



The Invaders

This activity center is part of the **Water Protection** theme.

Purpose of this activity:

This activity helps students become aware of the impacts of invasive species in Ontario's lakes. This activity will focus on one species, the Spiny Water Flea. The students will investigate the interaction between a native and non-native species and examine the impact the Spiny Water Flea has on the native species and its habitat. There are two parts to this activity.

Key Messages:

- Water is home to more than just frogs. There are microscopic plants (phytoplankton) and animals (zooplankton) that depend on and contribute to maintaining a balanced ecosystem.
- Introduced plants and animals like the **Spiny Water Flea** compete with native species for food and habitat.
- An aquatic ecosystem is made up of a variety of species that depend on one another for survival. Introduced species disrupt this balance and the whole ecosystem can be affected. The success of the **Spiny Water Flea** puts the native species at risk for survival.

Materials:

- 4 pylons for boundary of game
- About 50 popsicle sticks with the word zooplankton written on both sides of each stick
- 10 red pinnies representing the **Spiny Water Flea**
- 1 blue pinny representing the small native fish, **Perch**
- 1 orange pinny representing a predator, the **Osprey**
- Laminated display pictures of the Spiny Water Flea (invasive), zooplankton, perch, Osprey, round goby (invasive), zebra mussel (invasive), rusty crayfish (invasive) and leopard frog

What will I be doing?

Set Up Information:

Designate the boundaries of the game with four pylons, make it appropriate size for the person who is it to easily catch the zooplankton. This will also ensure the game is not too long.

You will introduce and explain the activity and provide general supervision while the students are participating in the activity. At the end of the activity you will focus the learning by asking students the questions provided

Part 1

Start the activity by introducing the Spiny Water Flea and zooplankton through a quick game of tag. Pick one student to be 'it' wearing a red pinny to represent the **Spiny Water Flea**. The rest of the group are zooplankton (food for the Spiny Water Flea) and must try and not get caught by the hungry Spiny Water Flea. Give the Spiny Water Flea 30 seconds to catch as many zooplankton as he/she can. Once caught the zooplankton simply sit down on the spot. Blow a whistle at 30 seconds, count up the number of zooplankton and play perhaps one or two more quick games. Be sure and establish clear boundaries that aren't too big, that the students must play within. If the students go outside the boundary, they are considered caught by the Spiny Water Flea and must sit down. This will provide a fun active introduction to the activity and introduce the relationship between the Spiny Water Flea and Zooplankton.

Questions to Ask Students:

Q: What kinds of plants and animals live in Ontario lakes?

A: birds (seagulls, loons, Canada geese, osprey,) plants (algae, cattails, arrowhead), fish (rainbow trout, catfish, salmon, minnows) mammals (otters, beavers, mink), benthic invertebrates and insects (dragonfly larvae, crayfish), and amphibians (frogs, salamanders)

Q: What kinds of food are available in lakes for fish & animals to eat?

A: minnows (Small fish), frogs, also microscopic animals called plankton, tiny plants (phytoplankton).

Part 2

Set-up

Spread the zooplankton popsicle sticks on the ground. Identify boundaries with 4 pylons.

1. Introduce the idea that there are species that are native to lakes (native = locals) like, perch, leopard frogs and zooplankton and, there are species that have been introduced (introduced = not-native = invasive species), like zebra mussels, round goby, rusty crayfish and the spiny water flea. **Show the laminated picture of each of the species as you say the name.**
2. Today we are going to discover what happens to the “locals” when “guests” arrive and start competing for survival.
3. To introduce the activity, simultaneously demonstrate and explain each of the following parts:
 - One student will represent a perch (put a blue pinny on a volunteer)
 - One student will represent an Osprey (put an orange pinny on a volunteer)
 - The remainder of the students will represent the spiny water fleas (give them red pinnies to put on). They are to collect as much zooplankton as they can, while avoiding being eaten by the perch.
 - Explain that the food for the Spiny Water fleas is zooplankton, represented by the popsicle sticks that are spread out in the playing area.
 - Show boundaries for the activity (a small field is ideal).
 - Establish a start & end signal.

Step 1

During the 1st round, only the Spiny Water Fleas and the perch will collect zooplankton. **The Osprey does not yet participate in the activity because it does not eat zooplankton.** Have the Osprey on the sidelines watching the feeding occur.

Step 2

Once the activity starts, the Spiny Water Fleas and the perch must pick up as much zooplankton (popsicle sticks) as they can within **1 minute**. Once all the of popsicle sticks have been picked up, the students gather and count the number of popsicle sticks they have individually collected. This represents the amount of food that they have eaten. Ask the Spiny Water Fleas to call out the number of popsicle sticks they individually collected. Ask the

perch to call out the number of popsicle sticks collected. Make reference to the number of popsicle sticks collected by the Spiny Water Fleas compared to the number collected by the perch. **State that most fish in Ontario lakes are unable to eat the spiny water flea because of the spine which scratches the throats of the small fish that attempt to eat them, so these native fish need the zooplankton too.**

Step 3

Disperse the popsicle sticks on the ground again. Introduce the predator (Osprey) into the game. **Ask the group what the food for the Osprey would be in this activity (the perch).** The Osprey will try to catch the perch, by tagging the perch while the perch is trying to collect zooplankton. Play a round with the Osprey in the game – **perhaps let the game start for 30 seconds or so and then introduce the Osprey. Make sure the perch knows that the Osprey has arrived in the game.** Review the numbers as before.

Step 4

After this round discuss what happened. Summarize the activity by asking questions that relate directly back to the activity. For example:

Q: Who got more food (zooplankton), the spiny water flea or the perch?

Q: As a result, what do you think will happen to the number of spiny water fleas and the number of perch over time? Why?

A: Spiny water flea will increase because there is no natural predator. Perch will decrease because there is competition for food, and have a natural predator (Osprey)

Step 5: Summarize take-away message:

- The success of the Spiny Water Flea in competing for food puts the native species (like the perch) at risk for survival.

Background Information:

Spiny water flea is a predacious zooplankton species introduced to the Great Lakes from Europe. It is a type of crustacean. Shrimp, crayfish and lobster also belong to this group. It is believed that the spiny water flea was transported to North America in the ballast water of ocean crossing ships. Ballast water is comes from cargo ships which pick up water from their point of origin. Once the ship reaches its destination it releases the water that it has accumulated. The spiny water flea is about 1 to 1.5 cm long. It ranges

in colours orange, blue and green may appear on its body and a large back eye can be seen. As its name suggests, it has a long, barbed tail. A red strip runs down half the tail. This organism can produce resting eggs, which are capable of over wintering on the lake bottom until spring or early summer when they hatch into juvenile fleas.

It was first recorded in Lake Ontario in 1982 and by 1987 it was in all great lakes. It is now known to be in at least 80 inland lakes. Spiny water flies feed on zooplankton and may eat up to 20 of these prey organisms a day. When populations of spiny water flea are large, consumption can be significant, limiting the amount of food available for native species and increasing the abundance of algae, a favourite food of zooplankton. This can lead to algae blooms and murky water which can further affect aquatic life. Please visit www.invadingspecies.com for more information. More information is also available in the resource kit at the fish hatchery.

Clean Up Procedures:

- collect all pinnies
- pick –up all popsicle sticks
- collect together all laminated pictures
- put all items back in their carrying container.
- Take all materials back to centre