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Iowa Waterways -- Biological Communities

Iowa Association of Naturalists

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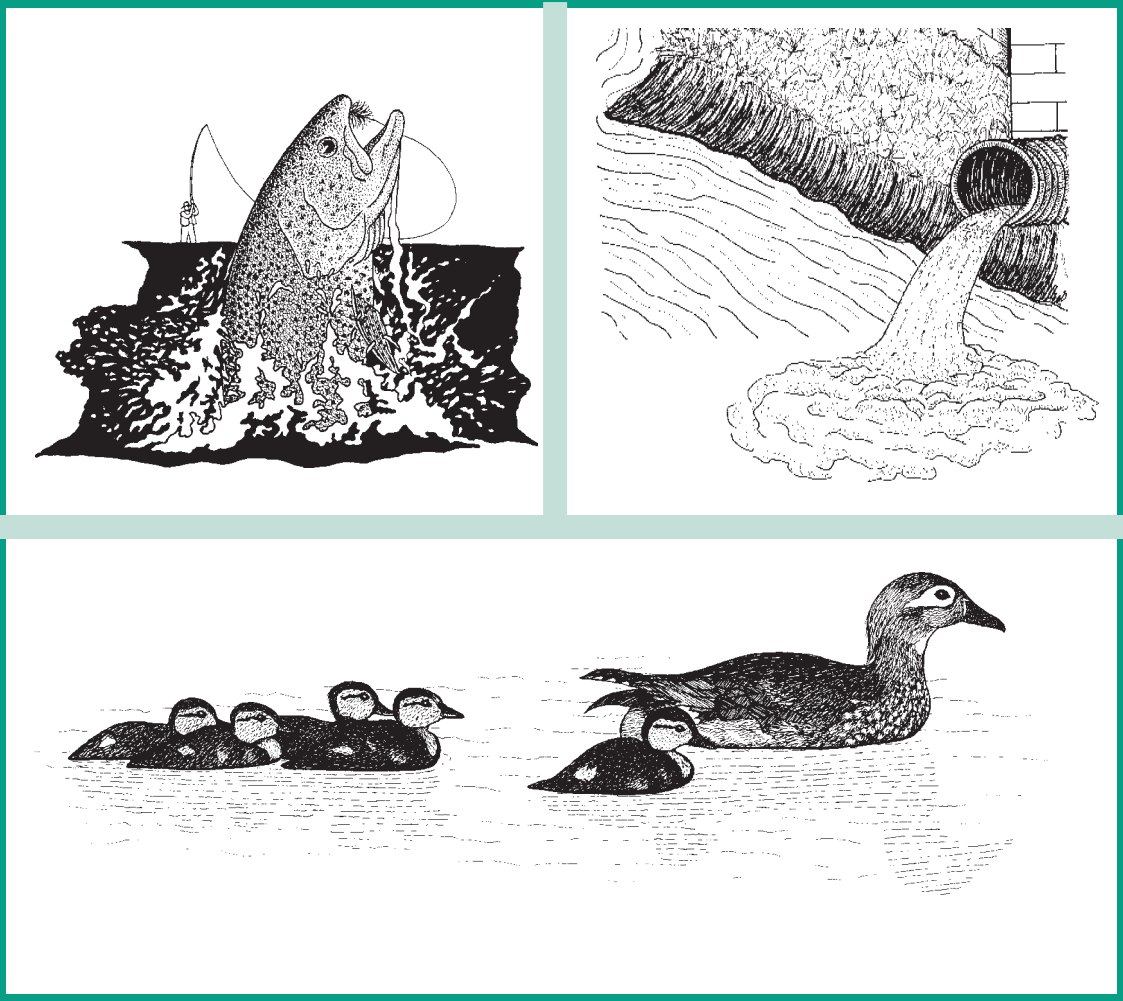
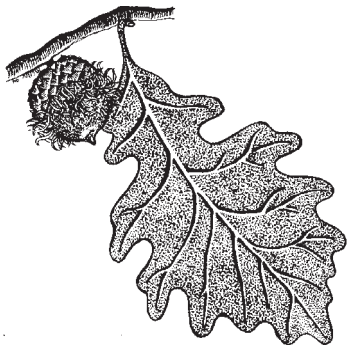
Iowa Waterways



Iowa's Biological Communities Series



Iowa Association of Naturalists

The Iowa Association of Naturalists (IAN) is a nonprofit organization of people interested in promoting the development of skills and education within the art of interpreting the natural and cultural environment. IAN was founded in 1978 and may be contacted by writing the Conservation Education Center, 2473 160th Rd., Guthrie Center, IA 50115, 515/747-8383.

Iowa's Biological Communities Series

Iowa's natural beauty has long been a great factor in drawing people to the state. But there is more to that beauty than meets the eye. To assist Iowa educators in teaching their students about the complexities of Iowa woodlands, wetlands, waterways, and prairies, the Iowa Association of Naturalists has produced a series of booklets which offer a basic, understandable overview of Iowa biological communities. The five booklets in this series are:

Iowa's Biological Communities (IAN-201)
Iowa Woodlands (IAN-202)
Iowa Prairies (IAN-203)
Iowa Wetlands (IAN-204)
Iowa Waterways (IAN-205)

The *Iowa's Biological Communities Series* is published by IAN with major funding from the Resource Enhancement And Protection (REAP) Conservation Education Board (September, 2001).

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Iowa Waterways is one in a series of five booklets that are part of the *Iowa's Biological Communities Series*. The booklets in the series include:

Iowa's Biological Communities

Iowa's Biological Communities	(IAN-201)
Iowa Woodlands	(IAN-202)
Iowa Prairies	(IAN-203)
Iowa Wetlands	(IAN-204)
Iowa Waterways	(IAN-205)

The Iowa Association of Naturalists has produced six other booklet series that provide readers with a clear, understandable overview of topics concerning the Iowa environment and conservation. The booklets included in each of the other five series are listed below.

Iowa Physical Environment Series

Iowa Weather	(IAN-701)
Iowa Geology and Fossils	(IAN-702)
Iowa Soils	(IAN-703)

Iowa Wildlife Series

Iowa Mammals	(IAN-601)
Iowa Winter Birds	(IAN-602)
Iowa Nesting Birds	(IAN-603)
Iowa Reptiles and Amphibians	(IAN-604)
Iowa Fish	(IAN-605)
Iowa Insects and Other Invertebrates	(IAN-606)

Iowa's Natural Resource Heritage

Changing Land Use and Values	(IAN 501)
Famous Iowa Conservationists	(IAN 502)
Iowa's Environmental Laws	(IAN 503)

Iowa Wildlife and People

Iowa Wildlife Management	(IAN-401)
Keeping Iowa Wildlife Wild	(IAN-402)
Misconceptions About Iowa Wildlife	(IAN-403)
State Symbols of Iowa	(IAN-404)
Iowa Food Webs and Other Interrelationships	(IAN-405)
Natural Cycles in Iowa	(IAN-406)
Iowa Biodiversity	(IAN-407)
Adapting to Iowa	(IAN-408)

Iowa Plants

Iowa's Spring Wildflowers	(IAN-301)
Iowa's Summer and Fall Wildflowers	(IAN-302)
Benefits and Dangers of Iowa Plants	(IAN-303)
Iowa's Trees	(IAN-304)
Seeds, Nuts, and Fruits of Iowa Plants	(IAN-305)
Iowa's Mushrooms and Other Nonflowering Plants	(IAN-306)
Iowa's Shrubs and Vines	(IAN-307)

Iowa Environmental Issues

Iowa Habitat Loss and Disappearing Wildlife	(IAN-101)
Iowa Air Pollution	(IAN-102)
Iowa Water Pollution	(IAN-103)
Iowa Agricultural Practices and the Environment	(IAN-104)
People, Communities, and Their Iowa Environment	(IAN-105)
Energy in Iowa	(IAN-106)
Iowa Waste Management	(IAN-107)

These booklets are available to download via PDF on the ISU Extension Store:

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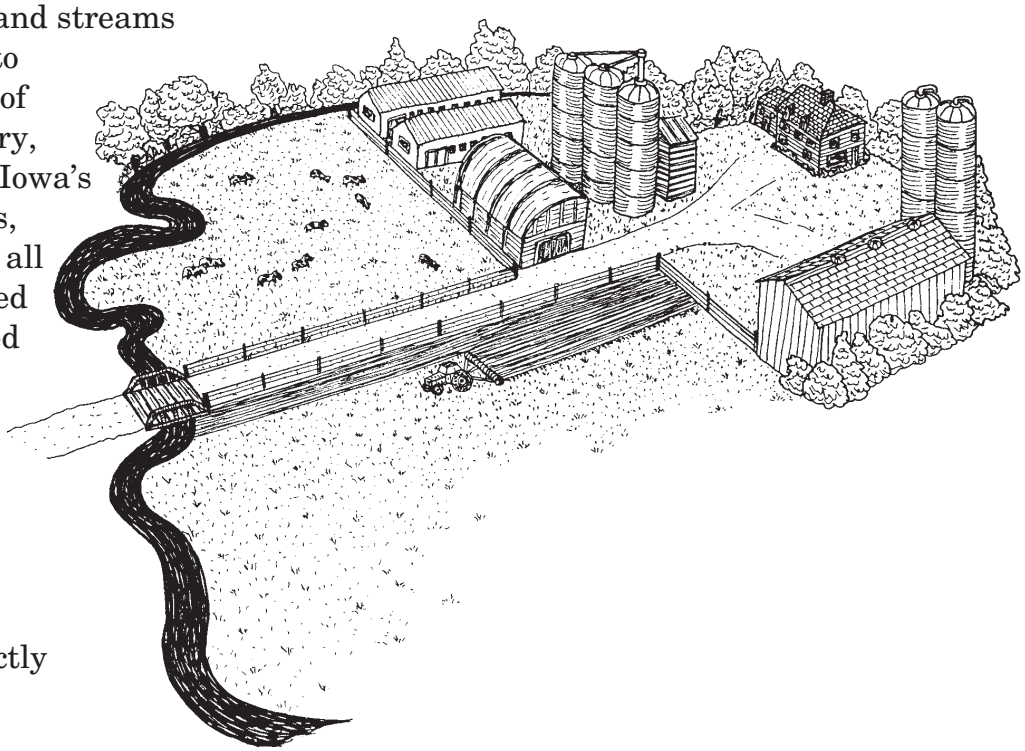
Iowa Waterways

Waterway communities are places where animals and plants make their home within and along the moving waters of rivers, streams, or creeks. In this booklet, rivers refer to our larger interior waterways and the Mississippi and Missouri Rivers. Smaller interior waterways are referred to as streams. There is both an abundance and diversity of waterways in Iowa - the great Mississippi and Missouri border rivers, the flat meandering streams found throughout most of Iowa, and the cold, clear, fast waters of northeast Iowa. Wherever you travel in Iowa, you are only minutes from a waterway.

Iowa was once covered by vast prairie grasslands, open savannas, and marsh land. Numerous streams and rivers were bordered by woodlands and associated wetlands. But the landscape of Iowa has undergone drastic changes in the past 160 years. Rivers and streams have been altered to meet the demands of agriculture, industry, and development. Iowa's prairies, woodlands, and wetlands have all been greatly reduced and largely replaced by farms, towns, industries, and roads. Many of the once vibrant waterway communities have been destroyed directly and indirectly by these changes.

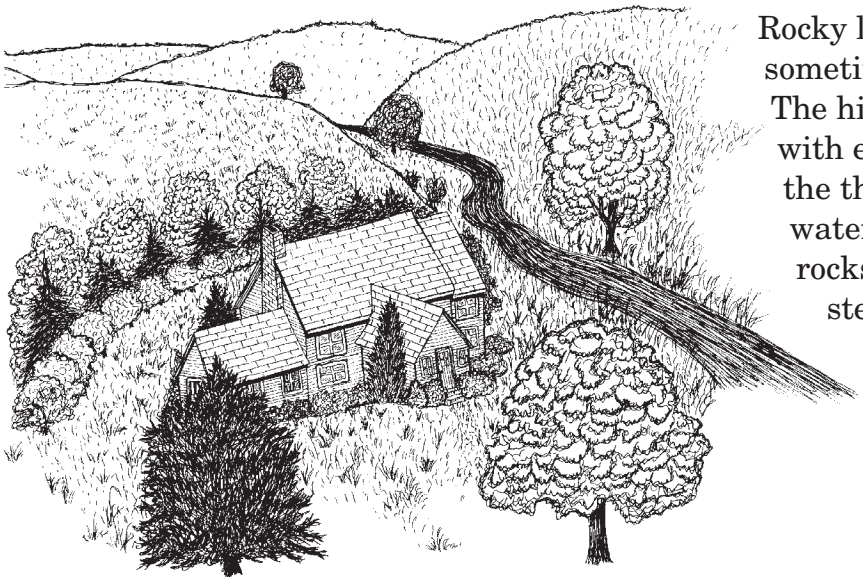


Waterways are homes for a great variety of life. Some plants and animals have adapted to life in the stream's channel current, while many more favor the slower moving backwaters. Rivers and streams are places where land communities border water communities. They may contain combinations of woodland, wetland, or prairie life, as well as aquatic life.

Iowa's waterways vary, depending on the underlying landscape. Where the landscape is relatively young, streams slowly meander through flat terrain and black topsoil. Much of north and central Iowa contains these types of waterways. This area, known as the Des Moines Lobe, was formed as a result of the most recent glaciers that covered Iowa 10,000-14,000 years ago. The glaciers flattened and scraped the land, leaving behind a level landscape and fertile soils.

The gently rolling hills and deep river valleys of southern Iowa are part of an older landscape. Over time, the region has become well-drained, with meandering rivers and streams making their way to the Mississippi and Missouri Rivers.

Where the landscape is very old, streams have cut well-defined beds into the land. Rocky ledges and stone cliffs sometimes border the waterways. The hilly landscape is well-worn, with exposed rock poking through the thin, eroded topsoil. Cool water rushes and tumbles over rocks and gravel, and down the steep slopes. The northeast corner of Iowa contains these types of streams. The area was not covered by the most recent advances of glaciers and is therefore the "oldest" landscape in Iowa.

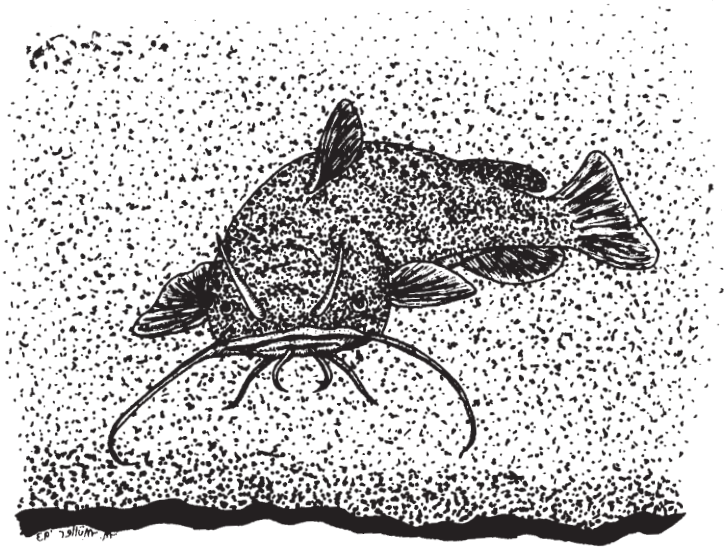


Water habitat

The types of plants and wildlife that live in a waterway community are dependent on the characteristics of its waters.

Clouded water

Turbidity refers to the degree to which a waterway is clouded with sediment. Many types of fish, such as trout and northern pike, and many invertebrates cannot survive in water that is very turbid. Smallmouth bass and some other species of fish require gravel bottoms for spawning, and turbid waters often have muddy or sandy bottoms. Plants are also affected by clouded water, which blocks incoming sunlight. The bottom of a turbid stream is usually without plant life.



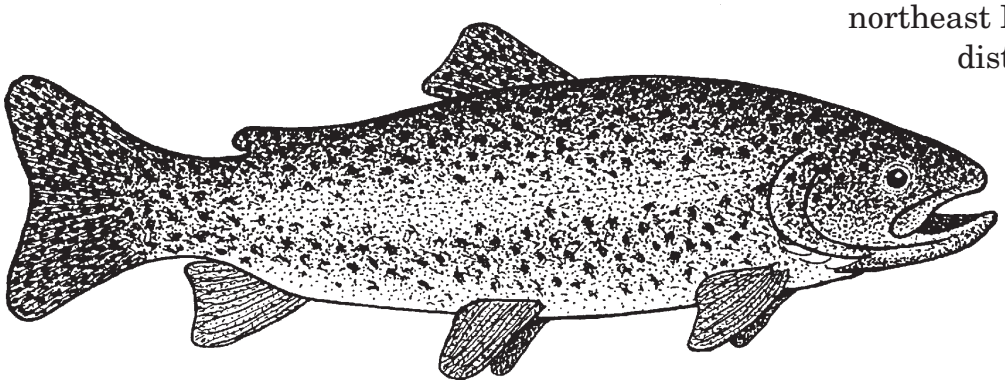
Although catfish and bullheads can withstand moderate levels of turbidity, other fish, such as trout and smallmouth bass, cannot.

Depth and velocity

The **depth** and **velocity** of a waterway largely determine life within the water. Shallow, slow-moving waters are typically warm – too warm for fish such as trout and smallmouth bass. Largemouth bass, bluegill, and other sunfish can live in these waters. Shallow areas of a river or stream are usually places where these fish make their nests and spawn. Where shallow waters form a wetland, many land animals become part of the stream community. Mink hunt along the stream bank for muskrats and other small animals. Raccoon, opossum, and deer tracks can be seen on the muddy shores.

Plants also are affected by depth and water velocity. Shallow, slow waters become wetland habitat for emergent plants such as bullrushes. Floating plants, like small duckweeds that sometimes carpet the edges of a stream, and submersed plants, like coontail, live in slow, shallow water. As water becomes deeper, light decreases and reduces the productivity of plants, and therefore animals, in a river or stream.

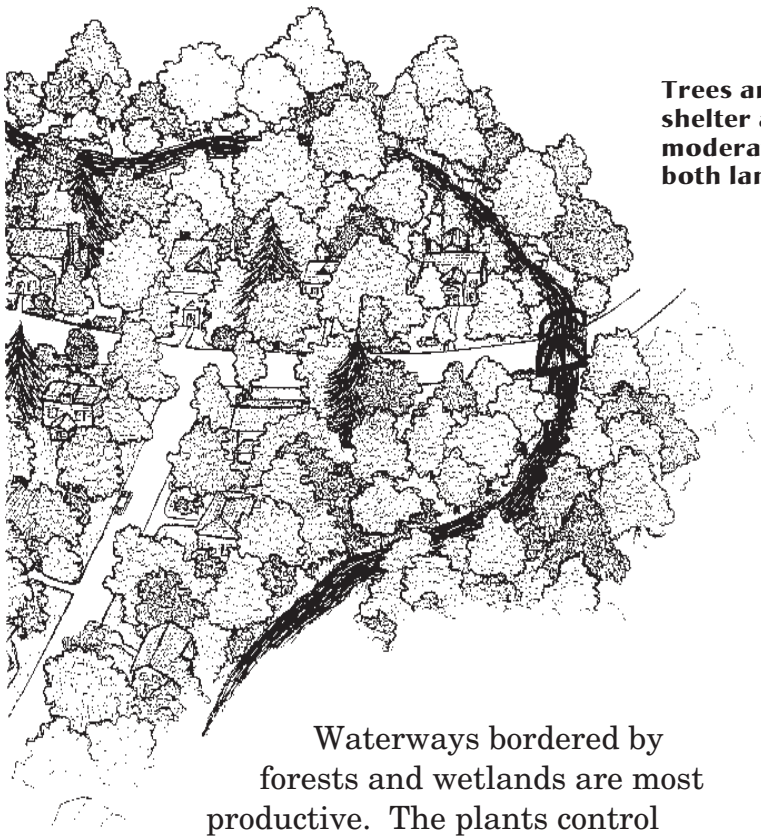
Only plants and animals that can attach to rocks or logs, swim strongly, or find "quiet places" can make their home among fast-moving waters. Fast-moving water is usually colder and contains more oxygen. Trout streams in northeast Iowa are distinguished by their strong currents and cold water.



Trout are found in pools and eddies associated with fast-moving, cold water streams in Northeast Iowa.

Surrounding environments

The waterway community is unique in that it is always moving. Water and nutrients, and some plant seeds and animals are imported from upstream and exported downstream. The condition of the water, plants, and wildlife depends on the surrounding environment – the land bordering the river or stream and the waters upstream.



Trees and other plants provide shelter and shade the water, moderating temperatures for both land and stream animals.

Waterways bordered by forests and wetlands are most productive. The plants control flooding and erosion, and filter out soil and chemical pollution. Trees and other plants provide habitat and shade the water, moderating temperatures for both land and stream animals. Fallen leaves and other decomposing plants and animals add nutrients to the moving water.

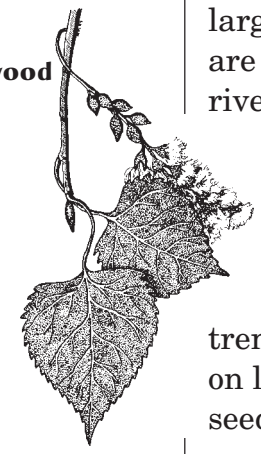
Changing rivers

Waterways do not flow naturally in a straight line. Rivers and streams periodically flood, change course, and cut new and deeper channels. Eroding soils cause riverbeds to fill with silt. Spring floods may "flush-out" the silt, replacing the muddy bottom with sand or gravel.

A person standing on a bluff bordering the Mississippi River in eastern Iowa and looking east will see a broad, flat floodplain separating the hills of Iowa and Illinois or Wisconsin. This floodplain was formed over many years as the Mississippi grew and shrank, meandered, and formed oxbows. Large rivers and streams often form these wide wetland floodplains.

Plants of Iowa waterways

Waterways usually are bordered by a variety of wetland plants specially adapted to water. Plants can only grow where the water is clear or shallow enough for them to get the sunlight, oxygen, and nutrients they require. Plant life in the deeper channels of large streams and rivers is absent. The following are descriptions of some common plants of Iowa rivers and streams.



Eastern cottonwood

Cottonwood is a large tree found along rivers, lakes, and wetlands. The triangular leaves are three to five inches long. The leaf petioles are flattened, causing the leaf to tremble in the wind. The seed capsules are borne on long catkins and produce many tiny, cottony seeds that are blown by the wind.

Silver maple

Silver maple is a climax canopy tree found in river bottoms. The leaves of the silver maple have five lobes and the lobe sinuses are pointed or slightly rounded. The leaves are green above and silvery below, and in autumn become bright yellow with tints of orange and red. The seeds are borne on wings that are longer than those of other maples. Sap from these trees can be used to make syrup, but silver maples do not have as high a sugar content as their relatives, the sugar maples.

Black willow

Black willows prefer rich, moist soils along floodplains. They are the largest of the willows, sometimes growing 80 feet tall. Willows are easy to identify by their long narrow leaves with long tapering tips. The leaves of black willows are from three to six inches long and up to half an inch wide. Willows have soft and weak wood that lacks durability, and are rarely used commercially.

Sycamores grow along waterways and in damp woodlands. They may be more than 100 feet tall and have a trunk diameter of ten feet. The leaves are large and maple-like, from six to ten inches wide. Unlike maples, which have an opposite leaf arrangement, sycamore leaves are arranged alternately on the branches. Sycamores produce seeds that hang from a long stalk in a ball-shaped cluster, approximately one inch in diameter.

Jewelweed, also called touch-me-not, is a common wildflower of moist, shady woodlands and stream edges. The pale-yellow to orange flowers are approximately 1.5 inches long and sometimes spotted. The stem is translucent, containing a watery juice that may be used to relieve itching due to poison ivy, stinging nettles, and even athletes' foot. The tall leafy plant grows to a height of two to five feet.

Jewelweed

Watercress is an aquatic plant that grows to a height of four to ten inches and is usually found growing in colder water. The roots anchor the plant to the bottom of a moving stream while the stem floats in the water. The leaves may be very small or up to six inches long.

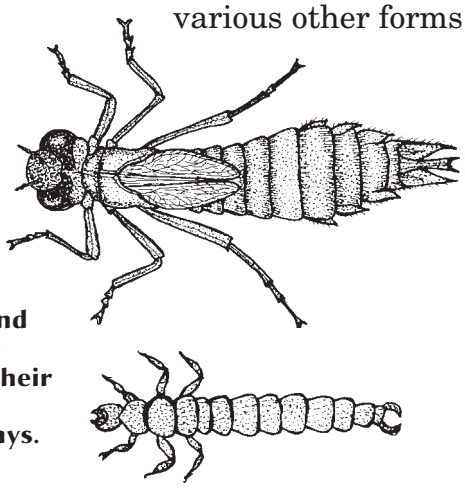
Duckweeds are tiny, floating plants which may form a carpet-like cover over still wetland waters. The small, round leaves are attached to one or more hair-like roots. There are several species of duckweeds which range in size from the 2.5 millimeter **great duckweed** to the one millimeter **watermeal**.

Duckweed is a tiny plant that often grows in large groups. A single plant is shown above.

Algae and **mosses** often cover the rocks and plants in a stream community. Algae is also found floating in stream water and is probably the most important source of food in a waterway or wetland community. Mosses differ from algae by having leaf-like and root-like structures.

Animals of Iowa waterways

Most of the animal life found in rivers and streams is restricted to slower-moving, shallow waters where plants are more common. But some animals have adapted to life in fast currents. Fish live in waterways. So do various other forms of life, each with its own special adaptations to living in water. Different habitats within a waterway may be critical in the life cycle of Iowa wildlife – providing areas for breeding, raising young, or gathering food. For many insects and amphibians, periods of their life cycle rely on wetlands and waterways.



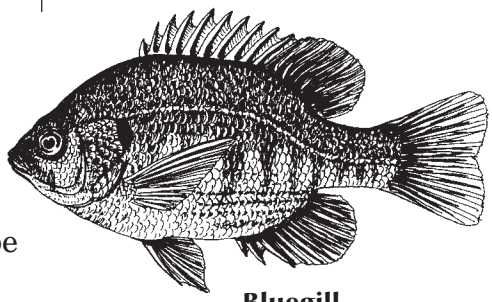
Dragonflies (above) and caddisflies (below) lay their eggs in water. Their larvae live in feed in wetlands and waterways.

Common wetland fish

Warm, shallow waters, often low in oxygen and high in plant life, are typical of most Iowa streams. Many fish are well-adapted to Iowa's broad, shallow waters – so long as the water is not too warm or polluted.

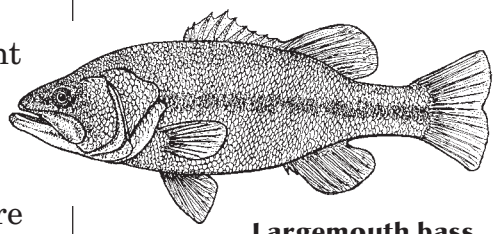
Bluegills and black crappies find cover and nesting places in the weedy wetland shorelines. Largemouth bass wait among plants for the chance to catch an unsuspecting frog, crayfish, or small fish. One of the most numerous fish found in slow-moving rivers is channel catfish. Catfish have long whisker-like barbels which act as antennae as the fish search the dark wetland bottoms for plants or animals – dead or alive.

Bluegills, crappies, bass, and catfish are all considered "sport fish," and are highly sought by Iowa anglers. Less common sport fish in Iowa waterways include northern pike, walleye, and stocked trout. Native trout are rare in Iowa. "Rough fish" are less sought by anglers, but may be critical to food chains that support sport fish. Many are members of the minnow family and include the small minnows, shiners, and chubs. Carp and suckers are also considered rough fish, although some may grow to more than 80 pounds.



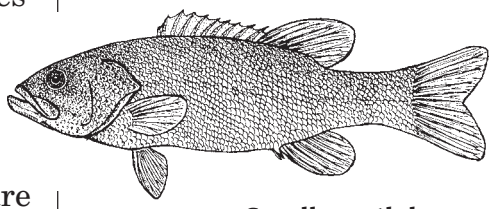
Bluegill

Bluegills are usually light or dark olive, but may be orange or bluish with a bright orange and yellow throat. Their gill covers sometimes have a blue color and always have a black tip. Bluegills are very common in a variety of lake, pond, or stream habitats. They prefer clear water with sand or gravel bottoms and often grow to be eight or nine inches long.



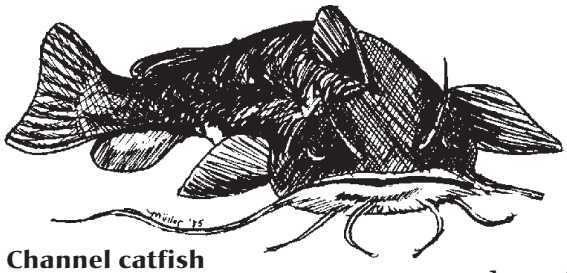
Largemouth bass

Largemouth bass prefer still, warm waters where they hide among wetland plants. They are most common in lakes and ponds but also live in the Mississippi and Missouri Rivers and some interior streams. Largemouth bass are big fish, often more than 12 inches long, and occasionally longer than 20 inches. They are distinguished from other bass by their large mouths which extend back past the eye. Largemouths also have blotches on their body, and the blotches sometimes form a line along the side of the body. They are dark green on the back and lighter on the sides.



Smallmouth bass

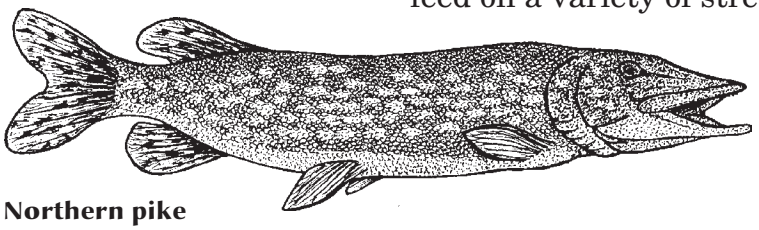
Smallmouth bass look much like largemouth bass but prefer cooler, faster-moving water and are strictly a stream fish. They have a smaller mouth than the largemouth. When the mouth is closed, the jaw does not extend past the eye. They also have five olive-green bars radiating back from the eye. The eye is usually a brighter red color.



Channel catfish

Channel catfish, like all catfish, have a scaleless, slimy body and whisker-like barbels. Channel catfish are found in nearly all Iowa rivers and streams and in some lakes and farm ponds. They are a silvery-gray color with many small dark spots and have a deeply forked tail. They sometimes weigh more than 20 pounds, although five- to ten-pounders are good-sized channel catfish.

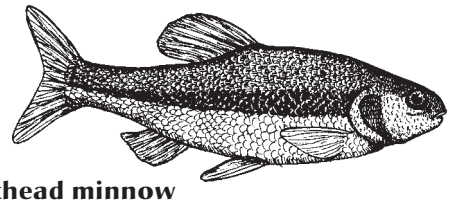
Northern pike are found throughout Iowa, but are most common in larger lakes and in the headwaters of major Iowa streams. They are large, streamlined fish with a long snout full of sharp teeth. Colors of the fish vary, but most are dark green on the back and have light yellow spots on the sides. Northerns prefer cold water and are most often found by anglers in early spring. They feed on a variety of stream and surface animals, and grow to be two to four feet long.



Northern pike

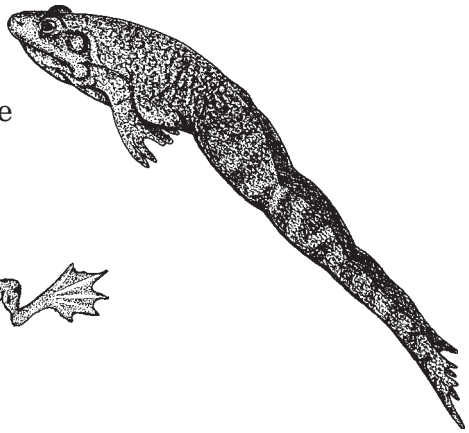
Northern common shiners are larger members of the minnow family found in most Iowa streams and border rivers. They grow to a length of eight to ten inches. They are silvery fish, sometimes tinted with pink.

Fathead minnows are one of the most abundant minnows in Iowa and the most important food and bait fishes for many Iowa sport fish. They are dark olive-green on their back, and have a tinge of copper behind the head. A big fathead minnow is three inches long.

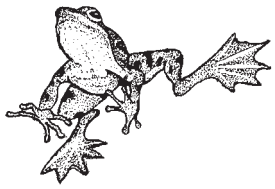


Fathead minnow

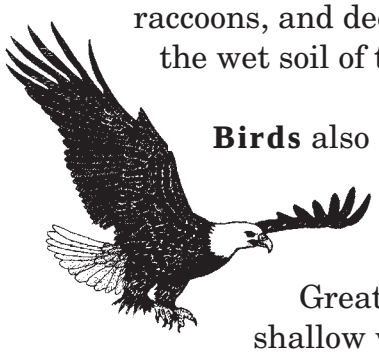
Other wildlife of Iowa waterways



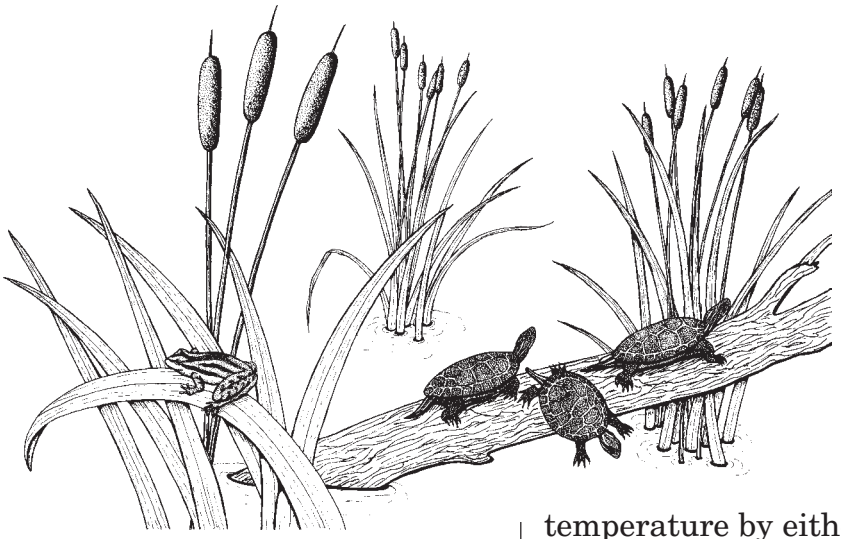
In addition to fish, waterways provide habitat for mammals, birds, reptiles, and amphibians that use the waterways but still require air for breathing. Numerous invertebrates also make their homes in rivers and streams.



The presence of **mammals** is easily seen in Iowa waterways. In some cases, a beaver dam can alter the course of a stream, creating backwaters and oxbow wetlands. Muskrats are most common in still wetland waters, but also make their homes along the banks of slow-moving river banks. They can be seen swimming along the water's surface, often toting a corn stalk or reed in their mouth. Thanks to a recent program of otter reintroductions, river otters have become more common in Iowa streams. Otter slides appear as small runways leading from the river bank into the water. Other mammals, including opossums, raccoons, and deer, leave their tracks in the wet soil of the floodplain.



Birds also are common along Iowa waterways. Killdeer can be seen on nearly every dry sand bar. Great blue herons wade in the shallow waters and use their long beaks to probe for fish and frogs. Kingfishers and gulls hunt the water from the air, diving down to snatch fish. In winter, bald eagles are common along Iowa's larger streams and rivers, and are becoming more common elsewhere in the state. They visit open water below the dams in search of fish and waterfowl. More than 100 bald eagle pairs now nest in the state. Iowa's waterways and backwaters provide important feeding and nesting habitat for ducks and geese. The Mississippi and Missouri Rivers are the most important interior flyways for migrating waterfowl in North America.



Reptiles and **amphibians** are predators along stream edges. Amphibians are biologically linked to water. Their life cycle and physical adaptations bind them to a damp existence. Many reptiles also are dependent on water. Cool water and reflected sunlight allow cold-blooded animals to easily regulate their body temperature by either swimming or sun bathing. More than 75 species of Iowa reptiles and amphibians are known to be dependent on wetlands and waterways. Frogs and turtles are especially common in our waterways. Northern water snakes can often be seen swimming in slow moving water. No populations of venomous water snakes are known to live in Iowa's rivers or streams.

A large variety of small **invertebrates**, including crayfish, clams, snails, worms, spiders, and insects, fill every type of waterway environment. They are an important part of the food web. A single lock and dam pool along the Mississippi River may provide more than 2,500 tons of fingernail clams as food for ducks during fall migration. When a waterway becomes polluted with sediment or chemicals, small invertebrates are often the first to be affected. Other animal populations that depend on invertebrates for food soon suffer. In some cases, the health of a stream may be determined by sampling invertebrate indicators such as stonefly and mayfly nymphs and caddisfly larvae, which can only survive in relatively clean water.

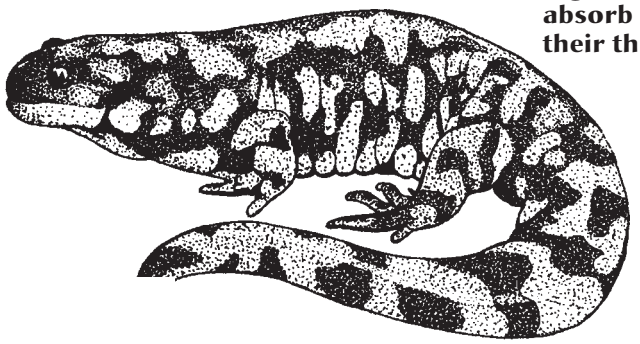
Mayfly

Waterway ecology

Plants and animals that make their homes in a river or stream live in a constant world of moving water. Many have developed special means for breathing, moving, and finding food and safety within a waterway.

Oxygen without air

For plants and animals living in water, special adaptations are necessary to guarantee adequate supplies of oxygen. Plants rooted in the deoxygenated river muck must get all their oxygen through pores in their leaves and stems above the water's surface, or, in the case of submersed plants, directly from oxygen dissolved in the water. Fish and some invertebrates have gills that "breathe" dissolved oxygen from the water. Animals without gills use more unusual means for getting oxygen. Like miniature deep sea divers, whirligig beetles and backswimmers carry a bubble of air with them. Mosquito larvae attach themselves to the water's surface where they breathe air through a tube. Worms, leeches, and even frogs and salamanders can absorb dissolved oxygen through their skin. Turtles and other reptiles, as well as mammals, must breathe air and have the ability to hold their breath for long periods of time.

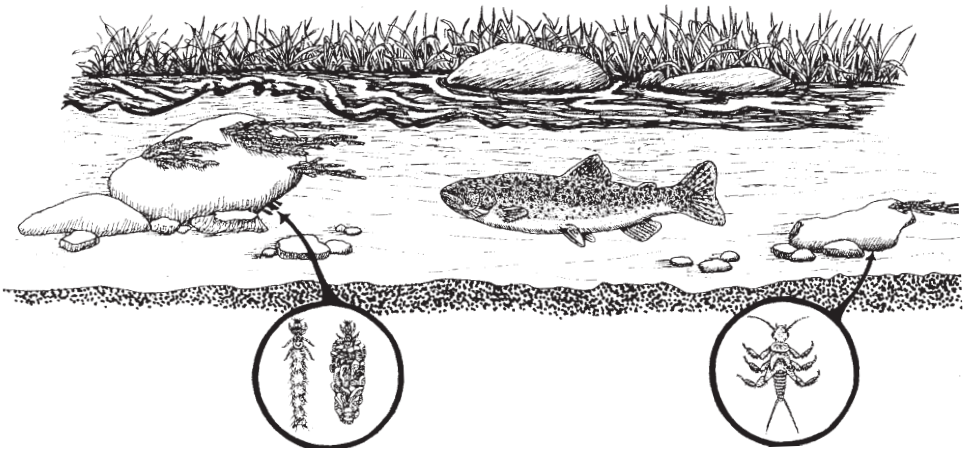


Tiger salamanders can absorb oxygen through their thin, moist skin.

Going against the current

Animals and plants have to battle a constant current as they move or try to remain stationary in a swift-moving stream. Many animals in a waterway are streamlined. Many fish are flattened lengthwise, while leeches and flatworms are vertically flattened. Smaller animals and some plants survive in quiet places out of the current. They can crawl under or behind rocks, dig under the sediment, or find refuge in small eddies or pools. Plants, such as water cress, stay anchored in the fast current by "grabbing onto" small rocks by their roots. Algae and mosses are periodically torn from their homes, but they can quickly recolonize once the current subsides.

Animals and plants have to battle a constant current as they move or try to remain stationary in a swift-moving stream.



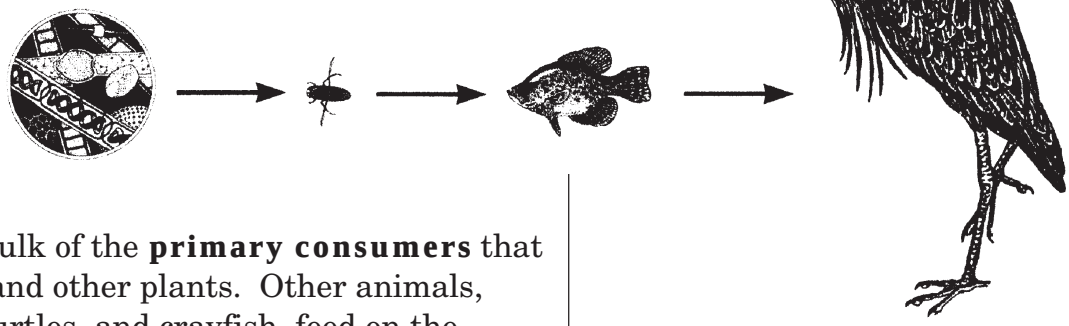
Hide and seek

Dense vegetation along an Iowa waterway is ideal cover for animals trying to conceal themselves from predators or for predators trying to sneak up on prey. Many of these animals take on the colors of their surroundings and may have spots or stripes that further aid their camouflage. Wetland wildlife is especially well-hidden among emergent plants or thick patches of lily pads. Frogs, turtles, and salamanders are often difficult to see until they move. These animals rely on their camouflage colors and quickness to escape predators. Fish and other underwater animals also conceal themselves among the surrounding colors.

Fish and other underwater animals conceal themselves in the surrounding rocks and vegetation.

Life and death

Strands of algae, clinging mosses, and other green plants and tiny protozoans are the **producers** of food for river and stream animals. Algae are perhaps the most important plants in a waterway. Most of the animals either feed directly on algae or on other animals that eat algae.



Wetland food chains often begin with algae, which is food for a variety of small animals that later serve as food for larger animals. Pictured above, algae (magnified) is food for a water boatman, which is food for a crappie, which is food for a heron.

A variety of larval and adult insect plant-eaters make up the bulk of the **primary consumers** that feed on algae and other plants. Other animals, such as fish, turtles, and crayfish, feed on the plants but will also feed on smaller animals. Bass, northern pike, and snapping turtles are **secondary consumers** and are the large predators of the underwater world. On the water's surface, frogs, toads, snakes, mink, foxes, great blue herons, and raccoons feed on smaller animals. Above the water, kingfishers and gulls swoop down to catch surfacing fish.

As predators feed on their prey, food chains are formed. These food chains interlink to make an intricate food web. Strands of this web create health and stability within river and stream communities.

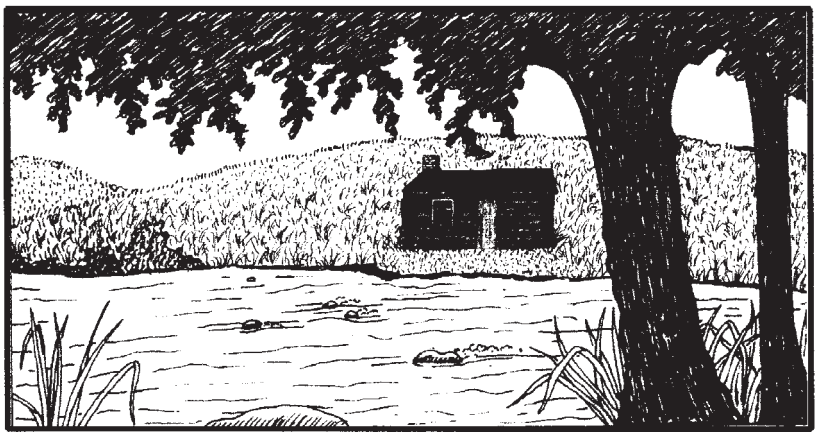
Eventually all plants and animals in a stream die, and a variety of animals scavenge on the organic remains. Insects, scuds, crayfish, turtles, and bullheads find nourishment in the death of other animals. Fungi and bacteria further decompose dead plants and animals.

People and waterways

In addition to their beauty and richness of plant and animal life, waterways provide people with clean water and recreation, and are important to the Iowa economy. Because waterways are so important to people and wildlife, the way we impact rivers and streams is crucial.

An altered ecosystem

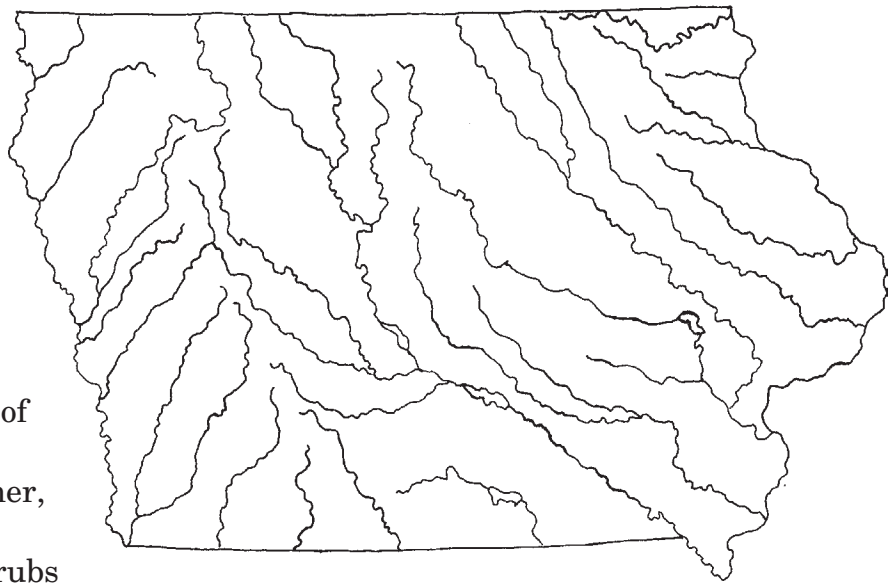
Iowa's waterways posed problems for early settlers. Meandering streams periodically flooded farms and towns. Heavy rains caused curved sections of rivers and streams to scour out new channels. These natural and somewhat predictable changes in Iowa waterways made farming and homesteading more unpredictable and dangerous. Still, many people chose to settle near rivers and streams that could be used to provide drinking water, haul away waste, and provide transportation. Over time, they attempted to control rivers to make farming and development easier, often at the expense of natural waterway communities. Within a 75-year period, from the mid-1800s to the 1930s, Iowa's border rivers and many interior streams went through drastic changes.



Iowa settlers often chose to settle near rivers and streams that could provide drinking water, haul away waste, and provide transportation.

Past and present changes in rivers and streams affect waterway communities in many ways. Dams along rivers and streams create habitat for lake wildlife, but act as barriers to migrating fish and create reservoirs that collect silt. River and stream channelization and deepening are accomplished by dredging and stabilizing the banks of waterways. In the process, the environment of plants and animals that live in the water is dramatically changed. During a 30-year period beginning at the turn of the century, approximately 1,000 miles of rivers and streams were lost to channelization. When curves are taken out of a stream, there are fewer miles of river and much less river habitat. There is also less wetland habitat. Approximately 40,000 acres of river oxbows and overflow wetlands are associated with Iowa streams. Less than half of our original miles of inland streams are left.

Destruction of adjacent wetlands have also played a part in altering river habitat by speeding the removal of water from the land and quickening the current of the rivers. When a waterway is channelized, the loss of plants bordering a stream leads to warmer, shallower waters as shading trees and shrubs are removed and the water is exposed to the sun's heat and evaporation. At the same time, sediment and chemicals from eroding land have a straight shot into the waterway. Many modern-day streams were formed as water was transported from drained wetlands.

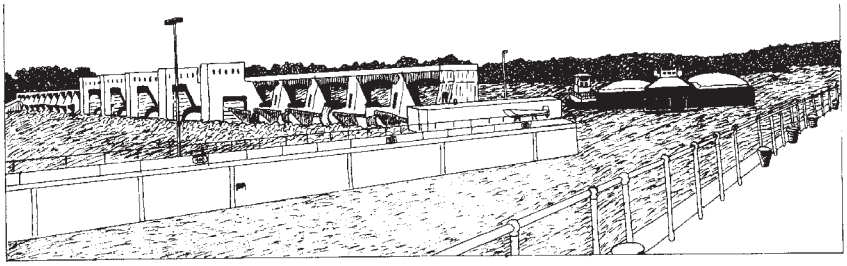


Iowa has 71,665 miles of rivers and streams, many of which have been greatly altered during the past 100 years.

Controlling the border rivers

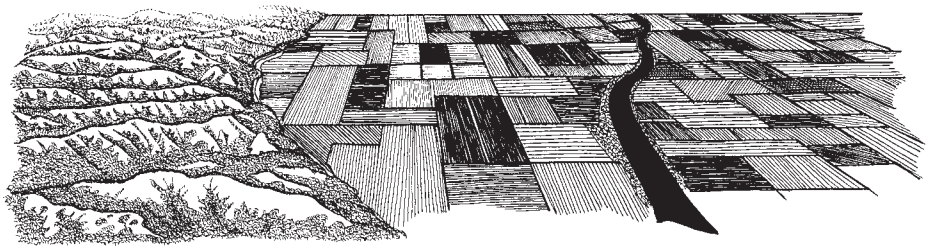
The Mississippi and Missouri Rivers are especially important routes for moving products and consumer goods in and out of the state. They are also especially important areas for wildlife. More than 320,000 acres of stream community lie within the riverbeds of the border rivers. But both the Mississippi and Missouri have been controlled to meet the demands of human use. The Missouri has lost most of its valuable backwaters and marshes, and human use of the river upstream has greatly reduced the amount of water flowing along the Iowa border. The creation of locks and dams on the Mississippi altered the river channel, but resulted in some pond and marsh habitat.

Efforts to create a navigation lane on the Mississippi River began in 1820, but not until 1878 was a channel 4.5 feet deep created from Minneapolis to St. Louis. The channel has since been deepened to nine feet. The river went through more channelization in the 1930s, and locks and dams were installed to provide better navigation of the river. The result has been some trade-offs in river habitat for commerce. The Mississippi River remains one of the most fantastic corridors of river habitat in North America. But the mighty river is in serious trouble. Like most Midwestern rivers, the Mississippi receives large amounts of silt and chemicals from surrounding run-off and eroding land. Beginning in 1987, under the Conservation Reserve Program (CRP), Iowa farmers helped control erosion on approximately one million acres of erodible land by not planting them in row crops.



The creation of locks and dams on the Mississippi altered the river channel, but resulted in some pond and marsh habitat.

The Missouri River was once a wide, sprawling river, studded with islands and snags. It provided vast areas of wildlife habitat. Human "improvements" along the Missouri began in earnest in the 1930s. In subsequent years, the river was channelized and deepened for navigation. The result is a completely different type of river. The diverse habitat that once existed along the Missouri was exchanged for a controlled river channel to allow for barge traffic and to develop farmland in the alluvial plain.



Once a wide, sprawling river, the Missouri is now a more controlled river bordered by farm land.

Clean water and good fishing

Clean water is important to Iowans. Although most Iowans rely on groundwater for their drinking water, some get their water from rivers and streams. There is a close relationship between the quality of stream water and of groundwater, especially where water tables are near the surface.

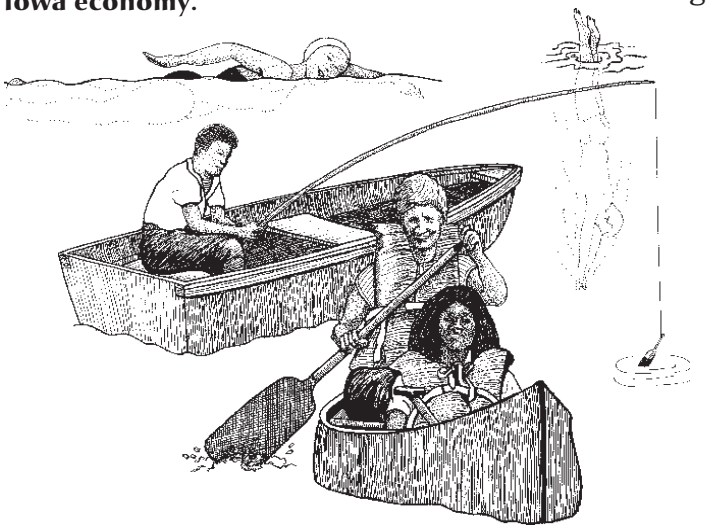
Commercial and sport fisheries are also dependent on clean water. Many species of invertebrates, amphibians, and fish are especially vulnerable to soil and chemical pollution. When these vulnerable species become less common, their loss is felt by other species throughout the stream food web. A lack of clean stream water may lead to fewer game fish, birds, and other wildlife. In Iowa, runoff from farmland often contains manure or chemical fertilizer. This pollution can lead to large algae blooms in Iowa waterways. Algae absorb carbon dioxide and release oxygen during the day. At night, the process is reversed. In warm streams, which naturally hold less oxygen, algae blooms can drain the water of oxygen overnight, killing fish and other aquatic life.

Soil erosion in Iowa watersheds is a serious threat to Iowa rivers and streams. There are more than 7.1 million acres of highly erodible cropland in Iowa. Runoff from these areas often contains soil, fertilizer, and pesticides that affect waterway communities. Plants are especially vulnerable to soil pollution which blocks sunlight from reaching submerged plants. Soil and nutrient pollution affect some types of fish more than others. Smallmouth and largemouth bass, and northern pike are quickly affected when soil and nutrients enter a stream. They may be replaced by carp, bullheads, chubs, and other rough fish that are less affected. Many commonly used agricultural pesticides are also dangerous to animals in a river or stream community. Some of their effects on wildlife are shown in the following table.

Waterway recreation

A great diversity of fish and wildlife make waterways beautiful and fun. Hunters, trappers, anglers, and wildlife enthusiasts rely on rivers and streams for their recreation. Nearly all of Iowa's larger streams and rivers are home to popular game fish and waterfowl. The beauty of Iowa's waterways attracts canoeists, raft runners, stream waders, bird watchers, and other waterway wanderers. Motor boats and water skiers are seen on our larger streams, rivers, and reservoirs.

Rivers and streams provide a great source of recreation, and pump millions of dollars into the Iowa economy.



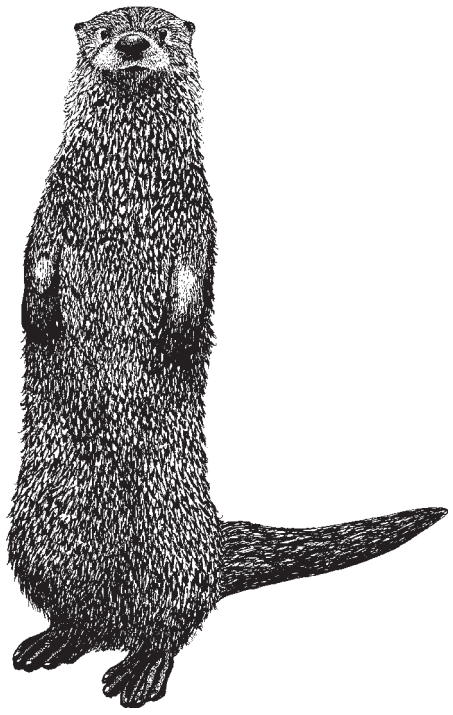
Economic considerations

Rivers and streams provide direct benefits to our economy. In 1991, Iowa anglers spent more than $320 million on their sport, pumping money into the Iowa economy. In 1990, Iowa commercial fisheries along the Mississippi and Missouri Rivers produced nearly 3 million pounds of fish.

The border rivers and larger inland streams have been used to turn turbines in grist and saw mills. Rivers and larger streams are used to run hydroelectric power plants. Hydroelectric power accounts for two percent of Iowa's total electric power generation. Iowans have begun to recognize the great value of rivers and streams as natural, as well as economic, resources. Future decisions regarding waterways need to balance wildlife with economic demands for healthy river communities.

Protecting Iowa waterways

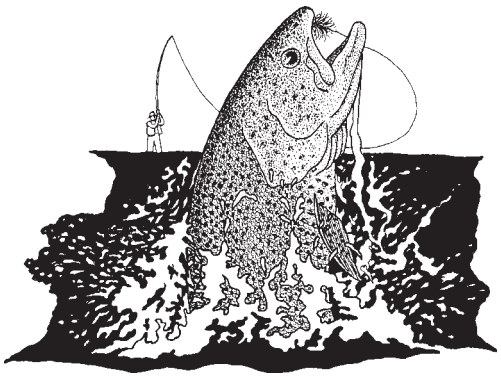
In an attempt to save valuable waterways, legislators have created some key programs. Section 404 of the 1977 Federal Water Pollution Control Act, known as the **Clean Water Act**, regulates dredging and fill activities in navigable waters. Left out of the Clean Water Act were many activities that affected waterways through agricultural production. The **1985 Farm Bill** helped fill this gap with two federal programs – the Swampbuster Provision and Conservation Reserve Program. Both of these programs have helped Iowa rivers and streams by reducing erosion from farmland. The 1990 and 1996 Farm Bills continued these programs in modified forms.



The **Swampbuster Provision** protects waterways by saving wetlands that filter soil and chemical runoff. It makes it difficult for farmers to drain wetlands if they wish to receive any farm program benefits. The **Conservation Reserve Program** pays farmers not to plant erodible areas to row crops, and instead maintaining a plant cover, that reduces bare soil exposed to wind and water erosion. The continuous CRP pays farmers to plant grass filter strips and forested riparian buffers along waterways.

In 1984, the **Protected Water Areas** (PWA) program was enacted by the Iowa legislature in an attempt to protect more scenic waterways and backwater areas. The PWA has designated portions of the Boone, Wapsipinicon, Upper Iowa, Raccoon, and Little Sioux Rivers as Protected Water Areas – rivers with outstanding natural features that should be protected.

Summing it up



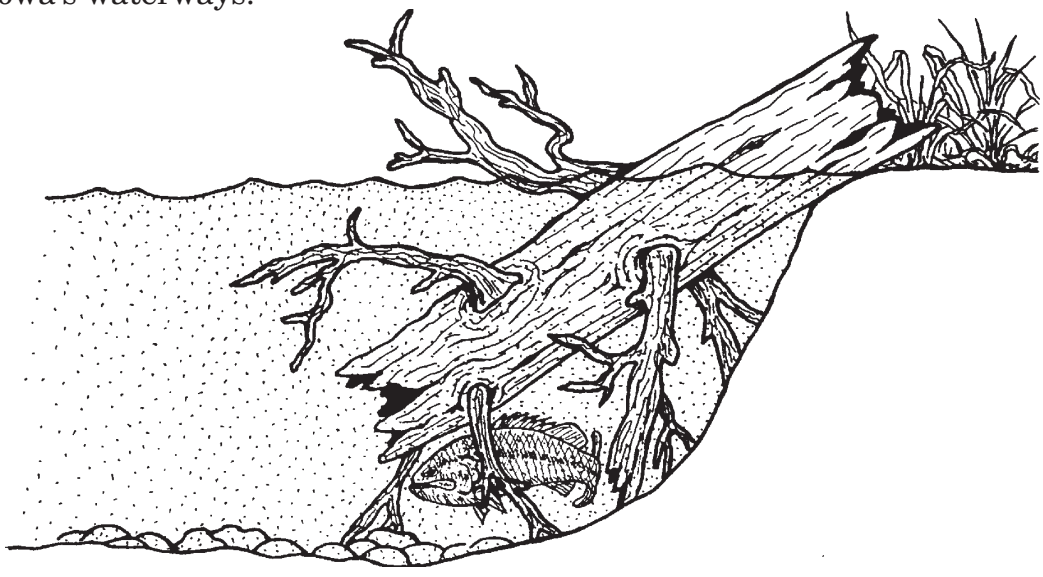
Iowa is a land between two large border rivers that contains numerous interior rivers and streams. These waterways are home to many plants and animals that make up the waterway community. Depending on the nature of a waterway – its current, depth, and turbidity – a large variety of fish may inhabit the waters. Wetland mammals, birds, reptiles, and amphibians also rely on the nature of Iowa's rivers and streams.

Iowa's waterways have been drastically altered. Commercial navigation has greatly changed the biological communities of the Mississippi and Missouri Rivers. Many streams have been affected by dams and channelization. Channelization is especially damaging as it reduces the number of river miles and erases bordering wetlands. Perhaps the biggest modern threat to Iowa's waterways is pollution – the result of soil, nutrient, and chemical runoff from adjacent land.

The value of waterways to both people and wildlife make them worth protecting. The Clean Water Act and the Farm Bill have been important to the protection of Iowa's waterways. The state's Protected Water Areas program has the potential to further protect our most spectacular streams.

Iowa waterway facts

- By 1870, more than 1,000 dams impeded the seasonal migration of fish in Iowa's waters.
- Iowa has lost more than 95 percent of its original wetland habitats.
- All of Iowa's larger rivers and streams have undergone some channelization or impoundment.
- In 1991, Iowa anglers pumped more than $320 million into the economy.
- In 1990, Iowa's commercial fisheries along the Mississippi and Missouri Rivers produced nearly 3 million pounds of fish.
- By 1930, more than 1,000 miles of Iowa streams had been erased through channelization.
- Siltation has had a major impact on an estimated 92 percent of Iowa's waterways.
- Nutrient pollution has had an impact on almost all of Iowa's waterways.



Useful resources

Agricultural Pesticides and Wildlife: A Balancing Act; Iowa State University Extension
The Audubon Society Nature Guides - Wetlands; 1987.
A Country So Full Of Game; James J. Dinsmore; University of Iowa Press, Iowa City, Iowa; 1994.
Extinction: The Causes And Consequences of the Disappearance of Species; Paul and Anne Ehrlich; Random House, New York, NY; 1981.
The Field Guide to Wildlife Habitats of the Eastern U.S.; Janine M. Benyus; 1989.
IAN Booklet Series; Iowa Association of Naturalists; ISU Extension Service, Ames, IA.
See list of titles and ordering information on page 25 of this booklet.
"Iowa Natural Heritage Preservation..."; Proceedings of the Iowa Academy of Science (88(1):43-47); 1981.
"Iowa's Natural Heritage"; Iowa Academy of Science and Iowa Natural Heritage Foundation; 1982.
Iowa's Waters and Fishes: A Century and a Half of Change; Proc. Iowa Accad. Sci.; 88(1):17-23; 1981.
"Iowa's Wetlands"; Richard Bishop; Proceedings of the Iowa Academy of Science (88(1):11-16); 1981.
Landforms of Iowa; Jean Prior; University of Iowa press; Iowa City, IA; 1991
Living On The Edge: Endangered Species In Iowa; Daryll Howell and Mark Leoschke; Iowa Department of Natural Resources, Des Moines, IA; 1992.
Natural Resource Conservation: An Ecological Approach; Oliver S. Owen; Macmillan Publishing Co., New York, NY; 1980.
Prairies, Forests, and Wetlands: The Restoration of Natural Landscape Communities In Iowa; Janette R. Thompson; University of Iowa Press, Iowa City, IA; 1992.
Saving Soil and Wildlife: The Promise of the Farm Act's Conservation Title; Ann Robinson; Izaak Walton League of America; 1987.
Up On The River; John Madson; 1985.
Wetlands: Losses in the U.S. 1780s to 1980s; U.S. Dept. of Interior, Fish and Wildlife Service, 1990.
Wetlands Overview: Federal and State Policies, Legislation, and Programs; U.S. General Accounting Office; 1991.
Why Preserve Natural Variety?; Bryan G. Norton; Princeton University Press, Princeton, NJ; 1987.

Iowa State University Extension publications, contact your county extension office.