

Rivers of Illinois: Mississippi, Illinois, Ohio and Wabash Ecology: Invasive Species

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Ecology: Invasive Species

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The rivers in Illinois are home to people, plants and animals. Historically, humans chose land close to major waterways to build their communities. Sites close to rivers had much appeal for the many resources and opportunities they presented.

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The four main rivers in the state are the Illinois, Mississippi, Wabash and Ohio.

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The Illinois River runs 332 miles connecting northern Illinois to the Mississippi River.

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Some of the major cities along it include Ottawa,

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La Salle, Peru,

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Peoria, East Peoria

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and Pekin.

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The other three major rivers define much of Illinois' borders. The Mississippi River acts as the 581-mile western border with Missouri and Iowa.

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Major cities along it are Moline, East Moline,

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Rock Island,

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Quincy,

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Alton,

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East St. Louis

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and Cahokia.

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The Wabash River makes up a piece of the eastern border between Illinois and Indiana, and this section is 230 miles long.

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It passes by Palestine

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and Mt. Carmel.

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The border of Illinois and Kentucky is defined by the Ohio River which runs 133 miles along the southeastern part of the state.

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Cities along this river include Rosiclare,

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Golconda,

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Brookport,

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Metropolis

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and Cairo.

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Ecology is the scientific study of relations that living organisms have with respect to each other and their natural environment. In this podcast we will focus on invasive species. Plants and animals that can be found in Illinois now but that were not present here prior to European settlement are called nonnative or exotic species. These exotic species can be aggressive in new environments because their natural enemies or other environmental controls do not exist. If they become overly aggressive they may be considered invasive.

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Invasive species are plants and animals not naturally present in an area whose introduction to that area causes economic or environmental harm or harm to human health. Invasion by nonnative species can eliminate native species, reduce biological diversity and degrade wildlife habitats. Not all exotic species are invasive, and many cannot survive in Illinois for long.

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Many aquatic invasive species were brought to the United States unintentionally in the ballast water of large ships. Ballast tanks in cargo ships are filled with water to help the ships maintain their stability when they aren't carrying heavy loads. The water comes from the port where the ship is docked and includes anything that is drawn into the ship along with the water, including small animals and plants.

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When cargo is loaded onto the ship, the ballast water and everything in it is emptied into the harbor of the port where the ship is docked. Ships from Europe filled with ballast water often empty it in ports at United States harbors, potentially releasing large numbers of invasive species. Today the U.S. Coast Guard works with the United States Environmental Protection Agency and other organizations to improve ballast water management by ships and reduce the potential introduction of new invasive species.

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The systems of locks, dams and canals that allow ships from the eastern coast of the United States to travel through the Great Lakes to reach ports in Illinois and the system that makes an artificial connection between Lake Michigan and the Illinois River provides an easy pathway for invasive species to travel throughout all of Illinois.

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Other aquatic invasive species have been brought intentionally to the United States for food or to control other species. They have spread from their introduced habitats to other waterways during flooding and by human actions. A few aquatic exotic species spread naturally into this country.

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Today aquatic invasive species continue to spread within the United States due to recreational water users, bait fishes, horticultural practices and from people releasing unwanted pets. For example, boats and jet skis are often moved from one water body to another. Many organisms, particularly very small ones like the immature forms of mussels and the seeds of plants, can remain attached to equipment or

be present in live wells, and escape into the next body of water the boat enters. Boat and jet ski users should wash their watercraft before putting them in new waterways.

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Fishermen often use bait that is nonnative to the areas where they are fishing. When done fishing, some fishermen dump the contents of their bait bucket into the water, freeing their leftover bait, which may be exotic species, and anything else in the water. This practice has led to the introduction of numerous new aquatic invasive species and the spread of others.

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Many plants sold for decorative purposes in homes and landscaping are not native. The majority of them do not live for more than one year. Some of them can spread to other areas, though, causing ecological problems.

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Sometimes pet owners release their aquatic pets into waterways when they no longer want to care for them. This action can lead to the spread of exotic invasive species and related ecological problems.

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Aquatic invasive species tend to spread more easily than invasive species on land because many waterways are connected, and floods often occur so it is easy to travel from one water body to another.

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Invasive species do harm both economically and ecologically. Invasive species cost the United States \$137 billion of environmental damages and economic losses each year. They cost Illinois millions of dollars each year in control measures and damage. They also out-compete many native species and cause declines in native populations, making habitats less diverse. For example, the presence of zebra mussels (*Dreissena polymorpha*) greatly reduces native mussel populations, and dense growths of common reed (*Phragmites australis*) block out native plant growth.

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One of the biggest control efforts for aquatic invasive species involves preventing the introduction of new species. Port inspections and quarantines are used for this purpose. For species that are already well established in Illinois, various control methods can be attempted though chemical, biological and mechanical practices to reduce species' populations. Perhaps the most effective way to prevent further spreading of these species is to educate water users. Many aquatic invasives are spread unwittingly by recreational boaters and fishermen. Informing them about these unwanted species and offering preventive measures they can take, should greatly reduce the spread of aquatic invasive species.

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Plants

Invasive plant species can out-compete native vegetation by taking up space, removing soil nutrients and blocking sunlight from native plants, thus dominating habitats. By eliminating plant species that occur naturally, invasive species cause problems in food chains and webs.

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Purple loosestrife (*Lythrum salicaria*) is a severe threat to native emergent vegetation, plants that grow above water in shallow areas along the shoreline. It is completely dominating many of the wetlands in the state, especially in the northern half. It is native to Eurasia and was introduced to North America in the early 1800s. It has been brought here by people for ornamental plantings, as a medicinal herb, in the ballast water on ships and in sheep's wool. This erect, herbaceous plant has red-purple flower spikes and produces millions of seeds every year that are dispersed by water and wind, allowing it to spread rapidly.

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Its hardiness and tolerance for wide varieties of nutrient and moisture levels helps purple loosestrife to thrive over native grasses, sedges and other flowering plants that provide higher quality sources of food,

cover and nesting sites for native animals. Attempts to control this species have involved hand pulling and digging, herbicides and the release of certain species of beetles from Europe that eat it. The first two methods had no impact on its populations, but the beetles have weakened the plants' presence in some areas, although it still remains a large problem for native species today.

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Common reed is an invasive species that consumes available growing space and replaces native plant species. This grass has stems that can grow up to 15 feet tall. It has dark blue-green leaves and lives near rivers, ponds and other wet areas in full sunlight. It can easily establish itself in areas that flood regularly. Although its exact origin is unclear, the common reed's native range is in Europe, and it appeared in the United States during the late 1800s. It is found statewide in Illinois.

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Its spread is helped by changes in land-use patterns, water control constructions and urbanization. Common reed populations grow rapidly and densely. Using chemicals, burning or cutting are ways to try to control this plant. The spread of this species has been tremendous within the past 15-20 years. It is tolerant of areas with high salinity and may have been assisted in its spread along roadways by the increased use of deicing chemicals on highways over this period of time. The residue washes off the roads and can lead to increased salinity in the soil, giving common reed an advantage over many native plants.

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Reed canary grass (*Phalaris arundinacea*) overtakes wetland areas and river banks in central and northern Illinois. This species can survive the regular floods and droughts that occur around large rivers. Although it looks similar to native grasses, it is distinctly transparent where the leaf blade meets the stem. Few species eat this plant, and its stems grow so densely that it cannot provide sufficient cover for small mammals and waterfowl. It is used for feeding grazing livestock and to help control erosion.

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Reed canary grass produces a tremendous amount of pollen when it flowers, worsening conditions for allergy and hay fever sufferers. One of the best control methods for reed canary grass is burning, but no large scale control measures have been done in the state. It is native to other parts of the United States as well as Europe and Asia.

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Animals

Invasive animals can also be harmful to their new environment. They can out-compete native animals for food and shelter or be predators of them.

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The common carp (*Cyprinus carpio*) is native to Asia and was brought to the United States by German immigrants as a food fish to California in 1872. In 1877 the U.S. Fisheries Commission received 345 carp from Germany and distributed them to 38 states and territories. These fish then spread through connecting waterways. This species was first recorded in Illinois in 1879. It eats both plant and animal material as it searches in the mud at the bottom of the river.

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These fish live for eight to 15 years and can weigh more than 80 pounds. Common carp are very active when they are looking for food, often disturbing sediment and making the water murky. They inhibit the growth of aquatic vegetation by feeding on and uprooting plants in rivers, disturbing sight-dependent predator fishes, like bass and sunfish, as well as spawning fishes that lay eggs in vegetation. They can survive in poor water quality, an advantage over many native fishes, and can be found in all of the large rivers in Illinois.

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Invasive Asian carp populations have expanded immensely since they were first introduced to the United States in the late twentieth century. These species include the bighead carp, silver carp and grass carp. They continue to thrive and may be negatively impacting native species. Their habit of jumping from the water when disturbed by noise is dangerous to boaters and other users of recreational watercraft. They are also potential threats to the commercial fishing industry.

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Bighead carp (*Aristhythys nobilis*) and silver carp (*Hypthalmichthys molitrix*) were brought to Arkansas in 1973 to feed on, and thereby control, plankton populations in commercial fish-rearing ponds. During floods that covered these ponds, they escaped to other waterways and continued to spread, reaching the Mississippi River in 1982. They feed by straining plankton from the water with their gill rakers, putting them in direct competition with native species that also use plankton for food, like paddlefish, bigmouth buffalo, gizzard shad, mussels and fish larvae and juveniles.

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These carp can consume two or three times their weight in plankton every day. They are also adapted to survive on lower oxygen levels and varying temperatures than many native species. These carp can be found all along the large rivers of Illinois and spawn in their backwater lakes. Possession of these fish alive in Illinois has been illegal since 2005. Do not transport them from one body of water to another.

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Grass carp (*Ctenopharyngodon idella*) were also imported to control aquatic vegetation. They were brought to Alabama and Arkansas in 1963 from eastern Asia. Some of these fish escaped from their commercial fish farm ponds due to floods and by the early 1970s they were found in the Mississippi River. Now they live in all the large rivers of Illinois. Grass carp compete with native crayfish and other fish species for food. They grow very quickly and can be very large, reaching more than 40 pounds. They alter habitats by destroying vegetation and reducing water quality through stirring up sediment.

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Since Asian carp escaped to natural waterways in the southern United States, they have been moving steadily north through our river systems. They have not yet been found in the Great Lakes but have been found within 60 miles of Lake Michigan. To try to keep Asian carp from reaching the Great Lakes, systems of electric barriers, underwater speakers and bubbling curtains of air have been set up in the Illinois River to deter the fishes from moving in that direction. If Asian carp do reach the Great Lakes they may harm native species populations and the habitats in the lakes. They could also pose threats to boaters and sport fishing. No one knows the extent of damage these carp could inflict on the Great Lakes. The Asian carp problem will be an issue for many years to come.

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A plan has been developed to try to help Illinois' commercial fishing industry and maintain native fish populations. China has agreed to buy 30 million pounds of Asian carp from Illinois rivers each year. Whereas most Americans will not eat Asian carp, in China this fish is in demand. The Illinois Department of Commerce and Economic Opportunity gave a commercial fishing company from Pearl, Illinois, a \$2 million grant in 2010 to expand their company and export the fish.

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The round goby (*Neogobius melanostomus*) is a small, bottom-dwelling fish. It lays still on the bottom when searching for prey. It eats mollusks, crustaceans, worms, fish eggs and insect larvae. The round goby competes with native fishes for food but is also a source of food for native fishes and birds. It eats invasive mussels like the zebra (*Dreissena polymorpha*) and quagga (*Dreissena rostriformis bugensis*) mussels.

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It was originally brought from its native home in central Eurasia to the United States in 1990 in ballast water from cargo ships. This species first invaded the Great Lakes and now is beginning to spread to the

Illinois and Mississippi rivers. The electric fish barrier that stops carp from reaching the Great Lakes is also helping to stop the downstream spread of the round goby into the Illinois River.

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Goldfish (*Carassius auratus*) were possibly the first foreign fish species to be brought to the United States, arriving in the 1600s. They were raised and released because people enjoyed watching them in aquariums, fountains and lakes. They were also used for bait. Originally from eastern Asia, goldfish survive in the large rivers of Illinois because they are tolerant of sediment, temperature fluctuations, pollution and low oxygen levels. People often release their pet goldfish into the wild where they then compete for space and food with native species. No measures are being taken to control their populations, but no exotic species should be released into the wild.

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The rusty crayfish (*Orconectes rusticus*) is native to areas of the southern United States. It was brought to Illinois by people to use as fishing bait in 1973. Leftover bait was often dumped into the water at the end of the fishing day. These invertebrates were able to establish breeding populations in Illinois. Rusty crayfish were first found in the state in the Illinois River at Peoria and have spread throughout northern Illinois. They feed mostly on plants and dead animals and burrow into the riverbank. They take over the habitats of other crayfishes, leaving them unprotected from predators and with less food. In several locations rusty crayfish have completely destroyed the populations of two native species. They also directly reduce the populations of native fishes and amphibians by feeding on their eggs. There is now legislation prohibiting their use as bait in the state. The Illinois Natural History Survey is studying rusty crayfish to try to find a solution to the problem, but currently there are no known safe means for eliminating this crayfish from the state.

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The zebra mussel is another aquatic invasive species. These small, triangular mussels attach to native mussel shells by anchor threads that they produce. The large numbers of zebra mussels attaching to the shell of a native mussel can interfere with breathing and feeding of the native mussel and can kill it. Zebra mussels filter the water, eating algae and other tiny organisms.

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They can be found in tremendous numbers near the water intake pipes of power plants and municipal water supplies where the water constantly flows. Huge colonies of zebra mussels can block these pipes causing power plants to shut down and water supplies to be unavailable or much reduced. Facilities spend millions of dollars a year trying to remove zebra mussels and prevent them from coming back. Chemicals, manual removal, electric currents and filters have been successful, although expensive, in stopping the spread of this species.

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These mussels entered the country in 1988. They were transported in ballast water of cargo ships from eastern Europe and western Asia to the Great Lakes. Now they are found all along the rivers in Illinois. They do not have many predators in North America, but some species of fishes and diving ducks have been known to eat them. Boaters and fisherman often unwittingly move this species from one water body to another.

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Quagga mussels also attach to native mussels and reduce their food supply. These mussels rapidly adapt, expand and colonize so much that their filtering actions often make the water much more transparent in areas where they live than it was before. Quagga mussels are native to the Dneiper River drainage in the Ukraine and Ponto-Caspian Sea, in western Asia. They first entered the Great Lakes in 1989 in ballast water and traveled down the Illinois River to the Mississippi River by 1995. Today they are also found in the Wabash and Ohio rivers. These mussels are eaten by fishes, birds and raccoons.

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The Asian clam (*Corbicula fluminea*) was introduced to the west coast of the United States in 1924 by Chinese immigrants to use as a food source. The species spread eastward through its use in aquariums and as bait. By the 1970s the clam had reached the Mississippi drainage basin and Illinois. This species competes with native clams for resources and causes problems in irrigation canals and pipes, drinking water, power plants and other industrial systems. They like the warm water in these areas, as they have a low tolerance for cold temperatures. These clams can be found in all the large rivers of Illinois. They are eaten by fishes and crayfish but not enough to control their populations. No limiting measures have been taken to reduce their populations.

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Cattle egrets (*Bubulcus ibis*) are common migrants and summer residents throughout the state. They tend to follow livestock to eat the insects that fly as the cattle walk. Cattle egrets greatly reduce the number of insects that bother cattle, but they also can carry animal diseases and be safety hazards to aircraft when they feed in large grassy areas near runways at airports. These birds use aquatic habitats but are not dependent on them to survive. Originally found in Europe, Asia and Africa, they spread naturally to North America and South America in the late 1800s and were first recorded in Illinois in 1952. Since no specific impacts have been recorded or studied, no measures have been taken to control these birds.

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Many aquatic invasive species live in the the large river habitats in Illinois. Their spread has been aided by the artificially connected waterways used as transportation routes and by the actions of humans. They can be detrimental to the environment as well as the economy. Changing human practices and educating people are both actions that would help stop invasions of nonnative species now and in the future.

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Resources

Animal and Plant Health Inspection Service, U.S. Department of Agriculture. 2011.

http://www.aphis.usda.gov/wildlife_damage/nwrc/publications/07pubs/pitt071.pdf

Defenders of Wildlife, Washington, D.C. 2011.

<http://www.defenders.org/resources/publications/invasives/illinois.pdf>

Illinois Department of Natural Resources, Springfield, Illinois. 2011.

<http://www.dnr.state.il.us/orc/exotics/index.htm>

Illinois Natural History Survey, Champaign, Illinois. 2011. <http://www.inhs.illinois.edu/inhsreports/nov-dec98/crayfish.html>

Illinois State Archives, Springfield, Illinois.

<http://www.sos.state.il.us/departments/archives/i&mpack/i&mex.html>

Indiana Department of Natural Resources, Indianapolis, Indiana. 2009.

http://www.in.gov/dnr/files/Asiatic_Clam.pdf

Midwest Invasive Plant Network, Indianapolis, Indiana. 2010.

<http://www.mipn.org/Aquatics%20Early%20Detection%20Flyer.pdf>

University of Georgia Center for Invasive Species and Ecosystem Health, Tifton, Georgia. 2010.

<http://www.invasive.org/species/fish.cfm>

University of Illinois Extension, Champaign, Illinois. 2010. <http://hyg.ipm.illinois.edu/article.php?id=158>

U.S. Department of Agriculture, National Invasive Species Information Center, Beltsville, Maryland.

2011. <http://www.invasivespeciesinfo.gov/unitedstates/il.shtml#thr>

U.S. Environmental Protection Agency, Washington, D.C. 2011.

http://water.epa.gov/type/oceb/habitat/invasive_species_factsheet.cfm

U.S. Fish and Wildlife Service, Midwest Region, La Crosse, Wisconsin. 2009.
http://www.fws.gov/midwest/LacrosseFisheries/asian_carp.html

U.S. Fish and Wildlife Service. 2011. <http://digitalmedia.fws.gov/index.php>

U.S. Geological Survey. 2009. <http://nas.er.usgs.gov/>

Wisconsin Department of Natural Resources, Madison, Wisconsin. 2007.

<http://dnr.wi.gov/org/gmu/mississippi/invasives.htm>

Washington State Department of Ecology, Olympia, Washington.

<http://www.ecy.wa.gov/programs/wq/plants/weeds/aqua011.html>

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