Fire Prevention & Mitigation

This pamphlet deals with both wildfires and structural fires in the boonies (called wildland-urban interface, or WUI): Like others in this series (see the **Table of Contents** pamphlet), it attempts to cover beginning and some intermediate level material. The emphasis is on practical aspects, with concepts provided only where necessary. Intermediate and advanced information can be accessed through the Resources at the end of §4.

There are five sections:

1. Introduction. What makes fires in the boonies different – and more dangerous. How attitudes are changing.

2. Frequently Asked Questions (FAQ). Basic questions in traditional Q/A format. The answers are brief; reference is made to greater detail in either §3 ("Discussion") or §4 ("Quik-Ref"). (***Note:*** If you have a question that we missed, please email bsanders@boonieliving.com)

3. Discussion. Contains four subsections:

wildfires	evacuation
structure fires	summary.

4. Quik-Ref. A reference section that combines short answers, glossary, statistical data, directory information, and resources for further study. Some of the content is the same as in the "Discussion" section, but the "Quik-Ref" format is easy-in/easy-out.

5. Appendixes.
App. A: Wildfire-Resistant Vegetation
App. B: Wildfire Mitigation Annual Checklist
App. C: Fire Evacuation Checklist.

Related Pamphlets

The following BoonieLiving pamphlets contain more details on particular topics treated here.

Shell. Construction materials (particularly roof and walls) are crucial to whether your house will withstand a fire. The pamphlet describes your options in more detail than this one.

Landscaping. Next to your house construction materials, and access to your buildings, the flammable material around it is the most important aspect in combating fire. If you are far from water, your own cistern is invaluable.

Operations & Maintenance. Describes in detail (with a date-oriented "tickler file") the steps to be taken to maintain your fire preparedness.

1. Introduction

Wildfire is a growing problem. Actually, it's growing problem added to growing problem added to growing problem added to…:

1. Fire is natural and cannot be eliminated.

2. Fifty years of suppression has left forests extremely dense.
3. Housing boom along the WUI has made fire losses skyrocket.
4. Recreational boom along the WUI has made fire more likely.
5. Series of dry years has created a tinderbox in many areas.

= You do the math; it can't get any worse than this!

Fire is like water or wind: it will find the weak spot in your defenses and exploit it. A partial fire safety program is not enough if the danger materializes in ways you haven't prepared for.

It's bad enough in the city, but it's potentially much worse in the boonies, where:

- water and equipment are less available or further away;
- a larger area is under homeowner's control – but the fire source may not be;
- there may be less stringent building codes that you must supplement with your own precautions;
- a wildfire suddenly becomes a very different structural fire (or the reverse);
- increased wind and decreased humidity encourage rapid spread of fire.

Obviously, one or two of these factors may not apply – but in most cases most do.

Four things:

- a series of dry years
- fire fighter fatalities
- a trend away from full public responsibility for private actions
- a philosophy to allow nature some say in the matter

are combining to change attitudes towards fighting all fires in the WUI. In a rapidly increasing number of jurisdictions, fire fighting authorities are marking houses which ***they will make no effort to save***.

Note: In May 2002, a lightning strike caused a fire about four miles from us. Evacuation orders were issued for the houses on the paved road below; 11 of the 13 were marked "do not save". The situation causing the unusually high number was unique, but several other fires occurred in our vicinity during that terrible summer, and all of them had an eye-catching number of marked houses.

Making sure that your house is not among the marked should be one of your primary concerns.

2. FAQ

xxxx

What are my greatest fire dangers living in the boonies?

Here are some of the main problems:

Forest/grassland interface. Many houses are surrounded by combustible forests, brush, or grasslands – and particularly in the dry West, these materials can be highly combustible. This not only increases danger because a campfire that you're not aware of several miles away is a potential threat, but it also changes the nature of the fire when it goes from the forest or grassland to your house: different equipment, different firefighting techniques.

Distance from help: The nearest fire department may be 5-10 miles away by poor road, and staffed by volunteers who must travel an equal distance to get to the fire truck. Their training may be less complete, and water may be scarce.

Weather & Terrain. Typically, in the boonies, winds are higher (no buildings, etc., to provide a lee). In most of the country, humidity has risen in cities since 1950 – but the boonies are almost as dry as they ever were. ***[get stats]*** Fire likes high wind and low humidity. In mountain areas, add in slope; fires love to run uphill.

Building codes. Many rural counties are catching up quickly, but many buildings 10-30 years old (and still perfectly serviceable) do not have safety features city dwellers have come to expect. So you may have to anticipate the measures you need to take – in other words, be experienced before you even move in.

So: there's greater risk and less support. Much more of the fire mitigation effort has to come from…you.

What prevention measures are most important?

There are several, but the Colorado State Forest Service identifies two primary ones:

Roof Material. Aerial photographs of fire damage at the residential/wildland interface are absolutely conclusive: houses with combustible roofs are far, far more likely to burn to the ground. Make your roofing material Class C or better (see the Glossary in §4 ("Quik-Ref").

Defensible Space. Follow your county codes closely; they are designed with your terrain and conditions in mind. A typical defensible space plan is shown in Fig. 1 in §3.

Fire districts are encountering more inaccessible building sites, so they stress a third primary measure: access. Make sure that a large truck can get up your road: width, slope, overhangs, switchbacks. A truck requires more than an SUV; if you will be less accessible than your neighbors, check with your local fire department. They'll be glad to come out and tell you if their vehicles can access your land.

There are also several important tertiary measures to take:

- other construction materials (wall, windows, tight-sealing doors);
- available water (cistern on the property);
- smoke detectors, sprinklers;
- access to all parts of the house, preferably from a second direction.

What is "defensible space"?

It is an area ***that you create*** around your house so that you (and the local firefighters) can defend and hopefully save it. It is one of the most important factors in whether your house survives a wildfire.

Defensible space measures vary, depending on where you live; increasingly, counties are establishing fire mitigation regulations that mandate some (or all) of these recommendations. For more information, see **defensible space** in §3 ("Aspects of Fire Prevention").

Does defensible space mean a demilitarized zone around my house?

No. That would work, but who would want it? You probably won't get all of your first choices of landscaping, but with a little care you can have attractive surroundings that will probably withstand most fires.

What does the defensible space do?

Whether vegetation, decorative rock, or some other technique, defensible space is designed to do three things: slow the advance, reduce flame length, and reduce burning temperature. Each of these makes saving the house easier; all of them combined makes a huge difference.

What are the vegetation characteristics I should be aiming for?

There are four:

increased moisture content	shorter plant height
less flammable content	different arrangement

You can see how this will bring about the changes listed in the previous question.

Why would I want a cistern?

In the context of fire fighting, to aid the local fire truck (which is normally limited to 1000 gallons and needs to be spread over more houses than just yours). You don't normally get points from counties that have instituted wildfire mitigation requirements in their approval of building permits (although this has to change soon!), but most insurance companies will lower your premium sufficiently that the savings over a few years will pay for the cost of an economical system.

Depending on your situation, additional benefits of a cistern might be potable and/or irrigation water.

Note: You should be aware that in most dry Western states, restrictions exist on the use of well water to fill non-potable cisterns. Areas with sufficient snow runoff should have no trouble keeping a cistern filled after initial filling from some other source.

I work in the city, an hour away from my boonie home. What do I do in a fire emergency?

Most notification system contact only land lines within a circle with a prescribed radius from the fire. Three improvements are being made to this:

- Cell phones are being added to land line capability (although at first notification will be for cell phones currently within the prescribed area, not ones home-based there);
- The circle is being replaced by a customized, computer-drawn oval (so the notification area can look like the configuration of the territory over which the fire is spreading.
- ???

But they are too expensive for most boonie communities to add in the foreseeable future. Your best notification method is probably a reliable friend within the notification area. The other action you must take is to have as much as possible of the Evacuation Checklist (App. B) completed all the time, because even if the friend notifies you, you will be 2-3 hours behind everyone else by the time you get home.

FAQ-Q

FAQ-A

Where can I learn more?

Some basic resources you can start with are provided below:

Websites

- *Forest Home Fire Safety*. `Http://www.ext.colostate.edu/pubs/natres/06304.html.` [Also in print: see below.]
- Colorado State University Cooperative Extension. `Http://www.colostate.edu/Depts/CoopExt`
- *Firewise Website*. Http://www.firewise.org

Print

- *Clear Creek Currant*, 22-May 2002 (special fire edition)

- *Forest Home Fire Safety*. Colorado State University Cooperative Extension Publication 6.304. [Also a Website: see above.]
- *Living with Fire: A Guide for the Homeowner*. Univ. Nevada, Reno.
- *Wildfire Protection in the Wildland Urban Interface.* Colorado State Forest Service.

Local Sources

- Colorado State Forest Service
- Colorado State Univ. Cooperative Ext.
- Clear Creek County Site Development Coordinator

These and other resources are cited in full and annotated in the "Resources" in §4.

3. Aspects of Fire Prevention

Living in the boonies exposes you to two types of fires: wildfires and structure fires. The two are very different:

- different causes
- different prevention
- different skill sets
- maybe different jurisdictions to respond.

Unfortunately, in the wildland-urban interface (WUI), fire can change from one type to the other very, very quickly.

Note: Many of these issues are also covered as individual items in the "Glossary" below.

Wildfires

In the WUI, there's bad news and good news about wildfires:

- **Bad:** They can start far from your land, where you have no control.
- **Bad:** Help is probably further away, less experienced, and spread thinly over a larger area.
- **Good:** But you (and your neighbors) might have enough land in the direction from which the fire is coming to influence its course and intensity.

If you see more bad news than good in this, you're right. That's why rural homeowners have to take more responsibility than their counterparts in the city. (Re-read the first couple paragraphs of the "Introduction".)

There are several measures you can take to mitigate wildfires:

- **Site Selections.** The spot you like and the spot you can defend may be very different, but there may be trade-offs.
- **Forest Management.** There are well-defined practices – actions that make your forest healthier also help in fire mitigation.
- **Access.** Absolutely vital: if fire fighters can't arrive, they can't fight.
- **Water Supply.** Also vital – and you have more options than you think.
- **Defensible Space.** Extremely important (and, fortunately, relatively easy). More and more jurisdictions are setting minimum standards that you must adhere to.

Each of these is described below. Several of them apply both to wildfires and to structure fires, illustrating the interrelationship between the two on the WUI.

Note: This interrelationship may also allow trade-offs. For example, selecting your favorite but hard to defend site might be compensated for by rigorous adherence to defensible space requirements.

Fire Behavior

The three major elements that determine fire behavior are weather (temperature, humidity, wind), topography (primarily slope), and fuel (type, density dryness). That's a lot of variables, so every fire is at least a little different.

You need a basic understanding of fire behavior for two reasons: to determine what you can do on your land to minimize danger, and to recognize dangerous conditions in your area.

Note: During the horrendous fire season of 2002, we used our knowledge of fire behavior on several occasions to make frequent calls to our home answering machine to determine whether "Reverse-911" notifications had been given.

Site Selection

If your land is large enough to have more than one building site, and you haven't yet determined conclusively where you will build, the following aspects are advantageous from a fire mitigation standpoint. (Fire isn't the only criterion; we certainly considered other factors.)

Terrain. As level as possible or downhill from where the fire is likely to be coming from. Fire travels uphill much more rapidly

Access. A broad, smooth, level, straight access road is obviously impossible in most cases – but all of those factors are desirable. Numerous (particularly sharp) switchbacks or large overhanging branches will often get your house marked "do not save". ***[another "access" below"]***

Note: An over-sized SUV (we call them SAVs in these parts: suburban assault vehicles) is not a sufficient test for accessibility; fire trucks are an order of magnitude larger.

xxx. xxx

Forest Management

On your entire land, exercise good forest management practices: remove dead trees; thin living trees to specified densities, removing the less hardy; and clear ladder fuel. Forest Management is described in more detail in the CSFS *Wildfire Protection…* pamphlet, listed under "Resources" in §4.

Access

Provide road and driveway access for fire equipment wherever you have something you want protect. In particular, make sure that they have access to within 100 (preferably 50) feet of all parts of your house and outbuildings. The two most important aspects are driveway width and the number and tightness of the curves; fire trucks are ***much*** more difficult to maneuver than are private vehicles. If in doubt, contact your local fire department – particularly before you begin any construction. Some fire departments have clear guidelines concerning how many switchbacks they will negotiate in an attempt to bring equipment to your house.

Water Supply

Rural fire trucks rarely carry more than 1000 gallons of water, so providing a source, either through stream, pond, or cistern can be extremely helpful. If the expense of creating a water supply seems prohibitive, determine how many years of reduced fire insurance premiums it takes to amortize the cost; you may become more receptive to the idea.

Defensible Space

This is so important that most localities have enacted regulations concerning it – but the rules are often less strict than they should be or not completely enforced. All plans include zones (normally three) around the house. Details vary, but the following description is fairly typical.

Zone 1 extends 15 feet in all directions from the eaves, deck, etc. Nearly all vegetation inside the zone should be removed or chosen and arranged with fire suppression in mind. (A well watered lawn is a plus; other vegetation should be chosen from the list in Appendix A, well spaced, and kept away from windows and vents. You can take a few more liberties if your walls and roof have a two-hour fire rating (brick, stucco, metal, etc.). No firewood should be stored in zone 1, particularly next to the house or under the deck, both popular places because it is accessible and protected.

Note: Decorative rock and other dry landscaping techniques can be used to space the shrubs and trees in an attractive fashion.

The width of **Zone 2** is between 75 and 125 feet beyond Zone 1. The distance increases on a steep downslope and going into the wind (because the house is above and downwind, both directions in which fire likes to spread), and decreases in the reverse situations. Remove all ladder fuel (easily combustible material on the ground and up to 10 feet), and thin the forest if necessary.

Zone 3. From Zone 2 to the end of the property. Standard forest management procedures (see the ____ pamphlet) apply.

Figure 1 shows the house and Zones 1 and 2. Note the bulges in Zone 1 to accommodate the tree on the left and shed 1 on the right, which are otherwise too close to the house.

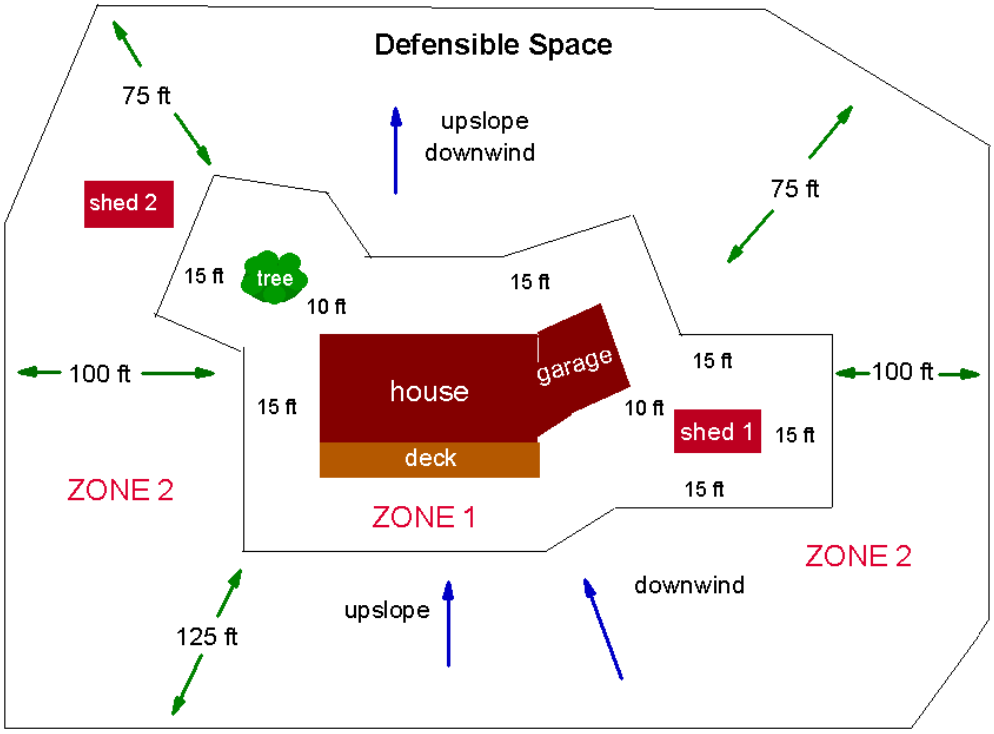

Figure 1: Defensible Space Zones 1 & 2

Improvements

In Colorado, you can get advice or assistance in bringing your house and yard up to standards from many sources:

- The **CSU Co-operative Extension** and the **Colorado State Forest Service (CSFS)** issue documents and provide advice; see the "Resources" in §4.
- For a modest fee, Clear Creek County's **Site Development Coordinator** will inspect your site, recommend improvements, and reinspect after modifications.
- Matching (50/50) **"WUI Grants"** are available to owners of **existing** residences for approved specific fire-mitigation-related improvements. These grants are implemented through the CSFS, assisted by the Site Development Coordinator.

Jurisdictions

There are typically several jurisdictions involved along the WUI; in Clear Creek County, we have the following:

County. (Planning Comm.) responsible for building codes for all but state and federal buildings; (CCFA) responsible for fire suppression in all but federal areas; (BOCC) establishment and (Sheriff) enforcement of laws in all but federal lands and Home Rule towns.

US Forest Service (USFS). Much more than half of the county lies within the Arapaho Nat'l Forest

Home Rule Towns. There are four home rule towns in Clear Creek County: Empire, Georgetown, Idaho Springs, and Silver Plume. Colorado state law gives home rule entities a great deal of authority.

Bureau of Land Management (BLM). Roughly equivalent to the US Forest Service in areas which it is still active. It is transferring most of the land it manages to the county or leasing it to Colorado Division of Wildlife.

Colorado State Forest Service (CSFS). There are no state-held public lands in Clear Creek County, so the CSFS has no jurisdiction. They are, however, a valuable source of information; see §4 ("Resources"), below. Several pamphlets are listed under "Printed Materials" and contact points are provided in the "Directory".

Fortunately, co-operation between the diverse agencies is uniformly good.

Structure Fires

If the source of the structure fire is external, the measures described above will help protect the house. If it is internal, more or less standard rules for structures apply.

Recently, many jurisdictions are requiring a minimum number of fire mitigation points for a certificate of occupancy (CO). Points are awarded for such aspects as:

- defensible space in accordance with local regulations;
- building with fire-resistant material (roof, walls, windows, doors);
- proximity to approved fire station;
- smoke detectors (generally more points for detectors wired to house power);
- sprinkler system (increasingly a requirement for larger houses);
- cistern (long recognized by insurance companies, recent awareness by governments).

Construction [This is both kinds of fire]

Much more information is contained in the **Exterior** pamphlet. Here are some very basic guidelines:

- **Roof:** Class C minimum, preferably Class B or A.
- **Walls:** Two-hour fire rating (4 hour exists).
- **Windows:** Double- (or triple-) pane. Minimize size and number on side fire is expected to come.
- **Doors:** xxx

These are goals, and there are obviously trade-offs here: what do you do, for example, if the fire is expected from the direction of the best view?

Example: Our house illustrates the issue: We overlook the Continental Divide, are east of it, and at the top of a forested ridge. That breaks a lot of rules, since the prevailing wind (and the fire!) comes uphill through a forest. So we have:

- four-hour walls
- a metal roof
- double-pane windows
- the most fire-resistant deck short of concrete
- eight feet (two feet beyond the deck) with no vegetation whatsoever)
- a tuned chain saw ready to immediately fell four trees barely inside Zone 1.

You're free to adopt a stricter or looser solution – provided it's within local regs and you accept the consequences.

Mitigation Measures

In addition to the defensible space, access, and water aspects described above, it is extremely important to do several other things:

1. **Coordinate with your local fire department:**
   - Make sure that they have a record of your house number, location of power sources (including buried cables, solar batteries, and fuel cells.
   - Check with them yearly to ensure their information is current and to remind them who you are (volunteer fire departments, in particular, have a high turnover).

   Note: One of the authors is a volunteer fire fighter. Trust me: the fire department will not resent the intrusion – in fact, they'll thank you for the effort.
2. **Have emergency plans. Particularly in summer, and even more vitally during dry years:**
   - know how you're getting out (two routes are preferable);
   - know how to prepare your house;
   - know what you're taking with you (you might even pack a suitcase and keep irreplaceable documents offsite).

   This may (or may not) be overly cautious in the city; in most boonie areas it's just common sense. Appendix A contains a condensed version of the annual Wildfire Mitigation Checklist developed by CSFS; Appendix B is an Evacuation Checklist.
3. **Keep your equipment properly maintained.** Table A.1 in App. A is a wildfire check-off list, which includes maintenance items. In addition, you should do the following:
   - Quarterly: check smoke detectors and fire extinguishers;
   - Semi-annually: charge and test your sprinkler system (if you have one);
   - Semi-annually: check your cistern (if you have one).

Evacuation

A tranquil setting can become an alert, and an alert can become an evacuation order in a matter of hours. The stress and confusion that accompany that situation makes constructive action very difficult. It is absolutely vital that you be prepared in advance.

App. B. Contains a two-page checklist that should be reviewed each year and completed as a fire approaches (and evacuation becomes increasingly likely). The checklist has three purposes:

- provide step-by-step instructions for you during a period of high stress;
- convince firefighters that your house can be saved;
- give them information they need to fight effectively.

Note: Paper copies are available from Bill Sanders (PO Box 1490, Idaho Springs 80452). Free to GCCHLA members; $1.00 each plus SASE for all others. ***Improvements welcomed at email above.***

Summary

Above all, remember the following:

1. Fire is more dangerous in the boonies, and help is less available. The shortfall must be made up by you.
2. House construction and defensible space are the two most important issues that you can address.
3. Coordinate with your local fire department. There are very few tract homes in the boonies, so every case is unique. They need to know your special circumstances.