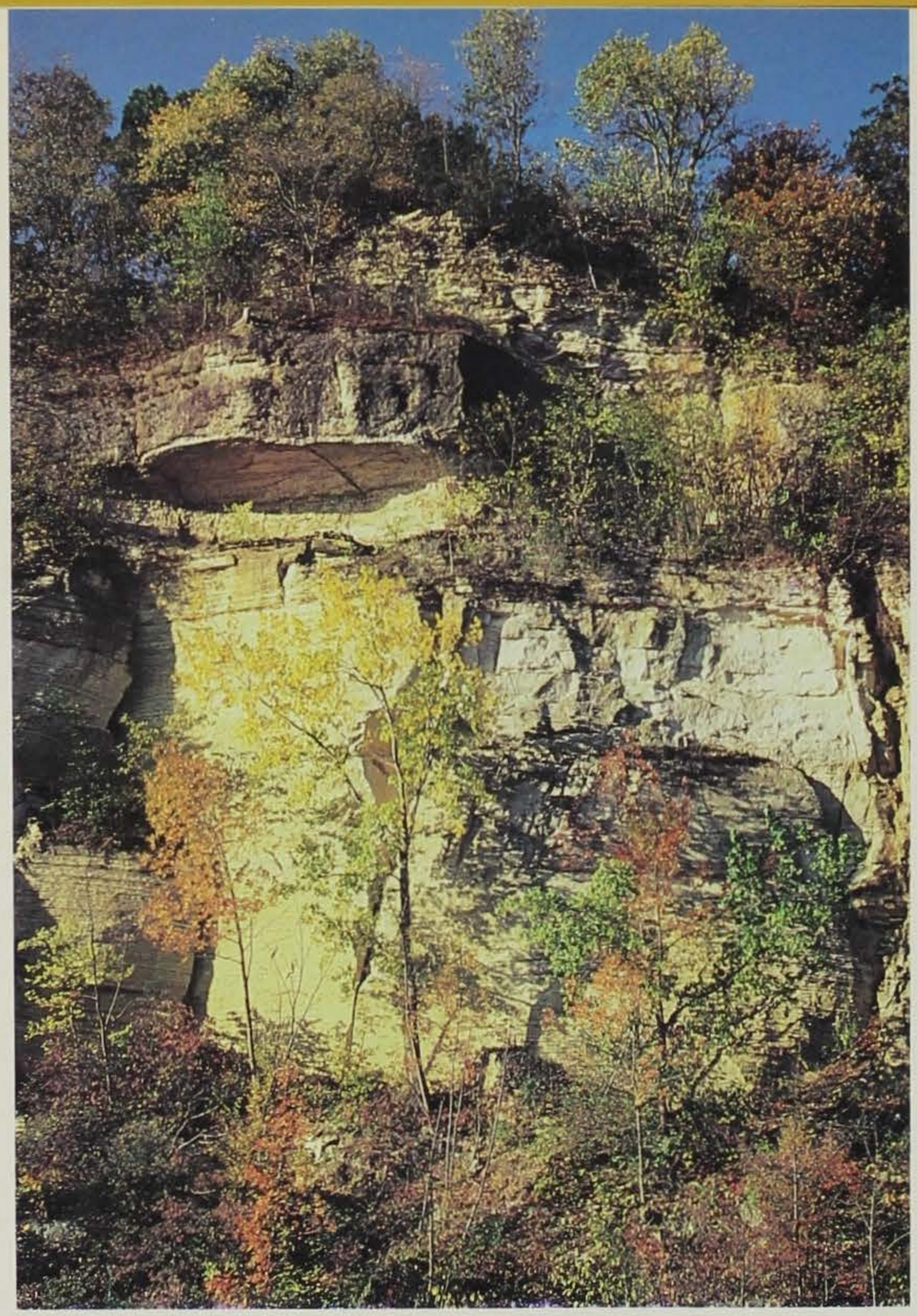
Iron-stained, Cretaceous sandstones near Springbrook State Park in Guthrie County exhibit patterns characteristic of river deposits.

The influence of bedrock, whatever its age, on state park is always eyecatching. In many such parks across Iowa, the surrounding landscape starts out in low-relief uplands, dominated by rounded shapes contoured from easily eroded glacial-age clays, silts and sands. Continuing further into the park, the terrain drops quickly into wooded valleys whose rivers have carved deeply enough to expose the bedrock beneath. These strata, especially the more resistant limestone, dolomite and sandstone, change the whole visual and ecological setting to one of abrupt slopes, rocky bluffs and ledges, and cooler and more moist habitats.

Beginning in western Iowa and traveling east and north, visitors to state parks see sedimentary bedrock formations of increasingly older age. It is that structural dipping of the sequence of strata to the southwest, combined with extensive periods of subsequent erosion that beveled the surface of these inclined layers, that continues to keep older and older rock units within reach of the land surface. The banded appearance seen on the state's bedrock geology map reflects the pattern caused as each deeper, and older, stratigraphic unit extends farther northeast beyond the one above it.

The uppermost bedrock exposed in Stone State Park in Woodbury County contains clam-rich, thin-bedded, chalky limestones of the Cretaceous-age

Article by Jean C. Prior Photos by Greg Ludvigson



Dolomite bluffs at Bellevue State Park in Jackson County contain lime deposited in warm, clear, Silurian seas.

Greenhorn Formation. These 90-million-year-old marine deposits were left by the eastward migration of a major inland seaway that extended back to a mountain range in the western states. In Guthrie County, older portions of this Cretaceous record are exposed in the Springbrook State Park vicinity. Colorful, reddish-brown sandstones seen here were deposited in stream channels that drained southwesterly toward the advancing Cretaceous coastline. These deposits, about 100 million years old, belong to the Dakota Formation and show interesting cross-stratifications of sand and gravel, occasional plant fossils, and perhaps, someday, Iowa's first convincing dinosaur remains.

Continuing to the east, Dolliver State Park in Webster County and Ledges State Park in Boone County display still older, 300-million-year-old rocks of Pennsylvanian age. The geologic record of this time interval is characterized by cycles of marine and terrestrial environments that left behind alternating deposits of limestones and dark shales, with interbedded coals and sandstones. The thick sandstones in these two particular parks represent river-channel deposits that were building in a southwesterly direction across a coastal delta. These environments where the river met the sea were unstable and frequently shifted position as continental glaciation in the southern hemisphere caused repeated world-wide fluctuations in sea level. Pammel State Park in Madison County contains a better look at the alternating limestone and shale deposits that reflect some of these global changes in water depth.

The entire sequence of Pennsylvanian rocks in Iowa has been eroded back to the southwest, many miles from where they once were present. Erosional outliers, or isolated remnants of these rocks, still occur at scattered locations well to the east of the main deposits. The prominent sandstone bluffs in Pine Lake State Park in Hardin County and Wildcat Den State Park in Muscatine County mark two of these notable Pennsylvanian outlier locations.

At Lacey-Keosauqua State Park in Van Buren County and Geode State Park in Henry County, the Des Moines River and the Skunk River have eroded their respective valleys deep enough to expose this region's Mississippian-age strata. These rocks, about 350 million years old, are dominated by fossiliferious carbonate deposits formed on shallow marine shelves in sea water rich with lime-secreting organisms such as crinoids. Increased quantities of mud washed into these seas at times and are marked today by deposits of shale, some of which contain the highly prized, crystal-lines geodes, Iowa's state rock.

Limestone in the vicinity of Lake Macbride State Park in Johnson County belongs to the 385-million-year-old Cedar Valley Formation. This Devonian-age carbonate represents still older, warm, shallow seas and tidal shoreline environments that contained abundant fish, brachiopods and corals.

Moving northeast, Palisades-Kepler State Park in Linn County, Maquoketa Caves State Park in Jackson County and Backbone State

Massive outcrops of weathered Silurian dolomite contribute to the rugged beauty of Maquoketa Caves State Park in Jackson County.

Park in Delaware County show the increasing effects of bedrock on the scenery within state parks. These frequently visited parks are formed from resistant Silurian-age dolomites approximately 420 million years old. The massive dolomites seen in each of these parks exhibit abundant fossil colonial corals and reef structures, which indicate warm, clear water and uniformly shallow sea bottoms.

At Bellevue State Park in Jackson County the exposed bluffs include durable Silurian dolomites in the upper vertical cliffs and older, less-resistant Ordovician-age shale at the base of the slope. Ordovician strata completely dominate the landscape at Pikes Peak State Park in Clayton County. Here, 450-million-year-old sandstones, shales and dolomites reflect the deposition of sand, mud, volcanic ash and lime in offshore marine shelf environments that gradually deepened over time.

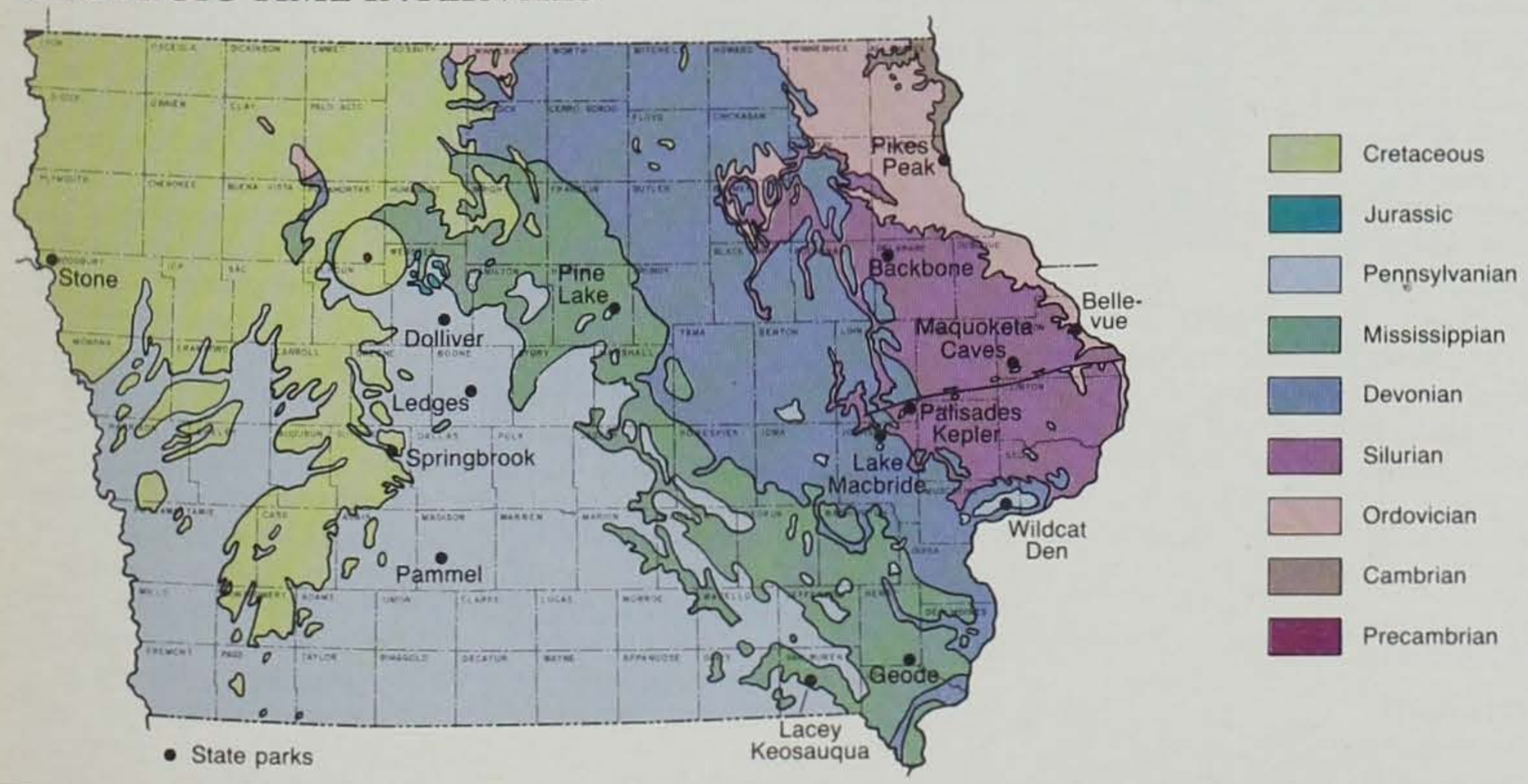
The oldest rocks exposed in any state park also occur at Pikes Peak, just at river level, near the base of the massive bluff that overlooks the Mississippi Valley. These 500-million-year-old rocks belong to the Jordan Sandstone, a formation of well-rounded quartz grains with sweeping acres of cross-stratification showing the direction of shallow marine currents. Exposures of these and older Cambrian strata continue northward into Allamakee County.

Many visitors take in Iowa's state parks on a weekend afternoon for a spring picnic, some summer shade, or a look at the fall colors. These areas offer additional attractions, for each park is also a place that records in its rocky scenery the events from a distant geologic past. Each park visited is a crossroads in time, a place to pause and consider what other environments and events have occupied that space and how they have influenced what is seen there today.

Reprint from Iowa Geology 1989, *Number 14*.

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

GEOLOGIC TIME INTERVALS

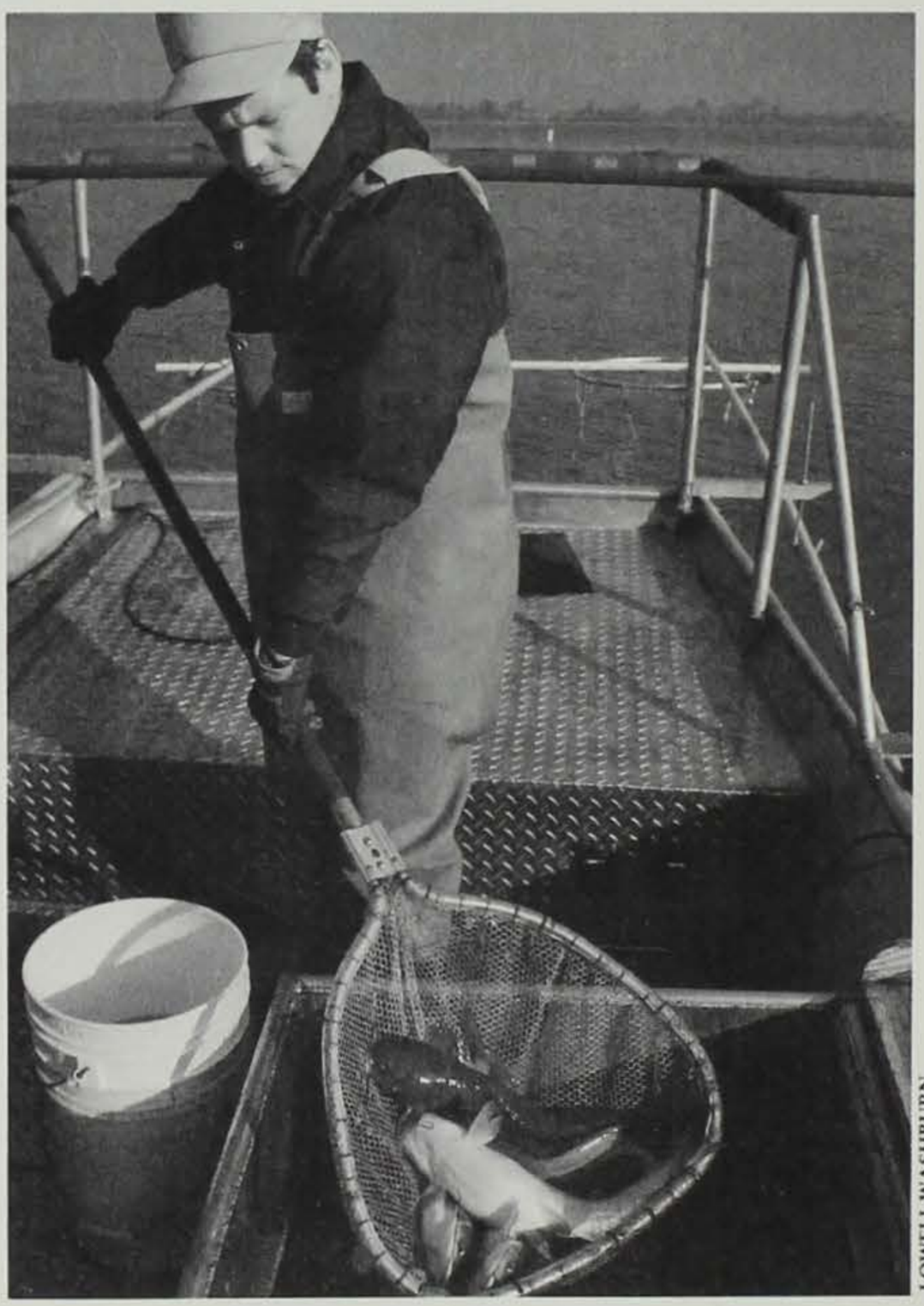


E L E C T R O F I S H I N G

A Shocking Way to Improve Fishing

The use of electricity to capture fish was first introduced in 1863 when a British patent was granted. In the early 1900s electrical screens were used to guide movements of fish. However, electrofishing did not become an important tool in fisheries management until the late 1940s.

Iowa's senior fisheries biologists recall shocking small Iowa trout streams using a portable generator placed on the shore with long extension cords to electrodes. Today, the more-convenient back-pack shocker is used. These lightweight, portable self-contained units are powered by either a 12-volt deep-cycle battery or a small generator. The electrodes are four to six feet long and have safety switches on the insulated handles. While the person wearing the backpack shocks fish, another person or two net the stunned fish. The method presently used in streams too large for a backpack shocker and too small for an outboard powered shocking boat is to place the generator in a small boat. Two to three people carefully guide the craft downstream, while another crew carries the electrodes and dips fish.



LOWELL WASHBURN

Electrofishing Boat Construction

The earliest shocking boats were constructed of wood and usually were equipped with alternating current (AC) power units. Today a typical electrofishing boat used in Iowa may range from a 14-foot flat-bottom boat with a simple AC rig to a custom-built 18-foot boat equipped with state-of-the-art AC and direct current (DC) capacities. The larger boats are used on larger lakes and rivers. Typically, a 3,000- to 5,000-watt generator is mounted beside the boat operator. Electrical wires are run from the generator through conduit to two, three- to six-foot steel electrodes which hang down from fiberglass poles mounted off the bow of the boat. The electrodes are partially filled with lead to keep them down in the water. During AC operation each electrode alternates from being a positive and negative pole.

When using AC, most operators use 230 volts. In a boat set up for DC operation the back electrodes, or in some cases the boat hull itself, act as the negative pole. The front positive electrodes are made of stainless steel droppers off two aluminum rings. This ring design maximizes the radius of the positive pole. Studies have shown that this design produces the least harm to the fish while providing the largest effective stunning field to the fish.

Both AC and DC can be pulsed at different rates to target individual fish species. For example, a very low pulse rate and a high voltage have been shown to be effective on catfish as old-time poachers with modified telephone crank generators have known for years. Normally, a moderate current of three to six amps and 350 volts is used in DC shocking. Today's electrofishing boats have

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by Tom McCarthy

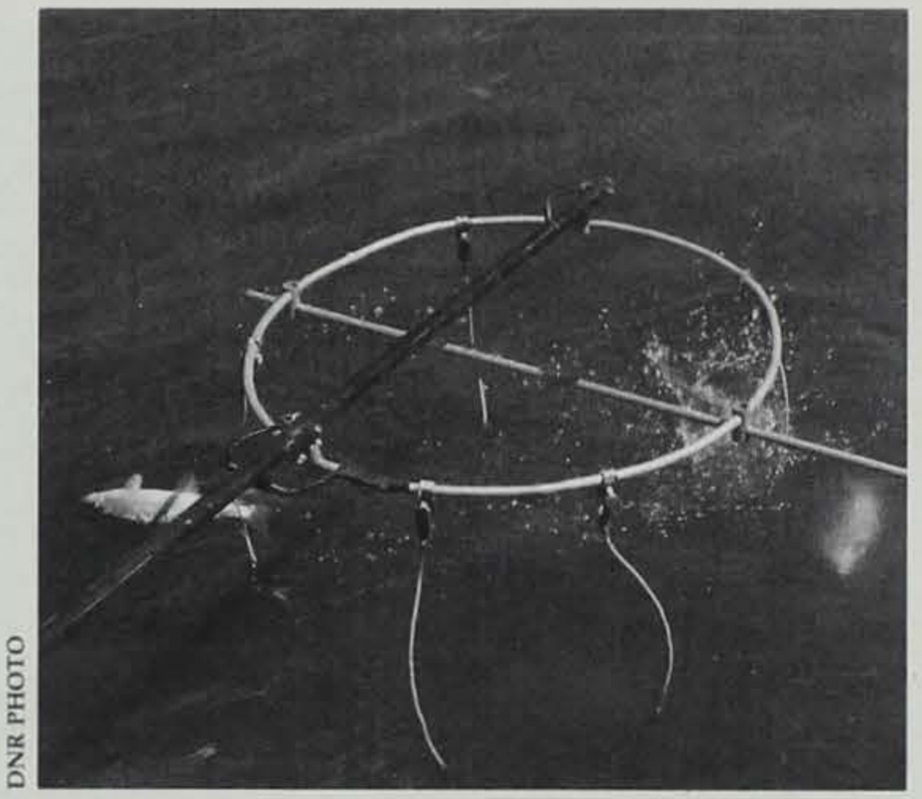
many features allowing the crews to work safely. The bow of the boat is surrounded by sturdy guardrails to prevent netters from slipping into the water. The railing also allows netters to lean out over the water to dip darting fish. Both the driver and the netter have foot-operated safety switches to quickly turn off the current in case of an emergency. Crews often wear rubber boots, gloves and life jackets for further protection.

Why, How and When Do We Shock Fish?

Over a period of years, electrofishing data can give biologists an idea of trends in the number of fish species, changes in proportions of species, their age structure and growth rates. Population estimates for many species such as large-mouth bass can be obtained through electrofishing. Captured fish are fin-clipped and/or tagged. The floy tag (spaghetti tag) is the most commonly used marker. It is a one-and-one-half to two-inch brightly colored cylindrical plastic tag lettered with the tagger's identification and numbering system. A tagging gun is used to insert the tag below the dorsal fin. The study areas are later sampled to capture marked and unmarked fish until the proportion of marked to unmarked fish in the data set produces a population estimate.

Depending upon the objective of the sampling, a set distance of shoreline or a set amount of time of shocking is performed. Electrofishing boats are usually operated at a slow pace. This allows for maneuvering around structure and also allows time for stunned fish to float up. Because most boat electrofishing equipment is effective at a depth of six to eight feet and is used mainly to collect fish along shorelines and other shallow structure. For this reason, large-mouth bass, bluegills, crappies, carp and northern pike are very susceptible to electrofishing. Open-water species like white bass, even when they are close to the surface, are able to swim or dive away from the current. Bottom-dwellers like catfish and freshwater drum are often too deep to be shocked with conventional equipment. However, specially designed AC equipment with long electrodes can be used to reach them.

The time of year greatly influences the effectiveness of electrofishing. Fish are vulnerable when they move up into the shallows in the spring to feed and spawn. Later in the year warm water temperatures and infiltrating sunlight may drive some fish species into deeper water, although lakes that thermally stratify limit fish distribution to the top portion of oxygenated water. Summer night time shocking is used to collect fish that move closer to shore to forage. Fall is a favored time to electrofish as fish again move inshore. The water levels are usually stable and water clarity is good, allowing for easier fish spotting. The size and numbers of fish from the previous spring spawn and/or a recent fish stocking can be evaluated. Also fish can handle the stress of being shocked



DNR PHOTO

RON JOHNSON

The front positive electrodes of a DC boat operation (top) are made of stainless steel doppers off aluminum rings. This design maximizes the radius of the positive pole, causes less harm to the fish and provides the largest effective stunning field.

The bow railing on the shocking boats (above) allows netters to lean out over the water to dip stunned fish.

LOWELL WASHBURN

LOWELL WASHBURN

Specially designed AC equipment with long electrodes is sometimes necessary to shock bottom-dwellers like catfish (above).

Electrofishing is one of the least stressful methods of collecting fish, allowing biologists to carefully research the fish populations of Iowa's waters.

and can be handled better in cooler water. Additionally, fewer anglers are out during fall weekdays so it disrupts fewer fishing trips.

The Fish's Response To Electrofishing

Many factors determine how a fish responds to the current field. Fish respond differently to AC and DC currents. A fish solidly hit by an AC field tends to lose its swimming ability and float up. A lightly stunned fish frantically tries to swim, dart, jump or dive away from the electrical current. Here is where quick netters, wearing polarized sunglasses, can make the difference between data in the livewell and the one that got away.

Pulsed DC induces the fish to swim towards the positive pole. This makes netting fish easier in turbid waters and in areas with current or heavy vegetation. Fish size is also a determining factor in how fish react to the electric current. A 16-inch largemouth will produce a greater voltage drop across its body than a two-inch bluegill. Therefore, the bass will be affected more by the voltage. The combination of shockings selectivity for larger fish and the greater visibility of these fish to the netters tends to make shocking data biased toward large fish. Other sampling methods such as bag seines are better suited towards sampling small fish.

Electrofishing normally does not cause problems in healthy fish. In fact, it is one of the least stressful methods of fish collection. After several minutes in the livewell the fish are back to normal. Anglers have been known to catch fish out of a shocked area within an hour after the sampling took place. Interested anglers watching from a safe distance cause no problems and they can learn more about fish habits. When the crew stops to record data on captured fish you can stop and take a closer look at their catch.

Electrofishing is an excellent method for collecting fish data for a wide range of project objectives. The results from sampling can help biologists better understand and evaluate the state's fishery resources.

Tom McCarthy is a fisheries technician for the department at Bellevue.

Planting For Energy

by Katherine Sibold

When Larry Gnewikow tells people he is the forester for the Amana Society, he admits he gets a few double takes.

The forestry management graduate from Iowa State says many people are surprised to learn that a privately owned corporation employs a forester, much less is instrumental in a progressive program to convert marginal farmland into energy-productive tree plantations.

Gnewikow attributes Amana's interest in the project partly to tradition. "The Amana people have German roots and still appreciate the value of the trees and timber they have," he said.

The communal society was founded in 1855 for religious reasons and did not start marketing goods outside the Amana boundaries until 1933. The Amana Society is now a multi-faceted corporation owned by its members with businesses ranging from agriculture to retail sales to forestry.

RON JOHNSON

The benefits of planting trees on marginal cropland are multiple. Not only are the "tree crops" a money-maker for the agricultural community, they also reduce erosion, cleanse the groundwater of some toxins and produce renewable material for fuel.

The wood energy project is part of a research program sponsored by the U.S. Department of Energy with assistance from the Iowa Department of Natural Resources and the Iowa State University Forestry Department. The Department of Energy is the major monetary backer for the program with the DNR providing technical consulting assistance and Iowa State concentrating mainly on economic research.

The project's primary objectives are to find alternative uses for land that is poorly suited for grain production and to create a native energy alternative for Iowans. It will define the best methods for farmers to

incorporate tree plantations into their present crop farming businesses and identify the risks and costs involved in producing the trees, now considered cash crops.

The Amana plantation, started in September 1988, consists of more than 72,000 silver maple trees planted on 60 acres of bottomland adjacent to the Iowa River. This area was chosen because it is prone to flooding and is risky to crop. The plantation is divided into three 20-acre sites divided by natural culverts.

Silver maples were selected for their fast-growing, flood-tolerant qualities. Unlike corn, which must be planted annually, silver maples resprout, or coppice, at the stump after being cut, allowing regrowth. Gnewikow said the trees will be harvested in six- or seven-year cycles and may resprout for as many as 20 rotations before having to be replanted.

"Replanting intervals are a major aspect of our research," he said.

The tree crop will be used as the energy source for the wood-burning boiler that heats the combination farm shop and agricultural building in High Amana.

The plantations have several features that will entice farmers to take part. They can be scaled up or down to meet the needs and the land availability of each individual, and the trees thrive in the rich lowland soil. Researchers are working to incorporate existing farm equipment to avoid expensive equipment expenditures.

"We want to make it as easy and economically efficient as possible for anyone who wants to do it," said Gnewikow.

Silver maples were selected for their fast-growing, flood-tolerant qualities. Unlike corn, which must be planted annually, silver maples resprout, or coppice, at the stump after being cut, allowing regrowth.

The benefits of planting trees on marginal cropland are multiple. Not only are the "tree crops" a moneymaker for the agricultural community, they also reduce erosion, cleanse the groundwater of some toxins and produce renewable material for fuel.

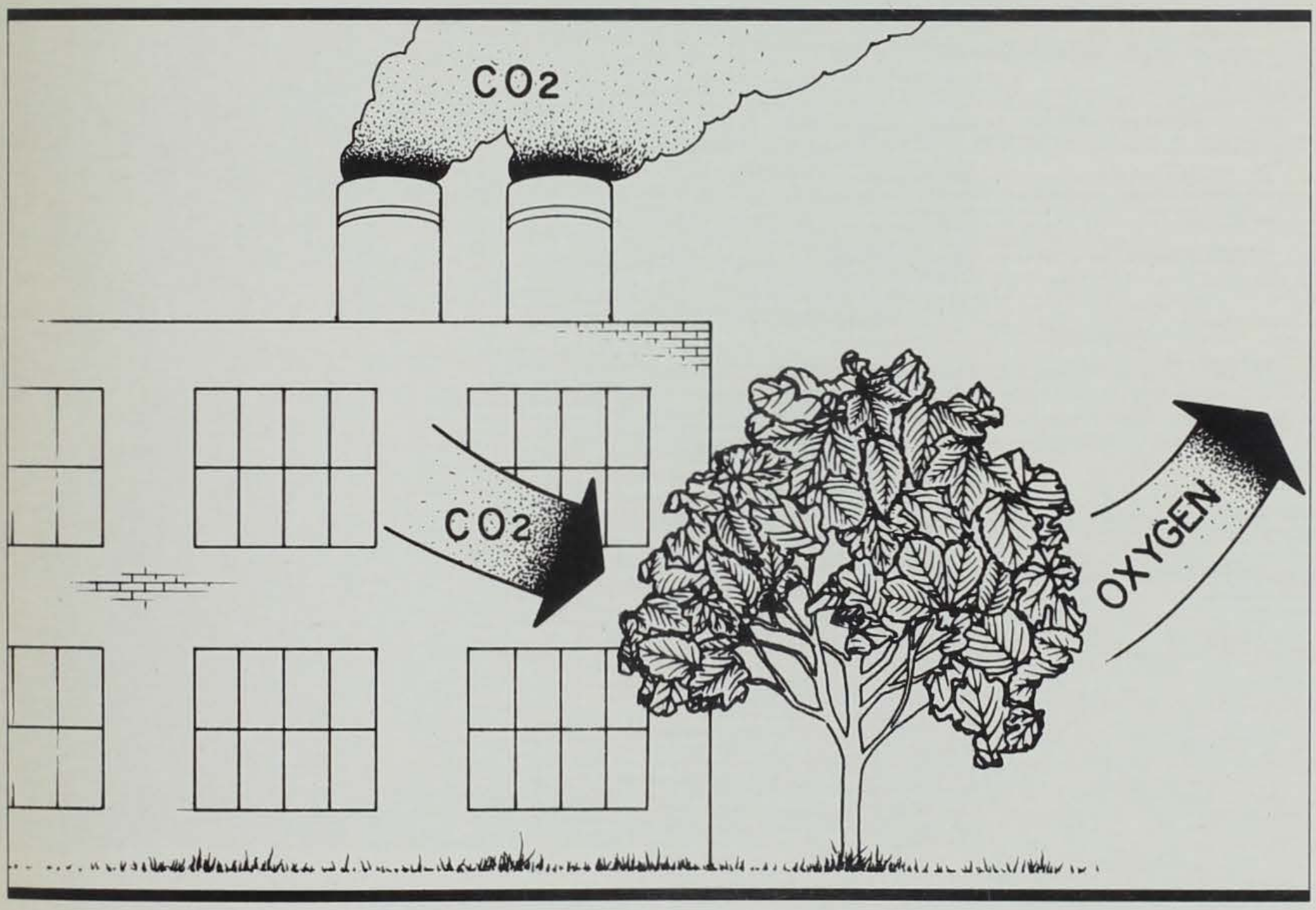
Renewable energy is energy produced from supplies that are continuously restored such as wind, solar, hydro (water) and vegetation.

Trees are a part of a short-term renewable energy cycle. Burning wood for fuel releases carbon dioxide into the air, but that carbon dioxide is taken back by actively growing trees which fix it (turn it into plant matter) and release oxygen. The wood produced in this process can then be used as an alternative to coal and other fossil fuels. Coal, unlike trees, puts carbon dioxide into the atmosphere without taking it back out.

To maximize the environmental benefits of growing trees and the financial abilities of the program, the trees should be cut before they reach maturity. According to DNR chief of forestry services Mike Brandrup, a mature tree does not fix as much carbon dioxide as an actively growing tree and has a much slower growing process which reduces the amount of burnable material produced.

"Trees are a crop just like corn and there comes a time when they have to be harvested," said Gnewikow. When the silver maples are harvested, they will be about 20 feet in height and five to six inches in diameter.

For those interested in establishing energy plantations or tree buffer strips to reduce erosion and pesticide runoff, there may be help from the state. The Resource Enhancement and Protection program (REAP) was designed to increase



the acreage of forested areas and improve the quality of existing treed areas. In this program private landowners can cost-share with REAP for reforestation and the establishment of woodlands.

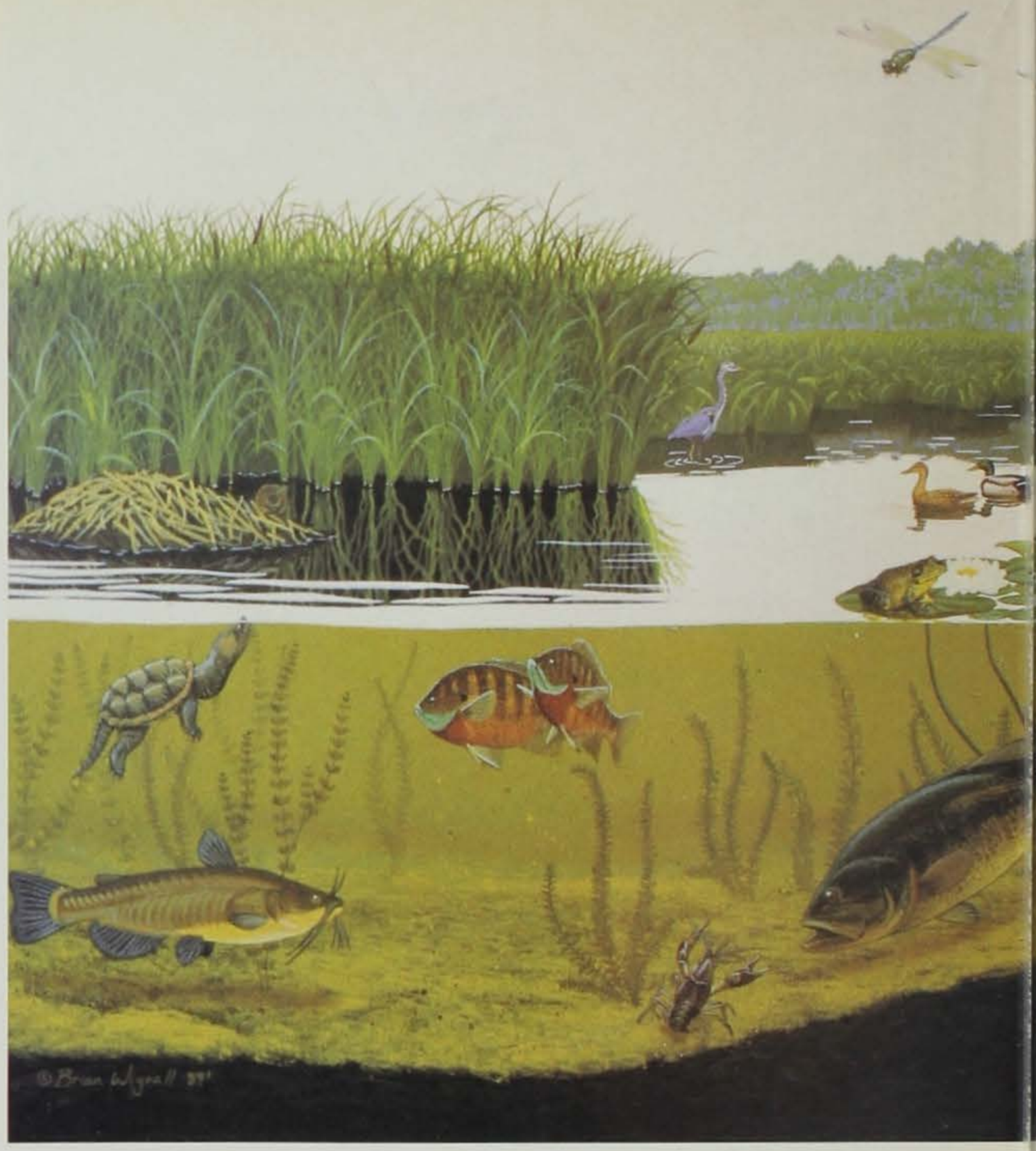
Gnewikow predicts that those getting involved in REAP and other tree planting programs are on the ground floor of the wave of the future -- a future in need of trees for energy.

"Most of the land in the state is owned by the private sector and in order to produce more projects like this we need to inform this sector," said Gnewikow. "Once the idea of short rotation comes of age, we hope to have all the information landowners will need to implement plantations."

For more information about planting trees on cropland or about the Resource Enhancement and Protection program, write the Iowa Department of Natural Resources, Wallace State Office Building, Des Moines, Iowa 50319-0034.

Katherine Sibold is the section supervisor for the agricultural and environmental programs of the department.

This illustration was designed by Brian Wignall for the DNR's aquatic education program.



What's Really Out There?

by Barbara D. Gigar

Can you (quickly) name 10 animals commonly found in a lake or pond? What about five kinds of plants? Well, if you failed this little "pop" quiz, you are not alone. Most people are only vaguely aware of the abundance of life that our waters support. Listed below are some common plants and animals found in Iowa lakes and marshes. They are all depicted in the illustration above. Study the drawing and read on to find out more about each of them.

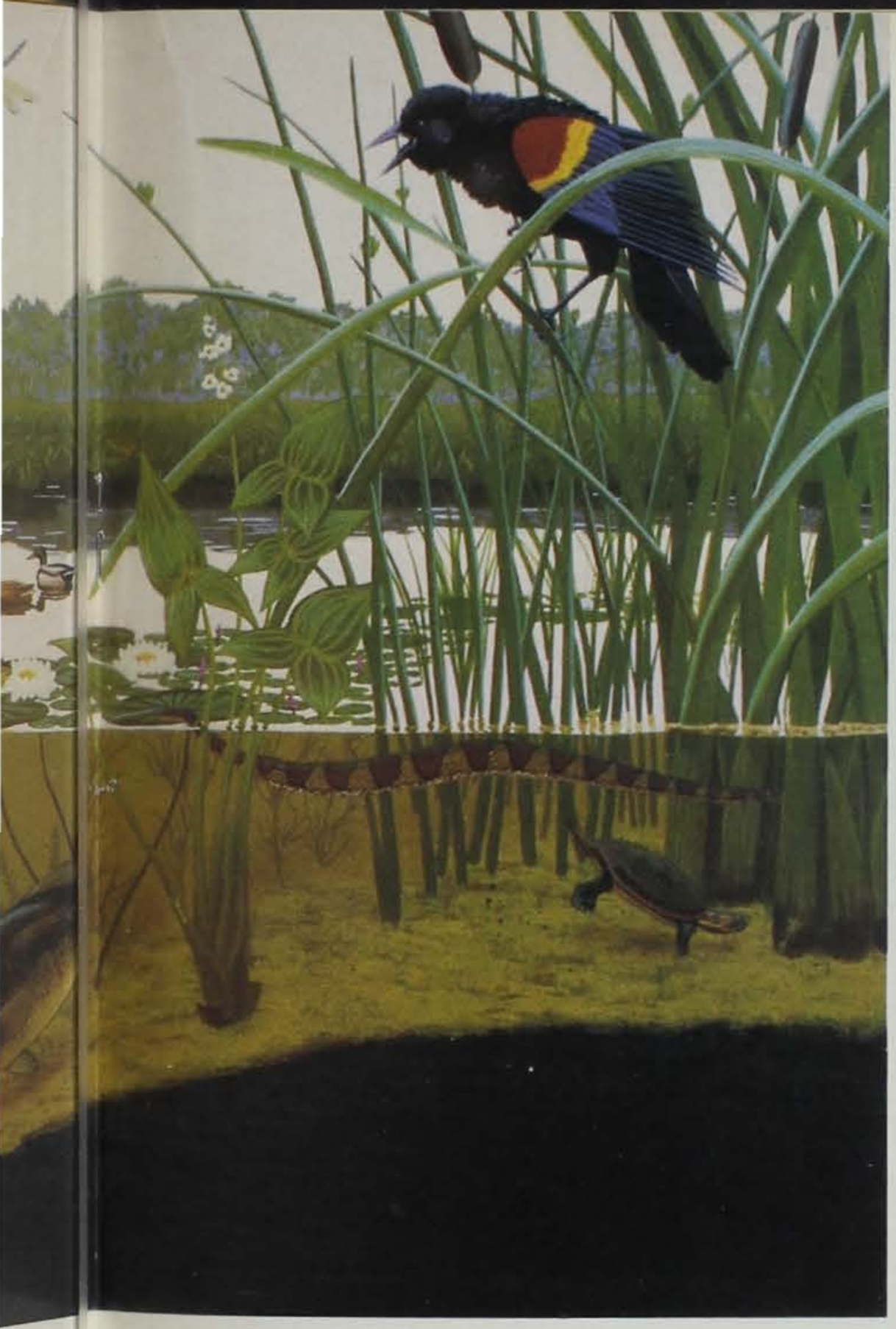
Plants

Aquatic plants are generally classified as emergent, floating-leaved or submersed. Plants are an essential part of the natural community because they are capable of converting carbon dioxide and water to food (glucose) and oxygen using the sun's energy. Aquatic plants also shade the water during the summer when the sun is intense and provide hiding places for smaller animals.

Chara (1). Often called "muskgrass" because of the odor it emits when crushed, chara has a green or greenish-brown color and stem-like branches with forked "leaves." Chara is actually a type of algae, but may grow to be several feet in length. It is usually found in clear water and dense growth may cover an entire lake bottom.

Elodea (2). This bushy plant grows entirely under water and does best in cool water in a soft bottom. It is usually a deep grass-green and the small leaves are oval in appearance. It can grow up to six feet long and provides food and cover for many insects which are valuable as fish food.

Cattail (3). Cattails are found in marshes and ditches as well as the shallows of ponds, lakes and slow streams. Their slender leaves are often six to eight feet tall. The brown head is actually a cluster of flowers, which produce seeds carried to new locations. Once cattails are established in an area, horizontal roots grow



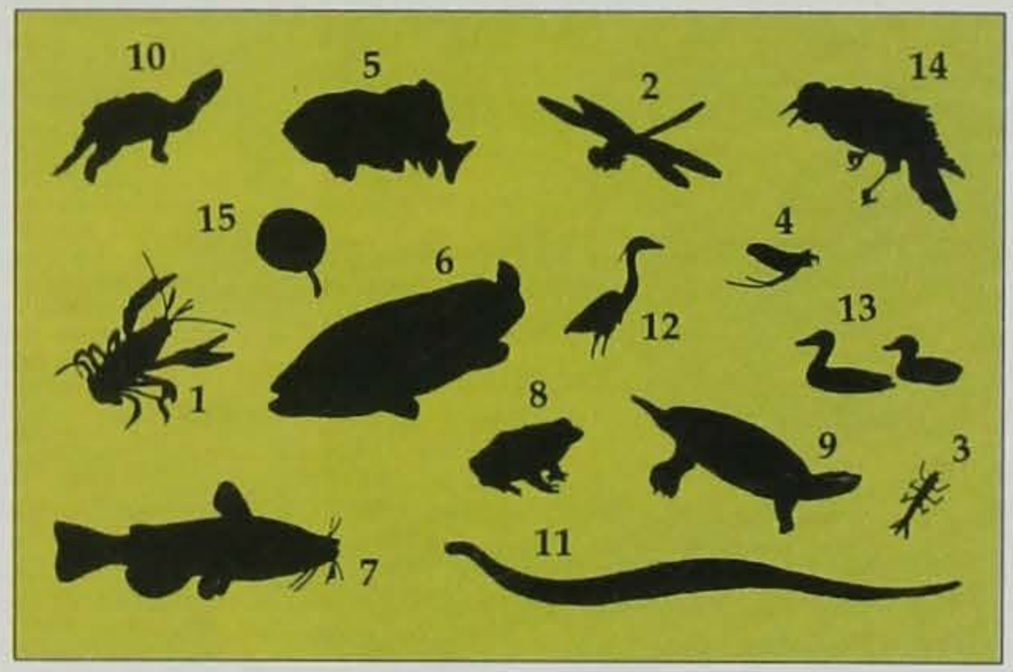
Animals

Animals are often classified according to their feeding habits. They may be plant eaters (herbivores) or meat eaters (carnivores). Animals which feed on both plant and animal matter are classified as omnivores and scavengers eat dead animals and plants.

Animals and decomposers such as fungi and bacteria both produce carbon dioxide when "burning" food, forming a unique "buddy system" with the plant kingdom. The removal of any group of organisms can weaken the system and may cause it to break down entirely.

The classic definition of an animal is "a living thing which is differentiated from a plant by having the ability to move voluntarily." There are exceptions to this statement, but the animals described here all possess that characteristic.

Crayfish (1). One of the arthropods, or "joint-footed" animals, crayfish have a body that is divided into two regions with an armour-like covering and five pairs of walking legs. The first pair of legs have large pincers used to hold and tear food. They feed mostly

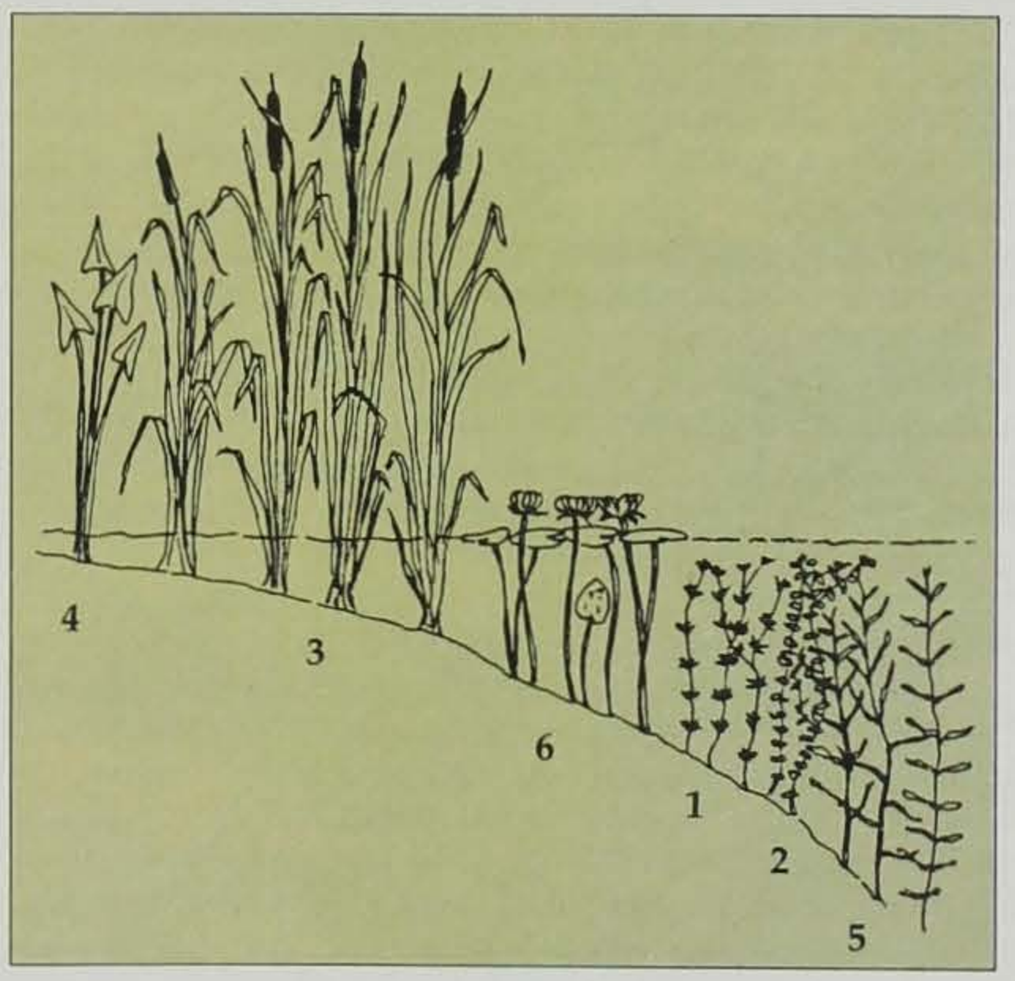


out from the "parent" plant and new plants arise along their lengths.

Arrowhead (4). There are actually several types of arrowhead which are emergent or grow submersed in shallow water. They are also called "duck potatoes" because they have edible tubers (enlarged underground stems). The leaves arise from a basal stalk and may be slender, egg-shaped or arrow-shaped.

Leafy pondweed (5). Pondweeds make up the largest family of truly aquatic plants with more than 60 species growing in fresh-water ponds and lakes. The leaves of leafy pondweed and the other so-called narrow-leaved pondweeds are "grass-like" and do not float on the surface. Pondweeds are used as food by several kinds of ducks and provide habitat for many aquatic animals.

Water lily (6). The familiar white water lily is only one of approximately 100 species of water lilies found in shallow areas of ponds and lakes and river backwaters in temperate areas. Large, flat floating leaves grow on long, limber stems from thick, branching roots. Many water lilies have edible roots, seeds and/or tubers. They provide a shady canopy for fish and often have showy white, yellow or pink blooms.



on plants, but eat some animals and often scavenge dead ones. More than 200 kinds of crayfish are found in North America.

Dragonfly (2). Dragonflies are ferocious-looking insects, but they do not bite or sting. They prey on small insects which are caught in flight by a "basket" formed by the legs. Their long, narrow wings and flight patterns give the impression of small helicopters as they search for insects along the water's edge. Dragonflies lay their eggs in the water and the aquatic immature stages often live for a year before changing into the adult which may live only a few weeks. Immature dragonflies resemble the adults, but have no wings.

Damselfly (3). Very similar in appearance and habits to the dragonflies, damselflies are different because they fold their wings over their back when they land. Many are also more "delicate" in appearance — smaller and less heavy-bodied. Their life history is similar to dragonflies with an aquatic immature stage that changes to a terrestrial adult. Immature damselflies look somewhat like the adult, but they have three projections (gills) from the end of the abdomen and no wings.

Mayfly (4). Mayflies, too, have aquatic immature forms which change into adults that live only a very short time. As a matter of fact, the Latin name for mayflies means "short-lived" and the insects may not even eat as adults. The immature insect may be confused with damselflies, but the gills are feather-like structures along the sides of the abdomen. Adult mayflies fold their triangular wings over the back when they land. They also have two very long, thread-like "cerci" extending from the abdomen.

Bluegill (5). This abundant and widespread sunfish can be found in nearly all of Iowa's waters, but is far more common in lakes and ponds. Bluegill are deep-bodied with a dark olive-green back and yellow or reddish-orange below. They feed mainly on insects and are a major food source for largemouth bass and other large predatory species.

Largemouth bass (6). Largemouth bass are rather streamlined with a characteristic mouth that extends past the rear margin of the eye when closed. They also have a broad continuous dark stripe along the side of the green-shaded body. Largemouth bass are the primary predators in many of Iowa's lakes, ponds and quiet rivers, feeding on a variety of smaller fish and other animals.

Bullhead (7). Like all catfish, bullheads have no scales and their mouth is surrounded by eight fleshy barbels. The black bullhead is, by far, the most common of the three types found in our state. Bullheads are omnivores, feeding on whatever is available, including minnows, fish eggs and insects as well as dead animal matter.

Bullfrog (8). Reaching lengths of up to eight inches, this is the largest frog in North America. It is green to yellowish above and may be mottled with gray. It is often seen along the water's edge or in the shallows where it waits to ambush its prey. The green tadpoles are much larger than those of other frogs and take two years to mature into an adult frog. The name comes from the characteristic call which sounds much like a bellowing bull.

Painted turtle (9). Found in shallow, weedy waters, the painted turtle has a flattened carapace (top shell) with red markings along the edge. The plastron (lower shell) may be plain or variously marked and there are red and yellow stripes on the neck, legs and tail. It is five to six inches long and eats mostly plant material.

Snapping turtle (10). The common snapping turtle may weigh up to 35 pounds in the southern part of its range, but is usually much smaller. The plates of the carapace are ridged (these may wear down in older animals) and the plastron is small. It often buries itself in the mud or basks at the surface of the water. Snappers eat some plants, but about two-thirds of their diet is fish and aquatic invertebrates.

Northern water snake (11). Although it is much more aggressive than many terrestrial snakes, the northern water snake is not poisonous. It is a predator that feeds on fish, amphibians and other aquatic animals. Reaching lengths of four feet, it is characterized by reddish brown spots with a darker border on a lighter background. Older snakes are often much darker and the pattern can become indistinct.

Great blue heron (12). This long-legged wading bird stands about three feet high and has a wingspan of almost six feet. It is slate blue with a long neck and spear-like bill. It nests in colonies near water and feeds on aquatic animal life in the shallows. The "great blue" is the largest of the herons in North America.

Mallard (13). This is the most abundant duck in the Mississippi Valley and a common nester in Iowa. The mallard is a "dabbling" or surface feeding duck that nests in uplands adjacent to marshes as well as some lakes and ponds. The male is brightly colored with a dark green head, rust-colored breast and blue speculum (rectangle of color on the hind part of the wing) edged with white. The female is a drab brown, but does have the speculum.

Red-winged blackbird (14). The male is black with a bright red shoulder patch bordered with yellow, but the female is dark brown and streaked in appearance. Red-winged blackbirds nest in cattails or similar vegetation along waters or in wet fields. The males arrive early in the year and set up territories before the females migrate north. The loud "conk-a-ree" call can be heard near most of our ponds and lakes throughout the summer. Red-winged blackbirds are about seven inches in length as adults.

Muskrat (15). This is a small brown mammal which uses cattails for food as well as building its impressive conical "huts" in marshes and wetlands. The muskrat is most easily confused with the larger beaver, but muskrats are only 10 to 14 inches in length and the tail is narrow and flattened from side to side. Muskrats play a vital role in marshes by clearing cattails and maintaining open water areas.

Barbara D. Gigar is the aquatic education program coordinator for the department at Springbrook Conservation Education Center.

WARDEN'S DIARY

The Last Angry Game Warden by Chuck Humeston

ILLUSTRATION BY NEWTON BURCH

When I started this job, September was the month when the curtain came up for the fall. We had an early duck hunting season then.

Now, I was born and raised in south-central Iowa. Yes, I've heard all the jokes about giving away the southern two tiers of Iowa counties to Missouri -- say what you want, but let me tell you, it's beautiful country! However, it is not known for an abundance of duck marshes.

Anyway, when I was sent to northwest Iowa, I encountered these flying creatures. As I was in training, I'd ask a neighboring officer, "What are those?"

"Those are ducks!"

Bob Moats, fellow game warden, took me under his wing and asked me how I was at duck identification, wherein I would point at one, and say, "That is a duck." Shaking his head, he gave me a one-more-burden-to-bear look and began to train me in the art of waterfowl enforcement.

We started with a book of wing identification, kind of like flash cards. I saw wings in my sleep. We walked marshes. We looked at duckbills. We observed flights. Ducks, ducks, ducks ducks!!!

Finally one day, Bob presented me with a device he made to check magazine plugs and kicked me out of the nest.

There are many methods for waterfowl enforcement. You can get out on the marsh early before everyone else, in disguise of course, whereas at sunrise usually everyone looks at you, and says, "Look, a game warden." Or you can wait until everyone is on the marsh, then begin, in disguise again, stealthily sneaking up on hunters to find them already handing you a license and stamps, saying "Good morning, officer!" I've tried everything, camouflage, holding cattails in front of me, crawling --sometimes it works, sometimes not.

But it yields lots of experiences. Some bad -- such as finding the water is always one inch higher than your waders, or worse, such as the officer who stepped out of his boat to wade over to some hunters, and found the spot where the water was higher than his head!

Some good -- such as watching the sun rise behind the marsh or talking with people who appreciate the need for wetlands. More than once I've encountered someone with thermos in hand, gun at side, just watching the spectacle of ducks in flight, the quiet of the marsh after the initial flight was over, yielding to a unique tranquility.

But every September always reminds me of the experience of the officer I call "The Last Angry Game Warden."

It was a typical September duck season. The teal were flying low and fast. It's not uncommon to hear a hunter's shot pattern zinging over your head.

The officer, in disguise, was blending in with the scenery. The teal zipped over the water. *Crack*, the hunters across the water fired, sending the officer and all hunters near him diving. This went on for a while.

More ducks, another *crack* -- the shot sped over the water hitting the officer in the waders. The officer and other hunters grumbled.

More ducks, another *crack* -- the officer was hit again, really stinging this time. His trigger was tripped.

A hunter said, "Someone should call a game warden." The officer, trying to rise above the cattails, although he was not much taller to begin with, announced. " I AM A GAME WARDEN AND I AM MAD." So throwing disguise to the wind, still stinging in the leg, and with all speed and splashing stealth, he raced to the hunters and confronted them about their concern for target background when firing at ducks. His words are lost, but among his arm motions and aggravations, in that moment he became "The Last Angry Game Warden."

Ahhh, September . . .

CONSERVATION UPDATE

Timber Stand Improvement: "Releaf" for Iowa's Forests

by John Walkowiak, special projects coordinator

Iowa's native woodlands have produced some of the highest quality hardwood timber and lumber in the United States for both domestic and export markets. High-quality black walnut, red oak and basswood from Iowa woodlands are now especially in great demand for overseas markets, prompting concern that our limited high-quality forest resources are being overcut. As the demand for high-quality timber continues, many Iowa woodland owners wonder if their acres of immature woodlands could be put into production of high-quality timber. Timber stand improvement may be the key to improving existing forest areas to meet the strong demand for high-quality timber in the near future, according to forestry officials of the Iowa Department of Natural Resources.

Not all trees in the forest are capable of producing high-quality timber or lumber. Trees removed from timber stand improvement can be used for low-quality lumber, firewood or other products.

Timber stand improvement involves the identification of potential crop trees and use of forestry practices to enhance their growth and quality. It is performed to shift growth to fewer trees of better form and higher value. Typically, timber stand improvement involves thinning a forest by increasing the spacing between crop trees and reducing the number of trees with marketing defects. But it also means maintaining forest diversity and enhancing wildlife habitat by providing improved ground forage and reducing the risk of fire, insect or disease damage.

Not all trees in the forest are capable of producing high-quality timber or lumber. That is why the identification of potential crop trees should be done with the assistance of a qualified forester. If sawlogs are desired, crop trees will be straight, well-formed, naturally pruned and of the highest value species. Once identified, the crop trees are released of their competition by cutting or girdling unwanted trees. Trees removed from timber stand improvement can be used for low-quality lumber, firewood or other products. The brush created from tree tops when piled enhances wildlife habitat for many small mammals.

Other forms of timber stand improvement involve improving tree quality of selected crop trees by pruning off unwanted branches or eliminating livestock grazing to protect them.

The costs of timber stand improvement vary with each woodlot, but foresters generally agree it costs $50 to $100 per acre to perform in Iowa. Fortunately, forestry cost-share funding from the Resource Enhancement and Protection (REAP) program are available to offset 75 percent of the costs on a minimum of five acres.

For more information concerning timber stand improvement or the REAP forestry cost-share program, write to the Forests and Forestry Division, Iowa Department of Natural Resources, Wallace State Office Building, Des Moines, Iowa 50319-0034.

Correction . . .

The masthead listed on page two of the August 1990 issue of the *Iowa Conservationist* included incorrect information on the officers of the Natural Resource Commission. The correct officers and members are: John D. Field, Hamburg, chairperson; Richard C. Young, Waterloo, vice-chairperson; (Mrs.) Marion J. Patterson, Cedar Rapids, secretary; Marian Kieffer, Bellevue; Barbara Nelson, Ruthven; Douglas R. Smalley, Des Moines; and Thurman Gaskill, Corwith.

Iraq's invasion of Kuwait last month triggered increased oil prices. According to DNR officials, consumers can help bring the prices down by reducing the amount of fuel being used.

Reduce Fuel Prices Through Transportation Efficiency

World oil prices increased considerably in August as a result of Iraq's invasion of Kuwait. According to Sharon Tahtinen of the Department of Natural Resources' energy bureau, "These price increases demonstrate the United States' vulnerability due to its dependence on foreign imports. Although there is adequate fuel supply at the present time, a reduction in consumption will help bring oil prices down."

Consumers do not need to feel helpless in the face of increased prices, according to Tahtinen. "Drivers can reduce the impact of high prices by making their vehicles more fuel efficient and by operating their vehicle in a more fuel efficient way," she said.

A few simple steps can be followed to save fuel: check tire pressure at every fill, regularly tune up engines and drive the speed limit.

Other ways to save gas include ride sharing, consolidating trips whenever possible, using the mass transit system and moving to a four-day work week. In addition, these measures would have the added benefit of decreasing the number of vehicles on the road during the week and reducing parking problems. "A carless day, in which individuals elect not to drive for one day per week, is another option," said Tahtinen.

By lowering the demand for fuel, consumers can actually have the effect of helping to lower prices, according to Tahtinen.

Tips For Out-of-State Hunters

According to the National Rifle Association of America, more than 1.4 million hunters will travel outside their state of residence this fall to enjoy a hunting trip. Hunters planning such a trip are reminded to review the hunter education requirements of their destination state or in Canada. Failure to be able to show proof of completing a hunter education course may prohibit the purchase of hunting licenses.

Hunter education courses for first-time licensees or those born after a certain date are now required in 39 states and seven Canadian provinces. Iowa's law requires that anyone born after Jan. 1, 1967, must have a certificate of completion of a hunter education course to purchase an Iowa hunting license.

It is recommended that hunters contact the fish and wildlife agency where they intend to hunt for the specific requirements of that area. If a hunter education course is necessary, the hunter's home state fish and wildlife department should be contacted concerning course availability.

For information on hunter education courses in Iowa, contact the Iowa Department of Natural Resources, Wallace State Office Building, Des Moines, Iowa 50319-0034.

DNR Publications

New and recently revised publications of the Iowa Department of Natural Resources are listed below. These publications are free unless otherwise noted ($). We reserve the right to limit quantities. To request copies, write the Iowa Department of Natural Resources, Wallace State Office Building, Des Moines, Iowa 50319-0034.

1990 Iowa Hunting and Trapping Regulations (New; 32-page booklet on Iowa's hunting laws for 1990.)

Household Hazardous Waste Fact Sheets (New; four, two-page flyers on what to do with household hazardous materials such as *Cleaning Products, Oil, Paint* and *Pesticides*.)

Simple Key to Iowa Trees (Reprint; eight-page booklet on identifying the various trees found in Iowa.)

Waste Disposal On The Farm (New; two-page brochure on proper disposal methods of farm animals, farm buildings and other farm waste.)

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:
-- Oct. 3-4, Spencer
-- Nov. 1, McGregor
-- Dec. 6, Des Moines

Environmental Protection Commission:
-- Sept. 17-18, Des Moines,
-- Oct. 15-16
-- Nov. 19-20

State Preserves Advisory Board:
-- Sept. 11, Des Moines

Grimes Wastewater Facility Wins EPA Award

The wastewater treatment facility in Grimes has received an award for operation and maintenance excellence from the U.S. Environmental Protection Agency.

The Grimes facility received the award demonstrating a commitment to controlling water pollution through operations and maintenance.

In addition to reinforcing the pollution control efforts of wastewater treatment facilities, another benefit of this awards program is to heighten public awareness and encourage support for effective management of these facilities.

Iowa is in the EPA's region seven, which also includes Nebraska, Missouri and Kansas. The regional awards program was started in 1985 to support a national program initiated by the EPA that same year. Winners of the regional awards are automatically nominated for the national awards to be announced in October.

Also honored was the wastewater treatment facility in Carson, which received a certificate of merit in the operations and maintenance category.

Jeff Brown of Colfax holds the new state record wiper. Brown caught the 13 lb., 10 oz., fish Aug. 2 from the Des Moines River.

New Wiper Record Set

A new state wiper record was set Aug. 2 by Jeff Brown of Colfax. The wiper, caught from the Des Moines River below Saylorville, weighed 13 lbs., 10 oz., and was 27-1/2" long. The previous record wiper weighed 12 lbs., 11 oz., and was taken by Aaron Crook of Boone. Crook's wiper was taken from the Des Moines River, Boone County, in April 1989. A wiper is a hybrid between a white bass and ocean-striped bass.

Each year the Iowa Department of Natural Resources awards hundreds of anglers with certificates and patches for their catches. Anglers with fish eligible for a big fish award should fill out the entry blank available in the current fishing regulations brochure. One witness must attest to the length or weight of the fish to the nearest ounce on scales legal for trade. Length is measured from the tip of the snout to the tip of the tail (total length). If there is doubt in species identification, the angler should contact the nearest DNR personnel in the area for verification. All potential state record fish must be examined and verified by DNR personnel.

A photograph or color slide of the angler and fish should be sent along with the completed entry blank to Fish Records, Iowa Department of Natural Resources, Wallace State Office Building, Des Moines, Iowa 50319-0034. The photo will be returned to the angler. The top 10 and released of each species will be published in a future spring issue of the *Iowa Conservationist* magazine.

Donations

Fred Maurer Bellevue	Agates valued at $60 for South Bluff Nature Center, Bellevue State Park
Bob Allen Sportswear Des Moines	Bush coat valued at $105 for 1989 state park employee of the year
John Ludwig Anamosa	Cracked corn valued at $120 for wildlife feeding at Wapsipinicon State Park
Hill and Williams Truck Line Cedar Rapids	Truck rims valued at $90 for fireplace construction at Wapsipinicon State Park
Wayne Jones Furniture Ft. Dodge	Sofa-sleeper bed frame valued at $90 for rental cabin at Dolliver State Park
Anonymous	$358 for playground equipment at Lake of Three Fires State Park
Roy Jahde Lake View	Birdhouse valued at $50 for Black Hawk State Park
Anonymous	"Bearcat" scanner valued at $99 for Green Valley State Park
Friends of E.B. Lyons Prairie--Woodland Dubuque	1,324 assorted gift shop items valued at $2,645 for E. B. Lyons Nature Center
Youth Camp Halada, Iowa Odd Fellows Des Moines	Playground equipment valued at $1,414 for Springbrook State Park
Asgrow Seed Co. Anamosa	Shelled corn valued at $100 for wildlife feeding at Wapsipinicon State Park

Classroom Corner -- Chiggers

by Robert P. Rye

Now is a safe time to discuss one of my worst education program conflicts -- chiggers. They can cause itching in some of the hardest places to scratch and can cause this personal disturbance for 7-10 days. Most of what we hear about chiggers are myths. One thing I know for a fact is that their efforts cause a definite itching, and the hazardous chemicals I have used to get rid of them have no effect. Test your knowledge and learn new information about chiggers.

1. Chiggers are juvenile (or larval) forms of a family of mites which are related to spiders and ticks.

2. Chiggers are invisible.

3. Chiggers are born red -- they do not become red from their hosts' blood.

4. Chiggers burrow into our skin and eventually die, causing a persistent itch.

5. Attached chiggers are removed by even the lightest rubbing, such as a towel or wash cloth.

6. In North America the only real danger from chigger bites is secondary infection from scratching.

7. The first line of defense against chiggers is tightly woven socks, long pants tucked into the socks, long-sleeved shirt, tight collar and high boots.

8. Chiggers, like ticks, crawl through vegetation and attach to a passing host.

9. Chiggers can travel from your feet to your waist in 15 minutes looking for a tender spot. If they run into an obstacle, they will stop, crawl under the obstacle and feed.

10. Chiggers get only one chance to feed because when you brush them off, some mouth parts are lost.

ANSWERS:

1. True 2. False -- however, they are difficult to see with the naked eye. 3. True 4. False -- your skin reacts to chigger saliva, forming a tubelike structure called a stylostome, which causes the red welt and itch. 5. True 6. True 7. True 8. True 9. True 10. True

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A new state wiper record was set Aug. 2 by Jeff Brown of Colfax. The wiper, caught from the Des Moines River below Saylorville, weighed 13 lbs., 10 oz., and was 27-1/2" long. The previous record wiper weighed 12 lbs., 11 oz., and was taken by Aaron Crook of Boone. Crook's wiper was taken from the Des Moines River, Boone County, in April 1989. A wiper is a hybrid between a white bass and ocean-striped bass.

Each year the Iowa Department of Natural Resources awards hundreds of anglers with certificates and patches for their catches. Anglers with fish eligible for a big fish award should fill out the entry blank available in the current fishing regulations brochure. One witness must attest to the length or weight of the fish to the nearest ounce on scales legal for trade. Length is measured from the tip of the snout to the tip of the tail (total length). If there is doubt in species identification, the angler should contact the nearest DNR personnel in the area for verification. All potential state record fish must be examined and verified by DNR personnel.

A photograph or color slide of the angler and fish should be sent along with the completed entry blank to Fish Records, Iowa Department of Natural Resources, Wallace State Office Building, Des Moines, Iowa 50319-0034. The photo will be returned to the angler. The top 10 and released of each species will be published in a future spring issue of the *Iowa Conservationist* magazine.

Donations

Fred Maurer Bellevue	Agates valued at $60 for South Bluff Nature Center, Bellevue State Park
Bob Allen Sportswear Des Moines	Bush coat valued at $105 for 1989 state park employee of the year
John Ludwig Anamosa	Cracked corn valued at $120 for wildlife feeding at Wapsipinicon State Park
Hill and Williams Truck Line Cedar Rapids	Truck rims valued at $90 for fireplace construction at Wapsipinicon State Park
Wayne Jones Furniture Ft. Dodge	Sofa-sleeper bed frame valued at $90 for rental cabin at Dolliver State Park
Anonymous	$358 for playground equipment at Lake of Three Fires State Park
Roy Jahde Lake View	Birdhouse valued at $50 for Black Hawk State Park
Anonymous	"Bearcat" scanner valued at $99 for Green Valley State Park
Friends of E.B. Lyons Prairie--Woodland Dubuque	1,324 assorted gift shop items valued at $2,645 for E. B. Lyons Nature Center
Youth Camp Halada, Iowa Odd Fellows Des Moines	Playground equipment valued at $1,414 for Springbrook State Park
Asgrow Seed Co. Anamosa	Shelled corn valued at $100 for wildlife feeding at Wapsipinicon State Park

Classroom Corner -- Chiggers

by Robert P. Rye

Now is a safe time to discuss one of my worst education program conflicts -- chiggers. They can cause itching in some of the hardest places to scratch and can cause this personal disturbance for 7-10 days. Most of what we hear about chiggers are myths. One thing I know for a fact is that their efforts cause a definite itching, and the hazardous chemicals I have used to get rid of them have no effect. Test your knowledge and learn new information about chiggers.

1. Chiggers are juvenile (or larval) forms of a family of mites which are related to spiders and ticks.

2. Chiggers are invisible.

3. Chiggers are born red -- they do not become red from their hosts' blood.

4. Chiggers burrow into our skin and eventually die, causing a persistent itch.

5. Attached chiggers are removed by even the lightest rubbing, such as a towel or wash cloth.

6. In North America the only real danger from chigger bites is secondary infection from scratching.

7. The first line of defense against chiggers is tightly woven socks, long pants tucked into the socks, long-sleeved shirt, tight collar and high boots.

8. Chiggers, like ticks, crawl through vegetation and attach to a passing host.

9. Chiggers can travel from your feet to your waist in 15 minutes looking for a tender spot. If they run into an obstacle, they will stop, crawl under the obstacle and feed.

10. Chiggers get only one chance to feed because when you brush them off, some mouth parts are lost.

ANSWERS:

1. True 2. False -- however, they are difficult to see with the naked eye. 3. True 4. False -- your skin reacts to chigger saliva, forming a tubelike structure called a stylostome, which causes the red welt and itch. 5. True 6. True 7. True 8. True 9. True 10. True

COUNTY CONSERVATION BOARD FEATURE

Our Prairie Wilderness by Cele Burnett

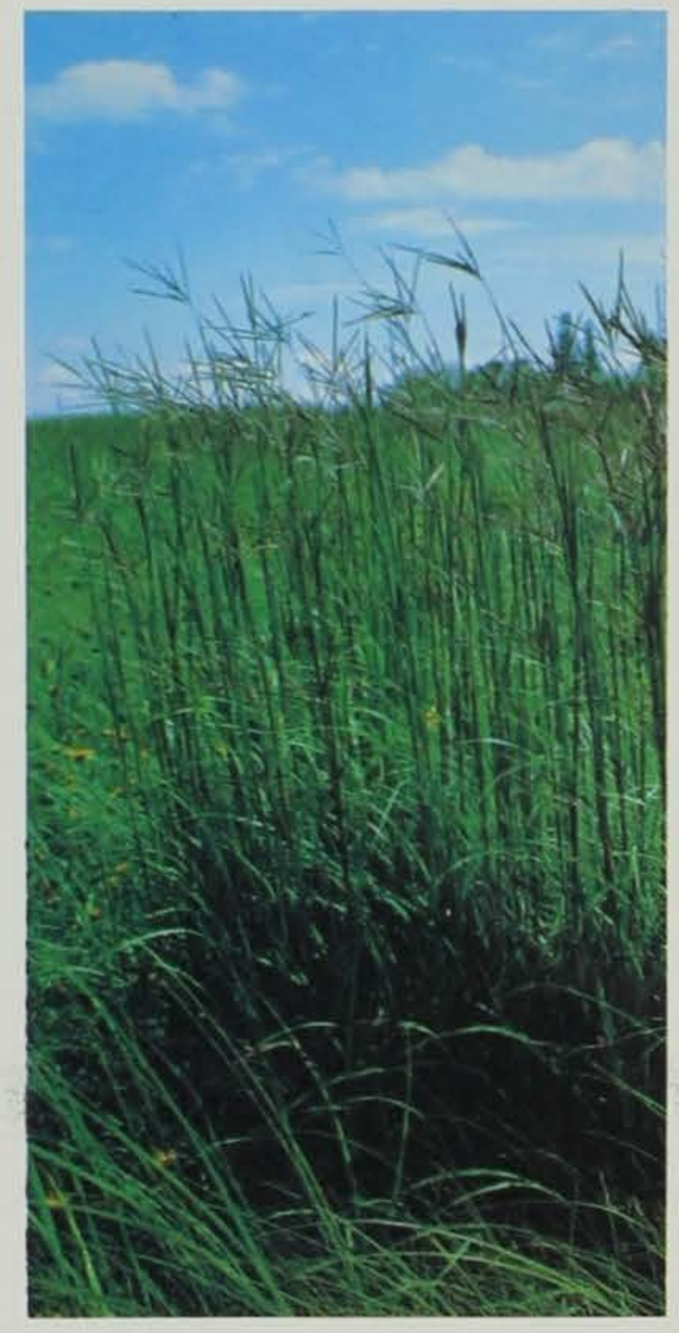
The earth buckled and folded violently and torturously, forcing up the sharp rocky peaks to be called, in time, the Rocky Mountains. It was 25 million years ago. The inland seas had receded, and the climate was warming. The mountains in the west intercepted the Pacific moisture and prevented it from reaching the mid-continent. Lacking the moisture necessary for survival, the forests retreated. But the grasslands flourished in this age of mammals until one million years ago.

Then the great ice sheets flowed over the continent, scouring the landscape, burying everything beneath in a frigid, silent world. Slowly, in starts and stops as the climate again warmed, these icy masses retreated. Only 9,000 years ago, glacial ice still clung to the shores of upper Lake Michigan and Lake Superior.

Chunks of rocky debris, frozen in the ice and ripped free of the main glacial body, dotted the landscape. As these ice pockets melted, countless thousands of pothole ponds and marshes pitted a broad area in the northern grasslands. This was the prairie pothole country, and it was to become the most important nesting ground for waterfowl in North America.

Great flights of waterfowl moved in with the spring to mate on the temporary water in the wet grasslands. Diving ducks such as canvasbacks, redheads, and ruddy ducks nested on mounds of plant debris floating on the water, while broods of dabbling ducks such as mallards, teal and pintails hatched in nearby uplands.

Also left behind in the wake of glacial retreat were the hills and swales of the gently rolling prairielands. Deposits of fertile windblown soil smoothed the contours of the prairies and plains.



DEAN ROOSA

Big bluestem

And the grasslands returned to a land too dry and windswept for trees to take root.

Without trees to act as windbreaks, the wind blew freely across the plains, further decreasing the moisture necessary for woodlands to grow. Fires prevented the trees from invading the prairie from its edges. Natural fires, sparked by lightning igniting the dry, scorched grasses of summer, frequently swept across the land. Woody species growing above ground could not survive the heat and destruction of a fire. But the prairie vegetation, with its growth center beneath the surface of the soil, sprang forth green and glorious in the black ashes.

This was the treeless land of constantly blowing wind, the birthplace of violent storms, tornadoes, and hailstones the size of hens' eggs which pummeled songbirds and waterfowl to death. It was a land characterized by the grasses -- big bluestem, Indian grass, switchgrass and Canada wild rye -- grasses high enough to be tied together over the back of a horse.

But it was also the land of tremendous floral variety and beauty. Stands of cattails, bullrushes, reeds and sedges bordered low-lying wet spots and marshes. Bur oaks and quaking aspens crept in along borders between prairie and forest.

And more than 250 species of flowering, broad-leaved nongrassy plants -- the forbs -- displayed their brilliant colors from early spring until late into autumn. Scattered across the plains were the delicate pale blue of the blue-eyed grass, the elegant purple of the blazing star, the orange-red of the butterfly weed. Rolling hills of blue-violet bottle gentian, purple prairie clover, yellow coneflower, black-eyed Susans, yellow ox-eye daisies, asters and phlox of every shade from white to pink to purple seemed to stretch endlessly to the horizon.

This was also the land called home to the largest and most spectacular creature of the grasslands, the American bison, traveling in bands of 50 to 200. It was home to the light-colored plains wolves, extinct before the end of the nineteenth century and the black-tailed prairie dogs whose numbers were estimated to be in the millions and whose mounded towns covered hundreds of square miles.

This was home to ground squirrels, moles, mice, pocket gophers and cottontails; to the

ROGER HILL

RON JOHNSON

ROGER HILL

The prairie, home to plants as wells as various species of wildlife such as the prairie chicken (above left) and white-tailed deer (left), is perhaps some of the most difficult wilderness to preserve, for it is also our most valuable cropland.

black-footed ferret, now close to extinction; to elk, white-tailed deer and pronghorn; to badgers, beaver, weasels and skunks; to coyotes, bobcats, mink and the rare kit fox; to prairie chickens, turkeys, whooping cranes and mute swans; to thousands of song birds, marsh birds, raptors and waterfowl.

Grasses, potholes, fire -- these are the images of the grasslands of North America. Between the forests and lakes of the East and the wooded mountain ranges and deserts of the West lies the prairie. Moving towards the east with increasing amounts of precipitation, the grasses grow progressively taller, intermediate between the desert shrubs of the West and the forests of the East.

It is this tallgrass prairie that sparks the imagination. Snatches of it in Ohio and Indiana give way to swatches in Illinois. From southwest Wisconsin and Minnesota, northwest Missouri, almost all of Iowa, and deep into Nebraska, west into the Dakotas and Kansas, stretching south to Oklahoma and Texas and north into Manitoba -- this was the original expanse of the tallgrass prairie.

Even before the ice masses melted, the bison migrated into this region across the Bering Sea landbridge. Eventually, vast herds of this symbol of the tallgrass prairie roamed the grasslands.

Tens of thousands of years ago, ancestors of Native Americans arrived, like the bison, as immigrants from Asia. These early people understood their survival depended on the survival of the buffalo. They lived according to the cycles of nature and knew the role of humans as part of nature, not separate from it. They lived on the prairie without disturbing or destroying it for hundreds of years. Fifty to 60 million bison coexisted with the Indians on the grasslands until the European settlers arrived.

It was the first European settlers who christened the prairie, named for the French word for "meadow," as they looked over the seemingly endless expanses of grasses, broken only by potholes and marshes, streams and the wooded floodplains of rivers.

At first, these farmers from the forested East clung to the safety and familiarity of the woodlands along the waterways. It is said they believed that soil which did not grow majestic trees could never grow crops.

They did not understand that a black treasure lay beneath their feet. Prairie sod, unlike forest sod, is a thick, dark humus-laden mass of fibrous roots one to two feet deep. The roots of the grasses grow downward 12 feet or more. Dead vegetation lies on the surface to accumulate and eventually decay, to become nutrients for the next generations. This is the sod so thick the settlers needed five teams of oxen to pull the breaking plow.

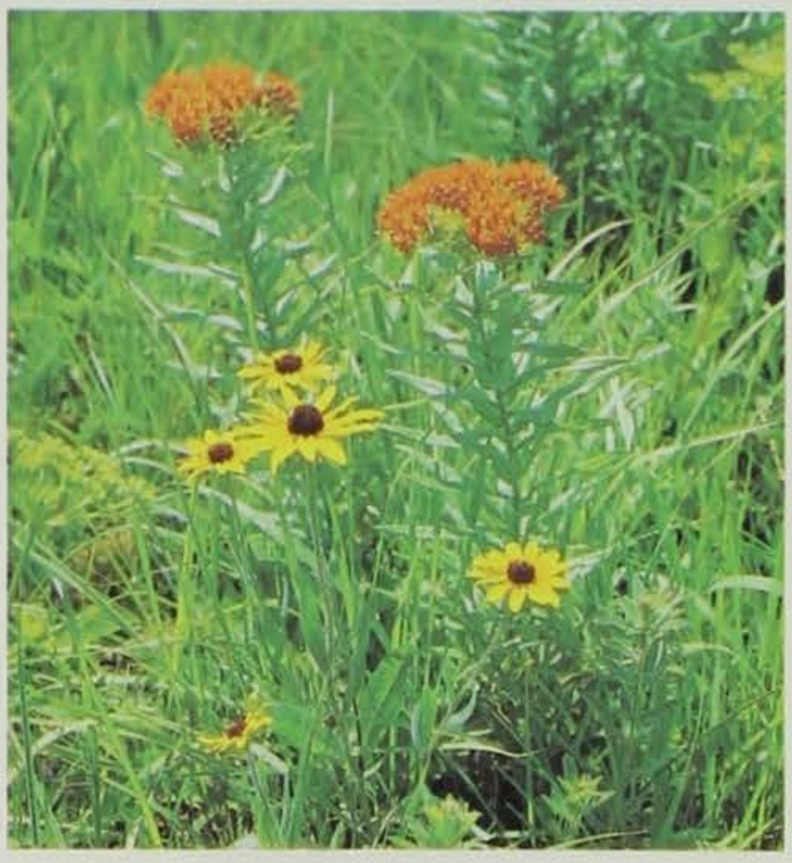
And once its precious secret was discovered, the prairielands paid an enormous price. The homesteaders came, breaking the soil with their steel plows, expanding their fields and destroying the prairie. The country moved westward, first by covered wagon and later by railroad.

The best of the grasslands were soon under cultivation, so the farmers moved into the marginal border land, the slopes and hillsides. The wild animals that had lived in these areas for generations were pushed farther and farther west.

Some, such as the passenger

pigeon, were moved to extinction. Marshes and potholes, nesting sites for great numbers of waterfowl and marsh birds, were drained and tiled. Waterfowl populations subsequently declined.

Where once the prairie blazed with color and beauty, now the land grew tall corn and rippling fields of wheat. Where once the deep thick mats of roots bound the soil, now the overgrazed and overworked soil lay bare and exposed to the erosion of wind and rain.



RON JOHNSON

Butterfly milkweed and black-eyed Susans

Today only remnants of our native prairie remain, patches in forgotten pioneer cemeteries or tucked away in corners, small pieces along never-disturbed railroad rights of way. In Illinois, Wisconsin, Minnesota and Iowa a few small tracts remain. Once 85 percent of Iowa was covered by prairie. Today, less than 10,000 acres of approximately 30 million acres remain. In the Dakotas, Nebraska and Missouri, larger areas are still in existence, but only in Kansas and northern Oklahoma are great acreages of tallgrass prairie still intact.

Today's threats are not from the plow, but from modern development and progress. The few remaining large tracts of the tallgrass prairies are in danger of being parceled into small tracts by construction of highways and power transmission lines crisscrossing the land that once belonged to the grasses. Urban sprawl stretches father out into the prairies, covering up the few remaining acres with housing developments and sidewalks. Water impoundments and reservoirs flood out the grasslands and all the life within them.

The bounties of the tallgrass prairie -- the grasses and forbs, the bison and waterfowl, the potholes and fires -- would be reason enough to preserve our prairie wilderness. But perhaps just as compelling a reason is the mystique of the prairie.

The prairie is, as John Weaver wrote in *North American Prairie* (1954), ". . . composed of many different species of native American plants. It appears as an inextricable mass of endless variable vegetation. One glories in its beauty, its diversity and the ever-changing patterns of its floral arrangements. But (we are) awed by its immensity, its complexity and the seeming impossibility of understanding and describing it. After certain principles and facts become clear, however, one comes not only to know and understand the grasslands but also to delight in them and to love them."

It sounds so simple and obvious, but the prairie is perhaps some of the most difficult wilderness to preserve, for it is also our most valuable cropland. But if we must make choices, surely there are values other than economic ones to be considered. The prairie is part of our heritage and history, a gift to be passed on to future generations, a reminder of the beauty and vastness which once spilled over the landscape. Surely these are values too vital to disregard.

Cele Burnett is a naturalist with the Story County Conservation Board.

CALENDAR

SEPTERMBER 9-15
Prairie Heritage Week.

SEPTEMBER 21-23
Competitive Horseback Trail Ride. Stephens State Forest near Lucas is the location for this event sponsored by the North American Trail Ride Conference and hosted by the Iowa Trail Riders Association. Competitive trail rides will include open and novice categories. For more information, contact Ruth Bourgeois, Rte. 3, Box 97, Newton, Iowa 50208, (515) 792-5962.

SEPTEMBER 22
National Hunting and Fishing Day.

SEPTEMBER 22-23
Prairie Harvest Festival. Smith Lake Park in Algona is the location for this festival featuring square dancers, folk music, bluegrass band and craft demonstrations. For more information, contact Kossuth County Conservation Board, Rte. 2, Box 216A, Algona, Iowa 50511, (515) 295-2138.

SEPTEMBER 29-30
Fort Atkinson Rendezvous. Buckskinners, period costumes, food and craft, military drills and theatrical production within the historic fort walls. For more information, contact Volga River State Recreation Area, Rte. 1, Box 72, Fayette, Iowa 52142, (319) 425-4161.

OCTOBER 13-14
Forest Crafts Festival. Lacey-Keosauqua State Park is the location for wood crafts and demonstrations, buckskinners and an operating sawmill. For more information, contact Lacey-Keosauqua State Park, Box 398, Keosauqua, Iowa 52565, (319) 293-3502.

Making Heads or Tails of the Duck Season

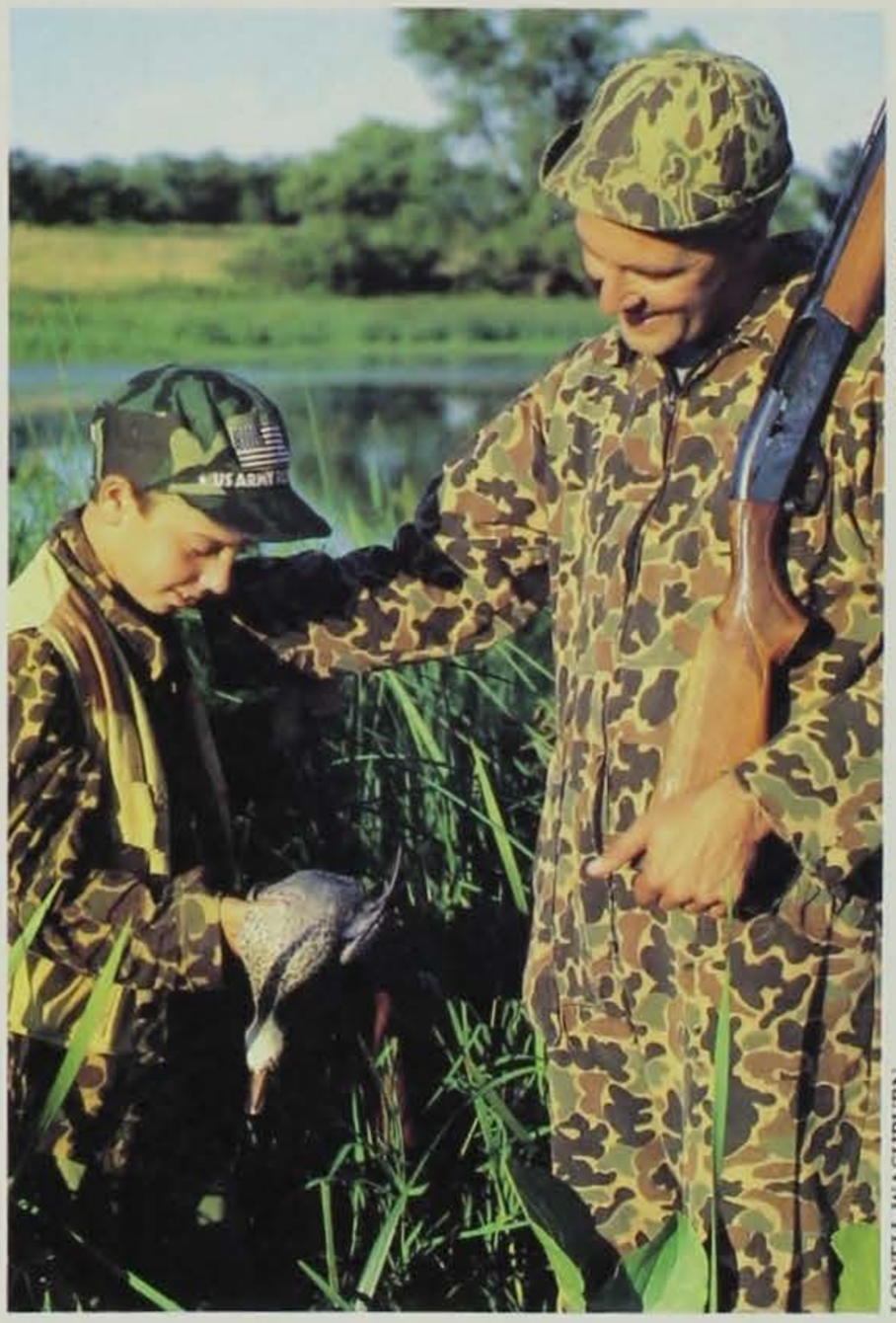
LOWELL WASHBURN

For a full decade, waterfowl populations have been under siege as a relentless blast furnace drought has plagued the northern prairies. Some duck populations have been driven to record low numbers. There was fear that if habitat conditions did not improve this year, populations would continue to plummet.

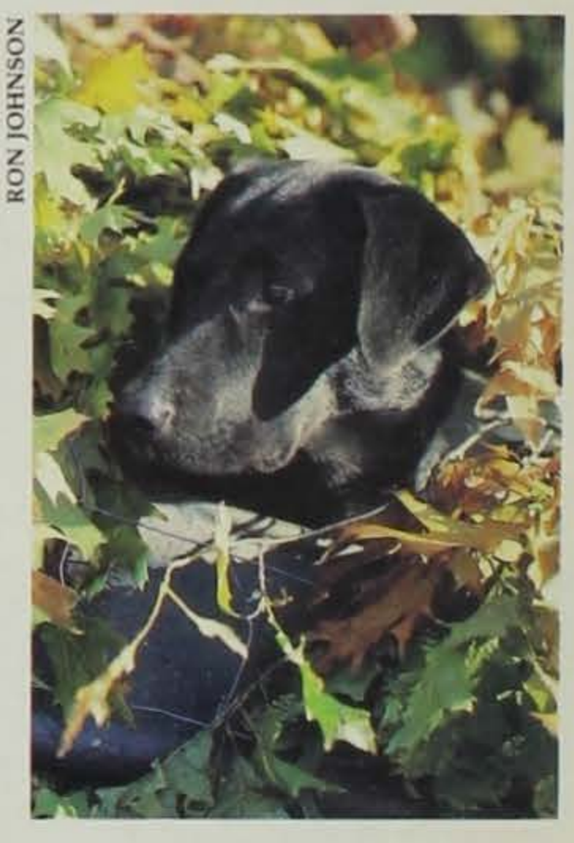
But conditions have eased. Rain has fallen, and some ponds have refilled. Consequently, most duck populations have been able to hold their own.

LOWELL WASHBURN

by Guy Zenner and Lowell Washburn



LOWELL WASHBURN



RON JOHNSON

The U.S. Fish and Wildlife Service released figures this summer that indicate this year's fall flight of ducks should be very similar to last year's. Spring breeding ground surveys indicated that most duck populations were the same as last year. Of course, some areas had improved habitat while others deteriorated due to local drought conditions. The good news is that overall, duck populations in the surveyed areas are holding their own. May pond numbers increased throughout the Canadian provinces. Total pond counts were up a full 66 percent in surveyed areas of Canada and the U.S. Although these indexes remain below the long-term average, these improvements may signal the end of Canada's prolonged dry spell.

In Minnesota, duck populations remained similar to last year while both Manitoba and Saskatchewan had improved habitat and duck numbers. However, on the downside, both North and South Dakota had very poor habitat conditions and, likewise, poor duck populations and production. Some improvements in precipitation and wetland habitat were seen during late May and June in prairie Canada, Minnesota and South Dakota which improved the renesting effort for some species. Overall, the pluses equaled the minuses. The fact the downward trend in duck numbers does not continue should be viewed with optimism.

In Iowa locally nesting ducks found difficult conditions in early spring. However, timely rains in late May and early June improved wetland habitat across most of Iowa, the exception being the extreme northwest corner of the state. Replenished wetlands, even if only half full, were an improvement over last year's dry marshes and helped insure that any hatched ducklings had a good chance of surviving to flight stage. Also, ample late summer precipitation has already set the stage to boost next year's waterfowl production.

With the duck populations the same as last year, duck hunters should not expect many changes in the upcoming season regulations. The U.S. Fish and Wildlife Service is still very concerned about the status of duck populations and has again offered Iowa (and other Mississippi Flyway states) options for a hunting season that is designed to achieve at least a 25 percent reduction in harvest. These options consist of a 30-day season and a conventional bag limit.

Despite an increased duck harvest in the Mississippi Flyway, the nation-wide harvest of ducks during 1989 still remained well below the normal, as was desired. Harvest rates for species of concern, such as mallard, pintail and blue-winged teal, did not increase dramatically. In Canada the harvest rates remained the same or were reduced.

Preliminary estimates from the U.S. Fish and Wildlife Service surveys show Iowa duck hunters bagged only 88,503 ducks last year, which is still 63 percent below the average harvest. Iowa's poorest season came in 1962 when only 45,100 birds were killed. The mallard harvest was only 32,100 -- down 23 percent over last year but 68 percent below the long-term average. As intended, this remains substantially

RON JOHNSON

below the harvest of 64,200 seen during the 1987 season. The average number of ducks killed per hunter was 5.1 birds per season, down 15 percent from the long-term average of six ducks per season.

The upcoming duck season promises to be quite similar to last year with one major exception. Our local drought has abated and north-central Iowa marshes have returned to crest levels during late summer. In northwest Iowa, wetland conditions have also improved, though much less dramatically. Overall, hunters will enjoy much better habitat than last year. Much of the rest of the state has also received an abundance of rainfall this year, replenishing the nearly dry ponds and wetlands of last fall. These changes in habitat alone will entice more ducks to stay longer on our local marshes, thus improving the chances for hunters to encounter their quarry.

Improving the outlook even more is the knowledge that the fall flight of geese through Iowa should be very good again this year.

The principle populations of Canada geese that nest along the sodden, windswept tundras near Hudson Bay and migrate through Iowa have been doing very well during recent years. Production estimates indicate the fall flight should be dramatically improved from last year, and is, in fact, at an all-time record high. Our local giant Canada geese, as well as giants in neighboring states, such as Minnesota, continue to expand their range and increase their numbers. The number of giant Canadas is also presumed to be at an all-time high, and the current population is more than five times that of the 1969 level. These birds will provide some exciting hunting opportunities across much of the state and should not be overlooked. (See *The Flipside*, page 30.)

Snow goose populations remain strong and a very good fall flight is again predicted. The hunting opportunity experienced here in Iowa will depend primarily on weather conditions to the north and our wetland habitat along the Missouri River. In the past decade, snow geese have primarily restricted their fall migration patterns to a relatively narrow band over western Minnesota and western Iowa. However, last year's drought appeared to cause more of these geese to migrate over central Iowa. If the drought in the Dakotas continues, we may see the same pattern again this year. There are plenty of snow geese for hunters to pursue. All we need is the right weather to encourage a few hundred thousand of these gregarious birds to spend some time in Iowa on their way south.

There is no question the decade of the 80s has been one of dismal disappointment for the continent's duck populations. But hopefully, the worst part of the crisis is behind us as rains have begun to return to prairie nesting habitats across the northern U.S. and southern Canada. In Iowa, additional cause for optimism comes in the form of newly rejuvenated, food-rich marshlands that will prove irresistible to migrating ducks. Also, due to wetland restoration work that has been occurring on both private and public lands, more than 300 new wetlands have been added to the state's inventory since the drought began. Add to this the fact that Canada geese continue to increase in spite of excellent harvest rates, and it does seem as if there are things for the Iowa waterfowler to feel good about.

Although the upcoming hunting season's length and bag limits may not be much improved over last year, concerned hunters and nonhunters alike should continue to purchase duck stamps. Duck stamps are the primary source of monies used to acquire and preserve waterfowl habitat. And preserving wetland habitat is the key to the recovery of American's waterfowl population.

Guy Zenner is a waterfowl research biologist for the department at Clear Lake.

Lowell Washburn is an information specialist for the department at Clear Lake.

The Flipside

Duck hunters have had it tough over the last few years with reduced bag limits, shorter seasons and the drought. However, on the reverse side of the waterfowl coin are geese -- both snows and Canadas are at high levels, offering hunters a possible haven this year.

by Bill Ohde

Although things are looking better, there are no two ways about it -- duck hunters have had a tough time over the last few years. What with declining populations and the necessity of reduced bags and shorter seasons, duck enthusiasts have had little to be enthused about. On top of everything else, the drought has left many Iowa duck hunters without a place to even enjoy a sunrise over the decoys.

On the reverse side of the waterfowl coin are geese. Both snow geese and Canadas are at high population levels, and snow goose hunting regulations have even been liberalized in recent years. The season length for Canada geese was shortened temporarily but should soon return to a more generous offering. Interest and participation in goose hunting seems to be at an all-time high.

Why the big difference in success between critters as similar as ducks and geese? The answer lies in their respective life histories.

Probably the most critical difference is where they nest. The most important duck production area in North America is the prairie pothole region, stretching from Iowa through Minnesota and the Dakotas into Manitoba, Saskatchewan and Alberta. The shallow marshes and rolling grasslands of this region are the life blood of mallards, pintails, canvasbacks, blue-winged teal and many more.

LOWELL WASHBURN

However, this area has been heavily impacted by increasingly intensive agriculture. Wetland drainage and grassland conversion for corn and wheat production have drastically reduced duck production. Drought has compounded the problem by shrinking available breeding areas and allowing easier wetland conversion.

Most of our geese, on the other hand, nest much further north. The majority of both Canada and snow geese, that migrate through Iowa, nest on the tundra around Hudson Bay and other Canadian northlands. Their nesting grounds are too far north to be impacted by agriculture and have remained relatively unchanged.

Another factor affecting overall Canada goose numbers is the success of giant Canada goose reintroduction programs. This is one subspecies of Canada geese that does nest farther south. Giants have proven to be much more adaptable than ducks, however, and differ in that nesting is not strictly tied to

shallow marshes or grasslands. They usually nest on a muskrat hut, island or peninsula, but will readily accept artificial structures along the shore or over water. Giants will nest not only on marshlands but also on deep lakes, reservoirs, farm ponds and old quarries. Giant Canada goose production is steadily climbing throughout the country.

KEN FORMANEK

It appears that waterfowl hunters may do well to put more emphasis on geese in upcoming years. With tundra-nesting geese doing very well and giant Canadas on the increase almost everywhere, the goose hunting future looks bright.

Ducks face additional problems on their wintering grounds. Coastal marshes and the bottomland hardwood wetlands of the lower Mississippi River have been the mainstay of wintering mid-continent ducks. These areas have also been rapidly eliminated by agricultural conversion, development and channelization projects. Ducks take it on the chin again.

Geese have responded to large refuges for migration and wintering. Provide them with open water and some large expanses of protected cropland for feeding, and they rapidly key in. They have become adept at hop-scotching their way south from one traditional stop-over to the next. The spectacular concentrations of snow geese along the Missouri River, and the tremendous flights of Canada geese from Horicon Marsh in Wisconsin to southern Illinois refuges attest to their refuge-tuned behavior.

Taking all of this into consideration, it appears that waterfowl hunters may do well to put more emphasis on geese in upcoming years. With tundra-nesting geese doing very well and giant Canadas on the increase almost everywhere, the goose hunting future looks bright.

Goose hunting opportunities vary around the state, but tend to be more land-based than duck hunting. Most hunting takes place in cropfields around refuge areas, where the geese are flying out to feed. A tradition for hunting Canada geese in this manner has developed around the giant Canada goose areas in northwest and north-central Iowa, as well as around Rathbun Reservoir and Lake Odessa in the southern part of the state. Field hunting for snow geese is extremely popular around the Riverton, Forney Lake and DeSoto refuges in southwest Iowa.

Some goose hunters, however, pursue their sport on water, much the same as a traditional duck hunt. Success for these hunters is usually more dependent on good migration days and new arrivals, although increasing populations of local giants are creating new opportunities.

Does all this mean that duck hunting will soon be a thing of the past? Absolutely not. As indicated in the previous article, things are looking brighter for ducks. And, great strides are being made to restore their abundance under the direction of the North American Waterfowl Plan. Waterfowl managers are cautiously optimistic that those continued efforts, coupled with a return of water to the prairie, can be successful.

Until then, take advantage of our current success story and get after those geese!

Bill Ohde is a wildlife biologist for the Odessa Wildlife Unit in southeast Iowa.