Community Wildfire Safety Through Regulation

A Best Practices Guide for Planners and Regulators

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A Planner's Role in Wildfire Safety Regulations

Wildfire hazard is a growing threat to communities around the United States. In 2011, the National Interagency Fire Center reported nearly 75,000 wildfires in the U.S., the majority of which were a result of human activities. Preferences for second homes, suburban lifestyles, and the desire to live closer to nature have pushed populations into the "wildland/urban interface" (WUI) — areas with more vegetation, parks, and forests than their city center and older suburb counterparts. Living closer to nature offers many benefits, but all too often the risk of brush, grass, or forest fires gets overlooked. This guide is designed to help planners and local communities considering wildfire regulations to understand their options and implement a successful public process to adopt effective WUI tools that match local needs.

How this manual can help you.
It provides planners and public officials with sound technical and legal justifications for adoption of wildfire regulations.
It provides tips on what planners should do before the community embarks on a formal wildfire safety regulation adoption process.
It helps communities evaluate their wildfire safety needs and choose tools that fit those needs.
It summarizes the best practices used around the country to address wildfire risk in the WUI.

The good news is that wildfire is a hazard that we can address through a variety of tools, including regulations. By modifying the "fuels" available to a wildfire during an event – that is, ensuring that buildings are flame- and ember-resistant and reducing the amount of vegetation in a flame's path, there is a tremendous amount of risk we can reduce within our communities.

The information in this guide is based on a recently completed study commissioned by the National Fire Protection Association (NFPA) that included in-depth interviews and extensive analysis of best practices for wildfire regulations in communities across the country. A copy of that study is available at www.nfpa.org/regulatorytools.

Why Planners Need to Get Involved in Wildfire Protection

Traditionally, reducing wildfire risk has been treated as a job for the fire department or district, and planners were happy to stand on the sidelines. That day has passed, and planners can and should have a more significant role in protecting communities from wildfire. Planners are uniquely qualified to assist their communities in creating a more comprehensive approach to wildfire risk — one that goes beyond structure and site design to fundamentally change the location, design, and type of development in high wildfire risk zones. The rising toll of fire losses in the wildland/urban interface reflects not just a wildfire problem but a problem of poorly planned development, and planners can change that.

To make matters worse, research on global climate change indicates that losses due to wildfire are going to get worse in coming decades, with some models predicting that the total number of trees and other vegetation consumed by wildfire will at least double in the western United States over this century. To reduce those losses we need to expand our understanding of fire risk to include site, subdivision, and even community design – and that is what planners are uniquely trained to do. This guide summarizes many of the key planning, subdivision, and zoning tools that planners can use to help protect their communities from wildfire. These actions should complement — but not replace — the well-proven techniques we already use to reduce wildfire risk through fire and building code enforcement.

Why Don't More Communities Have Wildfire Regulations?

While wildfire hazards to life and property are often clear, many at-risk communities have few or no wildfire regulations. The reasons for inaction are many. First, the seriousness of these threats is not always clear and present to the average citizen. Wildfires may affect a community only once every decade — or even less — so the threat seems remote. It can be hard to convince residents that the cherished forest in their backyard may someday threaten their homes and lives.

Second, discussions about regulations to address future wildfire risk can quickly become politicized and controversial. For example, requirements to cut or thin trees and other vegetation can generate considerable opposition from full-time and second-homeowners who want to preserve the greenery and privacy on their property. Some landowners also worry that their property's value will be reduced by the loss of trees or that the costs for compliance will be burdensome. These concerns create fertile ground for the spread of misinformation regarding the true cost of proposed wildfire regulations and erode support for those new regulations. It is important to remind skeptics that wildfire regulations are similar to other hazard-related land use requirements. For example, many communities restrict the size and location of structures in floodplains and strictly limit modifications to the floodplain itself, but the public has generally come to accept such restrictions as reasonable and necessary. Wildfire regulations based on accurate mapping and risk assessment should gain a similar level of credibility and acceptance in communities that adopt them, and this guide can help achieve that goal.

Four Good Reasons for Wildfire Regulation in Your Community

So, what motivates a community to adopt wildfire regulations? In many cases, a recent wildfire that threatened or damaged the community creates a strong local consensus that additional measures are needed. However, even communities that have not had a recent wildfire have many reasons to consider adoption of WUI regulations before that fire occurs. Below are the four primary reasons that at-risk communities should consider adopting WUI regulations.

1. Protect Lives of Residents and Firefighters

Ensuring the physical safety of its residents is the primary duty of local officials and planners. Planners play a key part in a community's preventative defense against natural hazards such as wildfire. While firefighters ultimately contain over 95% of wildfires, those that escape containment can have deadly consequences. In wildfire-prone areas this often includes adopting wildfire regulations to not only reduce the likelihood of wildfires being started but also to keep residents safe from any approaching wildfire. Vulnerable and concentrated populations of residents, such as school children or hospital patients, should be located away from wildfire areas to the degree possible. Proper wildfire regulations also enhance the safety of the fire-fighting professionals and volunteers who respond to wildfires in very hazardous conditions. For example, regulations that require roads to be of adequate width and grade to accommodate fire trucks are critical in helping firefighters reach (and retreat from) wildfires with the speed and equipment necessary to control the fire, save lives, and protect themselves in the process.

FACT.
11 firefighters died in 2011 due to wildfire-related incidents.

2. Limit Property Damage and Protect Community Assets

Wildfires can cause considerable damage to homes, businesses, and community facilities. According to the National Interagency Fire Center (NIFC), the U.S. loses 800 to 1,000 structures to wildfire in a typical year, with many more destroyed during larger, less frequent conflagrations. While insurance companies are increasingly factoring wildfire risk into their premiums and coverage plans, local communities should not wait for the insurance industry to take the lead in getting residents to make changes to protect their property from wildfire. As with protecting lives, local government has a fundamental duty to protect the property of its residents from known and largely preventable dangers such as wildfires.

Wildfires can also threaten cherished and irreplaceable community assets, such as sensitive habitat areas, historic structures and districts, infrastructure, scenic vistas, and recreational assets. For many communities, especially those heavily dependent on tourism, second-home owners, or outdoor recreation, a wildfire can be devastating to the local economy for many years.

FACT.
The 2012 Waldo Canyon wildfire in Colorado Springs, Colorado caused an estimated insured loss of over $350 million. Related losses to the local tax base were also significant.
Rocky Mountain Insurance Information Association

3. Save Taxpayer Money

At a time when public sector budgets are being slashed, costs for wildfire suppression and damage costs are soaring. The federal government typically spends more than $1 billion annually on responding to fires on both public and private land. Damage from the Texas fire season in 2011 was estimated at roughly $500 million. The bulk of fire suppression costs are incurred to protecting homes, infrastructure, and other community amenities in the wildland/urban interface. Losses associated with fires occurring on municipal lands also cost local governments millions of dollars annually.

FACT.
The federal government typically spends more than $1 billion annually on responding to fires on private and public lands.

4. Complement Voluntary Wildfire Safety Efforts

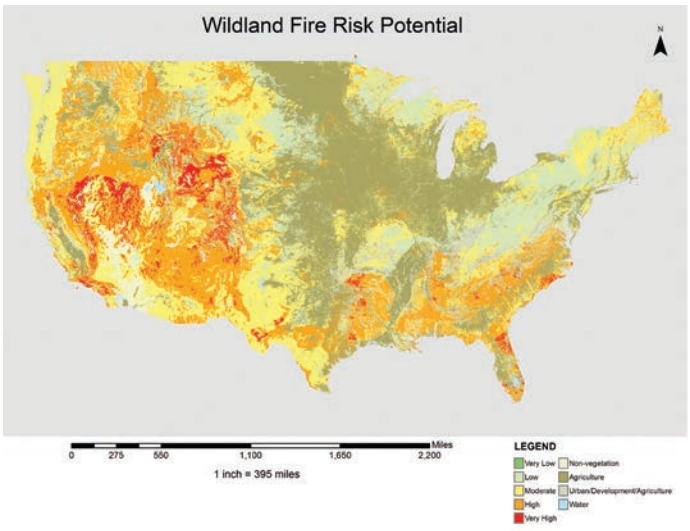
Some communities already address wildfire risk in their communities through voluntary programs. For example, the Firewise Communities® program administered by the National Fire Protection Association teaches citizens how to protect their homes by managing vegetation and building or retrofitting structures to be fire-resistant. Residents of subdivisions that implement the Firewise recommendations can obtain national Firewise recognition that not only demonstrates responsible home ownership in fire-risk areas but can improve real estate values and sometimes reduce insurance premiums. Local governments may also provide programs to help homeowners clear and haul away flammable vegetation from their properties at little or no cost. These programs often include strong educational components that help inform the public about the dangers and responsibilities of living in wildfire country and can help prepare the way for more mandatory and extensive development code changes. Wildfire safety regulations can reinforce the effectiveness of voluntary programs and ensure that public and private activities complement one another.

FACT.
The National Fire Protection Association (NFPA) has helped protect hundreds of communities from wildfire through the voluntary Firerwise Communities/USA® Recognition Program.

Understanding the Different Scales of Wildfire Regulation

In thinking about WUI regulations, it is important to understand the different scales at which these regulations can apply. These scales exist because wildfire risk reduction often requires a multi-pronged approach to provide effective protection to a community. The four regulatory scales addressed in this guide are the 1) community scale; 2) neighborhood/subdivision scale; 3) individual property scale; and the 4) structure scale. Communities need to decide at which scale(s) they are willing and able to regulate.

Community Scale



Credit: Fire Modeling Institute, Fire Science Laboratory, Rocky Mountain Research Station, Forest Service, Department of Agriculture.
The data was downloaded from a US Forest Service Geodatabase Clearinghouse: http://fsgeodata.fs.fed.us/state_private/nationaldata.html

The community scale applies to WUI regulations that apply to a large area within a community, or to the whole community (i.e. an entire town or county) in exceptional cases. The most common community scale WUI regulation is the mapping of the high-hazard wildfire areas. Some states, such as Texas, California, Florida, and Colorado, provide wildfire mapping resources that cities and counties can use or modify. In addition, regional wildfire risk assessments, such as the Southern Wildfire Risk Assessment and West Wide Wildfire Risk Assessment, provide consistent criteria to widely identify communities at risk. Increasingly available online resources are providing more communities with detailed wildfire risk maps or, at a minimum, enough basic information to enable communities to prepare their own local maps.

Hazard mapping can be based on a variety of factors, but is often based on two fundamental analyses: hazard assessment and risk assessment. Hazard assessment identifies and maps areas based on natural factors such as fuel/vegetation, slope, and weather patterns that increase the likelihood of wildfire occurring. Risk assessment identifies and maps where wildfire is most likely to threaten something of community value, such as human life, property, natural/historic resources, or other features or resources of local value. Risk assessment maps also often include other risk factors, such as existing roof types,

road access, water supply, location and density of structures, and likelihood of post-fire flood damage. A high hazard rating in an area with a low risk rating (i.e., a likely wildfire in an undeveloped area) may therefore result in a lower risk of loss than a moderate hazard rating in a moderate risk area.

Because conducting a full hazard and risk assessment can be expensive and dependent on existing data, some communities identify high wildfire areas through more simple means. For example, communities can sometimes identify wildfire prone areas based on locally-derived risk indicators such as steep slopes, distance from public roads, and proximity to a fire district (e.g., Yakima County, WA). This method is especially practical if the community has a good GIS system that includes the necessary layers of information. Another strategy is to apply WUI regulations based on an existing regulatory requirement or overlay. In Oregon, all land that is zoned Forest Resource by the state is automatically subject to wildfire mitigation requirements to protect adjacent property. In addition, because mapped wildfire areas are often done at a general level and may contain errors, many communities require

that a site-specific wildfire analysis be done for proposed projects in a mapped area to make sure that wildfire measures are in fact necessary and justified. Others simply allow landowners to appeal and revisit risk designations on their property that they think are inaccurate.

In rare cases, WUI regulations are applied to an entire city or county with no map, particularly when the entire jurisdiction has major wildfire hazards (e.g., Ruidoso, NM).

EXAMPLE.
In Clack County, WA, the wildland/urban interface/intermix areas are defined as any property where elevations exceed 50 feet, slopes exceed 25%, or forest-type vegetation exists.

Neighborhood/Subdivision Scale

Neighborhood scale WUI regulations are those that do not cover an entire city or county, but are designed to apply when applications for major new developments are submitted. Typically, they apply when applications are made for the approval of new subdivisions or large Planned Unit Developments (PUDs), because these involve the layouts and location of lots (which could be in fire risk areas) and streets (which need to be accessible to firefighting equipment). In addition, PUDs often involve unusual or innovative site layout approaches that need to be reviewed for public safety impacts. These tools are typically not applied when the application is for creation or development of a single platted lot.

A common form of neighborhood-scale risk reduction is through subdivision layout standards. In their simplest form, these require clustering of structures in the lowest risk areas on the property, while still requiring all structures to be separated by a safe distance to avoid the spread of fires from structure to structure. In other cases they require community protection fire breaks that, for example, require a 30 to 50 foot fire protection zone on the perimeter of all PUD or residential developments (Flagler County, FL; Palm Coast, FL). Some regulations encourage the use of natural features (e.g., lake, river, wetlands) and man-made features (e.g., roads, utility rights-of-way, ball fields) as fire breaks.

A second set of tools are structure location standards, which require that structures need to be located on the property to maximize the use and effectiveness of defensible space areas. This is sometimes done by the designation of a specific building envelope on the subdivision plat (e.g., Santa Barbara County, CA).

Perhaps the most aggressive neighborhood scale approach involves density modifications or reductions based on the presence of wildfire hazard – where wildfire risks are greatest, fewer structures may be built. Typically, this tool is not applied automatically but is negotiated to offer flexibility on other development standards to provide some off-setting benefit to the landowner (e.g., Summit County, CO; Flagstaff, AZ).

Other common forms of neighborhood/subdivision scale code requirements include requirements for adequate water supply and road access.

EXAMPLE.
In Larimer County, CO, the county can impose conditions on subdivisions in wildfire hazard areas related to the "location of proposed stuctures, uses or other improvements on the land" and "the arrangement and density distribution" of new lots.

Individual Lot Scale

Individual lot scale tools are applied to the layout or development of an individual platted lot or parcel. Since the parcel itself has already been approved, adequate street access and any required utilities are usually in place. The review and approval process often involves applying whatever special dimensional and layout standards the community has adopted for driveways, loading areas, service areas, landscaping, buffering of adjacent uses, site lighting, fencing, and other related standards. Single-family residential lots are almost always exempted from this level of review, because it is assumed that these issues have been addressed through the original subdivision approval or will be taken care of during the building permit process. In such communities, the individual lot scale standards are usually applied to multi-family and non-residential projects. The most common individual lot scale WUI tool is defensible space requirements, such as clearing of flammable vegetation away from structures and roads and then maintaining those areas. (See the discussion on Defensible Space on page 20 for more detail).

EXAMPLE.
In Josephine County, OR, "Slopes [in wildfire hazard areas] in excess of 40% may be disturbed or altered only after the disturbance or alteration is authorized pursuant to the requirements for modification of standards contained in Section 76.090 of this Article. Dwelling in Forest Zones shall not be sited on slopes greater then 40%.

Building Scale

Building scale tools apply directly to structures, such as houses, garages, and other accessory structures. Structure protection controls are the regulatory tool most citizens anticipate when they think of fire risk, and they are still the most common form of fire-related regulation in use. Even communities that have not adopted defensible space requirements or included subdivision standards to reduce fire risk often adopt and enforce building codes designed with fire risk reduction as a primary goal. For instance, structural protection regulations may distinguish between "primary structures" (e.g. the house, office building, or other building where people live or work) and "accessory structures" (e.g. barns, sheds, garages, and other structures that are only occasionally occupied by people).

EXAMPLE.
In Boise, ID, "exterior windows, window walls, glazed doors, windows within exterior doors, and skylights shall be tempered glass, multilayered glazed panels, glass block or have a fire protection rating of not less than 20 minutes."

How to Adopt Wildfire Regulations

Mitigation measures to address wildfire risk can generate strong and often conflicting emotions and opinions within a community. A successful approach to WUI regulations should anticipate and address challenges by following the recommendations below.

Steps to Take Before Code Adoption

Before a community begins a formal adoption process for proposed wildfire regulations, it should take these four preliminary steps to increase its chances of success.

Step 1: Identify Problem

STEP 1

The first step is to accurately identify the nature and extent of the wildfire problem in your community. Those leading the WUI regulation effort need to be prepared to clearly explain to the public, some of whom may be skeptical of new regulations, why action is necessary and to set realistic expectations regarding outcomes for potential land use code changes.

This requires posing and answering a series of fundamental questions. Is the wildfire risk limited to just one area in the community (i.e., near a national forest boundary) or is it widespread? Is the primary problem protecting existing development or is future development going to be the bigger problem? What type of regulatory scheme (e.g., voluntary, incentives, or mandatory) is most likely to be supported and to work well with existing regulations? What constituencies would be most affected by new regulations and what needs to be done to address their concerns? Are there local staffing and budgetary limitations that might impact your jurisdiction's ability to enforce new regulations? The answers to these and other related questions should provide a good picture of the type of WUI regulations your community needs.

TIPS.
Clearly identify the scope of the wildfire threat in your community early in the process to set realistic expectations and focus thinking about solutions.

Step 2: Gather Information/ Best Practices

STEP 2

Before proposing new development regulations, it is informative to study what other communities have done. While no two communities are identical, many communities have faced similar challenges and learned valuable practical lessons regarding wildfire regulations that might provide important guidance in your community. The key is not only to identify the most relevant communities and study their WUI regulations, but to contact them directly to speak with someone with direct knowledge regarding the administration of their WUI regulations, because regulations that look good on paper may not work so well in practice. There are also a variety of state agencies (state departments of forestry or natural resources), federal agencies (USDA Forest Service), and professional organizations that can help with technical data. Reviewing the wildfire codes of NFPA and the International Code Council (ICC) is also very helpful (see last section for more information).

TIPS.
Look to other communities with similar wildfire risk and political contexts for guidance, but be sure to adapt WUI regulations to fit local circumstances.

Step 3: Review Existing Regulations and Plans

STEP 3

It is critical that local planners carefully review all their local regulations and plans (such as the comprehensive plan, community wildfire protection plans (CWPP), and hazard mitigation plans) to identify all existing wildfire safety standards and efforts. This not only avoids duplication of existing work, but can help ensure that new WUI standards can be integrated into existing policies and requirements.

It can be a major challenge to identify all existing standards, however, when WUI-related standards are located in a wide variety of local codes, including the fire, building, zoning, and subdivision codes (see table on page 15). This is not surprising because WUI standards can affect diverse aspects of development, including requirements for structures, vegetation management, land development, and public and private infrastructure. Completing this review is essential to determine where new wildfire safety regulations should be targeted and whether the existing related standards should be consolidated in one section to make them easier to find and enforce. In general, it is often good to have all regulations related to land design, development, and infrastructure (as opposed to building construction) located in the land development code.

This review will probably also reveal that several different local departments (e.g., building, fire, and planning) have existing WUI enforcement roles that will need to be clearly coordinated with adoption of any new WUI regulations. Consolidating enforcement authority of WUI standards in one person or department is also highly recommended.

TIPS.
Conduct a thorough review of your community's entire regulations to identify all provisions that impact wildfire mitigation and then ensure that proposed WUI regulations are consistent with existing standards.

Common WUI-Related Provisions in Local Codes

BUILDING CODE

- Roof must be Class A, B, or C fire-resistant
- Windows must be double-paned
- Chimneys must have spark-arresters
- Soffits and decks must be enclosed
- Sprinklers are required in larger structures

FIRE CODE

- Multiple accesses required for subdivisions or projects of certain size
- Access roads must be of certain width and gradient
- Emergency firefighting water supply required
- Flammable materials (wood piles) must be located 30 feet or more from the principal structure
- Proper addressing and signage required to guide wildfire and emergency service providers
- Clearance of flammable vegetation (defensible space) required around structures

LAND USE CODE

- Overlay map of high fire-hazard areas
- Clearance of flammable vegetation (defensible space) required around structures
- Site plans must use natural features (lakes) or artificial features (golf courses) as fire breaks
- Wildfire breaks around perimeter of development must be provided for larger and more complex projects
- Maximum development density reduced in high-hazard areas
- Clustering of new development away from high wildfire risk areas required or encouraged
- Maintenance requirements for defensible space

SUBDIVISION CODE

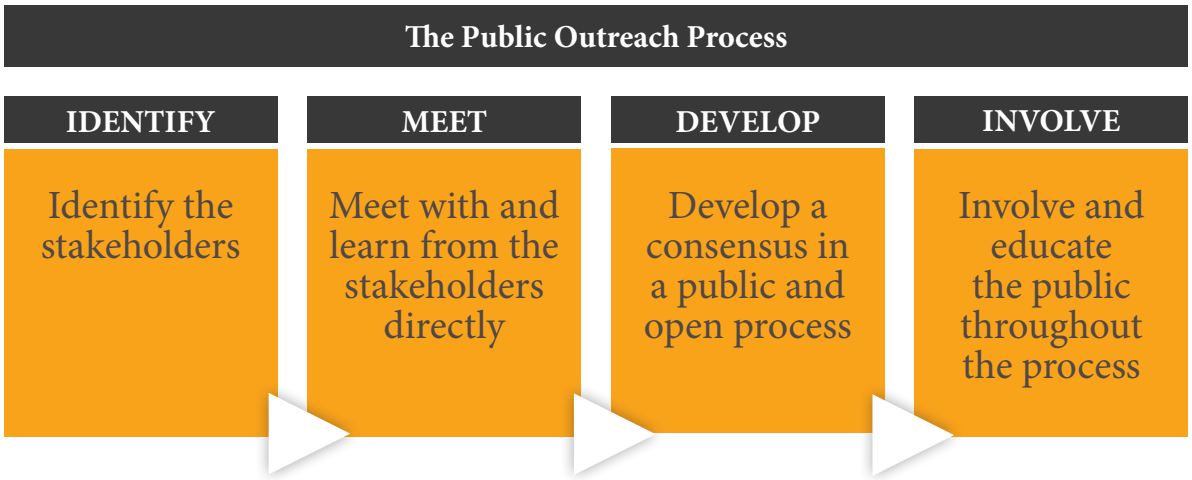
- Clustering of new development away from high wildfire risk areas required or encouraged
- Multiple accesses required for subdivisions or projects of certain size
- Requirement that homeowners' association be responsible to fund and maintain defensible space

Step 4: Involve and Educate the Public

STEP 4

Perhaps the most important component of a successful WUI regulation adoption process is an effective public outreach and education program. Some efforts to adopt WUI regulations have failed due to opposition by powerful local interests that often react to misinformation or fear regarding the impact that new wildfire regulations would have on their property or business. Later efforts with better outreach often succeed.

Key stakeholders, such as full-time residents, seasonal residents, builders, nursery owners, landscaping companies, and conservation groups need to be engaged before the formal public process begins, in order to understand and address their concerns and to share credible and accurate information. The goal is to develop their support before the adoption process begins and not wait until late in the review process to find out that important stakeholders have major concerns with the proposed regulations. Some communities have set up local stakeholder working groups to discuss wildfire issues and try to develop a consensus for action. Others have sponsored educational workshops with fire professionals, and some have used radio, print, and social media to introduce and inform the public about the need for wildfire safety. Wildfire can be an emotional issue for some people, including elected officials, so it is critical that clear and accurate information be provided as early in the process as possible. These public outreach efforts should be continued and broadened throughout the code adoption process after it is formally underway.



Should Wildfire Safety Regulations Apply to New or Existing Development?

Independent from the question of which WUI tools a community should adopt is the question of when and where the adopted WUI standards should apply. This fundamental issue can generate as much controversy as the actual standards, especially if influential stakeholders feel proposed regulations will unfairly target them or their financial interests.

While it is tempting to say that "everyone" should comply, that is very seldom the case. Most land use and building regulations are applied when new development or major reinvestments in property occur. Existing development is generally allowed to continue in use in their current condition until the owners make a major investment or unless they create very clear and dangerous risks to public safety that elected officials are willing to address proactively. Broad-based attempts to apply newer, safer standards to existing properties are rare, not only because they are generally unpopular with voters but because they tend to be expensive. For example, requiring an existing house to replace its wood shingle roof with a fire-resistant roof would result in considerable expense and inconvenience for the landowner and likely create opposition. For this reason, some communities exempt single-family homes from WUI requirements in order to lessen the burden on individual homeowners and their "castles."

EXAMPLE.
The Jackson County, OR, zoning code states that "[w]hen 50 percent or more of the roof covering of any building is repaired or replaced within one (1) year, the entire roof covering will be made to comply with the requirements for roof coverings for new structures within wildfire hazard sones."

One option for communities is to apply only the WUI "defensible space" vegetative control requirements (and not the structural requirements) to existing properties, because complying with the vegetation requirements do not require existing structures to be moved or modified. The State of California, for example, requires a 100 foot defensible space buffer for both existing and future structures in very high hazard areas. However, even structural changes to protect against wildfire can be phased in over time. Colorado Springs, CO, for example, has a roof ordinance that has phased out hundreds of flammable wood roofs over the past ten years.

The following are types of new development applications that are typically required to comply with WUI standards if they are located in high or extreme risk areas:

- Building permits for new structures.
- Building permits for significant expansions (e.g., 50% or more) of existing structures.
- All subdivisions and Planned Unit Developments (PUDs)
- Land uses with high fire hazard risks (e.g., lumberyards, power lines, tire storage, temporary uses, gas stations); and
- Land uses with vulnerable residents or users (e.g., hospitals, schools, group homes)

When these circumstances do not apply, but communities want to apply new safety standards to existing development, they almost always couple the new regulation with a financial incentive. For example, communities interested in energy conservation sometimes offer financial rebates to those replacing old, leaky windows with new tighter-sealing windows (e.g., Portland, OR), and communities wanting to encourage water conservation often offer rebates to those installing low-flow toilets (e.g., Denver, CO). At a minimum, communities that intend to apply new wildfire safety regulations to existing structures that are not applying for a major renovation should waive application and processing fees; and if possible rebates or small grants should be offered. Some communities have found that even a rebate of five or ten percent of the cost of the required improvement can reduce public opposition simply by demonstrating that the public is willing to be a partner in improved safety.

Choosing WUI Tools for Your Community

Know Thyself

Successful land use regulations not only encourage or require positive change but do so in an equitable manner that respects the community's capacity for change. An overly aggressive attempt to "impose" new regulations can spoil wildfire safety discussions for years into the future. Similarly, proposing an overly complex or expensive WUI program for a small community with limited resources will likely create backlash and fail in time. Therefore, those leading the effort to adopt new WUI requirements should work closely with their community to first accurately assess the level of wildfire risk and then craft regulations that address this risk in the most effective and least burdensome way.

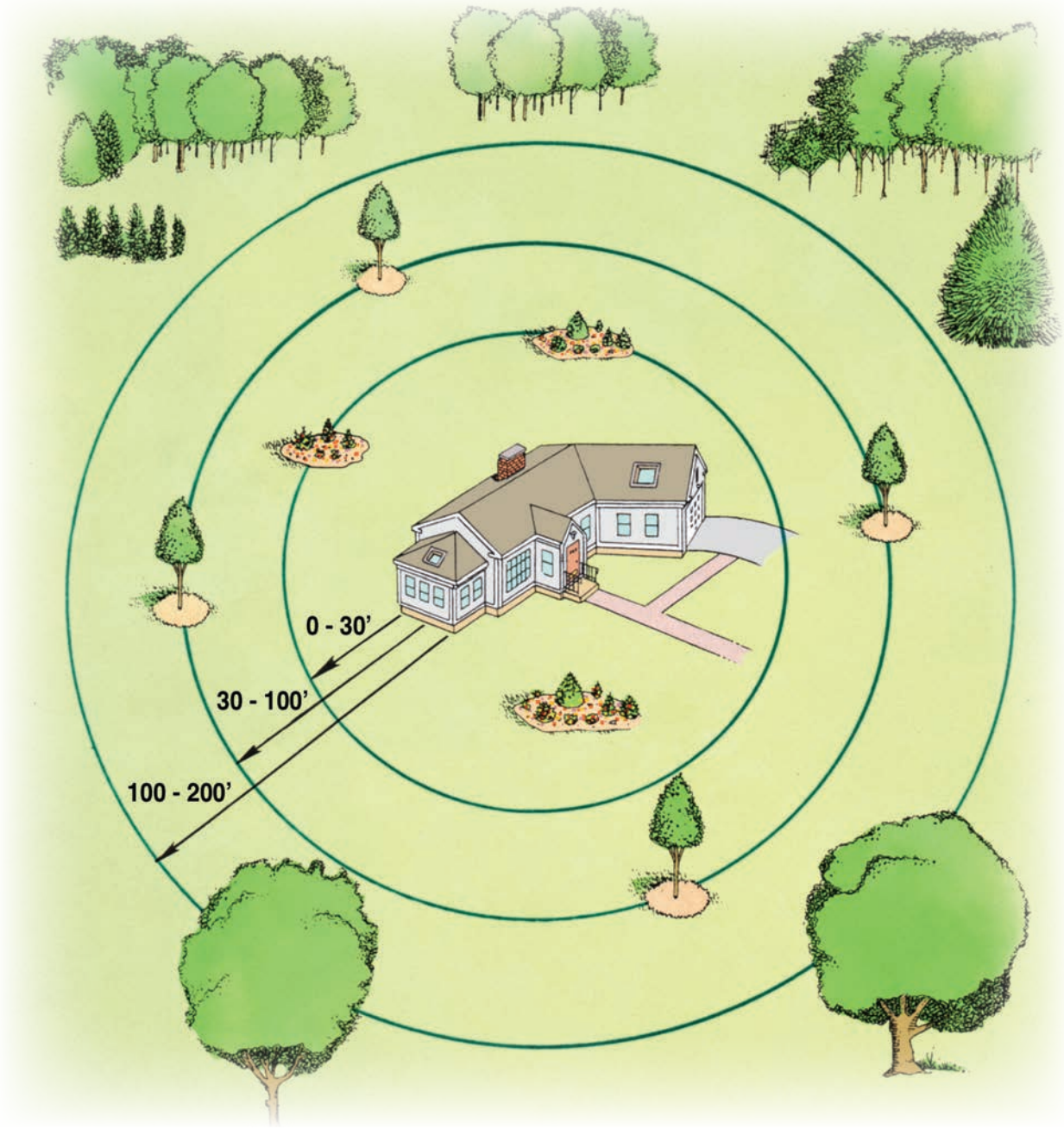
In order to do this, each community needs to understand itself. What is the community's view of property rights and regulations in general? What kind of budget exists to enforce new regulations? Are voluntary or mandatory regulations generally preferred? Should an incremental approach be tried or is the community ready for adoption of "full" WUI regulations? Are there similar communities that have adopted wildfire safety regulations that might work here? How will new regulations work with existing regulations? What are the consequences if risk is not addressed through regulation and the community suffers a devastating fire? The answers to these and other similar questions will provide a realistic framework within which specific WUI tools can be discussed and developed.

The Basic WUI Approach: Simple but Effective

Some communities, especially those with limited staff and financial resources, might want to know the one or two WUI tools they should adopt if they do not have a lot of time or money to invest in the education and negotiation process. The answer is 1) defensible space and 2) fire-resistant roofs. These two WUI measures alone will greatly increase the level of wildfire safety in any community. The paragraphs below outline the basic provisions of these tools, but it is important to note that WUI regulations often give the fire official or other decision-maker discretion to modify WUI standards to protect other natural or cultural resources (e.g., riparian habitat or snags for bird nesting) when there is a conflict between local development standards.

Defensible Space

Defensible space is perhaps the most basic and popular WUI tool. The basics of defensible space were introduced above but this section provides more detail. The concept is simple and intuitive: reduce the flammable vegetation that fuels wildfires and you directly reduce the risk of wildfire. Studies show that keeping wildfire 100 – 200 feet away from structures should protect them from ignition in most cases. Defensible space is intended to create this low-fuel buffer and is often divided into the following three zones:



Zone 1

Generally extends 15 or 30 feet from the primary structure, but that distance can be extended if the hazard level is particularly high and/or on the downward side of steep slopes. Common requirements include:

Establishment of a fuel-free zone within 3 – 5 feet of all structures;

Removal of all dead materials and dry grasses;

Thinning of trees (crown separation of at least 10–18 feet);

Prune lower tree branches to a height of 6 to 15, depending on tree's height and crown size;

Removal of most shrubs, with clumps allowed if separated by at least twice the shrub height;

Cutting grasses to 3 or 4 inches maximum height, but sometimes allowing taller vegetation on steeper slopes to retain soil;

Keeping trees 10 to 15 feet from the roof or chimney; and

Maintaining vegetation further than 10 feet from combustible fences and from utility lines (with distance depending on voltage).

Zone 2

Generally extends 30 to 100 feet from the primary structure (or from the outer edge of Zone 1). Typical requirements include removal of most dead material, tree crown separation of 5-10 feet, limited grass heights, pruning of shrubs, and removing tree limbs. Many of the standards parallel those for Zone 1, but with more lenient requirements.

Zone 3

Extends from the end of Zone 2 to property line and generally only requires minimal vegetation management.

Slope

Slope is a critical element in assessing wildfire risk. The greater the slope the greater the fire risk in most cases. Thus, some communities increase the size of the above defensible space zones when steep slopes (greater than 20% to 30%) are present.

Alternative Approach: "Weed Ordinance"

A simpler alternative to the vegetative zone approach is to adopt a "weed ordinance". These ordinances apply to all properties in the jurisdiction (or some defined area) and state not only that properties must be kept free of weeds but that vegetation is also not allowed to become a wildfire hazard. Vegetation that is deemed a wildfire hazard is declared a nuisance and the landowner will be given a warning or citation and given a fixed time (e.g., 30 days) to reduce their vegetation, usually consistent with the defensible space requirements above. This approach is entirely dependent on proactive enforcement because compliance is not linked to any permit or regular compliance process.

Fire-Resistant Roof

Many wildfires are spread by embers landing on flammable roofs that ignite structures. Furthermore, ignited structures can then ignite surrounding vegetation, perpetuating the wildfire. Wood shingle roofs are particularly flammable and should be avoided. A good practice is to require Class A or B roofs in the highest risk areas, Class B in moderate risk areas, and Class C in lowest risk areas. Some communities ban all wood roofing materials even though Class A wood shake roofs are available.

The Full Treatment: Additional WUI Tools

For communities that want to go beyond defensible space and fire-resistant roofing materials, there are many other important and effective WUI tools that can be adopted. Below is a summary of several of these tools. Regardless of the tool(s) chosen for community, it is important that any new WUI standards are consistent with existing ordinances that address topics like tree preservation, stream buffers, landscaping, and protection of natural resources.

Community Scale WUI Tools	
Hazard mapping	Conduct hazard assessment (risk of wildfire) and risk assessment (risk of loss of structures or life).
Zoning overlays	Consider using existing zoning overlays for wildfire purpose or develop new overlays applicable to known wildfire areas.
Restriction of sensitive or hazardous uses	Restrict land uses with vulnerable populations (hospitals), large populations (stadiums), or flammable materials (gas stations) in wildfire risk areas.

Neighborhood/Subdivision Scale WUI Tools	
Residential clustering requirements	Require new lots in subdivisions to be located away from wildfire hazard areas, and allow smaller lots if necessary to avoid economic harm to the landowner.
Water supply	Require firefighting water supply. Provide hydrants with adequate pressure and volume or a year round water source of 4,000 – 5,000 gallons in the form of a dry well, cistern, pond, or swimming pool.
Density reductions in high hazard areas	Reducing permitted development density in high wildfire hazard areas. Transfer of Development Rights (TDR) programs may also be useful.
Tax districts to fund fire mitigation projects (vegetation clearance)	Establish special districts funded by homeowners to conduct wildfire mitigation services for the neighborhood (e.g., clear and maintain vegetation, install signage, develop evacuation plans).
Proper access	Require adequate road (20 to 28 ft.) and driveway (12 ft.) widths and clearance (13.5 ft. vertical and 10 ft. horizontal) to accommodate fire-fighting equipment. Limit grade of roads to 10 -15% and require multiple access points for larger developments.
Signs	Require that street signs and address markers be noncombustible, easy-to-read, and well-located. Dead-end roads should be clearly signed.

Individual Site Scale WUI Tools	
Site-specific hazard assessment	Require or allow landowners to perform wildfire hazard assessment of their own property to confirm or establish wildfire hazard level. Use that analysis as the basis for project site design.
Location of accessory structures and flammable materials	Require accessory structures to be separated from other structures (e.g., 30 ft.). Require wood piles and gas tanks to be located 20-30 ft. from primary structure. Fences must be of non-flammable material – or at least within a minimum distance from the structure.
Fire-resistant landscaping	Ensure that only fire-resistant landscaping is allowed in hazard area.

Building Scale WUI Tools	
Siding	Require one-hour fire resistant materials, or brick, stone, stucco, or large timber siding, and generally prohibit metal siding in most fire hazard classifications.
Windows	Require or encourage double-paned or small-paned windows.
Eaves and soffits	Require eaves and soffits to be covered and boxed in or covered with mesh that will not allow embers into attic.
Gutters	Require designs that do not collect leaves/needles (and require regular cleaning).
Attic vents	Require mesh coverings with a maximum mesh size of 1/8 inch, or install approved ember-resistant vents.
Chimney spark arresters	Require spark arresters on all chimneys.
Decks and porches	Require that under-deck areas of structures 3 ft. or less above the ground be enclosed with wire mesh or fire resistive material. Require that structures farther from the ground be enclosed with a solid fire resistive skirt, and ensure that these features be constructed of heavy timber or other fire resistant material.

Learning from Other Communities

Many communities, especially those in the arid West and fire-prone Southeast, have extensive experience in adopting and administering WUI regulations. Much can be learned from the successes and challenges of these communities. Based on interviews done in a 2012 study by the Fire Protection Research Foundation, most WUI communities with WUI standards are satisfied with the technical effectiveness of those standards. Several important lessons have also been learned about how to improve the public adoption process and on-going enforcement of WUI standards. Below are some of the more common lessons summarized from communities with WUI regulations.

Key Insights from Communities with Wildfire Safety Regulations

- Outreach to community and stakeholders is critical during adoption process
- Non-regulatory programs that aid homeowners are very effective (e.g., chipper days, free consultations) and build good public relations
- Consider using incentives to provide flexibility for landowners if mandatory requirements are not feasible
- Only adopt standards you are able and willing to enforce
- Incremental steps are sometimes necessary before more extensive WUI standards can be adopted
- Resolve all potential inconsistencies with other code requirements
- Identify one person or department to administer the WUI program if possible

Resources

For the most up-to-date information on community wildfire mitigation resources, visit the Fire Adapted Communities website: www.fireadapted.org. Specific links provide information about Firewise principles for the home and neighborhood, home wildfire risk assessments, Community Wildfire Protection Plans, and other tools for land managers and community leaders seeking to implement WUI regulations and related programs.

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