Forest Protectors Lesson Plan

In this lesson, students learn about **invasive forest insects**, focusing on the *Emerald Ash Borer*, *Hemlock Woolly Adelgid*, *Asian Longhorned Beetle*, and *Spotted Lanternfly*. The lesson includes a basic explanation, visual aids, a game, and review questions to reinforce learning.

The game illustrates each pest, signs and symptoms for the pests, information on how people can slow the spread of the pest and how they can report it.

Note: If you are not in Vermont, you will need to adapt the reporting information for your state.

LESSON TITLE: FOREST PROTECTORS!

Grade Level: 5th Grade and up

Duration: 30 - 40 minutes (12 – 15 minutes background preparation; 15 - 20 minutes playing game, 2 - 5 minutes review learning)

Theme: Understanding specific invasive forest insects and slowing their spread.

Big Ideas:

- Insects and their predators evolve together.
- Humans move insects around the world, sometimes moving them far away from their original habitat.
- When insects arrive in the new environment, they can harm trees and other plants because their usual predators are not there to keep the pest population in check.
- Humans can take steps to slow or even stop the spread of invasive pests.

Learning Objectives:

By the end of this lesson, students will be able to:

- Define what an invasive insect is.
- Name at least one of the four invasive forest insects in the game and the damage it can cause.
- List at least one action people can take to help slow or stop their spread:
  1. Clean off gear and vehicles.
  2. Don't move firewood.
  3. Report suspects to VTinvasives.org or your State's Agency of Agriculture.

Materials Needed:

For the Teacher

- Lesson plan and Background Cards
- Instruction sheet
- Access to color printer, card stock, paper cutter, and scissors
- If playing outdoors, rocks to hold game board down

For Each Group of Two to Five Players

- Game Board (print on an 11 x 17 sheet of paper)
- Four Background Cards. One on each of the four insects and their impact (print on both sides of 8.5 x 11 card stock)
- Four Clue Cards with each pest's signs and symptoms and host tree.
- 57 Playing Cards: 13 Challenge cards, 23 Action cards, 8 Wild cards, and 9 Game Changer cards. There are also 4 Detective Cards – optional for older or more advanced players **(print on 8.5 x 11 card stock and cut out individual cards)**
- 8 Character Markers (camper, park ranger, etc…), one for each player.

Vocabulary: (use or explain as appropriate for players)

- Organism
- Habitat
- Environment
- Introduced
- Invasive
- Infested
- Larva(e)
- Predator
- Co-evolve / co-evolution
- Antennae
- VTinvasives.org (or your state's reporting agency)
- Signs and symptoms

LESSON: Protecting the Forest from Invasive Insects

Introduction to Concepts (5 – 10 minutes)

Start with the question: Have you ever heard of an invasive species?

Concepts:

- An invasive species is a plant, animal, or insect[1] that has been brought to a new environment or habitat.
- Usually, they are brought to the new environment by people, sometimes on purpose, and sometimes by mistake.
- To be considered invasive, the organism *must cause harm to the environment, the economy, or to human health*. Examples include fast-growing plants that spread quickly and push out the native plants that animals need for food and shelter, or an insect that feeds on a certain tree and kills it.
- Many plants, animals, and insects are moved to new environments by people and do not cause any problems. For example, apple trees are native to Kazakhstan, a country in Asia. People brought apple trees to North America, and they do not cause any harm.

Ask: Why do invasive species cause harm in their new environments?

- Most living things (organisms) have predators in their native habitats. Predators are other living things that eat them or can make them sick.
- Invasive species can spread quickly and cause harm when they are brought to a new environment *because they do not have predators*. Nothing in the new environment knows it can eat the new species.
- Raise your hand if you can name any examples of invasive pests.

We are going to be playing a game that focuses on four invasive insects that can harm trees and plants where we live in North America.

Explain or ask: How do invasive *insects* get to North America?

- People bring them on purpose
- Or by accident: they hitch a ride on plants or in shipping containers, or on trucks or other vehicles.

[1] You can also explain that an invasive species can be any kind of a living thing. For example, there are many invasive species that are fungi or viruses that cause diseases.

Explain or Ask: Once invasive insects arrive here, how do you think they spread?

- You can show the back of the VTinvasives Clue Card and discuss how tiny insects and their eggs and/or larva can hide in firewood, camping and hiking gear, and vehicles. People can move them to new places without ever knowing they are doing so.

Meet the Insects! (5 - 10 minutes)

Show each of the four Background Cards. Briefly explain the kind of harm each insect causes. Point out the scale showing the actual size of the insect.

Explain that each insect also attacks specific trees or plants, called "hosts" and there are specific signs or clues that tell you which insect might be hurting a tree. Hold up Clue Card for each insect and tell them they can refer to it during the game.

Ask players to:

- **Describe what they notice in each picture** (color or size of insect, damage to tree, etc...)
- **Say the name of each insect aloud** – Ask: What would help you remember the name of the insect? (emerald green, woolly balls, spotted wings, starry sky beetle, etc…). You could challenge them to say the name three times fast.

Emerald Ash Borer

Emerald ash borer is already in Vermont, but we can still slow its spread, giving people more time to prepare for it.

- **Shiny green beetle.** Tiny — about the size of a grain of rice.
- **Lays eggs in ash trees** — its larva eat the inside of the tree, cutting off its circulation. The tree can't move the sap that keeps the tree alive.
- **How insect is spread:** Emerald ash borer is spread when people take **firewood** that has emerald ash borer eggs or larvae in it and move it to a new place. Because the eggs and larva are inside the wood, and very small, people do not know they are spreading the pest.
- **Clues (or signs and symptoms):**
  - Woodpeckers flecking bark off the tree looking for larva to eat.
  - Sprouts coming out of the main trunk of the tree.

Hemlock Woolly Adelgid

Hemlock Woolly Adelgid is established in Southern Vermont. It is important to look for it and to clean off our outdoor clothes and gear, so we do not spread it further.

- **Protects itself with white, fuzzy, "wool".** Looks like tiny cotton balls about half the size of the end of a cotton swab – the size of this dot (show dot by cotton swab on card).
- **Attacks hemlock trees** by sucking out the sap at the base of the needles, causing them to fall off. Without their needles the trees starve and slowly die.
- **How insect is spread:** Hemlock woolly adelgid can be spread by people or animals. If you brush against a hemlock branch the tiny adelgids can get onto your clothes, or an animal's fur and then be brought to a new place.
- **Clues:** See tiny white balls along the twigs on the underside of a hemlock branch.

Asian Longhorned Beetle
(Also known as Starry Sky Beetle)

Asian Longhorned Beetle is not known to be in Vermont. It is important if you think you see this insect, to report it.

- **Big beetle with long black-and-white antennae.** About an inch to 1 ½ inches long.
- **Larva chew big holes** tunneling into the insides of maple and other trees.
- **Trees become weak and fall apart.** Their favorite tree is maple.
- **How insect is spread:** Just like emerald ash borer, the main way Asian longhorned beetle, or the starry sky beetle is spread is when people move infested logs or **firewood.**
- **Clues:**
  - Dime-sized bite marks in bark where adults lay eggs.
  - Holes as wide as a pencil where the adult comes out of the tree.
  - Sawdust-like material around the tree from the adult chewing its way out.

Spotted Lanternfly

As of summer 2025, Spotted Lanternfly is not established in Vermont — we want to keep it that way. It's important to check your things for egg masses if you visit a state that has Spotted Lanternfly.

- **Suck the sap from plants and trees.** They do not kill most trees, but they can kill grape vines.
- **The adults are large,** about one inch long and a half inch wide.
- **They excrete a sticky substance called "honeydew"** that covers everything below it and attracts black mold. When there are many spotted lanternflies in one place it is not nice to be outside.
- **How insect is spread:** Spotted lanternfly will lay their eggs on any solid surface – even cars, camp chairs and bicycles. When the car or other item is moved, it spreads the insect to a new place.
- **Clues:** No clues needed — if they are around, you will see the adults!

Ask: What Can We Do to Not Spread These Insects to New Places? (2 minutes)

Ask players to name things they can do. You can show the VTinvasives.org/ How Invasive Insects Spread card.

- **Don't move firewood** long distances. Always use or buy firewood as close to your campsite as possible or buy specially treated firewood from a store.
- **Brush off your clothes**, backpacks, pets, and horses off when leaving trails.
- **Check your car** to make sure it does not have spotted lanternfly egg cases on it if you go someplace where there are spotted lanternflies.
- **Tell other people** what you have learned about these pests.
- **Take a picture and report it** to VTInvasives.org, if you find one of these pests or see their signs. Most states have websites where you can report invasive pests. In Vermont, it is VTinvasives.org. If you see a pest or its clues, take a picture and report it!

Play the Game – see Instructions (15 – 20 minutes)

After Playing Game: Review (2 – 5 minutes)

Raise your hand if you can share something about:

- **How to identify** one of the pests?
- **A clue** about one of the pests?
- **How to avoid spreading** one of these pests?
- **What to do if you find one of these pests,** or see a clue?
- OR: **What was one new thing you learned?**

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