

# The Wildland/Urban Interface



## Part A: The Fire Behavior and the Wildland-Fire Environment

*(Rev. 01/31/2006)*

# Objectives

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Students will learn:

- About California's wildland fire problem
- To understand the wildland fire environment
- Factors influencing wildfire behavior
- How to prepare homes for wildfire
- About special considerations for evacuation

# The Wildland Fire Problem

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California has one of the most severe wildland fire problems in the world because of:

- Population



# The Wildland Fire Problem

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California has one of the most severe wildland fire problems in the world because of:

- Population
- Vegetation



# The Wildland Fire Problem

California has one of the most severe wildland fire problems in the world because of:

- Population
- Vegetation
- Topography



# The Wildland Fire Problem

California has one of the most severe wildland fire problems in the world because of:

- Population,
- Vegetation,
- Topography, and
- Climate



In wildland/urban interface areas, wildfire isn't a matter of "IF," it's a matter of "WHEN."

# Local Conditions

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In California, thousands of people choose to build homes within or near wildland areas.

These areas are covered with flammable, native vegetation.

This environment may be desirable for some, but it comes with consequences.

# Local Conditions

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## VEGETATION = FUEL



California's native plants and shrubs are among the most flammable in the world.

Chamise, buckwheat and sage are referred to as *chaparral*.

Local hillsides and canyons are covered with these flammable plant materials.

# Local Conditions

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## VEGETATION = FUEL

In mountain areas, forests with large meadows are predominant.

Fire danger exists in this environment, as well.



# The Wildfire Environment



# How a Fire Burns...

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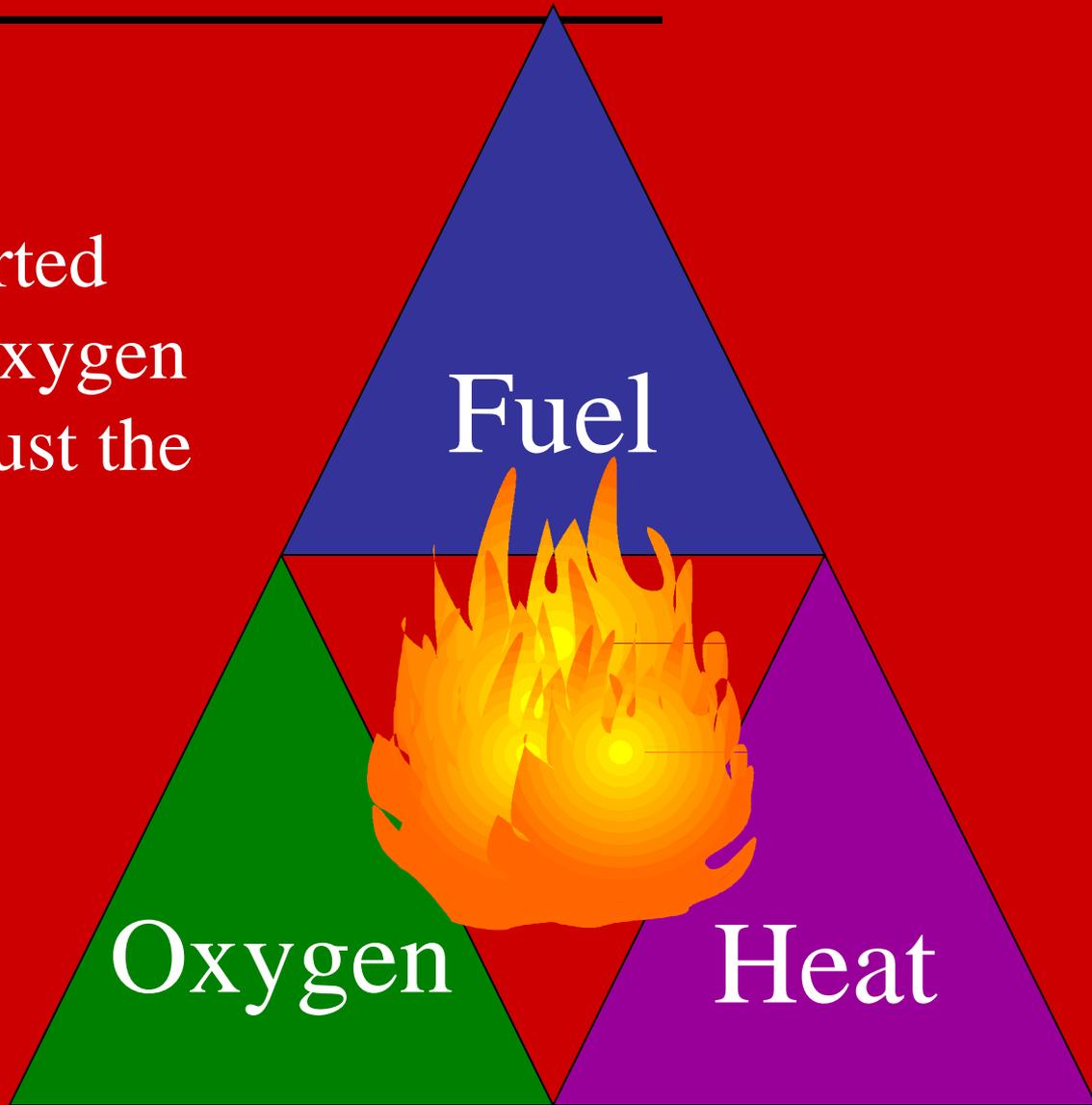


The act of burning is  
**COMBUSTION**

# How a Fire Burns...

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Combustion is supported when fuel, heat and oxygen (air) combine in the just the right amounts.

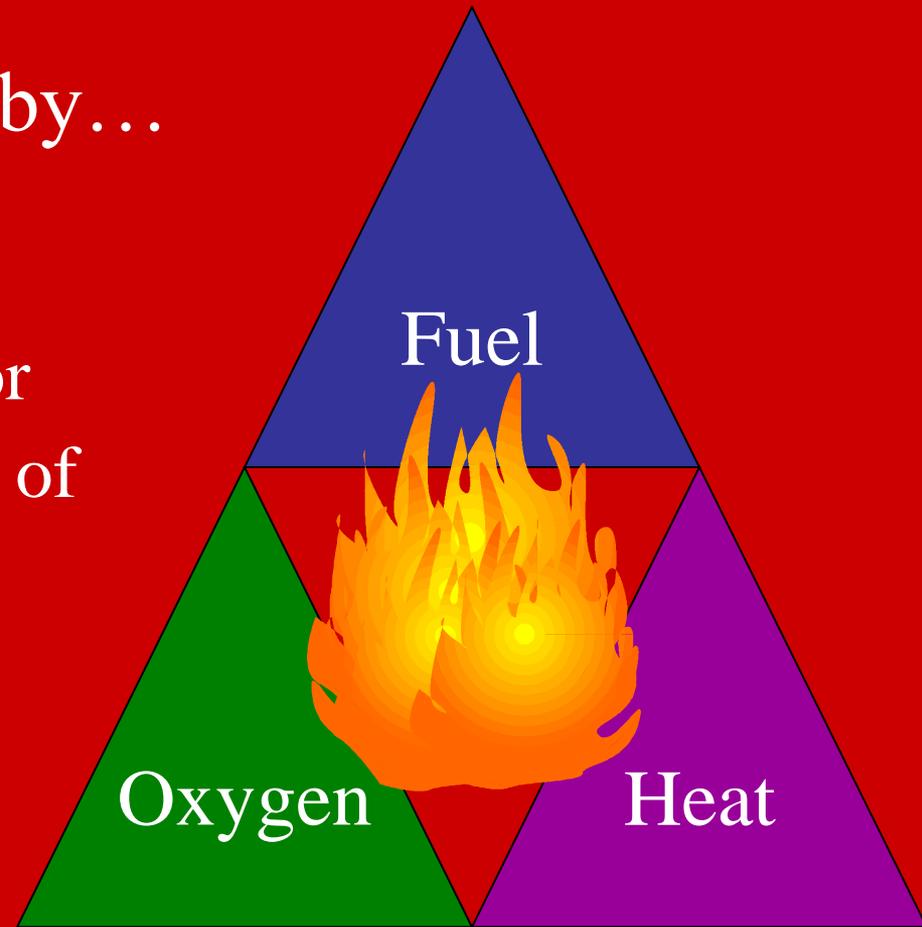


# How a Fire Burns...

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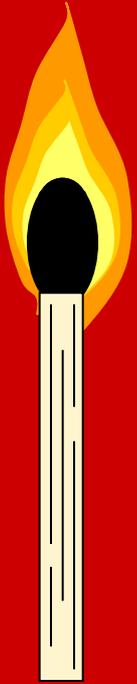
Combustion is interrupted by...

- Removing the fuel, or
- Removing the oxygen, or
- Cooling the temperature of the fuel



# How a Fire Spreads...

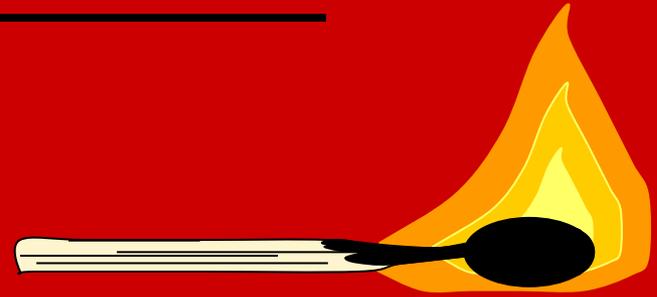
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Transfer of heat  
by contact

**Conduction**

*Slowest*



**Conduction and Radiation**

Transfer of heat by contact  
& through the air



**Conduction, Radiation,  
and Convection**

*Fastest*

Transfer of heat by contact,  
air and direction (rising)

# How a Fire Spreads...

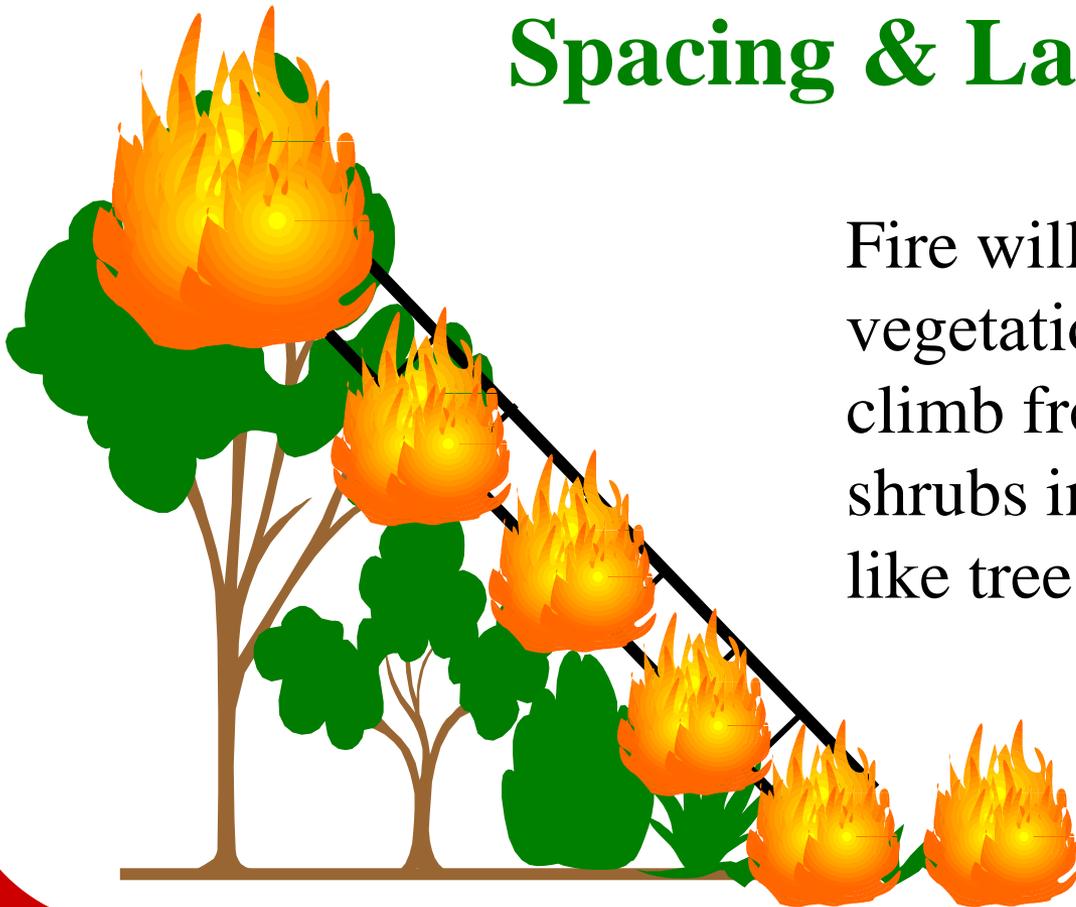
Factors that influence ignition and fire spread:

- ✓ Fuels
- ✓ Fuel moisture
- ✓ Fuel size
- ✓ Fuel continuity
- ✓ Vertical spacing
- ✓ Horizontal spacing



# How a Fire Spreads...

## Spacing & Ladder Fuels



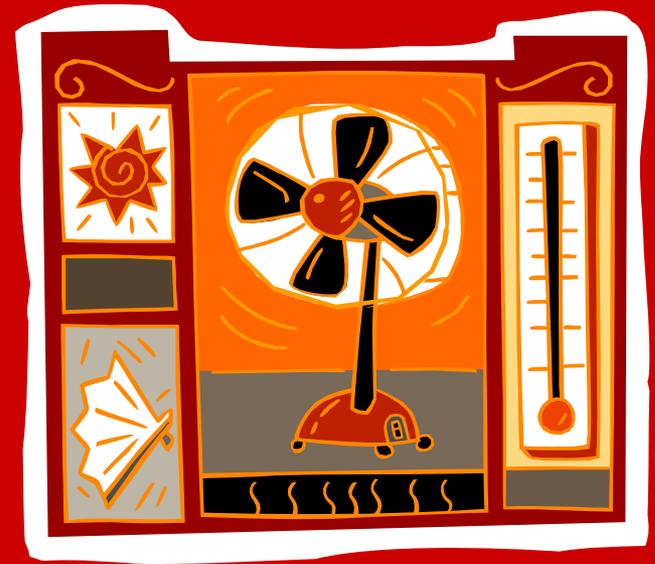
Fire will use tightly-spaced vegetation as a “ladder” to climb from surface plants and shrubs into aerial vegetation, like tree canopies.

# Weather & Wildfire...

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Three fundamental parts of weather have a significant impact on wildfire:

- Temperature
- Relative Humidity
- Wind



# Weather & Wildfire...

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## Temperature:



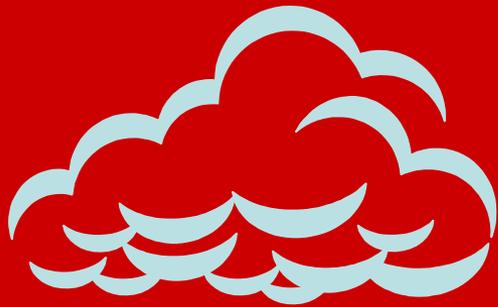
- Preheats fuels
- Preheats the ground
- Affects air currents
- Reduces firefighter endurance
- Reduces moisture in the air:
  - The higher the temperature, the lower the relative humidity

# Weather & Wildfire...

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## Relative Humidity:

- Water vapor in the air
- Expressed in a percentage
- Hot temperature = reduced humidity
- Cool temperature = increased humidity
- Higher humidity = higher fuel moisture
- Fires usually burn more rapidly during the day due to lower humidity

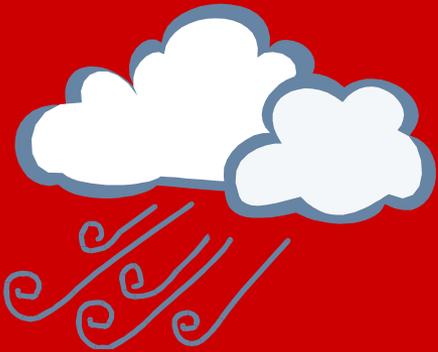


# Weather & Wildfire...

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## Wind:

- Has the greatest influence on rate and direction of fire spread
- “Bends” flames close to fuel
- Generally: blows up-slope during day  
blows down-slope at night
- Unpredictable
- Hazardous to firefighters



# Topography...

**Topography = the configuration of the land**

- Topography has significant affect on RATE and DIRECTION of fire spread.
- Three fundamental parts of topography:

SLOPE

ASPECT

TERRAIN

# Topography...

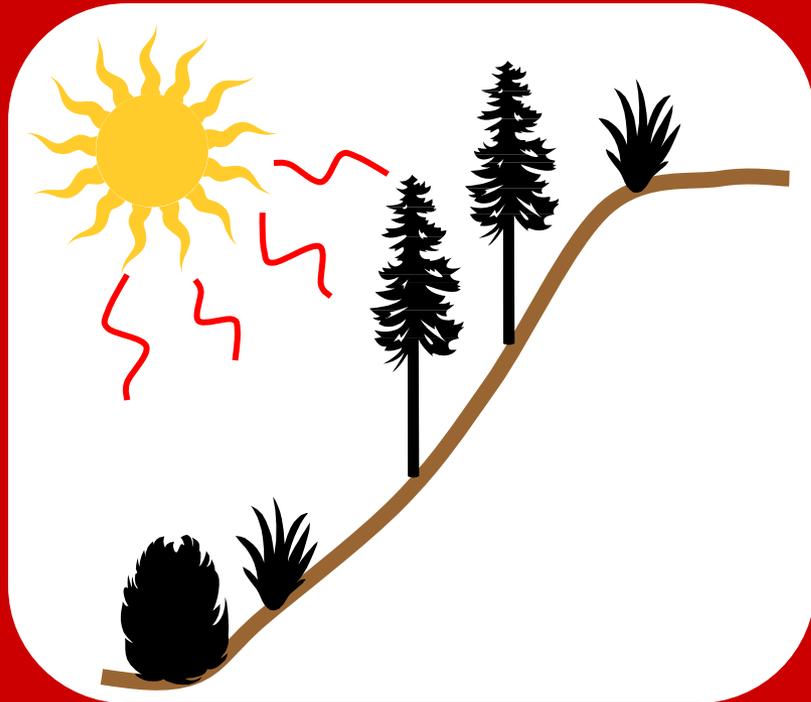
## Slope



- The steeper the slope, the faster the fire will move
- Slope influences fire by preheating fuels
- Wind currents usually flow uphill
- Convected heat causes a draft
- Burning material can roll downhill

# Topography...

## Aspect



- The direction a slope faces (N, S, E, W) affects the spread of fire
- Southern aspect:
  - receives more direct radiation
  - fuels are usually drier, but less dense
  - receives a stronger slope wind

# Topography...

## Terrain



- The “lay of the land”
- Obstructions include ridges & canyons
- Cause wind turbulence & erratic fire behavior
- Fires in canyons or steep drainages are **DANGER ZONES!**

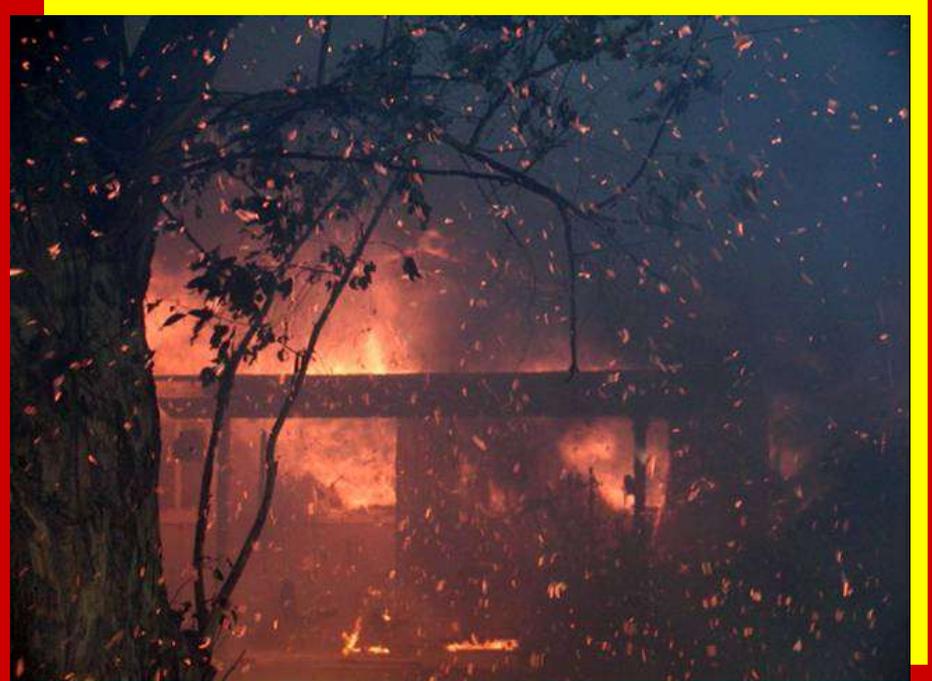
# Spot Fires: Fire Brands & Embers

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## **CONVECTION:**

Pieces of burning material are lifted into a convection column.

Embers settle on homes and vegetation far ahead of the fire-front.



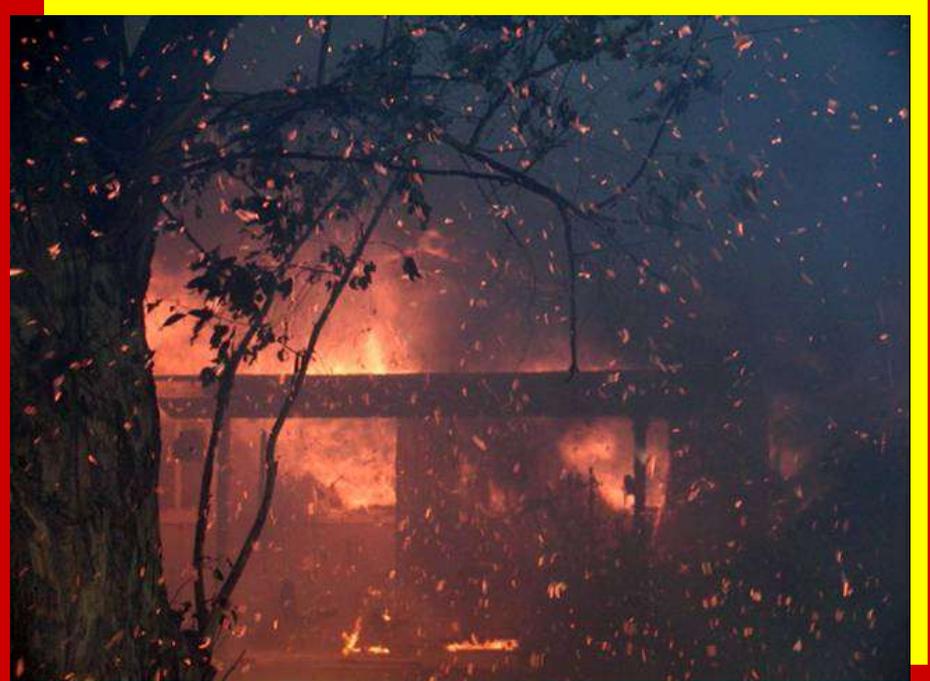
# Spot Fires: Fire Brands & Embers

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## **WIND:**

Causes short-range spot fires ahead of fire-front.

The combination of convection & wind can carry brands considerable distances, causing long-range spotting.





# Summary...

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- The Elements of Fire:
  - *Fuel, Heat, and Oxygen*
- Fire Spread:
  - *Convection, Radiation, Conduction*
- Weather and Wildfire:
  - *Temperature, Humidity, and Wind*
- Topography:
  - *Slope, Aspect, and Terrain*

# Fire in the Wildland/Urban Interface



This is looking west from the area of Tavern Road in Alpine as the fire jumps Interstate 8 and marches up through the communities Harbison Canyon and Crest.

# Beware & Prepare

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Defensible Space & Zones

The “Small Things”

Access & Egress

Special Considerations

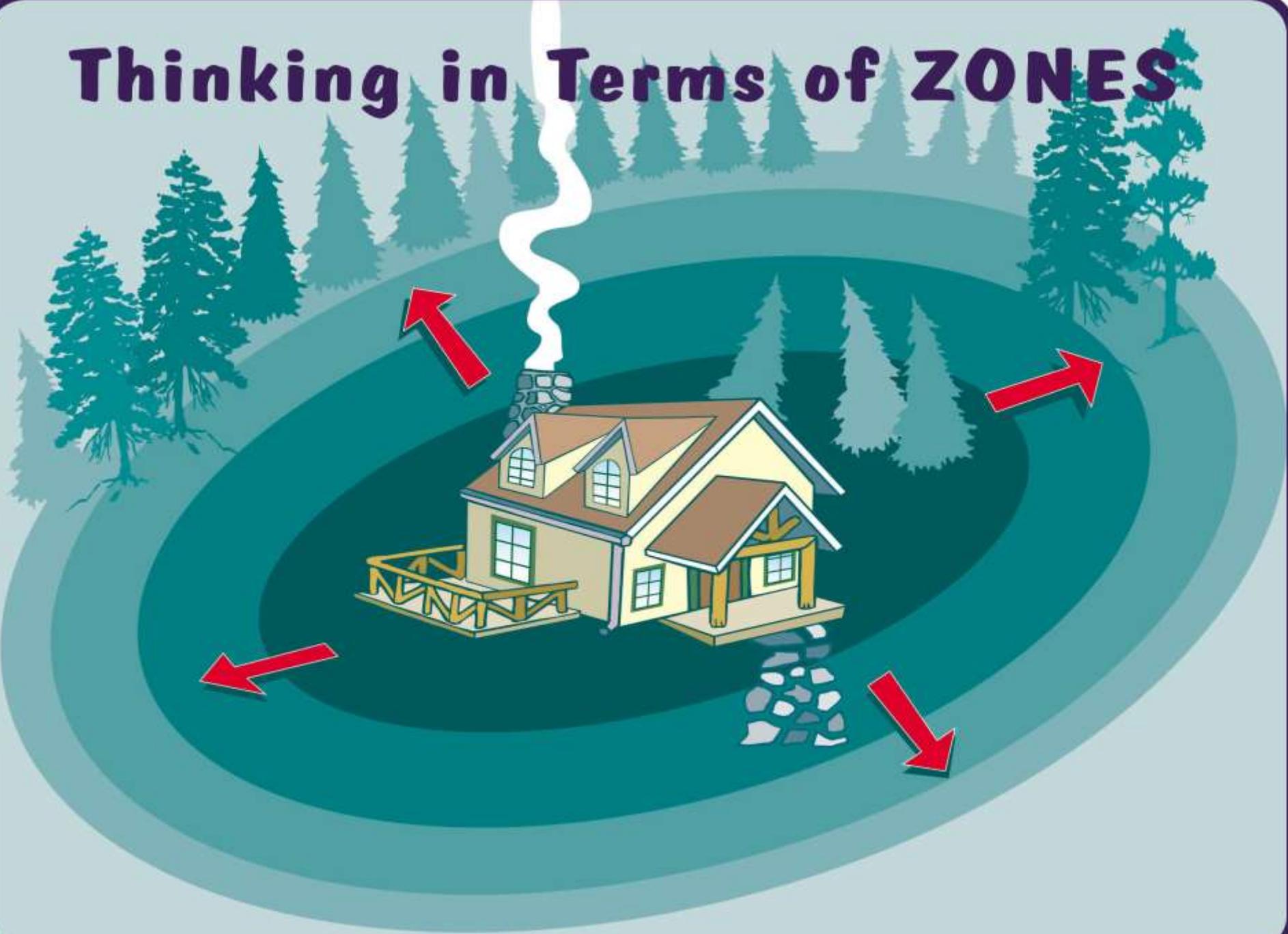
# Defensible Space

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An area surrounding structures that allows firefighters and equipment the space to defend against an approaching wildfire.



# Thinking in Terms of ZONES

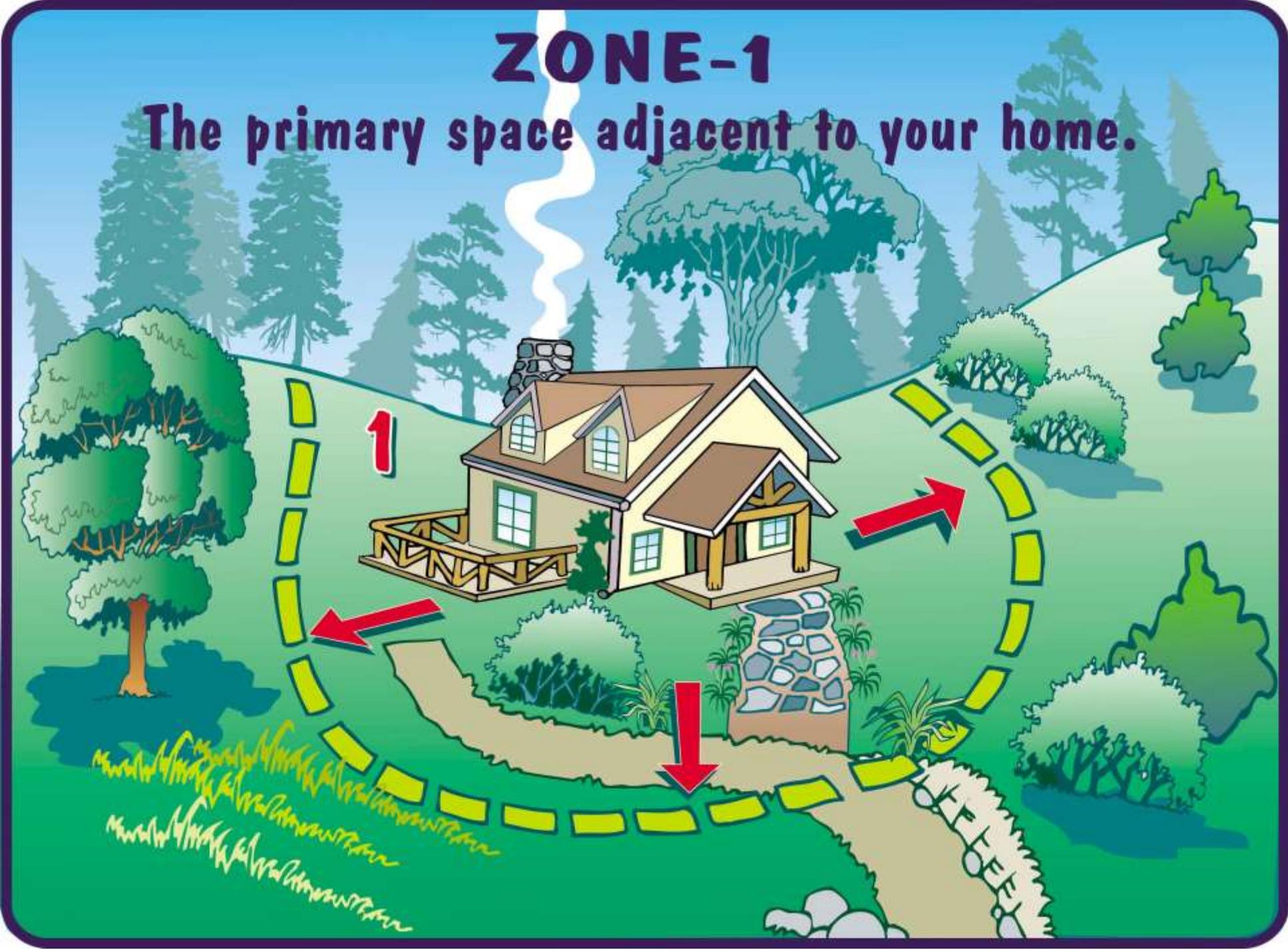


# YOUR HOME



# ZONE-1

The primary space adjacent to your home.

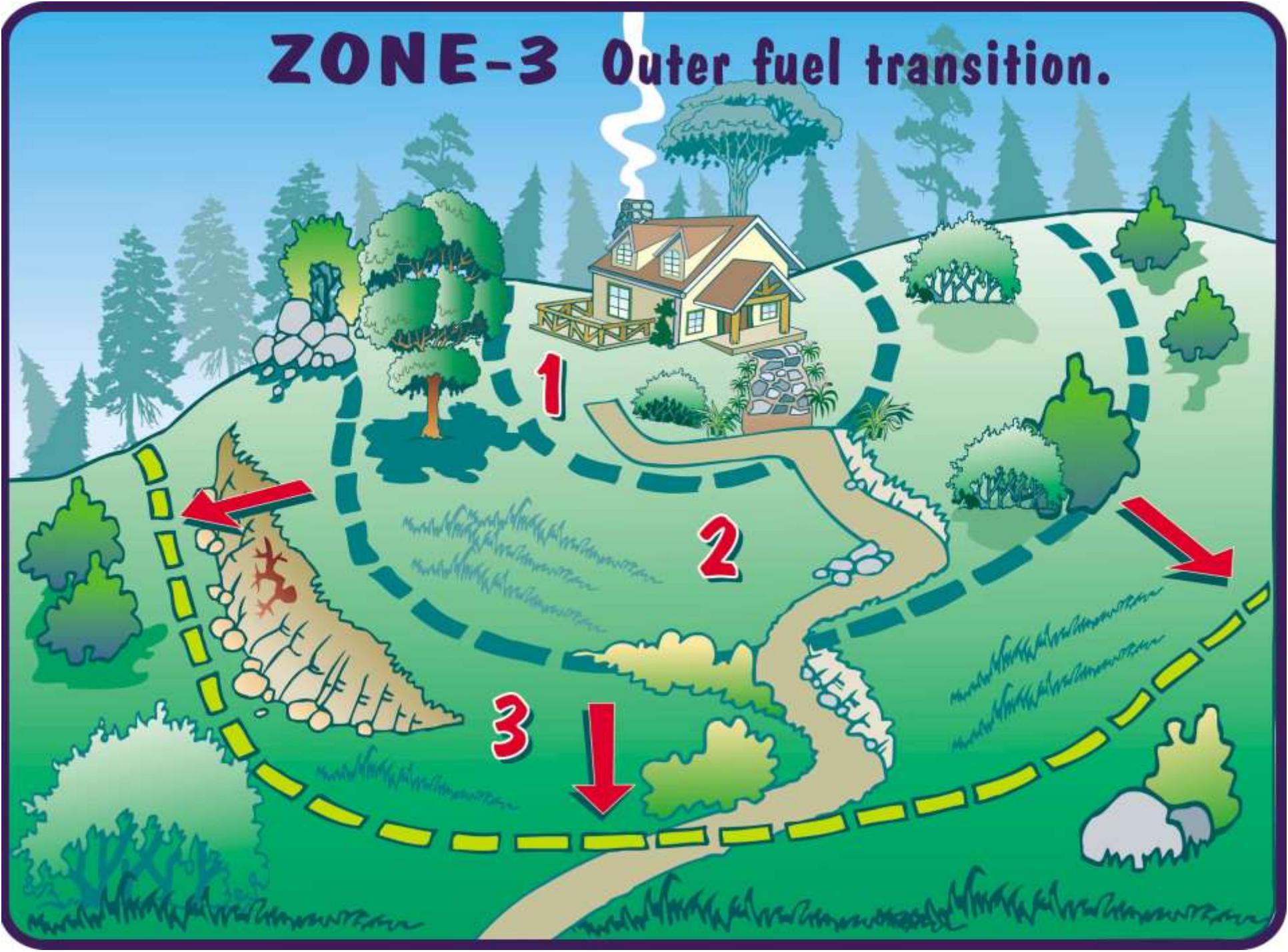


# ZONE-2

Secondary buffer area.

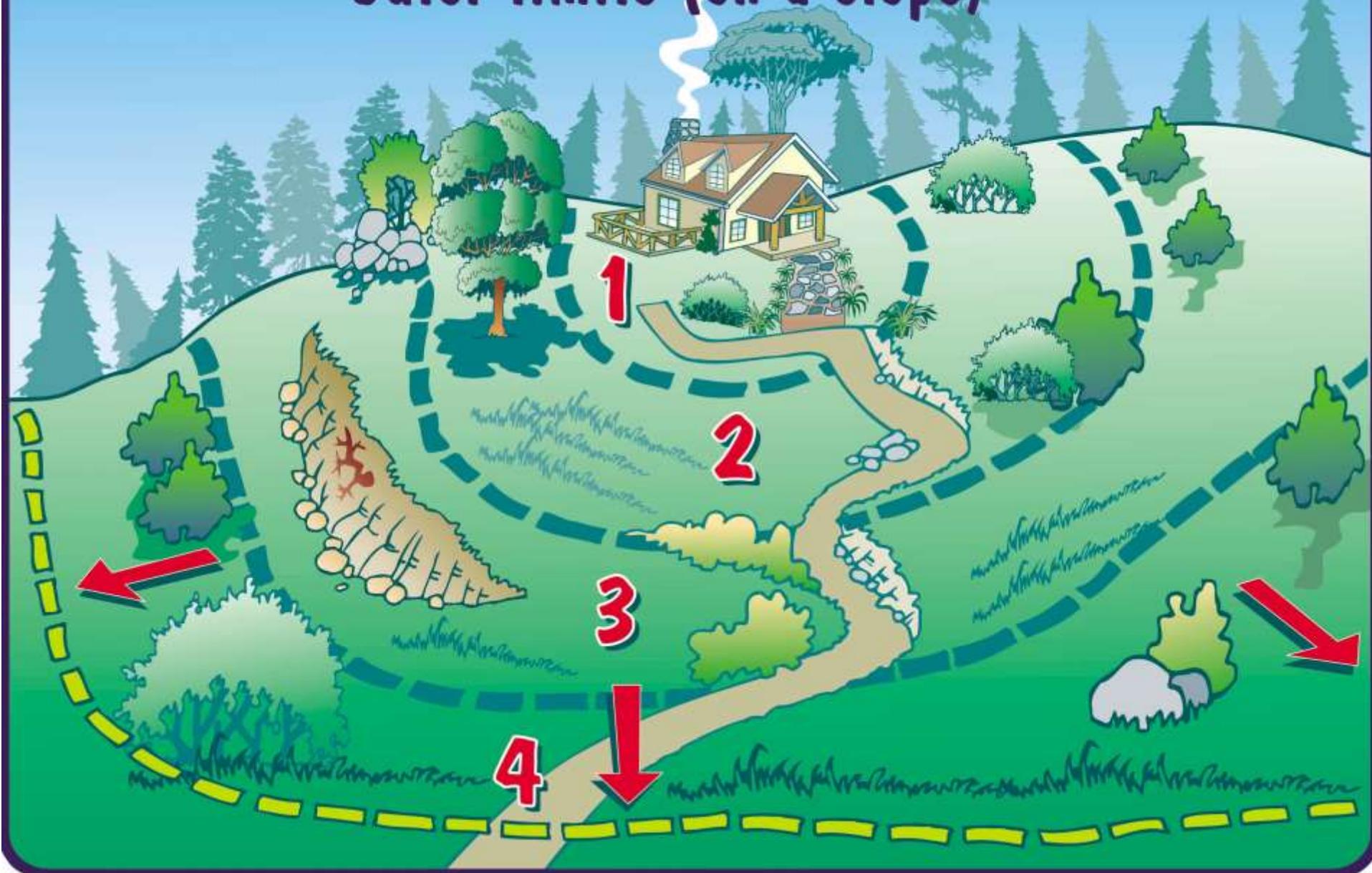


# ZONE-3 Outer fuel transition.



# ZONE-4

Outer limits (on a slope)



# The "Small Things"

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# YOUR HOME



**CHIMNEY**

**ROOF**

**GUTTERS**

**SIDING**

**WINDOW**

**DECK**

# IT'S THE SMALL THINGS



**CAULKING,  
WINDOWS  
& VENTS**

**DECORATIVE  
WOOD WORK**

**WIRE  
SCREENS**

**GUTTERS &  
DOWNSPOUTS**

# IT'S THE SMALL THINGS



SPACE BETWEEN SIDING & EAVES GABLES

VENTS & SCREENS

WINDOW BOXES

SPACKLE AROUND WINDOW

CELLAR WELLS & VENTS

# SLOPES, CHIMNEYS & SADDLES

**FIREBRANDS**



**Slope with  
Ladder Fuels**

**Saddle**

**Chimney**

## **Dangerous Areas**

**INDIRECT: Flying embers (FIREBRANDS) coming to rest on your home.**

# Access...

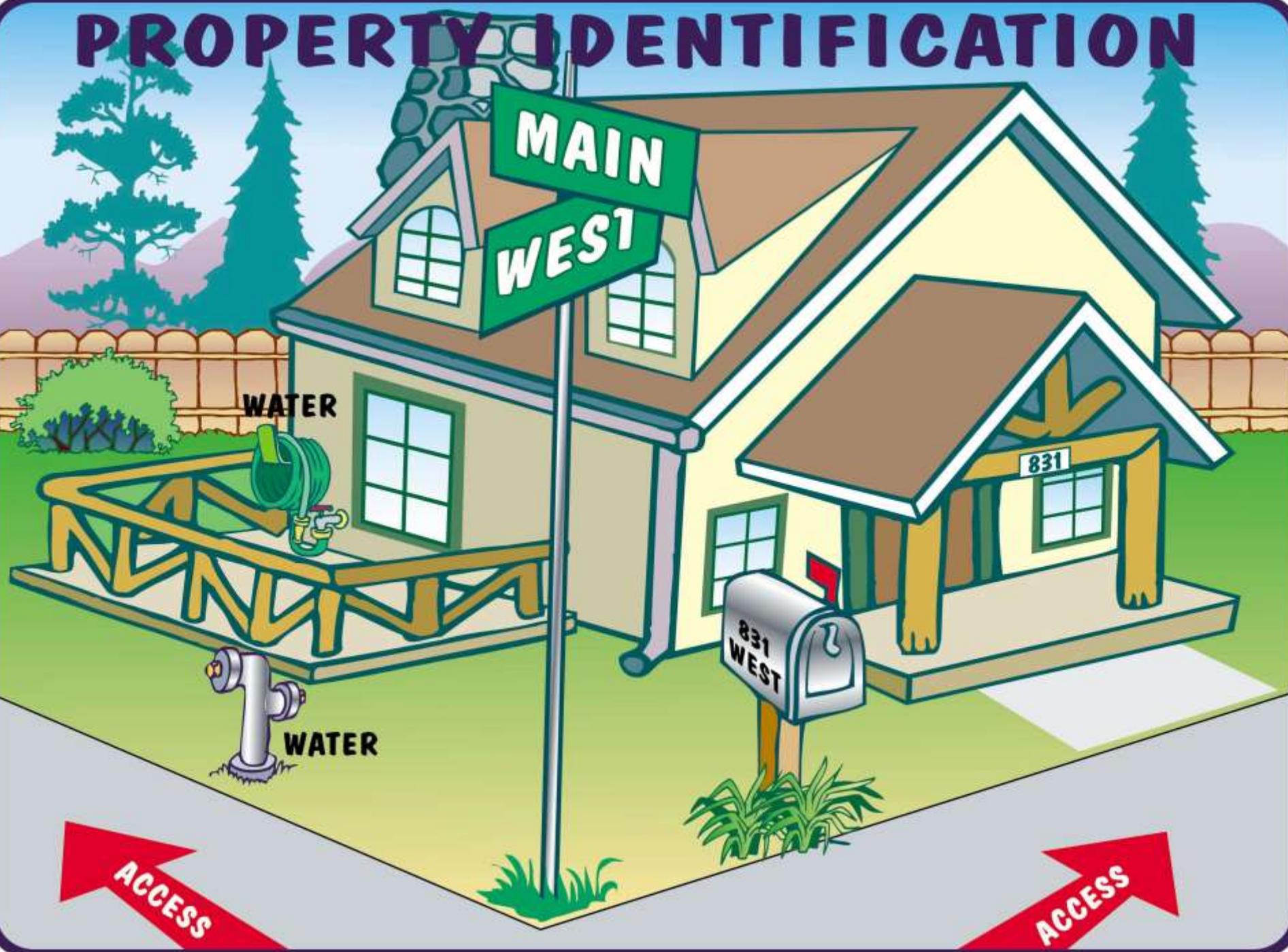
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Fire department access is extremely important & often overlooked



- Driveways and other access roads must meet or exceed your fire department's needs.
- Display address with 4" high numerals (Min) on a contrasting background.

# PROPERTY IDENTIFICATION



WATER

MAIN  
WEST

831

831  
WEST

WATER

ACCESS

ACCESS

# Access...

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- Keep roadways free from overhanging vegetation, fence posts or signage.
- “Vertical Clearance”
- Driveway/road surface and weight requirements.



# Access...

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- *Minimum* 16-foot wide driveway/access road is needed.
- May need a wider road if a number of homes are served – allowing for two way traffic (access & egress).

# Special Considerations

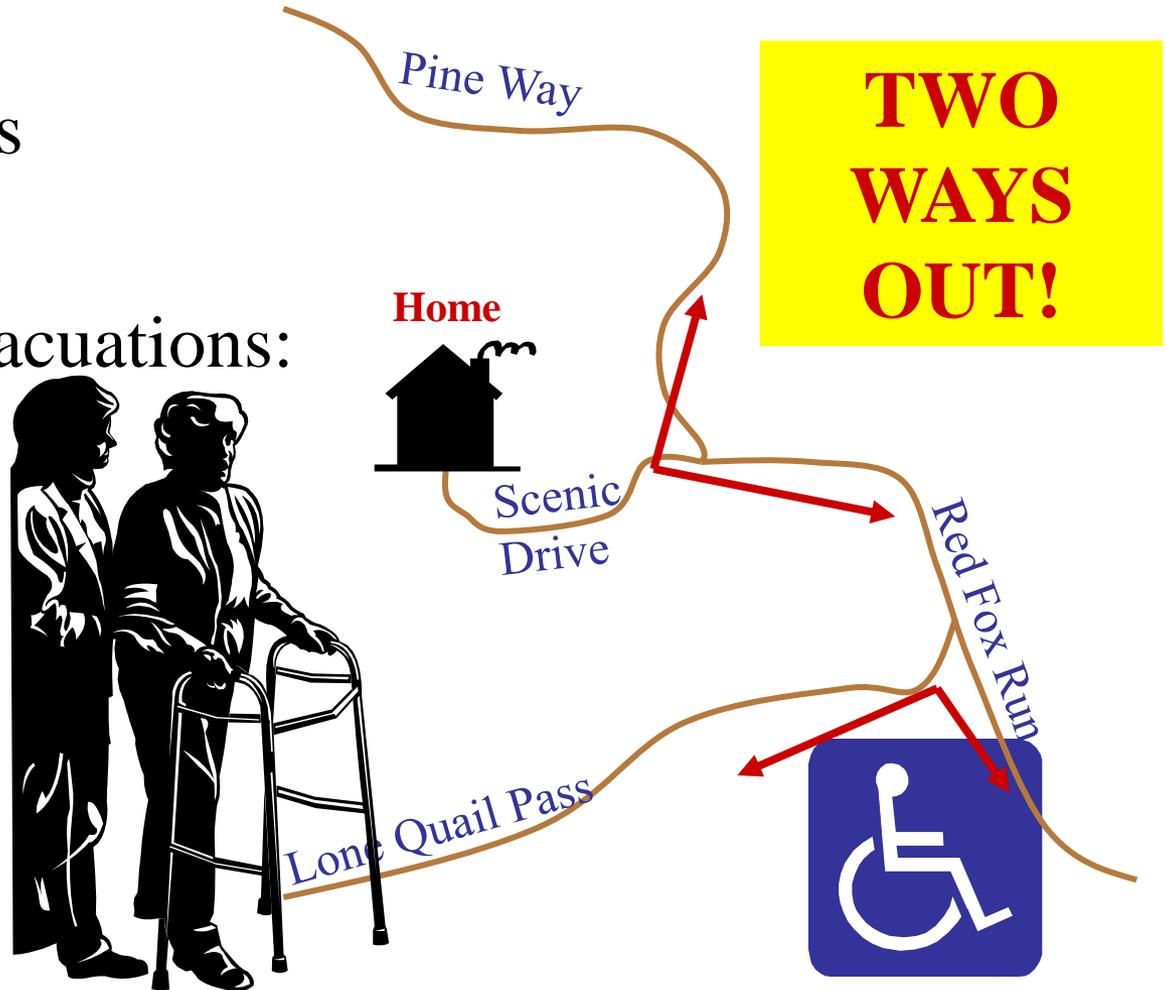
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- Evacuation routes



# Special Considerations

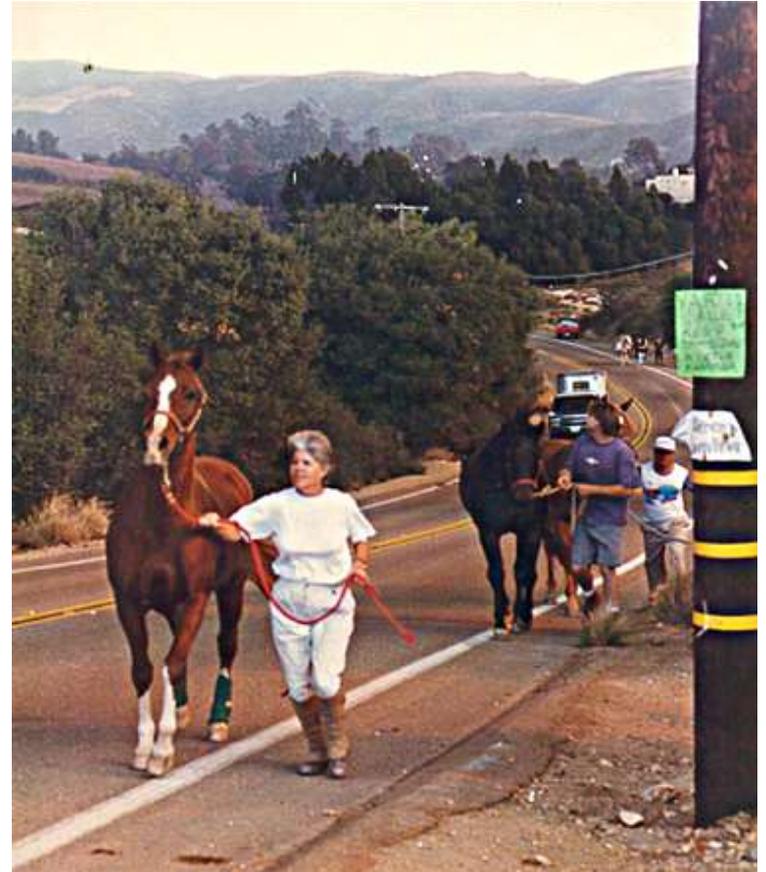
- Evacuation routes
- Special-needs evacuations:  
Plan ahead!



# Special Considerations

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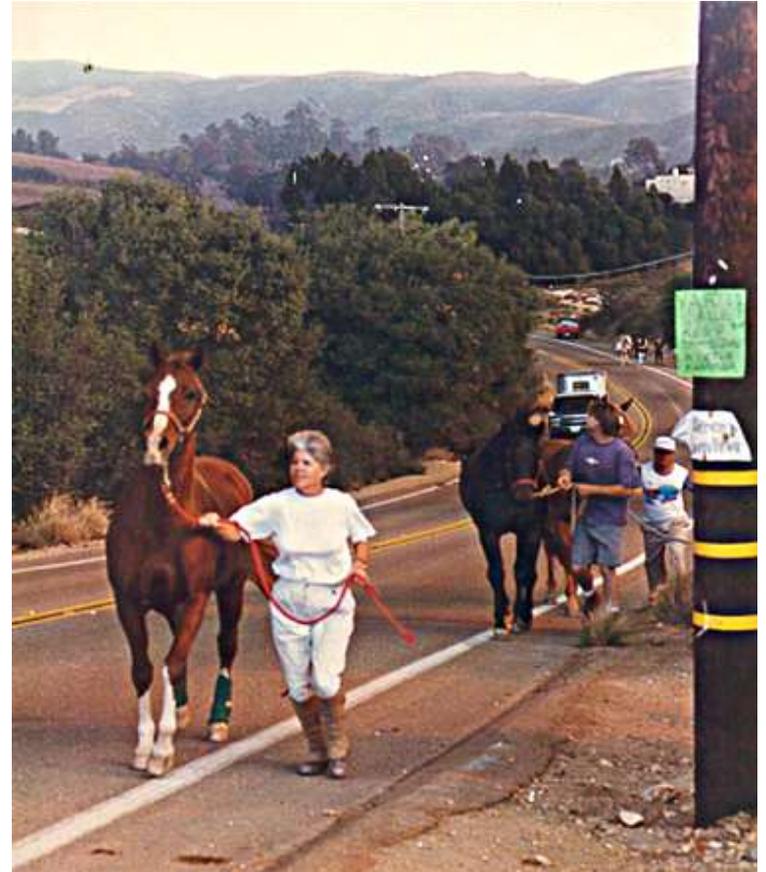
- Evacuation routes
- Special-needs evacuations:  
Plan Ahead!
- Livestock & pet evacuations



# Special Considerations

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- Evacuation routes
- Special-needs evacuations  
Plan Ahead!
- Livestock & pet evacuations
- “Safe” areas



# Summary

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## Wildfires are a year-round threat to communities throughout California

To prepare for the impacts of wildfires, continue to:

- Identify your local wildland fire problem,
- Monitor your local wildland environment,
- Make your home defensible against wildfire, and
- Plan for any special considerations for evacuation in your neighborhood

