

Theme: Fire Behavior – Effects of Fuels, Moisture, Winds & Slope

(See the Online Schedule for Week 3 for links)

A. FIRE TRIANGLES (nfb 3.1 = “new fire basics” item 3.1, on the Fire Basics website)

1. Why do we need two different “fire triangles” to capture the main factors affecting wildfires?
2. What are 3 factors that affect the ability of fuels to burn?
3. What are the 3 main weather factors (not counting precipitation & lightning) that affect the strength of a wildfire?
4. What does the word “aspect” mean when referring to a mountain slope, and why is it relevant to wildfire behavior?

B. BC FIRE RANKS (nfb 3.2)

1. A wildfire is producing lots of black smoke, with flames roughly 5 m tall (≈15 feet). Most of the tree tops (i.e., the crowns of trees) are burning. Winds are throwing embers large distances ahead of the main fire front, causing “spot fires”. What is the appropriate BC Fire Rank for this behavior?
2. What is the lowest fire rank that is too difficult for ground crews to fight using only hand tools?

C. FOREST MAPS AND LAYERS (nfb 3.3)

1. Where can you find boreal forests (tiaga) in Canada?
2. What characteristics of boreal forests are relevant to the behavior of wildfires?
3. Starting at the forest surface and looking upward, what are the names of forest layers?
4. Starting at the forest surface and looking downward, what are the name of the forest layers?
5. What is “peat”, and why is it relevant to wildfires? Is peat different from “deep duff”?

D. SLOPE EFFECTS (nfb 4.1)

1. If hot air from a wildfire wants to rise vertically due to its buoyancy, why does the hot air follow the mountain slope instead? (Explain in your own words.)
2. When wildfire hugs the slope, how does that allow the fire to advance faster upslope?
3. Is it possible for fires to advance downslope? Explain.

E. FIRE WEATHER METRICS - parts 1 & 2 (nfb 4.1 & 4.1)

1. What is the relationship between relative humidity in the air and fuel moisture? How does this relationship vary depending on the shape/size and live/dead nature of the fuels?
2. “Insolation” is a contraction of two words. What does it mean? What affects insolation at a forest, and why is it relevant to the behavior of wildfires?
3. What is a “diffusion flame” and why is it relevant to wildfires?
4. Where are “thermal belts” found, and how are they relevant to wildfires?
5. What is the difference between “crowning” and “torching” fire behavior?

F. FUEL CHARACTERISTICS (nfb 3.4)

1. What are ladder fuels, and why are they important for wildfires?
2. What aspects of the structure of the forest fuels are relevant to wildfire behavior?
3. What can happen if your description of forest structure is incorrect?

G. Fuel Moisture (nfb 3.5)

1. Moist fuels are harder to ignite. Summarize the moisture characteristics of living vs. dead fuels, and fuel types (evergreens, deciduous, grasses).
2. What is “equilibrium moisture content” of fuels, and how does it affect fuel moisture on non-rainy days?