



# Fire: Agent of Change

Age range: 16 to 18 (Senior)

Time: two 75-minute classes on computer, one in class

Subjects: Science, Geography

Resources: Internet access,

*Understanding Fire Ecology and Prescribed Burns* (page 38), *Planning a Prescribed Boreal Burn* (page 39) and *Mapping a Prescribed Burn* (page 40) worksheets.

## Learning Outcomes

Students will analyze the role of natural fires and prescribed burns in the life and management of the boreal forest.

## Hook: The Power of Fire

To introduce students to fire and fire management in Canada's boreal forest, gather some statistics, then facilitate a question-and-answer session for the class. To access statistics and facts about fire and the boreal, visit:

### Ontario

<http://affm.mnr.gov.on.ca/spectrasites/internet/affm/fire.cfm>  
In *Fire Information*, select *Fire Statistics* and/or *Current Fires*.  
In *About Forest Fires*, select *Fire Management Facts*.

### Alberta

[http://www3.gov.ab.ca/srd/wildfires/fpd/mfp/mfp\\_pub.cfm](http://www3.gov.ab.ca/srd/wildfires/fpd/mfp/mfp_pub.cfm)  
Select *Wildfire Information*.

### Manitoba

<http://www.gov.mb.ca/conservation/fire/>  
Select *Current* or *Archived Information*.

### Saskatchewan

<http://www.se.gov.sk.ca/fire/>  
Select *Wildfire Information*.

### Canada

[http://nfdp.cfm.org/compendium/fires/tables\\_index\\_e.php](http://nfdp.cfm.org/compendium/fires/tables_index_e.php)

### Natural Resources Canada

Report: *The State of Canada's Forests 2003-2004* available at  
[http://www.nrcan-rncan.gc.ca/cfs-scf/national/what-quoi/sof/latest\\_e.html](http://www.nrcan-rncan.gc.ca/cfs-scf/national/what-quoi/sof/latest_e.html)

## Procedure

- 1** During the first two class periods, give students the worksheets *Understanding Fire Ecology and Prescribed Burns* (page 38) and have them complete the questions by consulting with the provincial Web sites it lists.
- 2** During the third class, review what they have learned and ask them to share their answers.
- 3** Individually or in groups, ask students to plan a prescribed burn using the handout *Planning a Prescribed Boreal Burn* (page 39) and *Mapping a Prescribed Burn* (page 40).
- 4** After the students are finished, have them discuss their answers.

## Extensions

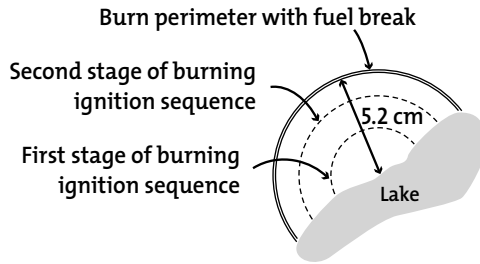
Watch the video *Wildfire: A Force of Nature* [King Motion Picture Corporation, 29 minutes 1995, English only; [www.thislivingworld.com](http://www.thislivingworld.com) or (800) 630-7840]. Visit [www.learnforestry.com](http://www.learnforestry.com), the Web site of the British Columbia network of forest educators. In *Lesson Plans*, you will find a *National Forest Week* teaching package entitled *Force of Fire*.

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## ✓ Answers

### Planning a Prescribed Burn (page 39)

1. The prescribed burn should be located along the northwestern shore of the lake.



2. 
$$\begin{aligned} \text{Area of burn} &= 40 \text{ hectares} = \frac{1}{2}\pi r^2 \\ 40 &= 0.5 (3.14) r^2 \\ 40 &= 1.57 r^2 \\ 26.1 &= r^2 \\ \text{square root of } 26.1 &= r \end{aligned}$$
Therefore  $r$  (radius of semicircle) = 5.2 cm (see #1).

3. To create a fuel break you must:
  - cut down the trees in a two or three-metre swath (the width of one bulldozer blade) along the burn perimeter
  - use heavy equipment to displace leaf litter so that only soil and some stumps remain.

Note that a soil barrier does not guarantee the fire will be contained within the burn area. Weather and wind conditions are the deciding factors.

The tree-cutting crew requires chainsaws, hard hats, chainsaw pants, eye protection and steel-toed boots.

The heavy equipment operators need hard hats, eye protection and steel-toed boots. Of course, everyone needs training in the proper use of the equipment and first-aid certification.

4. See #1.
5. One crew must be responsible for complete implementation of ignition. Most other crews should be placed along the various ignition lines, with an emphasis near any hazards (e.g. clear-cut) just outside the burn. A couple of crews should be on stand-by in trucks, ready to go where needed.
6. Possibly. It depends on wind direction and whether the smoke is at ground level or high above the ground. Sometimes ground-level smouldering is evident the morning after the burn, so traffic assistance may then be needed.

# Understanding Fire Ecology and Prescribed Burns

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On a separate piece of paper, answer the following questions.

## 1. The Role of a Forest Fire

- What are three common effects of a forest fire on plants and trees?
- Describe five specific effects of a forest fire on various wildlife species.

For information, visit:

- ▶ Ontario – <http://affm.mnr.gov.on.ca/spectrasites/internet/affm/fire.cfm>  
In *About Forest Fires*, select *Science of Fire*, then *Fire Ecology*.
- ▶ British Columbia – <http://www.for.gov.bc.ca/protect/burning/prescribedfire.htm>  
Read *Fire in Nature*.
- ▶ Manitoba – [http://www.gov.mb.ca/conservation/parks/popular\\_parks/fire83/](http://www.gov.mb.ca/conservation/parks/popular_parks/fire83/)  
Consult *Introduction* and *Section 1: Reborn of Fire*.
- ▶ Saskatchewan – <http://www.se.gov.sk.ca/fire/insect-disease>  
Select *Fact Sheet 7: Fire Ecology*.

## 2. Prescribed Burning

- Describe eight situations in which prescribed burns are conducted; provide specific examples for each.
- List and explain five factors that are considered when planning the location, size and ignition of a prescribed burn.

For information, visit:

- ▶ Ontario (as above) –  
In *Managing Fire*, select *Prescribed Fire*.  
In *Issues in Fire Management*, select *Prescribed Burns*.
- ▶ Alberta – [www3.gov.ab.ca/srd/wildfires/fpd/mfp/mfp\\_pub\\_wm\\_prescribed.cfm](http://www3.gov.ab.ca/srd/wildfires/fpd/mfp/mfp_pub_wm_prescribed.cfm)
- ▶ Manitoba – [www.gov.mb.ca/conservation/forestry/](http://www.gov.mb.ca/conservation/forestry/)  
In *Forest Renewal*, select *Site Preparation*; scroll down to *Prescribed Burning*.
- ▶ Saskatchewan – [www.se.gov.sk.ca/fire/insect-disease](http://www.se.gov.sk.ca/fire/insect-disease)  
Select *Fact Sheet 5: Prescribed Burning*.

## 3. Introduction to Planning a Prescribed Burn

You will now participate in an interactive exercise introducing the decision-making process for planning a burn. It takes about 60 to 75 minutes to complete, and can be done in pairs.

- ▶ Go to <http://www.tallgrassontario.org>
- ▶ Select and read *Fire and the Prairie*.
- ▶ Select and read *Prescribed Burns*.
- ▶ Select and read *Prescribed Fire Decision Support System*. At the bottom of this Web page, click to begin.
- ▶ Follow the instructions, agree to the software licensing agreement and answer the questions.

Upon completion, examine the output data based on your input variables.

- What is the significance of having deer on-site?
- What is the significance of site visibility?
- What is the cost and time commitment to conduct the burn?
- Describe some of the factors that need to be considered with regard to internal and external communications.



# Planning a Prescribed Boreal Burn

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You are the Burn Boss. The planning and safe execution of this prescribed boreal burn is your responsibility. Wildlife, your crews, and people in the surrounding area are counting on you to do your job correctly. This section of boreal jack pine forest will be burned mainly to help prevent and/or contain future forest fires.

As part of the necessary paperwork for a prescribed burn (all 10 cm of it!), you must draw a map and outline the steps the burn crew will follow. Before the burn, you must also contact the public, alert emergency services, arrange for traffic assistance on nearby roads due to smoke, receive approval to proceed, monitor weather forecasts and conduct a final weather check on burn day.

On a separate sheet of paper, answer the following questions.

**STEP 1:** The small lake in this area provides an ideal moisture break that you will use to contain the fire. The wind usually blows from the northwest. On the *Mapping a Prescribed Burn* worksheet on page 40, draw a semicircular area where the burn should be placed.

**STEP 2:** Based on the number of people and heavy equipment available to you, this burn will be about 40 hectares in a semi-circular shape (1 hectare on the map = 1 cm<sup>2</sup>). Using the equation for area of a semi-circle, solve for radius and draw the burn perimeter (a line enclosing the semi-circular burn area).

$$\text{Area of burn} = 40 \text{ hectares} = \frac{1}{2}\pi r^2$$

$$\text{Therefore } r \text{ (radius of semicircle)} = \underline{\hspace{2cm}}$$

**STEP 3:** All along the burn perimeter, your crews must create a fuel break.

a) What are the two tasks involved in this?

b) List the equipment that is required to do this work; include safety equipment.

**STEP 4:** The prescribed burn ignition sequence will occur in three stages. Draw a line inside the burn area along which you will start the fire, and then another line along which you will introduce the second-stage burning. The third stage will occur along the perimeter.

**STEP 5:** You have seven fire control crews at your disposal. Describe where you will place your crews during each stage of burning.

**STEP 6:** Explain the conditions under which you will need to direct traffic on the road due to smoke from the prescribed burn.





# Mapping a Prescribed Burn

