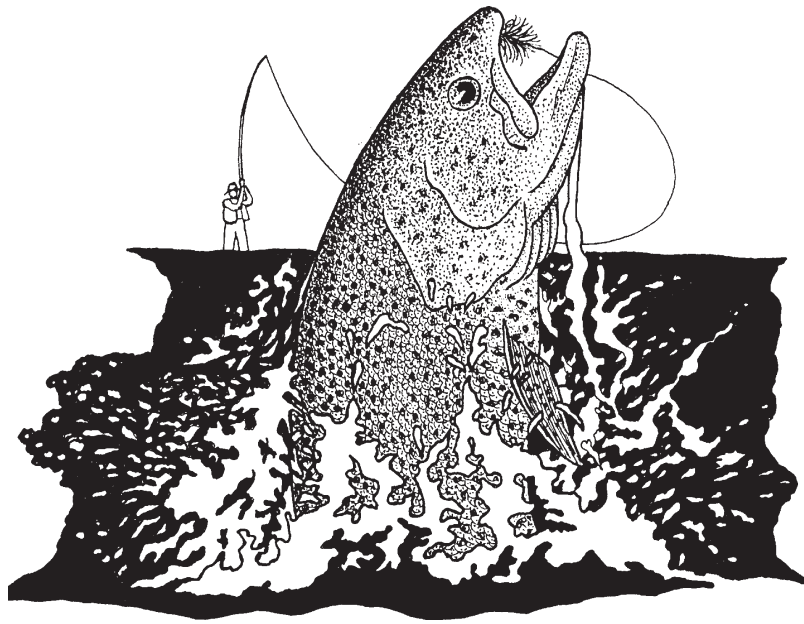


Iowa Fish

Iowa Association of Naturalists



Iowa Wildlife 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 Wildlife Series

Students need to be knowledgeable about and appreciate local wildlife in order to better understand the natural environment. The Iowa Association of Naturalists has created this series of booklets to offer a basic understandable overview of Iowa wildlife. These booklets will assist educators in teaching students about Iowa wildlife. The six booklets in this series are:

- 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)



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Iowa fish

What is a fish?

Fish are animals that live their lives in water. They catch their food in the water, lay their eggs in water, and are specially designed to move around in water. They are **cold-blooded**, which means their body temperature changes with the temperature of the water. They are also **vertebrates**, which means they have a backbone and an internal skeleton made of cartilage or bone.

There are many different kinds of fish in Iowa, but all fish have some things in common. The first thing many people think of when they think of fish is **gills**. Because they are animals, fish must breathe oxygen, but they breathe oxygen which is dissolved in the water. Gills are structures that make it possible for fish to take up this dissolved oxygen.

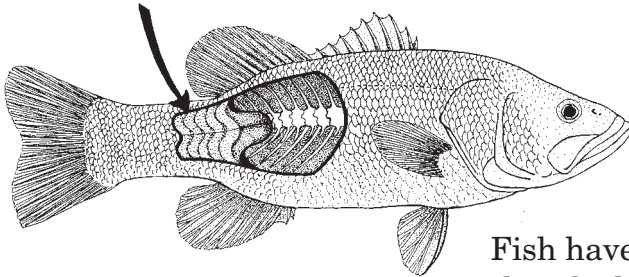
Another feature of fish is their **fins** and **scales**. Fins are the appendages which make movement in water possible for a fish. Unlike the legs of land animals, fins do not have fingers or toes, but some may have bony spines. The bodies of most fish are covered with scales; the exceptions are catfish, bullheads, sticklebacks, and lampreys. Scales serve the purpose of protecting fish from the environment. Fish also secrete a mucous slime from their skin which further protects them from water-borne diseases and also reduces friction during swimming.

Adaptations for an aquatic life

Fish are well adapted for living in water. Most fish have a characteristic long and narrow shape. In fact, engineers would have a hard time designing a better swimming machine than a fish. The streamlined body design decreases water resistance and allows them to move easily and quickly through the water to escape predators and to capture food.

The muscles of fish also are adapted for swimming in water. The muscles are concentrated in the back and tail regions of the fish's body. The muscles lie on either side of the fish's backbone and are arranged in segments which resemble a series of W's lying on their sides. To swim, a fish first contracts the muscles on one side of the body, followed by the muscles on the other side. This creates a back-and-forth motion of the tail which pushes the fish through the water.

A fish's muscles are concentrated in the back and tail regions.

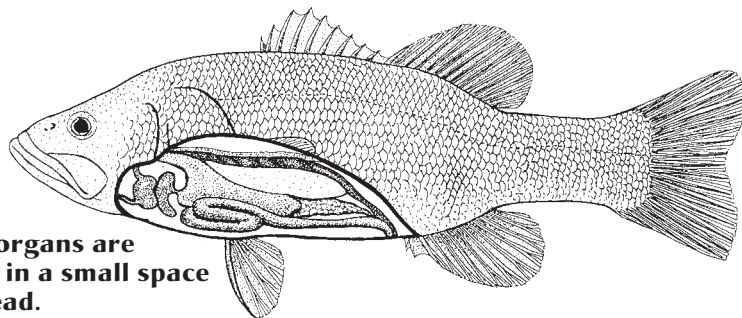


Fish use a back-and-forth motion while swimming.



Fish have very few muscles anywhere else in their bodies. The gills and jaws of fish have some small muscles to open and close them, but most of the fish's head is bone. The body muscles of fish take up so much of the back part of the fish that the vital organs, like the heart, stomach, and liver are forced into a very small space just behind the head.

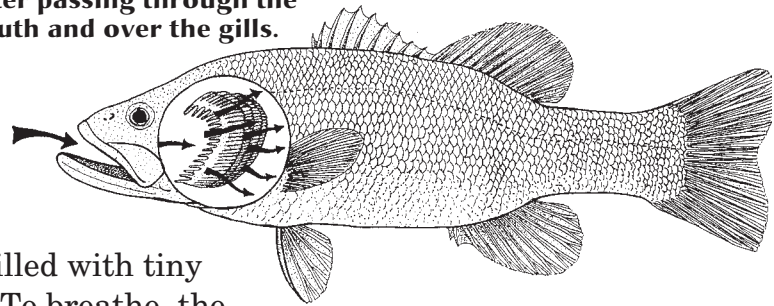
A fish's vital organs are concentrated in a small space behind the head.



Most fish have four pairs of gills. Gills are designed to help a fish breathe in the water. They consist of fine fleshy filaments attached to a bone in the back part of the fish's mouth.

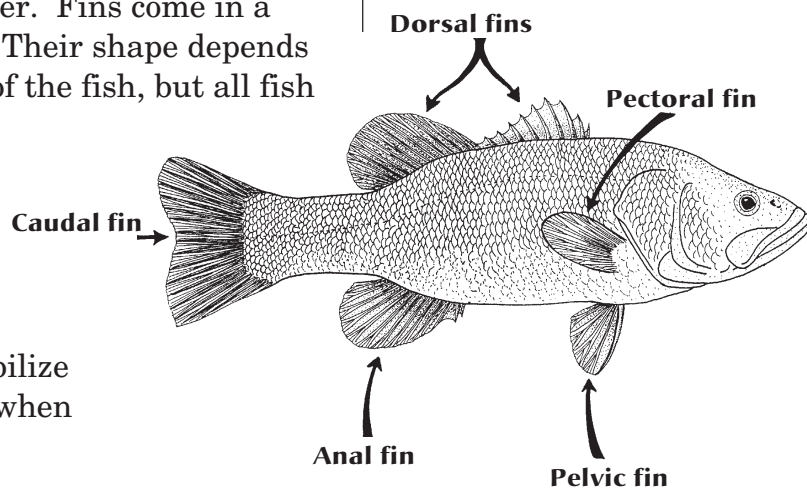
The filaments are very thin and filled with tiny blood vessels called **capillaries**. To breathe, the fish first takes water into its mouth, then closes its mouth forcing the water out through the slits on either side of the head where the gills are located. As water passes over the gills, oxygen is taken out of the water and into the blood stream. At the same time, waste materials, including carbon dioxide, pass out of the blood stream into the water. In many ways, gills function the same way as lungs in land animals, but are adapted to breathing in water instead of air.

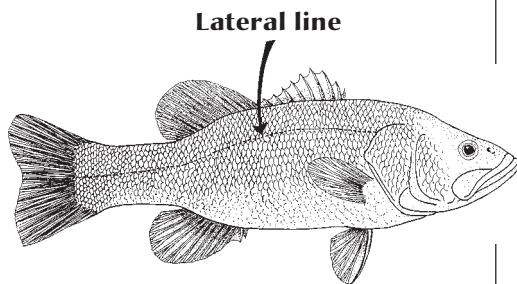
Oxygen is taken from water passing through the mouth and over the gills.



Blood is pumped from the fish's two-chambered heart to the gills where it picks up oxygen from the water, and then flows directly to the rest of the body where it delivers the oxygen to the tissues and organs that need it.

All fish have fins. Fish use them for swimming and maneuvering in the water. Fins come in a variety of shapes and sizes. Their shape depends on the habitat and lifestyle of the fish, but all fish have dorsal, pectoral, pelvic, anal, and caudal fins. Fish can use their fins like oars or paddles to propel and steer themselves through the water. Fins also help to stabilize fish and keep them upright when they are swimming rapidly through the water.





Fish do not have external ears but they can hear with the use of inner ears located just behind the eyes, near the brain. These ears consist of bony chambers in the skull that can sense very high-pitched sounds. In addition, fish have a **lateral line organ**, a series of mucous-filled pits which run along the side of the fish from the gills to the tail. The lateral line organ is sensitive to very low-pitched sounds and vibrations. It is sensitive enough to pick up the passing of another fish or vibrations reflecting off underwater obstacles. Such sensations are useful to fish that cannot rely on eyesight alone, such as those in dark or cloudy waters.

Most fish have a very good sense of smell. They have nostrils located in front of the eyes, but unlike the nostrils of mammals, fish nostrils do not connect with the throat. They end in blind sacs where special **olfactory cells** smell the molecules in the water. Fish also have taste buds on the tongue and mouth which can distinguish sour, salty, and bitter substances. Some fish, like catfish, have **barbels** which are whisker-like structures around the mouth that have taste-buds.

Fish Habitat

In Iowa there are many different bodies of water, from the Mississippi and Missouri border rivers, to lakes and reservoirs, to smaller streams and rivers. Even small farm ponds may have sizable fish populations, sometimes over 200 pounds of fish per acre of water. The type of habitat will determine the kinds of fish that live there.

Iowa's waterways vary depending on the underlying landscape. In much of north and central Iowa, where the landscape is relatively young, streams slowly meander through flat terrain and black topsoil.

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

In much of northeast Iowa, where the landscape is very old, streams have cut well-defined beds into the land. Rocky ledges and stone cliffs sometimes border these waterways. The hilly landscape is well-worn with exposed rock poking through the thin, eroded topsoil.

Natural characteristics of waterways, such as the vegetation in and around them, current, depth, and type of bottom surface all affect fish habitat. In addition, urban, agricultural, and industrial pollution from human activity affect the conditions of fish habitat.

Mississippi and Missouri rivers

The Mississippi and Missouri are Iowa's eastern and western border rivers. Like our inland rivers, these two large river systems effect and are affected by the life in and along their waters.

The bed of the Mississippi consists mainly of mud and sand, with a few bedrock outcroppings. The waters of the Mississippi are quite muddy, especially during floods. The water flows slowly, at about two miles per hour, and the constant churning caused by motorboat propellers keeps the water very cloudy.

In the past half century, the kinds of fish found on the Mississippi have not changed a great deal. Carp and catfish comprise the vast majority of fish in the Mississippi. Only about seven percent of fish caught on the Mississippi are other species.

Before engineering efforts to control flooding and improve navigation, the Missouri was a wild and turbid river. Its muddy appearance was a result of fine, shifting sand stirred up in the turbulent waters. Even so, the river historically had a great diversity of fish species, including walleye, catfish, crappie, sunfish, and others. Paddlefish and sturgeon were also abundant.

Since it was channelized in the 1920s and 1930s to meet human demands, the Missouri's original broad, semi-braided stream has become a fast-flowing, narrow, smooth channel today. Channelization also has shortened the length of the river by 18 miles in Iowa.

Channelization, damming, and dredging of the border rivers has, to some extent, changed the habitat for fish which live in these rivers. In the Mississippi, channelization of the river has led to a reduction in shoreline fish habitats, such as vegetation and overhanging stream banks. There is less shelter for the small forage fish which are food for larger game fish, and the numbers of both have dwindled. Dams built on parts of the Mississippi caused large pools to form. These calm, lake-like pools reduced the populations of fish species which live in fast-flowing water, such

The broad floodplain of the Missouri River gives way to the Loess Hills of western Iowa. The slow meandering nature of the river, and adjacent agricultural practices, greatly affect the fish of the Missouri River.



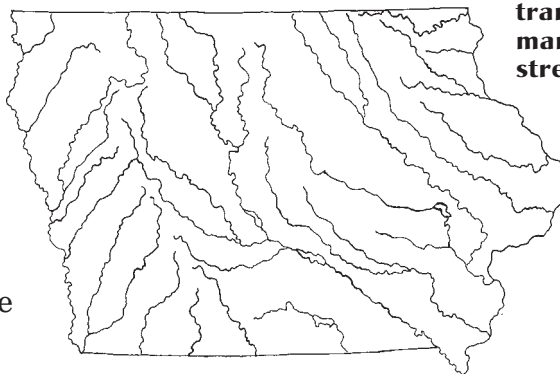
as smallmouth bass. Fish preferring quieter, pond-like habitats, like crappie, bluegill, walleye, and carp, increased in abundance. These fish could also better adapt to the increased siltation of the Mississippi caused by damming.

The diversity of fish in the Missouri has suffered much more as a result of human-made changes. Fish habitats such as fallen trees, cut banks, and snags have all but disappeared following channelization. Catfish, paddlefish, carp, and sauger are the primary species which now live in the few remaining habitats on the Missouri, mostly in the protected eddies and pools downstream from dams used to control this once mighty waterway.

Non-border streams and rivers

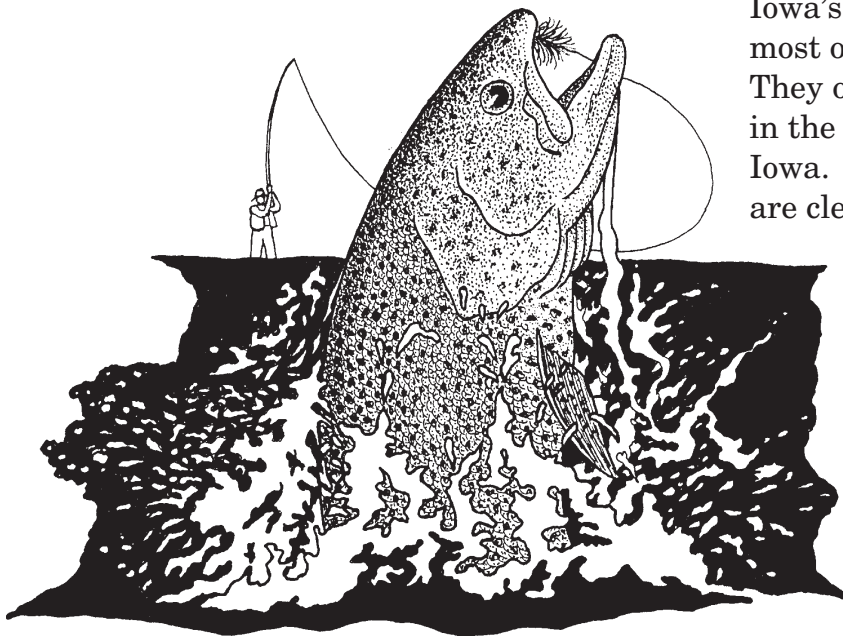
With the exception of the largest rivers, most streams in Iowa have headwaters within the state. These waterways are called **interior streams** and all of them are part of either the Mississippi or Missouri watersheds. For most of the interior waterways, the quality of the water changes from headwaters with clear, stable water levels, to water that is more turbid, polluted, and subject to flooding as you move downstream. As a result, fish species found in downstream parts of Iowa's interior streams will tend to be those more tolerant to environmental change.

Since the arrival of Europeans, the run-off of silt from agricultural lands, urban erosion, and construction-site erosion into Iowa's interior streams and rivers has changed these habitats and caused a slow, but systematic decline in some fish populations. However, high nutrient levels in this runoff has allowed some fish species to adapt and thrive in the new conditions.



Iowa is a land between rivers, transected by many interior streams.

In the last century, human activities have changed the consistency of the river bottoms. Erosion has led to lighter silty soils being carried away, to be replaced by heavier sands which settle along the bottom of the channel, filling in valuable food-producing riffles and fish-sheltering habitats.

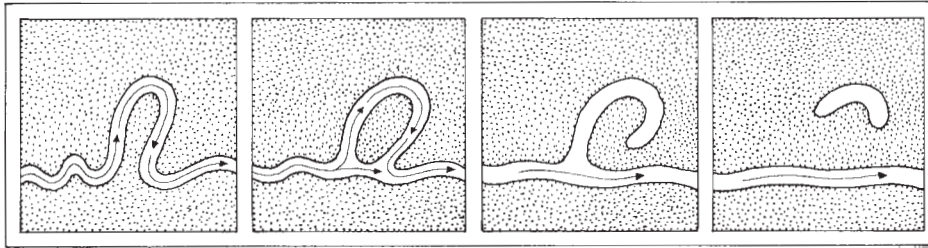


Iowa's trout streams differ from most of Iowa's interior streams. They originate from cold springs in the limestone bluffs of northeast Iowa. Most of these streams are clear and fast-flowing with limestone rubble and sand bottoms, perfect habitat for trout, which can't tolerate the warm, slow waters found in the rest of Iowa. Often these streams are **stocked**, meaning they are supplied with fish raised in fish hatcheries.

Lakes and reservoirs

There are 31 natural lakes throughout Iowa, of which the Iowa Great Lakes of northwest Iowa are the most well-known. They make up 28,891 acres of lake habitat. The larger lakes do not necessarily have more fish or a greater diversity of fish. In most natural lakes you can expect to find bluegill, largemouth bass, crappie, yellow perch, walleye, bullhead, catfish, and carp.

Because some natural lakes are shallow, wintertime fish kills due to total freezing of the lake basin, or low oxygen content, can be a problem. Aeration systems are often used to prevent this from occurring in shallow lakes.



An oxbow is formed over time as a bend in a meandering river gets cut off from the main channel.

Oxbow lakes are lakes which are formed when a river side channel gets cut off from the main course of a river by natural or human-made re-channelization. In oxbow lakes which are deep enough to avoid complete winter freezing and which contain water all year, fish populations can be quite abundant. The fish species found are usually those of the parent stream, and fish are naturally restocked to oxbow lakes whenever the parent stream floods.

Reservoirs, sometimes called **impoundments**, are common in southern Iowa. They comprise over 30,000 acres of lake habitat and typically contain a large variety of fish. Reservoirs are made by damming rivers to store water for a variety of purposes. Because damming slows water flow, reservoirs often have siltation problems. Iowa streams have been dammed at 207 locations on all 25 major river flowages to create impoundments. While river impoundments contain the same kinds of fish that the parent streams do, stocking affects the kinds of fish that can be found. Most reservoirs have populations of largemouth bass, smallmouth bass, crappie, bluegill, walleye, and channel catfish. Carp, bullhead, and yellow bass can also be found.

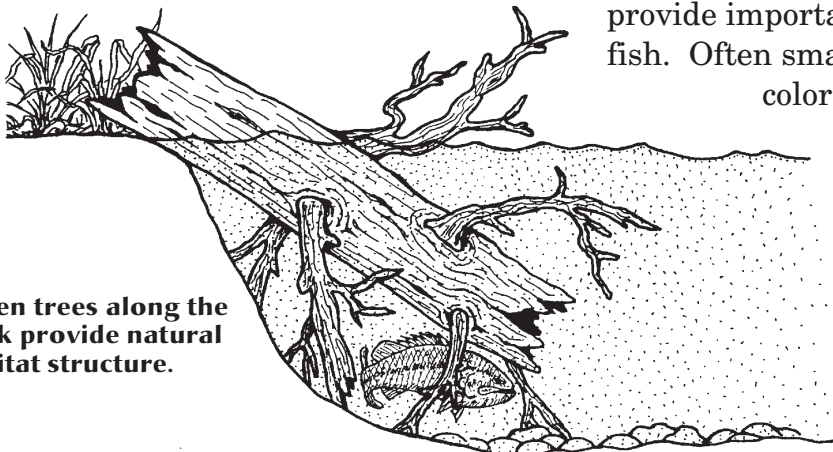
Iowa has many **artificial lakes**, particularly in the southern part of the state. Artificial lakes are lakes which do not occur naturally but are constructed by people. Most are managed for populations of largemouth bass, channel catfish, bluegill, walleye, and crappie. Perch, bullheads, catfish, white bass, and carp are often found.

Surface mine lakes are a type of human-made lake, but were not originally built as such. These lakes form in the excavated areas left behind after earth mining operations. Typically, largemouth bass, bluegill, and crappie are found in surface mine lakes.

Habitat structure

Fish, like other animals, have certain places they like to live in and around. The presence of certain structures determine the major fish species that will be found in a body of water. Baby fish are extremely vulnerable to predation by larger fish, so having structures to hide in is very important for young fish to survive to adulthood.

The types of structures preferred by adult fish often will vary with the time of year. But nearly all fish prefer some kind of underwater structure, such as dense vegetation, a fallen log, or an undercut river bank. Structures may occur naturally, such as a deep pool dug by the erosion action of a stream or a fallen tree. Other structures are human-made. Tires, pallet “cages,” and discarded Christmas trees are examples of human-made habitat structures.



Fallen trees along the bank provide natural habitat structure.

Underwater and emergent plants provide important shelter for juvenile fish. Often small fish are greenish in color and have stripes to help conceal them in the weeds. Plants are also home to many aquatic invertebrates which provide food for small fish.

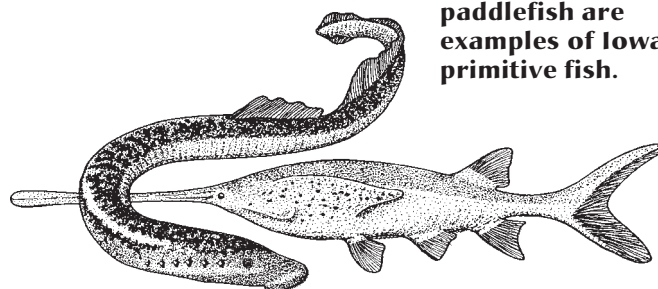
Types of fish in Iowa

There are 148 different kinds of fish in Iowa. Scientists have classified fish into groups. Because there are so many different kinds of fish, they must be grouped into many divisions and subdivisions. Fish which look alike and have similar characteristics are grouped together. Because of genetic differences and geographic location, fish are sometimes classified as different species even though they are very similar and can even interbreed.

Primitive fish

Some fish today resemble their fossilized ancestors. Because of this resemblance, they are called **primitive fish**. However, this does not mean that they are any less successful or important than other kinds of modern bony fish. Primitive fish are most commonly found on the great border rivers and some of their tributaries. Rarely are they found in the lakes and waterways within the state.

Lampreys are primitive, eel-like fish. Unlike most fish, they lack true jaws and have very primitive gills, called **gill pockets**, which resemble seven holes on either side of the head. Most lampreys are parasites on other fish. They have rasping mouths with sharp, piercing tongues used to pierce the skin of other fish and suck out the body fluids. Typically lampreys are found on the Mississippi River, parasitizing sport or commercial fish. However, their occurrence is rare and they are listed as a threatened species in Iowa. The brook lamprey, a non-parasitic species, is found in eastern Iowa streams.



Lampreys and paddlefish are examples of Iowa primitive fish.

The **paddlefish** and **sturgeon** of today are the closest evolutionary relatives to the armored “dinosaur fish” found in fossils. Paddlefish are easily recognized by their long, paddle-like snouts. They are extremely rare and are found only in the border rivers.

Gar comprise a large group of fish sometimes called **living fossils**. They are very long and streamlined fish, and are covered with tough, interlocking, diamond-shaped scales. In addition to their gills, gar have a primitive lung which they use to take in air at the surface of the water during periods of low oxygen when their gills are of little use. Gar are fierce predators and will attack almost any other fish they encounter. Adult gar have almost no natural predators except humans.

The **bowfin** is an uncommon fish in Iowa, and is considered a primitive fish species because it is the only living relative of an ancient fish family. The species found today is quite hardy and can survive under a variety of environmental conditions. It too has a primitive lung. In fact, young bowfins have been able to survive for days in moist ponds containing no standing water.

Some of the primitive fish of Iowa

<u>Common name</u>	<u>Characteristics</u>	<u>Food and habitat</u>
Paddlefish	Elongated snout; long gill covers and shark-like mouth; no scales; skeleton of cartilage	Zooplankton and insect larvae; Mississippi and Missouri Rivers and larger tributaries of the Mississippi
Shovelnose sturgeon	Covered with heavy, plate-like scales; flattened snout	Insect larvae and small mollusks; and Mississippi and Missouri Rivers and larger tributaries
Shortnose gar	Long, beak-like snout with sharp teeth; very aggressive; dorsal fin is far back on the body	Smaller fish, insect larvae and crayfish; Mississippi River, natural lakes, and oxbows and tributaries of the Missouri River

Bony fish

Most of the fish in Iowa and the world are bony fish. There are several families of bony fish which occur in Iowa. Bony fish are more evolutionarily advanced than primitive fish and differ from them in several ways. Bony fish have a well developed **swim bladder**, an air sac which enables them to control their buoyancy and remain stationary without expending a lot of energy. Bony fish can adjust the inflation of the swim bladder to sink or rise in the water without having to use their fins. The fins of bony fish are supported by long rays which have been modified for maneuvering, defense, and other functions. Because of this, bony fish are often called **ray-finned** fish.

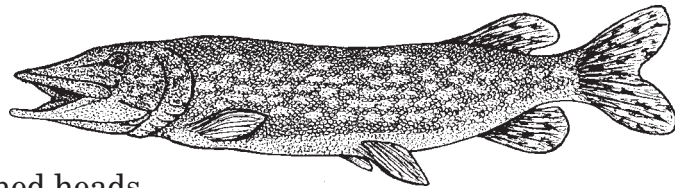
Pike family

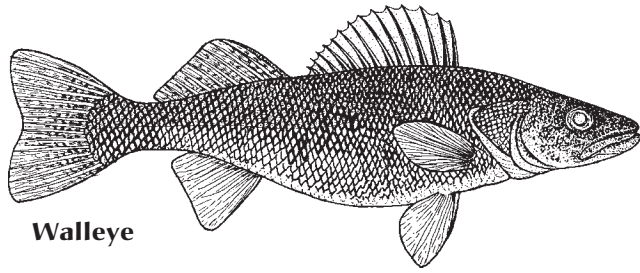
All members of the pike family have round, elongated bodies, flattened heads, and duck-bill shaped jaws lined with large, bony teeth. Most members of the pike family are voracious predators. The dorsal fins of pike species are located far back on the fish, almost directly above the anal fin in some cases. There are three main species of pike found in Iowa waters. They are the northern pike, the muskellunge, and the grass pickerel. There is also a hybrid species called the tiger muskie, but it does not survive well in Iowa and is no longer being produced in Iowa fish hatcheries.

Perch family

Members of the perch family usually have slender, rather elongated bodies, and have a flat spine on their gill covers. The front, spiny part of the dorsal fin is separated from the soft, back part. In other fish families, the two parts are often connected.

Northern pike





Walleye

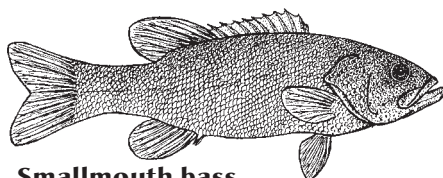
Some members of this family, particularly walleyes and saugers, have mouths which are filled with sharp canine teeth. There are about 20 perch species found in Iowa, including walleye, sauger, perch, and

darters. Walleye and yellow perch are found in nearly every major body of water in Iowa. Other species occur more regionally. Darters are typically found in northern parts of Iowa. The Iowa Department of Natural Resources produces a hybrid of sauger and walleye called saugeye, or hybrid walleye, which survives well in Iowa waters.

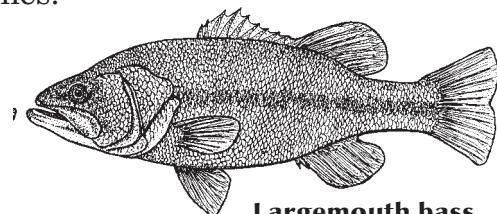
Sunfish family

The sunfish family contains many of the common **panfish**, so-called because the meat of several sunfish species is sought by people as food. The sunfish family is only found on the North American continent and it includes fish like smallmouth and largemouth bass, crappies, and bluegills. There are twelve species found in Iowa waters. These fish have spines on the front dorsal fins and anal fins which can give a painful, though not poisonous, prick to the careless angler.

Most sunfish species are carnivorous, eating small fish, insect larvae, and other small invertebrates. Many sunfish are alert to food items falling onto the surface of the water, and fish like the bluegill will often rush to engulf potential prey on the surface. During their spawning season, male bluegills become very protective of their nests along shorelines.



Smallmouth bass



Largemouth bass

Trout family



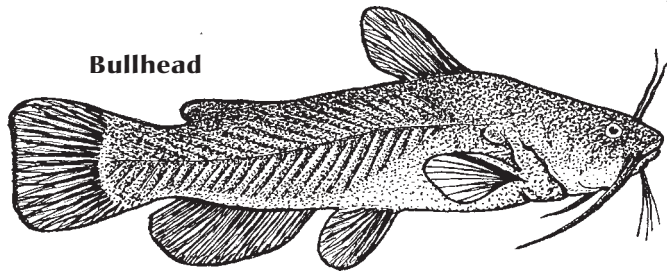
Rainbow trout

Trout are the only cold water fish species in Iowa. Three trout species live in Iowa, but only the brook trout is native. The brown trout and rainbow trout are stocked. Trout need cold, clear water with a great deal of oxygen for their survival. Thus, all are found in spring-fed cold water streams in nine counties in northeast Iowa.

Some common bony fish of Iowa (pike, sunfish, and perch)

<u>Common name</u>	<u>Characteristics</u>	<u>Food and habitat</u>
Northern pike	Bluish-green to gray on back; yellow or gold spots on sides; may weigh over ten pounds	Mostly smaller fish in heavily vegetated areas of larger lakes and slow-moving rivers in the upper two-thirds of Iowa
Muskellunge	Olive to dark gray above; sides with dark spots or bars; up to 36 inches in length by age five in Iowa waters	Mostly smaller fish; stocked in some of Iowa's larger natural and human-made lakes
Walleye	Brassy olive-colored on top, white below; white glossy eyes and sharp teeth; white tip on lower tail fin	Fish and small aquatic animals; found state-wide in large lakes and rivers
Yellow perch	Sides bright yellow to brassy green with seven dark vertical bars; back is dark olive-green	Small fish and aquatic invertebrates; found state-wide; greatest abundance in natural lakes
Johnny darter	Maximum length is 2.5 inches; important forage fish in aquatic food chains; brightly colored	Small insects and other invertebrates; found state-wide in medium sized streams and some lakes
Largemouth bass	Lower jaw extends well past its gold-colored eye; may reach up to 16 inches in length; territorial	Fish, frogs, crayfish, insects; lives in Lakes, ponds, and quiet rivers; found statewide
Smallmouth bass	Five olive-green bars radiate back from its red eye, and one radiates forward; smaller jaw than largemouth	Fish, large insects, and invertebrates; found in the northeastern two-thirds of the state in clear rivers and streams and in some lakes
White crappie	Silvery body with green or brown on back; "hump-backed" with six spines in dorsal fin	Small fish and aquatic insects; found state-wide in lakes and larger rivers
Black crappie	Silvery with dark back and green or black mottling on sides; "hump-backed" with 7-8 spines on dorsal fin	Small fish, minnows, and insects; found in clearer lakes and streams; does not tolerate turbid waters
Bluegill	Dark olive-green back and sides, lighter below; chin and gill covers often bright blue; seldom exceeds eight inches	Insects and small aquatic organisms; found in nearly all waters; most abundant in lakes and ponds

Catfish family



Bullhead

Members of the catfish family are distinguished from other species of fish by their smooth looking, scaleless bodies and eight long, feathery “whiskers,” called **barbels**, around the mouth.

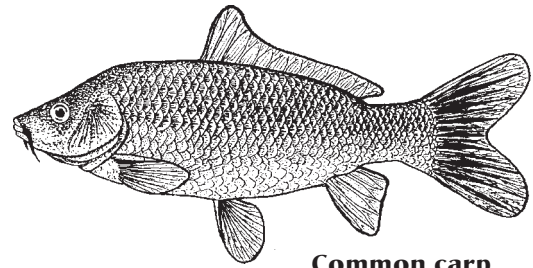
The barbels can sense vibration and chemical signals and are used to sense food in murky water. Many catfish also have “taste buds” all over the surface of their bodies which further help them to find food. The dorsal and pectoral fins of catfish have sharp spines. These are thought to be defensive in nature, because the fish extend them when they are bothered or touched, making them nearly impossible for predators to swallow. Catfish were once an important commercial food fish along the Mississippi River. Today, most catfish are cultivated on farms for commercial use.

Minnow family

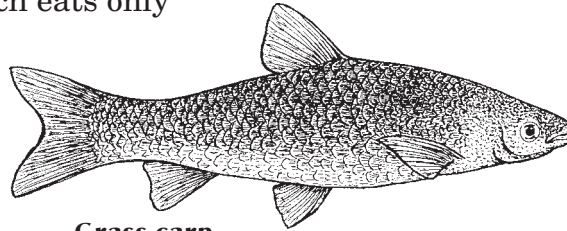
Juvenile fish, because of their small size, are often referred to as minnows. However, true minnows comprise a family of 50 species found in nearly all of Iowa’s rivers, streams, and lakes. While most members of this family never achieve a size greater than about 12 inches, some members, such as carp and goldfish (both non-native species), are able to reach very large sizes.

The habitat and environmental requirements of minnow species vary greatly. Some species, like carp, can tolerate a wide range of environmental conditions, but others, like several species of chubs and shiners, have been unable to adapt to changing habitats and have all but disappeared from Iowa.

The popularity of minnows as a bait fish illustrates the fact that many small minnows are important forage food for larger game fish. As such, they are very important to aquatic food chains. The common carp is an important minnow which was introduced to Iowa from Europe in the early 1900s. A close relative of the common carp, the grass carp, is an important fish which eats only aquatic plants. It was introduced to the United States from Asia in 1963 and has been used to control nuisance vegetation in some Iowa waterways.



Common carp

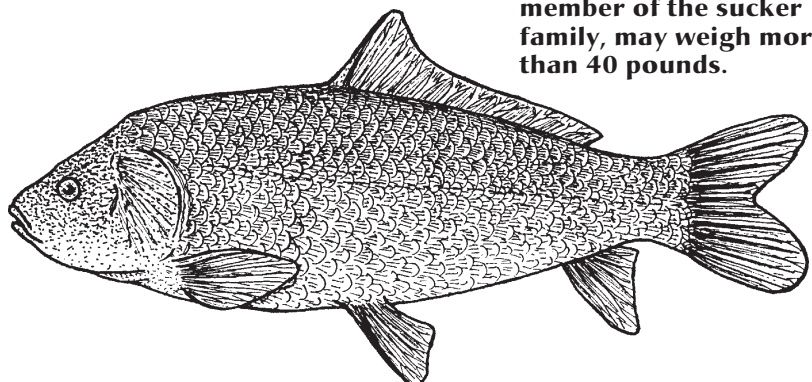


Grass carp

Sucker family

Suckers are mainly bottom feeding fish. Many members of this fish family have characteristic fleshy-lipped mouths located on the underside of the head with which they sift through the debris on the bottom of ponds and rivers. All fish in the sucker family have toothless mouths, but they are unique in having tooth-like structures located in the throat. These are used for crushing food, such as the hard-shelled mollusks and crustaceans which suckers eat. Suckers do well in a variety of aquatic habitats, and pound for pound, may comprise more of the total biomass than all other fish in most Iowa rivers and impoundments. Some people consider the meat of sucker species to be quite tasty, but it is extremely bony which detracts from its taste.

Bigmouth buffalo, a member of the sucker family, may weigh more than 40 pounds.



More common bony fish of Iowa (catfish, minnows, and suckers)

<u>Common name</u>	<u>Characteristics</u>	<u>Food and habitat</u>
Channel catfish	Silver-gray, marked with dark spots; tail fin deeply forked; barbels above and below the mouth	Fish, invertebrates, and plants; found in rivers, lakes, and ponds state-wide
Black bullhead	Dark olive to black; belly white; juveniles may have sharp spines on pectoral fins	Any available animal or plant matter; found state-wide
Common carp (Non-native)	One of the largest fish in Iowa; large diamond-shaped scales; conspicuous "whiskers" on sides of mouth	Any available animal or plant matter; found in nearly all Iowa waters
Grass carp (Non-native)	Close relative of the common carp; dark olive body; lacks "whiskers"	Aquatic plants exclusively; not widespread; found in some ponds and human-made lakes; a stocked species
Creek chub	Olive to purplish, with lateral stripe from snout to tail; forage food for sport fish; up to 12 inches in length	Insect larvae and small organisms; found in small to medium-sized streams state-wide
Fathead minnow	Dark olive above with silvery sides and white belly; maximum length is three inches; bait fish	Insect larvae and algae; found in streams, natural lakes, and human-made lakes
Bigmouth buffalo	Deeply rounded body with a large head and mouth; dorsal fin is sickle-shaped; may weigh more than 40 pounds	Plankton and small invertebrates; found in Large, slow-moving rivers and river impoundments state-wide
White sucker	Slender with fine scales; lips have numerous wart-like projections	Bottom-dwelling organisms; found mostly in small rivers and streams state-wide

Other kinds of fish in Iowa

There are other species of fish which are more rare and not of much commercial or recreational interest, like sticklebacks, drums, and mudminnows. Many of these fish have highly specialized characteristics and, with the exception of the freshwater drum, often live in restricted habitats. Although most of them are not abundant in Iowa waters, they often have very interesting adaptations for survival. Look at the *Useful resources* section at the back of this booklet to find other sources of information about Iowa's fish and fish in general.

Water quality effects on fish

Climate, landforms, and human activity determine both the characteristics of Iowa's surface waters and the type and abundance of fish that live in those waters.

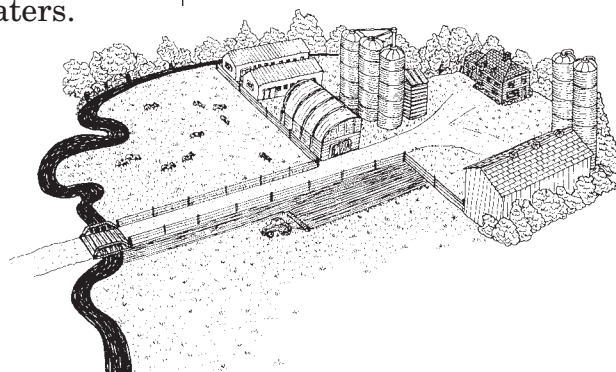
Seasonal temperatures in Iowa can range from well below freezing to more than 90 degrees Fahrenheit. Water temperatures also vary greatly throughout the year, and Iowa's fish must be able to adapt to these fluctuations. Only a few Iowa waters can support cold-water species such as trout.

Landform refers to geographical factors which affect fish populations. The types of soils and rocks, their locations on the landscape, and the nutrients and other chemicals they contain often determine the health and occurrence of fish.

Human activity also affects the diversity and abundance of fish in Iowa. This can be anything from fish stocking practices to the affects of changing agricultural and urban practices. Historically, human influence has had a degrading effect on Iowa waters. On the other hand, fish management programs have actually increased the numbers of some fish in Iowa. While we cannot change climate or landforms, we can control the human influences on Iowa waters.

Siltation and chemicals

Soil erosion is the most serious threat to Iowa rivers and streams. Runoff from the land often contains soil, fertilizers, and pesticides which can



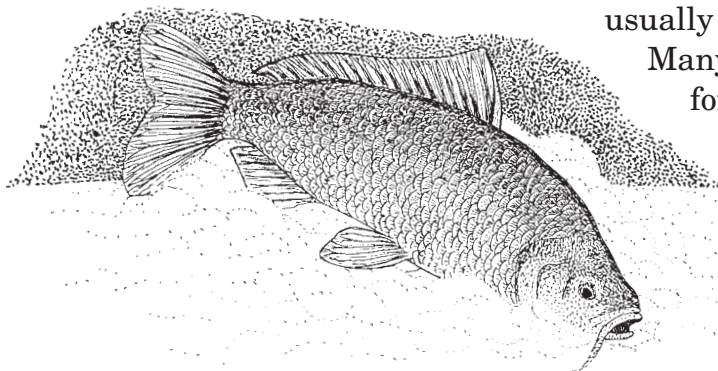
negatively affect fish populations. In addition, industrial and urban chemicals and urban soil erosion contribute significantly to the quality of Iowa's waters. Smallmouth bass, largemouth bass, and northern pike are quickly affected when soil and nutrients enter a stream. They may die off, to be replaced by carp, bullheads, chubs, and other fish which are less affected by these changes.

Chemical fertilizers from both agricultural and urban sources, manure from farm runoff, and inadequate residential septic systems can lead to algal blooms in Iowa waters. Algae absorb carbon dioxide and release oxygen during the day. At night the process is reversed. In warm streams and ponds, which naturally hold less oxygen, algal blooms can drain the water of oxygen overnight, killing fish as well as other stream inhabitants upon which fish depend. Some urban and agricultural chemicals, especially ammonia, are themselves toxic and can kill fish directly if concentrations get too high in the water.

Turbid water

Turbidity is a measure of water clarity. A turbid stream has a lot of soil suspended in it and appears very cloudy. Turbidity affects the vegetation upon which fish and other aquatic animals depend. Plants require sunlight to grow and turbid waters do not allow much sunlight to pass through the water. As a result, vegetation is usually sparse in highly turbid waters.

Many species of fish rely on vegetation for protective cover and many of the invertebrates which fish eat are found in and around aquatic vegetation. Few types of fish spawn in very turbid water. Hence, many kinds of fish tend to stay away from turbid waters.



Depth and current

The depth and velocity of water in a waterway also determine what life will be found there. Shallow, slow-moving waters are typically warm - too warm for fish such as trout and smallmouth bass. Largemouth bass, bluegill, and some other sunfish can live in these waters. Shallow areas of a river or stream are usually places where fish make their nests and spawn. As water becomes deeper, sunlight penetrating the water decreases and this reduces the productivity of plants, and therefore fish, in a lake, river, or stream.

The velocity of water in a river or stream has a major influence on the kinds of fish which live there. Only fish which are strong swimmers, or which can find quiet places to make their homes, can live in fast-moving waters. Some fish find quiet pools where they sit and wait for their prey to drift by in the current.

Fish management

The Fisheries Bureau of the Iowa Department of Natural Resources (DNR) performs most of the public fish management operations in Iowa. The Fisheries Bureau is responsible for conducting scientific studies on fisheries questions, propagating fish species through fish hatchery management, and designing and implementing the fish management strategies in Iowa. The Fisheries Bureau employs specialists who perform studies that are directly applicable to managing Iowa's fish resources. The goal of the Fisheries Bureau is to make sure that Iowa waters always have a continuous yield of healthy fish.

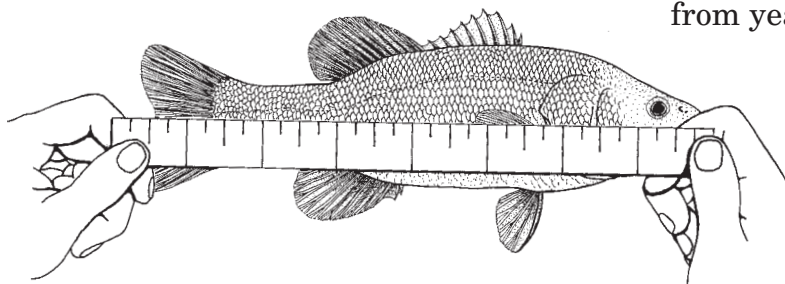
The Fisheries Bureau conducts annual and semi-annual fish inventories on public fishing waters to make predictions about trends in fish populations. Are they healthy? Are the numbers of fish declining or increasing? What kinds of fish do anglers demand? Scientists periodically examine water quality to determine future fish stocking policies for Iowa waters.

Fishing regulations

In managing the fish populations of Iowa's waters, the DNR has implemented a number of fishing rules and regulations to protect fish and allow for safe, enjoyable outings. For some species of fish, the DNR requires that anglers release any fish they catch which are below a certain length. This restriction is called a **length limit**. Length limits serve two important purposes. One is to ensure that important predatory fish species, such as bass, walleye, muskie, and trout, are not over-harvested. Releasing small fish allows them to grow and be caught again when they are a larger size.

Other important fishing regulations imposed by the DNR are the **daily bag limit** and the **possession limit**. The daily bag limit is the number of fish that a person may legally catch in a day and the possession limit is the number of fish that may be held by an angler in a specified time. These regulations also help to ensure that fish populations are not over-harvested.

Fishing regulations and guidelines may change from year to year. Updated versions of the *Iowa Fishing Regulations* booklet can be obtained by contacting the DNR, sport shops, the county recorders office, or your local county conservation board office.

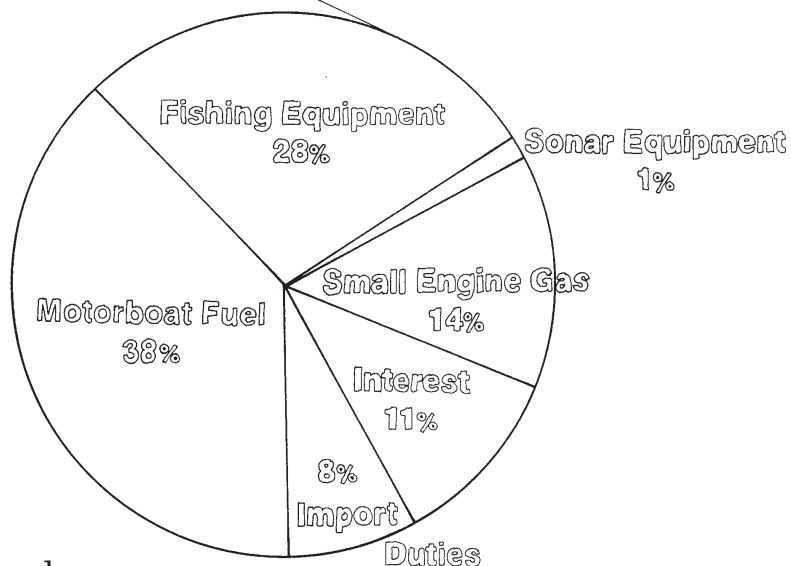


Funding for fish

To fish in Iowa, you must purchase a fishing license at a nominal fee. The funds raised from license fees are used to fund the fisheries management program in Iowa, to operate Iowa's six fish hatcheries, and to fund educational programs and exhibits related to Iowa's fisheries, such as the *Fish Iowa!* aquatic education program. The money is also used to build new lakes, public access roads, fishing jetties, underwater structures in lakes and streams, and to enforce sport and commercial fishing laws in Iowa.



Sources of fishing dollars from federal excise taxes on fishing equipment



In 1950, the United States Congress passed the **Sport Fish Restoration Act (SFR)** which provided additional funding for fisheries management nationally through a tax on fishing tackle and accessories. This was followed in 1984 by the passage of the Wallop-Bureaux Amendment to the SFR Act, which imposed a tax on motorboat and small engine fuel. Iowa's share of this federal tax money is about \$2 million each year which goes toward funding a variety of fisheries projects and programs, including purchasing fishing areas, constructing aeration systems in lakes to prevent fish die-offs, and improving lake fish habitat. This money is essential to maintaining the health of Iowa's waterways and the fish they contain.

Useful resources

Iowa Fishing Regulations; Iowa Department of Natural Resources, Wallace State Office Building, Des Moines, Iowa. (515) 281-5145; updated annually.

Agricultural Pesticides and Wildlife: A Balancing Act; Iowa State University Extension; (515)-294-4576.

Fishes and Their Ways; Clarence J. Hylander; The Macmillan Company, New York; 1964.

Fish Iowa! Web Site; <http://www.state.ia.us/fish>.

Fish Iowa! An Introductory Guide to the Fish of Iowa; Iowa Department of Natural Resources, Aquatic Education Program, Wallace State Office Building, Des Moines, Iowa; (515) 281-5145.

4-H Fish Iowa Responsible Angling Guide; ISU Extension Service, Ames, IA; 1998.

IAN Booklet Series; Iowa Association of Naturalists; ISU Extension Service, Ames, IA.

Iowa Biodiversity (IAN-407); Iowa Wildlife and People Series; 1996.

Adapting To Iowa (IAN-408); Iowa Wildlife and People Series; 1996.

Iowa Wetlands (IAN-204); Iowa's Biological Communities Series; 1993.

Iowa Waterways (IAN-205); Iowa's Biological Communities Series; 1993.

Iowa Habitat Loss and Disappearing Wildlife (IAN-101); Iowa Environmental Issues Series; 1998.

Iowa Fish and Fishing; James R. Harlan, Everett B. Speaker and James Mayhew; Iowa Department of Natural Resources Publication, Des Moines, Iowa; 1987. (515) 281-5145.

Iowa Fish and Wildlife News; Newsletter of the Fish and Wildlife Division, Iowa Department of Natural Resources, Wallace State Office Building, Des Moines, Iowa; 1997. (515) 281-5145.

Iowa Fishing Guide; Iowa Department of Natural Resources, Wallace State Office Building, Des Moines, Iowa; 1996. (515) 281-5145.

Iowa Trout Fishing Guide; Iowa Department of Natural Resources, Wallace State Office Building, Des Moines, Iowa; 1996. (515) 281-5145.

1-800-ASK-FISH (275-3474). The DNR's toll-free source for anyone who wants information about fishing in Iowa. Includes information on fishing locations, boat ramps, where to get a license, and current fishing regulations.

Iowa Fish is one in a series of six booklets that are part of the *Iowa Wildlife Series*. The booklets in the series include:

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)

The Iowa Association of Naturalists also has produced five 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'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'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)

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:

store.extension.iastate.edu

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