Invasive Species Council of British Columbia

Invasives in the Classroom: A Practical Teacher's Guide for Intermediate Levels

2012

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Table of Contents

Note: See separate PDF documents for **Invasive Species Profiles** and **Native Species Profiles**, downloadable from the Youth School Program's Learning Unit Resource Index section, found at: www.bcinvasives.ca.

Welcome to the Educator's Library

Welcome to this practical teacher's guide (otherwise termed 'Educators' Library') of resources. This guide offers a great selection of learning units, background information, videos, and activities to teach students about invasive species. The learning units are designed to compliment the Grade 4 Life Sciences Integrated Resource Plans for British Columbia.

All of the learning units follow a standard format and cover topics such as an introduction to invasive species, characteristics of plants (invasive or otherwise), what makes them so invasive, how they spread, and what we can do about them. Each learning unit has a materials list and links to relevant activities and resources.

The learning units use a variety of teaching techniques, including short and simple powerpoint presentations, lab activities, web-based activities, role play, and dress up as well as the 'Know-Wonder-Learn' tool. There is also a lesson that uses persuasive arguments as a tool for learning about what we can do to help stop the spread of invasive species.

The background information provided will make it easy to use these learning units. There are **ecosystem descriptions** for five generalized ecosystems in BC: Grasslands, Temperate Rain Forest, Montane Forest, Northern Forest, and Lakes, Rivers, and Wetlands. In addition, there are 37 invasive plant and seven invasive animal **species profile sheets** that include pictures. There are also 26 profiles for native plant species. Each profile contains detailed information on a specific species.

How to Use these Resources:

Here are a few suggestions to help put together a complete invasive species mini unit that will fit into the regular life sciences studies:

- **Choose at least two Learning Units along with two or more of the recommended activities for each**. Start with Unit 1 – Introduction to Invasive Species, and select other units that would best compliment class studies.

- Select **ecosystem descriptions** that reflect ecosystems in the local area. Select species profile sheets from the species listed in the ecosystems you choose.

This booklet (in full or separated sections), and accompanying resources are available for downloading online or by ordering hard copies through the Invasive Species Council of BC (ISCBC) office.

For more information on the Educators' Library, please contact the ISCBC at 1-888-WEEDSBC or visit: www.bcinvasives.ca, under Programs, Youth School Program. As well as the Educator's Library, the Youth Program section of the ISCBC website offers engagine games and quizes for students in the Invader Ranger's Clubhouse.

Unit 1- Introduction to Invasive Plants

Background

Many people are surprised to learn that some of the plants they have in their garden or see along roadsides, are invasive plants. The activities in this unit will help students understand what the term 'invasive' means and will get them thinking about whether or not the plants they see are invasive.

Prior Knowledge

This lesson and related activities are an introduction to invasive and non-invasive plants. There is no prior knowledge required.

Learning Outcomes

Students will be able to define the term ' invasive' and will be inspired to learn more about invasive species in general.

Recommended Activities

For this unit there are three recommended activities, two slide shows and one engagement exercise. The slide shows cover the invasive plant basics and the Know-Wonder-Learn activity allows students to ask and then answer questions of their own about invasive plants and thereby deepen their understanding of the topic. Browse through the **Learning Unit Activities** for the following activities:

1. **Powerpoint: What is an invasive plant?**
2. **Powerpoint: Invasive or Not**
4. **Engagement: Know-Wonder-Learn**

Resources

There are several helpful resources available to aid in the delivery of this Unit and related activities. Browse through the Learning Unit Resources and select species profiles from the ecosystem you have chosen to focus on:

- Grasslands
- Lakes, Rivers &Wetlands
- Montane Forest
- Northern Forest
- Temperate Rainforest
- List of all Species Profiles

Materials

There are several materials required to deliver the recommended activities in Unit 1:

- Computer,
- Screen,
- Projector,
- Flip chart/blackboard/white board/overhead projector.

Unit 2 - Aboriginal Use of Native Plants and Impacts of Invasive Plants

Background

Aboriginal Peoples have been living off the land since time immemorial using plants and animals for food, shelter, and medicine. This is still the way of life for many Aboriginal people today. This lesson plan focuses on how Aboriginal Peoples of British Columbia use native plants and how invasive plants are consequently impacting their traditional way of life.

A useful way to start this unit is to have a local Cultural Person or Elder come to speak to your class about the traditional use of native plants. You may want to ask your guest to bring in an item made from native plants such as a basket, art work, drum or rattle. It is customary to provide a gift to the invited guest for the knowledge your students will receive. The link below provides contact information for all Aboriginal Peoples and Nations in British Columbia. http://www.gov.bc.ca/arr/treaty/alpha_a_g.html

Using the resources and activities provided, describe how Aboriginal Peoples of BC traditionally use native plants and how invasive plants are impacting those uses. Use the information from the background and the activities listed below to demonstrate the traditional and cultural significance of native plants to the Aboriginal People of British Columbia.

Prior Knowledge

Students need to complete Unit 1prior to starting Unit 2.

Learning Outcomes

Students will be able to list at least two ways that Aboriginal Peoples traditionally use plants and explain two ways that invasive species impact traditional uses.

Recommended Activities

For this unit there are several activities that are applicable. Browse through the Learning Unit Activities and select one or all of the following activities:

6. Presentation: Traditional Use of Native Plants
10. Game: Invasive Plant Bingo
12. Field Day: Plant Press

Resources

Browse through the **Learning Unit Resources** for the following resources:

- Video_ Art Napoleon - Cultural Uses of Native Plants
- Species Profiles – Choose from the species profiles listed in the following table, or those included in the ecosystem you have chosen.

Invasive Species Profiles	Native Plant Profiles
English ivy Giant hogweed Knapweeds Knotweeds Marsh plume thistle Purple loosestrife Scotch broom Sulphur cinquefoil Yellow flag-iris	Balsamroot Bluebunch wheatgrass Common juniper Field mint Lodgepole pine Red-osier dogwood Sage Salmonberry Saskatoon berry Sweetgrass Western redcedar Wild raspberry Yarrow

Materials

There are several materials required to deliver the recommended activities in this Unit. You are not limited to using materials provided or mentioned. The list below outlines the materials that you will need:

- Computer,
- Screen,
- Projector,
- Flip chart/blackboard/white board/overhead projector,
- Silk flowers or live plants (invasive & native),
- Reference Books (such as *Plant Technology of First People*; *Food Plants of Interior First People*; *Food Plants of Coastal First Peoples*).

Unit 3 - Identifying Invasive Plants

Background

Being able to identify key invasive plants will provide students with an opportunity to take an active role in managing weeds in your region. Some of the basic characteristics used to help identify plants in general include:

Flower - color, number of petals, size; Plant height; Leaf shape - round, oval, short, long, pointy, smooth/toothed/lobed edges; Leaf texture - smooth, waxy, hairy;	Stem texture - hair, hairless, thorns; Stem length; Stem content - no fluids, clear fluids, milky fluids.

It is important to report invasive plant occurrences: 1) call the 1-888-WEEDSBC hotline; Contact your Regional Committee (www.bcinvasives.ca, under Partners), or report online using the Province's "Report-a-Weed" tool.

Prior Knowledge

Students should complete Unit1 prior to starting Unit 3.

Learning Outcome

Students will be able to indentify basic plant parts and explain the function of those parts. They will also be able to identify some regional invasive plant species, enabling them to spot and report occurrences.

Recommended Activities

Browse through the Learning Unit Activities for the following recommended activities:

3. Powerpoint: Identifying Invasive Plants
10. Game: Invasive Plant Bingo

Resources

There are several helpful resources available to aid in the delivery of this Unit and related activities. Browse through the Learning Unit Resources and select species profiles from the ecosystem you have chosen to focus on:

- Grasslands
- Lakes, Rivers &Wetlands
- Montane Forest
- Northern Forest
- Temperate Rainforest
- List of all Species Profiles

Materials

There are several materials required to deliver the recommended activities in Unit 3. Specific materials are listed in each of the activity files. The list below outlines the general materials that you will need:

- Computer,
- Screen,
- Projector.

Unit 4 – Vectors of Spread

Background

Invasive species reproduce sexually, by seed, or asexually by stolons/runners above ground, rhizomes below ground, or plant fragments. Seeds and plant fragments travel further with water, wind, people, pets, vehicles, soil/fill, gravel, and equipment. For example, Eurasian water-milfoil spreads via tiny fragments and some terrestrial plants have burred seeds that cling to clothing, skin, and fur.

Using the resources listed below explain some of the methods of dispersion of invasive species. Then using a series of five lab stations, students will experiment with different materials to discover how invasive species spread. Each station uses easily obtainable materials and set up is not complicated. You can have a single station for a short science lesson or all five stations for a full lab.

Prior knowledge

Students should complete Unit 1, prior to starting Unit 4. However, even with no prior knowledge, students will grasp the various ways plants can spread.

Learning Outcomes

Students will be able to describe ways that invasive species spread from place to place.

Recommended Activities

For this unit there are five hands on labs and one background slide show recommended. Browse through the **Learning Unit Activities** for the following activities:

1. **Powerpoint: What is an invasive plant?**
5. **Lab: Vectors of Spread**
    a. **Station 1: Aquatic Hitch-hikers**
    b. **Station 2: Bag the Burrs**
    c. **Station 3: Stowaway Seeds**
    d. **Station 4: Terrestrial Hitch-hikers**
    e. **Station 5: Pond Jumpers**

Resources

There are several resources available to aid in the delivery of this Unit and related activities. Browse through the **Learning Unit Resources** for the following resources:

- Species profiles – Choose from the species profiles listed in each lab or from the ecosystem you have chose to focus on.

There are also several resources available on the Invasive Species Council of BC website at www.bcinvasives.ca. Navigate to the resources page of the website for the following:

- Aquariums and Water Gardens TIPS sheet,
- Water-based recreation TIPS sheet.

Materials

Required materials are listed for each lab. Refer to each lab description for specific materials. The following list contains all of the materials needed for all five lab stations:

Station 1: Aquatic Hitchhikers:

- Three water bins - marked, lake 1, lake 2 and lake 3;
- A toy boat or truck that fits into the water bins;
- Dill weed - 1 tsp. for class demo or 1 tsp. per group;
- Water - It works best to have a water tap nearby to wash the toy and change the water in the bins.

Station 2: Bag the Burrs:

- Velcro pieces or seeds with hooks (e.g. from burdock or hound's tongue);
- Plastic garbage bag;
- Magnifying glasses;
- Three plates - to set the seeds on while looking at them;
- Wool sock or cotton sock or shoe lace or toy stuffed animal;
- Rubber gloves or work gloves - for pulling the burrs off;
- *Optional:* a selection of different seeds - Your students can experiment with different seeds to see which ones stick and which ones don't. Larger seeds such as corn or beans or peas don't stick and even some smaller seeds don't stick. Some other seeds might be small enough to get stuck in the fabric even without hooks.

Station 3: Stowaways – Edible Seeds

- Blackberries or raspberries;
- Small plastic baggies;
- Cola beverage;
- *Optional:* other berries such as blueberries or strawberries.

Station 4: Terrestrial Hitchhikers

- Soil or mud;
- Small seeds - poppy or mustard;
- Toy truck with nobby tires;
- Two bins or one bin and a long piece of relatively clean ground - to drive the toy over; Toothbrush.

Station 5: Pond Jumpers

- Two plastic or styrofoam egg cartons;
- Food colouring- red and blue;
- Two measuring cups;
- Water;
- A large bin - big enough to contain the egg cartons and other supplies to reduce the chance for spillage.

Unit 5 - What makes a species invasive?

Background

Each plant and animal has unique adaptations to survive in their respective habitats. For example, a plant might have wind- blown seeds to disperse its seeds in a dry windy environment or seeds that float if it lives near water. Other plants might have few seeds and instead have roots that if broken off, are capable of starting a whole new plant. Many invasive species have several adaptations that, when combined with a lack of natural predators and pathogens, allow them to thrive and take over in a new community.

One important area of adaptation is in the roots of the plant. There are several types of roots including tap roots, fibrous, rhizome, and tuber. Tap roots break up the soil and fibrous roots tend to hold the soil in place. Rhizomes are horizontal stems that can either be above or below ground and do not hold soil well; erosion may be increased when an invasive plant with rhizomes, like knotweed, invades.

Other potential adaptations include toxicity, barbed/hooked seeds, growing in dense patches, producing thousands of seeds, and having prickles or thorns (being unpalatable to grazing animals).

Using the assorted dress up items that you provide, your students will dress up as an invasive plant and explain why they chose those items. Students dress up as an invasive plant to describe to the class the characteristics that make them able to spread.

Prior Knowledge

Students should complete Unit 1prior to starting Unit 5.

Learning Outcome

Students will be able to explain the why certain characteristics of a plant can make it adaptable to survive in a specific habitat and will also be able to list three of those characteristics.

Recommended Activities

For this Unit there is one recommended activity:

9. Game: Invasive Plant Dress Up

Resources

There are several helpful resources available to aid in the delivery of this Unit and related activities. Browse through the **Learning Unit Resources** section and select species profiles from the ecosystem you have chosen to focus on:

- Grasslands
- Lakes, Rivers &Wetlands
- Montane Forest
- Northern Forest
- Temperate Rainforest
- List of all Species Profiles

Materials

There are several materials required to deliver the recommended activities in this Unit. The list below outlines the materials that you will need:

- Velcro,
- Tongs,
- 20 m of string,
- Spray bottle – filled with water and set on fine mist,
- Assorted colourful hats and gloves,
- Pieces of tarp or fabric,
- Broom handle,
- Small pieces of string,
- Fluff or feathers,
- Anything that you can think of that would represent some aspect of an invasive species (flowers, leaves, roots, stem, seeds, mouth parts, legs, eggs, shell).

Unit 6 – Ecosystem Webs

Background

Ecosystems are made up of living/biotic parts (plant and animal species), non- living/abiotic parts (soil, light, parent material, water), and the relationships between them. An "ecosystem web" refers to the nature of the relationships between species and their habitat. Any one species may eat others and be eaten but the same species may also provide shelter for yet another species; the relationships between species are web-like rather than linear. Changes to the species of plants or animals within an ecosystem web will upset the balance of the ecosystem.

When an invasive species takes over, some plants and animals can be pushed out of the ecosystem web. A loss or change in species type may mean the loss of a food source for one species or a loss of shelter for another species. The introduction and spread of invasive species can result in a detrimental change to the ecosystem web.

On the website there are ecosystem webs for each of five different ecosystems that are found in BC. Using one of the webs put a list of animals, plants, and other components of the ecosystem that you are making a web of life about. Use these 'components' for your index cards. These components are all plants and animals that are found in the ecosystem. However, an ecosystem web could also include the non-living parts of an ecosystem, such as boulders, pools, gravel, and shorelines for example. You can add components to the ecosystem webs provided.

Prior Knowledge

Students should complete Unit 1 prior to starting Unit 6. In addition, students should have a basic understanding of ecosystems.

Learning outcome

Students will be able to explain three different relationships/connections in an ecosystem web and what happens when an invasive species interrupts or changes those connections.

Recommended Activities

For this Unit there is one group game activity:

13. Activity-Game: Ecosystem Webs

Resources

There are several resources that will be helpful in the delivery of this Unit. Select the ecosystem and species you want to focus, from the online resource index, on from the following:

- Species Profiles;
- Ecosystem Descriptions;
- BC Ecosystem Webs.

Materials

The list below outlines the materials that you will need to deliver the activity for this Unit:

- Ball of string - preferably butchers twine;
- Index cards – write ecosystem web components on them;
- List of components and connections for the food web and ecosystem you are working with.

Unit 7 – Where do invasive species come from?

Background

Once people start learning about invasive species, they often want to know the answer to the questions, "Where did they come from?" and "How did they get to BC?". Each species has its own unique history. Some species arrived as early as the 1600's, some are very recent, and new ones are still coming.

Some invasive species arrived by accident, mixed in with hay or other seed and others were brought here on purpose as ornamental flowers, shrubs or trees. They come from many different places too. Giant hogweed originated in Russia, New Zealand mudsnails came from their namesake, and gorse and Scotch broom are from Europe. There is plenty to learn and discover about where a species came from and how it got here.

It is important to note that a species that originates from a different area is not necessarily an invasive plant. There are plenty of non-native, non-invasive plants that are sold in garden stores everywhere that pose no threat to natural systems and habitat. In order for a species to be invasive it needs to behave invasively, out competing native species etc. In addition, we are not alone in our invasive species situation; some plants that are native plants here, such as salal, or Douglas-fir, are invasive in other countries.

Using the **invasive species profiles** provided, introduce some local invasive species. Provide some research tools, reference books, internet etc. and as a class figure out where one of the invasive species came from and how it most likely travelled here.

Prior knowledge

Students will already have a basic understanding about plants and invasive species and will have completed Unit 1.

Learning outcome

Students will know the origin of at least one invasive species and will be able to explain how invasive species move around the world.

Recommended Activities

For this Unit there are two recommended activities, one research & poster project and one dress-up/role play exercise.

7. Research: Poster Making
10. Game: Invasive Plant Dress Up

Resources

There are several helpful resources available to aid in the delivery of this Unit and related activities. Select the invasive species profiles from the ecosystem you have chosen to focus on:

- Ecosystem descriptions – for an ecosystem similar to your region;
- Invasive species profiles – choose from the list of species.

Materials

You will need several materials to complete the recommended activities for this Unit. The following list includes what is required for poster making however there is a long list of materials required for invasive plant dress up. There are detailed materials lists in each of the activity files.

- Access to a computer lab/library for research,
- Empty cereal boxes - students can bring them from home, or Poster boards/paper.

Unit 8 - Local Invasive Plants

Background

Each region in BC has different native and invasive plant species. For example, invasive plant species in the Okanagan are very different than those found on Vancouver Island. This unit and related activities will help students learn to indentify invasive plants so they can spot them in their community and/or region.

Invasive plants are found all over the province, some areas have many different species of Invasive plants, such as the Okanagan and the Lower Mainland. Other areas have very few invasive plants like the north-eastern part of the province. This unit is going to help students learn to identify some invasive plants so they can keep an eye out for them and help prevent the spread of invasive plants in their region.

The native plants listed below, all have great significance with the Aboriginal people of British Columbia. Native plants provide Aboriginal people with food sources, medicines, and building materials, for such things as bows & arrows, baskets, toys for kids, and many other tools. It is important that we learn how to identify native plants, so we can help protect them from invasive plants.

Review

What are invasive plants?

They are non-native to BC, introduced without natural pathogens or predators. Invasive plants establish aggressively and out-compete native vegetation. They can have detrimental impacts on humans, animals, and ecosystems. Invasive plants are sometimes referred to as "non-native", "exotic", "introduced plant species", and "weeds".

What are native plants?

They grow naturally in a particular area (prior to major trade routes) and are kept in check by the collective processes of the ecosystem where they occur. These processes include the coexistence of a group of plant species based on the use of nutrients, light, and water along with naturally occurring predators and pathogens.

Prior Knowledge

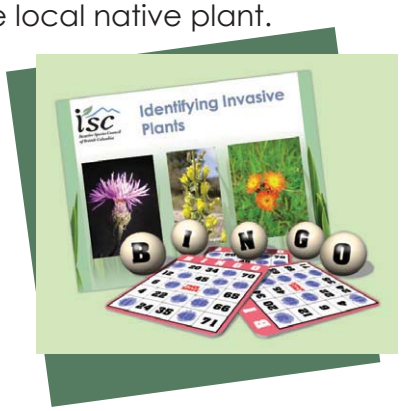
Student should complete Unit 1 prior to starting this Unit. In addition, this Unit should be delivered in conjunction with Unit 2 - Aboriginal Uses of Native Plants and Impacts of Invasive Plants.

Learning Outcomes

Students will be able to recognize one local invasive plant and one local native plant.

Recommended Activities

For this unit there are several recommended activities, two slide shows, one game, and one learning engagement activity. Browse through the Learning Unit Activities for the following activities:



1. Powerpoint: What is an invasive plant
2. Powerpoint: Invasive or Not
4. Engagement: Know-Wonder-Learn
10. Game: Invasive Plant Bingo

Resources

Browse through the Learning Unit Resources and select species profiles from the ecosystem you have chosen to focus on:

- Grasslands
- Lakes, Rivers &Wetlands
- Montane Forest
- Northern Forest
- Temperate Rainforest
- List of all Species Profiles

Contact the local **Regional Committee** for additional information on invasive species of concern in the area, located at www.bcinvasives.ca under Partners.

Materials

There are several materials required to deliver the recommended activities in Unit 8. For each activity there are additional materials listed in each of the activity files. The list below outlines the general materials that you will need:

- Computer,
- Screen,
- Projector,
- Flip chart/blackboard/white board/overhead projector.

Unit 9 – What You Can Do To Help

Background

The spread of invasive species usually has something to do with people. Invasive species travel with us on vehicles, clothing, pets, and livestock. They also spread on their own by water and air, and on wildlife. However, people are the ones that have brought these organisms here either accidentally or on purpose.

There are things that each of us can do to help prevent the further spread of invasive species. With just a bit of planning ahead these simple actions can make a big difference to keeping invasive species from taking over new areas.

There are many ways you can help prevent the spread of invasive species. You have already taken the first step by learning about invasive plants. Check out how to become an **Invader Ranger** on the ISCBC website (www.bcinvasives.ca under Programs - Youth School Program). Here are things you can do:

1. **Inspect** and clean bicycles, vehicles, boats, clothing, boots, dip nets, and other equipment before leaving an area.

    - Small organisms including aquatic plants, mudsnails, and quagga and zebra mussels can all be transported on these things from one area or water body to another.

2. **Arrange** an invasive plant pulling event with friends and family to hand pull an invasive plant site in your area.

    - Non-profit organizations can earn a 250$ honorarium for having 10 people complete hours of invasive plant removal.

    - Broombusters.org supports 'cut broom in bloom' events wherever scotch broom is a problem.

    - Organizations such as park user groups, Girl Guides, nature groups, and school groups have had great success with invasive plant removal projects.

    - Another one to check out is the No Ivy League in Portland, Oregon USA (http://www.portlandonline.com/parks/index.cfm?c=47820).

3. **Dispose** of aquarium water, plants and animals properly – not down the toilet, storm drains, or in natural water ways.

    - The plants sold for use in aquariums maybe invasive aquatic plants. The water may contain invasive or pathogenic organisms and the fish or other animals may be invasive. These aquatic invasive organisms are particularly difficult to monitor or manage once they are released into the natural environment because the aquatic environment is not easily visible and it is difficult to target only the invasive species with management programs.

4. **Educate** yourself and others about invasive species and how to identify and report them.

    - Invasive species are just ordinary plants and animals growing in a new area where they are not kept in check by the normal pests, predators, and diseases they had where they came from. Each one is unique in its adaptations and characteristics for growing and reproducing. These organisms are fascinating and the different techniques for preventing and controlling their spread are sometimes challenging and complex. There are new amazing discoveries in this field of research happening every day. Learning about how to identify these organisms and learning about all the unique characteristics they have is useful and relevant for all of us.

5. **Remove** burrs from your shoes, clothing, and pets. Put invasive plant parts in a bag in the garbage, not on the ground.

    - Burrs are seeds or seed heads from plants. Invasive species are able to spread long distances when they become attached to our clothing or pets.

Prior Knowledge

Students should complete Units 1-3 along with one or two activities for each unit prior to taking part in Unit 9. Students much have a good understanding of invasive species.

Learning Outcome

Students will be able to list three things they can do to prevent the introduction and spread of invasive species.

Recommended Activities

For this Unit there is one engagement activity, one game and one lab recommended. Browse through the **Learning Unit Activities** for the following recommended activities:

5. Lab: Vectors of Spread
9. Game: Invasive Plant Dress Up
11. Engagement: Persuasive Arguments

Resources

Browse through the Learning Unit Resources and select species profiles from the ecosystem you have chosen to focus on:

- Grasslands
- Lakes, Rivers &Wetlands
- Montane Forest
- Northern Forest
- Temperate Rainforest
- List of all Species Profiles

Materials

There are several materials required to deliver the recommended activities in Unit 9, specific materials required for each activity are listed in the activity file. The list below outlines the materials that you will need:

- Computer,
- Screen,
- Projector.

LEARNING UNIT ACTIVITIES

Download the Powerpoint presentations from the Youth School Program section on the ISCBC website Programs section, in the Resource Index of the Educator's Library (www.http://www.bcinvasives.ca/kids/kids).

1. Powerpoint - What is an Invasive Plant

2. Powerpoint - Invasive or Not?

Instructions

These Powerpoint presentations are comprised of a series of plant and animal pictures that are found in five different ecosystems. Some of these species are invasive while others are not. Ask the students to guess which species are invasive.

Step 1: Download a version of the Invasive or Not? Powerpoint presentations that depicts an ecosystem similar to your area. Choose from one of the following options:

1. **Invasive or Not? - Grasslands**
2. **Invasive or Not? – Lakes & Rivers**
3. **Invasive or Not? – Montane Forest**
4. **Invasive or Not? – Northern Forest**
5. **Invasive or Not? – Temperate Rain Forest**

Step 2: Explain the activity to the students. Ask the students to guess which species are invasive by showing a "thumbs down" for invasive species and 'thumbs up' for non-invasive species.

Step 3: Show the first slide and allow the student's time to guess whether the species is invasive or not.

Step 4: Provide the answer and a little fact about the animal or plant from the background information in the notes section for each slide.

3. Powerpoint - Identifying Invasive Plants

Instructions

The Identifying Invasive Plants slideshow activity will help students identify plants and understand the function of each plant part. They will use this information to assist them in identifying invasive plants in their community.

Preparation

In the slideshow there are a series of slides that are blank. You will need to pick 4-5 invasive plants that are present in your region from the **Invasive Species Profiles** located in the **Learning Unit Resources** file folder. Copy and paste the photos from the profiles into the slide show and make note of some of the key physical characteristics of these plants.

Step 1: Set up the **Identifying Invasive Plants** slide show on a computer/ projector.

Step 2: Explain the exercise to the class: you present to the students a series of slides that depict the key parts of a flowering plant. The students will be quizzed on the parts of a plant. They will then be asked to use their new skills to list several key characteristics of invasive plants known in their region.

Step 3: Start the slideshow and refer to the slideshow notes to help you along.

Step 4: When you get to the slide labelled "Plant Parts" you will quiz the students as a group and ask them to name each plant part shown on the slide. The answers to the quiz are provided in the slideshow notes and shown on the following slide.

Step 5: Continue with the presentation and go through the series of invasive plant slides that you have chosen. Work with the students to identify key characteristics that will allow them to identify these plants in their community.

4. Engagements: Know-Wonder-Learn

The Know- Wonder-Learn activity will help students organize what they know and what additional information they want to learn about regarding invasive species.

Step 1: Set up the **Know-Wonder-Learn Worksheet** (see next page or download from Learning Unit Resources folder in the Resource Index of the online Educator's Library) either on flip chart paper, chalkboard/ white board, overhead projector, or computer projector.

Step 2: Explain the exercise to the class: students will work in pairs to discuss what they know and what they wonder about invasive species. They will be required to share the outcome of their conversation with the rest of the class.

Step 3: Pair up the students. Allow the pairs to discuss what they already know about invasive species. Stop the conversation after 30 to 45 seconds have passed. Select 3-5 pairs to share with the class what they already know about invasive plants. Record their comments on the Know-Wonder-Learn Worksheet.

Step 4: Have the students switch partners. Allow the pairs to discuss what they wonder about invasive species. Stop the conversation after 30 to 45 seconds have passed. Select 3-5 pairs to share with the class what they wonder about invasive plants. Record their comments on the Know-Wonder-Learn Worksheet.

Step 5: Have the students switch partners. Allow the pairs to discuss ways they can learn more about invasive species. Stop the conversation after 30 to 45 seconds have passed. Select 3-5 pairs to share with the class to discuss ways they can learn more about invasive species. Record their comments on the Know-Wonder-Learn Worksheet.

Step 6: Throughout your mini-unit, refer to the Know-Wonder-Learn Worksheet and keep track of the student's questions that have been answered.

This activity is based on the activity from "Weed Wackers" Villano, K.L., and Villano, C.P. (2008) WEED WACKERS! *K-6 Educators Guide to Invasive Plants of Alaska*. Independent publication in cooperation with the Alaska Committee for Noxious and Invasive Plant Management. Fairbanks, Alaska. Access from: http://www.juneauinvasives.org

Know-Wonder-Learn Worksheet

Invasive Plants			
Topic	**Know**	**Wonder**	**Learn**

Some options for topics: What are they? How do they spread? Where do they come from? How do they compete with other plants? Are some poisonous? What do they look like? How many are there?

Or you could ask specific questions about one kind of invasive plant, for example giant hogweed: What does it look like? Where did it come from? How big is it?

5. Lab: Vectors of Spread

Unit 4 Lab, Station 1: Aquatic Hitch-hikers

Background

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, but can be felt as small bumps on the surface they are attached to. In this lab exercise, the dill is clearly visible. 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.

Learning Outcome

Students will be able to explain how some plants and animals are adapted to spread or disperse to new places, even from small fragments and cells.

Materials Required

- Three water bins - marked, lake 1, lake 2 and lake 3;
- A toy boat or truck that fits into the water bins;
- Dill weed – 5 ml for class demo or 5 ml per group of students;
- Water - It works best to have a water tap nearby to wash the toy and change the water in the bins.

Suggested

- Coffee filter

Resources

Refer to the **Lakes, Rivers and Wetlands** ecosystem description in the **Learning Unit Resources** to learn more about the impact that invasive species have on these different areas and for a list of the relevant **species profiles**. These resources are available for download from the ISCBC website (bcinvasives.ca) under Programs – Youth School Program.

Method

Students use a toy boat to illustrate how seeds cling to a boat and motor as it moves from lake to lake.

Preparation

1. If you are doing this lab as a station, place a card at the station with instructions for your students and questions to answer (see below);
2. Watch the **Aquatic Hitch-hikers** video demonstration on how to do this lab;
3. Watch the **Matthias Herborg** video about invasive zebra and quagga mussels;
4. Fill the bins with enough water to allow the toy to be submerged without overflowing;
5. Print a copy of the **STATION CARD: Aquatic Hitch-hikers** below and place the card at the station.

Activity

1. Put 5 ml of dill weed into one of the three bins. Explain that the toy represents a boat or trailer being put into a lake (water bin) with an invasive plant such as Eurasian water-milfoil represented by the dill weed.
2. Put the toy into the bin with the dill weed and then take it out. Ask your students to make a 'mental note' of how much dill weed is attached to the toy when it is taken out of bin number one.
3. Now put the toy into bin two and take it back out. Bin two represents a different lake that did not have Eurasian water milfoil.
   a. Does Bin two have milfoil in it now?
   b. Does the boat still have milfoil attached to it?
4. Now put the toy into bin three and note how much dill weed comes off of the toy in bin three. Bin three represents another lake that did not have Eurasian water-milfoil before. With many invasive aquatic plants, seeds or whole plants are not necessary to grow a new plant or to transplant.
5. Discuss what they could do to prevent the milfoil from spreading.
   a. ANSWER: Wash the boat before leaving the first lake.
6. Clean the bins that have dill weed.
7. Now run the experiment again but this time, spend time washing off the toy in between bins.

**With this activity, you can use a coffee filter to collect the dill from each bin and then weigh it to find out the amount of material that was transported. Though, the important concept for younger grades is that invasive species can hitch a ride on our vehicles.

LAB STATION CARD - Station 1: Aquatic Hitch-hikers

These three bins represent three lakes in your area. The first lake gets infested with an invasive species called Eurasian watermilfoil.

1. Put 5 ml of dill weed into Lake 1 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 1.
3. Take the toy out of Lake 1.
   a. Where is the Eurasian watermilfoil (dill weed) now?
   b. Just in the lake?
   c. When you take the toy out, notice how much dill weed is clinging to it.
4. Put the toy into Lake 2.
   a. What happens to the water in the lake?
   b. Where is the milfoil going?
   c. Notice how much plant material comes off.
5. Put the toy into Lake 3.
   a. Now where is the milfoil?
   b. Notice how much plant material comes off.
6. Rinse out all three bins and fill them up again for the next group of students.

Questions

a. How are aquatic invasive species moved to new locations?
b. What are some things that we could do to keep from moving invasive species between lakes?

Unit 4 – Lab, Station 2: Bag the Burrs

Background

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 such as those from **common burdock** or **hound's tongue**, have tiny hooks that will cling 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.

Burred seeds aren't just annoying for people; they can also cause injury to pets and livestock because the little hooks are capable of hanging on to skin. Most animals have exposed skin around their eyes, nose and mouth and while grazing they can get burrs stuck to these sensitive areas and they can cause injuries.

Most of us have had the experience of going for a hike and noticing later that our socks, bootlaces and pant legs are covered in burrs. Burrs are seeds and that is why we **"Bag the Burrs"**. By putting burrs into a plastic bag and putting them into the garbage, we prevent those seeds from growing in a new location.

Learning Outcome

Students will be able to explain how seeds can be moved to other locations by clinging to fur, feathers or clothing.

Materials

You will require the following materials to complete this lab station:

- Velcro pieces or seeds with hooks (e.g. from burdock or hound's tongue);
- Plastic garbage bag;
- Magnifying glasses;
- Three plates - to set the seeds on while looking at them;
- Wool sock or cotton sock or shoe lace or toy stuffed animal;
- Rubber gloves or work gloves - for pulling the burrs off;
- *Optional:* a selection of different seeds - Your students can experiment with different seeds to see which ones stick and which ones don't. Larger seeds such as corn or beans or peas don't stick and even some smaller seeds don't stick. Some other seeds might be small enough to get stuck in the fabric even without hooks.

Resources

Refer to the **Learning Unit Resources** for **species profiles** for **hound's tongue, common burdock,** and **puncturevine**.

Method

Students use socks to see how seeds with hooks can hang on to clothing and pets and be moved large distances by people.

Preparation

1. If you are doing this lab as a station, print a copy of the **STATION CARD: Bag the Burrs**, below and place the card at the station;
2. Watch the Bag the **Burrs video demonstration** on how to do this lab;
3. Watch the **Species at Risk video** to see how these plants with hooked seeds can impact species at risk;
4. Gather all materials.

Activity

1. Ask students if they have had the experience of getting burrs stuck to their clothing. Discuss their answers. Some students may offer up examples of pets or livestock getting burrs stuck to them as well. If not, then you can explain that animals can get burrs stuck to them as well.
2. Put the burred seeds or velcro onto a plate and let the students look at them with a magnifying glass to see the little hooks. Students should not pick up the burred seeds as they have fine hairs on them as well, that can cause irritation. (If you have a magnifying projector in your classroom, you could use that instead.)
3. If you are using burdock or hound's tongue seeds for this demonstration, or for part of the demonstration, we recommend that only the teacher works with them. Put the other seeds onto the other plates and let the students look at them closely.
4. Using the sock, pick up some of the burred seeds. You will only need to brush them with the sock or stuffed toy. Try picking up the burrs with the feather as well. Feathers don't get caught as easily, but small birds have been trapped by burdock burrs.
5. Using the gloves, pull the burrs off the sock or toy and put them in the garbage bag. Bagging the burrs keeps them from growing in a new location. **Invasive plant seeds cannot be composted.
6. *Optional:* Once you are finished with the seeds, experiment with some other seeds such as peas, beans, corn, poppy, carrot or others.

LAB STATION CARD - Station 2: Bag the Burrs

The burrs on this plate are seeds that are adapted to hook on to fur and skin. Avoid touching them, they will stick to you!

1. Using the magnifying glass, look closely at the burrs or velcro pieces to see the little hooks.
2. Use a wool sock or stuffed toy to pick up the burrs or velcro pieces.
3. Put on the gloves to take the burrs off of the sock or toy. Put the burrs onto the plate or in a plastic garbage bag.
4. Try sticking some of the other seeds to the sock or stuffed toy.

Questions

What are some ways that different types of seeds can get to new places?

6. Oral Presentation: Aboriginal Use of Native Plants

British Columbia is the home to many different Aboriginal groups distinctive by language, territory, beliefs, and diet. There are 201 registered First Nations in British Columbia and these nations can be divided into 26 cultural groups. There are 32 Aboriginal languages spoken in British Columbia including Okanagan, Carrier, Coast Salish, Cree, Dunne-za, and many others. British Columbia is also the home of a large number of Métis people, who have a strong connection with the land and a traditional knowledge of native plants.

Native plants are a very important commodity to the Aboriginal Peoples of BC. They have a variety of cultural/historical and current uses including building tools, utensils, and weapons. **Common juniper**, for example, is used for building bows and spears. **Saskatoon** berries, **cow-parsnip** (Indian celery), **wild raspberry** and many more are used as food sources. Native plants are also used for ceremonies. For example, **sage** and **sweetgrass** are burned for smudging. Plants are also used for medicine, such as **field mint**, for coughs and colds. Young **lodgepole pine** was used to construct tepees and meat racks. Spruce boughs were used to create the first tents in BC and also make beds in tepees.

Knowledge of traditional plant use is passed down from generation to generation through stories and teachings from parents and elders. Many nations have ceremonies associated with the harvest of native plants such as the "first fruit" ceremony celebrated by Secwepemc people marking the beginning of the picking season for saskatoon berries (Turner, 1997).

There are many stories of how Aboriginal Peoples first learned to use the plants around them. One such story is that of a Medicine Man from the Cree Nation.

> The Medicine Man was out exploring the world around him and he happened upon a wounded black bear. He decided to follow the bear to see what he will do to help heal his wound. While following the bear he noticed that the bear was rolling in mud along a stream bank to coat the wound, this helped seal up the wound and keep it from getting infected. The bear then started eating certain plants such as **yarrow**, which helped stop bleeding and acted as an antiseptic. The medicine man followed the bear for a long time and learned many things about plants and how to use them. In Aboriginal cultures many teachings have come from animals and how they use the earth to survive. The wounded black bear in the story taught the medicine man about which plants help heal wounds.
>
> The medicine man in the story learned about native plants from the wounded black bear; we must be like the medicine man and learn about plants both native and invasive plants.

Invasive plants are found throughout the province. Some areas have many different species of invasive plants, such as the Okanagan and the Lower Mainland, while other areas have very few species like the north-eastern part of the province. Invasive plants have a direct and lasting impact on the native plants; they move into their habitat and rob native plants of water, nutrients, and space.

Invasive Plants
Invasive plants are plants that are **non-native** to BC. Many were introduced and do not have the natural pathogens or predators that help keep them under control in their native country. Most invasive plants **out-compete** native vegetation causing detrimental impacts to humans, animals and ecosystems. Invasive plants are sometimes referred to as: non-native, exotic, introduced, or weeds. For more information on invasive plants see the **invasive plant profiles**.

Native Plants
Native plants grow naturally in a particular area (prior to major trade routes) and are kept in check by natural processes. Natural processes include native insects eating the plants, wildlife browsing, and naturally occurring pathogens. For more information on native plants see the **native plant profiles**.

Impacts
The introduction of invasive plants has impacted the way of life of Aboriginal Peoples in many ways. People have to travel farther to locate traditional plants for harvesting. **Giant hogweed** is a highly toxic invasive plant and it looks very similar to cow-parsnip, which is a staple in many Aboriginal Peoples' diet. Giant hogweed has impacted the way Aboriginal People harvest **cow-parsnip**. Stories and teaching are being lost due to the lack of traditional plants in certain areas.

Ceremonial sites are being over taken by invasive plants, examples are **sulphur cinquefoil** taking over traditional camp grounds, grave sites, and gathering sites. It moves in and pushes out all the native species and makes the site less desirable for camping and gathering native plants.

Many Aboriginal Peoples have to travel farther to harvest moose, deer, and elk, as the native plants that these ungulates eat are being taken over by invasive plants. In areas where forage is limited, ungulates are less healthy and may have to more to new areas to find food.

Knapweeds, knotweeds, and **Himalayan balsam** can impact important salmon streams, since they don't have the fibrous root systems of native plants like willows and **red-osier dogwood**. The lack of fibrous root systems of these invasive plants that are taking over many stream-sides allows soil erosion into the streams which increases the sediment load in the stream. Increased sediment in streams reduces oxygen levels for salmon and other fish, and can also bury eggs and destroy spawning grounds.

It is important to learn how to identify invasive plants to protect Mother Nature and a way of life for many different people who use the land for food, shelter, and ceremonies.

> Below are two examples of the impacts that invasive species have on the traditional use of native plants and animals. If possible, try to locate some traditional tools to give demonstrations of how Aboriginal People used native plants. If you are unable to get a guest speaker, your local museum may have traditional tools or Aboriginal Peoples school program that you can use.

Using pictures of a drum or an actual drum explain what is written below.
A good example of how Aboriginal People used plants, trees, and wildlife is a traditional drum. To build a drum Aboriginal People would harvest a deer, elk, or beaver and use their hide for

the drum skin. The hide must be cured before it can be used for the drum; while the hide is curing they would harvest a paper birch tree to construct the ring of the drum. Drums are very important in Aboriginal culture; they are used in ceremonies, games, give-aways, and pow wow's.

It is getting harder and harder to find deer, elk, and beaver and Aboriginal People have to travel further and further to do so. Part of the reason is because of invasive plants, such as **sulphur cinquefoil**. Sulphur cinquefoil moves into the native habitat of deer and elk and pushes out native plants that they forage on. Some native plants that sulphur cinquefoil displaces are **balsamroot** and **bluebunch wheatgrass** which are an important food source for deer and elk.

Marsh Plume thistle, English ivy and **Scotch broom** are examples of invasive plants that can out-compete tree seedlings in their early stages. Paper birch likes to grow in moist to wet soil, the same area you can find marsh plume thistle. English ivy and Scotch broom may affect where western redcedar is growing. (Ask kids what the impact is to Aboriginal People and to the trees if there are invasive plants instead of native trees.) The impacts include needing to travel farther to harvest paper birch or western redcedar and a reduction in the population of the trees.

If Aboriginal People are unable to harvest deer and elk and are unable to find paper birch trees or other plants they use, it will be a great loss to their culture and way of life.

Using pictures of salmon, yellow perch, purple loosestrife, yellow flag- iris, cow-parsnip and red- osier dogwood explain what is written below:
For many nations in British Columbia salmon are an important way of life. There are many different ceremonies that are performed before salmon harvest takes place, such as the "First Salmon" ceremony. This ceremony welcomes the salmon back to the river and is showing the salmon respect for the food they will provide to the people.

Invasive plants like **purple loosestrife** and **yellow flag-iris** can impact salmon habitat Yellow flag-iris can form a dense thicket around the edges of the lakes, wetlands and streams that young salmon need to grow up in. Yellow flag-iris can replace the native plant community within a few years. When this happens, it changes which birds, amphibians, and wetland creatures such as insects can live in the pond. Dense thickets of yellow flag-iris can also slow and change the flow of water, by trapping sediment. This can change the amount of pond habitat available and even block access to ponds and wetlands that young salmon need. The change in water flow can also cause lower dissolved oxygen levels in the water than what young salmon need to thrive.

Purple Loosestrife also forms dense thickets along lakes and streams. The root system of purple loosestrife is very dense and matted (fibrous). It traps dirt and sediment and changes and slows the flow of water. It also can take over an area within a few years, filling in the wetland with the thick matted roots. This means less pond habitat is available for young salmon. Purple loosestrife also changes the community of birds, amphibians and small mammals that live around the wetland or stream. Many animals are unable to live in a dense purple loosestrife infestation due to the thick mat of fibrous roots, or the different leaves that it has compared to the native plants.

Native plants like **cow-parsnip** and **red-osier dogwood** and **salmonberry** are found along stream banks in a community of many different plants. Together, the community of native

plants help hold the soil and keep it from washing away in the stream. They also are the food and homes of the insects that the young salmon eat. Native plants have a hard time competing with purple loosestrife and yellow flag-iris. Both purple loosestrife and yellow flag-iris were brought to BC by people who wanted to plant them in their gardens. Now they are taking over in natural areas that affect the native plants and animals we all rely on. It is important to learn how to identify native plants and invasive plants, and try to control invasive plants, so we can to help protect the salmon in our streams and rivers.

INTERESTING ASIDE: In addition to invasive plants having an impact on salmon, there are also invasive fish that are a potential threat to salmon populations. One such fish is **yellow perch** which eats the plankton (microscopic plants and animals) in the streams and lakes, reducing available food sources for salmon and trout. Yellow perch are also a predatory fish that eat young salmon and trout, further reducing their populations. This reduction in salmon population due, in part, to invasive plants and invasive fish will have a long lasting negative impact on many Aboriginal groups all over the province whose way of life depends on salmon as their main food source.

Photos of Traditional Use of Plants and Trees

Trappers and hunters build shelters known as "lean-tos" using small trees and spruce boughs.

Meat Racks were made out juvenile trees and were used to make dry meat, similar to beef jerky. Techniques for cutting the meat on the rack as well as drying it over a smouldering fire were part of the technology for preserving food created by Aboriginal Peoples that is still used today.

Grasses and bark are used for ceremonies and to make artwork and baskets. Below is an example of a medium sized basket made from birch bark and a smaller basket and turtles made from ponderosa pine needles.

The Eagle is an important symbol for many Aboriginal cultures. Their feathers are used in ceremonies and smudging. The picture to the right shows how feathers would be arranged and also shows a braid of sweetgrass, which is used for smudging and cleansing.

Aboriginal Peoples make drums using deer, elk, moose, or beaver hide and wrap the hide around a wooden circle made from a birch tree, then tie the hide together using sinew.

Western redcedar is very culturally significant tree in British Columbia and it is used by many different Aboriginal groups to build totems, big houses, bentwood boxes, and many other things. The first set of pictures are of a cedar bentwood box (provided by Nella Nelson), then of Totems outside of the Royal BC Museum, and a picture of the Mungo Martin Big House also outside of the Royal BC Museum.

7. Research: Poster Making

Student Engagement
Research & Poster Project – Where do invasive species come from?

Working alone or in pairs, students choose an invasive species to learn about. Using research techniques (online, reference books etc.) and the **invasive species profiles**, students learn about different aspects of their chosen species. As students complete their research, they are able to answer the questions in the attached worksheet. Then they can make a poster to display the information, or glue the information with some pictures to a cereal box to display in the classroom. The information could also be pinned to a world map.

Step 1: Students select an invasive species from the **invasive species profiles**.

Step 2: Students conduct research on their chosen invasive species so that they are able to answer the questions below.

Step 3: Students represent what they have learned on a poster or on the sides of a cereal box.

Questions

1. What is the name of the species that you chose?

_____

2. Where did it come from?

_____

3. What year did it arrive in Canada?

_____

4. How did it get here?

_____

5. Was it brought here on purpose or accidentally?

_____

8. Field Day: Scavenger Hunt

In this exercise, students become familiar with local invasive and native plants, different habitat types, and basic plant characteristics. Students are led on a scavenger hunt to find particular characteristics of plants or to find particular plant species. Students note where they find the species and or characteristics, check them off on a list, and sketch what they see.

Within a small area there may be a range of habitats: shade and full sun, wet and dry sites. Usually native plants are adapted to grow best when they have specific conditions such as full sun or dry sites. Invasive species will often grow in a wider range of conditions.

Preparation

1. Download the **invasive** and **native plant profiles** that are applicable to your area.
2. Find a weedy site near your school or call your **regional invasive plant committee** to locate some potential invasive plant sites. Regional committee contacts can be found at www.bcinvasives.ca under Partners.
3. Make sure that there are 3-5 examples of invasive plants and native plants at the site and note some characteristics of the plants. Note the habitats where you find them (e.g. wet, sunny, shady, forest, etc.).
4. Review the **scavenger hunt data collection card** and print one copy for each group of 2-4 students.
5. Make sure students bring clothing that is suitable for going outdoors.

Materials

Required

- Species profiles from the **Learning Unit Resources**
- Scavenger hunt data collection cards
- Clipboards
- Pencils
- General outdoor and safety gear

Suggested

- Magnifying glasses
- Carabiner key chains from the **Invasive Species Council of BC** (www.bcinvasives.ca). These keychains have cards on them with a picture of an invasive species on one side and a few points of information on the back. Your **regional invasive plant committee** may have some of these as well.
- Invasive plant bookmarks from the Invasive Species Council of BC

Activity

Step 1: Explain the purpose of the field day to look for specific examples of local invasive and native plants. Describe the boundaries of your search area. **Make sure that they understand that they are only collecting information and sketches, not plants.** Note: Samples of plants are not collected because 1) wild plants should remain in the wild, 2) invasive plants may be prickly or poisonous and 3) picking invasive plants can help spread seeds.

Step 2: Explain and discuss your own class rules for outdoor learning.

Step 3: Divide the class into groups of 2-4 students and give each group a clipboard, scavenger hunt data collection card, and magnifying glass (if available). Give each group 1-3

plant cards for species they might find. Give out carabiners or bookmarks if you have them.

Step 4: Provide 20 minutes for students to conduct their scavenger hunt in the area you scouted ahead of time.

Step 5: When they are finished scavenging, have students check their shoes/clothing and remove any seeds or plant pieces **prior to leaving the area**. Explain that helps prevent spreading these invasive plants.

Step 6: Return to the classroom to discuss the findings:

a. What species did they find?
b. What plant characteristics did they notice? (leaf shape, plant height, hairy stalks, thorns, flower colour etc.)
c. Were the characteristics easy to find?
d. What types of habitat were the invasive plants growing in? (wet, dry, shady, sunny etc.)

Step 7: Review the invasive and native plant cards with your students and note which characteristics were found on invasive plants, native plants or both.

Extension Activity

Invasive Species Cereal Box Research Project

Students select a native plant and an invasive plant to research. Students research 3 facts for both an invasive plant and a native plant. Students also research how the invasive species spreads and how to prevent the spread. Students put a picture of the native plant with name and the facts they researched on one side of the cereal box and a picture of the invasive plant with its name and facts on the other side. The side panels are used for the information about how the invasive species spreads and preventing the spread.

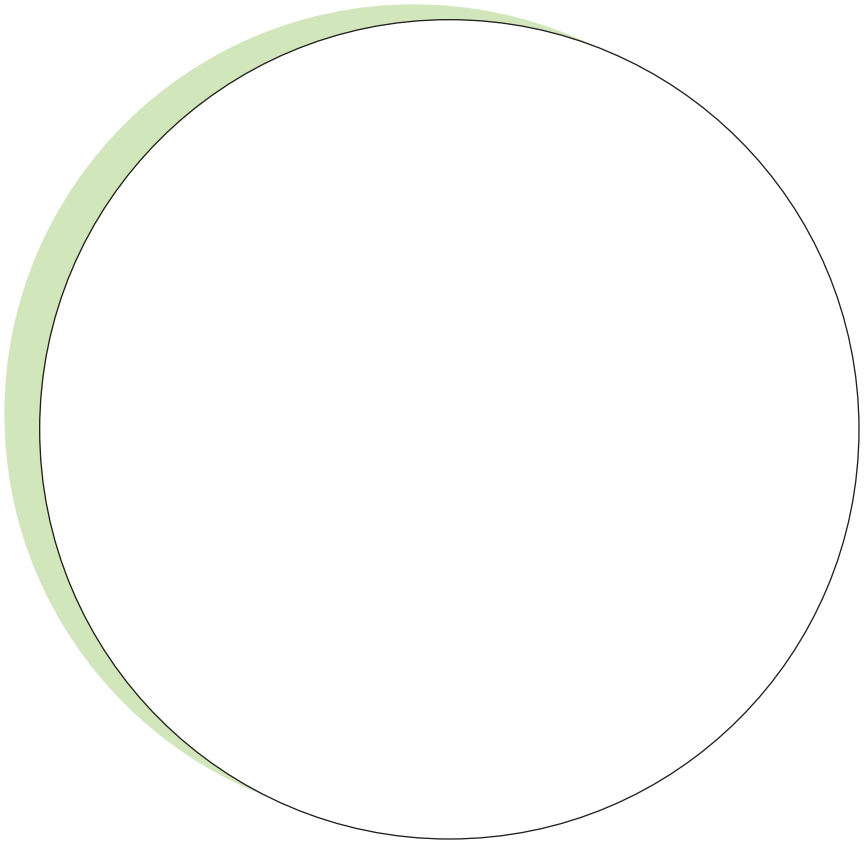
Scavenger Hunt Data Collection Card

(check ✔ the ones you find)

Flower	
Thorns	
Hairs	
Prickles	
Seed pods	
Hooks or claws	
Waxy leaf	
Berries	
Leaf with a smooth edge	
Leaf with a serrated (toothed) edge	
Plant growing in full sun	
Plant growing in shade	
Plant growing in dry place	
Plant growing in wet place	

Notes about drawing:

In the circle, draw one of the items you found from your scavenger hunt list in the circle below. Add notes to describe the item.



9. Game: Invasive Plant Dress Up

Student Engagement
Invasive Plant Research & Dress Up-Role Play

Students work in pairs or small groups to conduct research on an invasive species, specifically what characteristics it has that make it better able to survive than native species. Students will find most of the information they need on the invasive species profiles or native plant profiles.

Then, using regular household items, students illustrate the adaptations by dressing up as the invasive species and explaining their characteristics to the class. This activity is a way for students to demonstrate what they have leaned from their research. Ask students to answer the questions in the handout below.

This activity could be delivered in combination with some of the other research-based units so that students can represent different parts of what they learned in different ways, or so that students can choose how and what they would like to illustrate for the class. For example, one student may choose to create a poster, another student may choose to do the dress up/ role play.

Extension Activities

Extension 1
Divide the students into two groups, native and invasive. One group researches a native plant species and the other researches an invasive species. When it comes time to demonstrate the role play/dress up, a native plant and an invasive plant do the role play to see how the adaptations of each might interact.

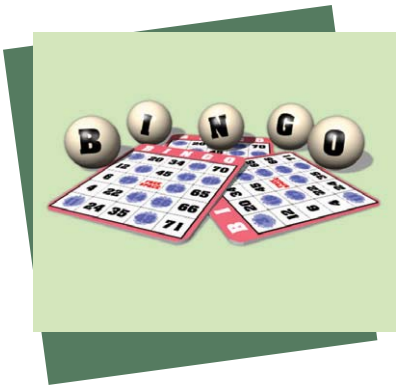
Extension 2
Students research an invasive animal species and dress up to explain how the animal's adaptations help it thrive in its community/habitat.

Handout - Dress up/Role Play

1. The plant is called _____.
2. The colour of the flowers is _____.
3. The number of seeds it makes is _____.
4. The seeds are dispersed by_____ and _____.
5. This plant has roots that are _____.
6. This plant grows _____ tall.
7. Some other interesting facts and features of this plant are:
   a. _____.
   b. _____.
   c. _____.

Look at the assortment of dress up items that your teacher has provided and think about how you could use them to dress up like the plant you have chosen. When it is your turn to dress up, you can either dress up yourself, or dress up one of your group or partner. Explain to the class why you chose the items.

10. Game: Invasive Plant Bingo



Students play a game of bingo using plant cards instead of letters to help reinforce their plant identification skills and knowledge.

Preparation

1. **Review native plant cards, invasive plant cards**, and/or **invasive species cards** for species within your chosen ecosystem.

Materials

There are several materials required to deliver this activity. The bingo cards and plant picture cut outs are located in the bingo activity file folder.

- Bingo cards
- Plant picture cut outs
- Bucket
- Prizes (Invader Rangers Activity book, pencils, bookmarks, rulers, etc.)

Browse through the **Learning Unit Resources folder** for the following **native and invasive species cards:**

Invasive Plants	Native Plants
Common burdock	Saskatoon berry
Purple loosestrife	Cow parsnip
Giant hogweed	Blueberries
Scotch broom	Wild raspberries
Hounds tongue	Red-osier dogwood
Yellow flag-iris	Sage
Himalayan blackberry	Fireweed
Puncturevine	Labrador tea
Sulphur cinquefoil	Prickly rose
Yellow starthistle	Balsamroot
Rush skeletonweed	
Canada thistle	
Spotted knapweed	
Diffused knapweed	
Orange hawkweed	
Oxeye daisy	
Leafy spurge	
Knotweed	
Scotch thistle	

Activity

Step 1: Cut out plant pictures and put them in the bucket.

Step 2: Shake up bucket and pull out a picture. Show the picture and call out the name.

Step 3: Students mark the plant on their card if it is present.

Step 4: After students mark the plant ask the following questions:

1. Is this plant a native or invasive?
2. Who has seen this plant in their neighbourhood?
3. Is this plant in found in British Columbia?
4. How are these seeds spread?

Step 5: Pull out another card and repeat.

How to win:

- First game: mark a single line or all four corners.
- Second game: mark two lines or make a X
- Third game: mark three lines.
- Fourth game: blackout card.

11. Engagement: Persuasive Arguments

Engagement
What You Can Do To Help - Persuasive Arguments

Students develop 'argument' statements for and against an action that helps prevent the spread of invasive species. Option: You could divide the class into groups and assign one action to each group.

Preparation

1. Review the "What You Can Do" list of simple things that you can do to help stop the spread of invasive plants.
2. Watch the video of **Melissa Noel** about community invasive plant removal events from the **Learning Unit Resources** file folder.
3. Watch the video of **Brian Heise** about invasive fish from the **Learning Unit Resources** file folder.
4. Select **invasive species profiles** from the **Learning Unit Resources** file folder for species for your ecosystem or that are common in your area. Each ecosystem has a list of invasive species that are found in those areas.

Materials

There are several materials required to deliver the recommended activities in this Unit. The list below outlines the materials that you will need:

- Computer,
- Screen,
- Projector,
- The "What You Can Do" list of things that you can do to help prevent the spread of invasive species – print one copy for each student or use as an overhead,
- The Persuasive Argument Organizer – print one copy for each student.

Activity

Step 1: Using the invasive species profiles and the list of 'What You Can Do', discuss with your class some of the actions that each of us can do.

Step 2: Brainstorm further ideas.

Step 3: Students select an action from the "What you can do" list or the brainstormed ideas.

Step 4: Students use the persuasive argument organizer to write a minimum of two statements in favour of the action and one statement about why a person might not do the action. The supporting statements are about why people ought to do that action and the opposing argument is about why people might not do what they ought to. The solution is an idea about how to overcome the obstacle posed by the opposing argument.

Example:
Action: Inspect and clean bicycles, vehicles, boats, clothing, boots, dip nets and other equipment before leaving an area.

Arguments in Support:
1. Support: There might be invasive species that would be spread to other lakes if they are not pulled off.
2. Support: These hitch-hikers may make your equipment wear out faster if you don't take them off
3. Support: Your boat truck and trailer will look better if clean.

Arguments against:
1. Opposed: It takes too long to clean your boat if other people are waiting at the boat ramp.
2. My boat already looks clean so it doesn't need cleaning

What could be done to overcome this argument (obstacle)?
1. Provide a space for people to clean off their boat, truck or trailer that is out of the way of others with instructions and a checklist for boaters before they leave the area.
2. Hire people to stand by the boat ramp to remind folks about cleaning before leaving.

Other examples of argument, supporting and opposing statements:
- Support: Otherwise the invasive plant seeds will spread
- Support: The burrs could cause irritation if you don't remove them
- Support: It is hard to untie shoelaces that are covered in burrs
- Support: This helps keep hair/fur from getting matted
- Oppose: When you try to take the burrs off, they get stuck to your fingers.
- Oppose: People might not always have gloves handy to pull the burrs off.

What You Can Do To Help - Persuasive Arguments Worksheet

Write down your action to prevent the spread of invasive species:

Make 2 or 3 arguments in favour of your action:

Make one argument against your action:

Solution:

What You Can Do!

There are many ways you can be an Invader Ranger. You have already taken the first step by learning about invasive plants. Being an "Invader Ranger" means that you are careful not to spread invasive plants. Here are things you can do:

Inspect and clean bicycles, vehicles, boats, clothing, boots, dip nets and other equipment before leaving an area.	**Dispose** of aquarium water, plants and animals properly – not down the toilet or in natural water ways
Never plant invaders	**Educate** yourself and others about invasive species and how to identify and report them
Visit the Invasive Species Council of BC website for more information (www.bcinvasives.ca)	**Remove** sticky seeds from your shoes, boots, pant legs, and pets (put in the garbage – not on the ground). Bag the burrs!
Arrange a pulling event with friends and family to hand pull an invasive plant site in your area	

What You Can Do - Detailed LIst

1. **Inspect** and clean bicycles, vehicles, boats, clothing, boots, dip nets, and other equipment before leaving an area.

   - Small organisms including aquatic plants, mudsnails, and quagga and zebra mussels can all be transported on these things from one area or water body to another.

2. **Arrange** an invasive plant pulling event with friends and family to hand pull an invasive plant site in your area.

   - Non profit organizations can earn a 250$ honorarium for having 10 people complete 4 hours of invasive plant removal.
   - Broombusters.org supports 'cut broom in bloom' events wherever scotch broom is a problem.
   - Organizations such as park user groups, Girl Guides, nature groups, and school groups have had great success with invasive plant removal projects.
   - Another one to check out is the No Ivy League in Portland, Oregon USA. (http://www.portlandonline.com/parks/index.cfm?c=47820)

3. **Dispose** of aquarium water, plants and animals properly – not down the toilet or in natural water ways.

   - The plants sold for use in aquariums maybe invasive aquatic plants. The water may contain invasive or pathogenic organisms and the fish or other animals may be invasive. These aquatic invasive organisms are particularly difficult to monitor or manage once they are released into the natural environment because the aquatic environment is not easily visible and it is difficult to target only the invasive species with management programs.

4. **Educate** yourself and others about invasive species and how to identify and report them.

   - Invasive species are just ordinary plants and animals growing in a new area where they are not kept in check by the normal pests, predators, and diseases they had where they came from. Each one is unique in its adaptations and characteristics for growing and reproducing. These organisms are fascinating and the different techniques for preventing and controlling their spread are sometimes challenging and complex. There are new amazing discoveries in this field of research happening every day. Learning about how to identify these organisms and learning about all the unique characteristics they have is useful and relevant for all of us.

5. **Remove** burrs from your shoes, clothing, and pets. Put invasive plant parts in a bag in the garbage, not on the ground.

   - Burrs are seeds or seed heads from plants. Invasive species are able to spread long distances when they become attached to our clothing or pets.

12. Field Day: Plant Press

Giant hogweed

One way to identify invasive plants is by comparing them with dried samples that have been previously identified. This set of samples, or 'herbarium', is a wonderful educational tool as it can be used to develop identification skills when live plant samples are not available.

In this activity, students will learn how to make and use a plant press and collect plant samples to press. Once they are dried (several days) they may display them on cardstock or in a photo album.

The field trip portion takes 45 min or less, depending on if a walk to look at invasive and native plants is included. If you have the materials prepared for the plant press activity, then pressing will only take 10 to 15 minutes.

Preparation

1. Using the **Invasive Alien Plant Program (IAPP)**, and scouting the field trip site, identify what plants are present. Or you can contact your local **regional invasive plant committee** for suggested locations and species to focus on. Contacts can be found from www.bcinvasives.ca under Partners
2. Download the **invasive** and **native plant profiles** for your ecosystem from the **Learning Unit Resources** file folder.
3. Download the **Plant Press Activity** video from the website.
4. Assemble the required materials.
5. If following Unit 2, contact your local First Nations to request a guest speaker. Otherwise, contact your **regional invasive plant committee coordinator** as they have local knowledge about invasive species in the area and may also be able to provide pamphlets or prizes.
6. Gather materials for the field trip.
7. Make sure students bring clothing that is suitable for going outdoors.

Materials

There are several materials needed to deliver this activity.

Required:

- Rubber gloves - for handling any plants,
- Native plant profiles,
- Invasive species profiles,
- Extra chaperones - for field trip,
- Plastic bags,
- Clippers,
- Plant press (see Plant Press Activity for details),
- Wax paper,
- Newspaper,
- Quick and easy plant press - heavy books and plastic wrap, **OR**
- Large plant press - two pieces of corrugated cardboard or plywood (11 x 17 inches) and webbed belt.

Suggested:
- Magnifying glasses,
- Cardboard - for gluing plants onto,
- Laminator or photo album.

Activity

Step 1: Discuss the invasive and native plants that students will be looking for.

Step 2: Before leaving the classroom review basic rules for outdoor field trips.

Step 3: Ask students:

1. How will they treat the plants they are going to see?" (Treat them with respect).
2. What should they do before touching any plants?" (Ask an adult before touching any plant).

Step 4: You will create one herbarium for the class. A herbarium is a collection of dried pressed plant samples. Explain that each student may collect one or two plants for the herbarium. ***Note:*** **When collecting plants only take what you need to make identifying the plant easy and be careful not to disturb the other plants around you. Also, only collect native plants that are very common. Some rare plants may be endangered and should not be collected at all.**

Step 5: Using the invasive and native plant profiles, explore your school grounds with your students to see what plants are growing. Use magnifying glasses to explore the small plant parts. Ask student what impacts they might be seeing from invasive plants. Ask Students:

1. What do Aboriginal Peoples use the native plant for? (follow-up from Unit 2).

Step 6: Collect the plants by clipping them at the base, or carefully digging up the roots; collect stem, leaves, flowers, and seeds if possible. Try to find plants that will fit into the plant press. Put the plants in a plastic bag for transporting to the plant pressing area.

Step 7: Once the plant collection is complete, make sure that students inspect their clothing and shoes and that they remove any plant parts that they find before leaving the collection site.

Step 8: Go back into the classroom and begin constructing the plant presses so the kids can preserve their plants for the herbarium. Layer the plants in the plant press to be pressed and dried. The **Plant Press Activity** has pictures of a herbarium as it is constructed.

1. When the plants are completely dry (different timing for different plants), you can laminate them to a piece of cardboard as a reference set of the native and invasive plant species in the area.

13. Game: Ecosystem Webs

Students play a game where they are a species in an ecosystem where everything is connected with a ball of string, and then see what happens when an invasive species is introduced.

Preparation

1. Select an ecosystem from the **Learning Unit Resources** file folder and download the **ecosystem description**.
2. Select the video by Brian Heise about yellow perch from the **Learning Unit Resources** file folder for an example of how an invasive species can impact natural systems.
3. Select the ecosystem web to match the ecosystem description you have chosen.
4. **Review native plant cards, invasive plant cards**, and/or **invasive species cards** for featured species within your chosen ecosystem.
5. Create index cards for plants and animals featured in your ecosystem.

Materials

- Ball of string - preferably butchers twine,
- Index cards - write ecosystem web components on them,
- Species information cards,
- List of components and connections for the food web and ecosystem you are working with.

Activity

Step 1: Players sit or stand in a circle.

Step 2: Each player has an index card with one component of the ecosystem web written on it. The player holds the card facing out towards the group so everyone can see it.

Step 3: The yarn starts at a major, widely used component of the **ecosystem** web. This could be a tree, shrub, or grass depending on the ecosystem you are working with.

Step 4: The person with the yarn looks around the circle to find something that they connect with. Everyone can join in by helping out with thinking of connections. If you are starting with a western red cedar tree, the 'tree' would perhaps look for a 'bald eagle' as the thing to connect to. The 'tree' gently tosses the ball of twine, but hangs on to the end of it. The result is that there is now a length of twine going between the tree and the eagle. Now the 'bird' looks around and spots a salmon. Again, hanging on to the end, they toss the ball of yarn to the salmon.

- If the person who is 'up' can't think of a connection, then they can ask for help to see if someone else can think of one. Encourage active participation of all the players on each turn, even if it isn't "their turn".

Step 5: Carry on with passing the yarn until there is a complex web of connections running back and forth across the group.

Step 6: Discuss the ecosystem web you have created. Are there other connections or components you would like to add?

Step 7: Now discuss how the components of the web would change if an invasive species

was taking over. Refer to the ecosystem web for examples of how an invasive species would impact the ecosystem web.

Step 8: 'Components' who are displaced can tug on or drop their string.

Step 9: When the invasive species takes their place in the circle, read the description of the impacts from the **invasive species profile.** You will also find information about how invasive species can affect an ecosystem on the **ecosystem web.** The species that are displaced directly by that species are out of the web. As the group discovers that certain species are displaced, those species turn their card over on their lap and are out of the web. For example, in a wetland, if yellow flag-iris takes over, then cattails are out right from the start. Then, since nothing eats yellow flag iris, anything that used to eat the cattails will eventually be out of the game as well.

Step 10: Experiment with a few different invasive species in one ecosystem web. In a wetland, for example, you could try the 'web of life' with yellow-flag iris. Then, start again with purple loosestrife or yellow perch in the web.

Example

Suggested ecosystem components for the **Lakes, Rivers and Wetlands Ecosystem Web**:

- Western toad,
- Garter snake,
- Northern harrier hawk,
- Muskrats,
- Cattails,
- Red-osier dogwood,
- Aquatic plants,
- Ducks,
- Snails, insects and other invertebrates,
- Fish,
- Bacteria,
- Inorganic components - shoreline, boulders, tree roots, deep pools, riffles and rapids.

Invasive:

- Yellow flag-iris, purple loosestrife – replaces cattails,
- Eurasian water milfoil – replaces aquatic native plants,
- Yellow perch – replaces native fish,
- New Zealand mudsnail – replaces native snails,
- Bull frog – replaces native frogs and toads,
- Zebra or quagga mussels.

GRASSLANDS ECOSYSTEM

What is grassland?

Grassland is an area that is dry and where the most common plants are grasses or grass-like plants with some shrubs and flowers. There are many kinds of grassland types in British Columbia. If you look very closely at the undisturbed ground between bunch grasses you will see that there is a there is a community of algae, mosses and lichens that forms what is called a biotic soil crust. This crust is important because it helps to maintain a soil surface that captures water more effectively and also reduces erosion from wind and water.

Only a small amount of the land in BC is grasslands; less than 1%. Grasslands provide habitat (homes) and food for a variety of birds, deer, small mammals and many other wildlife species.

What is the Climate?

Grasslands can be found in many areas of BC but the common feature is a climate where drought occurs in mid-summer. In general, grasslands have warm dry summers, cool dry winters and limited moisture. This climate, and the presence of animals such as deer and bison which graze on the plants, is ideal for grasses but limits tree growth. Most of the grasses in our grasslands are dormant (dry out) in the dry hot summer and only grow in the spring and fall.

What are Some Plants Found in the Grasslands of British Columbia?

Bluebunch wheatgrass, rough fescue and Idaho fescue are common in the Southern Interior grassland ecosystems. These provide excellent food for elk, deer and livestock.

In the Chilcotin and Cariboo, porcupine grass is an important species. In the northern grasslands, rough fescue and 'needle and thread' are common grasses. In other areas of the province, the species of grasses may be different.

Common flowers in the Southern Interior grasslands are **arrow-leaved balsamroot, yarrow,** silky lupine, and pussy toes. **Bitter-root** can be found in hot dry grasslands and sagebrush slopes.

Within grasslands there are often some shrubs that grow here and there. In the Okanagan the shrub steppe grasslands have **sagebrush** that provides nesting sites for some rare birds. Grasslands higher up on the hills often have choke cherry and **saskatoon** bushes that produce berries.

On the coast, the Garry oak ecosystem grassland meadows contain some of the same plants as you find in the Southern interior such as chocolate lily, and tall Oregon grape. These Garry oak ecosystems also contain rare and unique species such as the endangered deltoid balsamroot.

Each type of grassland has its own community of plants and animals that are adapted to living in its climate.

Spotted knapweed

How Do Invasive Species Affect the Grassland Ecosystem?

Many of the grasslands in BC have been altered by humans through building or agriculture. Through these and other human activities, invasive species are introduced.

When invasive species such as **spotted knapweed** or **sulphur cinquefoil** replace bluebunch wheatgrass or other valuable food species, it impacts livestock and wildlife because they often will not eat the invasive species. Sometime the invasive plant tastes bad or is poisonous. An invasive species such as knapweed tastes bitter but is edible, but it provides less food value than native plants. Other invasive plant species that have impacts are **hoary alyssum, hoary cress, hound's tongue, common burdock, orange hawkweed, perennial pepperweed, baby's breath, dalmatian toadflax, yellow toadflax, rush skeletonweed, leafy spurge, puncturevine, scentless chamomile, common bugloss,** and **blueweed**. An invasive plant that is not in BC yet is yellow starthistle, which has caused large problems in the United States.

Sulphur cinquefoil

If invasive plants take over too much of the natural food plants, animals may need to move elsewhere. Once the animals leave, the food chains and food webs are altered. For example, if elk are unable to find food, they will not stay in that area. Any animals, that eat elk would not be able to find them there and would also have to look elsewhere for food.

Spotted knapweed pushes out native food plants that wildlife eat and can affect water cycling on a grassland. Knapweed pushes out other plants by releasing toxins into the soil that kill other plants growing nearby. This process is called "allelopathy". A study in Montana found that sites covered in spotted knapweed had 1½ times more water from rainfall running off, rather than being absorbed into the soil, making dry sites ever drier . They also found that the water running off was loaded with twice as many bits of soil (sediment) than would normally occur from a stand of healthy bunchgrass. Too much sediment reaching streams can impact fish and spawning areas in creeks.

Another example of how invasive plants can affect native animals is found in the Cranbrook and Kaslo areas of the province. Western painted turtle eggs and hatchlings are getting encased, caught up in and sometimes skewered by the roots of invasive plants such as knapweed, couch grass and hawkweed. The western painted turtle in these areas is at the most northern extent of its range in North America and the babies (hatchlings) actually stay underground in the nest through the fall and winter after hatching, and wait to come out until the next spring. The problem is that while they are waiting, couch grass roots are growing around and into the turtle eggs and hatchlings, and taking nutrients from them.

Yellow hawkweed

Behr's hairstreak butterfly larvae depend exclusively on antelope-brush in the Okanagan area. The female butterflies lay their eggs on this plant and the larvae eat and pupate on this one kind of plant. Without the antelope-brush, the Behr's hairstreak butterfly cannot complete its lifecycle. Sulphur cinquefoil grows into such dense infestations that it can keep antelope-brush from sprouting and growing. **Yarrow** is one of the native plants that the adult butterflies get nectar from. Cheatgrass, **diffuse knapweed** and Dalmatian toadflax out-compete the native flowering plants that the butterflies get nectar from.

Yarrow. Photo: L. Scott

To find further information about the grasslands in BC, please visit www.bcgrasslands.org. To find more information about the Garry oak ecosystem, please visit www.goert.ca.

LAKES, RIVERS AND WETLANDS ECOSYSTEM

British Columbia has a rich diversity of water bodies such as small salt lakes, large freshwater lakes, rivers, streams and wetlands. These different water bodies have some similarities but many differences.

Lakes can be large or small, fresh water or salt, but all have still water and are surrounded by land. Some lakes have a river or stream flowing into them or out of them or both. There are many different types of lakes in BC including the small salt lakes which can be found in the interior and large freshwater lakes such as Atlin Lake, the largest natural freshwater lake in the province. BC has salty warm lakes that dry out in the summer in the Southern Interior and cold alkali lakes such as Boya Lake in northern BC that is clear and cold and covered in ice for cold and for several months of the year. Many of the salt lakes dry out during the summer while lakes at high elevations may be covered in ice for all but a few months a year.

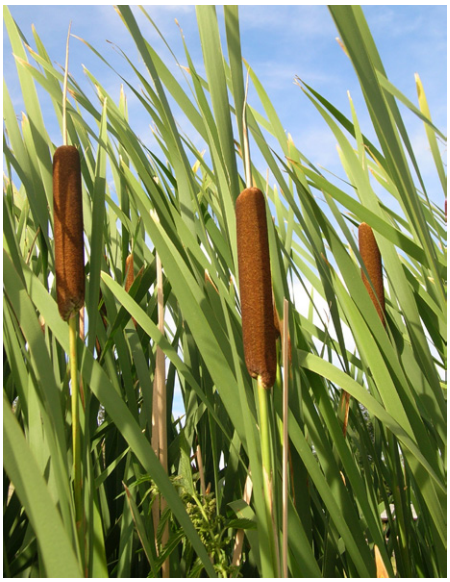
Rivers and streams are flowing bodies of water. They usually start from lakes, springs or wetlands. The rivers drain to the Pacific Ocean through the Columbia River in the south or through the Fraser River in the west. In the north, water drains through the Liard and Peace Rivers systems to the Beaufort Sea. Some of the streams in BC are quite big and will run year round but others are very small and will dry out for part of the year. Streams that only contain water some of the time are often called seasonal streams. Just because there isn't water in them all of the time doesn't mean they can't be impacted by invasive species. Shrubs including **red-osier dogwood**, willows, and trees including **black cottonwood** and spruce typically grow along the edges of many rivers and streams.

Wetlands of South Okanagan. Photo: L. Scott

Williams Lake. Photo: L. Scott

River scenery in Similkameen region. Photo: L. Scott

Wetlands are smaller bodies of water that have unique vegetation, are not very deep and may not stay wet all of the year. There are many types of wetlands including ponds, fens, swamps, bogs and marshes. Wetlands are very important because they filter and clean our water and protect against floods. **Cattails** and other native plant species typically grow in and around wetlands. Wetlands provide homes to many amphibians, reptiles and birds that rely on them.



Common Cattails. Photo: L. Scott

Native species depend on our lakes, streams and wetlands. Salmon, trout and other fish need the spawning and rearing habitat that rivers and lakes provide. Amphibians like the western toad rely on a watery habitat during their life cycle. Muskrats and beavers build their homes in these areas. Birds like songbirds, ducks and birds of prey (such as the northern harrier) use these wet areas to find food, nest, or rest. Tiny animals like snails, insects and other invertebrates are a vital part of wetlands, breaking down dead plants and animals and also providing food for larger animals.

Pacific salmon. Photo: R. Koopmans.

What Are Some Invasive Species in Lakes, Rivers and Wetlands?

As with terrestrial (land-based) invasive species, aquatic invasive species are more common where there is more human development because usually, people have brought them, either accidentally or intentionally. There are a few differences between aquatic and terrestrial invasive species though. Aquatic species that are introduced to one place in a watershed have the potential to spread throughout the downstream areas of that watershed, and possibly upstream as well by moving in water. These invasive species are almost impossible to get rid of once introduced.

Below we have described a few of the invasive species that are of concern in BC either because we already have these species in some places and want to prevent their spread, or because we don't have them in BC and would very much like to keep it that way.

Yellow Perch. Photo: M. Herborg

Two laws help prevent introduction and spread of these species:

- It is illegal in BC to use live fish for bait or hold live fish in a "live well" on your boat.
- It is illegal to possess or move live fish without a permit.

Yellow perch have been introduced illegally to lakes in Southern Interior BC and to some lakes on Vancouver

Island as well. Yellow perch females produce thousands of eggs for every inch of length of their body. Yellow perch are able to adapt to a wide variety of lake environments. The only way that yellow perch could have gotten into these lakes is by people introducing them. People mistakenly believed it was okay to do this because they wanted to be able to fish for them or because they provide food for other introduced species such as bass. Unfortunately, the yellow perch is so successful that they can harm our native fish populations of trout and salmon. Yellow perch will eat trout and salmon fry and other native fish.

New Zealand mudsnail. Photo: Wikipedia

New Zealand mudsnail is an invasive species that has recently made its way to BC, probably on recreational vehicles, boats and trailers. This tiny (3-5mm long) snail can reach populations of 500,000 per square metre. It eats algae off rocks and mud in streams, lakes and estuaries. Research has yet to document exactly how the New Zealand mudsnail impacts natural ecosystems but one possibly way is by changing the diet of trout. Although trout eat New Zealand mudsnails, they can pass through their digestive system without being digested or killed. That means they are not really 'food' for the trout. The usual food of trout is digested and turned into calories and nutrients for the trout. If they fill up on this 'junk food' they might not be as healthy and strong as they would be if they were eating their usual diet of insect larvae.

Eurasian water-milfoil. Photo: A. Fox.

Eurasian water-milfoil is a fast growing plant that can grow even from tiny pieces. It can grow in very thick mats and has an impact on boaters and swimmers as well as fish. Like other invasive species, it can take over from native species in the area. Anything that ate the native species then has to move away to find food because often, they won't recognize the invasive species as food. In BC Eurasian water-milfoil is found in some of the large Southern Interior lakes such as Shuswap, Mara, Christina and Champion Lakes, as well as the Columbia and Kootenay Rivers, and the Lower Mainland and Okanagan Valley as well as certain locations on Vancouver Island and Nicola Lake. So far, it is not found in many smaller lakes.

Eurasian water-milfoil has been transported between lakes on boats, jet skis, boat trailers and other water toys. Plant fragments are picked up at one lake and, if people don't clean off their boats and equipment, are dropped off in the next lake they visit. It is important to be aware of these aquatic hitchhikers and always remove any plant material, mud, or other hitch-hikers from anything that has been in the water so that they aren't transported to another place.

Zebra and quagga mussels. Photo: J. Leekie

Zebra and quagga mussels are fresh water mussels that live on underwater surfaces. We don't have them in BC and we don't want them either. Both species have a large impact on native species since a colony of these mussels can completely cover underwater surfaces and push out native plants and

animals. As well, they can cause a large reduction in dissolved oxygen that other animals need. Another serious impact of these mussels is a result of how they grow on underwater surfaces. They grow so thick on the inside of water pipes that they can clog them up. It is very expensive to remove them because the pipes are underwater and not all of the pipes are easy to reach. In places where these mussels have invaded, people have spent hundreds of millions of dollars to deal with the problems the mussels have caused.

Quagga and zebra mussels probably came to North America in the bilge water of tanker ships. Now they can spread to BC by hitchhiking with people. If they are attached to a boat that comes to one of our lakes, they can start a whole new colony. It is very important to inspect boats, trucks and trailers and remove any plants, mud or critters and creatures that might be stuck to them, before and after being in the water. This way we will prevent the introduction of these invasive species.

Bullfrogs were brought to BC to farm for their legs, but when the bullfrog farms closed down the frogs moved into nearby wetlands. These large frogs can grow to the size of dinner plates and eat native frogs, birds, snakes and other animals. Predation on other wetland species is the main ecosystem impact of bullfrogs.

American bullfrogs. Photo: S. Price

Not So Fast – What Are You Doing With Your Aquarium Pets?

Another source of invasive species is aquarium pets and water that are put into our lakes, rivers and wetlands. Species like crayfish, frogs, turtles, gold fish, pumpkin seed fish and other fish and living plants from aquariums may be invasive. If they are set free in our lakes, rivers and streams, they can cause a serious and irreversible problem. Even the aquarium water may have plants and animals that are too small to see, but they can still cause big problems when they are set free in local lakes or streams. People may think "what could be the harm of setting this one animal free?" Invasive species have already caused the extinction of some native species in BC lakes. Our native species are not always prepared to compete with a new neighbour for food and homes.

The **rusty crayfish** may be purchased by schools for science class aquariums and projects. After the studies are done, the question is "what do you do with the crayfish?" It is a living thing and people might think the best thing to do is to put it back in the natural environment "where it came from". The problem is that it didn't come from a natural ecosystem in BC. Rusty crayfish are not native to BC. They are native to streams in parts of the United States.

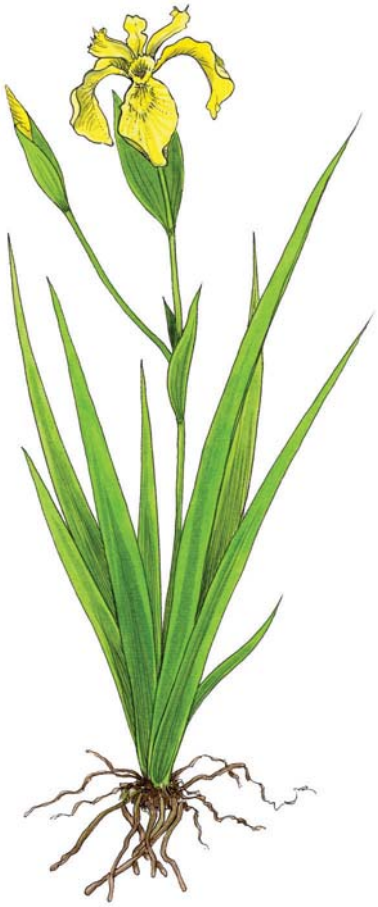
Rusty crayfish. Photo: Wikipedia.

After rusty crayfish have been released into new streams they are almost always able to out-compete native species. Rusty crayfish are bigger and eat more for their size than native crayfish. They eat the plants and animals that provide cover and nutrients for smaller native crayfish and fish. Rusty crayfish are very successful in new streams and lakes and that is not a good thing.

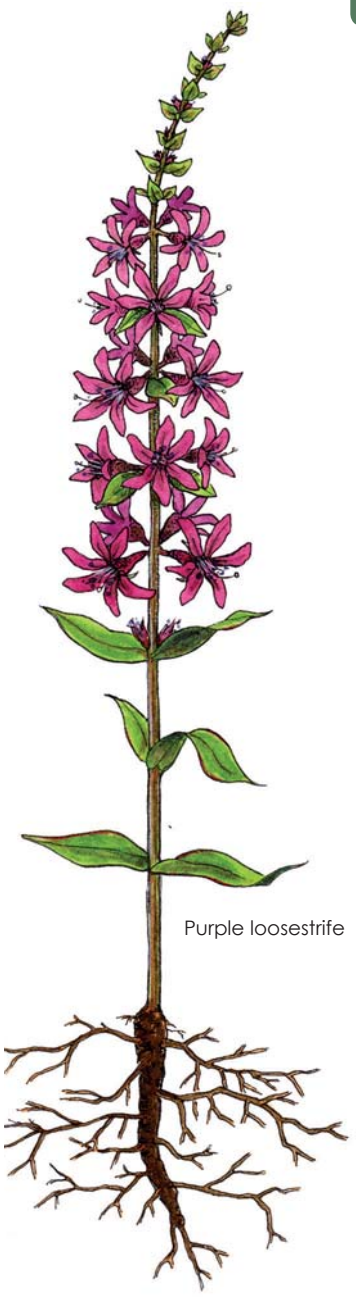
The only way that the rusty crayfish can get into our streams is if we let them go there. There are many other invasive species that might be in your home or school aquarium. Never release any aquarium pet or the water you keep it in. The water from an aquarium should be poured onto dry ground. Aquarium pets are trickier to deal with because they are living things. A crayfish can live for 2 -3 years. The most humane way to dispose of aquarium pets (if they can't be given to another person with an aquarium) is to put them in a freezer. People, who dispose of their aquarium pets and water responsibly prevent the introduction and spread of invasive species and, in turn, save many of our native species.

BC also has invasive plants that live around lakes and wetlands. **Yellow flag-iris** grows on the edges of wetlands, lakes and rivers. It out-competes native plants and the animals that live in these areas don't use it for food. Yellow flag-iris quickly spreads by floating seeds and can take over small wet areas in just a few years. **Purple loosestrife** also grows around the edges of wetlands, lakes and rivers. It grows a tangled mat of fibrous roots that can clog waterways. Purple loosestrife infestations also result in changes to the number and variety of birds, mammals and amphibians.

There are many invasive aquatic species that are not yet in BC so we are fortunate that we can try to prevent their introduction. By checking boats, trucks and trailers and removing all plants, mud and creatures, and by disposing of aquarium pets and water responsibly, we can prevent aquatic invaders.



Yellow flag-iris



Purple loosestrife

MONTANE FOREST ECOSYSTEM

What is Montane Forest?

In British Columbia, montane forests are in the southern part of the province from the Cariboo region south to the border with the United States. The forests begin at the edge of the grasslands and extend all the way to the mountain tops. The lower valley slopes are dry so trees like Douglas-fir and ponderosa pine grow there, often with open areas around them. Above the valley, the mountains are covered in a dense forest with many different kinds of trees including western larch, subalpine fir, spruce and lodgepole pine. These forests support a variety of different plants and animals.

The forests on the lower valley slope used to have frequent wildfires which helped to keep the ecosystem healthy. The fires were usually started by lightning and often killed small trees but most big old trees that provide very important habitat for many birds, bats and other animals, survived. When a wildfire occurs, it fills the soil with nutrients and burns some of the small trees and shrubs allowing more grass and other plants to grow. This process is called a fire maintained ecosystem.

Ponderosa pine stand. Photo: L. Scott

What is the Climate?

The climate of the montane forest varies depending on elevation up the mountain. It is mild and dry in the southern valleys and cold and humid higher up the mountains farther north. Total rainfall each year can vary from 0.3 metres in the hot dry valleys to 1.2 metres on the mountain ridges.

What Are Some of the Plants Found in the Montane Forest?

The montane forest has a variety of trees, wildflowers, and shrubs supporting many different kinds of wildlife. In the open forest, the big old ponderosa pine and larch trees provide nest sites for woodpeckers and perching sites for hawks and

owls. Squirrels make their home in Douglas-fir and **ponderosa pine** trees and also harvest seeds from the cones to store for winter.

Fireweed. Photo: L. Scott

Common shrubs include saskatoon, prickly rose, red-osier dogwood, snowberry and elderberry. **Rocky mountain juniper** and **common juniper** often grow in forest openings **Labrador tea** often grows near moist areas near wetlands or in the forest. **Saskatoons** and **wild raspberries** are used by many species including songbirds and black bears who eat the berries, and mule deer who eat the leaves and stems in winter when other food is hard to find. Birds often eat the snowberry berries in the fall and winter when other berries are all gone. Black bears like to eat **cow-parsnip**, while grouse enjoy **soopolallie berries**.

Common wildflowers in open areas include **arrow-leaved balsamroot**, silky lupin and pussytoes. Higher up the mountain, plants include **fireweed**, twinflower, bunchberry and bracken fern. Grasses include **bunchgrasses** in forest openings and **pinegrass** in areas with lots of trees. These grasses are important food for mule deer, elk and cattle and provide food and shelter for many other animals, including insects.

European starling. Photo: L. Karney

How do Invasive Species Affect the Montane Forest?

Along the edge of the grassland the big standing dead trees, called wildlife trees, provide nesting sites for Lewis's woodpeckers, a species at risk in BC. **European starlings**, introduced from Europe, are known to take over ("parasitize") woodpecker nests by laying their eggs in the nest so the woodpecker will raise the baby starlings without realising it. Often the baby woodpeckers do not survive but the baby starlings do. Even without laying eggs, starlings can affect woodpeckers by using the woodpecker nest and pooping in it. Since woodpeckers will not nest in a cavity that starlings have been in, they have to find new homes. Pecking out a new nest cavity is a lot of work for a woodpecker. Also, with less wild fires happening in our forests, there are less and less dead and dying trees that make good wildlife trees so new nesting trees are hard to find.

As well as this invasive bird, many invasive plants cause problems in the montane forest. Invasive plants are introduced through logging roads which have been built to harvest timber. Invasive plant seeds often hitch-hike on trucks and equipment up these roads. The new invasive plants grow quickly and make more seeds, spreading along the roads and into the forest openings so there is less space for native plants to grow.

Invasive **orange hawkweed** and **yellow hawkweeds** take up all the water and nutrients in the soil that native plants normally need to grow. Hawkweeds not only spread by seed they also spread by runners above the ground so they can form dense patches, preventing native plants from growing Since animals do not like to eat them, hawkweeds reduce food for deer, elk and cows.

Leafy spurge is another invasive plant that often takes over grasslands and forest openings. It has a big network of roots under the ground so it can suck up water and nutrients making it harder for the native plants to grow. Its stems have a white milky liquid in them that irritates the throat of grazing animals making them sick if they eat it. Dense patches of leafy spurge reduce the amount of grass and native wildflowers for elk, deer and cows to eat so these animals have to find new places to find food. Fortunately some sheep can eat leafy spurge so some land managers are using herds of sheep to control leafy spurge.

Leafy spurge

Diffuse knapweed grows in forest openings and releases a chemical that prevents native grasses and wildflowers growing around it. Over time, the forest opening will be nothing but diffiuse knapweed and because it is not very good food for elk and mule deer, these animals have to find new areas to eat grass. Over the last 20 years a program has been going on called "biocontrol". This program finds insect predators for knapweed from the countries where knapweed is from. These insects are carefully tested to make sure they will only attack knapweed and no other plants in the ecosystem. This program has been very successful for diffuse knapweed. The insects have prevented growth of diffuse knapweed to the point where it no longer dominates grasslands in southern BC. This process of bringing in insect predators is called biological control. For more information on biological control visit http://www.agf.gov.bc.ca/cropprot/bioweed.htm or http://www.for.gov.bc.ca/hra/Plants/biocontrol/what.htm

Hound's-tongue grows along roads and forest openings, and does well on sites that have been logged. Animals that eat the leaves of hounds-tongue get sick since the leaves are poisonous. The burred seeds get stuck the faces and fur of animals which can be uncomfortable and weakens the animal. Because the seeds hitch-hike on animals and people, it is important to always 'Bag the Burrs' and put them in the garbage. The biocontrol program has also been very successful on hounds-tongue. A small little beetle called *Mogulones crucifer* was released in southern BC in 1997 as a biocontrol insect and has been busy chewing on hound's-tongue ever since. This beetle has eaten so much hound's-tongue now that it is bringing this invasive plant under control throughout southern BC. For more information see http://www.for.gov.bc.ca/hra/Plants/biocontrol/bcmatrix.htm#HT

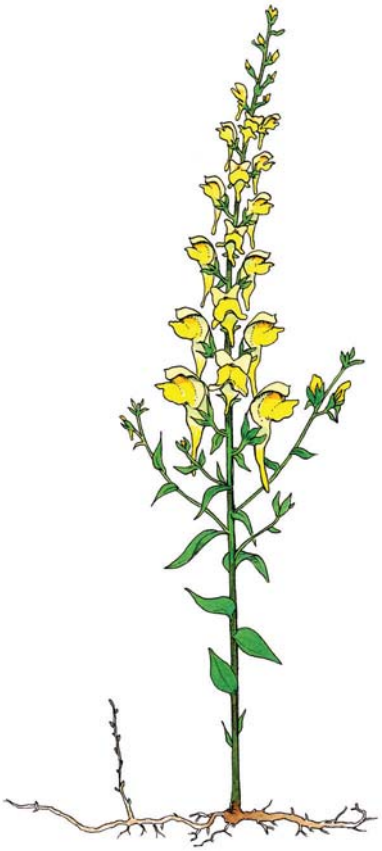
Hound's tongue

Scotch thistle is the largest invasive thistle in BC. Growing two metres tall, it creates dense thickets that are painful to walk through. With leaves and stems covered in spiny thorns, this thistle monster really is a nightmare. Not only do people have trouble hiking through it, but so do coyotes, cougars and other large animals. Fortunately the flowers of thistle have lots of nectar making a little extra food for honey bees.

Scotch thistle. Photo: J. Leekie

Hoary alyssum and **hoary cress** are invasive plants that are a particular problem in hay fields, pastures and crop land. Hoary alyssum is toxic to horses even when it is dried in hay so it is a huge problem in hayfields and pastures These species also spread by hitch-hiking on animals and vehicles to natural grasslands so it is important to take care to check clothes, vehicles and equipment and remove plant parts when travelling in our forests.

Other Invasive Plants that can impact montane forests are: **common bugloss, common tansy, dalmatian toadflax, field scabious, oxeye daisy, sulphur cinquefoil, tansy ragwort,** and **yellow toadflax.**



Dalmatian toadflax

Hoary alyssum. Photo: L. Scott

NORTHERN FOREST ECOSYSTEM

What is the Northern Forest?

In British Columbia, the northern forest is the northern part of the province from Prince George to the Yukon Border. In this large area there are a number of different habitats ranging from peat bogs to deciduous forests and from valley bottoms to alpine tundra. Each of these habitats supports a variety of different plants and animals.
Some areas of the northern forest have frequent wildfires which help keep the ecosystem healthy. The fires are usually started by lightning and they can burn very hot, often killing all the trees and understory. When a wildfire occurs, it fills the soil with nutrients and burns some of the trees and shrubs which allows new trees, shrubs and other plants to grow.

What is the Climate?

The climate of the northern forests is the coldest in the province. The winters are very long, windy and cold. There is snow in some areas for over half the year. The summers are generally short and cool. The climate means short growing seasons for plants. Plants also need to be able to survive the harsh climate changes in these areas.

Red-osier dogwood. Photo: Eflora

What Are Some of the Plants Found in the Northern Forests?

The northern forest has a large variety of trees, wildflowers, and shrubs supporting a variety of wildlife.

Prickly rose. Photo: C. Bjork

The trees of the northern forest provide shelter to many different birds. For example, large **black**

cottonwood trees provide nesting sites for eagles, northern goshawk, and magpies. **Lodgepole pine** provides food sites for woodpeckers, porcupines and black bears. There are many different tree species in the northern forest including trembling aspen, white spruce, black spruce, tamarack, **Douglas-fir**, and balsam poplar.

Common shrubs of the northern forests include **saskatoon, common juniper, red raspberry, high-bush cranberry, blueberry**, huckleberry, **prickly rose**, and **red-osier dogwood**. The berries of saskatoon are eaten by song birds and grizzly bears. Elk eat the fresh branches and leaves. The branches and leaves of red-osier dogwood are also eaten by ungulates, such as moose, deer and elk. Moose and caribou eat the leaves and twigs of **Labrador tea**.

Common juniper. Photo: G. Wojciech

Common wildflowers and forbs of the northern forest include **cow parsnip, yarrow, mint, fireweed**, bunchberry, and wild sarsaparilla. Grizzly bears and black bears like to eat cow parsnip. Fireweed is a great nectar source for butterflies and bees and it is also browsed by moose, deer and elk.

Other important species in the northern forests are lichens and mosses. Examples of lichens are powdered beard, common witch's hair, freckled pelt, and lungwort. Common mosses are knight's plume, red-stemmed feathermoss, and step moss. Lichens are the favourite food of woodland caribou.

Labrador tea. Photo: M. Harte

Bluejoint, **common sweetgrass**, timothy and many other grasses call the northern forest home. These grasses are browsed by ungulates, bears, rodents, and many other wildlife species.

How Do Invasive Plants Affect the Northern Forest?

The northern forest is a busy place in the province with many natural resource activities, such as logging, mining, oil and gas, and agriculture. All these activities create disturbance in the soil and create prime habitat for invasive plants to thrive.

The nutrient rich soils left by fires can also become prime growing areas for invasive plants. Invasive plants can establish quickly preventing the native plants from growing well in the burned areas.

How do invasive plants get to wildfire areas?

When fighting wildfires, equipment, trucks, and people come from other parts of the province or the country they can accidently bring hitch hiking invasive plants from these other areas. Invasive plants can be caught in mud on equipment, trucks, and or fire fighting gear. To help prevent this from occurring, it is important to make sure that everything is cleaned and Invasive plant free before going into remote areas.

Marsh plume thistle. Photo: Cariboo Regional District

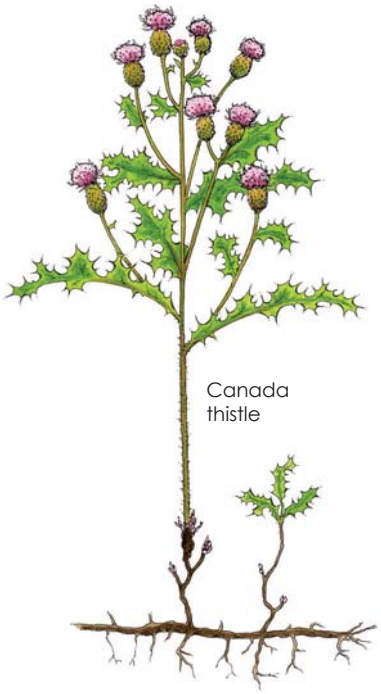
Some of the invasive plants to watch out for in the northern forest are marsh plume thistle, **orange and yellow hawkweeds**, scentless chamomile, Canada thistle, **oxeye daisy, common tansy, leafy spurge, diffuse and spotted knapweeds, Japanese** and **giant knotweeds, Scotch broom, and common burdock.**

For more information on invasive plants of the northern forest, visit www.nwipc.org.

Scentless chamomile. Photo: R. Mueller

Marsh plume thistle is an example of an invasive plant that is having an effect on the northern forest. It grows in cut blocks (i.e. areas that have been logged) and along roadsides, out-competing the newly planted tree seedlings. When newly planted trees don't grow well, there are costs to replant seedlings and to treat these invaders.

Canada thistle is a large threat to agriculture and to restoring old mine sites. It can move in and take over a pasture, reducing food for wildlife and livestock. Canada thistle invasions cost farmers money since they have to spend money to deal with Canada thistle on their property and can't grow as much hay and seed crops.



Scentless chamomile can change the amount of water and nutrients in the soil, making it difficult for native plants to grow. Livestock and wildlife do not usually eat scentless chamomile so they have to move to new locations to find food. One of the ways they are battling invasive plants is with biocontrol. Little insects are released that eat the plants and reduce their health or seed production. Several types of insects have been released in northern BC to attack scentless chamomile.

Most of the northern forest is free from invasive species because there are few roads and people in these remote areas. Many organizations are working hard to keep invaders out of the area.

TEMPERATE RAINFOREST ECOSYSTEM

What Is a Temperate Rainforest Ecosystem?

All of the temperate rainforests of British Columbia contain large coniferous (evergreen) trees. In BC, most rainforests are along the coast near the ocean, but there are also some in the interior. Temperate rainforests receive a lot of rain; usually, more 200 cm of rain a year. They are full of plants that like water such as ferns, mosses, and coniferous trees. The trees of the rainforest are usually different heights, ages and species. Some trees can grow to be very old and very large. Plants called "epiphytes", like mosses, ferns, and small shrubs, grow on the trees.

What Is the Climate?

On the coast, the temperature usually stays above zero, even in winter, which means it usually rains, not snows. The temperate rainforests further inland often do have temperatures below 0 C in winter, so they get their moisture from big snow loads in winter as well as some rainfall in summer. The interior temperate forests have much warmer summers than the coastal areas and are more likely to experience fires. However, both coastal and interior forests have some very old forests.

Douglas-fir. Photo: D. Powell

What are Some Plants Found in the Temperate Rainforest?

Coniferous trees such as **western red-cedar,** western hemlock, grand fir, Pacific yew, Sitka spruce, **Douglas-fir**, mountain hemlock and yellow cedar are an important part of temperate rainforests. Trees provide habitat for a variety of animals in several different ways. Birds may use these trees for resting, roosting or nesting. Some birds nest in cavities in older rotting trees. Other animals such as raccoons and black bears also use these cavities. Bald eagles and cougars sit on the large branches to spy for prey. Trees also provide habitat for invertebrate

species (insects, spiders) that are food for other animals living there.

Salal. Photo: C. Baldazzi

Trees provide other important functions. They shade streams, keeping them cool for fish such as salmon, that can die if the water gets too warm. When a tree dies and falls into a stream, it can form a water pool that provides an important place for fish to rest during migration or stay to escape predators. Tree roots bind with the soil to keep it from washing away during high water flows.

Shrubs like **salal, salmonberry**, red huckleberry and Oregon grape provide food for animals such as deer, and voles. Hummingbirds drink the nectar from salmonberry bushes. **Labrador tea** often grows in moist forests. **Cow-parsnip** often grows along streambanks, meadows, and moist slopes. The temperate rainforest is also full of many ferns, herbs and grasses.

How Do Invasive Species Affect Temperate Rainforests?

Since trees are such an important part of temperate forests, anything that interferes with the sprouting of new trees will have an impact on forests. One way that invasive species harm a forest, is by keeping new trees from growing. Invasive plants such as giant hogweed, Himalayan balsam, English ivy or knotweeds can cover over an area so thickly that nothing else can grow there. In particular, no new trees can sprout and grow. If no trees are able to live and grow tall along a stream bank, then all of those functions that trees provide are lost over time.

In a natural, healthy forest there are a variety of plants and animals. There are both open spaces and areas thick with plants, with different animals living in each. In most areas, there are worms, insects, spiders, amphibians, birds, and mammals. In streams, there may also be fish. In addition, there is a whole community of very small plants and animals that you can only see under a microscope. This natural community of plants and animals interacts in many different ways. For example, a salmonberry bush provides habitat for an insect or spider, nectar for a hummingbird, a nest site for a robin and berries for bears, to name just a few. The insects and spiders may be food for birds or small mammals and even for fish if the insect or spider falls into the water.

An invasive plant such as **knotweed** can easily take over along a stream bank. When it does, it can form a dense thicket that no other plant can grow through. Knotweed species do not provide the same habitat for the insects and spiders that lived in the salmonberry bush so those animals will move to new locations. The knotweed flowers don't provide nectar for hummingbirds that have timed their migration so they can feed on salmonberry flowers. Knotweeds do not produce berries for bears. In addition, knotweed species have a root system

Japanese knotweed. Photo: J. Leekie

that has no fibrous roots to hold soil and the plant dies back to the ground every winter. This combination causes increased soil and stream bank erosion in places where knotweed has replaced the natural community of plants.

The fibrous roots of plants growing on stream banks help protect the soil from eroding too fast. When an invasive plant with no fibrous roots takes over, then soil may erode more quickly into the stream which can make the stream channel unstable, fill in pools and fill in salmon spawning habitat as well.

Invasive species can also affect the temperate rainforest ecosystems by interfering with the growth of herbs and bushes that a wide variety of animals may be relying on. Here are a few examples of invasive species that are found either in the coastal or interior rain forest.

Giant hogweed with its towering flower and gigantic leaves can impact the area along river and stream banks where it grows by shading out other plants such as cedar seedlings, salmonberry bushes, vanilla leaf, trillium, and pink fawn lily. It has a 'carrot-style' root that does not hold the soils as well as some of our native plants do. Giant hogweed also has a toxic sap that can be harmful to people. The sap causes extreme sensitivity to sunlight. If people or animals get the sap on their skin, it can result in very serious painful burns. Giant hogweed is often confused with **cow-parsnip**, a beneficial native plant.

Giant hogweed. Photo: B. Brown

Daphne is an invasive species common in coastal forests, particularly in the drier Douglas-fir zone. People brought Daphne to BC intentionally as a garden plant. Daphne produces many berries and these have been spread by birds into natural areas including parks. Daphne is allelopathic (meaning it puts out chemicals to discourage the growth of other plants nearby) and all parts of the plant are poisonous. When an invader like daphne takes over in a forest, it replaces the native plants that many animals rely on for food or shelter.

English ivy keeps its leaves all year. The shade from this thick blanket of leaves prevents native plants from starting or growing. After a few years of growing along the forest floor, ivy starts growing up into the trees. The thick patch of ivy on the tree can weigh 900 kg, about the same amount as four large adult black bears. In a wind storm, this extra weight can pull the tree over. As the ivy grows further and further up the tree, it even starts to shade the leaves of the tree it is growing on, possibly killing the tree.

English ivy. Photo: J. Leekie

Many people have ivy growing in their gardens or on walls and fences. The problem is that ivy is now found in many natural areas. It may have grown over the fence and into the forest. Or, sometimes, when people have yard and garden clippings and trimmings to get rid of, they take them to a natural area. Many people think it is okay to put garden waste into a ravine or forest because it will be like compost. The problem with invasive plants is that sometimes those plant parts can start a new plant but now it is in a natural area instead of a garden. If garden waste has any invasive plant parts in it, it should be taken to the garbage dump, not the compost or a natural area. It probably seems strange to hear that, since we all want to limit the amount of garbage we produce. However, it is very important to keep invasive species from taking over our natural areas.