

Aquatic Invaders!

2016

AN ACTIVITY PACKAGE FOR TEACHERS & YOUTH LEADERS



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Introduction

Greetings teachers, youth leaders and educators!

This resource contains a range of activities to help students and youth groups learn about invasive species and their impacts, and ways we all can help prevent their spread. They are primarily focused on aquatic invasive species but can be adapted for any invasive species exploration.

The activities are suitable for use in both formal school programs, as well as for informal youth groups, camps and recreation programming.

The activities are listed with suggested age / grade categories, but most of them can be adapted to suit almost any age and audience.

All feedback, comments and adaptations very welcome – please let us know how you have used these activities and your experiences with them.

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Thank you for your interest in invasive species!

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PURPOSE: By playing a “Who Am I?” type game, students will learn to identify animal adaptations and explore how these may relate to survival in specific habitats and communities. In addition, students will be introduced to the concept of invasive species.

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In this active version of Musical Chairs, students will compete as aquatic species to show how basic needs are met. This activity highlights how certain adaptations enable invasive species to outcompete native species to attain water, food, shelter and room to grow.

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Issues relating to invading species and their vectors of spread come alive for students as they investigate key characteristics that make invasive plants successful at spreading, then look for and document invasive species in their own community, and try to figure out how the plants got there in the first place.

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Students will take action by creating educational posters to display at school, libraries, pet shops and city aquariums that remind the public of their responsibilities as pet owners. As an art activity, this project will be used to explore tint, shade and texture.

6. Invasive Species Jeopardy - [page 25](#)

In this simplified version of Jeopardy, students create game questions using information learned during preceding lessons and activities, and test their knowledge by playing a game of “Diversity Jeopardy”. This is a great activity for assessing what students have retained and can be used as a summary activity or evaluation tool.

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Students research and develop brochures to highlight invasive animal species that are present in your region or that have the potential to invade.

8. Vectors of Spread: Invasive Species Getaway Vehicles! - [page 28](#)

This activity engages students in exploring some of the methods of dispersal of invasive species, through visiting a series of lab stations where they experiment with different materials to discover how invasive species spread. Students rotate through several lab stations to explore methods that invasive species use to spread.

Background Notes for Teachers/Leaders

A *native species* is one that naturally occurs in an area. A native plant, for example, is a plant that has lived and evolved in a certain place for a long time (i.e. thousands of years) and is part of the natural ecosystem. Native species have co-evolved with other competing species, predators, diseases, climate factors and other aspects of a region and an ecosystem. Native plants are part of a natural balance and a natural system and provide important food and shelter for wildlife.

Non-native or alien species are those that do not naturally occur in an area and were likely brought to a place by humans, either accidentally or intentionally. A non-native species has not evolved as part of the native ecosystem and does not have the same balance and place in the ecosystem. Non-native plants have been introduced by humans into ecosystems where they don't belong.

Some non-native species are not invasive – such as tulips or tomatoes – and won't spread beyond our gardens. Some however are called *invasive* because they are able to spread and dominate or push out native species, and have great impacts on the ecosystem.

Invasive species are one of the biggest threats to native ecosystems worldwide. The United Nations Environment Programme states that invasive species are recognized as “one of the greatest biological threats to the environment and economic

welfare of the planet. The threat to biodiversity due to invasive alien species is considered second only to that of habitat loss”. Invasive species are able to out-compete native species for their basic needs such as food, shelter and space. Invasive plants have special adaptations which allow them to spread rapidly. English Ivy (*Hedera helix*) is a good example of an aggressive species that out-competes native species by suppressing other plants, creating a monoculture on the ground, and climbing trees, eventually leading to the death of trees.

Invasive Plant Characteristics:

There are four main distinguishing features of invasive plants:

- they are usually prolific seed producers,
- their seeds spread easily and effectively,
- they establish and spread quickly,
- they lack natural predators and diseases that keep them under control in their native locations.

There are approximately 133 different ***aquatic invasive species*** in British Columbia, many of which continue to spread causing serious damage, such as clogging waterways, reducing habitat, outcompeting native fish and wildlife populations, and impacting recreation, fishing and swimming.



Eurasian Watermilfoil



Yellow Flag Iris



Largemouth Bass

These include:

- Eurasian watermilfoil
- Yellow flag iris
- Purple loosestrife
- Largemouth bass
- Northern pike
- American bullfrog

Quagga and zebra mussels are a High Alert species in BC – We do not want them to establish here! They have invaded the Great Lakes, causing significant economic and environmental damage through their ability to spread rapidly and establish in underwater infrastructure such as hydroelectric intakes. ISCBC asks all boaters and outdoor recreation enthusiasts to commit to following the Clean Drain Dry principles as soon their boat or watercraft is removed from the water:

- CLEAN off all plant parts, animals, and mud from boat and equipment (e.g. boots, waders, fishing gear). Use a power wash station if available.
- DRAIN onto land all items that can hold water (e.g. buckets, wells, bilge, and ballast).
- DRY all items completely before launching into another body of water.

Learn more about how to protect our waterways from invasive species at:

<http://bcinvasives.ca/resources/programs/clean-drain-dry/>



Purple Loosestrife



Northern Pike



American Bullfrog



1. Activity: Native and Invasive Plants: An Exploration!

Grade Level: K - 4

Subject Areas: Science, Visual Arts

Duration: 1-2 class periods

Description: Participants classify pictures of native and non-native animals and plants, then participate in activities at various stations to explore native and invasive plants, with a special emphasis on aquatic plants. This is a fun activity to set up at an event or fair, as it is quite self-directed.

Learning Objectives

Students will be able to:

- recognize that there are many different types of plants
- distinguish between native and non-native species
- recognize some native plants and their key features
- explore and compare differences in native plants
- recognize connections of wildlife and people to native plants

Materials

- Pictures or species cards of native and non-native plants and animals
- poster board or somewhere to post the pictures
- leaves of native plants, possibly live samples and other plant materials (see Important Notes: *Live Samples and Collecting*).
- magnifying glasses
- art supplies: cardstock, glue, mactac or laminating materials, colour cards such as paint samples from a paint store.

Procedure

To Being – An Introduction:

1. Gather a collection of pictures of native and non-native plants and animals. (If feasible, students can help by bringing pictures from home: often old calendars and greeting cards have good images for use.) If you need help finding pictures of native plants, check out The Native Plant Society of BC's website:

<http://www.npsbc.ca/photogallery.html>

Download TIP Sheets and photos from the ISCBC's website: <http://bcinvasives.ca/resources/tips>

2. Discuss the meanings of native and non-native species with students - use examples of animals they know such as elephants and tigers versus deer and cougar. If you are developing a station at an event, you could make a poster with different pictures of natives and non-natives to display. Which animals belong here? Introduce the concept of native plants with similar examples that they might immediately recognize.

3. Classify the pictures or species cards in your collection – either as a whole group or in smaller groups. You can create a sorting activity for participants to complete (Native and Non-Native piles), collages, posters or a bulletin board of collections of native and non-native species. You may want to create separate collections for plants and animals, or just focus on plants. (Note: laminating the pictures will make them last much longer for repeat usage)

Plant Station Exploration

1. Set up plant stations around the room or site for the students/participants to rotate through. See the list of suggestions below. Note: Use a field guide for your region to make sure the plants you select are native.

Station 1: Native Plant Study

Objectives: To compare and observe native plants

Method: Plant matching activity

Procedure: Provide live samples of plants and match plant photos to the live samples. Magnifying glasses can also be used to encourage observations. You can also include non-native plants at this station. (see *Important Notes: Live Samples and Collecting*).

Station 2: What is Native?

Objectives: To identify and reinforce the concept of native and non-native plants.

Method: Sort pictures of plants into native and non-native species.

Procedure: Provide pictures of easily identified plants that students should be able to sort into native and non-native species. Choose obvious examples of non-native species for younger children (examples: palm trees, exotic flowering plants, cactus).

Station 3: A Rainbow of Plants

Objectives: Compare and observe different colours in native plants.

Method: Match colour cards to pictures or live samples of native plants.

Procedure: Provide pictures or live samples of plants and colour cards (i.e. from a paint store) and ask students to match the cards to colours they find on the plants.

Station 4: Shape Hunt

Objectives: Recognize different shapes of flowers and leaves of native plants.

Method: Matching shapes to create native plants

Procedure: Provide pictures or illustrations of native plants and cards with shape outlines.

Match the shapes to the flowers. (Examples of shapes and plants: circle – wild rose, heart – bleeding heart, star – salmonberry, egg-shaped – salal leaf, bell-shaped – salal flower) Addition: crayon rubbings for shapes can be made from different shaped plant leaves.

Station 5: Wildlife Connection

Objectives: Recognize and identify ways that wildlife use native plants.

Method: Match pictures of wildlife with native plants they might use.

Procedure: Provide pictures of plants with specific features that students/participants would be able to connect with wildlife. Provide wildlife cards (pictures or illustrations with names for older students, or toy creatures if available) and ask students to match the creatures to a plant they might use. (Suggestions: bees to flower, beaver to small tree, squirrel to acorn/oak tree, bird to a bush with berries...) Include a picture of a person to promote the idea that we are part of the natural system as well!

Station 6: Plant Creations

Objectives: Explore native plants through art and use of senses.

Method: Create an art project using plant materials.

Procedure: Provide materials for participants to create their own plant creations (paper, glue and other appropriate art supplies) and allow the creative juices to flow! If available, provide fallen dried leaves and needles, fallen or dried flowers, cones or pieces of cones, bark, seeds,

Important Notes: *Live Samples and Collecting*

It is important to model stewardship of native plants and natural areas to all participants. The following are some guidelines for the collection of native plant materials:

- Bring live samples of native plants from a nursery or garden. Please *do not* remove native plants from natural areas.
- Collect native plant materials such as leaves, flowers and other parts of plants in a sensitive manner. Collect materials in small amounts (or from different areas), materials that have already fallen or collect no more than 5% of fruit, seeds or cuttings from a plant to ensure sufficient parent materials remain for natural propagation, food and habitat for wildlife.
- It is illegal to collect from any national, provincial, regional or local park (without a permit).
- Do not collect intensively from the same area.
- Avoid disturbance to the area you collect from, including avoiding trampling of other plants and the spread of invasive species – know what you are collecting!

Note: It is important to make sure the plants you are including in this activity are native plants. Plants that grow wild can often fool people as they seem so plentiful, yet they may not be native to the region and may even be invasive. Check a field guide for your region (see Resource section).

Adapted from Project WILD: What's Wild Activity (p. 2-3) and Wild BC's "Exploring Plants Activity package" (2006).

Educational Resources

Canadian Wildlife Federation. 1995. *Project WILD*. Western Regional Environmental Education Council, Ontario. (Available in BC: www.hctf.ca/wild.htm)

Carle, Eric. 1987. *The Tiny Seed*. Simon and Schuster, New Jersey, USA. (Preschool to Grade 2)

MacDonald, Carolyn and Sue Staniforth. 2005. *Garry Oak Ecosystems of British Columbia: An Educator's Guide*. Wild BC and Habitat Conservation Trust Fund, Victoria, BC.

Staniforth, Sue. 2004. *Leap Into Action: Simple Steps to Environmental Action*. BC Conservation Foundation and Wild BC, Victoria, BC.

Resources and Field Guides for Native Plants in BC

Naturescape British Columbia: Caring for Wildlife Habitat at Home (Series, Kits) <http://hctfeducation.ca/resource-room/>

Pettinger, A. and B. Costanzo (1996) *Native Plants in the Coastal Garden*. Whitecap Books, North Vancouver, BC (Revised edition 2002).

Turner, Nancy J. (1998) *Plant Technology of First Peoples of British Columbia*. Royal British Columbia Museum and UBC Press.

Johnson, D, L. Kershaw, A. MacKinnon and J. Pojar (eds.). 1995. *Plants of the Western Boreal Forest and Aspen Parkland*. Lone Pine Publishing and the Canadian Forest Service, Canada.

Kershaw, L., A. MacKinnon and J. Pojar. *Plants of the Rocky Mountains*. Lone Pine Publishing

MacKinnon, A., J. Pojar, and R. Coupé. 1992. *Plants of Northern British Columbia*. BC Ministry of Forests and Lone Pine Publishing, Canada.

Parish, R., R. Coupé and D. Lloyd. 1996. *Plants of Southern Interior British Columbia*. BC Ministry of Forests and Lone Pine Publishing, Canada.

Parish, R., R. Coupé, and D. Lloyd. 1999. *Plants of Southern Interior British Columbia and the Inland Northwest*. Lone Pine Publishing,

Pojar, J. and A. MacKinnon. 1994. *Plants of Coastal British Columbia: Including Washington, Oregon and Alaska..* BC Ministry of Forests and Lone Pine Publishing, Canada.

Pojar, Jim and Andy MacKinnon. 1994. *Plants of the Pacific Northwest Coast: Washington, Oregon, British Columbia and Alaska*. Lone Pine Publishing, Vancouver, BC.

2. Activity: Know Me, Know My Adaptations

Grade Level: K - 5

Subject Areas: Science, Visual Arts

Duration: 1 class period

Description:

By playing a “Who Am I?” type game, students will learn to identify animal adaptations and explore how these may relate to survival in specific habitats and communities. In addition, students will be introduced to the concept of invasive species.

Learning Objectives

Students will be able to:

- Understand the concept of adaptations and their importance
- Define some examples of adaptations in animal species
- Recognize that there are many different types of adaptations
- Explore the adaptations that make some species invasive

Adaptations:

Species and communities that have come to survive in specific habitats and ecosystems have traits that are suitable to their surroundings. These are called adaptations. These adaptations greatly help in their struggle for survival, that is, in finding food energy, keeping safe from predators and reproducing. Examples of adaptations include: a colouring that enables a species to hide from enemies; claws that help them open a particular type of available shell or nut; webbed feet that can propel them quickly through water; sharp spikes that protect them from predators.

Invasive Species Characteristics:

Invasive species are able to out-compete native species for their basic needs such as food, shelter and space. Invasive species have special adaptations which allow them to spread rapidly. English Ivy (*Hedera helix*) is a good example of an aggressive species that out-competes native species by suppressing other plants, creating a monoculture on the ground, and climbing trees, eventually leading to the death of the trees. American bullfrogs can lay up to 20,000 eggs, and their fast growth rate and large mouths enable them to take over a pond and eat many of its smaller inhabitants!

There are four main distinguishing features of invasive species:

- they are usually prolific seed / young producers,
- their seeds / or young spread easily and effectively,
- they establish and spread quickly,
- they lack natural predators and diseases that keep them under control in their native locations.

Materials:

Photos of native animal species and invasive species from your region in groups of three each – enough for your group of students. e.g. Choose nine native species and have three photos of each of them: (E.g. 3 beaver, 3 deer, 3 screech owls , etc), as well as three invasive species in groups of three: (e.g. 3 bullfrogs, 3 English ivy, 3 goldfish)

Prior to the lesson:

- Prepare Species Cards of several native animal species as well as some invasive species cards (prepare enough for a group e.g. 9 native species and 3 invasive species x 3 of each) Use key invasive species for your region, and emphasize aquatic invasive species if you like: i.e. bullfrog, gold fish, small-mouth bass, etc.
- Note: The ISCBC has some useful TIPS sheets that can be used for this: also downloadable photos from our website.
- Copy enough Worksheets for one per animal group

Procedure:

1. Discuss the concept of adaptation with the group, provide some examples.
2. Students each get a Species Card taped to their back (use tape or butterfly clips)
3. Students then walk around asking each other Yes / No questions to discover who they are. Once a student figures out she/ he is a beaver, she finds all the other beavers and forms a small group: have students sit in their species group.
4. Once all students have figured out their species and formed groups, hand out a work sheet to each species group, where the group has to fill out their adaptations (i.e. Beaver / strong teeth) and how they help the species adapt to their environment.
5. At the end of the activity, introduce the concept of **invasive species** in general terms: that they are not originally from the habitat, which can mean that they lack predators, and that they have adaptations that enable them to survive and reproduce at a higher rate than a habitat's native species.
6. Explain that three of the nine species are invasive. In a discussion, have students determine which species they think these are, based on the adaptations they've listed and the descriptions given.

Animal Adaptations

Know Me, Know My Adaptations

Student Work Sheet

Please answer the following questions with your group:

Name of Animal: _____

Student Group Members: (Names)

Where does this animal live?

What is the weather like?

How does this animal find food?

How does it get around?

How does it find shelter?

Does it have any predators?

How are some of the ways it has adapted to its environment?

3. Activity: Musical Mussels!

Grade Level: 2 - 5

Subject Areas: Science, Life Sciences, Physical Education

Duration: 1 class period

Description:

In this active version of Musical Chairs, students will compete as aquatic species to show how basic needs are met. This activity highlights how certain adaptations enable invasive species to outcompete native species to attain water, food, shelter and room to grow. It can also be done outside using **“sit-upons”** for chairs.

(“sit-upons” are outdoor seating pads made from grocery bags filled with folded newspaper and duct-taped shut: have each student make their own and decorate them with waterproof markers for other outdoor uses).

Learning Objectives

Students will be able to:

- Define the terms: community, habitat, adaptations, basic needs, native species and invasive species.
- Describe the basic needs of an animal species (water, food, shelter, room to grow)
- Explain how an animal meets its basic needs.
- Explore how certain adaptations of invasive species enable them to outcompete native species to attain their basic needs.

Materials and Preparation

1. Photocopy and cut: Blackline Master: Musical Mussels into 10 card-sized pieces. (see **Resources** section below)
2. With a marker, draw stripes on ~16 mailing labels.
3. Print a “P” (for predator) on 2 labels.
4. Assemble chairs or “sit-upons” in two rows of 5 chairs, back to back.
1. Select music to play during the game. Optional: choose an aquatic theme - for example tunes from *The Little Mermaid* or *Finding Nemo*, or Handel’s *Watermusic*.

Procedure

1. Introduce or review the concept of basic needs such as food, water, shelter, and room to grow. Indicate that all animals, including humans, must meet these needs to survive.
2. Ask students to imagine being unable to get something that was a basic need (like having no water while playing soccer on a hot summer day, or not being able to get undercover during a rainstorm).
Ask: *Can you think of a situation where a human or animal has gone without getting a basic need?*

GAME I:

Explain to students that they will experience the struggle for survival through a version of Musical Chairs. Each of the chairs will represent all of an aquatic animal’s basic needs (food, clean water, shelter and room to grow). Therefore, students that find a seat when the music stops are able to meet all their needs.

1. Choose 5 students to be native fish (such as trout or Dolly Varden) in a lake. Play one round of Musical Chairs as you normally would with the five students walking slowly around the 10 chairs and finding seats once the music stops.

2. Explain that due to their success at meeting their basic needs, these 5 students are able to reproduce. Add 5 more students and play again.
3. Explain that again, due to the success of the fish meeting their basic needs, reproduction occurs and five more students are added to the game due to reproduction. After this round, not all of the fish are able to meet their needs. Five must leave to find food elsewhere or perish.
4. Play several more rounds, allowing students who have not played yet to participate. Ask questions throughout to prompt their understanding of the simulation. For example: *What are the basic needs? What happens to those that don't meet their basic needs? What happens to those that do?*
5. Place a Musical Mussel card on three chairs face down. Play a round and ask those landing on a card to share it with the class.

Explain: Zebra Mussels are a non-native (new to the area) species accidentally brought to the lake. They are not yet found in BC but have impacted many lakes and waterways in Ontario and other eastern provinces. They compete for the same basic needs as the fish do. If a player gets a card that shows that a zebra mussel has taken a basic need, they must leave the lake along with the others who couldn't meet their basic needs.

6. 10. Retrieve all cards and shuffle. Explain that the zebra mussels have got enough basic needs to reproduce, this time place a card down on 6 chairs. Play the round again and note that reproduction in fish is not occurring due to dwindling basic needs. Again, those with zebra mussel cards on their seats must leave the game.
7. 11. Retrieve all mussel cards, shuffle and place 9 cards down on chairs. Play the round.
8. 12. Retrieve all mussel cards, shuffle and place 10 cards down on chairs. Play the round. Ask remaining student(s): How are you feeling? Are you worried? Ask the class: What do you think would happen next? Do you think this could really happen in nature? How do you feel about zebra mussels taking over your lake?

Explain that the next two rounds will give insight into some of the reasons zebra mussels can outcompete native species.

ROUND I:

From the class group, choose 10 students to take on the role of a native aquatic species, 1 zebra mussel (identified with striped mailing labels) and 2 predators ("P" labels). Explain: during this round of Musical Chairs, predators will walk around and try to tag the native species only. This is because predators don't like to eat zebra mussels. When a predator tags a native species, that student must leave the game. Therefore, natives species must try to both dodge the predators and get their basic needs met. (Note: As predators don't compete with the native species and zebra mussels for the same basic needs they will not try and get a seat when the music stops.) Play one round

ROUND II: Add two mussels – representing successful reproduction – for every seat-finding mussel or try again with a new mussel if the one playing doesn't make it.

Play again, doubling the number of successful mussels from the last round.

Play again, allowing 2 mussels to share one seat if all others are taken. Explain that zebra mussels have small space requirements and live in colonies attached to one another by sticky threads they produce to stay on hard surfaces. Continue until most or all of the basic needs (seats) are taken by zebra mussels.

Discuss the game observations with students. *Ask: What happened to the native species competing with the zebra mussels? Why were the zebra mussels so successful? (They are not sought by predators, they need less space to live, and they produce many offspring.)*

Explain that zebra mussels (and other invasive species) have adaptations that make them very successful in nature and enable them to expand throughout waterways.

Ask: *How do you think zebra mussels affect humans? (Because their populations grow quickly, they take food away from native fish. This decreases fish stock and impacts humans. In addition, they clog water pipes and cling to boat hulls, ruin beaches and cut swimmer's feet with their sharp edges.)*

Ask: *How do you think we can manage them and prevent their spread? (Take care to ensure they don't get into new habitats.)*

Clean Drain Dry

Introduce the **Clean Drain Dry** slogan to students: this is the main provincial program targeting boaters to clean, drain and dry their boats, trailers and fishing equipment before entering another water body, to ensure that they do not spread invasive species from place to place, especially zebra mussels, but also other aquatic invasive plants such as Eurasian watermilfoil. Learn more about how to protect our waterways from invasive species at:

<http://bcinvasives.ca/resources/programs/clean-drain-dry/>

Extension Activity:

Have students prepare a short write-up that describes the game's outcome and includes the words: community, habitat, adaptations, basic needs, native species and invasive species. They can illustrate their report with some of the top invasive aquatic species in BC.

Adapted from the curriculum resource: Making Waves: Protecting Ontario's Aquatic Habitats:

www.invadingspecies.com

Musical Mussels Playing Cards

<p>You are meeting your basic needs!</p>	<p>Zebra mussels are taking your food. You can't stay! (Basic Need: FOOD)</p>
<p>Zebra mussels are crowding you out! (Basic Need: ROOM TO GROW)</p>	<p>The zebra mussels on your back make it hard to move. This makes you vulnerable to predators. (Basic Need: SAFETY)</p>
<p>Because zebra mussels eat so much, there is less food for you! Go away! (Basic Need: FOOD)</p>	<p>Your eggs won't hatch among zebra mussels. Lay them somewhere else! (Basic Need: SHELTER)</p>
<p>Zebra mussels are crowding you out! (Basic Need: ROOM TO GROW)</p>	<p>Zebra mussels are taking your food. You can't stay! (Basic Need: FOOD)</p>
<p>Your eggs won't hatch among zebra mussels. Lay them somewhere else! (Basic Need: SHELTER)</p>	<p>Because zebra mussels eat so much, there is less food for you! Go away! (Basic Need: FOOD)</p>

4. Activity: Seeking Invaders and How They Got Here!

A Play Clean Go Activity!

Grade levels: Grades 5 - 8

Subject Areas: Science: Life Systems, Ecosystems, Impacts

Duration: 1-2 periods

Description:

Issues relating to invading species and their vectors of spread come alive for students as they investigate key characteristics that make invasive plants successful at spreading, then look for, and document, invasive species in their own community, and try to figure out how the plants got there in the first place.

Background:

One of the greatest problems with invasive plants is their aggressive spread from one area to another. Many of these plants are spread by humans, either through industry (logging, mining), recreation, horticulture and/or agriculture. A major way that plant seeds get around is through our recreational activities: seeds attach to our clothing, our camping gear, bike and hiking boot treads, our pets and our vehicles. By cleaning our gear of any seeds and burrs before we move to another location, we can help prevent the spread of invasive species.

Learning Objectives:

Students will:

- explore different characteristics that help invasive plants spread
- investigate invasive plants in their community
- Discuss what recreational activities move invasive species around
- Describe what can be done to limit or stop the movement of invasive species.

Materials:

- Pictures of adaptive features that make invasive plants successful (see Resources section below)
- Clipboards, pencils
- Copies of the Invasive Plant Tally sheet
- Field guides to native / invasive plants (weed guides)
- (Download the recent BC Weed Guide here: <http://bcinvasives.ca/resources/publications/field-guide-to-noxious-weeds-and-other-selected-invasive-plants-of-BC>)
- Download information sheets and photos here: <http://bcinvasives.ca/resources/tips/>

Procedure:

1. Before starting the lesson, select an area for students to search for evidence of invading species; school yard/boundary, park, trail, natural area etc.
2. Tell students that they will be exploring ways that invasive plants move around, and then doing some investigative field work in their community to look for and report invading species, and try to figure out how they got here in the first place.

Class Discussion:

3. Ask the students "Name some ways that humans have brought or can bring invasive species into a community." Write the answers on the board. (Answers may include; garden plants, boats, recreation equipment, seeds mixes, agriculture, clothing, pets)

4. Ask: “What industries move invasive species around, once they are established? (Answers may include; logging, mining, road construction, home building, recreation - fishing and hunting, camping, tourism industry)
5. Show the students some pictures of invasive plants (see *Resources* section below). Ask: What do you think make invasive plants so successful at getting around?
6. Introduce the concept of “getaway vehicles.” One of the problems with trying to stop invasive plants from spreading is that they have so many getaway vehicles that they use to spread.
7. Brainstorm ways that plants might spread around.

Outdoor Activity: To do in the spring / early summer or early fall season:

1. Review the Invasive Plant Tally Sheet with students. Provide each team of students with a clipboard, Tally sheet, pencil, and field guide (weed guide / plant guide)
2. In teams of two – three, have students walk around the school grounds, a neighbourhood park or local green space, to search for plants that may be invasive. 3. Have them look for and note the characteristics listed on the tally sheet.
 - Their seeds spread by wind
 - They are protected by spines or prickles
 - Their seeds spread by burrs
 - They have prickly seedheads and/or flowers
 - They have sticky seeds
 - If possible, have students take a picture of each plant they discover.
3. At the end of the session, collect student data forms. Share the slogan: **Play Clean Go** with students and have them discuss what it refers to. Discuss as a class some of the ways to prevent invasive plants from spreading; for example;
 - Check vehicle and bike tires for plant pieces or their seeds that may be attached
 - Stay on marked trails so you don’t walk through patches of plants
 - Check equipment, socks and backpacks for seeds/ burrs
 - Do not plant invasive plants,
 - Dispose of invasive plants at the landfill,
 - Clean all recreation equipment (including boats, camping and fishing gear and backpacks),
 - Check pet fur and horses mane, tail and legs for seeds / burrs, and remove them at the site. Clip or pull invasive plants so they don’t go to seed

Invasive Plant Tally Sheet

Characteristics of invasive plants:

- Their seeds spread by wind
- They are protected by spines or prickles
- Their seeds spread by burrs
- They have prickly seedheads and/or flowers
- They have sticky seeds

Non-native Species: Name	Location (approximate)	Characteristics: Colour, height, description	Significant Features for dispersal (e.g. how does it get around?)	Other observations: how it may have arrived; size of patch

Resources: Ways that Plants Move about



Millions of seeds (burrs!)



Knotweed roots



Eurasian watermilfoil gets tangled on boats, trailers, and equipment



Purple loosestrife seeds spread by wind



Hounds-tongue clings to pets and livestock



Bull thistle forms clinging, prickly stems and burrs



Puncturevine has sharp spines that easily penetrate leather, skin and can flatten rubber tires

5. Don't Let It Loose! An Aquarium Poster Activity

Grade levels: Grades 3 – 5

Subject Areas: Art – Visual Art; Science: Life Systems, Ecosystems, Impacts

Duration: 1-2 periods

Description:

Students will take action by creating educational posters to display at school, libraries, pet shops and city aquariums that remind the public of their responsibilities as pet owners. As an art activity, this project will be used to explore tint, shade and texture.

Learning Objectives:

Students will learn that when they release aquatic pets and plants into local waterways there can be negative impacts on habitats and communities.

Through the creation and display of educational posters, students will demonstrate their understanding of responsible pet ownership and the importance of being an active community member in preventing the spread of invasive species.

Materials:

white paper, water colour paint kits / tempura paints, 1 cardboard square or plastic palette per student, brushes, water, OR use markers; scrap paper, pencils, rulers, examples of public information posters, Pet Shop Poster Messages (write on board or photocopy)

Procedure:

1. Begin a class discussion. Ask: *Who has or has had an aquarium?* An aquarium is a very simple, contained and created habitat, while the animals and plants that live in it (along with its human host) are a community. To class: Describe the aquarium food chain. Could this habitat survive without human interaction?

2. Ask: *What would you do if you had to move far away and couldn't look after your aquarium anymore? Why might someone think it would be good to empty an aquarium into a local water system? Why could this be a bad idea?* Explain that plant and animal species sold in pet shops are very often non-native species. What would happen if they were dumped into a pond?

If they are potentially invasive species, they:

- Have few natural enemies or predators
- Reproduce quickly and often
- Adapt to many conditions
- Out-compete native species for food and habitat
- Can eat many types of food

(Note that some aquarium species like exotic salamanders or fish like piranha may not be invasive, but could have disease or parasites that could infect our native species.)

Ask: *How does this compare to their life (role in the food chain) in the aquarium?*

3. In two separate columns on the board, brainstorm the following questions:
 - i. How can aquarium owners best care for their pets and plants when they can no longer look after them? (E.g. donate to schools or seniors homes, give back to pet stores, give to responsible friends, dry the plants out in the sun.)
 - ii. How as a class can we let people know about careful aquarium care? (Prompt: “create posters for community spaces, pet shops”, if needed.)
4. Explain to students that they will be creating a special poster that will educate citizens on the importance of being a responsible aquarium owner. Explain that it must contain one message from the Poster Messages list (see below). Write the list on the board or hand photocopy out to students. Go over the messages together to ensure that students understand them.
5. Ask students to close their eyes and imagine they are swimming underwater in a pond or aquarium. *What do you see? Now swim down to the bottom. Is it lighter or darker there? Why?* Tell students that they will adjust the lightness and darkness of the blue water in their painting using white paint and black paint. Referencing the chalkboard, define shade and tint for the students. (Suggest they start by painting the middle of the pond or aquarium in plain blue.)
6. Ask: *Describe the different textures in the water you were swimming in.* Explain that there are many things in a pond or aquarium that aren’t smooth. What can we do in our paintings to show different textures? Discuss (and demonstrate, if able) brush technique and the addition of sand to paint (mix it into the paint on the palette before applying) to create textures for pond and aquarium bottoms, plants and fish. (Optional: Students can also use materials like glitter for fish scales and wool for aquatic plants.)
7. Ask students to choose a poster message and using shade, tint and texture, create a picture depicting it. Write these criteria on the board and review with the class:

Posters will:

- Include a large aquarium or pond in tints and shades of blue
- Explore texture with brush strokes and sand
- Communicate a message to the public about aquarium pet stewardship

NOTE: Students should ensure there is message space on the top or bottom of their poster by marking it out ahead of time with a ruler. Messages can be written in when the painting is finished with marker or pencil crayon.

Closure/Checks for Understanding:

Once posters are complete, have students present to the class explaining how the message they’ve chosen is depicted in their poster. Ask them to also address the art techniques they used.

Determine a method for delivering the posters to libraries, a community hall, a mall or local pet shops. The ISCBC would love to see your students’ posters as well – send any photos to education@bcinvasives.ca.

Notes For Teacher:

Most aquarium fish, plants and invertebrates are not native to British Columbia waters. By releasing them into open waterways, these species could establish beyond their native range and have notable consequences on the environment.

An example is that of the red-eared slider turtle, a popular turtle species sold in pet stores. Red-eared sliders look cute and irresistible when they’re babies but can grow to dinner plate size as adults. All turtles

require a lot of care and investment when kept as pets to ensure that they do not get stressed and suffer from disease or infections. When released into BC's aquatic habitats, red-eared sliders compete with the Western Painted Turtle, BC's only native freshwater turtle, for food and nesting areas. They are also carriers of Salmonella, a bacterium that can be easily transferred up the food chain.

Bullfrogs, native to eastern North America, were brought to BC in the early 1900's to farm for their meaty legs. They have spread throughout the Lower Mainland, Vancouver Island and the Okanagan, and are out-competing BC's native frogs as well as eating them! (Bullfrogs will eat almost anything they can fit in their mouth, including other frogs, salamanders, fish, even small mammals and birds!) Bullfrog tadpoles are large (as are the frogs themselves) making them a preferred pet for kids to capture and raise. Once they grow into frogs, they are usually released into new habitats, increasing their spread.

You are responsible for your aquarium pets and plants. The release of aquarium pets into BC waters is illegal. You can help prevent the spread of non-native aquatic species by doing the following:

- Never release or flush unwanted aquarium pets or aquarium water into natural waters, drainage ditches or sewers.
- Drain aquarium water on dry land.
- Return or donate unwanted aquarium fish, reptiles, snails and plants to a pet store or a school.
- Contact a local aquarium club or the Canadian Association of Aquarium Clubs, at (905) 682-2991 (www.caoac.on.ca) and ask about a fish rescue program for unwanted aquarium pets, or contact the Invasive Species Council of BC at education@bcinvasives.ca.

Evaluation:

Posters can be evaluated for art concepts (tint, shade and texture) while presentations will indicate whether students recognize the need for human action to protect against the impact of invasive species. Students should be able to make connections to healthy habitats and communities discussed in previous activities and provide specific examples of what aquarium owners can do to protect local habitats.

Poster Messages

- Releasing aquarium pets and plants into the wild is harmful to local habitats!
- Never release or flush aquarium pets or water into drains, toilets, ditches, sewers, or natural waterways. Drain aquarium water on dry land – it can be really good for the garden!
- Burials on land are better than burials at sea. Don't flush dead pets away. They could harm our habitats!
- When finished with aquarium plants, dry them out in the sun and put them in the garbage (not in the compost)!
- Donate unwanted aquarium fish, snails and plants to a pet store, school or aquarium hobbyist. Advertise and offer them for free!

Adapted from: *Making Waves! Protecting Ontario's Aquatic Habitats*; Invading Species Awareness Program www.invadingspecies.com

Resources and Links:

Invasive Species Council of BC (ISCBC): <http://www.bcinvasives.ca>
Provincial Regional Committees: <http://www.bcinvasives.ca/partners/committees>
Weeds BC: <http://www.weedsbc.ca>
RBC Museum: Aliens Among Us <http://alienspecies.royalbcmuseum.bc.ca/eng/content/home>

6. Activity: Invasive Species Jeopardy

Grade Level: 3 - 7

Subject Areas: Science, Social Studies, Visual Arts

Duration: 1-2 class periods

Description: In this simplified version of Jeopardy, students create game questions using information learned during preceding lessons and activities, and test their knowledge by playing a game of “Diversity Jeopardy”. This is a great activity for assessing what students have retained and can be used as a summary activity or evaluation tool.

Learning Objectives

Students will:

- Review information they have learned on invasive species and their impacts
- Apply information to creating questions and answers
- Engage in a fun activity that reviews what they have learned.

Procedure:

Preparation for the Game:

1. Tell students that they will play a game called Diversity Jeopardy, loosely based on the television show. “Contestants” take turns answering questions, ranging from easy to challenging, to accumulate points. Questions are selected at random from a game deck. The team with the most points at the end of the game wins.
2. Students are responsible for writing questions for the game. Each student will use the information gained from studying biodiversity and invading species to write five questions and answers. Easy questions carry a value of 10 points, up to 50 points for challenging questions.
3. With the whole class, model writing questions of varying degrees of difficulty. Use Bloom’s taxonomy as the basis for modeling various types of questions. Share the sample questions with students as examples. If students only submit “knowledge” level questions, they may be giving easy questions to the opposing team (players do not get to choose which questions to answer).
4. Provide time for students to research their questions. Questions and answers prepared by students will be handed in for marking. The teacher can also add questions to the game deck.
5. Once questions and answers have been submitted, marked and corrected, students will write a good copy of each of their five question/answer sets on index cards. All index cards are collected to form the game deck.

To play the game:

1. Divide the class into two teams. Each student will take a turn as the “contestant”. Flip a coin to determine which team will go first.
2. One player from each team steps forward for the round.
3. The teacher draws the top card from the game deck and reads it aloud for the student to answer.
4. If the student gives the correct answer, they score one point and the play goes to opposing team.
5. If the student does not know the answer, or gives an incorrect answer, the turn goes to the opposing player. If they give a correct answer, they score one point for the question and their turn continues with another card drawn. If they do not know the answer, or give an incorrect answer, the card is returned to the deck to be played later.
6. The game is over when all questions have been answered (or allotted time is up).
7. Tally game score.

Jeopardy Starter Questions

(4 categories)

Amazing Aquatic Invaders	Totally Terrestrial Invaders	Biodiversity Blues	How Can I Help?
Since its introduction into BC in the early 19 th century, this amphibian has spread rapidly to lakes and ponds in southern BC. (Answer: What is the American Bullfrog)	This invasive plant has small purple flowers and has spread through much of Canada and the United States (Answer: What is purple loosestrife)	Many experts consider this to be one of the greatest threats to biodiversity (Answer: What are invasive species)	If you go camping, you can help stop the spread of invasive species by not transporting this item (Answer: What is firewood)
This popular aquarium pet starts small but will grow as large as a dinner plate and can live for 40 years! (Answer: What is the Red-eared Slider turtle)	This plant has bright yellow flowers, was brought to Canada by a homesick Scot and is threatening Garry oak ecosystems (Answer: What is Scotch Broom)	This word means “the variety of life on earth” (Answer: What is biodiversity)	Doing this to your boat before venturing onto another lake will help stop the spread of invasive species (Answer: What is washing your boat)
This invader has the ability to attach itself to nearly any firm surface using their small thread-like features called byssal threads (Answer: What is the zebra mussel)	This invasive woodland plant with purple flowers grows along the ground creating dense carpets, and was brought into BC as a garden plant (Answer: What is Periwinkle)	This invasive mammal is threatening populations of several native squirrel species (Answer: What is the Grey Squirrel)	By not dumping your aquarium, you are helping to keep this member of the carp family out of waterways (Answer: What is a goldfish)

7. Activity: Invasive Animals Brochures!

Grade Level: Intermediate /Secondary Grades 5 – 10 (Ages 12 – 17)

Subject Areas: Science, Visual Arts

Duration: 1-2 class periods

Description: Students research and develop brochures to highlight invasive animal species that are present in your region or that have the potential to invade.

Learning Objectives

Students will:

- Research an invasive animal in their region
- Summarize their learning and information into a short concise brochure
- Provide information to the public about the invasive species

Materials needed:

- Field guides on invasive animals or information from the internet
- Paper, pens
- Craft materials for posters, brochures,

Instructions:

1. Have each student develop a brochure to highlight an invasive animal species that is present in your region or has the potential to invade. For example, research an invasive animal species (e.g. insect, mammal, bird, fish): check out the Invasive Species Council of BC's web site for suggestions:

<http://www.bcinvases.ca>, and the Royal BC Museum's Aliens Among Us site:

<http://alienspecies.royalbcmuseum.bc.ca/eng/content/home>

2. The brochure should contain information on:

- description of the animal: size, colour, where it is found, habits,
- describe where the animal came from,
- how it may have got to BC,
- the main threats it poses to your region, and
- list some positive actions and behaviours that describe how we can act to prevent its introduction and/or spread.

3. Then research and list some public outreach and awareness activities that could help bring attention to this species: e.g. posters, door-to-door brochure campaigns, radio announcements, mall or special event booths, Earth Day events, campsite visits, park interpretive programs, beach and boat launch visits, pet store and aquarium visits.

See the *Clean Drain and Dry* program of ISCBC for an example: <http://www.bcinvases.ca/special-events/clean-drain-dry>

4. Print several copies of the brochures and present them to a local library or community centre for a display.

8. Activity: Vectors of Spread: Invasive Species Getaway Vehicles!

Grade Levels: 2 – 7

Subject areas: Science, Social Studies, Geography

Description:

This activity engages students in exploring some of the methods of dispersal of invasive species, through visiting a series of lab stations where they experiment with different materials to discover how invasive species spread. Students rotate through several lab stations to explore methods that invasive species use to spread.

Objectives:

Students will:

- learn some main characteristics that make a species invasive: prolific reproduction and effective methods of spread
- investigate several vectors of spread through hands-on demonstrations
- explain how some plants and animals are adapted to spread to new places, even from small fragments and cells
- explain how seeds are transported by vehicles, pets, and equipment
- explain why people should not release any animals, plants or water into lakes, rivers, and wetlands
- understand and apply strategies and methods to prevent the spread of invasive species

Background

One of the greatest problems with invasive species is their prolific ability to reproduce and spread from one area to another. Invasive plants reproduce by seed or by stolons or runners above the ground, rhizomes below ground, or plant fragments that can take root. The stems of a single plant of baby's breath, sought after by florists for flower arrangements, can produce more than 10,000 seeds, and these are distributed over long distances when the whole stalk breaks off at ground level and rolls like a tumbleweed! Often, the seeds of invasive plants can remain viable for years or even decades: gorse seeds have a hard coat and can persist in the soil for 25 to 40 years.

Invasive species travel further with the help of water, wind, people, pets, vehicles, soil, gravel, and equipment. Many of these invaders are spread by humans, either through industry such as logging and mining, recreational activities like boating and camping, and gardening and horticulture. Invasive animals such as the zebra mussel, an invasive species from Europe that has established itself in the Great Lakes, can produce up to 1 million eggs a year. Tiny eggs and larvae can easily be transported from lake to lake in the water in the bottom of your boat.

Terrestrial plants have a wide variety of adaptations for dispersing their seeds to new places. Light fluffy seeds move with the wind for long distances, flattened seeds flutter a short distance and then may float down a river or across a lake. Burred seeds have tiny hooks that will stick to skin, fur, feathers and clothing. Once they are attached, they can cling for long distances and when they eventually fall to the ground, they may have moved many kilometres.

Aquatic plants and animals move easily within a water body such as a lake or river and will eventually occupy the suitable habitat in that water body. Aquatic plants and animals sometimes adapt to survive out

of water for short periods of time. This adaptation allows them to hitch-hike with people on our toys, vehicles, equipment, clothing, and pets or livestock. In this way, invasive plants and animals can be transported to new locations by mistake. Sometimes a small piece of a plant is enough to start a new colony. Some animals, such as zebra or quagga mussels, have very small juvenile stages that can be very difficult to see. To avoid accidentally transporting invasive species, we need to inspect and clean vehicles, clothing and equipment before leaving an area, particularly if we know the area is infested with an invasive species.

Materials:

Station 1: Aquatic Hitchhikers

- Three water bins - marked Lake 1, Lake 2 and Lake 3
- A toy boat that fits into the water bins
- Bag of dill weed - 1 tsp. per group of students
- Measuring spoon (1 tsp. / 5 ml)
- Coffee filters
- Water

Station 2: Bag the Burrs!

- One or two Velcro pieces
- A selection of different seeds including several seeds with hooks (e.g. burrs from burdock or hound's tongue plants), some large seeds (e.g. corn or beans), some small seeds (e.g. flax, poppy, mustard), some seeds with "parachutes" (e.g. dandelions, milkweed), seeds with "wings" (e.g. maple keys).
- Plastic garbage bags
- Magnifying glasses
- Three plates - to set the seeds on while looking at them
- Wool or cotton sock or shoelace
- A toy stuffed animal
- A feather
- Rubber or work gloves (for pulling the burrs off)

Station 3: Stowaway Seeds – Edible Seeds

- Blackberries or raspberries
- Small plastic baggies
- Cola beverage
- ¼ cup measurer
- Coffee filters
- Optional: other berries such as blueberries or strawberries.

Station 4: Terrestrial Hitchhikers

- Soil or mud
- Small seeds - poppy or mustard
- Toy truck with knobby tires
- One bin that comfortably fits the toy truck
- Long pieces of cloth or paper towel or clear space - to drive the toy over
- Toothbrush and small container of water

Station 5: Pond Jumpers

- Two plastic or styrofoam egg cartons
- Two colours of Food colouring - red and blue preferably
- A 500 ml measuring cup
- A spoon
- Water
- A large bin big enough to contain the egg cartons and other supplies to reduce the chance for spillage.
- Towel

Procedure:

1. Set up each station before the class, and label them well. Print out and laminate (if possible) the instruction sheets for each station, and provide towels beside the “wet” station sites. With younger students you may want to reduce the number of stations, and/or demonstrate the procedures at each station before allowing them to experiment.
2. Begin with a class brainstorm to list some ways that humans have brought or can bring invasive species into the country. Answers may include: garden plants, boats, recreation equipment, seed mixes, agriculture, clothing, on pets, etc.
3. Then discuss “What industries could move invasive species around, once they are established?” Answers may include: logging, mining, road construction, home building, recreation (fishing and hunting, tourism industry).
4. Divide the class up into five equal sized groups and have students rotate through the stations, experimenting with each set of equipment as they go. Allow 5 – 10 minutes per station.
5. Once all students have visited all the stations, gather the class together for a final discussion. Ask students to list things that we can do to stop invasive plants and animals from coming to this region or from moving them around.

Answers may include: watch what you plant, do not plant invasive plants, dispose of invasive plants properly in a landfill, do not cut invasive flowers, stay on marked trails so you don’t walk through patches of plants, clip or pull invasive plants so they don’t go to seed, pick off any seeds on your boots, laces, clothing and pets and dispose of them properly, wash recreational equipment (including bikes, car and truck tires and bumpers, and ATV’s), clean, drain and dry boats; never dispose of aquarium water or pets in ponds or ditches.

Station Setup Directions and Instruction Sheets

Station 1: Aquatic Hitchhikers

Here students use a toy boat and some dill weed to investigate how some plants and animals are adapted to spread or disperse to new places, even from small fragments and cells. Fill the bins with enough water to allow the toy to be submerged without overflowing. Note: It works best to have a water tap nearby to wash the toy and change the water in the bins after each group. Provide a towel.

Option: Have students use a coffee filter to collect the dill weed from Lakes Two and Three and then weigh it, to determine the amount of material that was transported.

Station 1: Aquatic Hitchhikers Instruction Sheet:

These three bins represent three lakes in your area. The first lake gets infested with an invasive species called Eurasian watermilfoil, which we'll represent using the dill weed.

1. Put 5 ml of dill weed into Lake One water bin. This lake is now 'infested'.
2. Put the clean toy into the infested water bin – this is a boat spending the day on Lake One. "Drive" it around in the lake for a minute.
3. Take the toy out of Lake One. Notice how much dill weed is clinging to it.
Put the toy into Lake Two. Note what happens to the water in the lake: Where is the milfoil going? Notice how much plant material comes off the boat.
4. Put the toy into Lake Three. Now where is the milfoil? Notice how much plant material comes off.
5. Rinse out all three bins and fill them up again for the next group of students.

Station 2: Bag the Burrs

Students experience how seeds can be moved to other locations by clinging to fur, feathers or clothing. Have students experiment with different seeds to see which ones stick and which ones don't. Larger seeds such as corn, beans or peas don't stick to most material, and even some smaller seeds don't stick. Some other seeds might be small enough to get stuck in fabric even without hooks.

Option: Grow Your Sock!

Have each student wear a large woolly sock over their shoe and walk through an area of weed plants for 2 – 3 minutes to collect and count the seeds that they have collected. Each student needs a large sock (they could bring an old sock from home) and a plastic bag to bag the sock in after their stroll.

Note: it's important to collect and sort the seeds in an indoor space where seeds cannot be spread! Bring socks (in their bags) to an indoor space and pick through them to count seeds. You can have prizes for the most number of seeds, least number of seeds, largest seed, etc. Ensure that all seeds are bagged and carefully disposed of by burning them, or taking them to the dump to be buried deeply. Reinforce the importance of checking socks and gear (adapted from *Sock Seeds*; PBS Education Resources: Living Systems, 2002).

Adaptations/Variations: Grow Soil!

Have students go to an area near the school, a park or their home and collect 1 – 2 cups of soil. Put the soil in a small pot and tend it by watering it regularly and letting it get sunlight. See what begins to grow. Are there any invasive plants there? Identify and list the plants that appear, and put your pot on display. Be careful not to let any invasive plants go to seed, and dispose of them in the garbage.

Station 2: Bag the Burrs Instruction Sheet

Most of us have had the experience of going for a hike and noticing later that our socks, bootlaces and pant legs, and maybe even our dog are covered in burrs. Burrs are plant seeds that are adapted to hook on to fur, clothing and skin.

1. Using the magnifying glass, look closely at the burrs and then the Velcro pieces to see the little hooks.
2. Use a wool sock and the stuffed toy to pick up the burrs and Velcro pieces.
3. Put on the gloves to take the burrs off the sock and toy. Put the burrs back onto the plate or in a plastic garbage bag. Bagging the burrs keeps them from growing in a new location. ***Invasive plant seeds cannot be composted!*
4. Try sticking some of the other seeds to the sock or stuffed toy: what seeds stick and what seeds don't?
5. Try picking up the burrs with the feather. Feathers don't get caught as easily, but small birds have been trapped by burdock burrs.

Did you know? The clinging burr seeds of burdock were the inspiration for developing Velcro!

Station 3: Stowaway Seeds – Edible Seeds

Many plant seeds (and some small animals) are able to survive the digestion process. There are many plants that have edible fruits surrounding their seeds: e.g. apples, peaches, tomatoes, berries. As with many soft fruits, when the animal eats the fruit, often the seeds are not digested. This demonstration will illustrate how the seeds inside a fruit can survive the digestion process; this is an adaptation that some plants have.

Station 3: Stowaway Seeds – Edible Seeds Instruction Sheet

This demonstration will illustrate how the seeds inside a fruit can survive the digestion process; this is an adaptation that some plants have. Fruits like apples, blackberries and blueberries carry their plant's seeds inside. Some fruits are tasty and some are not; some are poisonous. Being surrounded by tasty, nutritious food (e.g. fruit), the seed will get transported to new places by the animals that eat it. Many fruits are not from invasive species, but some are invasive, such as Himalayan blackberries.

1. Put a few blackberries or raspberries into a small plastic bag.
2. Add a little bit of cola beverage (1/4 cup) to represent digestive juices.
3. Zip up the bag, making sure it is sealed.
4. Press and mush the berries and cola together inside the bag, to "chew and digest" the fruit. The fruit part of the berry will become mushy and liquid but the seeds stay whole.
5. See and feel the blackberry seeds inside the bag without opening it.
6. Now pour the contents into a coffee filter to see the seeds left behind with some of the fruit pulp that wasn't digested.
7. Try the same experiment with different seeds/fruits to see different seeds.

Station 4: Terrestrial Hitchhikers

At this station, students use a toy vehicle to illustrate how people with vehicles that have mud caked onto them can accidentally transport invasive species long distances.

Plant seeds and some small animals are often accidentally transported in the mud that clings to vehicles, equipment, footwear, and toys. This is why it is important to inspect and clean your vehicle and equipment before leaving an area.

Station 4: Terrestrial Hitchhikers Instruction Sheet

If you have ever planted a garden and spilled a few seeds, you know how difficult it can be to spot a plant seed once it is mixed into the soil. Some plant seeds and animals are so small and blend in so well, that we might not realize they are mixed into the mud on our vehicles, toys, pant legs and pets. New Zealand mudsnails, for example, are between 3 and 5mm long when fully grown. They can fit unnoticed into tire treads, horse hooves, pet fur and paws, muddy pant legs, and muddy boots. Since first being found in Idaho in 1987, these little snails have spread throughout the USA and southern Canada.

1. Put a small spoonful of seeds into the mud and mix it up. Can you still see the seeds?
2. Put the toy truck into the muddy bin and run it back and forth to get mud on the tire treads.
3. Now run the truck back and forth a few times on the clear space or towel provided. Can you see the seeds in the mud that came off of the tire tracks?

To avoid accidentally spreading an invasive species, it is a good practice to clean any mud, plants or 'small creatures' from your vehicle, boat, toys, clothing, and pets before leaving an area.

4. Clean off the truck with the toothbrush for the next group of students.

Station 5: Pond Jumpers

Here egg cartons are used to represent watersheds, and coloured water is used to illustrate how species can spread from lake to lake. Note: This is a good activity to demonstrate yourself, to save time and cleanup.

Before having students do this activity (or demonstrating it) review the definition of a watershed with the class. A watershed is an area of land where all the water that runs through it drains into the same place divided by mountains. Two lakes that are very close to each other may drain into completely different watersheds. Although they might seem like similar habitats, they may be completely different communities. All of the water in all of the different water bodies within a watershed is connected.

Aquatic organisms do not travel between watersheds naturally; however people sometimes move organisms from one lake or river to another. Ask students how this might happen (e.g. live fish bait being dumped into lakes; unwanted aquarium pets being released into ponds; eggs and larvae of aquatic animals being transported in boat bilge water between lakes). If organisms that are moved to new watersheds happen to be invasive species, they have an opportunity to invade a whole new watershed, not just a single body of water.

Aquarium water should be poured down an indoor drain or poured out on the ground where it will dry out and won't reach a stream. There may be invasive algae or eggs and larvae of non-native animals that you don't want to release into a new watershed.

Station 5: Pond Jumpers Instruction Sheet

When you put an invasive species into a lake or river, it can spread into a whole new watershed. Here, food colouring represents an invasive species that has been put into one lake in a watershed (one cup of an egg carton).

1. Fill both egg cartons with plain water.
2. Put one colour of food colouring into one of the egg cups in one of the cartons, to represent a native species.
3. Put some water in the measuring cup, and add a different colour of food colouring to represent an invasive species.
4. Pour the “invasive species” water slowly into the egg cup with the ‘native species’ and observe what happens.
5. Continue pouring slowly: when the water level reaches the tops of the egg cups, observe that the water in the cup that had a few drops of food colouring, changes colour and moves from cup to cup throughout the watershed.
5. Now use the spoon to scoop some of the water from the egg carton that is infested with the invasive species and put it into the second egg carton. This would be like transferring yellow perch or Eurasian milfoil (invasive species) from one watershed to another.
6. Discuss what this transfer would mean in a real watershed. (Once a species is introduced to one body of water, it can travel through water systems to other water bodies).
7. Pour from your measuring cup into the newly infested watershed. This represents the invading animal or plant reproducing and able to spread throughout the new watershed.

Resources and References

Tackle Invasives Hands-on with Your Students! Education Activities & Teacher Resources (2014). Invasive Species Council of BC (ISCBC) <http://bcinvasives.ca/resources/education/>

Invasives in the Classroom: A Practical Teacher's Guide for Intermediate Levels (2012) ISCBC: <http://bcinvasives.ca/resources/education/>

Making Waves! Protecting Ontario's Aquatic Habitat: Grade 4 curriculum kit

A fun, informative, activity-filled teacher resource kit that introduces children to the concept of healthy habitats and communities and our role in protecting them from aquatic invasive species. Invading Species Awareness Program: Ontario Federation of Anglers and Hunters / Ontario Ministry of Natural Resources www.invadingspecies.com