

# **Unit C: Forest Management**

**Lesson 4: Understanding the Role of  
Fire in Forest Management**

# Terms.

- Crown fires
- Crowning out
- Fire behavior
- Fire season
- Fire triangle
- Ground fires
- Ignition temperature
- Incendiary fires
- Prescribed fire
- Surface fires
- Updrafts
- Wildfire

# The Purpose of Prescribed Fire

- A **prescribed fire** is a managed, intentional fire set by humans for a specific purpose.
- A prescribed fire is usually controlled and contained within a specific area.

# The Purpose of Prescribed Fire

- A properly controlled prescribed fire produces several benefits for the forest, wildlife, and people.



## Some of the benefits are:

1. Reducing the hazard of wildfire by removing fuel from the forest floor.
  - A **wildfire** is a fire that endangers people or property, which is not within an area designated to be managed by the use of fire, or that, in conjunction with weather or other conditions, may threaten to expand, thus endangering people, property, or non fire-management areas.

# Benefits of a Prescribed Fire

2. Preparing sites for seedlings and planting.
  - A prescribed burn can remove other plants that will act as competition for nutrients and water to the new trees.
3. Removing undesirable trees and brush cluttering the forest understory.

# Benefits of a Prescribed Fire

4. Assist in controlling forest diseases.
5. Improves the quality of grass for grazing by removing brush and dried weeds.

# The Purpose of Prescribed Fire

- The use of prescribed fire as a management technique should only be conducted by a trained forester.
- It is a difficult task to perform safely.
- Here are some factors that should be adhered to in the safe use of prescribed fire.

# Safe Use of Prescribed Fires

1. Weather conditions - Only a small area should be burned at a time.
  - The humidity and moisture content in the forest must not be too low.
  - There should only be a slight breeze.

# Safe Use of Prescribed Fires

2. Fire intensity - The fire must not be allowed to get too hot.

- High heat intensity can cause the leaves of trees to wilt, damaging the trees.
- The heat can also cause the cambium layer under the bark to literally cook.

# Safe Use of Prescribed Fires

3. Fire containment - The fire must not be allowed to get out of control.
  - If a prescribed fire breaks containment, it becomes a wildfire and can cause great damage.

# Different Types of Forest Fires

- Forest fires are categorized into three general types: surface, ground, and crown fires.
- More than one of these types of fires may occur within the same forest fire.

# Surface fires

- These fires burn surface litter such as needles, leaves, and twigs on the forest floor and small vegetation.
- These are the most common kind of fires.

# Ground fires

- These fires burn the organic materials beneath the surface litter of the forest floor.
- They burn organic materials in various stages of decomposition that have accumulated on top of the mineral soil.
- In peat bogs or swamps, ground fires may burn many feet below the ground surface in the deep, organic material.

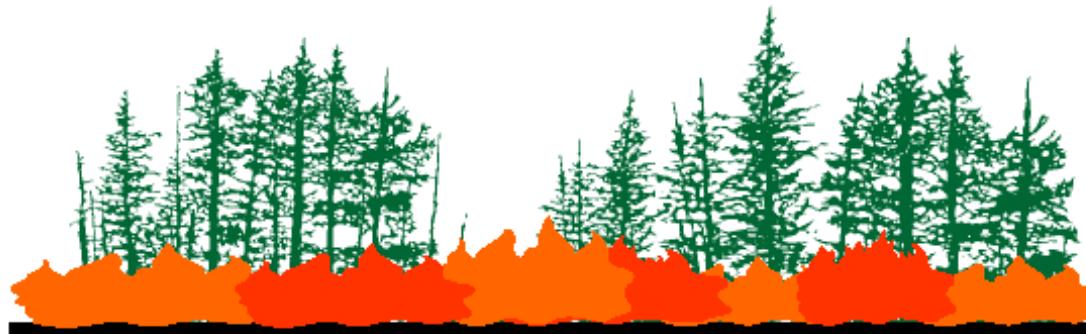
# Crown fires

- These fires burn from top to top of trees or shrubs, sometimes independently of a surface fire.
- However, crown fires almost always start as surface fires.
- When an abundance of surface fuel is present, fires may burn into the upper portion of trees.
- This is called **crowning out**.

# Crown fires

- Crown fires are the fastest spreading of all types of fires.
- They are more common in coniferous forests than deciduous forests because of the higher flammability of the coniferous foliage.

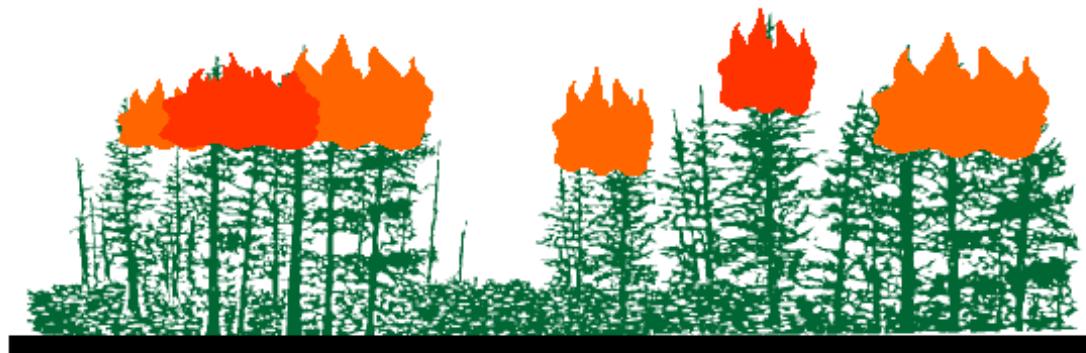
# **TYPES OF FOREST FIRES**



**SURFACE FIRES**



**GROUND FIRES**



**CROWN FIRES**

(Courtesy, Interstate Publishers, Inc.)

# Sources of Forest Fires

- Forest fires can be caused natural, often by lightning strikes.
- However, people cause the majority of forest fires.
- Some of the major sources of forest wildfires are:

# Incendiary fires

- This category of fires included malicious burning or arson.
- This also includes fires that were set as prescribed fires, but got out of control.

# Debris burning

- The burning of trash, brush, tree tops, and branches after harvest often gets out of control and causes a great deal of damage.

# Smokers

- Smokers were once a much more serious problem than they are today.
- Through education campaigns, the number of fires started by the careless discarding of a match or cigarette has been reduced.

# Railroads

- Like smokers, the number of fires started by railroad locomotives has dramatically been reduced.
- In the time of the steam locomotive, fires were more common as these machines produced sparks that often started fires.
- Also, fire was used to clear brush and grass from railroad tracks and right-of-ways.

# Lightning

- This is the main natural cause of forest fires.
- A bolt of lightning produces great heat, but during a rainstorm there is little danger of forest fire.



# What is a Fire Triangle?

- Fire is both a physical and chemical process.
- It is the result of quick combustion of oxygen with another substance.
- For a forest fire to occur, three things are required: fuel, oxygen, and heat.
- The relationship between these three can be illustrated as the **fire triangle**.

# Fire Triangle

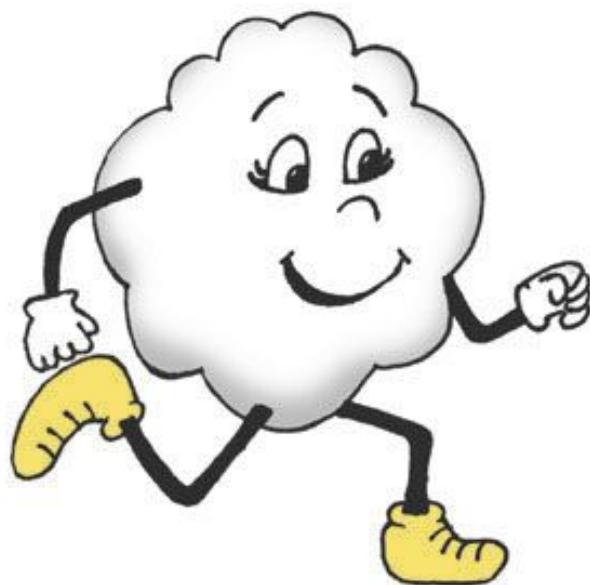
- For a fire to start all three factors within the fire triangle must be present.
- If one factor is removed, the fire goes out.
- This simple idea forms the basis for the very complicated and difficult processes of fighting forest wildfires and controlling prescribed fires.

# Fuel

- Fuel is something that can burn.
- Trees, dead leaves, grasses, forest litter, and many other things in the forest are combustible.

# Oxygen

- Oxygen gas makes up about 20 percent of the surface atmosphere.



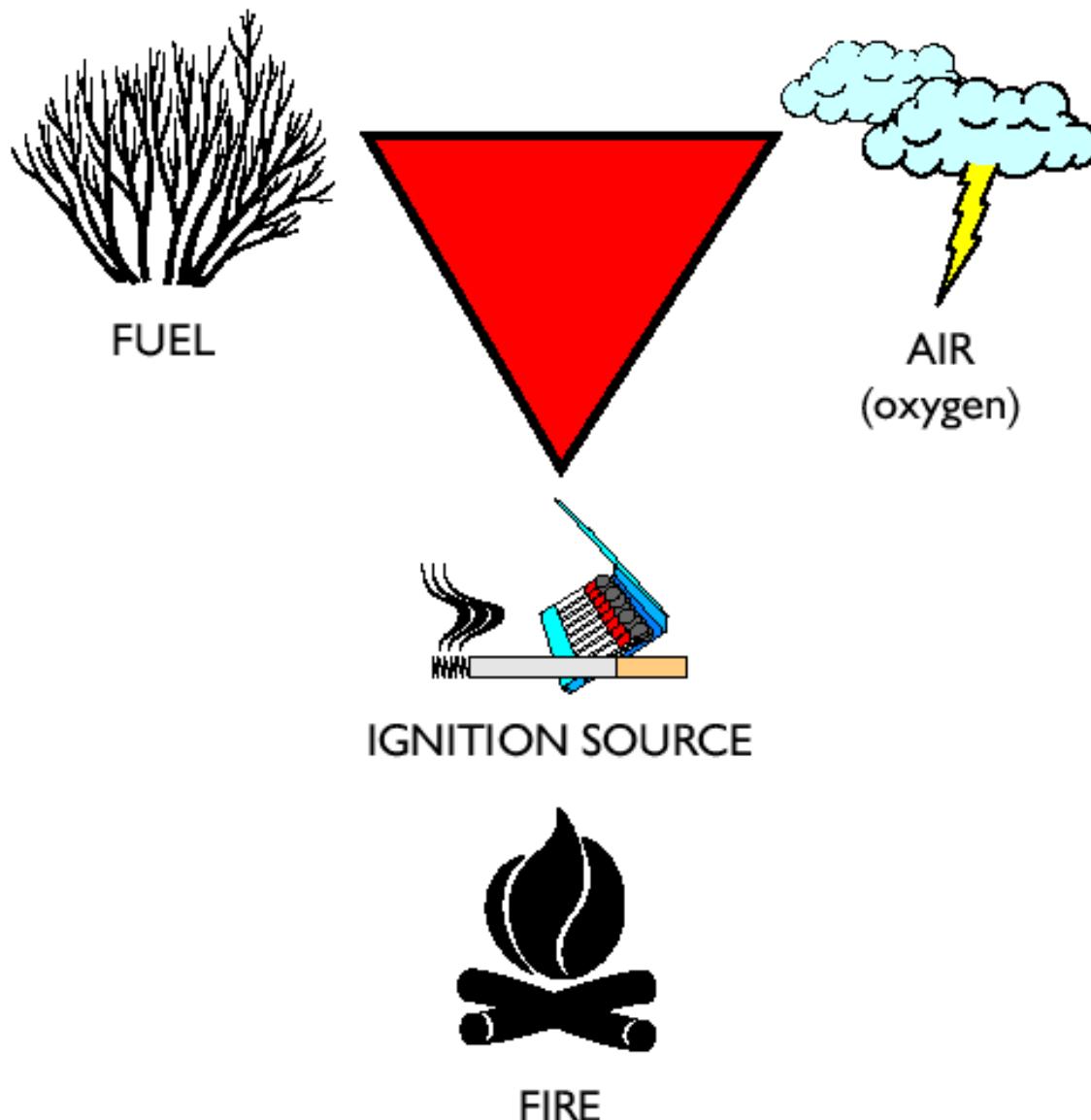
# Heat

- For a combustible material to burn, it must reach its **ignition temperature**.
- Most forest fuels have ignition temperatures of 316° to 471°C.
- The ignition temperature of an item is the same whether the material is wet or dry.

# Heat

- However, since water boils at a lower temperature, wet leaves and wood exposed to open flame do not get much above the boiling point of water until all the water evaporates.

# WHY A FIRE BURNS



**REMOVE ANY ELEMENT ABOVE TO STOP FIRE**

# Factors that Affect the Behavior of Forest Fires

- Fire behavior relates to what a fire does.
- Forest fires are capable of doing many things under a wide range of conditions.
- Some may burn very slowly while others may whip quickly through the tops of trees or brush at up to 8 kilometers per hour.

# Factors that Affect the Behavior of Forest Fires

- For this reason, a knowledge of fire behavior is essential to fire management activities.
- The behavior of a fire is related to its intensity and speed.
- Several factors must be considered in understanding fire behavior.
- These include:

# Fire Seasons

- The **fire season** refers to the time when the buildup of fuels and the occurrence of extended dry periods are greatest.

# Air Movements

- The speed and direction of the wind at different levels, including both horizontal and vertical movements, govern the duration and speed of a fire.
- Wind adds to the severity of a fire by drying out the vegetation and fuel.

# Air Movements

- Because hot air rises, fires tend to create their own winds, or **updrafts**.
- These updrafts may carry sparks into upper winds, which then scatter them into unburned areas and can cause the fires to grow.

# Topography

- The topography of the land has an important influence on the rate at which a fire spreads.
- The steeper the terrain, the more rapidly the fuel comes into contact with the flames.
- Steep slopes also increase the updraft, further speeding the fire's spread.

# Topography

- Generally, fires move up slopes, but some have also spread downward.
- Streams, highways, fields, and other areas serve as natural barriers to fires.

# Review / Summary.

- 1. Explain the purpose of prescribed fire.
- 2. Describe the different types of forest fires.
- 3. Identify sources of forest fires.
- 4. Explain the fire triangle.
- 5. Explain various factors that effect fire behavior.