



Invasive species—a threat to the Great Lakes

Card game: **Who am I? Where did I come from? How did I get here?**

Invasive species are non-native species that cause economic or environmental harm or harm to human health. Seemingly harmless but careless actions by ordinary citizens have led to harmful invasions by non-native species and the spread of disease to native species. While many invasive species in the Great Lakes, such as zebra mussels, arrived by ballast water which the general public can't directly do much about, public education can decrease the spread of invasive species, prevent new introductions through pet and other commercial routes, and detect new invaders, even before scientists discover them.



The pictured species are a few that people were primarily responsible for introducing into our environment or whose spread or further damage in Michigan might be prevented. Also shown are invasive mussels, which have burdened water users with control costs and changed the chemistry of the Great Lakes, and Asian carp, currently established in the Mississippi watershed but might spread to the Great Lakes through canal and river connections.

Zebra mussels and quagga mussels come from southeast Russia and Ukraine. Likely transported here in ship ballast they invaded the lower Great Lakes first, and spread through water connections and attached to boats and trailers to the Mississippi watershed, and west to Lake Mead in the western USA. They filter plankton out of the water; settle in water intakes of power plants, and on native species. Have changed the chemistry of the Great Lakes.




Native to China and Korea, the **Northern Snakehead** was likely introduced by recreational or aquaculture fish enthusiasts wanting access to them in the USA. Now present in Maryland, Ohio, possibly elsewhere, but not yet in Michigan. This carnivorous air-breathing fish can survive out of water for several days. They are voracious predators of native fish and may also carry disease that affects fish populations.

This beautiful aquatic plant, known as **Brazilian elodea**, was a favorite for teaching about plant growth and photosynthesis. **BUT NO LONGER!** Its invasive behavior caused it to be prohibited in Michigan. Instead, native elodea species can be used just as well. Fragments of these plants are spread by waterfowl and boats, where their thick growth can form dense mats that choke out native aquatic plants and hinder swimming, fishing, and other water activities.



Native to the lower Mississippi and Gulf Coast, the **red swamp crayfish** is on Michigan's invasive species watch list. Grown in aquaculture, kept as pets, and used in scientific research, these pests are hosts for parasites and diseases. With a diverse diet of plants, insects, fish and amphibians if released into the environment, they compete with native crayfish and other species for food and habitat.

Several species of **Asian carp** were introduced from China into southern USA aquaculture ponds, but they escaped into the Mississippi watershed due to flooding. Having spread up the Illinois and Wabash Rivers, they are now threatening to invade the Great Lakes through water connections near Chicago and in Indiana. They filter algae from the water, competing with native fish. **Silver carp** jumps when disturbed and has been known to injure boaters. An electric barrier near Chicago may prevent or slow their entry into the Great Lakes.



Originally from Asia, **goldfish** are common ornamental fish that people have intentionally released into the environment. In fact, goldfish releases have been reported in every U.S. state except Alaska. With the capability of spawning several hundred thousand eggs per year, goldfish have the potential to crowd out native fish and compete with them for food.

African clawed frogs are native to the southeastern portion of sub-Saharan Africa. The albino variety is often sold as pets, and requires permits in some states. When released into the wild, these frogs adapt well and devastate native populations of frogs and other animals by eating their young. African clawed frogs may be a carrier and the initial source of an infectious fungus that has reduced amphibian populations throughout the world.



Parrot feather watermilfoil (also known as Brazilian watermilfoil) is native to South America. Found in lakes, ponds, slow streams and mudflats, this ornamental plant grows rapidly and spreads by small pieces breaking off and rooting elsewhere. These plants are on the Michigan watch list. To prevent spread, boats should be inspected and washed before moving from one water body to another. Photo by Andre Karwath.

Game play: Write the names of all eight organisms on your whiteboard. Deal out cards one per student (share a card if necessary). Select a student with an "organism" card to do a charade or other activity to answer "Who am I?" After the student's organism is identified, ask "Who has the description card of this invader?" The student reads the card and pairs up with the student having the organism card. Repeat with other cards, or just pair up without the "Who am I?" part of the game. (Numbers on the cards can help make the right pairs if you don't do it by the "Who am I?" identification procedure). Optional: Locate native source on a world map. Then ask "How did I get here?" and add the student to the matching group that has the method that may spread the organism to the Great Lakes. These groups of three students then form "breakout groups" for 5 to 10 minute discussion of "How could we prevent this organism from spreading further?" and then report back. Answers could be personal actions (don't buy that pet! Dispose of pets or classroom organisms properly if no longer wanted.), or possibly new public policies—laws or regulations restricting what can be sold to whom, controlling how ships handle ballast, etc. In some cases more than one means of spreading might apply, but if you are guided by the card numbers, you will get the best grouping of cards. Printing cards: Pdf file available at <http://detroitaquarium.weebly.com/invasive-species-card-game.html>. You can print the pdf cards file on Avery 5390 "name badge insert refills," an available office supply. Or just print on card stock and cut.

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