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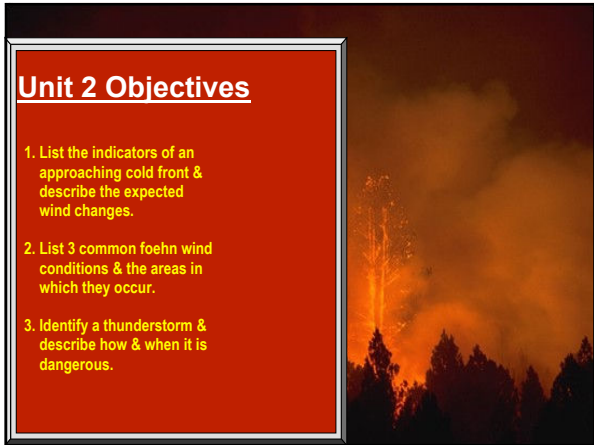
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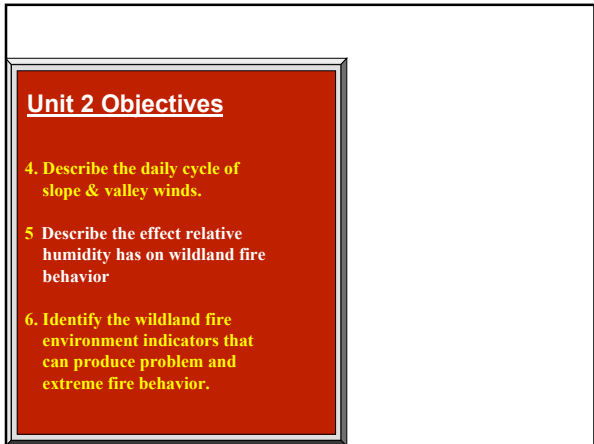
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**General or Gradient Winds**

Large scale winds caused by high and low pressure systems, but generally influenced and modified in the lower atmosphere by terrain.

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**Cold Front:**

A cold front is the boundary line between a cooler air mass which is replacing a warmer air mass.

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**Cold Front Indicators**

- Lines of cumulus clouds approaching from the west or northwest
- Large clouds of dust can precede the arrival of a cold front
- Shift in winds from the southeast, south, to southwest, and increase in velocity
- Winds will be strongest, erratic, and gusty as the front approaches.
- Winds will continue to shift as the front passes, generally resulting in strong, gusty, cool winds out of the west and northwest.

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## Dangers Associated with Cold Fronts

- Wind direction will abruptly change
- Strong southerly winds ahead of front will drive the fire head to the north or northeast
- Winds shifting to west or northwest after front passes will drive fire head to the east or south east.
- Rapid drop in relative humidity within 24 hours of front passage.

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### Foehn Wind

A dry wind with strong downward components, characteristic of mountainous regions

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### Thunderstorm

A storm produced by a cumulonimbus cloud and always accompanied by lightning, thunder, and strong gusty wind.

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## Visual Indicators of Thunderstorms

- Tall building cumulus clouds
- Dark flat base
- Virga or rain falling from cloud bottom
- Ice crystal top usually in anvil shape with fuzzy appearance.
- Cauliflower cloud appearance

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## Why Thunderstorms are Dangerous

- Produces strong gusty surface winds affecting direction of fire spread
- Downdraft winds will be erratic but always from the thunderstorm
- Thunderstorms also produce lightning which can be dangerous

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### Fire Whirls

Generated by intense fires can pick up large burning embers and toss them across fire lines causing spot fires

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**Fuel Indicators of Extreme Fire Behavior**

- Unusually dry fuels
- Large amount of light fuel (shrubs, grass, needles)
- Fuels exposed to direct sunlight
- Fuels dried by prolonged drought
- Ladder fuels that allow a surface fire to move into the crowns of shrubs or trees
- Crown foliage dried by surface fire
- Concentration of snags

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**Topographic Indicators of Extreme Fire Behavior**

- Steep slopes
- Chutes, saddles, and box canyons which provide conditions for “chimney effect.”
- Narrow canyons may increase fire spread by radiant heat and spotting
- Fire located on cape which can be impacted by sea breeze from three directions

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**Weather Indicators of Extreme Fire Behavior**

- Strong wind
- Sudden changes in wind direction and velocity due to weather
- High fast moving clouds may indicate unusual surface winds
- Unexpected calm may indicate wind shift
- Thunderstorms above or close to the fire
- Unusually high temperature and low relative humidity
- Dust devils and whirl winds developing
- Bent Smoke Column

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### General Indicators of Extreme Fire Behavior

- Keep an eye on the smoke column. Indicates direction of fire spread, spot fire locations, & changes in fire intensity
- Many simultaneous fires starting or smoldering fires beginning to pick-up in intensity
- Fire begins to torch small groups of trees or shrubs
- Frequent spot fires occurring
- Firewhirls beginning to develop inside main fire
- Crown fires

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#### Review

### Unit 2 Objectives

1. List the indicators of an approaching cold front & describe the expected wind changes.
2. List 3 common foehn wind conditions & the areas in which they occur.
3. Identify a thunderstorm & describe how & when it is dangerous.

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#### Review

### Unit 2 Objectives

4. Describe the daily cycle of slope & valley winds.
5. Describe the effect relative humidity has on wildland fire behavior
6. Identify the wildland fire environment indicators that can produce problem and extreme fire behavior.

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