

Forest Health

for: K-7

A general forest health lesson plan
(Produced to accompany the Market Outreach
Mountain Pine Beetle Package)

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Forest Health

Learning Outcome: To raise an awareness of various health issues that can affect the well being of our forests.

Curricular Connections:

K/1 - Life Science

- Plant and animal life cycles

Grade 2/3 - Life Science

- Animals in the environment.
- The balance among organisms and their environment.

Grade 4 - Life Science

- Adaptations of organisms.
- Environmental changes that affect animal behaviour

Grade 5 - Life Science

- The study of living resources.
- Sustaining a living resource.

Grade 6 - Life Science

- Classification of organisms.

Grade 7 - Life Science

- The study of ecosystems.
- The study of stages of recovery of a damaged ecosystem.
- Each living thing has some effect on all other living things in a community.

Materials:

- Lesson plan with picture page (*make an overhead of the picture page*)
- “Pheromone Frenzy” CD (*Download song*)
- Market Outreach Mountain Pine Beetle video (*Video is available in all BC schools with intermediate grades or download from www.beetleinfo.com*)

Contact local forest companies for the following samples or download pictures from www.beetleinfo.com (click on gallery)

- Mountain Pine Beetles
- Gallery sample
- Blue stained wood sample

Introduction: Brainstorm Activity:

- What types of things can affect your health?
Possible answers: colds, flu, break a limb, major problems like cancer...
- The forest is a living organism, just like you. Can you think of health problems a tree might have? (life threatening and non-life threatening)
Possible answers: windstorms can break branches or uproot trees, diseases, beetles, defoliators (insects that eat the needles/leaves), fire...

Lesson Part 1: FIRE

- What do we need to have fire?
Answer: Oxygen, fuel and a heat source.
- What are some heat sources for fire?
Possible answers: Lightning, matches, discarded cigarettes, untended campfire, spark from a passing truck or train.
- A fuel source is any material that can burn. What are some fuel sources in the forest?



- Possible answers: Dry vegetation (dead branches, needles, brush on the forest floor, standing dead trees), wooden structures & trees stressed by drought or insects
- Oxygen is always available in our air.
- Fire can be a positive and a negative influence on the forest. It is nature's way of renewing the forest. A "cool fire or controlled burn" will rid the forest of dry woody debris on the forest floor, aid lodgepole pine cones to open so that seeds can be dispersed and thin out unwanted trees/shrubs that may compete with an established or new forest for water, and nutrients.
- A "hot or uncontrolled fire" can destroy a forest and surrounding areas but it is also nature's way of controlling bark beetle attacks or bringing about succession. A FOREST IS ALWAYS IN A STATE OF CHANGE... THIS IS NATURE'S WAY!
- Some trees, like the Douglas fir, have very thick bark, which helps to protect them from fire.
- Fire won't always kill a tree but it can weaken a tree, making it more susceptible to attack from pests and disease.

Lesson Part 2: CLIMATE – WIND & WATER

- Wind or lack of water puts stress on a tree and may weaken it, making it more susceptible to fire, pests and disease.
- A stressed tree is more likely to break or uproot in a windstorm.

Lesson Part 3: DISEASES:

- Diseases can attack different parts of the tree, damaging or killing the tree.
Examples: Armillaria Root Rot girdles the root system, which supplies water and nutrients to the tree thereby killing the tree.
White Pine Blister Rust infection takes place on the bark of the tree and if it spreads to the trunk of the tree the tree will die.
(Overhead: Show the pictures of the signs of these 2 diseases)

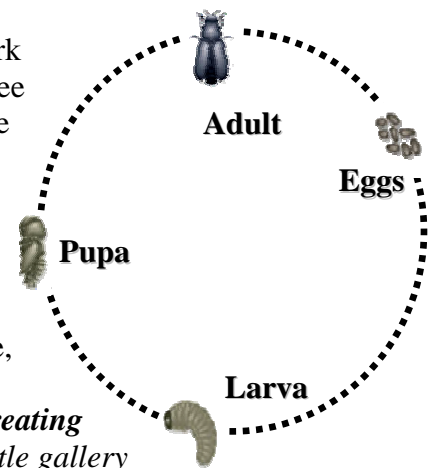
Lesson Part 4: PESTS that defoliate trees.

- Pests can defoliate (eat the needles/leaves of the tree) a tree. Without needles photosynthesis (Chlorophyll in the needles convert sunlight into sugar) cannot occur which can cause severe stress to the tree, decreasing its ability to withstand fire or beetle attack. Defoliators do not usually kill a tree unless a tree is attacked for multiple years.
(Overhead: Show the pictures of the larva stage of some defoliators)

Bark Beetle Life Cycle

Lesson Part 5: PESTS that burrow under the bark

- Bark Beetles will attack trees by burrowing under the bark bringing in a fungus, which stains the wood blue. The tree will try to defend itself by “pitching” the beetle out. (tree uses its pitch/sap to force the beetle out of the tree.) In a major attack, trees often die. (*Show beetles and blue stained wood sample.*)
- The female beetle looks for a good host. Depending on the type of beetle, she will choose a mature or stressed tree or perhaps a downed tree. When she finds a host tree, she gives off a pheromone or scent, which attracts other beetles to the tree. The female tunnels under the bark, *creating galleries or tunnels* in which to lay her eggs. (*Show beetle gallery sample.*) Every bark beetle will go through the same life cycle stages, only the timing differs from one beetle to the next. The new mature beetle will leave the tree and look for a new host, beginning the cycle all over again.
- The design of the galleries that the beetle makes is different for each species of bark beetle. (*Overhead: Show the beetle galleries*)
- Today, our province has a major problem with the Mountain Pine Beetle; the attack has reached epidemic proportions and is out of control. The video in this package is going to tell you the story of the Mountain Pine Beetle. Remember that beetles are a natural and important part of the forest. The problem today is that the Mountain Pine Beetle is out of balance in nature, causing an epidemic. (*Optional in BC Schools: Watch the video to learn more about the Mountain Pine Beetle.*)



Closure:

- People and trees have a lot of similarities when looking at health issues... disease, drought, broken limbs, and pests can all weaken living organisms.
- A tree weakened by fire, wind, drought, disease or pests is more likely to be affected by a second health issue.
- Not all stresses will kill a tree. Trees have defense mechanisms that can help to protect them.
- **Trees are renewable.** Nature will replace a dead or dying forest. Forests have withstood glaciers, catastrophic fires, beetle attack and disease because they will reforest themselves. With present reforestation policies, forest renewal is guaranteed. Today, the aim of the forest industry is to manage our forests in such a way that catastrophes are less likely to happen... a way in which we can manage our forests as a sustainable resource.
- End the lesson by playing the Song “**Pheromone Frenzy**”

Forest Health

Diseases: Visual signs of infected trees.

Armillaria Root Rot



White fan-shaped fungus growing under the bark



Many mushrooms growing around the base of the tree

White Pine Blister Rust



A canker has formed on the trunk of the tree. Resin (sap) is also running down the trunk of the tree.

Defoliating Insects: Larva stage (*Adult stage is a moth.*)

Western Spruce Budworm



Attacks Douglas fir

Western Hemlock Looper



Attacks Western Hemlock

Douglas fir Tussock Moth



Attacks Douglas fir

Bark Beetles: Galleries (*Adult beetle size is the same as a grain of rice.*)



Mountain Pine Beetle



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Spruce Beetle



Douglas fir Beetle

