



AQUATIC INVASIVE SPECIES

HOW AQUATIC INVASIVE SPECIES MOVE

SKILL LEVEL

6th-8th

KEY TERMS

Pathways
Natural Pathways
Human Intentional Pathways
Human Unintentional Pathways
Vector
Biological Control Organisms
Horticulture
Ballast Water

EDUCATION STANDARDS

SD Science:

MS-LS2-2

MS-LS2-5

MS-ESS3-3

SD English Language Arts:

6-8.RS2.2

TIME NEEDED

30-40 Minutes

MATERIAL LIST

- » Laminated Confuddling
Conundrum cards



EXPECTED LEARNER OUTCOMES

- » **OBJECTIVE 1:** Students will be able to define at least 3 different ways that aquatic invasive species spread, specific to South Dakota.
- » **OBJECTIVE 2:** Students will be able identify everyday actions that knowingly and unknowingly spread aquatic invasive species.

BACKGROUND

Aquatic Invasive Species (AIS) are species that are intentionally or unintentionally introduced into local bodies of water negatively impacting the ecosystem. But how are invasive species introduced?

Pathways are the means and routes by which invasive species arrive in new environments. These routes can further be broken into **natural pathways** (such as wind, currents, and other natural dispersal methods) and **human pathways**. Also of note are **vectors**. Vectors are biological transporters of AIS (Such as a duck landing in a lake, unintentionally picking up a veliger on it and dropping it off in another lake by landing in it. The duck acts as the vector that transports the veliger.).

Human pathways can further be broken into **intentional** and **unintentional**. Intentional human pathways are the result of deliberate movement of species such as the pet trade, **biological control organisms**, and **horticulture**. This movement may be good or bad dependent upon the impact of the species. Unintentional human pathways are the inadvertent movement of species as a byproduct of some other human activity such as **ballast** water discharge, imported plants as host to pests, movement of recreational watercraft, etc. This lesson will focus on human pathways of AIS spread as these are the pathways that students can impact with their behavior.

VOCABULARY

Pathways

The means and route by which invasive species are introduced into new environments.

Vectors

A pathway that is specific to movement/introduction to a new environment from a biological source (e.g., migrating duck).

Natural Pathways

Natural ways such as wind that invasive species spread.

Human Intentional Pathways

Deliberate move of nonnative species to a new environment.

Human Unintentional Pathways

The inadvertent movement of nonnative species as a byproduct of human action.

Biological Control Organisms

Use of living organisms to control a pest.

Horticulture

The practice of gardening, cultivation, and management.

Ballast Water

Water that is held in the ballast tank. Ballast tanks are used by vessels to control the stability of a ship, thus the water in these tanks can be increased or decreased to affect stability of the ship dependent upon the weight of the cargo. Ballast tanks or bladders are also found in newer recreational watercraft such as wakeboard boats.

ACTIVITY PREPARATION

Introductory Discussion/Probing Questions – 5 minutes

Begin the lesson by asking students: what are some ways aquatic invasive species move from one waterbody to another?

Notes/Prompts for Teacher:

- Animal distribution such as seeds attached to moving animals
- Natural movement, such as “going upriver”

Further probe, by asking, what are some ways humans could move aquatic invasive species ?

Notes/Prompts for Teacher:

- Ballast or livewell water in a boat
- Dumping unused bait
- Not cleaning boats and trailers between bodies of water
- Release of an unwanted pet
- Intentional planting of non-native species
- Not cleaning outdoor equipment before using in a new place (hiking boots, waders, beach toys, clothing, etc.)

Confuddling Conundrums Activity – 25 Minutes

Divide into small groups. Give each group one or more Confuddling Conundrum cards. You can:

- Give each group the same situation and allow for small group discussion.
- Give each group a different situation and allow time for small group discussion.
- Give each group several situations and let them work through the dilemma as a small group.

Bring the class together for a wrap-up discussion (possibly through presentation/ large group discussion).

REFLECTION

Create your own dilemmas and think about what you would do. Share your dilemmas with your classmates and discuss compare what others would do.

PRINTABLES

Confuddling Conundrum Cards

<p>CONFUDDLING CONUNDRUM 1</p> <p>Your family loves to canoe camp. Your favorite thing to do is travel from one lake to another. You don't mind the portages, but your dad's obsession with cleaning all the vegetation and aquatic animals off the canoe is driving you crazy. He even makes you clean the mud off your shoes! Now you are old enough to canoe on your own with some friends. You are leaving one lake for a new one. Do you clean the canoe?</p>	<p>Ok maybe dads can be a little unreasonable at times, but this time Dad has the right idea. Non-native plants and animals move easily from lake to lake on you, your shoes, clothes, packs, tents, canoes, pets, bait buckets, and anything else you use. If everyone was as careful as your dad, we might be able to control the spread of non-natives like zebra mussels and Eurasian watermilfoil.</p>
<p>CONFUDDLING CONUNDRUM 2</p> <p>You and your friends are out fishing at your favorite fishing hole. While fishing off the dock has been traditionally good for you, the fishing today is just slow. You scan the lakeshore and see a spot you just know will have the "big one" and point it out to your friends.</p> <p>Your friends head off in the most direct route to the spot, but you hesitate, knowing there is a trail if you back track a bit. What do you do?</p>	<p>Shortcuts are tempting! But the plants growing on shores protect the area and provide valuable habitat. Taking shortcuts increase shoreline erosion. But that's not all! Once the native plants along the shoreline have been disturbed, the likelihood of invasive plants taking root is much higher.</p>
<p>CONFUDDLING CONUNDRUM 3</p> <p>Your family likes to joke that you knew how to fish before you could walk. While you prefer lures, you enjoy experimenting with live bait. But at the end of the day, you are never quite sure what to do with leftover worms, larvae, crayfish, or minnows. One friend just dumps them in the water. What will you do?</p>	<p>If your friend jumped off a bridge, would you do that too? First, think about where you got the live bait. If you caught it yourself in the spot where you are fishing, it's okay to return it to the water. If you bought the bait at a bait shop or collected it from any other body of water, then you should dispose of any leftover bait in the trash or change the water and use the bait again. Never dump leftover worms on the ground. Improper disposal of live bait is one way that invasive species are spreading.</p>
<p>CONFUDDLING CONUNDRUM 4</p> <p>You and your family are moving across the country. While your parents promised that you could restock your aquarium after the move, they won't let you move your fish. You offered them to your best friend, the science teacher, and a dozen other people. No one is interested. Now what are you going to do?</p>	<p>You might be tempted to release them in a local waterway. At least, you figure, they would have a chance. The truth is that they will either quickly die, or they will survive and pose a risk to the plants and animals already living there. If you can't find a hobbyist, museum, zoo, nursing home, school or anyone to take care of them, try and return them to the store for resale or trade. If that doesn't work, don't be tempted to bury them at sea! Ask a vet to put them to sleep or place them in water and put them in the freezer. This is considered a humane method of euthanasia.</p>
<p>CONFUDDLING CONUNDRUM 5</p> <p>You and your family are taking a long hike into the forest. Dad parks at the trailhead and everyone gets ready to go. Just off the parking lot, there is a beautiful purple flower. Your mom picks one and sticks it in your hair. The hike goes great, but after a while the flower starts to itch. You carry it in your hand for a while, but it's all droopy and not that beautiful anymore. What do you do with it?</p>	<p>If you guess that the weed might be purple loosestrife, you could be right. You don't know for sure, though. It could be invasive; it could be endangered. However, invasives are a lot more common around parking lots where the soil has been disturbed and there is a lot of human activity. Now that you are far from the source, don't drop it on the ground and spread its seeds. Put it in a bag and throw it in the trash when you get home. Remember: it's best not to pick any wildflowers, ever.</p>