

Lesson Plan

- Fire and the Ecosystem -

OBJECTIVE:

Students will:

- Learn about the fundamentals that are required for a fire to occur
- Assess the different variables that affect the behaviour of a fire
- Identify the different types and classifications of fire
- Determine how fire affects the ecosystem (Positive and Negative)
- Describe the how to reduce the occurrence of urban interface fires
- Analyse the historic use of fire and determine the causes of forest fires (Natural/Manmade)

CURRICULAR CONNECTIONS:

- Science 8 - Applications of Science/Life Science: Global Ecosystems
- Biology 11 - Plant Biology (Gymnosperms and Angiosperms)
- Resource Science: Forests 11 - Forests and Society, Forest Ecology, Plants
- Resource Science: Forests 12 - Management perspectives, Fire Management
- Geography 12 - Resources of the Earth (Management of Resources)
- Socials 10 - Resource and Environmental Management
- Socials 11 – Environmental Issues
- Career and Personal Planning 11 and 12 - Career Exploration

MATERIALS REQUIRED:

- Overheads:**
 - Guided note package
 - Fire Ranking
- Guided Note Package (for students)**
- Answer Key to Guided Note Package**
- Crossword Puzzle**
- Optional: Fire Behaviour Lab and materials**

LESSON PLAN

A) Introduction (10 min)

Brainstorming Activity: 5 minutes for students to answer 2 questions and 5 minutes to discuss the student's ideas

Questions:

- What is needed to start a fire? (*oxygen, fuel, heat*)
- What affects how a fire behaves? (*fuel, topography, weather*)

B) Guided Note Package (30 - 40 min)

- Using overheads of the note package, have the students fill in the missing parts in the guided note package
- Get classroom discussion on each part of the note package

C) Conclusion (10 - 20 min)

Choose one or more of the following:

1. Review of Lesson

- Get students to complete the crossword puzzle using the note package

2. Prepare for Fire Behaviour Lab (to happen next class)

- Divide students into groups
- Review each group members role in
- Make Hawkes Boards (optional: teacher may want to make them)

This Lab requires a minimum of 1 hour to complete, preparing for the lab on the previous class is highly recommended

Fire and the Ecosystem

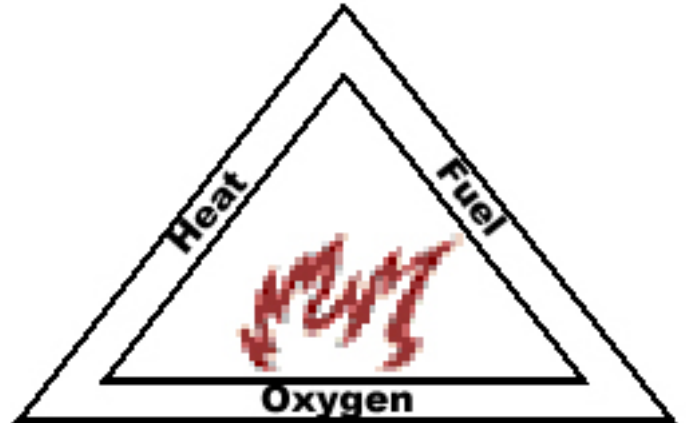
- teacher answer key -

1. Fire Fundamentals Triangle

Heat – refers to a pilot source that triggers ignition and heat release sustains the combustion reaction

Oxygen – required for combustion, and is affected by fuel arrangement (ie. The more spread out the more oxygen can feed the fire, more compacted fuel the less oxygen present)

Fuel – materials that burn

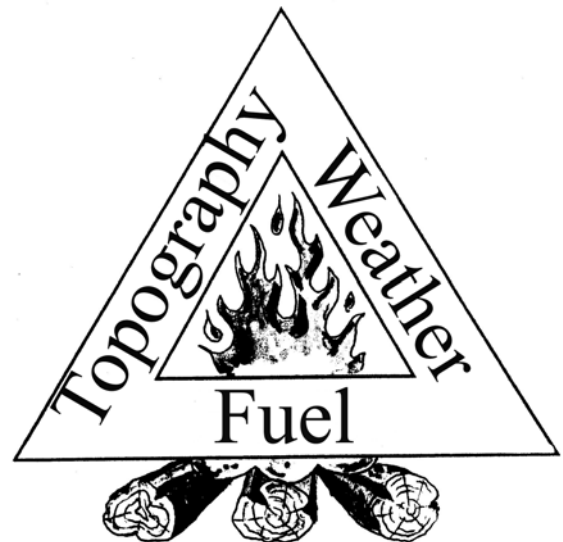


2. Fire Behaviour Triangle

Weather – relative humidity, wind velocity and direction, temperature, precipitation, and cloud cover

Topography – slope steepness, barriers to fire spread, aspect, and elevation

Fuel – moisture content, quantity, size, arrangement, continuity, and seasonal condition



3. The Affects of Forest Fires on an Ecosystem:

Positive	Negative
Renewal of the forest and the landscape	Loss of merchantable timber
Recycling of nutrients back into the soil	Destroys human development
Balance insect populations ie. Bark Beetles	Cause erosion problems
Help to thin overstocked areas	Air quality issues from smoke
Create more vegetative diversity	Displacement of wildlife
Reduce tree diseases	Causes stress to trees which increases the chance of diseases and insect infestation

4. Urban Interface Fires

Definition: Fires that burn forested land located in and around communities, consequently putting many people at risk.

General Facts:

- 3 000 000 000+ people live in BC
- Forest fires are a fact of BC life
- On average 2500 forest fires occur in BC each year
- There is a huge shift to live in “urban interface” (forested) areas
- There is training sessions every year to help prepare for wildfires, but this doesn't mean there is a 100% success rate in combating fires

Steps to Help Protect Your Home and Property:

Awareness – Being aware of the potential hazards in and around your property

that may promote fire spread. To reduce urban interface fires or fire spread it is

Important that you create a “fire safe landscape”:

- Remove dead needles/branches from your roof and eaves
- Reduce ground fuels and prune areas of heavy vegetation
- Remove ladder fuels (lower branches) to 2 meters above the ground
- Prune branches around power lines
- Move your wood pile 10-15m from your house
- Work with neighbours to clean up area between homes
- Choose building, roofing & chimney materials that are fire resistant

Preparedness – Being prepared and ready in the event of a wildfire:

- Know a fire escape/community evacuation route
- Have a list of possessions to take in case of an evacuation
- Know the phone number to report a forest fire
- Have smoke alarms and a charged fire extinguisher in your home
- Have fire tools easily assessable (ie. Axe, shovel, bucket, hose, ladder)
- Know proper procedures in the event of a fire (ie. Carry a flashlight and
Portable radio at all times, leave inside lights on, keep all inside doors closed,
remove combustible materials from around the house/deck (lawn chairs))

~ It is easier to control a fire along the ground than in the trees ~

5. Fire Intensity Rank – Based on a mature Lodgepole Pine stand
➤ **Show Fire Ranking Overhead**

Rank 1: smouldering ground or creeping surface fire

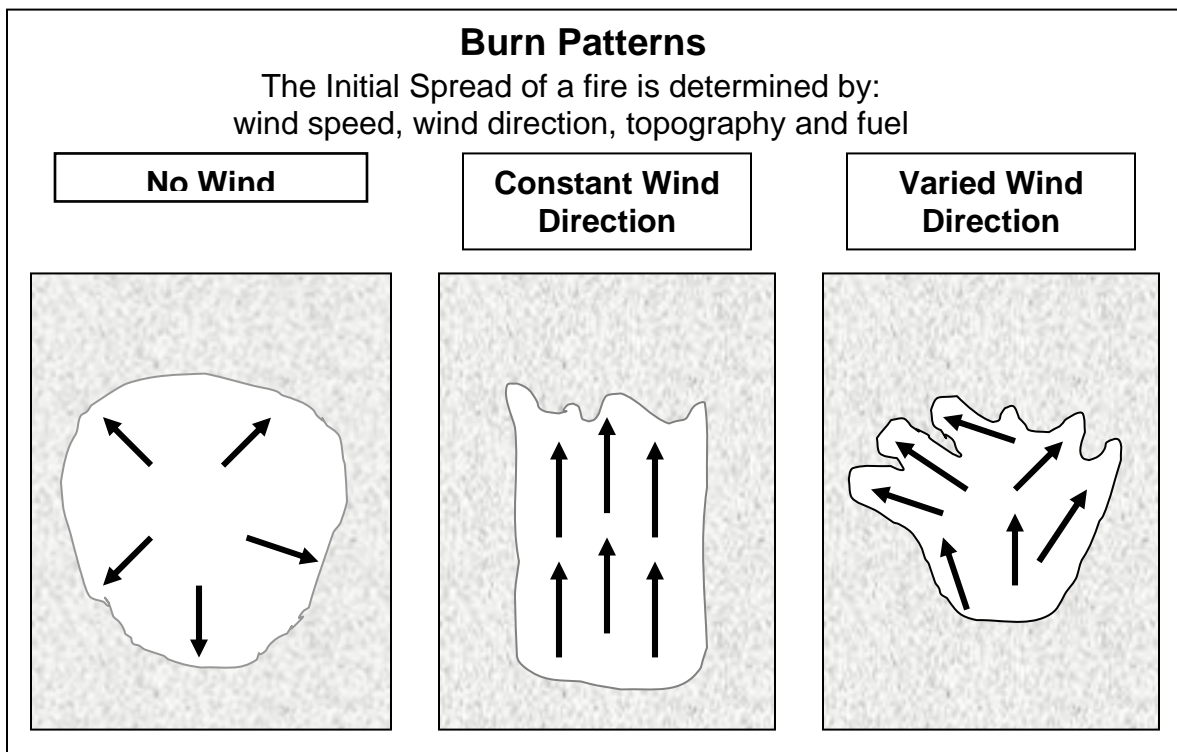
Rank 2: low vigour surface fire

Rank 3: moderately vigorous surface fire

Rank 4: Highly vigorous surface fire, torching/passive crown fire

Rank 5: extremely vigorous surface fire or active crown fire

Rank 6: blow-up, extreme fire behaviour



6. First Nations' Historic Use of Fire

First Nations people used fire to alter the successional stage of an area which

increased plant diversity and growth for wildlife and food

- Tanning buck skin using smoke
- Warmth
- Spirituality
- “Smudge”- using smoke to keep insects off of meat, protection against insect bites

7. Fires in the Past

- On average 45-50% of forest fires in BC are human related every year
- Major forest fires tend to occur every 4-5 years (see graph below: 1994, 1998, 2003)



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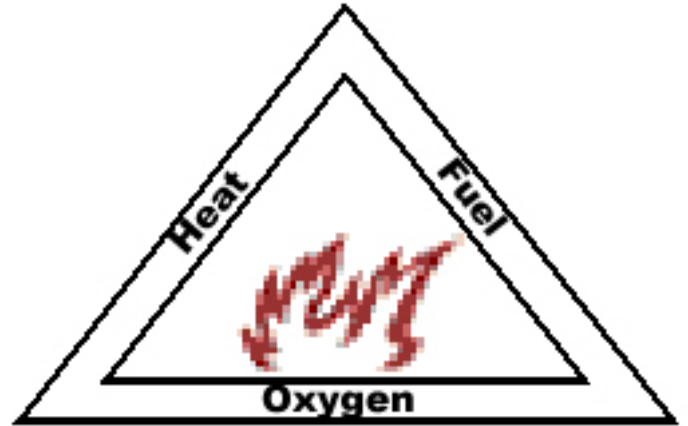
- Student guided note package -

1. Fire Fundamentals Triangle

Heat –

Oxygen –

Fuel –

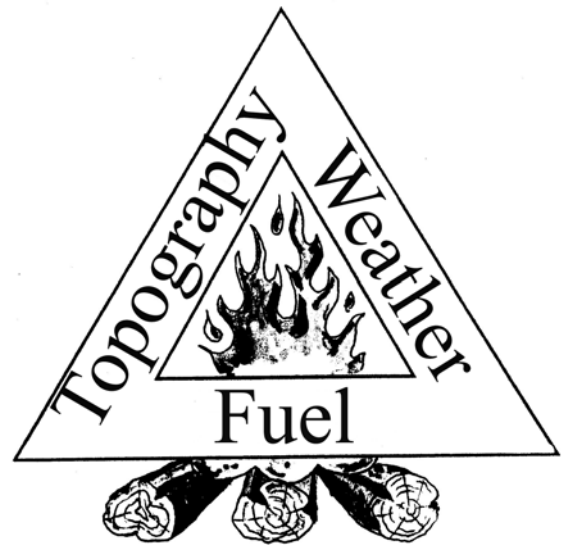


2. Fire Behaviour Triangle

Weather –

Topography –

Fuel –



Steps to Help Protect Your Home and Property:

Awareness – Being aware of the potential hazards in and around your property that may promote fire spread. To reduce urban interface fires or fire spread it is important that you create a “fire safe landscape”:

- _____
- _____
- _____
- _____
- _____
- _____
- _____

Preparedness – Being prepared and ready in the event of a wildfire:

- _____
- _____
- _____
- _____
- _____
- _____
- _____
- _____
- _____

~ It is easier to control a fire along the ground than in the trees ~

5. Fire Intensity Rank – Based on a mature Lodgepole Pine stand

Rank 1: _____

Rank 2: _____

Rank 3: _____

Rank 4: _____

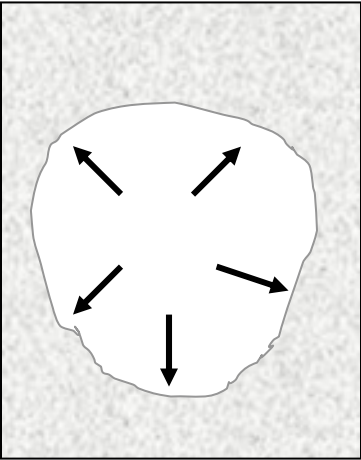
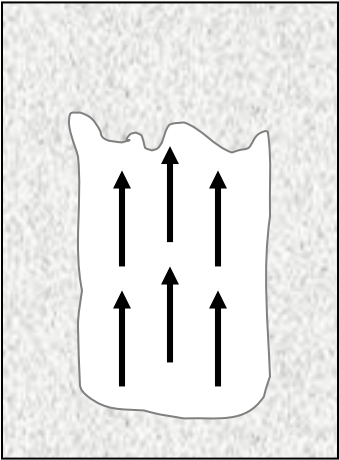
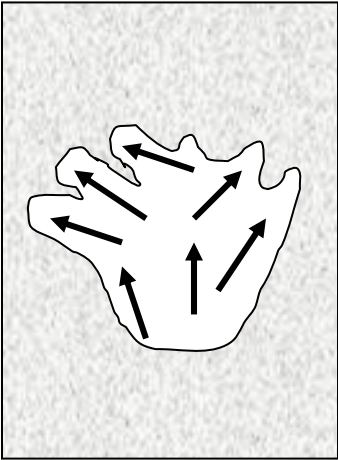
Rank 5: _____

Rank 6: _____

➤ **Show Fire Intensity Rank Overhead (Pictures)**

Burn Patterns

The Initial Spread of a fire is determined by:
wind speed, wind direction, topography and fuel



















6. First Nations' Historic Use of Fire

7. Fires in the Past



FIRE RANK

A Fire Description

RANK 1	RANK 2	RANK 3	RANK 4	RANK 5	RANK 6
NO OPEN FLAME WHITE SMOKE SMOLDERING GROUND FIRE	VISIBLE OPEN FLAME SURFACE FIRE ONLY UNORGANIZED FLAME FRONT LITTLE OR NO SMOKE	ORGANIZED SURFACE FLAME FRONT MODERATE RATE OF SPREAD VIGOROUS SURFACE FIRE	ORGANIZED SURFACE FLAME FRONT MODERATE TO FAST ROS ON THE GROUND SHORT AERIAL BURSTS GREY TO BLACK SMOKE	ORGANIZED CROWN FIRE FRONT MODERATE TO LONG RANGE SPOTTING INDEPENDANT SPOT FIRE GROWTH BLACK TO COPPER SMOKE	ORGANIZED CROWN FIRE FRONT MODERATE TO LONG RANGE SPOTTING INDEPENDANT SPOT FIRE GROWTH PRESENCE OF FIRE BALLS AND WHIRLS
					
					
					

DEFINITIONS:

Ground Fire - A fire that burns in the ground fuel layer.

Surface Fire - A fire that burns in the surface fuel layer, excluding the crown of trees.

Crown Fire - A fire that advances throughout the crown fuel layer.

Head - The portion of the fire having the greatest rate of spread and frontal intensity.

Flanks - Those portions of the fire that are between the head and the base.

Base - That portion of the fire perimeter opposite the head; the slowest spreading part of the fire.

Rate of Spread - The speed at which a fire extends its horizontal dimensions, expressed in terms of distance per unit time.

Candling - A single tree or a small clump of trees is said to candle when its foliage ignites and flares up, usually from bottom to top.

Spotting - A fire producing firebrands carried by the surface wind.
A fire whirl and/or convection column that falls beyond the main fire perimeter, and results in spot fires.

Flame Front - The strip of primarily flaming combustion along the fire perimeter; a particularly active fire edge.

Organized Front - A flame front exhibiting all the same characteristics, ROS (Rate of Spread), flame height and length.