Module 4: Home Protection Strategies

Introduction

This module provides information and skill development on assessing fire risk, creating defensible space, and learning how home fire risk assessments are done. However, it is not the purpose of this module to make participants experts in home assessments.

The information in this module will help the participant in preparing their wildfire preparedness plan for their property, which is a requisite for all participants in the CFA training. This module will motivate them to complete activities that will make their home and property more fire safe.

Finally, the concepts, terminology, and information regarding fire risk, defensible space, and home protection strategies will help participants communicate more competently to others when doing outreach.

Room setup

Facilitator should secure a room large enough to comfortably accommodate the number of participants. Organize the room in a U-shape fashion with long tables and chairs (See “Room setup,” page 7). The room should have a large screen to display the PowerPoint presentation and the room should have Internet access. Internet access is needed to show a video online for an in-class demonstration.

Total time needed

Classroom: 3 hours
Field: 3 hours

Equipment needed

Classroom
- Computer with PowerPoint
- Projector and screen
- Internet access or DVD to view in-class video demonstration

Field
- Handouts for home assessment exercise
- Area maps of fire risk
- Fire equipment (shovel, Pulaski, fire extinguisher) in vans if field tour is conducted during fire season

Background resources

- Reducing Fire Risk on Your Properties (PNW 618) https://catalog.extension.oregonstate.edu/pnw618
- Fire-resistant Plants for Home Landscapes (PNW 590) https://catalog.extension.oregonstate.edu/pnw590
- Institute for Business & Home Safety “Wildfire Ember Highlights” video: https://www.youtube.com/watch?v=_Vh4cQdH26g
- Examining Home Destruction in the WUI (2013) DVD by Dr. Jack Cohen
- Your Home Can Survive a Wildfire (2015) DVD by Dr. Jack Cohen
- “A Home's Safety Zone” graphic
- SB 360 Evaluation or HIZ Forms
- Local maps of fire risk, fire hazard for the area and region
- Firewise website: www.firewise.org
- Oregon Department of Forestry fire page http://www.oregon.gov/ODF/Fire/Pages/default.aspx or local state forestry agency page

Host prep

- Recruit instructor(s) and panelists
- Familiarize instructors and panelists with objectives, content, agenda, and structure of session
- Communicate with CFA participants to confirm location and time
- Make sufficient copies of all handouts
- Reserve classroom
- Confirm projector and laptop for the video
- Set up room
- Prepare refreshments (if applicable)
- Acquire DVDs or download videos from the internet to show
- Identify field sites
- Organize field tour transportation
- Do a practice field tour with instructor(s)

Class prerequisites
There is no prework for this module as designed, although some reading could be assigned.

Learning objectives
Participants will:
- Discuss components of risk
- Employ basic approaches of fire risk assessment around homes
- Identify the Home Ignition Zone (HIZ) and define “defensible space”
- Determine effective strategies to reduce fire risk
- Assess how a home's construction and surrounding landscape vegetation affect its combustibility

Behavior objectives
Participants will:
- Conduct a homesite fire risk assessment on their own home and use this in developing their wildfire preparedness plan for their home and property. (Participants are not expected to be competent in conducting official SB 360 home assessments after this module. In order to do official home assessments, CFA volunteers would need to complete a more intensive ODF training on this subject.)
- Communicate HIZ and defensible space principles to others so they will be motivated to take action
- Recommend fire-resistant landscaping techniques
- Point out where homes are vulnerable to fire and embers (vents, decks, roofs, etc.)
- Take measures to decrease fire risk on their own property
- Perform an HIZ assessment and develop an action plan, then explain that plan to CFA peers and include it in their wildfire preparedness plan

Delivery methods
- Video
- Guided discussion
- Field tour
- Instructor guidance

This module is important for building knowledge about Firewise and defensible space concepts. The instructor should be enthusiastic and make this module practical and fun. The information participants learn and the skills they attain will be vital as they develop their wildfire preparedness plans and as they work and communicate with homeowners in their neighborhoods during volunteer activities.

The field tour will be very important in bringing some real-world application to this module. One challenge for the instructor is that it is difficult to bring to life the idea of “risk” or give it meaning when there is no immediate threat from fire. Therefore, the instructor may want to have homeowners who have experienced a fire firsthand speak to the trauma and emotions they felt. Fire risk does have a face, so to speak, in the people and the properties that are devastated by wildfire.

Also, having CFA participants conduct a fire risk assessment around a home as a guided field exercise will help them better quantify risk in a systematic way and communicate strategies and techniques to their neighbors in reducing that risk. Remember, though, that the purpose isn't to make them experts on risk assessment.
When selecting sites for both parts of the field tour, consider the following:

**Part 1** – The field tour should illustrate wildfire risk in the area or region. Maps of fire risk would be helpful to have on hand for this field trip. If a recent fire burnt through an area with homes, bring participants there with the idea of having one or more affected homeowners explain what it was like during the fire from their perspective. However, finding a homeowner willing to talk about such a traumatic, emotional event may be difficult.

**Part 2** – For this portion of the field tour, it is important to find a homeowner willing to have his or her home assessed and to listen to CFA participants’ comments during that process. It is also important not to lay any blame on the homeowner but, rather, to be encouraging and provide helpful tips for reducing fire risk. One of the CFA participants may be willing to volunteer his or her home for this part of the field tour.

### Sample agenda

**Location:** Auditorium

9:00 a.m. Welcome, review agenda and objectives for the day, introductions

9:30 a.m. Presentation and video demonstration

10:30 a.m. Refreshment break

10:45 a.m. Presentation

11:45 a.m. Lunch

1:00 p.m. Field trip

4:00 p.m. Field trip concludes

4:30 p.m. Arrive back at the classroom

### Content outline

- **Home protection strategies**
  - Very brief review of fire triangles and how they are relevant to homes and landscapes in the WUI
    - Fire triangle
    - Fire behavior triangle
  - Fuel (natural and unnatural) and topographic characteristics around the home
    - Continuity and arrangement
    - Quantity

- **Availability**
- **Slope and terrain**
- **Defensible space**
  - What is it?
  - Why do you need it?
  - How do you create it?
  - Defensible space versus survivable space
    - Goal of survivable space: for home to survive the majority of wildfires without fire department intervention

- **Home Ignition Zone (HIZ) concept**
  - Defined zones: 1) 0 to 30 feet, 2) 30 to 100 feet 3) 100 feet or more away from the home
  - Concept of discontinuous fuels
  - Highlight zones 1 and 2 and how they could include an adjacent home or outbuilding
  - Management strategies

- **Fire-resistant landscaping**
  - Management strategies
    - Hardscape
    - Lawn
    - Mulch
    - Plant selection
  - Plant selection
  - Materials

- **Building materials and retrofitting**
  - Roofing
  - Siding
  - Windows and doors
  - Vents (preventing ember entry)
  - Decks
  - Gap management in log cabins, pseudo-stucco, etc.

- **In-class videos**
  - “Wildfire Ember Highlights” video produced by Steve Quarles, Institute for Business and Home Safety: [https://www.youtube.com/watch?v=_Vh4cQdH26g](https://www.youtube.com/watch?v=_Vh4cQdH26g)
  - All or segments of Dr. Jack Cohen’s DVD, *Examining Home Destruction in the WUI* (2013)
– Show all or segments of Dr. Jack Cohen's DVD, *Your Home Can Survive a Wildfire* (2015)
  - Water, access, and other concerns
  - Working with your local fire district or ODF or state forestry agency

■ Evaluating fire risk
  - Basic risk review
    • Ignition potential (i.e., likelihood of fire)
    • Hazard or potential for damage
    • Values at risk
  - Volunteer outreach and public education opportunities
    • Evaluating homes and homesites with additional training
    • Where to get information on county standards for new construction
    • SB 360 guidelines and checklist review
    • HIZ standards
    • Demonstrate how different standards and evaluation guidelines can be applied to a hypothetical homesite using the graphic on the “A Home's Safety Zone” slide
    • How to conduct an assessment

Exercises

There is one in-class video demonstration and one field exercise for this module. Below is a description of the setup for each demonstration and the facilitated discussion that should occur for each.

**Ember and home ignition demonstration video**

Part 1 – Embers are fire brands that have been lofted into the air by the upward movement of air or driven horizontally by wind from a wildfire. Embers can travel through the air and land ¼ mile or more from the fire front, often igniting additional spot fires ahead of the main fire.

During a fire storm, embers swirl around like snow and can accumulate on and around homes or enter through vents, igniting the inside of the home. Researchers estimate that 80 to 90 percent of all homes destroyed by wildfire are due to embers landing on something easily ignitable on, in, or near the home.

Show “Wildfire Ember Highlights” ([https://www.youtube.com/watch?v=_Vh4cQdH26g](https://www.youtube.com/watch?v=_Vh4cQdH26g)), produced by the Institute for Business & Home Safety. The video illustrates how embers ignite outside fuel but also how they penetrate a home through vents.

Part 2 – Show all or segments of the following two DVDs by Dr. Jack Cohen:
  - *Examining Home Destruction in the WUI* (2013)

**Field exercise #1 – Fire Risk in the WUI and Assessing Fire Risk Around Homes**

Part 1 – Take participants to a part of the WUI where homes are situated in areas with high fuel loads and moderate to steep slopes. Discuss fire risk in this situation as well as how homeowners would be evacuated should a fire erupt in that location. If possible, invite a fire chief to talk about how he or she would attack such a fire and go about conducting an evacuation. If convenient, locate an area where homeowners have created some defensible space or other mitigating treatments.

Part 2 – Take the group to a home and conduct a fire risk assessment using SB 360 evaluation form (handout) or HIZ assessment form. This should be a guided discussion with an expert from ODF or local fire district. It is important to start from the house (roof, decks, etc.) and work your way outwards, evaluating the landscape around the home and beyond. The instructor should do the assessment with the entire group moving through and discussing each item on the checklist. Discuss other factors that either mitigate or increase the fire risk for the home in question.

**Alternative delivery methods**

This module works best with an indoor session followed by a field trip. Though it may be possible to deliver the content online, it is essential to have a field component and allocate enough time to it.

**Suggested homework**

The information presented in this module will give participants necessary knowledge to keep working on their wildfire preparedness plan at home.
Self-assessment questions

1. What does HIZ stand for? What does it entail?
2. What are some things homeowners can do to create defensible space?
3. What does fire-resistant landscaping mean?
4. What are some the most vulnerable portions of a home to wildfire?
5. Where are likely locations for embers to enter a home?
6. What are some examples of fire-resistant building materials?
Home Protection Strategies Materials

Photo: Washington Department of Natural Resources
Section 1: Fire Behavior Review
- Remember the components of the fire triangle:
  - Heat
  - Ignition
  - Fuel
- Which is the component that you can affect?

Fuel characteristics
- Continuity and arrangement
- Quality
- Availability

How and why homes burn
- Home ignitions occur when a component of the home is exposed to one or more of the basic wildfire exposures.
  - Types of fire exposures include:
    1. Burning embers (also called firebrands)
    2. Direct flame contact
    3. Radiant heat

Pay particular attention to EMBERS!
- Burning embers are the most important cause of home ignitions.
- When they land near or on a building they can ignite nearby vegetation or accumulate debris on the roof, in gutters, or on decks.
- Embers can enter homes and buildings through openings (an open window or vent for example) and ignite areas inside or debris in the attic.

Studies in ember ignition
- Embbers vs. direct flame impingement
  - Ember stopover: https://www.youtube.com/watch?v=_VhNQ8d126g
  - Direct flame impingement: https://www.youtube.com/watch?v=O88s6v4icD8

Details of the Home Ignition Zone Concept
- Includes the home itself (more on the home later) and everything around it out to 200 feet.
- When the risk of wildfire is high, the home ignition zone extends out to 200 feet beyond the actual structure.
- Within this 200-foot area, there are three zones: 1, 2, and 3.
**Home Ignition Zone: Zone 1**

- Zone 1 encloses the structure and all its attachments (wooden decks, fences, and landscaping) for at least 30 feet on all sides.
- Note: 30 feet represents minimum separation distance (on flat ground) of the radiant heat source to the home without causing ignition.

**Home Ignition Zone: Zone 2**

- Zone 2 is 30 to 100 feet from the home. Plants in this zone should be low-growing, well-brushed, and non-flammable.
  - Leave 20 feet between clusters of two to three trees, or 20 feet between individual trees.
  - Encourage a mixture of deciduous and coniferous trees, and remove non-native shrubs, vines, and ground cover.
  - Prune trees up 10 feet from the ground.

**Home Ignition Zone: Zone 3**

- Zone 3 is 100 to 200 feet from the home and this area should be thinned, although less space between trees is required than in Zone 2.
- **NOTE:** Because of other factors such as topography, the recommended distances to mitigate for radiant heat exposure actually extend between 100 to 200 feet from the home on a site-specific basis.

**Resources**

- [Firewise publications on Hud: The basics of defensible space and the “home ignition zone”](http://firewise.org/wildfire_preparedness/be-firewise/home-wheel/landscapes/defensible-space.aspx)

**Section 3: Building Materials and Retrofitting**

- **Embers and small flames are major culprits**
  - Embers easily ignited both the pine needle debris that was placed in the gutters and the pine needle and bark mulch placed at the base of the exterior wall.
  - The gutter on the left was vinyl and that on the right was metal. Once debris in the vinyl gutter ignited, it detached from the facia and fell to the ground.
  - The burning debris contributed to the fire that resulted from the ignited mulch.

**Building materials**

The test building shows the near-building combustible mulch and vegetation, the pine needle accumulation in the valley of the asphalt composition roof shingles, and pine needle accumulation in the gutters. The gable end vent is also cleared.

**Watch the video on embers**

[https://www.youtube.com/watch?v=Vh5cI7ekMg](https://www.youtube.com/watch?v=Vh5cI7ekMg)
Roofing materials:
Wood shingles are not fire safe.

Vents:
These are 1/4-inch screens, which are too large. However, this is better than no vent!

Use 1/8-inch (or less) mesh metal screens for roof caves, peaks, or foundation vents to prevent ember entry.

Remove fuel sources close to the home:
The perimeter of the home and attachments out to about 15 feet is vulnerable if there is anything there—organic mulch, weedy shrubs and plants, larger shrubs—that could ignite and thus allow flames to touch the house.

- Wind-driven fires can occur at any time of year, so it is important to keep any leaves or branches away from the roof or any branches near the house, to at least 15 feet from the house.
- Keep any grass in the yard and other vegetation cut as short as possible.

Where leaves gather, so can embers!

In summary, property owners need to address the “little things” first
Start with the house and work your way out:
- Use a noncombustible roof covering and assembly with an envelope that resists fires and water, and keep the roof clean and free of debris.
- Keep decks and patios clear of debris, particularly where the siding meets the deck.
- Clean out any unused chimneys, or replace materials that could serve as a fuel source or potential ember source.
- During the high fire danger season, remove large potential fuel sources such as piles of wood, dry brush, or any debris that could serve as a fuel source or potential ember source.
- Download NFPA’s Firewise Tips Checklist for Homeowners that includes these and other valuable tips for residents.

Section 4: Fire-Resistant Landscaping

- Strategies (hardscape, lawn, mulch, etc.)
- Plant selection
- Materials

Fire-resistant landscaping:
- Fire-resistant landscaping is done in Zone 1, the first 30 feet around the home.
- In Zones 2 & 3, mostly fire reduction is done, leaving reduced amounts of native plants and trees.

Landscape vegetation can convey fire directly to the home:

Vegetation and fuel ladders:

What you plant, its arrangement, and proximity to your home matters!

Fire-resistant plants:
- Leaves are moist and supple.
- Plants have little dead wood and tend not to accumulate dry, dead material within the plant.
- Sap is water-like and does not have a strong odor.
- Sap or resin materials are low.
- Examples: maple, oak, deciduous shrubs

Fire-prone plants:
- A lot of dry, dead material at center of plant.
- Resinous sap and leaves or needles.
- Plants ignite easily.
- Examples: juniper, mistletoe, pine, cypress, and eucalyptus

Fire-Resistant Plants for Home Landscapes (PNW 590)
https://extension.pnnl.edu/pnw590
For more examples, look at these publications!

Fire-resistant landscape plans for the Willamette Valley (ON R16):
https://catalyst.uoregon.edu/onn/1620

Rosetta landscaping and plant list:
http://www.catalyst.uoregon.edu/onn/0920/0920_landscaping_plants.html

Fire-resistant trees and shrubs for privacy screens:

Other fire-resistant design features to consider:
- Use non-flammable features, such as rock or pavers, to break up vegetation.
- Use rock features on slopes below your home.

Fire-resistant landscapes...
- Use non-flammable features, such as rock or pavers, to break up vegetation.
- Use rock features on slopes below your home.

Fire-resistant plants can be used to break up or replace “fuel ladders” so fire is not conveyed to the home.
- Deciduous trees can block radiant heat directly to home.

An example

Well-maintained landscape = more fire-resistant

Section 5. Home Protection Strategies
- Defense - Potentials and limitations of home-based firefighting systems
- Water - cisterns / sprinklers / hoses / catchment / pump stations / ID in advance
- Access - gates on driveway / clear ID of home, number, and address

Home-based firefighting systems
- Remember, you will need power for the pump. Having a generator is a must as electrical power will be shut off during a wildfire.
- Train yourself on how to properly use this equipment and practice.

Home-based firefighting systems

Home-based firefighting systems
- Foam-based systems:
https://www.youtube.com/watch?v=lsuU1fO995d0

Photo: Oregon-Ducks, Oregon State University
Water: cisterns, ponds, and catchments

- Buried cisterns
- Cisterns filled by rainwater from roof
- Landscape ponds

Access considerations

Fire is not typically the threat it was in the past. However, it can spread quickly. The dry landscape in the left picture is a result of drought conditions. The fire may start from lightning and spread rapidly. To prevent it, we need to be aware of the risks and take appropriate measures, such as creating firebreaks and monitoring the weather conditions.

Thank you!