

The Ultimate Species

PURPOSE: Each student will create their own aquatic species designing adaptations that will determine how it eats, how it moves, where it lives and how it stays safe. On completion, students will compare their species, collectively identifying those with adaptations that indicate their potential to be invasive.

SUBJECT / STRAND:

Grade 4 Science –
Life Systems, Language
(Optional: Art)

DURATION:

2 - 3 x 50 minutes

GROUP SIZE:

Class and groups

SETTING:

Classroom

EXPECTED OUTCOMES: Students will demonstrate their understanding of what an adaptation is and how it relates to species' life within its community and habitat. In **Part 1** of the activity students will create their own ultimate species, which they will document in a written summary accompanied by a labelled illustration. In **Part 2**, students will gather in habitat groups, presenting and comparing their species in order to identify those with adaptations that identify their potential to be invasive.

MATERIALS: 11" x 17" paper, drawing utensils (pencil crayons, etc.), Blackline Master: *Cottage Country's Most Unwanted*, chart paper, markers

ENDURING UNDERSTANDINGS: Understanding concepts related to healthy habitats and communities; recognizing our role in maintaining healthy habitats and communities (*stewardship*).

EXPECTATIONS: 4s1, 4s2, 4s3, 4s7, 4s8, 4s10, 4s16, 4s18, 4e1, 4e2, 4e5, 4a31

PROCESSES OF SCIENCE: Inferring, classifying, communicating, constructing models

Lesson Sequence

Prior:

Day #1:

- Write on the board:
 - What I Eat (Food/Energy)
 - How I Move
 - How I Stay Safe
 - Where I Live
- Write on the board, with room for brainstorming: lake, stream and wetland.

Day #2:

- As a heading, write the following aquatic habitats on a piece of chart paper: wetland, stream or lake. Post these three habitat sheets around the classroom.
- Photocopy Blackline Master: *Cottage Country's Most Unwanted* (2x), cut and separate into habitat groups.

Procedure:

Day #1

- Ask: *What does "ultimate" mean? If we were to make up the term, "ultimate species", what would it mean to you?*
- Ask students to brainstorm on plants or wild animals that seem to be able to live in many different habitats. Some examples may be: gulls, ducks, mosquitoes or raccoons.
- Choose one of these species and draw it on the board. Discuss and label its key **adaptations** – characteristics that make it successful in specific habitats. Remind students that adaptations have a purpose (For example, a frog has spots to help it camouflage itself). Refer to the generated brainstorming list on the board and explain that different adaptations can help an animal eat a particular type of food, move faster, be safer (avoid predators) or live in a particular type of home.

For example: Raccoons are not fussy about what they eat, they have hands that can pick up and tear apart any type object to get at food (from shells to garbage cans), they can live on the ground or in a tree, and their coat keeps them warm in winter and camouflaged when moving around at night.

- Tell students that they will be using what they have learned about **habitats, communities** and the **adaptations** to create their own ultimate species! The organism they create must have extraordinary adaptations enabling them to live very well in an Ontario aquatic habitat (lake, stream, wetland). Tell students to use their imagination to create their ultimate species as long as they can explain why they chose their particular adaptations for aquatic environments.
- Brainstorm a few characteristics of each aquatic **habitat** to get students started on what is required to live in them. Note them on the appropriate habitat sheets posted around the room.

Note: Differences between different types of aquatic habitats can seem subtle. Here are some examples to share with your students:

- A plant or animal living in a wetland may have to survive changing water levels over the seasons. Wetlands can be very wet or quite dry if there is a drought.
- Some streams have fast moving water while lake water moves slowly.
- Shallow lakes tend to have warm temperatures in the summer that are good for fish like bass, while deep lakes tend to remain cool in the summer which is good for fish like trout.

Explain that the specific plant and animal **community** a species lives with also influences its adaptations. (For example: A pointy beak allows the woodpecker to bore underneath bark to reach its food, tree-dwelling insects; an otter's webbed

feet allow them to swim more effectively; a beaver's tail helps propel them through the water.)

6. Hand out 11" x 17" paper and ask students to fold it in half lengthwise. One side will be used to draw and label their ultimate species, while the other side will be used to describe their species in writing.

7. Ask students to choose a habitat (stream, lake or wetland) and print it on the top of their Ultimate Species sheet. Then, referring to the four headings written on the chalkboard, ask them to write a short paragraph indicating the adaptations that make their species well adapted to its habitat and community:

- How and What I Eat

What does your ultimate species eat? How does its mouth, hands, feet, tail or fins help it capture and eat its food? Or is your species a photosynthesizing producer?

- How I Move

How does your ultimate species move through the habitat? Does it move quickly? How? Or is it attached to a rock or rooted in the sediment? Does it have seeds that spread by floating?

- How I Stay Safe

Can your ultimate species move fast to avoid being eaten? Can it camouflage itself? Can it hide away from predators? Does it have a hard shell that protects it? Sharp spines?

- Where I Live

What kind of area does your ultimate species like to live in? Deep water? On a log? In rapids?

8. Once students have determined their species' adaptations, they can draw their creature in its habitat. Provide students with enough time to finish their Ultimate Species.

Day #2

1. Once projects are complete, review the term **adaptation** with the students. Ask: *Can you give me an example of an adaptation in an animal that is familiar to all of us?* (For example, ducks have webbed feet that they use like paddles to move fast in water; mosquitoes have wings that allow them to fly in many directions, thus avoiding the "swat").

2. Explain that **aquatic invasive species** are species that come from somewhere else and have been accidentally introduced by humans into Ontario's aquatic habitats.

Invasive species have **adaptations** that give them an advantage over native species. Their "super power" adaptations can include:

- a. the ability to eat a wide variety of foods,
- b. the ability to live in and adapt to a wide variety of habitats and/or conditions (ex. warm or cold temperatures, murky water, etc.),
- c. the ability to grow quickly (often faster than native species),
- d. the ability to avoid being eaten in their new community, as they are often not recognized as food by native species,
- e. having special protective adaptations (such as extra hard spikes on fish or a hard shell on a crayfish),
- f. some plants have the ability to make new plants from a small piece of themselves or can produce millions of seeds

3. Ask: *What could happen to a community of species and its aquatic habitat when a new "ultimate" invasive species moves in?*

4. Provide examples of invasive species from the Blackline Master: *Cottage Country's Most Unwanted*. (Good examples to use are: the rusty crayfish, purple loosestrife and the zebra mussel).

5. Drawing their attention to the habitat signs around the room, ask students to take their ultimate species project and go to their species' habitat area (wetland, stream or lake). (Students will be discussing their ultimate species with their habitat group. If some groups are too large break them up into 2 or 3 smaller groups.) Assign a group facilitator and secretary.
6. Within their habitat group ask each student to present their Ultimate Species, sharing 2 - 3 adaptations related to its habitat, movement, safety, and food source. Ask students to write these on the chart paper provided.

Closure/Checks for Understanding:

To each group distribute samples (from *Cottage Country's Most Unwanted*) of an invasive species that lives within the group's specified habitat. Have students discuss the adaptations listed on the samples, comparing them to their own. Provide the group secretary with chart paper and markers to make notes of the group's observations. Ask:

- *What does their ultimate species and the invasive species have in common?*
- *What is different?*
- *Does your group have any ultimate species that could be considered invasive due to the impact it could have on their community and habitat? Explain.*

Ask students from each group to share their group's discussion with the whole class.

NOTES FOR TEACHER:

There are many non-native species living in the habitats around us. Evolving in a foreign environment, non-native species have adaptations suited to meet the resources of a community and habitat different from the one in which they are introduced. These species become invasive when they take away habitat and food from native species to an extent where they do harm to the environment and economy. The adaptations of invasive species are particularly competitive as they may:

- Have few natural predators, disease or parasites to keep their numbers in balance,
- Reproduce quickly and often,
- Adapt to many conditions,
- Be able to migrate (and therefore spread) easily,
- Be *generalists*; they can eat a variety of foods and live in a variety of habitats; and
- Often defend themselves well or are particularly aggressive predators.

Invasive species are harming lakes and rivers of Ontario, at times seriously affecting native species and their habitat. By taking action to prevent the spread of invasive species (see *Actions to Stop Species Invasion, Background Information*), we can ensure that aquatic

habitats and communities remain healthy and vibrant for all to enjoy.

Report sightings or obtain more information on invading species by calling the Invading Species Hotline at 1-800-563-7711 or visiting www.invadingspecies.com

EVALUATION:

Teachers can use the rubric provided to evaluate the ultimate species activity based on Science, Language and Art requirements.

ACCOMMODATIONS:

Prior to creating their ultimate species, have students brainstorm with a partner to ensure they understand the task.

For the ultimate species activity, students that are challenged by writing tasks may work in pairs or focus on getting their ideas across through their drawing. Have students help each other with labeling and supply a list of key descriptive words on the blackboard.

EXTENSIONS:

Students may be more inclined to choose an animal over a plant when creating an ultimate species.

Encourage students who would like a challenge to consider choosing a plant.

Ask students to write a paragraph explaining how their ultimate species and habitat will be doing in 10

years time. Will it still be living where they originally thought it would? Has it found new food sources? Is it the only organism at its level in the food chain (i.e. the only plant, the only herbivore, the only carnivore)? What will its habitat look like?