State of Illinois
Illinois Department of Natural Resources

# Aquatic Resources of Illinois

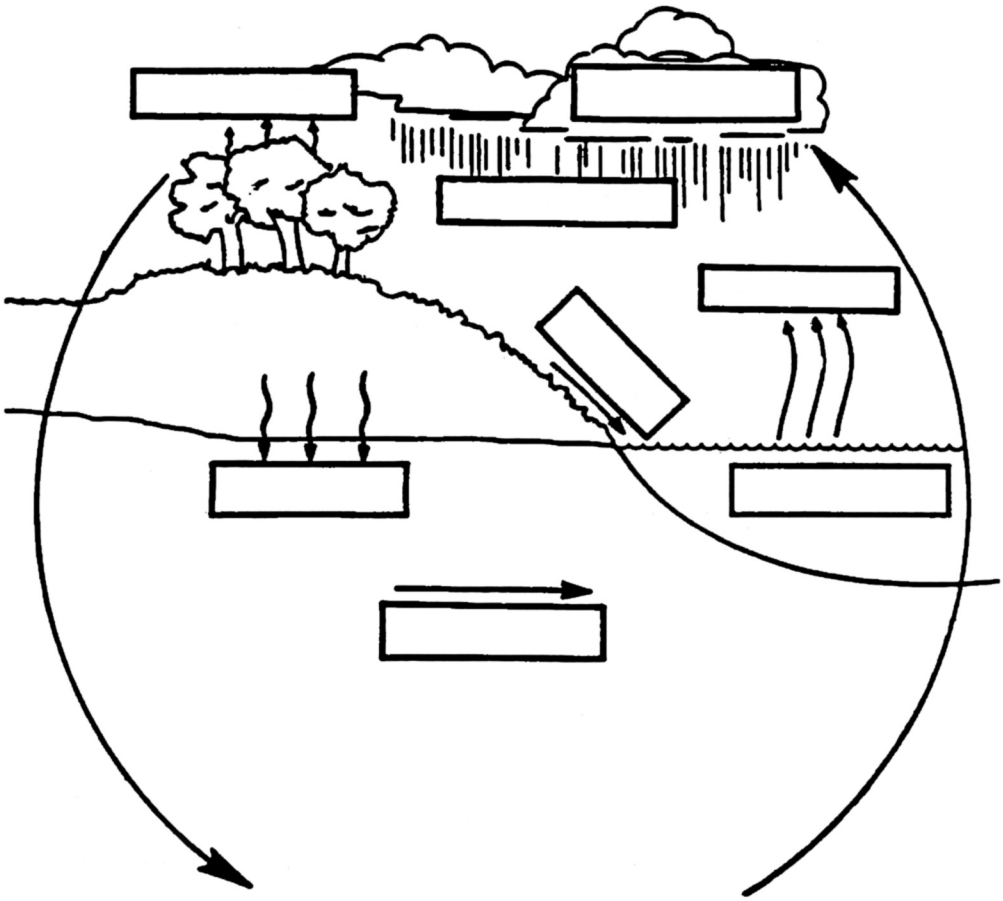
Illinois Department of Natural Resources

# What are aquatic resources?

The term "aquatic" describes things having to do with water. About three-fourths of the earth's surface is covered with water. It is one of the most common and valuable substances on earth.

Water can be found in three separate forms: solid; liquid; and gas. A single molecule of water can float as a vapor (gas), fall to earth as rain (liquid) or freeze into ice, sleet or snow (solid). This molecule can evaporate to a gas again or melt to a liquid. The movement from one form to another happens all the time and is called the water cycle.

**Nature's Water Wheel**



**Activity: Nature's Water Wheel**

Read each term and its definition. Write the term in the correct box on the water cycle wheel. When you have finished, answer the question.

**condensation:** changing water vapor into liquid water
**evaporation:** changing liquid water to water vapor
**ground water:** water found below the surface of the earth
**infiltration:** process by which water seeps into soil
**precipitation:** forms of condensed water that are heavy enough to fall to earth; examples are rain, snow, sleet, hail and fog
**runoff:** water that drains off the surface of the land
**surface water:** the water not in the air nor under the ground
**transpiration:** process by which plants release water vapor into the air

How many ways can you find to move a water molecule through the water cycle?

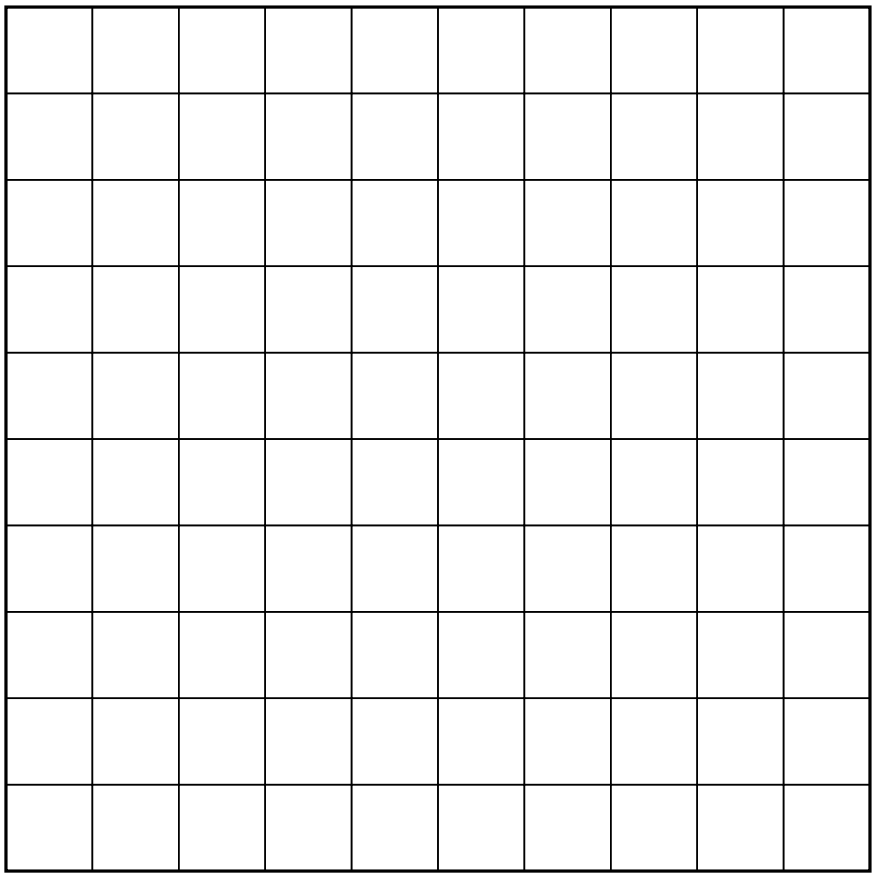
Write the number here. _____

# What are aquatic resources?

Hydrology is the study of water. Water can be found in the ground, on the earth's surface and in the air. Water is also found in all living things. About 97 percent of the earth's water is salt water, with most of it in the oceans. The remaining three percent is found in freshwater rivers, ponds, lakes, icecaps, water vapor, ground water and in organisms (living things). The two most available sources of fresh water are surface water and ground water. The other main source of fresh water is the ice in the polar regions.

Illinois is a very water-rich state. Water almost surrounds Illinois. The state receives 35 to 42 inches of rainfall each year and has large groundwater supplies.

**Activity: Fresh or Salt?**
This box contains 100 squares. It represents all of the water in the world. Color 97 boxes blue to represent salt water. Color three boxes red to represent fresh water.



What percent of the world's water is salt water?

_____

Can people drink salt water?

_____

Do any of Illinois' rivers and lakes contain salt water?

_____

Why should we take care of the fresh water in the world?

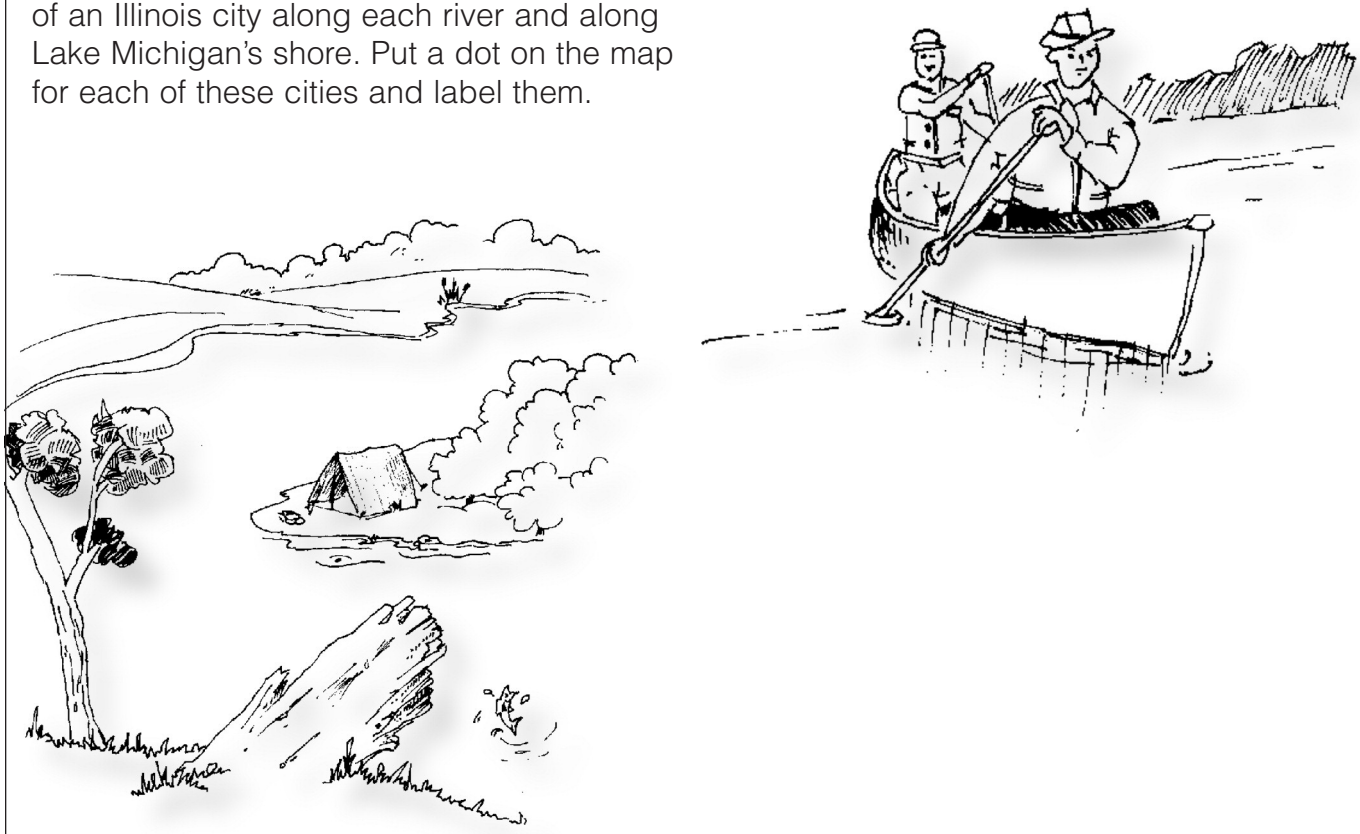
_____

_____

# Where are Illinois' aquatic resources?

Illinois is bordered by three major rivers: the Mississippi to the West; the Ohio to the South; and the Wabash to the East. Lake Michigan, one of the five Great Lakes, creates Illinois' northeast border.

**Activity: Water Geography**
On page 22 of this booklet, label the three major rivers and Lake Michigan on the map of Illinois. Use a state road map to find the name of an Illinois city along each river and along Lake Michigan's shore. Put a dot on the map for each of these cities and label them.



# Where are Illinois' aquatic resources?

The system of streams, rivers, lakes, creeks and other wetlands in our state is called surface water. If laid end to end, the streams in Illinois would be more than 106,900 miles long. This number changes constantly because streams are always changing. They lose soil from their banks. They fill in with soil in other places. They may change their course due to natural or human causes. There are nearly 91,400 lakes and ponds in the state and one million acres of wetlands. At one time Illinois contained eight million acres of wetlands!

Much of the water we use exists out of sight under the earth's surface. It is called ground water. It is often used for drinking water, in factories and in farming. There is more ground water in illinois than there is water in all the rivers, lakes and streams.

**Activity: Aquatic Amounts**

The distance around the earth at the equator is about 25,000 miles. If you could lay all the streams in Illinois end-to-end around the earth at the equator, how many times would they wrap around the earth?

_____

Illinois has lost nearly seven million acres of wetlands since the 1800s. What do you think happened to the wetlands? What do you think happened to the plants and animals that lived in these wetlands?

_____

_____

_____

_____

_____

_____

# Why are aquatic resources important?

**Drinking Water:**
Water for drinking can be taken from surface water (rivers and lakes) or ground water to meet daily needs. Approximately 1.474 billion gallons per day are removed from Lake Michigan just for the people in northeastern Illinois to use.

**Farming:**
Irrigation, a way to water crops, is a major water use in some areas of the state. Illinois has more than 2,000 farms that use irrigation. The source of most irrigation water is ground water. Water use for farm animals is important, too.

**Cleaning and Other Uses:**
People use water for bathing, washing clothes and dishes, brushing teeth, cooking and many more tasks. The average person in the United States uses 80 to 100 gallons of water per day. The total amount of water used in Illinois is estimated to be more than 1.9 billion gallons per day. The largest Illinois public water system is the Chicago Department of Water Management which delivers nearly one billion gallons of drinking water to residents of Chicago and 125 suburbs daily.

**Industry:**
Industry uses large amounts of water to make products and perform related tasks.

**Mining:**
Water is used to keep coal dust down in the mines as coal is being removed from the earth. Water is also used to wash the coal after it is mined. The average coal mine in Illinois uses about 150,000 to 195,000 gallons of water per day.

**Transportation:**
The Mississippi, Illinois, Ohio and Kaskaskia rivers serve as important transportation routes for moving products and materials in and through Illinois.

**Recreation:**
There are 328,139 acres of water open to the public in Illinois for recreational purposes. (An acre is about the size of a football field.) Swimming, fishing, hunting, trapping, boating, skiing, snowmobiling and observing wildlife are the major water-related activities.

**Education:**
Aquatic resources provide study areas for students of all ages.

**Habitat:**
Aquatic habitats are very important to wildlife. They provide breeding, feeding and resting areas for ducks, geese and shorebirds and are the home for hundreds of other species.

**Power Plants:**
The largest use of water in Illinois (95 percent to 98 percent) is for electric power generation. Most of the water used is for cooling and is recycled. The only water that is actually lost is through evaporation, but that water will be recycled through the water cycle.

# Why are aquatic resources important?

**Activity: Down on the Farm**
Listed here are estimated water uses for some farm animals including what they drink and other needs for their care.

Estimated Water Usage (gallons per day)

Dairy Cows .....35.0

Beef Cattle .....12.0

Horses/Mules .....12.0

Hogs .....4.0

Goats .....3.0

Sheep .....2.0

Chickens .....0.06

If you had a farm with one of each of these animals, how much water would you have to provide each day for the animals?

_____

If you had a herd of 50 dairy cows, how much water would you need to provide for them each day?

_____

**Activity: Aqua Fact**
The total water use in Illinois each day is estimated to be 1.9 billion gallons. Of that total, 1.474 billion gallons is taken from Lake Michigan for use in northeastern Illinois. How much water per day is required by the people in the rest of the state?

_____

**Activity: Getting Personal**
List five things that you have used water for today.

_____

_____

_____

_____

_____

# Types of aquatic resources

**Ground Water**

When precipitation (rain, snow, sleet) falls to the ground, some of it runs off, some of it evaporates and some of it soaks into the soil. The water that soaks into the soil fills the cracks and other openings between soil and rock particles. It can move down far enough that large underground pools of water form. This water deep under the ground is called ground water. It may remain under the ground for years, or it may flow into water wells drilled into the ground. It can also flow out of the ground at springs. A spring is a place where ground water comes out of the earth.

Ground water is affected by the type of soil in the area. It soaks in and moves slowly in clay soils (0.06 inches per hour) because the particles in clay soils are packed tightly together. Water can soak into and move quickly through sandy soils (more than 20 inches per hour) because the soil particles are very loosely arranged.

About half of the people in Illinois use ground water from water wells for drinking. Almost all of the people (98 percent) who live in rural areas of the state draw their drinking water from wells. Water wells range in depth from 20 feet to more than 2,800 feet. The depth is determined by how deep the well must be drilled to reach the ground water.

Even though it's deep under the ground, ground water may be polluted. In some areas of Illinois, the ground water is contaminated with natural minerals, like calcium and magnesium, which make the water "hard." Gasoline and other harmful liquids sometimes leak from underground storage tanks into ground water. Landfills and septic systems can also add pollutants to ground water, as can runoff from fertilized fields, livestock areas, abandoned mines, salted roads and industrial areas. Even homeowners can contribute to ground water pollution by pouring household chemicals on the ground.

In 1987, the Illinois General Assembly passed the Illinois Groundwater Protection Act. This law is meant to help stop pollution of groundwater sources. Several state agencies work to make sure that the law is being carried out. Those agencies include the Illinois Environmental Protection Agency, Illinois Department of Natural Resources, Illinois Department of Public Health, Illinois Pollution Control Board and the Office of the State Fire Marshal.

**Activity: Soak It Up**

Get three clear plastic containers or three clear plastic drinking glasses. The three containers or three glasses should be the same size. Fill one container half full with sand. Fill another container half full with potting soil. Fill the last container half full of clay soil. You are going to see which soil type absorbs water fastest. Make a prediction on the blank below. Now pour one-quarter cup of water into the container with sand and keep track of the time it takes for all of the water to be absorbed by the sand. Record the time below. Repeat this process with the other two containers. Answer the rest of the questions.

I predict that the _____ soil type will absorb the water fastest.

_____ time needed for water absorption in sandy soil

_____ time needed for water absorption in potting soil

_____ time needed for water absorption in clay soil

Which soil type absorbed the water fastest?

_____

Was your prediction correct?

_____

What could you do to the slowest soil type to make it absorb water faster?

_____

_____

_____

Name a reason why it's good for water to be absorbed quickly into the soil.

_____

_____

_____

Name a reason why it might be bad for water to be absorbed fast into the soil.

_____

_____

_____

# Types of aquatic resources

**Flowing Water**
Streams, canals, creeks and rivers all contain flowing water. Flowing water is water that moves. Most of Illinois' streams are found in the southern and western parts of the state. Henderson, Calhoun, Rock Island, Hancock and Carroll are the counties with the highest stream acreage.

**Activity: Mapping I**
On the map of Illinois (page 22) color in blue the five counties with the highest stream acreage. From looking at the map, what is one thing that these counties all have in common?

_____

_____

_____

Rivers, creeks and streams are flowing aquatic habitats contained within a channel. Some of these habitats have water that flows all year. In others, water flows only part of the year. Many rivers and streams flood regularly. Flooding is sometimes a problem for humans, but it is an important and natural process for rivers and streams. Floods happen when the stream channel receives more water than it can hold. The water then spreads out over the land next to the river, the flood plain.

As water flows over objects in the stream channel, oxygen is added. Increasing oxygen in the water is important because those creatures living in water must use oxygen from the water. Different organisms need different amounts of oxygen. For example, pike and trout need a lot of oxygen in the water, while carp and catfish can survive in water having lower amounts of oxygen.

Many living things can be found in and along streams. Crayfish, mussels and some immature insects live on the stream bottom. Organisms that float or swim include fishes, frogs, turtles, water lilies and a variety of insects. Some species live on the surface of the water, such as water striders and duckweeds. Where organisms live in flowing water is determined by how well they can deal with water currents. Some organisms living in swift water anchor to the bottom. Others stay behind large rocks or in pools where the current is slower.

Plants that grow next to flowing water provide shade to the water, slow the rate that soil washes away (erosion) and decrease the amount of silt moving into the water. Silt is soil particles that are washed into the water and carried along by the current. Silt gives water a brown or muddy look. It is a major problem in Illinois. Some plants that grow along Illinois rivers and streams include willows, cottonwood, sycamore, box elder, sedges, bulrushes, cattails, buttonbush and touch-me-not.

# Types of aquatic resources

Flowing water can have problems. Soil particles washed into the water can kill organisms that live on the bottom, clog the gills of fishes and mussels and destroy habitat. Chemicals attached to soil particles can kill or severely hurt aquatic organisms. Soil particles that settle from the flowing water to the bottom can block channels and reduce the water supply available. Sometimes this soil accumulation must be removed by dredging. Invasive species, such as the zebra mussel, can harm native aquatic life.

The Middle Fork of the Vermilion River is the only National Scenic River in Illinois. Its good water quality and habitat provide a home for many fish species. The Little Vermilion River is considered to be an "A" stream, a unique aquatic resource.

**Activity: River Ranking**

The following list shows the length of the major rivers of Illinois. The numbers include only the Illinois portion of rivers found in multiple states.

| | | |
|---|---|---|
| 581 mi Mississippi _____ | 163 mi Spoon_____ | 237 mi Little Wabash _____ |
| 332 mi Illinois _____ | 206 mi Sangamon_____ | 230 mi Wabash _____ |
| 292 mi Kaskaskia_____ | 163 mi Rock _____ | 220 mi Embarras_____ |
| 93 mi Cache _____ | 133 mi Ohio _____ | 156 mi Des Plaines_____ |
| 166 mi Big Muddy _____ | 115 mi Fox _____ | |

Source: Illinois Environmental Protection Agency, 1995.

Rank the rivers from longest (1) to shortest.

See if you can find them on a map of Illinois. Which of the rivers are found entirely in Illinois?

_____

_____

# Types of aquatic resources

**Still Water**

Still water is water that doesn't move. Lakes, ponds and reservoirs have still water. Even though the water at the surface can be blown by the wind, and the water inside does move up and down, the water doesn't flow like that in a stream. More than 2,900 lakes, 84,000 ponds and three large reservoirs are found in Illinois. Lakes are considered to be still water bodies 20 or more acres in size, while ponds are still water bodies smaller than lakes.

Illinois contains a variety of lake types. Northern Illinois has some lakes that were formed thousands of years ago as glaciers moved. Oxbow lakes are made when a stream cuts a new and straighter channel. The old bend in the stream, now cut off from the main channel, becomes a lake. Impoundments and reservoirs are created by blocking the flow of a river with a dam. Ponds are built by digging out or enlarging a lowland area. There are three large reservoirs in Illinois: Lake Carlyle; Rend Lake; and Lake Shelbyville. Only about seven percent of Lake Michigan is considered to be within the state of Illinois. This amount accounts for about 61 percent of the surface water of Illinois. Lake Michigan borders Cook and Lake counties.

Still water bodies are considered to be temporary because over time they fill in with dirt, decayed plant and animal materials and other items. Water moves much more slowly through a lake or pond than it does through a stream. Materials that are brought into a lake by flowing water may quickly settle to the bottom of the lake.

Many organisms live in lakes and ponds. Some stay on or near the bottom, like crayfish and bacteria. Some, like fishes and turtles, swim in the water. Plankton are small, free-floating organisms. Other creatures, like water striders and duckweeds, live on the surface film of water.

Temperature is one of the key factors that regulates the kind of species that can live in lakes. The amount of oxygen that water holds varies with the temperature. Warm water holds much less oxygen than cold water. Temperature also affects feeding, growth and reproduction of many aquatic organisms. Oxygen enters a lake from the air and by photosynthesis.

Wetlands are areas that are either covered with shallow water or have soils soaked with water for periods during the growing season. They also have soils that are low in oxygen and plants that can grow in water or wet soil.

Wetland areas include marshes, fens, swamps and bogs. They are fed by runoff, rainfall, seepage from ground water or a combination of all these sources. Wetlands consist of living and nonliving things. Wetlands serve very important environmental functions. They absorb large amounts of storm water and reduce flooding by storing and slowing down the water force. They improve water quality. Wetlands provide food, water and shelter for a variety of plants and wildlife. They provide recreational activities, too.

# Types of aquatic resources

Most wetland areas in Illinois are in the northeastern and southern parts of the state and along the Illinois River. However, all counties in Illinois have wetland areas, with the number of acres varying from 1,014 acres in Stark County to 35,502 acres in Clinton County.

**Activity: Mapping II**
The top five counties in regard to impoundment acreage are Lake, Mason, Williamson, Fulton and Cook. Find these counties on the map on page 22 and color them green.

The three reservoirs in Illinois are in Clinton, Bond, Fayette, Shelby, Moultrie, Franklin and Jefferson counties. On page 22, color these counties red.

**Activity: What Lives There?**
Circle the names of the species that can be found in wetland areas.

**American badger**

**cat-tail**

**duck**

**big bluestem**

**American bullfrog**

**dragonfly**

**American beaver**

**pine tree**

**crayfish**

# Watersheds

A watershed is a land area that drains water, soil and other substances into a body of water. The watershed for the Illinois River drains about one-third of the state. A watershed impacts lives on a daily basis. It affects what lives in an area. It affects the drinking water available. It affects human travel, trade and communication. A watershed shapes and is shaped by the land. Humans make changes to watersheds. Everyone is responsible for the health of a watershed.

**WAYS TO HELP THE WATERSHED**

- Turn off water when you are not using it. Don't let it run while you are brushing your teeth or washing your hands. When shampooing, turn off water while lathering hair.
- If your home has a dripping faucet, you may be losing more than 20 gallons of water per day. Replace worn-out washers to stop faucet leaks.
- If your toilet "runs" between flushes, you are losing water. Normally, you can't hear a leaky toilet valve unless you are losing more than 250 gallons of water a day. Repair the toilet to save water.
- Install water-saving devices. Take shorter showers. Don't let water run down the drain while waiting for it to get hot (for baths).
- Wait until you have a full load before washing your dishes or clothes. Use the water or energy-saving cycle whenever you can.
- Keep gutters and storm drains free of litter, pet waste, leaves and other debris.
- Apply lawn and garden chemicals sparingly. Try biological insecticides instead of human-made ones. Use the most pest resistant plants. Plant native species. Use pest traps or barriers.
- Utilize plants for ground cover to control soil erosion in lawns.
- Maintain your septic system.
- Water gardens and lawns only in the evening or early morning. Irrigate slowly, deeply and infrequently. Reduce evaporation by using organic mulches or plastic ground covers.
- Never dispose of used motor oil, paints or household chemicals into a storm sewer or down a drain.

# Watersheds

**Activity: Which Watershed Are You In?**

Using a road map, find the location of your city. Go to page 22 and put a dot on the map where your city is located. Label your city. Now find the nearest stream to your city on this map. Using a brown crayon or marker, trace this stream away from your city and into the next stream. Keep following the stream flow until you reach the end of the map.* Now, if your location isn't at the very upper reaches of the river, trace upward on the stream using a purple crayon. Your watershed is in the area surrounding the purple and brown marks. Use a pencil to outline the watershed. You must go around any streams that drain into the purple and brown markings because all those streams are in your watershed, too.

If pollution were to enter your watershed in the purple area, what affect could it have on your city?

_____

_____

_____

_____

_____

_____

How would you feel about it?

_____

_____

_____

_____

_____

_____

What if pollution were to enter the watershed in the brown area on the map instead? How would you feel then?

_____

_____

_____

_____

_____

_____

*Note: A small portion of Illinois drains directly into Lake Michigan. For purposes of this activity, if you live in this part of Illinois, follow the directions as they are written anyway.

# Illinois history and aquatic resources

Illinois' aquatic resources have been important to Native Americans, early explorers, fur traders, river boat operators, settlers and many other groups of Illinoisans. Native Americans were the first humans to use Illinois waterways, starting about 12,000 years ago.

Native American settlements were made along rivers where, besides the available water supply, people relied on the abundant wildlife in and on the river. Mounds were often built by Native Americans along rivers. These large mounds of earth were sometimes used as burial sites for the tribes' important members and contained beautiful pipes, jewelry and ornaments. Some objects found in burial mounds were brought to Illinois by the trade network established with other tribes along the rivers. The Hopewell people grew plants along the rivers. This activity was one of the earliest forms of agriculture.

French traders have an important role in Illinois aquatic history. Louis Jolliet and Father Jacques Marquette were two of the first explorers in Illinois. On June 20, 1673, they paddled their canoes past present-day Galena in search of a trade route to the Orient. Fur traders, frontiersmen and others settled into what was to become Illinois. Several forts were constructed along Illinois waterways. Fort St. Louis (Starved Rock) and Fort Creve Coeur were built along the Illinois River. Fort Massac was constructed on the Ohio River. Five forts were built along the Mississippi River–Cahokia, Prairie du Rocher, Fort de Chartres, St. Genevieve and Kaskaskia. Forts served as trading posts and military and governmental centers.

**Activity: Long Ago and Far Away**

In the space below, draw a scene of what you think a fort and its nearby river area looked like in the early 1700s. In the next space, draw what you think this area will look like 100 years from today.

**1700s Scene**

**100 Years From Now Scene**

# Illinois history and aquatic resources

Pioneers used rivers as a means to move West. In the early 1800s, thousands of people traveled down the Ohio River from West Virginia to Illinois before settling in the area or as a means to reach the Mississippi River. Travel by river was quicker than travel by land. People formed settlements along big rivers in places where a river joined with another river or where a fort was located. Flatboats were often used for travel. Pioneers floated downstream with all their belongings strapped to these large awkward floating decks. Travel upstream required keelboats, which were moved by pushing long poles into the river bottom.

Flatboats were also used as stores, transporting dishes, silverware, clothing items and tools between settlements.

By the 1830s the Great Lakes were used as an additional route to the West. Steamships provided a means of carrying huge shipments of materials including meat, dairy and grain products. Construction of the Illinois and Michigan Canal began in 1836. The canal was to be a link between the Great Lakes and the Illinois River. It was a safe and cheap way to transport goods and passengers. The canal was successful until railroad travel made it outdated.

**Activity: Floating Through Time**

Match the event to the time it occurred.
You may need to use a history book or the Internet to help you.

_____ 1673 **A.** Construction begins on the Illinois and Michigan Canal.

_____ 1680 **B.** Fort Dearborn is built on current site of Chicago.

_____ 1754 **C.** Jolliet and Marquette cross Illinois.

_____ 1775 **D.** French and Indian War begins.

_____ 1803 **E.** Fort Massac becomes the first Illinois state park.

_____ 1806 **F.** American Revolution begins.

_____ 1818 **G.** Illinois becomes a state.

_____ 1836 **H.** Fort Creve Coeur is the first fort built in Illinois.

_____ 1872 **I.** Shawneetown is settled and is the largest port on the eastern side of Illinois.

_____ 1908 **J.** Illinois legislature passes the first fish conservation law.

# Water quality

The quality of most Illinois bodies of water is monitored by the Illinois Environmental Protection Agency (IEPA). Water quality in Illinois has improved considerably since the early 1970s.

Pollution hurts water quality. Most of the time pollution alters water in ways so that it becomes hazardous to wildlife, wildlife habitat and humans. There are many types of pollution. Acid rain and pesticides are types of chemical pollution. Thermal pollution changes the temperature of water from its normal state. It can occur in water next to power plants or industries. Organic pollution happens when too many nutrients, for example, fertilizers, enter a water system. Even natural substances can cause pollution if they are added to a place where they are not normally found or if there is too much of them. The major sources of pollution for Illinois rivers and streams are agriculture, point sources, habitat modification, urban runoff and mining. The three leading causes of water quality problems are nutrients, siltation and habitat alteration.

**Activity: Pollution Solution**

Fill in the blank with the correct term.

_____ something that hurts water quality

_____ a type of pollution caused by changes in water temperature

_____ agency that monitors water quality

_____ fertilizers can be this type of pollution

_____ weed killers can be this type of pollution

_____ three leading causes of water pollution problems in Illinois

_____

_____

# Exotic species

Organisms tend to live in one general area on earth. They may find it hard to spread to new places because of their size or because of barriers, like mountains, oceans, deserts and rivers. Most species are very well suited for where they live.

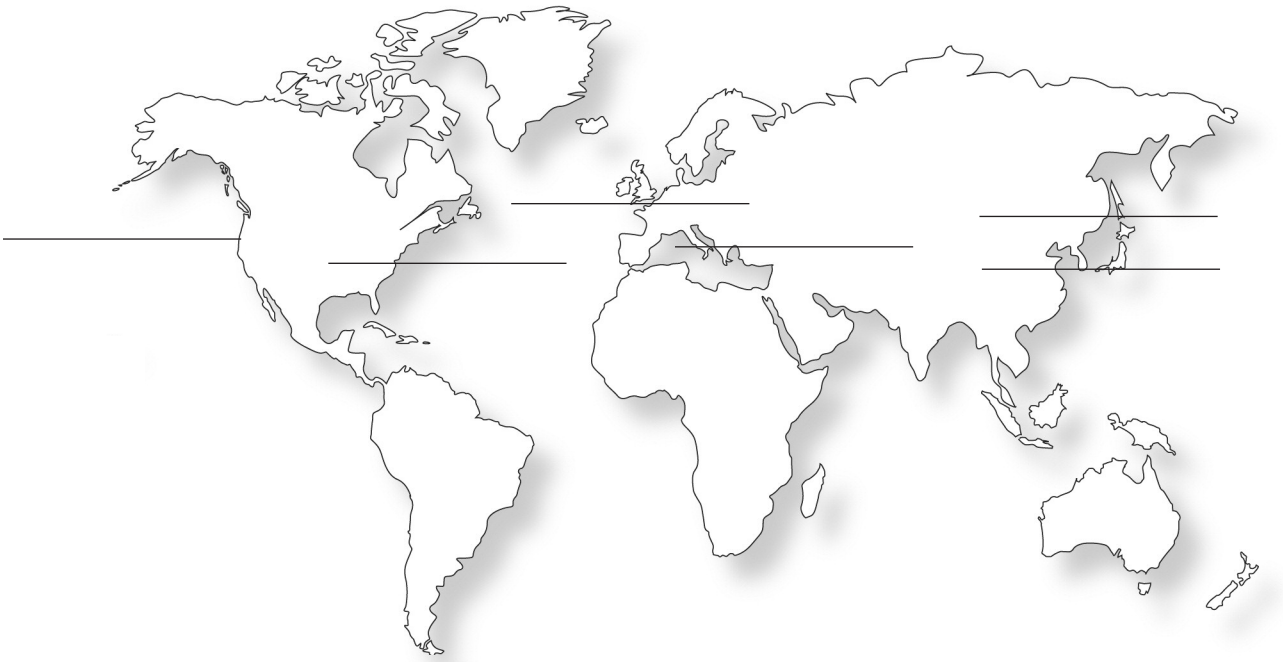
Sometimes organisms do move to new areas. For instance, their seeds may be blown or carried by ocean currents to new areas. Humans can be involved in moving species, too, either on purpose or by accident. Organisms introduced into habitats where they are not native are called exotic species.

Just because a species is introduced to a new habitat does not mean that it will survive. However, there are times when species adapt very well to their new surroundings. They may have no predators, parasites, diseases and/or competitors that were present in the native habitat. Often, adding species where they don't normally live can cause many problems. These invaders can crowd out native species. Native species may no longer be able to survive. Once established in an area, exotics can rarely be eliminated.

**Activity: Mapping III**

On the world map, fill in the blanks with the names of the species which are native to each area.

common carp – Asia
spiny water flea – Europe
purple loosestrife – Europe and Asia
rainbow trout – Pacific coast of North America
zebra mussel – Asia
rusty crayfish – Ohio, Kentucky, Tennessee



All of the species listed in the Mapping III activity now also live in Illinois.
How do you think they might have traveled so far?

_____

# Exotic species

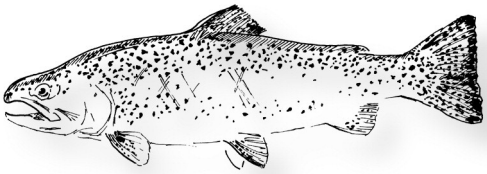
**Activity: Aquatic Exotics**
Match the exotic organism to its picture.

A. **purple loosestrife** (*Lythrum salicaria*): This plant reached Illinois in the 1940s or 1950s. It has spread along marshes and lake shores and crowds out many native species. Each plant can release about 2 million seeds annually. The seeds are spread by water and animals. In Illinois, no native species are known to eat it. A 1985 law bans the planting of this species in Illinois.

B. **zebra mussel** (*Dreissena polymorpha*): The zebra mussel was accidentally brought to the Great Lakes by ballast water released from ships in 1986. The water was picked up in Europe and had immature zebra mussels in it. This species has spread through all of the Great Lakes and into many rivers and other lakes. It is easy to identify with its two yellow or brown shells with wavy bands. Female zebra mussels can produce 30,000 to 1 million eggs per year. Zebra mussels attach to water intake pipes of power plants and water treatment plants. They also clog the cooling systems of boat engines. Zebra mussels can grow on living mussels and snails, sometimes killing them.

C. **rusty crayfish** (*Orconectes rusticus*): Native to streams in Michigan, Indiana, Ohio, Kentucky and Tennessee, the rusty crayfish was first released in Illinois in 1973. It is now found throughout the northern half of Illinois. It has been spread by anglers who use this species for bait, then release any crayfish left after the fishing trip is over. These crayfish reproduce rapidly and eat large amounts of plants, taking away shelter and food from native species. It is easy to identify the rusty crayfish by the single rust-brown spot found on each side of the back of the shell. Current Illinois law prohibits the possession and sale of live rusty crayfish.

D. **common carp** (*Cyprinus carpio*): Native to Asia, the common carp was brought to North America in the late 1800s. This fish became established in nearly every waterway in the country. Carp are found statewide in Illinois in all types of aquatic habitats. They eat plant and animal materials. Females lay 790,000 to 2 million eggs that hatch in 12 days. The average life span for carp in Illinois is seven to eight years. Carp provide a good fight for anglers, and some people like to eat the meat.



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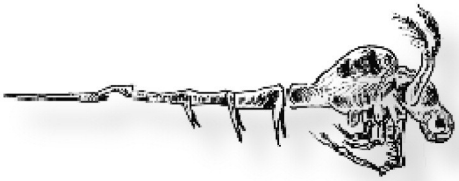

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# Exotic species

E. **rainbow trout** (*Oncorhynchus mykiss*): The rainbow trout is a fish with a pink stripe on its side and large jaws to catch prey. It lives in water with cool temperatures, where it eats insects, snails and small fishes. The rainbow trout has been released into Lake Michigan and other Illinois lakes and rivers as a sport fish.

F. **spiny water flea** (*Bythotrephes longimanus*): The spiny water flea is a tiny crustacean with a large, single eye. It was accidentally brought to the Great Lakes by ships. Because it has a long spine with barbs, young fish do not like to eat it. Many spiny water fleas are thus able to survive. Some adult fish do eat it, though, which can help keep its population in check.

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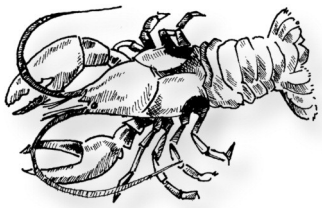

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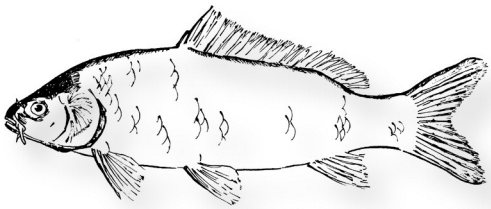

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**Activity: Multiplying Mess**

A purple loosestrife plant can release about two million seeds per year. If only half of the seeds become new plants, how many new plants could grow after one year?

_____

_____

If these new plants each had the same number of seeds released and surviving each year, how many plants could develop by the second year?

_____

_____

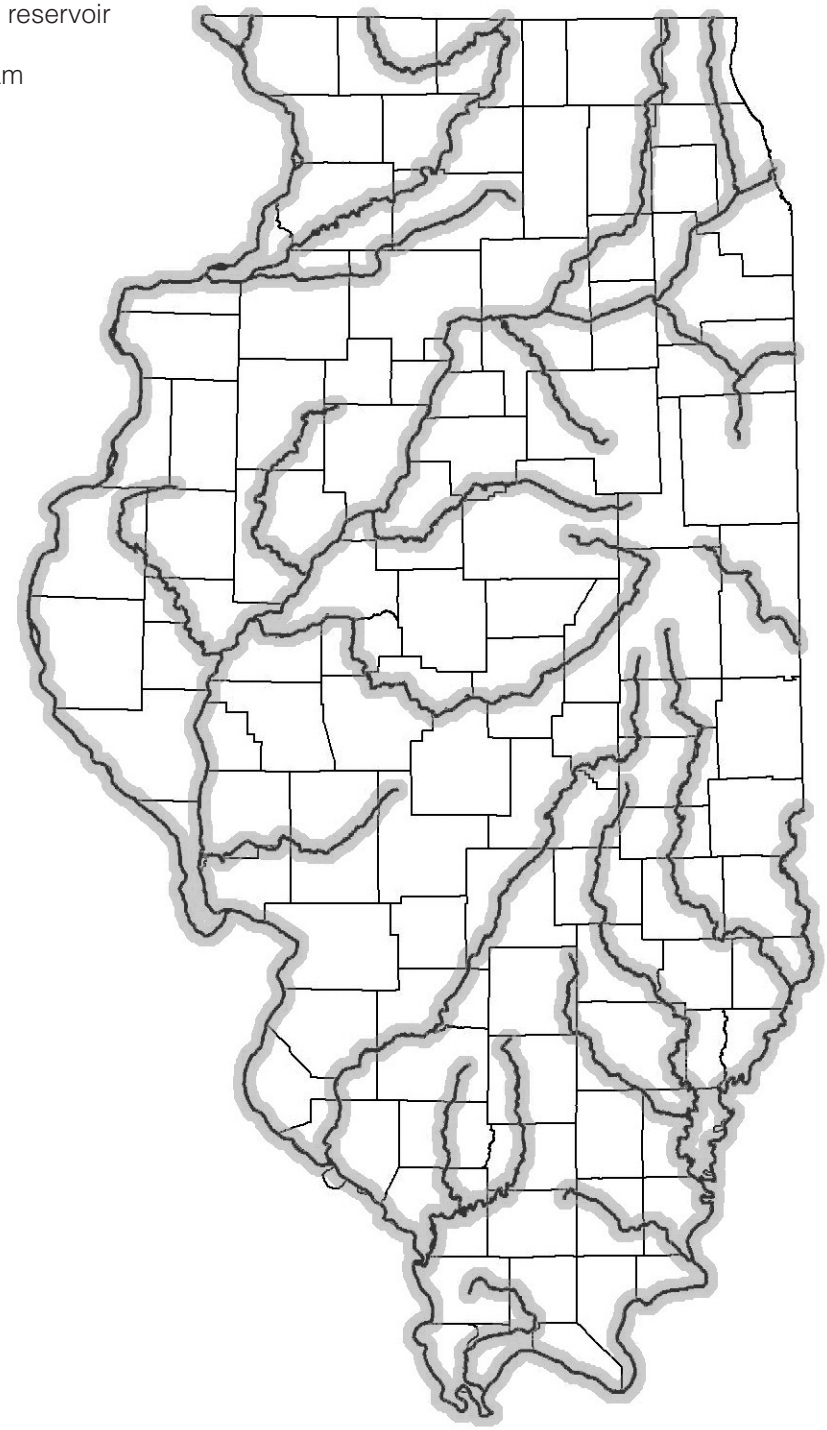
What do you think would happen to the area where the first plant began to grow?

_____

_____

# Illinois counties and rivers

- ☐ blue = counties with highest stream acreage
- ☐ green = counties with highest impoundment acreage
- ☐ red = counties with reservoir
- ☐ brown = downstream
- ☐ purple = upstream

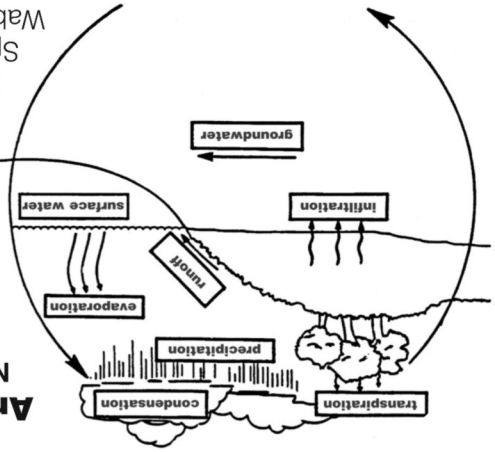


# Using this activity book

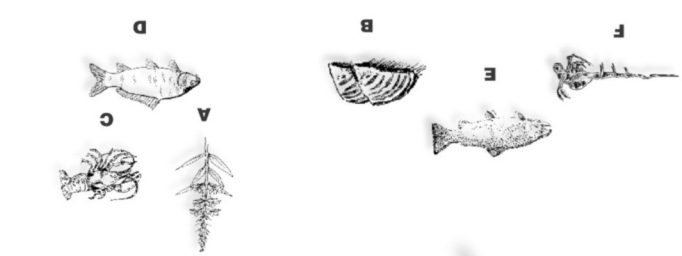
## Using this activity book: For the Educator

This activity book from the Illinois Department of Natural Resources' (IDNR) Division of Education is designed to make students of **grades four through middle school** familiar with the aquatic resources of our state. For some of the activities, an Illinois road map is needed. You can obtain a free map from the Illinois Department of Transportation. Lessons from the *Aquatic Illinois* unit support the topics from this activity book. You will find them as well as a resources trunk, video podcasts, publications and other supplemental items through the Web pages at https://www2.illinois.gov/dnr/education/Pages/default.aspx and https://dnr2.illinois.gov/teachkids/. Contact the IDNR Division of Education at 217-524-4126 or dnr.teachkids@illinois.gov for more information.

## Answers to Activities




**Nature's Water Wheel:** Answers will vary. They should find at least five ways.
**Fresh or Salt?:** 97; no; no; Answers will vary.
**Aquatic Amounts:** 4.3; mainly destroyed by human actions; moved, adapted to new environment or died
**Down on the Farm:** 68.06 gallons; 1,750 gallons
**Aqua Fact:** 0.426 billion gallons
**Getting Personal:** Answers will vary.
**Soak It Up:** Answers will vary.
**Mapping I:** The counties are all located along the Mississippi River.
**River Ranking:** Mississippi 1, Spoon 9, Little Wabash 4, Illinois 2, Sangamon 7; Wabash 5, Kaskaskia 3, Rock 9, Embarras 6, Cache 13, Ohio 11, Des Plaines 10, Big Muddy 8, Fox 12; Illinois, Kaskaskia, Cache, Big Muddy, Spoon, Sangamon, Little Wabash, Embarras
**What Lives There?:** dragonfly, cattail, duck, crayfish, bullfrog, beaver
**Which Watershed Are You In?:** Answers will vary.
**Floating Through Time:** C-1673; H-1680; D-1754; F-1775; B-1803; I-1806; G-1818; A-1836; J-1872; E-1908
**Pollution Solution:** pollution; thermal; IEPA; organic; chemical; nutrients, siltation, habitat alteration
**Mapping III:** Answers will vary.
**Aquatic Exotics:** Answers on right.
**Multiplying Mess:** 1,000,000; 1,000,000,000,000; Answers will vary.

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