

WILDFIRE RISK REDUCTION IN FLORIDA

Home, Neighborhood, and Community Best Practices



FLORIDA DEPARTMENT OF AGRICULTURE AND CONSUMER SERVICES, DIVISION OF FORESTRY

FLORIDA DEPARTMENT OF AGRICULTURE AND CONSUMER SERVICES

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Glossary, sources and references can be found at the end of the manual. Credits appear with each image.

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You are a...	Interested in...	Refer to...
General Reader	Understanding the wildfire problem	Chapters 1, 8
Homeowner	Understanding the wildfire problem	Chapters 1, 8
	Wildfire risk assessment processes	Chapter 1
	Making neighborhoods more Firewise	Chapters 4, 5
	Making houses and yards more Firewise	Chapters 6, 7
Fire Prevention Specialist and Community Educator	Understanding the wildfire problem	Chapters 1, 8
	Collaboration and education for wildfire risk reduction	Chapter 2
Business or Community Leader	Understanding the wildfire problem	Chapters 1, 8
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	Setting policy for wildfire risk reduction	Chapter 3
	Regulatory approaches to wildfire risk reduction	Chapter 4
Planner	Planning for wildfire risk reduction	Chapter 3
	Regulatory approaches to wildfire risk reduction	Chapter 4
	Designing Firewise subdivisions and developments	Chapter 5
	Designing Firewise landscapes	Chapter 7
Codes Enforcement Official	Regulatory approaches to wildfire risk reduction	Chapter 4
	Designing Firewise developments	Chapter 5
	Features of Firewise building construction and landscaping	Chapters 6, 7
	Wildfire fuel management processes	Chapters 8

You are a...	Interested in...	Refer to...
Fire Management Official	Understanding the wildfire problem	Chapters 1, 8
	Collaboration and education for wildfire risk reduction	Chapter 2
	Planning for wildfire risk reduction	Chapter 3
	Wildfire risk assessment processes	Chapter 1
	Wildfire fuel management processes	Chapter 8
Emergency Professional or Firefighter	Understanding the wildfire problem	Chapters 1, 8
	Collaboration and education for wildfire risk reduction	Chapter 2
	Cooperative planning for wildfire risk reduction	Chapter 3
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Homeowners Association or Neighborhood Group	Understanding the wildfire problem	Chapters 1, 8
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Architect	Designing Firewise developments	Chapter 5
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Landscape Architect	Designing Firewise landscapes	Chapter 7
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Landowner or Forest Manager	Wildfire risk assessment processes	Chapters 1
	Managing forests for wildfire risk reduction	Chapter 8

chapter

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SOLVING FLORIDA'S WILDFIRE PROBLEM TOGETHER





Photo: DOF

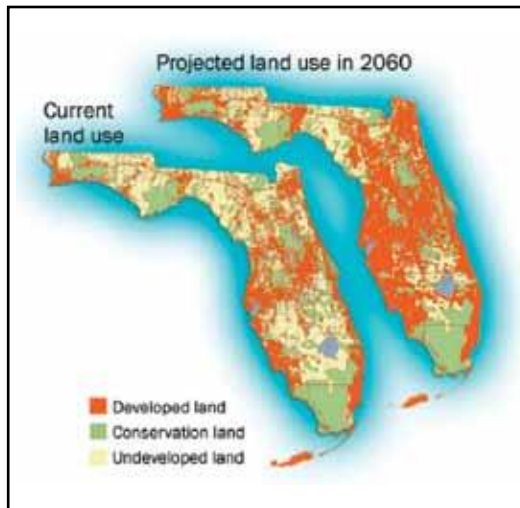
We continue to see the population growing in Florida's wildland-urban interface areas. The number of wildfires impacting residents and suppression costs also continue to grow. The need for mitigation – vegetation management and community education – is critical. Until more residents in these high-risk areas accept the personal responsibility to make their homes more likely to survive, we will continue to see more homes lost or damaged by wildfires.

–James R. Karels, Director, Florida Division of Forestry

DEFINING FLORIDA'S WILDLAND-URBAN INTERFACE

Population Growth and Development Pressures

Recent census data show that a majority of the fastest growing areas in the U.S. are in wildfire-prone environments. It is no surprise that some of these fast growing communities are in Florida. In the last decade of the 20th Century, Florida's total population increased by 23.5%, growing from 12.9 million to nearly 16 million residents. Considered as a daily rate of growth, this represents an increase of 833 people each day in Florida (net births plus in-migration, Florida Office of Economic and Demographic Research 2002). Although population growth slowed during the economic downturn of 2008-2009, Florida's population is expected to grow to 36 million residents by 2060. By 2020, Florida will overtake New York as the nation's third most populous state.



Graphic: 1000 Friends of Florida 2006

In the process of population growth, about 7 million additional acres of land could be converted from a natural or rural condition to suburban and urban uses (1000 Friends of Florida 2006). Florida also has very active local and state land conservation programs. As of March 2010, 27% of Florida was in local, state, or federal conservation status (FNAI 2010).

Homeowners in Florida must contend with natural hazards including wildfire, wind storms, and flooding. This combination of factors – burgeoning population, abundant natural areas, development pressures, and lack of public awareness – makes Florida a bellwether state for creating solutions to various hazards. Florida is at the forefront of managing wildfire issues through local comprehensive planning, hazard mitigation planning, and aggressive land management programs.

This collision of forces is especially true in the realm of wildfire. Many of Florida's existing and new residents are unaware of the vital role fire plays in our landscape and their houses are vulnerable to wildfire damage. Balancing development pressures with wildfire risk reduction and education creates a unique challenge for local governments, planners, emergency managers, hazard mitigation specialists, and other community management professionals, including public and private land managers.

Our growing population continues to spread from our communities into outlying areas where homes and wildland fuels intermingle. Unfortunately, homeowners who have moved to these areas to enjoy the benefits of being “close to nature” typically do not understand that the safety of their family, home, and neighborhood may well depend on action they take before wildfire occurs. Homeowners must, in essence, become partners with fire protection agencies.

—Charles Bronson, Past Florida Commissioner of Agriculture (2001-2010)

What is the Wildland-Urban Interface?

Under these population pressures, Florida's abundant forests and natural areas are increasingly converted to or affected by human development. With increasing environmental awareness, developments that incorporate “natural” vegetation have become more popular with Florida residents. Many people want a house in the woods. This mixture of development and forests, called the “wildland-urban interface,” aggravates the wildfire threat.

The wildland-urban interface (WUI) is a concept that can be defined from a number of different perspectives. On maps, the WUI is defined by the contrast between human population density and natural vegetation. When increased development changes the structure and function of ecosystems, impacts include habitat fragmentation, reduced diversity of native plants and animals, invasion of non-native species, increased storm water runoff, and increased soil erosion. Some WUI residents also have competing interests. For example, some people may value a natural land for outdoor recreation and water filtration, some may value wood fiber or agricultural products, and others may value subdivisions and shopping areas to serve a growing population.

Florida's Wildfire Problem in the Wildland-Urban Interface

From a fire management perspective, the WUI is where human development mingles with undeveloped areas, with the potential for both structures (e.g., houses and outbuildings) and natural vegetation (e.g., forests) to become fuel for wildfires. For example, the interagency National Wildfire Coordinating Group defines the WUI as a “set of conditions” that may promote wildfire (see box). This “set of conditions” method is perhaps the best way to define and assess WUI areas when planning for wildfire prevention, risk reduction, and protection activities.

In recent decades the intersection of people with natural areas and houses with forests in the WUI has complicated the Florida wildfire problem. Losses from WUI fires are higher with each extreme wildfire year. The increase in the number of houses destroyed by wildfire has occurred for two major reasons: (1) greater buildups of vegetation leading to more intense wildfires, and (2) greater numbers of houses being built in or near wildfire-prone areas.

The exclusion of fire from Florida's natural areas through much of the 20th Century has allowed vegetative fuels to build up to

dangerous levels in many areas. Fire exclusion may have been necessary to allow forests to regenerate after the heavy logging of the early 20th Century, but human settlements and roads also inadvertently prevented natural fires from moving across the land as they once did. Fire disappeared from many of the ecosystems it once regularly shaped and created.

In addition to vegetative fuels, houses and other structures have the potential to become fuel for wildfire in the WUI. As vegetative fuels continue to accumulate and the inevitable natural fire is postponed, the probability of devastating wildfire increases. These conditions

The Wildland-Urban Interface Defined...

...by Planners and Foresters

The area where increased human influence and land use changes are affecting natural areas and natural resource management.

...by Fire Managers

The area where human development mingles with undeveloped areas, resulting in conditions that make the area more vulnerable to wildfire.

...by the National Wildfire Coordinating Group

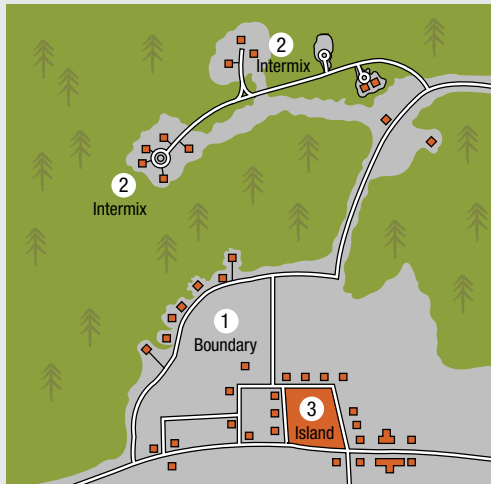
A “set of conditions” that may promote wildfire, including type of vegetation, building construction, road construction, accessibility, lot size, topography, and other factors such as weather and humidity. Certain combinations of these conditions make communities more vulnerable to wildfire.

SOLVING FLORIDA'S WILDFIRE PROBLEM TOGETHER

Categories of Wildland-Urban Interface

There are three major categories of wildland-urban interface (WUI). Depending on the set of conditions present, any of these areas may be at risk from wildfire. See the following section about Wildfire Risk Assessment to determine the level of risk.

1. “Boundary” WUI is characterized by areas of development where houses, especially new subdivisions, press against public and private wildlands, such as private or commercial forest land or public forests and parks. This is the classic type of WUI, with a clearly defined boundary between the suburban fringe and the rural countryside. From a planning perspective, it is best to minimize the length of the boundary, clearly define the urban boundary, and take advantage of natural or man-made barriers (e.g., wetlands, highways) to define and protect the boundary.
2. “Intermix” WUI areas are places where improved property and/or structures are scattered and interspersed in wildland areas. These may be isolated rural houses or an area that is just beginning the transition from rural to urban land uses. These mixed uses are problematic and costly to firefighting resources. It likely is in the best interest of the community to limit, cluster, or entirely avoid intermix development. Research has indicated that wildfire damage becomes worse with more WUI and intermix development (e.g., Irwin 1987).
3. “Island” WUI, also called “occluded” interface, is an area of wildland surrounded by predominantly urban or suburban land uses. As cities or subdivisions grow, remnants of undeveloped land may remain. Sometimes these remnants exist as parks or as land that can’t be developed due to site limitations, such as wetlands. While island areas add the amazing benefits of greenspace in a community, islands are the hardest to manage with fire, often requiring alternative fuel management approaches.



Wildland-Urban Interface

require that managers intervene with regular fuel management, such as prescribed fire, mowing, chopping of vegetation, and other approaches. Of these techniques, prescribed fire is the most economically and ecologically sound way to manage the fuels that contribute to wildfire in Florida.

Florida Wildfire: Values at Risk from the Florida Wildfire Risk Assessment

Although Florida has fewer wildland-urban interface acres (6.5 million, 7.3% of the state) than 6 other southern states (Alabama, Georgia, North Carolina, Tennessee, Texas, and Virginia), Florida has by far the highest wildfire risk.

- 95.5% of Florida wildland-urban interface communities are at high or extreme risk of wildfire damage based on the likelihood of wildfire occurring in nearby areas.
- 3.9 million acres in Florida are at high or extreme overall wildfire risk based on likelihood of wildfire, historic suppression costs, and infrastructure threatened.
- 3.5 million acres in Florida have a high or extreme Wildfire Susceptibility Index based on factor such as fuels, forest conditions, average weather, and wildfire history.

(Southern Group of State Foresters 2008)

Because of the number of homes and structures in Florida's interface areas, we estimate that over 70% of the wildfires we now respond to involve some type of structure.

—Gerry LaCavera, Wildfire Mitigation Coordinator, Florida Division of Forestry

Wildfire is a Symptom of Development

Fire managers question the wisdom of building in an environment where palmettos are brushing up against the sides of houses. The thick palmetto forests of Florida are the natural equivalent of “lakes of gasoline” from a wildfire perspective. The problem of wildfire in the wildland-urban interface is just one symptom of the broader trend of human development changing natural areas and affecting the condition, health, and management of resources.



Photo: DOF

UNDERSTANDING AND ASSESSING WILDFIRE IN FLORIDA

Factors that Intensify Wildfires in Florida

Along with accumulation of fuels and more houses near wildfire-prone areas, several major factors have historically combined to aggravate Florida's WUI fire problem.

- Unusually severe weather patterns due to climate and periodic atmospheric changes
- Lack of strategic fuel management programs
- Lack of public awareness and support of fuel management programs
- Lack of awareness by builders and developers to design Firewise landscapes and structures
- Inadequate community and individual wildfire hazard planning and preparedness
- Inadequate fire-fighting resources and infrastructure

Many of these factors have been addressed or mitigated in recent years in Florida and this manual is part of that process. This manual will focus on the most manageable factors contributing to the wildfire problem, including planning for development, creating regulations for wildfire risk reduction, determining fuel management needs, designing landscapes and buildings to reduce wildfire risk, and developing adequate infrastructure and community hazard planning and preparedness.



The Wildfire Disaster Cycle

Periodic wildfire is a natural part of Florida's environment. Wildfires are becoming more disastrous, however, because of the increasing fuel levels in natural systems. These increased fuel loads combine with several other conditions to create an extreme wildfire hazard. When a particular set of conditions is present, the wildfire disaster becomes a vicious cycle.

1. Construction of houses or businesses in or near fire-adapted ecosystems
2. Accumulation of vegetation leading to inevitable wildfire in ecosystems adapted to fire
3. Damage or destruction of unprotected structures by wildfire
4. Insurance company or FEMA payments to rebuild houses or restore communities
5. Rebuilding of houses or businesses in or near the same fire-adapted ecosystem, often with larger or more valuable structures with the same construction and landscaping approaches, along with an expansion of new development in the WUI

CASE STUDY

The Wildfire Disaster Cycle in Lehigh Acres, Lee County, Florida

Lehigh Acres is a wildland-urban interface community located in Lee County, comprising nearly 95 square miles with approximately 50,000 residents. The wildfire risk is rated high. Fuel density is high, fuels are highly flammable (palmetto to 15 feet, gallberry, invasive *Melaleuca*), a rich wildfire history exists, and houses are scattered throughout the area.

In late April 2006, a wildfire in Lehigh Acres burned for 3 days and destroyed 16 homes. Numerous other homes received damage. Post-wildfire inspection indicated that most of the damage to homes and other property was caused by excessive vegetative growth and vegetation that was too close to the structures.

This was not the first time wildfire had impacted the community. Lehigh Acres wildfires have been frequent and intense and always threaten homes. Lehigh Acres lost 3 homes in 2000 when a 387 acre wildfire threatened 241 homes and caused \$350,000 in estimated losses. Following this history of repetitive losses, an intensive vegetation management plan was included in the development of a 2007 Community Wildfire Protection Plan for Lehigh Acres.

6. Re-accumulation of fuels leading to inevitable wildfire in ecosystems adapted to fire

7. Repetition of this cycle

The repetitious pattern of disastrous wildfires and loss of property in Florida since 1998 may be a harbinger of the future. The number and value of houses in the Florida WUI is rapidly growing. There often is no effort to use fire-resistant building and landscaping materials or to address wildfire hazards around houses or on adjacent lands. Once a wildfire gets started, structural firefighting resources may be stretched thin and be unable to protect all of the houses at risk. Unless communities, organizations, and individuals take positive planning and preventive action, wildfire disasters will continue to follow a predictable cycle. Planners and insurance companies will immediately notice that this cycle is similar to the

repetitious hurricane disaster cycle in coastal communities.

Advances have fortunately been made in understanding the dynamics of the wildfire disaster cycle. Landscape-level wildfire models and evaluations of past wildfire events have led to a better understanding of risk factors and a better slate of recommendations for developers, builders, landscape architects, homeowners, neighborhoods, planners, and local governments to limit the vulnerability of life and property to wildfire.

Experience in Florida confirms that certain conditions increase the risk of wildfire damage. Several characteristics define the majority of the wildfire risk in Florida.

- Dense, flammable vegetation within 30 feet of houses and structures
- Combustible or vulnerable building materials, especially in roofing, siding, soffits, vents, and skirting

- Roads that are insufficient for firefighting equipment access (e.g., only one access road, too narrow, inadequate bridges, etc.)

- Water systems that are inadequate or dependent on electric power

Other factors that contribute to wildfire risk in Florida include large adjacent forest or natural areas, extensive canal or ditch systems blocking firefighter access, a high proportion of undeveloped or overgrown lots within a subdivision, and aboveground or overhead utilities. Global weather patterns play a role, with the La Niña (dry) weather pattern being correlated with drought that aggravates wildfire risk. In confirmation of the value of fuel management, especially with prescribed fire, research has found that the chances of a wildfire are lower in areas where there has been a

fire within the past ten years (Prestemon et al. 2002).

The wildfire disaster cycle can be averted by applying the considerable scientific knowledge and technology that are available to guide fuel management and wildfire-resistant house and landscape design. Case studies appear throughout this manual to illustrate the various wildfire risk reduction projects, success stories, and lessons learned from around the state.

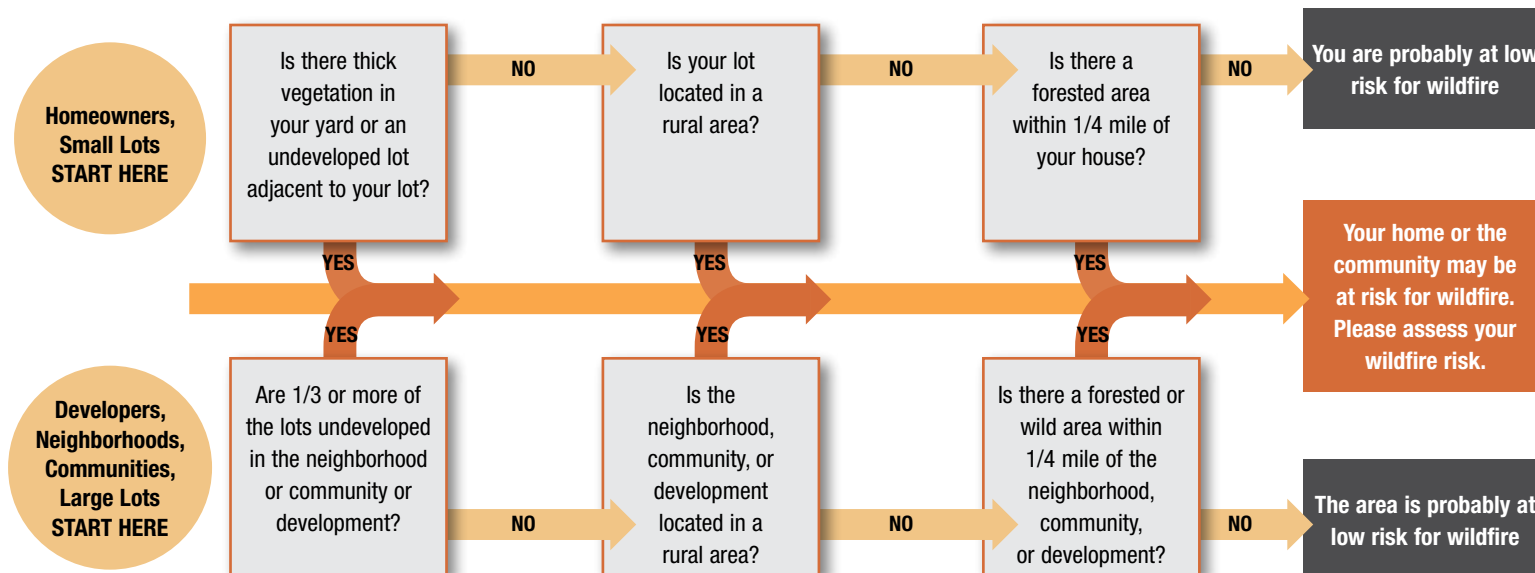
Wildfire Risk Assessment

Not every WUI area is at high risk from wildfire. It is important to assess the level of wildfire risk before planning for wildfire prevention and risk reduction practices. A wildfire risk assessment will help the homeowner, builder, developer, or planning professional determine

whether the area needs attention and will help to direct wildfire risk reduction to the areas at highest risk.





Wildfire risk assessment looks at the conditions around a house, a property, or a community that could lead to wildfire damage. In order to determine whether you should proceed with one of the more detailed wildfire risk assessment tools for Florida, please consult the accompanying Wildfire Risk Assessment Decision Tree. Please note that this Decision Tree does not cover all possibilities. If your urban Florida home is surrounded by palmettos, you should perform a detailed risk assessment and take action to maintain a Firewise landscape!

Wildfire Risk Assessment Decision Tree



SOLVING FLORIDA'S WILDFIRE PROBLEM TOGETHER

Florida Homeowner's Guide to Evaluating Wildfire Risk

Level of Risk	Low	Moderate	High	Extreme (or Large Parcel)
	 Photo: USFS	 Photo: Pandion Systems, Inc.	 Photo: DOF	 Photo: FDOF
Description of conditions within 200 feet of house	<ul style="list-style-type: none"> • A clear view at least 200 feet from the house • Widely scattered pine trees or moist forest or hardwood swamp • Bare ground or few plants growing low to the ground • Improved pasture or widely spaced grassy clumps or plants • Scattered palmettos or shrubs up to 3 feet tall separated by patches of grass and sand • Clumps of grasses up to 4 feet tall (with no cogongrass) • Scattered pine needles (non-continuous layer) • Large trees or mostly broadleaf trees • Leaves from oak or other broadleaf trees on the ground 	<ul style="list-style-type: none"> • A clear view above shrubs at least 200 feet from the house • Pine forest or scrub vegetation or cypress swamp • Continuous layer of pine needles under scattered pine trees • Clumps of grasses 4 to 6 feet tall, or cogongrass at any height • Palmetto/gallberry 3 to 6 feet tall with scattered pine trees • Scrub vegetation less than 6 feet tall, with or without sand pine • Dense, young pines up to 60 feet tall 	<ul style="list-style-type: none"> • No clear view into the landscape because of dense growth or vines • Pine forest or scrub vegetation • Thick, continuous grasses, weeds, or shrubs more than 3 feet tall • Palmetto/gallberry over 6 feet tall with scattered pine trees or palmetto/gallberry 3 to 6 feet tall with dense pine canopy* overhead • Vines growing up trees • Medium-size trees or cabbage palms beneath taller pine trees • Impenetrable shrubs or young pines • Scrub vegetation over 6 feet tall, with or without sand pine 	<ul style="list-style-type: none"> • Palmetto/gallberry over 6 feet tall with dense pine canopy* • Sand pine scrub with dense pine canopy* • Dense Melaleuca
Firewise Landscaping Guidelines <small>(see following section for details about Firewise Landscaping Zones)</small>	<ul style="list-style-type: none"> • Create a Zone 1 Defensible Space (0-30 feet) around the house, as described in Chapter 7 • Follow guidelines in Chapter 6 for providing (1) clearly marked street and house and (2) firefighting access 	<ul style="list-style-type: none"> • Create a Zone 1 Defensible Space (0-30 feet) and a Zone 2 Fuel Reduction Zone (30-60 feet) around the house, as described in Chapter 7 • Follow guidelines in Chapter 6 for a Firewise house 	<ul style="list-style-type: none"> • Create a Zone 1 Defensible Space (0-30 feet), a Zone 2 Fuel Reduction Zone (30-60 feet), and a Zone 3 Transition Zone (60-100 feet) around the house, as described in Chapter 7 • Follow guidelines in Chapter 6 for a Firewise house • Seek expert guidance from the DOF Field Unit to reduce high wildfire risk 	<ul style="list-style-type: none"> • Create ALL FOUR Firewise Zones around the house, as described in Chapter 7 • Follow guidelines in Chapter 6 for a Firewise house • Seek expert guidance from the DOF Field Unit to reduce extreme wildfire risk

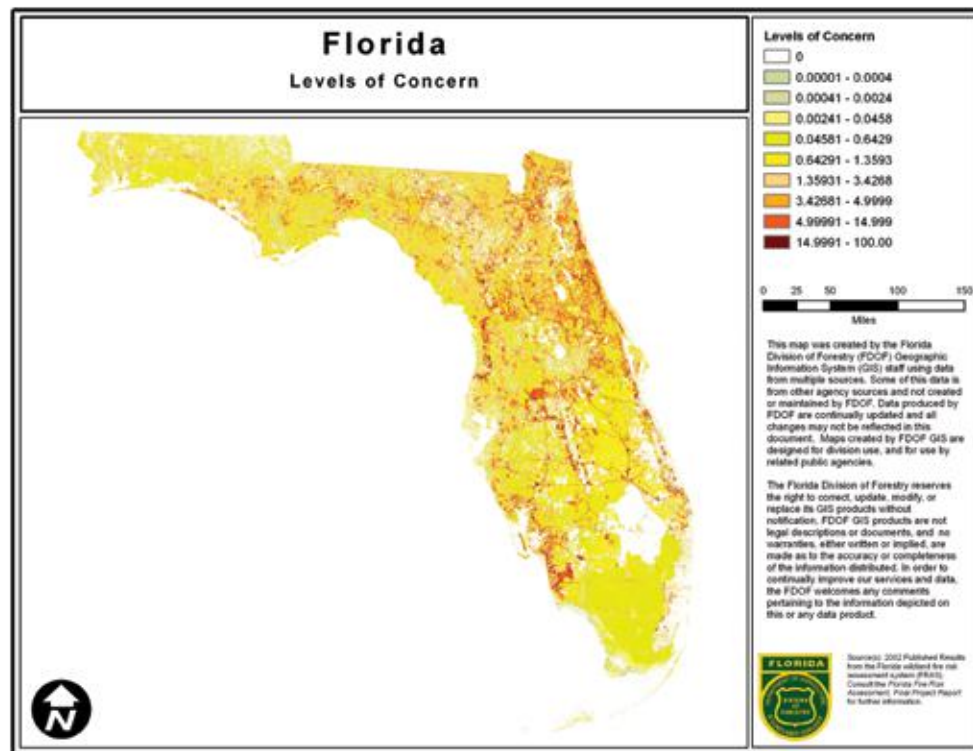
Several wildfire risk assessment tools are available for use in Florida.

- *Wildfire Hazard Assessment Guide for Florida Homeowners* for individual structures or entire developments and subdivisions – Produced by Florida Division of Forestry (DOF) in 2002, this assessment guide has been published to assist homeowners, neighborhood associations, developers, and designers with wildfire risk assessment. This guide divides the hazard assessment process into distinct steps and provides an assessment checklist that is easy to use. The risk checklist is available at http://fl-dof.com/wildfire/wf_pdfs/hazard_wf_risk_scoresheet.pdf

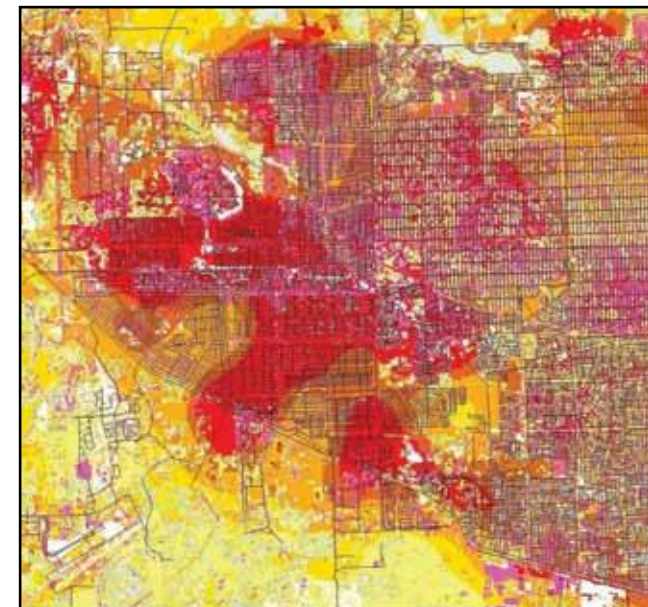
- *Florida Wildfire Risk Assessment (FLFRA)* for development, community, county, and state planning – Produced by the Southern Group of State Foresters in 2006, this regional assessment delineates high-wildfire-risk areas and is designed as a tool for state and local planners, communities, and developers. The Florida Fire Risk Assessment System (FLFRAS) is the GIS software framework used for viewing, modeling, and creating the wildfire risk assessment maps. The create outputs such as Level of Concern (LOC) and Wildland Fire Susceptibility Index (WFSI) that can be used during local hazard and land-use planning processes. The FLFRAS is used to analyze wildfire risk

factors and facilitate planning, management, and fuel reduction activities within an area of interest. The FLFRA and FLFRAS tool are online at www.southernwildfirerisk.com. The DOF's former Florida Risk Assessment System has been integrated into this regional tool.

Further assistance for wildfire risk assessment is available from a Florida Division of Forestry Field Unit (see DOF map below), from the local Fire Service, and/or from the Cooperative Extension Service county office listed in the telephone directory.



Graphics: DOF



“Levels of Concern” (left) and “Wildfire Susceptibility Index” (above) are two of the outputs available at different scales from the Southern Fire Risk Assessment System (SFRAS), which is available online at www.southernwildfirerisk.com.

SOLVING FLORIDA'S WILDFIRE PROBLEM TOGETHER

We should look at fire prevention as our number one priority. Houses threatened and firefighters at risk are telling signs that we – the fire protection agencies and the community at large – have not done our job.

–Mike Long, Past Director, Florida Division of Forestry (2003-2008)

ADDRESSING FLORIDA'S WILDFIRE PROBLEM

Who Needs to be Involved: Roles and Responsibilities

There is a need for shared responsibility in addressing wildfire risk reduction efforts. There is a great need for communication and cooperation among community members, local governments, planners, fire managers, and public educators to create wildfire risk reduction plans, comprehensive land use plans, land development regulations, fuel management strategies, and public information programs.

Planning responsibilities must be shared among federal, state, and local agencies in collaboration with public and private partners and citizens. Local leadership is especially important in the wildfire risk reduction process. The key to successful wildfire prevention and protection strategies is to encourage the interest of local citizens, developers, and planners, and to promote the undertaking of local education, planning, and preventive actions.

The Florida Division of Forestry and its Partners

The DOF was founded in 1927 in response to uncontrolled wildfires that burned during the 1920s. The DOF has a statutory responsibility to “prevent, detect, suppress, and extinguish

wildfires wherever they may occur on public or private land in the state and to do all things necessary in the exercise of such powers, authority, and duties” [F.S. 590.02(1)(b)]. In addition to fighting wildfires that threaten houses, property, and natural systems, the DOF provides wildfire prevention, education, and wildfire risk reduction programs, management of 35 state forests totaling over 1,052,000 acres, and urban, community, and private landowner forestry assistance.

The DOF relies on federal, state, and local partners to fulfill its wildfire suppression and prevention role. Mutual aid agreements throughout the state mean that county or municipal fire equipment frequently respond along with DOF firefighting units. Structural and forest protection firefighters work in concert with each other. Although the DOF serves Florida with a comprehensive wildfire prevention, suppression, and risk reduction program, it is necessary for many other agencies, private landowners, businesses, and homeowners to participate in community wildfire protection efforts.

DOF Regional Fire Management Teams and Field Units

DOF has a Fire Management Team located in each of its four regions. The sole mission of these teams is to help DOF Field Units provide fuel management of hazardous conditions

in WUI areas. The Fire Management Teams focus their efforts on high risk areas. They use both prescribed fire and mechanical treatments to assist landowners in reducing heavy fuel loads with the understanding that landowners will continue fuel management treatments in the future.

From 1999 to 2009, DOF Field Units and regional Fire Management Teams completed fuel management projects on over 94,000 acres at a total cost of approximately \$4.2 million. These projects provided enhanced protection for almost 60,000 Florida homes and business structures valued at over \$13 billion. These services were provided at an approximate cost of \$44 per acre treated or \$70 per structure protected, with 73,762 of these acres being man-



- | | |
|------------------------------------|------------------------------------|
| 1. Blackwater, Munson (Milton), FL | 11. Withlacoochee, Brooksville, FL |
| 2. Chipola River, Panama City, FL | 12. Orlando, Orlando, FL |
| 4. Tallahassee, Tallahassee, FL | 14. Lakeland, Lakeland, FL |
| 5. Perry, Perry, FL | 15. Myakka River, Bradenton, FL |
| 6. Suwannee, Lake City, FL | 16. Okeechobee, Okeechobee, FL |
| 7. Jacksonville, Bryceville, FL | 17. Caloosahatchee, Ft. Myers, FL |
| 8. Waccasassa, Gainesville, FL | 18. Everglades, Davie, FL |
| 10. Bunnell, Bunnell, FL | |

Field Units of the Florida Division of Forestry. Contact information is available at <http://www.fl-dof.com/>

CASE STUDY**Improving Response to Florida Wildfires**

The impact of the 1998 wildfires was so significant that the Governor of Florida established an inter-agency Wildfire Response and Mitigation Review Committee to thoroughly review the causes of the wildfires and to suggest ways to improve wildfire response and mitigation. The committee made 90 recommendations for improvement, which were outlined in the Governor's report on the wildfires of 1998. One year after that report, the DOF improved Florida's wildfire response and mitigation efforts. Accomplishments also have been made in the area of hazardous fuel reduction and assistance to land managers and local agencies in wildfire recovery activities.

Wildfire Response Improvements

- Unified State Command structure was redesigned for wildfire response
- Key liaisons were designated between agencies within the command structure
- Unified public information programs were implemented
- Training of emergency responders was increased at all levels

Wildfire Mitigation Improvements

- DOF staffed and equipped four Fire Management Teams
- DOF created 15 Wildfire Mitigation Specialist positions
- Firewise Mitigation strategies have been adopted by the state in all areas of planning and risk reduction
- The Florida Building Commission has adopted WUI standards
- Numerous statutes have been revised to more fully support prescribed fire
- Public and teacher education programs have been developed and are being implemented

(DEM and DOF 2000)

aged using prescribed fire (DOF 2010a). Floridians can contact their DOF Field Unit to request wildfire risk reduction and fuel management information, guidance, and assistance.

What Needs to be Done

Most land managers and interagency working groups agree that wildfire risk reduction efforts in high risk areas of the WUI need to accomplish a number of objectives.

- Engage in strategic hazard planning in advance of wildfire events
- Involve community members and partner agencies/organizations in understanding, preventing, and reducing the risk of wildfire
- Implement and maintain fuel reduction strategies
- Establish incentives for homeowners and partners to take appropriate actions

Most Effective Wildfire Risk Reduction Programs

Typical wildfire mitigation program objectives fall into four major categories: 1) education, 2) assessment of area-wide risks, 3) assistance to private property owners, and 4) implementation of regulations and standards. Wildfire program managers in 25 states were asked to name their most successful programs for wildfire risk reduction on private lands. Six program elements were identified as the most successful by the managers.

- Cost-share or free treatment
- Disposal or chipping of slash
- Public education
- Risk assessment and mapping
- Prescriptions
- Regulations

(Reams et al. 2005; see programs database at www.wildfireprograms.usda.gov)

Confirming what is already known about the role of weather and fuels in determining wildfire behavior, research suggests that any fuel reduction practice that mimics natural fire will be more successful in reducing the severity of future wildfires (Prestemon et al. 2002). Evaluations of past Florida wildfires have shown that wildfires that occurred in areas that had previously been burned tended to be smaller and burn fewer acres. The study concluded that for each dollar spent in fuel management, \$2.14 in wildfire suppression and damages was saved (DOF 2010b). Research has also shown that investment in wildfire preven-

Maybe, instead of focusing on how the fire was started and who's going to sue whom, we should be talking about reducing the risks in susceptible areas. We should be thinking about building disaster-resistant communities...and we should be thinking about the effects of sprawl and of new ways of developing our communities.

—Nan Johnson, AICP, *American Planning Association Magazine*, July 2000

tion outreach and education activities results in suppression cost savings of \$1,267 per acre (Prestemon et al. 2010).

The steep costs and potential losses from wildfire in the WUI are incentives to revise our approach. The wildfire threat to houses and communities is influencing lives and policies at local, state, and national levels. It is critical that Floridians become more aware of the personal responsibility for wildfire risk reduction and more involved in both wildfire risk reduction activities and land use planning decisions.

It is clear that both fuel management and wildfire prevention education must be performed to meet the challenges and reduce the cyclical costs of wildfires in Florida. The bottom line is that good wildfire risk reduction and education reduces the demand and costs for firefighter response and protects houses and public safety. The Reader Guide at the front of this manual will help citizens, government officials, and private partners find the resources to plan for wildfire risk reduction.

CASE STUDY

National Fire Plan Strategies

In the wake of the 2000 wildfires, the Secretaries of the U.S. Department of Interior and U.S. Department of Agriculture cooperated with Governors to create the Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment. The team developed a 10-Year Comprehensive Strategy (August 2001) and an Implementation Plan (May 2002).

These efforts are collectively known as the National Fire Plan (NFP). The NFP cites increasing forest ecosystem health problems and states that past approaches to land management (e.g., planting of unnaturally dense forests, exclusion of fire) have contributed to more severe wildfires. The NFP strategy highlights the need for a comprehensive approach to reduce wildfire risk to citizens and property in the wildland-urban interface. The plan has since been augmented by the Healthy Forests Initiative (2002), which includes provisions for development of Community Wildfire Protection Plans and other hazard mitigation plans. See a summary and progress reports at www.forestsandrangelands.gov/overview/index.shtml.

The NFP articulates several important goals for the millions of acres of land nationwide that are classified as at high risk for wildfire.

- Improve prevention and suppression of wildfires
- Reduce hazardous fuels
- Restore the health of fire-adapted ecosystems
- Promote community awareness

chapter

2

COLLABORATION AND OUTREACH STRATEGIES FOR WILDFIRE RISK REDUCTION



OPPORTUNITIES FOR COLLABORATION AND OUTREACH IN WILDFIRE RISK REDUCTION

Wildfire prevention and risk reduction is a cost effective way to proactively address wildfire concerns and issues. Dollar for dollar, wildfire prevention education in Florida results in wildfire suppression cost savings of \$1,267 per acre (Prestemon et al. 2010). Wildfire risk reduction strategies are most effective when approached collaboratively – involving groups of residents, elected officials, community decision makers, emergency managers, and natural lands managers – and when combined with effective outreach and education programs. Collaborative and outreach approaches make sense as the initial focus of any community attempting to work toward wildfire risk reduction.

Public acceptance or rejection of mitigation actions can make or break even the best wildfire risk reduction program. Wildfire risk reduction is inherently connected to people and the communities in which they live. In a recent national study, the most significant obstacles to success of a wildfire mitigation program were reported as inadequate program funding and negative public attitudes. Public apathy and resistance to fuel management activities were the most obstructive public attitudes (Reams et al. 2005).

The dramatic population increase in Florida's wildland-urban interface (WUI) is exacerbated by the fact that many new residents have moved to Florida from other states with little or no wildfire problem. Even long-term Florida residents may have limited knowl-

Our program's goal is to encourage community residents to accept the personal responsibility of living in the wildland-urban interface. We increase public awareness and understanding of specific actions they can take to reduce overall wildfire risk. The goal is for homes to survive a wildfire disaster even if fire services cannot get there.

—Gerry LaCavera, Florida Division of Forestry

edge of the natural fire-adapted ecosystems surrounding their homes. On the plus side, recent research shows that Florida residents are fairly knowledgeable about fire's role in forest renewal and the benefits of using prescribed fire as a land management tool (Jacobson et al. 2001). Despite these promising results, there remains a lack of urgency on the part of residents and organizations at many levels to protect houses and communities from wildfire.

Overcoming attitudes of “It won't happen to me,” “Not in my back yard,” “I moved here for privacy,” and “I moved here to be surrounded by woods” requires understanding and respect for residents' perspectives and beliefs. Several recent surveys suggest that public support may be weak for regulation, but is strong for education and assistance programs that raise the awareness of the wildfire threat, teach specific methods for fuel management, and encourage a coordinated set of wildfire risk reduction actions among community residents (Reams et al. 2005).

For the purpose of this manual, we have grouped these public efforts into three approaches: Collaboration, Outreach and Education, and Social Marketing, which are discussed in the three sections of this chapter.

• **Collaboration** – Examples of collaboration include prescribed fire councils, landowner groups or prescribed burning associations, Firewise Communities, stakeholder involvement programs, and the process of creating and implementing a Community Wildfire Protection Plan (CWPP). In all collaborative efforts, the goal is to cooperatively identify problems and reach a consensus for mutual action. In the case of wildfire mitigation, a reduction in the wildfire risk to the community's lives, houses, and property is the desired outcome.

• **Outreach and Education** – Outreach and education programs are designed to raise awareness and improve audience knowledge of wildfire risk reduction needs and practices. In addition, outreach and education programs can build skills, develop capacity, and create social capital. In the best cases, education and outreach programs will influence attitudes and opinions and result in effective action.

• **Social Marketing** – Enhancing awareness, knowledge, skills, and attitudes often does not lead to desired actions or behaviors. Social marketing is designed to use a specific set of tools to generate behavior changes based on social needs, peer pressure, rewards, and community acceptance.

These approaches are most effective when used in conjunction with one another. Simply publishing a brochure or creating a website will not address a complex problem or change attitudes and behaviors. A well-designed program that includes a creative mix of collaboration, outreach, education, and social marketing will increase the success of wildfire risk reduction programs.

COLLABORATION STRATEGIES

Collaboration is the assembly of various resources, information, and funding by two or more stakeholders to solve a set of challenges that would otherwise be difficult to tackle as an individual person, organization, or entity. Collaboration is voluntary, mutually beneficial, and goal oriented. There are many potential benefits of collaboration for wildfire risk reduction, including improved support for mitigation efforts, increased sharing of knowledge, increased access to funding, increased capacity, improved safety, and increased understanding on the part of the public as well as agency understanding of public perceptions and attitudes.

Bringing multiple agencies, organizations, and individuals together for a common cause can greatly improve the chances of program success. Collaboration can overcome many common challenges faced by those working to reduce wildfire risk. Some existing collaborative efforts are outlined on the following pages.

Case Study:

Marion County Multi-Agency Wildland Task Force



Photo: DOF

The Marion County Multi-Agency Wildland Task Force was formed after the devastating 1998 wildfires. Task Force members (U.S. Forest Service, Florida Division of Forestry, Marion County Fire-Rescue and Emergency Management, Dunnellon Fire Rescue, Ocala Fire Rescue, Florida Department of Environmental Protection, local landowners, and media) meet annually if local wildfire conditions warrant. The discussions encourage cooperative problem solving and the sharing of resources to prevent and suppress wildfires. The group advises the Marion County Commission on the implementation of both voluntary and mandatory burn bans. The incidence of major fires has remained low since the inception of the Task Force due to their focus on fire prevention.

The 2006 fires provided good evidence for the effectiveness of the Task Force. Despite a drought index of 600-700 for most of Marion County, only 330 acres burned in Marion County in 74 wildfires, much less than would ordinarily have burned under those conditions. Key to this success is the work of agency public information officers who actively promote fire prevention in problem areas of the county based on assessments from the Task Force members. The Task Force received the 2007 Smokey Bear Bronze Award to acknowledge their fire prevention success.

Benefits of Collaboration for Wildfire Risk Reduction Problems

Wildfire or fuel management problem	Benefits of collaboration
Lack of adequate funding or resources for wildfire risk reduction projects and programs	Can mobilize people and organizations to share resources or generate funding
Lack of quality, useable data and resources	Facilitates the discovery and sharing of data, expertise, and resources
Perceived and actual internal resistance or mistrust of wildfire risk reduction actions	Leads to institutional learning, coalitions, and opportunities for agreement
Incompatible external attitudes towards wildfire risk reduction activities	Leads to broader understanding of attitudes and values through outreach and shared learning
Conflicting project timelines, standards, and objectives	Can lead to coordination, cooperation, and increased effectiveness and efficiency

Adapted from Sturtevant et al. 2005

Stages of Collaboration

There are several commonly identified stages of collaboration. Movement from one of these stages to the next depends on the motivation of the group. Changes in staffing, priority, and time available are factors affecting participation for every partner organization. As a result, the stages may not progress in a linear fashion. If a group gets stuck at one stage, working ahead on the next stage sometimes creates the positive energy needed to complete the previous stage and the momentum to complete the entire process.



Adapted from Sturtevant et al. 2005

Initiate

The initial step in a collaborative process is to identify the problem that will be addressed. This is best done with representatives from various backgrounds, interests, and experience to ensure the problem gets defined in a way that is agreeable to all groups involved. The most successful collaborations come from situations where there is an urgent issue (wildfire) but there is no clear consensus on solutions (Sirmon 2001). One important function of the initiation phase is to determine whether or not a collaborative process will actually work with the time, money, facilitators, and existing level of conflict (if any) among the partners initially assembled.

Gather

A collaborative effort requires motivated leaders and coordinators who can bring stakeholders together. While an effort may be started by an agency, the best results ensue when the participants are from diverse backgrounds.

Set goals

A clear set of goals and priorities are necessary to provide a roadmap for the group to follow. A well defined mission statement, vision, or statement of purpose can act as an overarching guide for the group's work, although these are not needed for the group to get started.

Organize

Organization is needed to establish the fundamentals of the group. This is often best done by an experienced facilitator. Important details such as meeting logistics, necessary resources, communication protocols, legal requirements, involvement of agencies, and rules of conduct need to be considered.

Learn

Successful collaborative relationships are built by understanding each member's issues, concerns, perspectives, and needs.

Implement

The desired outcome of any collaborative group is to achieve goals. A skilled facilitator will be able to guide the group from ideas to action. Action may take many forms and there will likely be differences in opinion on what should be done and how it is done. Small successes early in the program can provide powerful motivation for the group to attempt more complex actions that will have lasting positive results.

Reflect

Monitoring and evaluation are critical to program success and continuation. Monitoring measures whether the group is on target toward its goals. Evaluation determines how successful a program was and where it can be improved. Reflection can help the group know it is keeping the focus and improving the initiative.

Assembling a Collaborative Team

Creating effective programs often requires the assistance of many organizations. A collaborative effort can give more value for resources invested in terms of program outcomes. Many resources can be tapped to assemble a collaborative team, including natural resource agencies, public agencies, community leaders, stakeholder groups, business and industry, and interested individuals. It is important to identify key players for the collaborative team, keeping in mind that working groups of between 4 to 20 people are the most effective, depending on the strength of leadership and purpose.

Potential Members of Collaborative Groups for Wildfire Risk Reduction	
Natural Resource Agencies	<ul style="list-style-type: none"> • Local (County/City environmental directors, County/City environmental land managers) • State (Florida Division of Forestry [DOF], Florida Fish & Wildlife Conservation Commission [FWC], Florida Department of Environmental Protection [DEP]) • Federal (U.S. Forest Service [USFS], U.S. Fish and Wildlife Service [USFWS], Department of Defense) • Private resource management groups (The Nature Conservancy)
Other Public Agencies	<ul style="list-style-type: none"> • County/City emergency management and fire/rescue directors • County/City hazard mitigation planners • County/City law enforcement leaders • County/City land use planners • County/City building codes and codes enforcement officials • Tourism Development Councils • Local Mitigation Strategy committee members
Community and Business Leaders	<ul style="list-style-type: none"> • Elected officials • School administrators and University faculty members • Timber companies • Developers • Real estate groups or agencies • Utility companies • Tourism and recreation organizations • Homebuilder organizations • Financial institutions • Insurance organizations • Private prescribed fire or forestry consultants • Teachers and educators
Stakeholder Groups	<ul style="list-style-type: none"> • Neighborhood associations • Local conservation groups • Regional conservation groups • Recreational user groups • Natural area support groups • Community service groups or churches
Interested Individuals	<ul style="list-style-type: none"> • Homeowners • Organizational leaders • Users of public natural areas • Conservationists • Media representatives

Case Study:***Living on the Edge* Community Decision Maker
Firewise Workshops**

Photo: DOF

Initiated by the DOF in 2004, the *Living on the Edge in Florida* program is designed to involve key decision makers in discussions about community needs and relevant methods to reduce wildfire risk. It increases decision makers' understanding of wildfire risk and begins the process of incorporating wildfire risk reduction in community planning and management activities.

The *Living on the Edge* program is a multi-hour workshop during which participants hear presentations by local fire experts including DOF and County Emergency Management representatives. They might also hear success stories from other communities,

usually from a Firewise Communities representative. At the core of the program is the *Living on the Edge in Florida* CD. This interactive CD contains video clips to reinforce speaker comments and handouts to provide education about key topics, such as an introduction to the issues in the wildland-urban interface, reasons why homes burn, techniques of Firewise landscaping, and issues in community planning for wildfire.

Using the knowledge gained from the first part of the program, participants take part in simulated activities to 1) evaluate and reduce wildfire risk in a community and 2) create a new Firewise development involving community design and layout, infrastructure, and management of surrounding natural areas. Throughout the activity, participants are prompted to consider critical factors such as effectiveness, cost, and community acceptance of each wildfire risk reduction decision. At the end of the workshop, participants are asked to commit to taking at least one action to promote wildfire risk reduction in their own communities.

In a 2007 evaluation, interest in and knowledge of Firewise and fire-related topics was shown to greatly increase as a result of the workshops, and participants felt that the usefulness of the information was very high. The largest change in results was seen in correct responses to "The single most beneficial step an average person can take to make their house safer from wildfire is" (answer: Create a lean, clean, and green defensible space around your home), with responses rising from 70% correct before the workshop to 94% correct after the workshop. Prior to the workshop, only 74% of participants knew how much defensible space there should be and following the workshop 97% of respondents correctly answered "30 feet wide." It is expected that the increased understanding and relationships built during the workshops will lead to new partnerships and increased support for wildfire risk reduction actions.

Examples of Collaborative Programs**Community Wildfire Protection Plan (CWPP)**

A CWPP provides a community with a road-map to reduce its risk from wildfire. A CWPP is designed through collaboration between state and local agencies, homeowners and landowners, and other interested parties such as city councils, utilities, homeowners associations (HOA), environmental organizations, and other local stakeholders. Workshops for community decision makers and other stakeholders may be offered as part of the collaborative planning process. The plan identifies strategic sites and methods for risk reduction and structure protection projects across the landscape and jurisdictional boundaries. A major benefit of having a CWPP is that projects identified in the plan may receive priority for National Fire Plan and other federal funding, as well as DOF fuel management activities. The complete process for developing a CWPP is discussed in Chapter 3.

Prescribed Fire Councils

Prescribed Fire Councils were created to bring together fire managers, natural resource professionals, and landowners to discuss fire issues and methods for maintaining the ability to use fire as a land and fuel management tool. The core mission of the Prescribed Fire Councils is to promote the appropriate use of prescribed fire for enhancing public safety, managing resources, and sustaining environmental quality. Prescribed Fire Councils facilitate communication among interested parties, provide a forum for sharing ideas and information, and create opportunities for on-the-ground collaboration. Collaboration through the councils helps to address the challenges of public safety

and health, ecological stewardship, liability, public education, air quality regulation, and the continued use of prescribed fire in the Wildland Urban Interface setting. The councils work to support policy and outreach programs to keep the public and decision makers aware and supportive of the uses and benefits of prescribed fire.

Florida has three Prescribed Fire Councils in north, central, and south Florida. Part of Florida's success in wildfire risk reduction and natural resource management is the large number of diverse groups using prescribed fire and bringing a wealth of knowledge and skills to the councils. See www.fl-dof.com/wildfire/rx_councils.html for more information.

Landowner Groups or Prescribed Burning Associations

Landowner groups (sometimes called Prescribed Burning Associations) are collaborative alliances that may function with or without the cooperation of federal, state, and local governmental agencies. These groups vary in format and structure from regional collaborations to neighboring landowner support groups. The motivation for landowner groups is greatest in areas where wildfire threat is high, where there is a history of wildfire in the area, and where landowners stand to benefit from the application of prescribed fire for wildfire risk reduction and forest or range improvement.

Many landowners understand the benefits of prescribed fire but don't have the experience or confidence to carry out the practice without technical help. There are a number of possible goals for collaborative landowner groups, which vary depending on the situation.

Case Study:

Greater Okefenokee Association of Landowners (GOAL)

Fire has been a common natural event in the Okefenokee Swamp at the Georgia-Florida border. Wildfires often burn acres of valuable commercial timber, but these same fires are of significant ecological benefit to the Okefenokee Swamp National Wildlife Refuge (OSNWR). Balancing these opposing needs led to the formation of the Greater Okefenokee Association of Landowners (GOAL: www.fws.gov/okefenokee/Goal.pdf).

The group came together after the 1990 Shorts Fire burned 21,000 acres of swamp and upland in and around OSNWR. GOAL is a cooperative effort among the USFS, the USFWS, Florida and Georgia state forestry agencies, and local forest landowners, such as private timber companies, private paper companies, private forest products manufacturing companies, mining companies, private consulting firms, and private landowners. GOAL provides landowners and interested parties with information about fire activity in the Okefenokee area. The mission of GOAL is to serve as a unified team for understanding fire dynamics in the Okefenokee system and for protecting and promoting forest resources in and around OSNWR. GOAL recognizes that:

- Forest resources are the basis of major industries in the area
- The Okefenokee Swamp is a national treasure that provides economic and biological benefits to the local communities and the states of Georgia and Florida
- It is essential to have a coordinating committee for protection of public and private resources from fire and as an avenue for communication and collaboration

In the years since it began, GOAL has addressed a number of fire-related issues. Landowners cooperated on maintenance of the swamp's Perimeter Road, compiled and maintained a resource list of fire equipment and personnel, constructed 80 helicopter dip sites surrounding the swamp, and shared a directory of radio frequencies and cellular phone numbers. Private landowners in the organization supported the black bear research at OSNWR by providing access to their lands and the expertise of their employees. The USFS and USFWS have contributed a total of \$550,000 to the construction of the John Bethea State Forest Joint Work Center in Baxter, Florida, which is designed to decrease the response time to wildfires in the GOAL area.

COLLABORATION AND OUTREACH STRATEGIES FOR WILDFIRE RISK REDUCTION

- Share important knowledge, experience, equipment, and skills among members
- Offer risk reduction assistance and training among neighboring landowners
- Multiply agency training efforts to reach many landowners at once
- Provide vegetation assessments and assistance with thinning trees, removing brush, or creating Defensible Space
- Create shared projects, such as a community fire break or Community Protection Zone
- Increase safety and reduce risks and costs for prescribed burning among members
- Inform residents about wildfire risk and status and keep them apprised of fire activity in the area
- Inspire community assistance and support for wildfire risk reduction efforts

Stakeholder Involvement Programs

While state and local governments can have a strong influence on planning for wildfire risk reduction, there are many other entities that have a role in how land is developed and redeveloped. Stakeholder involvement programs capture the collective expertise and influence of people who may not traditionally be involved in wildfire discussions, such as real estate agents, developers, insurers, businesses, land managers, HOA, and property owners. It is important for all of these entities to understand the connections between planning, development, maintenance, and wildfire risk.

Stakeholder involvement programs provide useful information and then engage participants in discussions about strategies and solutions. Through the process, stakeholders become more knowledgeable and their ability

Case Study:

Empowering Volunteer Organizations to Assess At-Risk Communities

The DOF's Caloosahatchee Forestry Center, which serves Collier, Hendry, and Lee counties, partners with fire districts to help neighborhoods become part of the Florida Firewise Communities program. This partnership trains members of local Community Emergency Response Teams (CERT) about wildfire risks and how to address them in their communities. CERT members learn to conduct wildfire risk assessments and write wildfire protection plans for neighborhoods. The training is modeled on Firewise Communities/USA's *Conducting a Community Assessment in the Wildland/Urban Interface: Beginning the Firewise Process*. Neighborhood concerns are related to larger local and statewide issues to provide better context for the work. Members create a simulated risk assessment to finish the training.

After training, CERT members can become a part of their neighborhood's Firewise Board, working with DOF and the partner fire district to write a wildfire risk reduction plan to apply for the national Firewise Communities/USA recognition for their community.

"CERT members are always looking for ways to help their communities," said Victor A. Hill, DOF Wildfire Mitigation Specialist and a former CERT coordinator. "They already have a solid knowledge of disaster preparedness, and teaching them to assist with risk assessments empowers them to better prepare their communities for wildfires."

Contact: Victor Hill, DOF Caloosahatchee Forestry Center, Ft. Myers, 239-690-3500 or hillv@doacs.state.fl.us.

to meaningfully contribute to decisions increases. As word of the collaborative process spreads, involving stakeholders in the process increases participation and support for resulting programs and related efforts throughout the community.

Stakeholder involvement can be accomplished through workshops, advisory boards, periodic meetings, webinars, seminars, volunteer programs, and other formats. In all cases, the outcome is a more informed group that is better armed to tackle wildfire issues in a collaborative manner. A stakeholder involvement process may later lead to a CWPP or other more formal community action plan for wildfire risk reduction.

Collaboration for Wildfire Risk Reduction

Sturtevant et al. 2005. *Social Science to Improve Fuels Management: A Synthesis of Research on Collaboration*. Gen. Tech. Rep. NC-257. St. Paul, MN. U.S. Dept. of Agriculture, Forest Service, North Central Research Station. Online at: www.ncrs.fs.fed.us/pubs/gtr/gtr_nc257.pdf



Florida Firewise Communities

The Florida Firewise Communities program is one model a community can use to reduce wildfire risk. A community can be designated before development, as is the case with Briargate, Verandah, and RiverCamps at West Bay. An existing neighborhood also can earn the Firewise recognition. A Florida Firewise Communities program is frequently started in a community with a collaborative workshop. Once the community has met the standards and has completed at least one Firewise project, the community is awarded the Firewise Communities/USA recognition. The community must seek recognition renewal each year, which includes submitting supporting docu-

mentation through the DOF of continued participation. With recognition the reward for community members is the knowledge that their community is safer in the face of the wildfire threat.

In order to receive national recognition from Firewise Communities/USA, a participating community must meet certain standards.

- Enlist a WUI fire specialist to complete a community assessment and create a plan that identifies agreed-upon solutions to be implemented by the community
- Sponsor a local Task Force to maintain the Firewise Communities/USA program and track program progress and status
- Observe a Firewise Communities/USA awareness day each spring that is partly dedicated to carrying out a local Firewise project
- Invest a minimum of \$2.00 per capita annually in Firewise projects, including the value of any work by municipal employees and volunteers and state and federal grants
- Submit an annual report to Firewise Communities/USA that documents how the community has met the goals of the program

The DOF coordinates the Florida Firewise Communities/USA recognition program. For a current list of Florida Firewise Communities go to www.firewise.org/usa/index.htm.

Case Study:

Wedgefield Firewise Community

Wedgefield is a community located in eastern Orange County that chose to become recognized by Firewise Communities/USA. The participants began by electing a board and forming a non-profit organization that provides educational information to homeowners, sponsors community awareness events and conducts ongoing mitigation projects with the assistance of the DOF (e.g., fuel reduction, creating fire breaks and prescribed burning). Community members and local elected officials have been very supportive. Each year, the organization participates in various wildfire awareness events, both within Wedgefield and nearby, including at a local home improvement center. At these events, volunteers distribute educational materials about Wedgefield Firewise including planting guides for less flammable plants and creating defensible space. The DOF, St. John's River Water Management District, and Orange County Fire-Rescue participate at these events, educating people on the how prescribed burning is done, why prescribed burns are beneficial, and how fuel management can protect communities from wildfire. These educational efforts are supported by articles in each month's community newsletter. In addition, members of the board have traveled to other communities throughout Florida and the United States to describe the benefits of being Firewise.

OUTREACH AND EDUCATION STRATEGIES

Outreach and education consists of programs, publications, and media designed to increase public and stakeholder understanding and acceptance of wildfire risk reduction efforts. Outreach generally delivers a message to a target audience through various types of media, while education works directly with audiences. Most programs are a combination of both approaches, with varying degrees of complexity, cost, time, and effort. This section presents the best practices, lessons learned, and specific tools to assist wildfire program managers in designing the most effective outreach and education programs possible.

It is very important to raise general public awareness of and support for wildfire risk reduction and fuel management strategies. Public misunderstanding of the need for prescribed burning was a factor in the buildup of fuels prior to the catastrophic 1998 wildfires in Florida. The Governor's report prepared after the 1998 wildfires specifically recommends that "The public...needs to gain an under-

standing of wildfire as a natural occurrence and the key role of prescribed burns in wildfire mitigation" (Florida Department of Community Affairs 1998).

As a result, there has been an increasing emphasis on wildfire outreach and education in Florida since 1998. Outreach programs have been successful in heightening awareness, increasing knowledge, stimulating supportive attitudes, and motivating people to take action to reduce their wildfire risk (e.g., Monroe et al. 2006; Beringer 2000; Boura 1998; Boyce and Geller 2000; Broussard et al. 2001; Carpenter et al. 1986; Loomis et al. 2001; Marynowski and Jacobson 1999; McCaffrey 2002; USFA 2002).

Outreach programs are beginning to reap rewards. A recent national survey shows that residents in the South are more likely than other U.S. citizens to take action to manage vegetation around their houses if they are in an area of wildfire risk. In this survey, over 90% of respondents agree that prescribed fire should be used to manage vegetation and respondents show support for other fuel management treatments (Bowker et al. 2005). Research also indicates that citizens under-

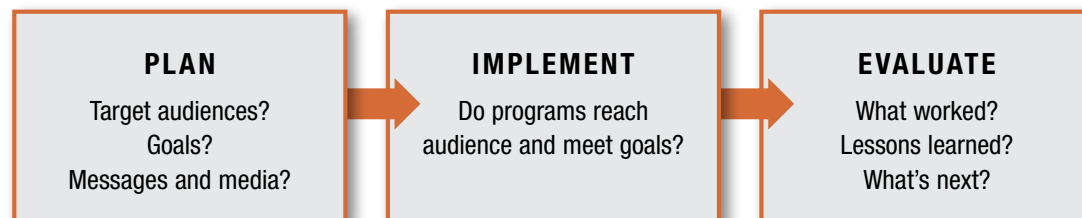
stand the difference between wildfire and prescribed fire (Partners in Fire Education 2008). Compared with research from the past, the results of these surveys suggest that the public is becoming more knowledgeable about wildfire dangers and more supportive of wildfire risk reduction practices, particularly prescribed fire.

Best Practices for Outreach Programs

The goal of outreach and education programs is to provide residents and community members with the information they need to understand and fully participate in a full range of wildfire prevention and risk reduction efforts. The best public outreach programs should change attitudes, encourage responsible behaviors, and generate a sense of community-wide ownership in the wildfire risk reduction program. See the following section on Social Marketing for more details about tactics to bring about changes in behavior.

Experience shows that there are a series of logical steps involved in any outreach program. Whether performing a single round of homeowner notifications for a prescribed

Best Practices for Outreach Programs



burn, a series of community workshops on wildfire risk reduction, or a multi-year effort to raise awareness and participation, following these steps assures the greatest level of success for the outreach effort.

1. Plan (Target Audience, Goals, Messages, and Media)

- **Target Audience** – Identifying, understanding, and involving the target audience is fundamental to designing a successful outreach program. While basic demographic information can be helpful, audience research can uncover additional needs, concerns, biases, and preferences that otherwise may not be known. Audience research explores not only what people know about wildfire risk reduction, but also what misconceptions may exist.

Learning about the audience can be accomplished in a variety of ways, ranging from a few informal conversations in a neighborhood to a full-blown “audience research” survey. Another way to learn more about a target audience is to engage them in an advisory

board, task force, working group, or other collaborative process. A collaborative process can be used to aid in overall program development while providing a sounding board for testing various messages and media approaches. Collaborators become more knowledgeable, develop a sense of “ownership” in the program, and become partners in bringing information to a broader audience.

The audience research will result in a clear understanding of audience knowledge and attitudes about methods of wildfire prevention and risk reduction. Research done by others, such as the demographic correlations in the accompanying box, may provide additional clues about audience characteristics and preferences. For example, there may be two or more audiences that need to be addressed through distinct outreach approaches. This audience research may also indicate which information might motivate citizens to become active participants in protecting their houses and communities from wildfire damage.

Ways of Collecting Audience Information

- Interviews (informal or formal)
- Focus groups
- Workshops
- Surveys (in-person, paper, telephone, or electronic)
- Collaborative groups or projects

Target Audience Characteristics for Wildfire Programs

- **Age:** While not necessarily more knowledgeable about wildfire, older people have more experience with wildfire and are more likely to manage vegetation around their house and purchase insurance.
- **Gender:** While women have less experience with wildfire, they tend to be more concerned about the effects of wildfire and more likely to take action.
- **Race:** People of color have less experience with wildfire and are less likely to carry insurance, but are more concerned about how wildfire might affect their house.
- **Education:** People with more education tend to have more wildfire experience and knowledge, but they are less likely to perform mitigation activities around their house.
- **Income:** People with higher income tend to have more wildfire experience and knowledge and also tend to perform mitigation activities and purchase extra insurance. As a result they are less concerned that wildfire might affect their house.

(Adapted from Bowker et al. 2005)

Wildfire Risk in Impoverished Communities

One recent study looked at hot spots across Alabama, Arkansas, Florida, Georgia, Mississippi, and South Carolina – areas that were identified as being at high wildfire risk and also ranked high in social vulnerability. The team analyzed the proximity of wildfire mitigation programs such as Firewise Communities and Community Wildfire Protection Plans (CWPPs) to these hot spots.

These programs were selected by researchers because they require a considerable degree of community initiative and capability, which was of primary interest to the research team. State forestry agencies and other public and land management agencies offer a range of programs to socially vulnerable communities that were not captured in this study.

The study results suggested that the socially vulnerable communities face greater wildfire risk than middle class or affluent communities. The lack of involvement by a community in these fire mitigation programs should not be interpreted as a lack of services but rather the community's capacity and/or willingness to engage with services (InterfaceSouth 2010). This outcome suggests that future efforts in socially vulnerable communities may need to focus more heavily on capacity building efforts.

Case Study:

The Role of Audience Experience with Wildfire

One might think that experience with a wildfire would cause homeowners to become more involved in reducing wildfire risk, but the effects are variable. The positive influence on behavior lasts only a short time. In some cases, homeowners become discouraged or defeatists, while others discount the chances of a similar disaster happening again. People who have repeated experiences with wildfire are more likely to take action, but some studies have found that homeowners in repeat fires may experience “disaster fatigue,” becoming apathetic about the threat. Others may come to view wildfire as uncontrollable and random, leaving them doubtful that suppression or risk reduction activities will help. In general, however, a nearby wildfire or the threat of wildfire creates an opportunity to raise awareness and encourage wildfire prevention and risk reduction actions.

(Adapted from Monroe et al. 2006)

Case Study: Florida Homeowner Perceptions of Wildfire Protection

In November 2009, the Alachua County Department of Public Safety and the International Association of Fire Chiefs collaborated with USFS scientists to study homeowner perceptions of wildfire protection. The survey randomly targeted 1,500 residents of high-wildfire-risk areas in the county. Preliminary results suggest that 60 to 70% of residents in high-risk areas have taken some action to protect their property from wildfire. While the cost for performing risk reduction activities was a concern, the most important considerations to homeowners were the level of risk and how effective they thought the actions would be in preventing damage. While homeowners appear to be taking action to protect their property, fewer are preparing for an actual event, with only 30% of homeowners indicating they have developed a disaster response plan; and less than half of those have considered questions of alternative evacuation routes, emergency meeting locations, and how to contact family members in the event of a disaster. Contact: Sarah McCaffrey, USFS, 847-866-9311

- **Goals** – Performing an audience assessment – even an informal one – will help establish more realistic and rational goals for the outreach or education program. Goals should be stated in active terms and should reflect the needs of a specific setting and conditions. Well-defined goals are easily measurable and have a time frame attached to them.

Program goals will often reflect a desire to change the knowledge, attitudes, or behaviors of the target audience. For example, a goal might be to “Increase public acceptance of prescribed fire in the Sandy Hammock fuel management area during the next year.”

Once the major goals for the outreach program have been established, you can consider what strategies might best meet the goals. The strategies will very much depend on the audience you are trying to reach and the key

messages that you want to communicate. The program goals should provide a road-map to guide program development and implementation.

- **Messages** – Persuasive messages are designed to promote wildfire risk reduction while addressing the specific needs and concerns of the target audience. When creating messages for the program, visualize being “in the shoes” of the audience members in order to grasp their views, values, biases, and level of understanding. Think about what sort of message would most likely resonate with them. When artfully done, the audience will hear the message, be able to understand the message, and be motivated to take action.

Typical Wildfire Risk Reduction Outreach Program Goals

- Increase awareness and knowledge of simple steps homeowners can take to reduce their wildfire risk in (location) during the next year.
- Increase community acceptance of prescribed fire in (location) this spring and summer.
- Increase homeowner participation in creating (desired actions) in (location).
- Reduce house damage and loss from wildfire in (location) over the next five years.

Guidelines for Creating Effective Wildfire Risk Reduction Messages

Cover Three Essential Topics

Good public hazard messages should clearly explain the potential losses, the chances that losses will take place in a given period of time, and specific positive steps that can be taken to prevent losses. These three topics make up the wildfire hazard message “tripod” – if one of these parts is left out, then the whole message may be less effective.

- Without being overly negative, describe potential losses in terms that help people envision the impacts that wildfire could have on their local community, their work place, their house and family, and their daily life.
- Realistically discuss the odds that losses will take place in a time frame that is easy for people to understand. For example: “Experience shows that is likely that wildfire will affect our community during the length of your 30-year mortgage.”
- Give proactive and specific suggestions on how to prevent and reduce wildfire losses. Tell people where they can get support, resources, and additional information. Organize events and work days to help people move from fear and inertia into action.

Identify Best Communication Channels

Identify which communication channels are best for reaching the audience (e.g., radio, website, poster, community newspaper, clubs, or associations). Consistent information repeated through multiple channels works better than if only one source disseminates the information.

Use a Variety of Approaches to Reach Diverse Audiences

Use a mix of both verbal and visual information and use a variety of media to reach people with different habits and learning styles. For example, a local campaign might include groups disseminating information, various media and advertising strategies, incentives, events, and free technical assistance. Programs in south Florida may be presented in multiple languages to reach diverse audiences.

Adapt Information to Local Concerns

Adapt information and visuals to the constituents and local conditions. If there is a disaster in local memory, reference it. Find the “local angle” and incorporate it through photos, stories, and facts.

Take Advantage of an Opening

The “Golden Rule” of communicating about hazards is that all the sophisticated materials and behavior modification techniques do not have the force of one catastrophe to change the ways people think and act. While it is very important to keep the “education” message separate from the “warning” message at the time of an actual wildfire disaster, it is certainly appropriate to take advantage of heightened awareness immediately after a disaster to deliver an action-oriented risk reduction program.

Provide Motivation to Spur Action

The information should be personally relevant and useful to audience members. Messages should include basic how-to procedures, but also explain why the action is necessary and how it will make a difference.

Be a Trusted Source of Information

People are most likely to pay attention to information from a group or a person they trust. Be sure to always present accurate information. Use partnerships with high-profile organizations and community leaders to deliver information with a punch.

Use Common Language

Translate and interpret technical information about the hazard to make it accessible to the public. Experts tend to use jargon and can have a difficult time explaining concepts in ways that are easily understood by the general public. Experts who will be speaking to the public can get training in message interpretation and delivery.

Keep Information Consistent and Repetitive

Because most people are exposed to huge quantities of information through a variety of media, your program should frequently repeat a consistent key message. Educators should work together across jurisdictions and organizations to establish consistent messages. Inconsistent information confuses people and allows them to discount some or all of it.

(Adapted from Monroe et al. 2006; Jakes and Barro 2004; Mileti and Sorensen 1990)

Messages for Florida Wildfire Mitigation Education Programs

- Don't invite wildfire home! (Key message, DOF)

- There are 3 simple things people should do to increase the odds their home will survive a wildfire: Clean your roof and gutters, clean around the sides of your home, and keep the area within 30 feet of your home mowed, picked up, and watered within water management guidelines. (Key message, DOF)

- Even a small fire can escape and become a wildfire, burning our beautiful forests and destroying homes. Remember, it's wildfire season in Florida. So, think before you burn. (Radio PSA, FDACS)

- The safety of your home may depend on actions you take before a wildfire occurs. (Radio PSA, FDACS)

- Florida's ecosystems need periodic fire. Florida's natural areas will burn in an uncontrolled wildfire or in a controlled manner using prescribed fire. (Fire in Florida's Ecosystems, DOF)

- "Prescribed fire is a safe way to apply a natural process, ensure ecosystem health, and reduce wildfire risk." (Key message from the One Message Many Voices campaign, Southern Group of State Foresters 2009)

- Most wildfires are supported by overgrown vegetation and debris. Wildfire fuel reduction activities remove this excess vegetation and debris. It is seldom necessary to remove

mature trees to protect a house from wildfire. (Recommended message)

- Residents at high risk of wildfire – with homes located in the wildland-urban interface – should take action to protect their property from wildfire damage and should encourage their neighbors to do the same. Many urban areas are at low risk of wildfire. (Recommended message)

- Wildfire will be less damaging and costly to society if preventive and protective actions are taken. While it is government's responsibility to provide for the protection of public health, safety, and welfare, it is everyone's responsibility to protect houses, neighborhoods, and communities from the wildfire hazard. (Recommended message)

Case Study:

National Fire Message Preferences

Partners in Fire Education performed focus group research in several U.S. regions, including the Southeast, which revealed that how messages about fire are crafted is critical to how they will be received by audiences. Statements about different fuel management approaches were tested with the focus groups. For example the term "controlled burn" was favorably viewed by 54% of respondents, while the term "prescribed burn" was favorable to only 8%.

Certain words and phrases were regularly chosen by participants as the most acceptable.

- "Safety" is a favorable message associated with all fire management activities
- Personalized messages of relevance to people, such as "fighting forest fires wastes tax dollars" and "healthy forests are important to the health of people"
- Success stories that demonstrate how repetitive fire is good for forests were favorably received

The study showed that the use of these message elements increased overall acceptability of fuel management strategies from 51% to 65%. This research underscores the notion that carefully crafted messages are critical to the success of outreach programs.

(Partners in Fire Education 2008)

COLLABORATION AND OUTREACH STRATEGIES FOR WILDFIRE RISK REDUCTION

• **Media** – Once you have defined the program’s audiences and goals and determined the best messages to reach those audiences, you will want to select the “media” that best fit your program’s needs. “Media” here refers to any of the channels or tools used to store and deliver information to the audiences. From

print to broadcast, paper to electronic, mass to personal, there seems to be an endless array of ways to deliver the wildfire risk reduction message.

Consider using a variety of media tools to reach the different audiences. Many communities have employed creative approaches to get

their messages out, such as newsletters, shopping mall displays, utility bill inserts, telephone hotlines, signs in popular outdoor areas, and business-sponsored outreach materials. More people will be reached when multiple methods are used. Research suggests that a combination of methods has the greatest effect on changing the attitudes and fuel management behavior of WUI residents (Reams et al. 2005).

Media for Wildfire Risk Reduction Outreach and Education

Type of Program	Examples of Media	Target Audience(s)
Mass Media	Press releases, public service announcements, press conferences, reporter tours, billboards	<ul style="list-style-type: none"> Journalists Media-using public Media targeted to a specific demographic, language, or socio-economic group, Geographic areas
Public Outreach	Educational materials, direct mail or telephone, newsletters, formal meetings, utility bill inserts	<ul style="list-style-type: none"> General public Demographic subgroups Utility subscribers Geographic (zip code) groups
Electronic Media	Website, web-based “news” feature or weblog, social networking (e.g., Facebook, Twitter), electronic newsletter or listserv	<ul style="list-style-type: none"> Journalists Internet-using public Generational cohorts Political groups Younger audiences
Teacher and Student Education	Teacher training, curriculum packages, field trips, events	<ul style="list-style-type: none"> Teachers and students Younger audiences Parents/families via students (not a proven effect)
Exhibits and Displays	Exhibits at festival or community events, museum displays, subdivision displays (clubhouse, entry gate), retailer displays	<ul style="list-style-type: none"> General public Special event groups (recreational users, fair-goers) Homeowner groups Retail customers
Community Events	Programs, field days, tours, classes, service group or church presentations, community work days	<ul style="list-style-type: none"> General public Community groups (service clubs, congregations) Recreational users College students Volunteers

2. Implement

After identifying the audience, setting the goals, and determining the most effective media to employ, the program is ready to be delivered. Success is simply a matter of producing and delivering the outreach program in accordance with the roadmap that was created through a careful research and planning process. This is a time to enlist the help of team members, advisors, community leaders, organizations, local media, and groups in high risk areas to deliver the program and spread the word. For further information on program design and delivery, see the descriptions of each type of program in the following outreach sections.

3. Evaluate

Program evaluation is the method used to determine the success of a project. An evaluation is an objective assessment of program design, implementation, and results. It often answers whether the program worked, what parts worked and did not work, and how future programs can be improved.

Mechanisms for program evaluation are as varied as programs themselves. Tools may include sign-in sheets to count attendance, written surveys to measure learning, feedback cards

to collect opinions, informal verbal feedback or question-and-answer sessions, photograph or video records of an event, or electronic tracking of website or social network site use.

Program evaluation may determine results at the end of a program or may provide direction for improvements or modifications during ongoing or new projects. In all cases, it is important to identify one or several indicators of program success.

- **Results-Oriented Evaluation** – For a program working toward specific results, establish measurable and meaningful goals. For example, an outreach program might seek to increase knowledge by 5% (a reasonable increase for an education program) or seek to increase Defensible Space participation rates for households in a high risk neighborhood. If the goals are measurable, then the evaluation will be easier to complete. Throughout the program, look for clues and collect information to show whether or not the program has worked. The results can be reported at the end of the program funding cycle (often at the end of the fiscal year) or at any time during the program.

- **Ongoing Evaluation** – For an ongoing program, evaluation can be performed at any time. The evaluation itself actually should be a part of the ongoing program, which will be designed to incorporate feedback. For example, at the end of community presentations, ask participants how they feel about the risk reduction program. For youth programs, provide a worksheet for students to complete later. If it is an ongoing outreach effort, make sure to pause and ask for feedback or look for results. Quarterly and/or annual reports are common for ongoing programs.

- **Lessons Learned** – When the evaluation process is completed, the results can provide information for planning of ongoing or future programs. For example, the evaluation may reveal that homeowners prefer weekend programs to weeknight programs, providing important guidance for future efforts. Lessons learned help shape future programs, thus making programs even better and more efficient for achieving wildfire risk reduction goals.

Public Outreach Programs

Providing public outreach and promoting participation in local government programs is becoming a primary function of some planning departments. Public participation in the

development of comprehensive plans and land use decisions is a fundamental basis of growth management in Florida. By directing public attention to wildfire hazards, citizens will begin to understand the importance of actions they can take that will reduce their wildfire risk. Information and education programs should be an integral part of wildfire prevention and risk reduction programs for the general public, the landscaping and building community, and elected officials. Community leaders and local government officials should learn how to implement wildfire risk reduction programs at the local level. Broad outreach programs should be undertaken to engender public support for wildfire risk reduction activities.

Florida Wildfire Mitigation, Prevention and Prescribed Fire Awareness and Outreach Programs

- *Living on the Edge in Florida (LOTE)* CD and *Living on the Edge* Workshops (DOF)
- *How to Have a Firewise Home* CD (DOF)
- *Fire in Florida's Ecosystems* Curriculum and Educator Training Program (DOF)
- *Florida Wildfire Prevention* CD-ROM and Online (DOF)
- *Firewise Communities/USA* Recognition Program (DOF)
- Wildfire Prevention and Mitigation presentations for schools or homeowners (DOF Field Units)
- Career Day presentations at schools (DOF Field Units, local agencies and groups)
- Smokey Bear educational materials and programs (USFS, DOF)
- Prescribed Fire awareness activities, workshops, and legislative days (Florida's Prescribed Fire Councils)
- Prescribed Fire Awareness Week (first week of March, multiple agencies)
- Wildfire Awareness Week (second week of April, multiple agencies)
- National Fire Prevention Week (second week in October, multiple agencies)
- Numerous publications (all agencies)

COLLABORATION AND OUTREACH STRATEGIES FOR WILDFIRE RISK REDUCTION

The DOF has a statutory responsibility “to prevent, detect, suppress, and extinguish wildfires wherever they may occur on public or private land in this state and to do all things necessary in the exercise of such powers, authority, and duties” [F.S. 590.02(1)(b)]. The DOF accordingly presents a number of educational programs to both adult and young audiences throughout Florida. See the DOF website at www.fl-dof.com. The DOF’s Field Units and the local DOF Wildfire Mitigation Specialists are an excellent resource for community information relating to wildfire issues, outreach programs, and wildfire prevention.

Mass Media Programs

Media such as press releases, radio airtime, television commercials and newscasts, billboards, news conferences, and newspaper and magazine ads are all frequently used as outreach tools. Organizations may turn to mass media in the hopes of educating the public

and changing behavior. While mass media is a good way to raise awareness of an issue, it should be combined with other outreach methods to be most effective and promote changes in attitude and behavior.

A great example of a combination of media and other outreach methods is Smokey Bear. Smokey could be found on television, the radio, billboards, and other media outlets beginning in 1944. To be most successful, Smokey was also on brochures, at presentations as a costumed character, in story books, posters, educational materials, in front of agency buildings, and in many other locations



Mass media interviews can bring public interest to wildfire risk reduction practices and programs in Florida.

Photo: DOF



DOF has mobile billboards stationed in each district. These billboards provide key messages that can be positioned where there are conditions that contribute to increased wildfire risk.

Photo: DOF

Strategic Use of Electronic Media

In the digital age, it is no longer a question of whether or not to use new media, but rather how to strategically employ digital media to more effectively deliver your message.

- Make the program visible on the internet – Make key information easy to find for journalists, the public, and target audiences. For websites, use keywords so individuals can find the website with a search engine. This process, called “search engine optimization,” can be performed by a web designer.
- Keep content fresh and timely – Stale content doesn’t appeal to readers, while regularly updated content attracts new and repeat readers. Consider deploying a “news” page or weblog and/or providing audience members with regular updates via a social networking site or feed (e.g., Facebook, Twitter).
- Gather subscribers and provide regular information – If regular communications are appropriate, develop a newsletter and securely collect subscribers through the website.
- Provide depth and background – Part of becoming a trusted source of information is to provide background information, papers, documents, and links for topics that are of interest or importance to the audience,
- Track use and ask for feedback – Track the use of the website and information features with a tracking program. Readers can be invited to provide comments through many “news” or weblog programs. Assign a person to monitor and moderate comments so that concerns can quickly be addressed.
- Let people contact the program – Provide a contact form or other contact mechanism in addition to a phone number.

Effective Use of Mass Media for Wildfire Outreach

Making the most of media opportunities can lead to increased program recognition and improved information transmission. While these actions take some time in the beginning, they ensure that messages are in a useful format and are usable by the target media outlets.

- **Package Information for the Media** – Effective public outreach programs have information prepared for mass media use. A media packet with interesting, easy-to-use information will help assure your message gets out. Information should be succinct and straightforward and should include both written and visual materials. Video is an added bonus in the television and internet age. Find information for media press kits in the National Wildland Fire Coordinating Group (NWCG) *Communicator's Guide to Wildland Fire* at www.nifc.gov/preved/comm_guide/wildfire/index.html, Firewise Communities' *Newsroom* at www.firewise.org/newsroom/index.htm, or the University of Florida's *Wildland Fire Education Handbook* at http://edis.ifas.ufl.edu/topic_book_wildland_fire_education_handbook.
- **Become a Resource** – When a wildfire happens or there is a question about fire issues, the media will contact the person they feel most comfortable with and that they feel is easiest to get information from. A reliable spokesperson who is familiar to the local media before a disaster will likely be the key contact for accurate information when an event does occur.
- **Write in the Style the Media Prefer** – Answer the “who-what-where-when-how-why” in two “lead” sentences in the first paragraph, then provide more information. Offer clear information and avoid jargon.
- **Use Human Interest Stories** – Stories capture audiences' imagination when they feature a situation, a solution, or a hero. Use stories to feature successful wildfire risk reduction projects, community risk reduction efforts, heroic homeowners, or successful community programs, strategies and tools.
- **Include Non-Mainstream Media** – There are many media resources that can be used to spread a message. Small local newspapers, community and HOA newsletters, entertainment publications, local gardening and native plant publications, public broadcasting, local weblogs, and other outlets can reach a wider audience that may be outside of the traditional demographic reached through mainstream media.

(Adapted from Monroe et al. 2006)

Case Study:

Living on the Edge in Florida and How to Have a Firewise Home CD-ROMs

The DOF released the educational *Living on the Edge in Florida* (LOTE) and *How to Have a Firewise Home* CD-ROMs in 2003. The CDs use video clips, documents, graphics, Internet links, and interactive activities to provide an enjoyable and user-friendly way to learn about wildfire prevention and protection in the wildland-urban interface. Both CDs include tutorials on wildland fire and an introduction to the *Firewise Communities* program. Video clips discuss topics such as Firewise landscaping and factors contributing to the ignition of houses during wildfires.

The CD is used in DOF's LOTE workshops where groups of community decision makers come together and learn about wildfire issues and ways to integrate wildfire risk reduction into community design. An interactive activity allows participants to design their own Firewise Community while tracking costs, public acceptance, and wildfire safety. *How to Have a Firewise Home* is an abridged homeowner version of the CD. The goal of both CDs is to encourage community members, decision makers, professionals, and homeowners to plan and take actions to reduce wildfire risk. CDs and workshops are available from the DOF.

with his message “Only you can prevent forest fires.” This simple message combined with Smokey’s huge presence made him one of the most effective outreach efforts ever created. Overcoming Smokey’s success and altering the public resistance to fire has been a challenge as land managers struggle to compare and contrast wildfire’s damaging effects with fire’s natural role in ecosystems. Smokey is helping in this effort, and his message now says “Only you can prevent wildfires.”

Programs for Teachers and Students

School programs for K-12 are one of the most frequently used approaches to outreach and education. It is rewarding to work with young people and to give teachers resources to better perform their jobs. Well-designed school or teacher-training programs can show easily measurable results in improved knowledge and attitudes. Programs for teachers and students can take on a variety of forms.

- **Teacher Training Workshops** – Varying in length from a few hours to a few days, teacher training workshops provide educators with information and hands-on learning. Taught by subject experts, these workshops are proven to be one of the best ways to get educators to integrate teaching materials and curricula into their classroom. Examples include *Fire in Florida’s Ecosystems*, *Living on the Edge in Florida*, the Florida Forestry Tour, *Florida Wildfire Prevention*, and *Project Learning Tree*.

- **School Presentations** – Presentations in classrooms, at career days, and during student gatherings or assemblies work best when the presenter uses a variety of media and provides hands-on learning opportunities. Videos, interactive DVD’s, and PowerPoints with engaging

Case Study:

Fire in Florida’s Ecosystems Curriculum and Educator Training Program



Photo: Pandion Systems, Inc.

Since 2000, the DOF’s *Fire in Florida’s Ecosystems* (FIFE) Educator Training Program has provided nearly 2,700 educators in over 90% of Florida’s counties with a free curriculum package and training. FIFE focuses on the natural role of fire in Florida’s ecosystems, wildfire prevention, and the use of prescribed fire as a land management tool. The program results in statistically significant increases in knowledge about fire and positive attitudes toward prescribed burning in the teachers that attend the FIFE training – changes that remain months and years after the training workshop. FIFE has close to 96% adoption by teachers in the classroom.

The curriculum package includes hands-on classroom activities, reading passages, videos, posters, the interactive *Burning Issues* CD-ROM, *Firewise Communities* information, and study questions to help students prepare for state assessment tests. A typical educator training session includes practice with the activities, background on fire and prescribed fire issues in Florida, a presentation by a DOF representative, and a tour of a fire-maintained landscape. The package and trainings are completely free of charge and are offered at schools, forests, nature centers, conferences, and other locations throughout the year. The FIFE curriculum and training schedule can be viewed at www.fireinflorida.org.

visuals enhance the student’s learning experience. Interactive opportunities such as bringing in equipment for students to touch and try on are also very good for learning. The key to successful presentations is to keep them short, engaging, and appropriate to the age group.

- **Field Trips** – Field trips to see ecosystems managed by fire, Firewise landscaping demonstrations, Firewise homes, and forestry and emergency management facilities can all be excellent learning experiences. Depending upon the age and level of the students, field trips can also include lectures and hands-on experiences.

- **Special Events** – Special events at the school can be a good way to deliver wildfire messages and generate enthusiasm among students and teachers. Events may include games, poster contests, career presentations, schoolyard demonstrations, or equipment and fire safety demonstrations. In preparation for the event, learning opportunities such as curriculum activities, educational materials, or a classroom presentation can increase student and teacher preparation and understanding for the day of the event. Providing a post-event worksheet is a way to assess the success of the event in reaching students.

In addition, many educational programs are designed with the expectation that students will take information home and that families will become more knowledgeable as a whole. Research is lacking on whether wildfire risk reduction programs translate from the classroom to families and communities, but if programs are designed to involve students along with their families and communities, the results will reach more people.

Additional resources for student programs can be found at the Firewise for Educators page at www.firewise.org/educators/educational_websites.htm.

Exhibits and Displays

An exhibit or display can be used at events, meetings, fairs, conferences, schools, and other locations to inform the public about wildfire risk reduction. There are several important things to consider when deciding to create an exhibit or display.

- **Exhibit planning** – Consider why the exhibit is being developed, who the target



The DOF has created a Fire Landscaping Exhibit at the Waccasassa Field Office near Gainesville. The public demonstration area provides Firewise landscaping tips, shows Firewise landscaping zones, and illustrates plantings that are appropriate for houses in areas at high risk of wildfire.

Photo: DOF

audience is, what the message and theme will be, and where and how it will be used.

- **Cost and budget** – Create a budget that includes materials as well as labor time.
- **Exhibit design** – Make the exhibit professional, readable, factual, and visually appealing. Text should be simple and be complemented with many visuals. Avoid scare tactics and jarring language, since these are generally not as effective as an inviting display that provides positive strategies and easy take home messages.
- **Staffing and partnerships** – Who is at the display is as important as what is in it. Staff should be well informed, interactive, and comfortable around people.
- **Preparation time and needs** – Create a realistic timeline with milestones and deadlines in order to have the display completed and, if necessary, shipped on time. Depending upon the intended use, exhibits may be designed to travel easily.

Community Events: Field Days, Tours, and Programs

Community events are a proven method to generate enthusiasm, raise awareness, and build collective energy for action. This is particularly true if community members participate in organizing and presenting the event. Events can be designed to raise awareness and they can also provide goods or services, such as Firewise landscape plants, noncombustible mulch, or homeowner assistance with Firewise landscaping. Cleanup days or neighborhood Firewise work days have been successful throughout the country.

Tours and field trips are a way to create

connections within the community. For example, the DOF's Waccasassa and Caloosahatchee Forestry Centers have Firewise landscaping demonstration areas that are open for tours on a regular basis. These areas provide a learning opportunity in addition to opening up communication between DOF staff and the community.

SOCIAL MARKETING STRATEGIES

While education and outreach programs seek to increase citizen's awareness and knowledge about an issue, social marketing programs are designed to change the behavior of the target audience. Social marketing is an ideal tool for wildfire risk reduction programs because the ultimate goal is to encourage behaviors that result in improved house and community safety planning and actions.

Nationally, about 20% of the population considers the likelihood of a forest fire within 10 miles of their houses to be "very likely," yet only half this number feels concerned that their house could be damaged by forest fire. Of those who feel that fire is at least "somewhat likely" in the vicinity of their house (39%), nearly three-quarters claim to regularly clear shrubs, leaves, and other combustible organic matter around buildings and to keep their property insured against fire (Bowker et al. 2005). True compliance levels are much lower than this; however, houses continue to be lost to wildfire annually due to dangerous fuel buildups and inadequate Defensible Space.

A wildfire social marketing program first discovers why people engage in a particular

Social Marketing Techniques and Examples for Wildfire Risk Reduction

Technique	What it Does	Example(s)
BEHAVIORAL AUDIT		
Surveys	Identifies broad community attitudes, current behaviors, and barriers to change.	Conduct a survey of the target community(ies) to identify residents’ understanding of and behaviors related to wildfire risk. Follow up on the survey with interviews and/or focus groups to identify the barriers to positive behaviors.
Interviews	Gathers in-depth knowledge of attitudes and barriers for selected individuals.	
Focus Groups	Gathers in-depth knowledge of attitudes and barriers and tests possible strategies. Best done after a survey that gathers general information.	
TOOLS TO OVERCOME BARRIERS		
Pledges	Collects written commitments for desired behaviors.	“I will remove pine needles from my roof by (date).” “I will assist with the community workday on (date) by helping to trim trees.”
Norms	Provides a standard of behavior for people to follow.	Model Firewise landscaped house in a prominent, visible location that is owned by a well respected member of the community.
Incentives	Rewards a desired behavior.	The community decreases HOA dues in return for actions that decrease fire risk. Participation yard signs are provided for homeowners who maintain Firewise status.
Prompts	Provides a reminder.	Signs in community to remind folks of the date for a workday or a scheduled pick-up of yard debris.
Communication	Informs and reinforces messages.	Many wildfire communication pieces are available from the DOF and the University of Florida.
Removal of Barriers	Makes the desired behavior easier.	Assist elderly community members who cannot get on their roof or trim trees. Bring in outside assistance to clear brush if internal ability is not there (DOF).
Provide Feedback	Acknowledges positive actions and maintains attention to the issue.	Make an awards ceremony a regular part of an annual workday. Acknowledge positive actions with a “badge of recognition.”

behavior and second what the barriers are to the new, desired behavior for reducing the risk of wildfire. Once barriers have been identified, the social marketing team determines the tools to use that best fit the situation.

Behavioral Audit

Social marketing programs begin by researching the behaviors and tendencies of the target

audience. This can be achieved through a combination of surveys, interviews, and focus groups. A behavioral audit identifies the audience's demographics, knowledge base, experience with wildfire, understanding of wildfire issues, and their current behaviors with respect to Firewise landscaping and home maintenance.

During the behavioral audit, identify the

best methods of communication for the target audience. What works in one community may not work in another community. Consider less traditional mechanisms of communication. For instance, if the audience tends to hire landscape companies to maintain their yard, the program may train landscapers in Firewise landscaping and include educational information in their company literature.

Most importantly, the audit clarifies what the barriers to change are. Barriers will often vary depending upon the audience. Barriers may include a lack of information about an issue, apathy, limited financial resources, incomplete knowledge of the solution and how to implement it, or simple forgetfulness. For example, a community survey may reveal that residents are very knowledgeable about the importance of fire, but are resistant to creating a Defensible Space because it will change the “natural look” of their landscape. A comprehensive social marketing program would help address this specific barrier while encouraging residents to create Firewise landscapes.

Tools to Overcome Barriers

Some of these tools are traditional outreach tools now used as part of a targeted program designed to trigger specific changes in behavior. The tools include pledges, establishing norms, incentives, prompts, communication media, the removal of barriers, and providing feedback. Each is briefly discussed below.

Pledges

People are more likely to follow-up on a promised action if they reinforce the promise with a pledge. Voluntarily written pledges are most successful. Easily accomplished pledges can provide an accessible “entry point” to a program so that individuals can begin to perceive of themselves as part of a solution, a key step to behavioral change. For example, homeowners are more likely to commit to clearing pine needles off of their roof before they will commit to replacing a roof with a more fire resistant material.

Social Norms

A norm is when a particular behavior is perceived as “normal” or “commonplace,” based on the tendency of individuals to behave the same way their neighbors do. Experience shows that it is usually a gradual process for a community to take on Firewise practices and finding people within the community to act as role models of the new behavior should be a cornerstone of any social marketing program. In most communities, about 10% of the people act as “leaders” and are listened to by others. If these leaders take steps to clean off their roofs and maintain effective Defensible Space, others in the community will be more likely to follow suit.

Incentives

An incentive is a reward for performing the desired behavior. Incentives tend to be more successful than disincentives that penalize individuals for negative actions. While sometimes monetary in nature, incentives can also be social. For instance, a neighborhood contest for the best Firewise landscape can result in the winning homes receiving a sign or medalion they can post on their lawn or mount on their house. Before creating an incentive program, consider that discontinuing it later could result in losing the desired behavior.

Prompts

One of the challenges to behavioral change is forgetfulness. Most people need regular reminders before a behavior becomes habitual. A prompt (a visual reminder of a desired behavior) is most effective as a simple message placed near the location where the behavior should occur and at the time the behavior

should occur. For example, when a community schedules a special yard debris pick up for a reduced fee (incentive) they post signs at the pick-up locations a couple of weeks before. The event and the signage serve as important prompts to engage residents in the desired behavior at the appropriate time of year.

Communication

In a social marketing program, communication focuses on defining simple messages that hone in on the key behaviors. Successful communication materials target the specific audience, provide credible, captivating information, and emphasize personal and/or community goals. Incorporating local photos and success stories makes the issue more relevant and achievable to a community. Positive messages generally are more effective than fear tactics, unless the threatening messages are accompanied by clear, achievable actions.

Removal of Barriers

A key component of social marketing is to remove as many barriers or obstacles to behavior change as possible. A real barrier may be someone’s limited financial means or physical inability to remove trees or brush on their property. Such a barrier is likely to make a resident feel helpless to achieve a Firewise landscape. To remove the barrier, a social marketing program may enlist a volunteer corps or emphasize what can be done with little financial investment. Another barrier may be a resident’s perception that Firewise landscapes don’t protect houses from wildfires because fires can even “jump highways.” In this case, the barrier can be addressed with relevant facts – about how fire travels and the importance of a Firewise landscape in preventing structural

ignition – combined with other incentives and/or landscape demonstrations.

Provide Feedback

Most people enjoy recognition of their efforts. Providing positive feedback to residents in the form of awards, certificates, yard signs, or a mention in a neighborhood newsletter can help reinforce a desired behavior. If a social marketing program has established a target goal, it is important to let residents know their progress towards that goal. For example, a community may set a goal of having 60% of all homes with a Firewise landscape. If the community goes from 50% to 55% in one year, this is a great step forward that can motivate homeowners to increase their efforts to attain the goal in the coming year.

What's Happening in Other States: Collaboration and Outreach Programs

COLLABORATION: The Boulder County Wildfire Mitigation Group, CO

The Boulder County Wildlife Mitigation Group (BCWMG) was formed in 1989, shortly after the Black Tiger Fire destroyed 44 houses and burned 2,100 mountain forest acres in the Sugarloaf area. Cooperation among federal, state, and local government agencies and organizations laid the foundation for BCWMG, one of the nation's oldest collaborative wildfire mitigation groups that focus on ecosystem management and public outreach and information. <http://lamar.colostate.edu/~csfsbo/wildfire>

COLLABORATION: The Edwards Plateau Prescribed Burning Association, TX

The Edwards Plateau Prescribed Burning Association was formed by individuals who participated in a prescribed burn tour held at the Texas A&M University Research Station near Sonora, Texas, in 1997. Originally formed by 30 members to serve three counties, membership has increased to 500 landowners and 10 chapters covering 17 counties. This neighbor-helping-neighbor cooperative has provided the resources, education, encouragement, and empowerment necessary to help restore fire on a sustained

basis. Members are encouraged to attend prescribed burning schools and actively participate in as many burns as possible. Ranchers must develop a burn plan for review by the association, are responsible for preparing their fire lines, and serve as the fire boss for burns on their property.

www.tpwd.state.tx.us/publications/pwdpubs/media/pwd_br_w7000_1019.pdf

OUTREACH/EDUCATION: Wildfire Education Programs in Wisconsin

To combat human-caused wildfires, Wisconsin has developed a public education program with many innovative ideas. The program includes Firewise presentations for building/landscape contractors, forest fire laws and regulations brochure, home sprinkler kit brochure, Burning News Flash video to assist foresters/rangers in their school wildfire prevention programs, radio public service announcements, wildfire prevention calendar, Take Smokey Camping kits to teach kids about wildfire, forest fire prevention night at a baseball game, hunting and fishing license holders with wildfire prevention tips, prevention banners and decals, and prevention and equipment posters. For more on Wisconsin's fire prevention public education program, see the Wisconsin Department of Natural Resources website: www.dnr.state.wi.us/forestry/fire.

chapter

3

LOCAL PLANNING STRATEGIES FOR SUCCESSFUL WILDFIRE RISK REDUCTION



LOCAL PLANNING STRATEGIES FOR SUCCESSFUL WILDFIRE RISK REDUCTION

The wildland-urban interface and the associated wildfire risk are a result of our collective land-use decisions. We should apply the land-use planning process available to us to minimize our vulnerability to wildfire.

–Jeff Bielling, AICP, Wildfire Mitigation Officer, Alachua County, Florida

THE OPPORTUNITY TO PLAN FOR WILDFIRE RISK REDUCTION

At 6.5 million acres, the area of Florida's wildland-urban interface (WUI) is already substantial. This area will expand as more people move into fire-adapted surroundings. Since Florida's coastline is heavily developed, much new growth will take place through the conversion of inland agricultural and natural areas to subdivisions and other suburban land uses. The counties projected to undergo the most dramatic transformations are Glades, Hardee, DeSoto, Hendry, Osceola, Baker, Flagler, and Santa Rosa (1000 Friends of Florida 2006).

As Florida's population grows and development expands into fire-adapted natural areas, risk to people and property increases. As we learned in Chapter 1, it is estimated that 96% of Florida's wildland-urban interface residents – or about 3.7 million people – are at high or extreme risk of wildfire damage. As the extent of wildland-urban interface increases, the net number of houses and people at risk concurrently increases.

Proactive planning is the best way for members of a local community to cooperatively address wildfire concerns. High-risk communities that have not adequately planned for wildfire have repetitively suffered damages.



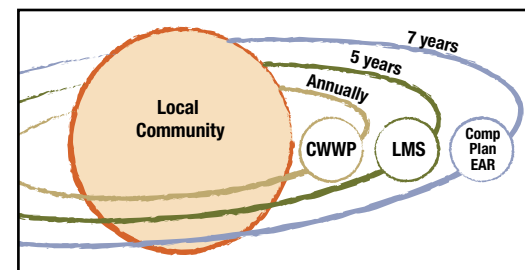
The Wildfire Susceptibility Index for Lehigh Acres in Lee County is an example of how the Florida Wildfire Risk Assessment mapping tool can be used to support local wildfire risk reduction planning efforts.

Graphic: DOF

On the other hand, significant reductions in risk have been achieved in communities where wildfire protection plans have been completed and implemented. We will provide several examples of successful local plans later in this chapter.

Growth of the WUI presents a challenge for community residents and decision makers. Poorly planned “intermix” development in the WUI further threatens public safety, jeopardizes community resources, and requires more

Local Wildfire Hazard Planning Cycles



fire protection services, ultimately impacting local government budgets. Integrating wildfire risk reduction into land use planning decisions is necessary for communities to address their wildfire risk in a cost-effective manner. Every acre with lowered wildfire risk due to fuel management or some other type of risk management activity represents a wildfire suppression cost savings of \$1,267 (Prestemon et al. 2009).

The bottom line is that planning is an effective means to curb WUI growth and decrease the number of residents at future risk of wildfire damage. There are several local planning mechanisms that provide opportunities to manage wildfire risk through policy-driven, strategic, and collaborative approaches.

- Local Comprehensive Plan
- Local Mitigation Strategy (LMS)
- Community Wildfire Protection Plan (CWPP)

These three planning mechanisms can work together in some very important ways to bring attention to community wildfire risk reduction needs. The LMS is at the heart of community hazard planning and is considered to be the minimum level of strategic hazard planning in most communities. Planners and community members interested in wildfire risk reduction should work with the local LMS Committee to be sure that wildfire concerns are included in the document. A vital way to highlight wildfire hazards in a high risk community is to complete a CWPP. The CWPP will specifically formulate actions, needs, and projects for wildfire risk reduction in the community. The CWPP, which is annually updated, can then be used as evidence for including more attention to wildfire issues and projects in the LMS. Both the CWPP and LMS are also useful for proposing strategic wildfire risk reduction amendments to the local Comprehensive Plan, which has a much longer adjustment cycle.

This chapter examines how each of the planning approaches can be developed to achieve a successful strategy for wildfire risk reduction. It also discusses the planning contexts in which they operate. Relevant legislation is referenced where applicable, although a full discussion on statutory guidance for wildfire risk reduction in Florida is provided in Chapter 4. This chapter also discusses possible barriers to implementation and likely participants in each process. Finally, a discussion on funding sources provides insight into resources that can be leveraged to help local governments implement wildfire risk reduction projects.

A well-crafted community plan for wildfire

Compact development, growth boundaries, infill – the topics we read about in the planning literature – could literally be lifesavers. Too often, we concentrate on fire trucks and sprinkler requirements. Shouldn't we be more concerned about land-use planning strategies for preventing the next disaster?

–Nan Johnson, AICP, *American Planning Association Magazine*, July 2000

risk reduction, ideally addressed through all three planning mechanisms discussed here, can provide focus for risk reduction actions such as outreach and social programs (Chapter 2), fuels management (Chapter 8), regulations (Chapter 4), development site design (Chapter 5), and structure retrofit and landscaping (Chapters 6 and 7).

LOCAL COMPREHENSIVE PLANNING

Planning for wildfire risk reduction needs to occur at the appropriate level. While the federal government plans for problems of national scale, risk reduction actions also should be planned for and undertaken at the state and local levels.

Comprehensive planning provides long-term guidance for growth, reflecting a community's values and future expectations. The Comprehensive Plan implements the community's vision and serves to protect natural and community resources and public health and safety. The Comprehensive Plan also serves as the basis for development regulations and ensures that adjacent land uses are compatible with one another and suitable for the characteristics of a given area.

The responsibility and authority for regulating land use and development rests with the

local (county or municipal) government with oversight from the Florida Department of Community Affairs (DCA). Therefore, local planners must be involved in working directly with wildfire experts (e.g., fire officials, foresters) and the public to determine appropriate land use policies to minimize wildfire risk. Typical wildfire risk reduction policies include development restrictions in high hazard areas and risk reduction through site planning, structural, and landscaping requirements for new or established developments. Wildfire risk also may be addressed through adjustments to future land use, density, and development patterns.

Planning also enables communities to address their development patterns – including in the WUI – and to determine how they can reduce their risks through alternative development patterns. The formal legal standing of the Comprehensive Plan and its central role in local government decision making underscores the opportunity to use this planning process as an effective means for reducing wildfire risk.

Legislation for the Comprehensive Plan

Florida's 1985 Growth Management legislation (F.S. 163.3167 *Local Government Comprehensive Planning and Land Development Regulation Act*) requires counties and municipalities to adopt a Comprehensive Plan. Comprehensive Plans are

LOCAL PLANNING STRATEGIES FOR SUCCESSFUL WILDFIRE RISK REDUCTION

required to be submitted to the DCA for approval. All land development regulations and land development decisions must be consistent with the adopted Comprehensive Plan (F.S. 163.3194). Plans and amendments may be challenged for failure to comply with state laws and regulations.

Chapter 9J-5 of the Florida Administrative Code, *Comprehensive Plans*, provides specific instruction on what the plans are required to contain. Among these requirements is the inclusion of certain “elements” that address future land use, housing, transportation, infrastructure, coastal management (if applicable), conservation, recreation and open space, inter-governmental coordination, and capital improvements. Each plan element must include goals, objectives, and policies that conform to the general requirements of the applicable statute and regulations. Elements must be internally consistent with all other elements.

Addressing Wildfire Risk Reduction in the Comprehensive Plan

Current legislation does not require Florida communities to address wildfire hazards in their Comprehensive Plan. The Comprehensive Plan, however, lends itself well to addressing wildfire hazard issues through its ability to guide land use and development patterns. Allowing development in wildfire-prone areas without considering alternative development patterns or risk reduction increases wildfire risk to persons and property in a community. In addition, the inclusion of wildfire hazard issues in the Comprehensive Plan will strengthen support for future wildfire risk reduction actions.

Case Study:

Wildfire Policies of the Comprehensive Plan of Alachua County, Florida

Wildfire Mitigation has been included in the Conservation and Open Space Element of the Alachua County Comprehensive Plan. There are several key wildfire-related policies included in the element.

- Map and rank wildfire hazards in the county
- Implement a fuel management program to reduce risk
- Educate the public about wildfire risk reduction actions
- Advance the policies of local emergency management plans and LMS
- Implement a Firewise Communities recognition program
- Prohibit certain land uses as necessary to assure public health, safety, and welfare and the protection of property
- Require new developments to prepare a Wildfire Mitigation Plan and undergo a development review process

(The text of the Open Space Element appears at the end of this chapter.)

Both the Future Land Use Element (FLUE) and Future Land Use Map (FLUM) have great potential for protecting future development from wildfire. The FLUE designates the general distribution, location, and extent of future land uses for residential, commercial, industrial, agricultural, recreational, conservation, education, public, and other uses of land (F.S. 163.3177(6)(a) *Florida Growth Management Act*; 9J-5.006 F.A.C.). The FLUM graphically identifies the specific purposes for which land may be used and is based on a suitability analysis of existing vacant and undeveloped land.

To consider wildfire hazards in future land use decisions, a community must first identify areas that are at risk of wildfire. This type of hazard identification and vulnerability assessment is typically performed as part of the Local Mitigation Strategy and Community

Wildfire Protection Plan processes (discussed in the following section). Wildfire hazard areas are identified using risk assessment tools, as described in Chapter 1. Of particular interest to planner will be the GIS-based risk mapping tool that is part of the Florida Wildfire Risk Assessment (FLFRA) project of the Southern Group of State Foresters (2008). Long-term geographic wildfire risk assessment information, such as the FLFRA's Wildfire Susceptibility Index (WFSI) may be incorporated into the FLUM map to assist in assessing land use suitability. Once a wildfire risk assessment is completed, decision makers can determine how future growth may be accommodated without putting more developments at risk.

Wildfire policies associated with future land use decisions will only target future development including redevelopment. Existing development is typically addressed by other

means, such as outreach programs or regulatory approaches. Scattered undeveloped parcels are a major problem for many existing subdivisions in Florida. In this case, policies can support risk reduction on empty lots, such as prescribed burning and other fuel management techniques. These policies can also lay the groundwork for future ordinances (i.e., Land Development Regulations) that require vegetative maintenance on vacant lots, such as the ordinance in Palm Coast, Florida. For detailed guidance on regulations and ordinances, refer to Chapter 4.

In addition to the FLUE and FLUM, other elements of the Comprehensive Plan that can address wildfire risk reduction include the Conservation Element, Intergovernmental Coordination Element, and Capital Improvements Element. Appended to this chapter is an example of how Alachua County addressed wildfire risk reduction in the Conservation and Open Space Element of the Comprehensive Plan. Planners will also want to refer to the discussions in Chapter 4 about potential regulatory approaches to wildfire risk reduction, including Land Development Regulations, development review, zoning regulations, vegetation management ordinances, Community Protection Zones, urban growth boundaries, and building permit requirements.

Comprehensive Plan Implementation and Updates

Each local government must adopt an Evaluation and Appraisal Report (EAR) once every 7 years to assess its Comprehensive Plan (F.S. 163.3191) and to provide recommendations for amendments to update the Comprehensive Plan. The DCA has developed detailed

Planning for wildfire events is just one part of a comprehensive community planning strategy...By proactively designing communities in ways that minimize loss...developments can be more sustainable in the face of natural catastrophe...By creating denser development footprints which reduce urban sprawl, the resulting increase in greenspace provides for more recreational opportunity, wildlife and plant species conservation, enhanced carbon sequestration, and opportunities for the creation of wildfire buffer zones.

—Robert F. Brzuszek, *Wildfire Planning Strategies for Community Design*, 2009

rules that establish minimum criteria for the oversight and review of Comprehensive Plans and amendments (Chapter 9J-5 F.A.C.).

The EAR is an opportunity for communities to address the wildfire hazard in their Comprehensive Plan if they have not already done so or to update existing wildfire hazard information to reflect progress and changes in local conditions. The DCA's Division of Community Planning has prepared a list of questions to suggest ways in which the Comprehensive Plan can better incorporate hazard mitigation planning. For example, the EAR should assess whether the Comprehensive Plan incorporates the most current information about "areas susceptible to wildfire" within a community and what data were used for this assessment (9J-5.006(2)(b)). Further EAR guidance can be found at www.dca.state.fl.us/fdcp/DCP/EAR.

Barriers to Addressing Wildfire Risk Reduction in Comprehensive Planning

Incorporating wildfire risk reduction policies into the Comprehensive Plan is not always an easy or straightforward process. Economic development pressures, private property rights,

differing perceptions of risk, and other factors compete strongly with wildfire risk reduction. Public education and outreach programs can be useful during the planning process to create awareness of the wildfire issues (see Chapter 2). Case studies throughout this and other chapters can also be used as examples of how communities throughout Florida have been handling these issues.

Other implementation barriers can include limited financial and/or staff resources and lack of technical expertise. During local government budget reviews, opportunities to channel funds toward wildfire risk reduction planning should be explored. Planners can use existing tools such as this manual and their LMS to better understand the wildfire hazard in their jurisdiction and how better land use decisions can reduce wildfire risk in the future.

Technical guidance to aid local planning departments is available from the DCA to improve hazard integration planning. In addition, the DCA's municipal case studies and Florida county profiles include recommendations on incorporating hazard mitigation into Comprehensive Plans at www.dca.state.fl.us/fdcp/DCP/hazardmitigation.

Wildfire Considerations in Land Use Planning

There are a number of ways that wildfire considerations can be recognized as part of a Florida local Comprehensive Plan.

- Acknowledge that a wildfire hazard exists in the area
- Identify areas of risk based on a wildfire risk assessment
- Provide detailed descriptions of the wildfire hazard and recommendations for dealing with it
- Include considerations of wildfire hazards in land use and other plan elements
- Address both wildfire risk reduction and development requirements in the fire protection and/or public safety elements

Land use policies can focus the attention of decision makers on the vulnerability of identified zones, neighborhoods, or properties to the wildfire hazard. Decision makers can then consider the wildfire hazard when comprehensive plan amendments cause rural lands to urbanize and during development and redevelopment decisions, especially as part of the formal site plan review process.

(Adapted from Institute for Business and Home Safety's *Community Land Use Project*, www.disastersafety.org)

Finally, keeping open lines of communication during the planning process can lead to a better chance of plan adoption. Any proposed policies that require increased responsibility at any level, such as site plan reviews by local fire experts, should be addressed early in the drafting stage to receive adequate input and support.

ALL-HAZARDS PLANNING: THE LOCAL MITIGATION STRATEGY (LMS)

The LMS is a collaborative all-hazards planning process undertaken by Florida counties with participation from municipalities and special districts that fall within the county. The purpose of the LMS is to create a strategic plan to reduce the effects of various hazards prior to the event. The LMS process is lead by a Committee or Working Group that typically includes participation from local governments, local planners, emergency managers, building officials, public safety and public works directors, elected and appointed officials, agency representatives, community groups, and citizens.

The LMS contains hazard risk analyses, mitigation strategies, and proposed projects. It can serve as a connection among the local government Comprehensive Plan, local emergency management plans, land development regulations, building codes, and relevant ordinances.

Legislation and Guidance for the Local Mitigation Strategy

As mandated by the Disaster Mitigation Act of 2000 (DMA 2000), FEMA requires county governments to adopt an LMS as a prerequi-

site for receiving funds from the Pre-Disaster Mitigation (PDM) grant assistance fund, the Hazard Mitigation Grant Program (HMGP), and the Fire Management Assistance Grant (FMAG) program.. This is mandated by the Disaster Mitigation Act of 2000 (DMA 2000). An LMS is required by the State of Florida for eligibility to receive state-administered federal HMGP funds (§9G-22, F.A.C.). Having an LMS plan also affects a county's ability to receive Flood Mitigation Assistance (FMA) grants, Severe Repetitive Loss (SRL) grants, and Repetitive Flood Claims (RFC) grants.

FEMA set forth guidelines for the LMS in the Final Rule in Code 44, Part 201 of Federal Regulations (CFR 2009). This document instructs that an LMS identify natural hazards and their potential impacts, identify actions to reduce losses resulting from the hazards, and create a process for the implementation of the

The Collaborative Process for a Local Mitigation Strategy (LMS)

There are several important features to a successful LMS development process.

- Government coordination – An inventory of hazard mitigation agencies, policies, agreements, conflicts, and potential local mitigation projects
- Public participation – Establishment of a working group, public participation procedures, and plan adoption and coordination procedures
- Evaluation and enhancement – Procedures for periodic review of the LMS and for broad participation in that review

plan. It also states that a previously approved plan must be reviewed, revised, and resubmitted every 5 years in order for the county and its jurisdictions to remain eligible for HMGP funds.

The Local Mitigation Strategy Product

In addition to defining the community's overall strategy for holistic, targeted risk reduction, the LMS includes a list of prioritized initiatives, both structural and nonstructural, to reduce the community's vulnerability to various hazards. For communities with a high wildfire hazard, the LMS is an effective means for prioritizing wildfire risk reduction projects to be eligible for FEMA hazard mitigation funds (HMGP and PDM) as well as other local funds contributed by the county (if available).

Incorporating Wildfire Risk Reduction in the Local Mitigation Strategy

Projects that contribute to a strategic, incremental approach to wildfire risk reduction might include fuel management projects, home retrofits to meet recommended National Fire Protection Association (NFPA) standards, Community Protection Zone projects, forest fuel management efforts, Firewise Community workshops or other public outreach and education initiatives, the development of more detailed plans to support wildfire risk reduction (e.g., a CWPP, as discussed in the next section), and hazard-reduction code enforcement, planning, and development practices. More specific information on how these projects support wildfire risk reduction can be found in subsequent chapters.

Major Features of a Local Mitigation Strategy

Prerequisites and Process

- Adoption by the local governing body
- Multi-jurisdictional plan adoption
- Multi-jurisdictional planning participation
- Documentation of the planning process

Guiding Principles

- Goals for hazard mitigation and recovery
- Recommendations from past disasters
- Relationship to relevant local policies and ordinances
- Coordination with local Comprehensive Plan goals (optional)
- Exploration of policies at variance or in conflict with LMS goals and objectives

Risk (Vulnerability) Assessment

- Identification and profile of hazards (may include mapping, may include models of how a disaster might affect the community under various scenarios)
- Vulnerability assessment, including overview, identification of structures, estimation of potential losses, and analysis of development trends (may include mapping, may include economic analysis)
- Multi-jurisdictional risk assessment
- A profile of hazards and hazard maps of the community (optional)

Mitigation Strategy

- Local hazard mitigation goals
- Identification and analysis of mitigation actions and policies (e.g., protection of critical facilities, prioritization of lands for hazard mitigation acquisition, protection of watersheds and ecosystems, diversification of economic sectors prone to disaster damages, policies for post-disaster reconstruction, reduction of public expenditures in areas subject to repetitive damage, elimination or regulation of development in hazard-prone areas, removal of vulnerable infrastructure on hazardous sites)
- Implementation of mitigation actions
- Multi-jurisdictional mitigation actions
- Identification of funding sources

Plan Maintenance Process

- Monitoring, evaluation, and updating of the plan
- Incorporation into existing planning mechanisms



Community leaders can enrich and expand the effectiveness of wildfire risk reduction planning efforts.

Photo: Pandion Systems, Inc.

Projects placed on the LMS list are prioritized to receive grant funding as it becomes available. Prioritization is determined by the LMS Committee and is based on a number of factors, including the number of people affected by the project, the cost, how many times the project is mentioned in other plans, and the level of concern about the hazard. The more detailed the information provided on the proposed wildfire risk reduction project, the more likely that priority support can be generated. It is also important that local agencies with knowledge of wildfire participate in the LMS process to contribute expertise and analysis of effective risk reduction projects and to provide input on how wildfire risk reduction activities might be mutually beneficial with other local mitigation efforts.

Local Mitigation Strategy Implementation and Barriers

The LMS is an established, long-term program built into the budgets of all Florida counties. Once the LMS is implemented, counties are required to monitor, evaluate, and update their

Working with Community Leaders in Collaborative Wildfire Planning

Community leaders possess skills that wildfire managers and public land managers may not have – critical skills that are needed in order to bring wildfire risk reduction projects to completion. There are a number of ways in which community leaders can bring special skills and attention to the wildfire risk reduction planning process.

- Leaders have motivations for becoming involved – Two thirds of leaders are motivated because their job involves oversight of emergency management or political office. Leaders also care about their personal property.
- Leaders bring important skills – Community leaders bring critical interpersonal skills, such as knowing their constituency, communicating with others, ability to work toward a goal, tapping into residents' talents, and delegating tasks.
- Leaders are valuable in their communities – Leaders in wildfire preparedness are able to mobilize their communities to identify local issues, create a vision for action, develop a preparedness strategy, commit to action, take individual responsibility, and drum up financial and material resources.
- Leaders carry projects forward – After wildfire managers help with technical aspects of identifying issues and creating a vision, community leaders can become champions in the partnership to carry projects to completion.
- Leaders motivate people – Rather than performing projects themselves, leaders motivate, facilitate, and delegate to get projects done.

(Adapted from Lang et al. 2006)

LMS on a 5-year cycle to maintain eligibility for FEMA grant funding and to remain in compliance with Florida rules (§9G-22, F.A.C.). LMS updates are reviewed and approved by the DCA's Division of Emergency Management (DEM) and FEMA. The update process is an opportunity for a county to assess how well it has executed its overall strategy for risk reduction and implemented its proposed mitigation projects, as well as a chance to incorporate updated hazard information.

Lack of available information on the wildfire hazard and lack of funding for wildfire risk

reduction programs can be barriers to implementing wildfire projects in the LMS. The state's Wildfire Mitigation Plan Annex to the 2010 State Hazard Mitigation Plan is designed to help overcome this obstacle by reflecting local wildfire risk reduction needs. In addition, FEMA has recently added language that makes all types of retrofit projects fundable through their grant programs. See the later section on wildfire risk reduction funding for more information.

As part of the Wildfire Mitigation Plan Annex project, an updated risk assessment will be done for each county and the state. These

risk assessments can be used by counties who have not yet performed detailed risk assessments in their own jurisdictions.

Ensuring that wildfire risk reduction projects get into the LMS may also require the participation of local forestry experts, fire chiefs, and other applicable representatives on the LMS Committee. Technical support for revising LMS plans can be aided by DCA's DEM at www.dca.state.fl.us/fdcp/DCP/hazardmitigation. Federal mitigation planning guidance is available in the FEMA Local Planning Guidance documents at FEMA at www.fema.gov/plan/mitplanning/guidance.shtm and through the FEMA Region IV offices at www.fema.gov/about/regions/regioniv.

FOCUSED PLANNING: THE COMMUNITY WILDFIRE PROTECTION PLAN (CWPP)

An outcome of the strategic planning process can be a more focused plan intended to address a single hazard identified in the LMS, such as wildfire. In the case of wildfire, this would be the development of a CWPP, which can be done at a subdivision, city, town, village, or county level. Several communities in Florida have already completed or initiated a CWPP and a number of projects are under way in high risk counties.

A CWPP often has much in common with a Firewise Communities plan. Each plan addresses specific action items that will reduce the wildfire risk of a local community. A CWPP is often written for a larger community such as a county, whereas a Firewise plan is intended to cover a smaller community group. Because a CWPP covers a larger geographic

Case Study:

CWPP Activities Gain All-Hazards Funding in Lehigh Acres, Lee County, Florida

An intensive vegetation management plan was included in the development of a CWPP for Lehigh Acres. The DOF vegetation management plan called for creation of strategic fire breaks throughout the community to slow the advance of a wildfire and allow for more effective suppression action should a wildfire approach the community.

Lee County was able to identify funding for this CWPP risk reduction activity from the county's all-hazards Municipal Service Taxing Unit (MSTU), providing over \$650,000 to finance the necessary equipment and operators to work on the project. This is an example of how a CWPP element can obtain funding by being included in a local government risk planning effort. The project has since become a part of Lee County's LMS.

Contact: John Wilson, Director, Lee County Division of Public Safety www.safelee.org.

area, it has more collaborative involvement from the area surrounding the community and requires the agreement of the local governing body, the local fire service, and the Florida Division of Forestry (DOF). A CWPP typically includes risk reduction activities in areas outside of but adjacent to the community. A CWPP will review the local ability to suppress wildfires, protect structures, identify suppression capacity needs, and identify potential sources of funding to address those needs.

Creating a CWPP can lead to economic and social benefits for the community. The collaborative nature of the CWPP process raises awareness of wildfire risk and strengthens networks in the community. The CWPP is an opportunity for the community to develop a locally coordinated approach to wildfire risk reduction. Proposed actions can also influence where and how state and federal agencies implement fuel management projects on public and private lands and how additional

federal funds may be distributed for projects on nonfederal lands.

Legislation for the Community Wildfire Protection Plan

CWPPs are authorized and defined in Title I of the Healthy Forests Restoration Act of 2003 (HFRA), a federal law developed in response to the widespread wildfires during the summer of 2002. The federal government has not yet made CWPPs a prerequisite for receiving hazard mitigation grant funding, yet CWPPs can lead to increased attention and support for wildfire risk reduction projects. For example, communities with a CWPP in place may be given priority for receiving hazardous fuel management and forest management funding administered by the U.S. Forest Service (USFS), the Bureau of Land Management (BLM), and other federal agencies.

The HFRA allows a great deal of flexibility in the development of a CWPP. There is no standard format for a CWPP, but there are several minimum criteria.

LOCAL PLANNING STRATEGIES FOR SUCCESSFUL WILDFIRE RISK REDUCTION

- **Collaboration** – The CWPP must be collaboratively developed by local and state representatives in consultation with federal agencies and other interested parties.

- **Prioritized Fuel Management** – The CWPP must identify and prioritize areas for hazardous fuel management treatments and recommend the types and methods of treatment that will protect one or more at-risk communities and essential infrastructure.

- **Treatment of Structural Ignitability** – The CWPP must recommend measures that homeowners and communities can take to reduce the ignitability of structures throughout the area addressed by the plan.

The HFRA requires that the local government, local fire department, and state forest management agency (i.e., DOF) mutually agree to the final contents of the CWPP. These entities are directed to consult with and involve local representatives of the USFS if appropriate and other interested parties or persons in the development of the plan.

Guidance for Developing a Community Wildfire Protection Plan

Besides the few important criteria required by HFRA, communities have leeway in the development of their CWPP. This can, however, be overwhelming, especially with limited resources or expertise. The following blueprint is intended to help communities better understand the steps and structure of a CWPP.

1. Establish a CWPP Working Group and Assign Responsibilities

The CWPP Working Group must include those agencies who will ultimately agree to the final plan: local government, local fire department,

and DOF representative. In addition, other important stakeholder groups should be included as part of the group or in an advisory capacity, such as local emergency managers, LMS Committee members, planning and growth management staff members, state and regional foresters, private land managers (e.g., large timber companies, The Nature Conservancy), representatives of state agencies (e.g., Department of Environmental Protection, Water Management Districts, as applicable), and representatives of federal agencies (e.g., USFS, Department of Defense, BLM, U.S. Fish and Wildlife Service, National Park Service, and Bureau of Indian Affairs, as applicable). As this group is formed, the assignment of roles and responsibilities for the CWPP process should be clear.

Because wildfire risk is a shared responsibility among those who live and work in a community, it is important to identify and invite the participation of other citizens or entities who might be affected by a wildfire. Potential nongovernmental partners include homeowners' or property associations, businesses, chambers of commerce, volunteer groups (e.g., American Red Cross), power companies, communications companies, insurance agents, school board members, local land conservation trusts, and representatives of churches or other local nonprofit organizations.

The CWPP Working Group does not need to be an entirely new entity. For county level CWPPs, the community may want to consider developing the CWPP in a subgroup of the LMS Committee, so that it is part of an already authorized budget expense. A few CWPP stakeholders may already be members

of the LMS Committee. While the CWPP Working Group will be most active during initial development of the CWPP, wildfire risk reduction efforts will benefit from the group being active in cross jurisdictional implementation of CWPP activities.

2. Define the Scope and Goals of the CWPP

This step involves efforts of information gathering and risk analysis, followed by setting of goals. It will determine the scope and level of detail of the CWPP and can be organized in three steps.

Gather Community Capacity Information

Information should be obtained about basic community capacities and characteristics related to wildfire.

- Current fire protection districts, equipment, personnel (qualifications, training, and suppression capabilities)
- Current mitigation efforts and capabilities
- Current wildfire policies and community support for wildfire risk reduction

This information provides a realistic appraisal of the resources available to implement the wildfire risk reduction actions proposed in the final CWPP. It is important to note that capacity is not necessary to create a CWPP. If community capacity is lacking, it becomes one of the needs identified in the plan.

Assess Wildfire Risk

A significant effort during this stage is identifying hazardous fuels and assessing the level of wildfire risk in the community (sometimes referred to as "Level of Concern" or LOC). Determining the level of wildfire risk can be aided through mapping such as that provided

LOCAL PLANNING STRATEGIES FOR SUCCESSFUL WILDFIRE RISK REDUCTION

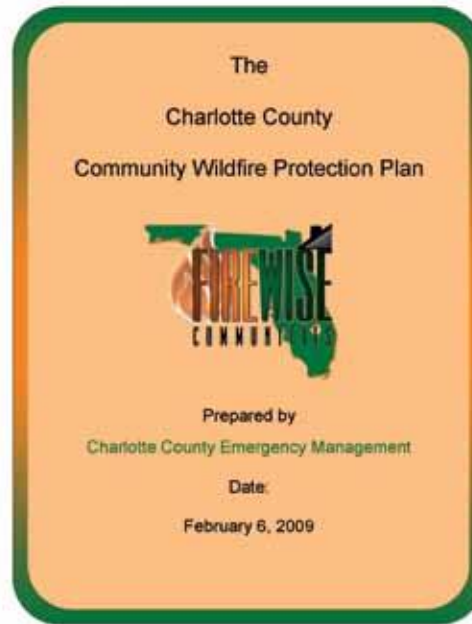
by the Florida Wildfire Risk Assessment (FLFRA – see Chapter 8). Local government GIS systems may also provide valuable information about community characteristics or facilities that can be merged with FLFRA or other hazard data. The FLFRA data incorporates wildfire history and the vegetation information has been checked on the ground for accuracy, so the FLFRA information is ready for counties to use during the CWPP process.

Establish Goals and Objectives

Based on the information gathering efforts and maps, the CWPP should identify specific geographic areas needing improvement or requiring wildfire risk reduction. The community's situation can be clearly defined in terms of wildfire hazard, current and potential wildfire risks, and values to be protected from wildfire. Using the information gathered, this step will establish clear goals for the CWPP with specific objectives to address both pressing problems and long-term issues. At this point, the geographic scale of the wildfire risk reduction approaches should be matched to the community capacity, taking into account existing networks and programs for accomplishing the goals of the CWPP. If resources are not available, then a requirement for these additional resources should be listed as a community need in the CWPP. The list of needs serves as the basis for developing funding needs and cultivating funding resources.

3. Draft the CWPP

At the end of the goal setting phase, a plan is put into writing so all participants can see the current situation and direction of the CWPP. Although no official CWPP format is required, some states make available a standard tem-



Graphic: DOF

plate. The State of Florida offers a template that many communities throughout Florida have used, with local variation in the level of detail and attachments. In Florida, the DOF supplies a CWPP template to guide communities in completion of their local plan as a part of the technical expertise they offer communities preparing a CWPP.

Well-crafted CWPPs should include several key pieces of information.

- Community background and existing situation
- Description of relevant wildfire regulations and policies
- Fire response and suppression capabilities
- Description of the WUI, fire history, and fuel types

- Community base maps
- Risk assessment map and methodology
- Critical facilities
- Goals and objectives
- Action plan and priorities, including identified projects, policies, and educational programs
- Implementation and monitoring strategy, including funding opportunities and other resources
- Plan evaluation, review, and amendment process
- Communications and outreach strategy
- Signature page of final committee member agreement

4. Conduct a CWPP Workshop

Although public participation is encouraged throughout the process, conducting a CWPP workshop provides a very tangible way for the public to become involved. The workshop will introduce and discuss the wildfire risk map, the draft plan components, and the proposed actions and allow the opportunity for residents to understand how the CWPP may affect them. The workshop should also allow residents to provide feedback on ways in which the final product may better reflect the values of the community. Finally, including an educational component in the workshop, such as showing DOF's *Living on the Edge* in Florida video, is an effective way to engage residents and encourage discussion.

5. Finalize and Implement the CWPP

Public input and findings from the CWPP Workshop should be incorporated into the final CWPP. The final CWPP should contain a

LOCAL PLANNING STRATEGIES FOR SUCCESSFUL WILDFIRE RISK REDUCTION

clear list of actions, assigned roles and implementation responsibilities, a monitoring strategy, and a signature page of final committee member agreement. It is important to ensure that each participant understands the roles and responsibilities assigned to them under the plan, including the designation of a point person for plan maintenance, review, and updating.

6. Monitor, Revise, and Update the CWPP

When activities are completed, this should be reported to the monitoring person to ensure implementation is tracked as part of the ongoing process. The plan should be reviewed and revised annually to make sure the document is current in the face of changing resources and procedures and to make sure the plan meets the changing needs of the community. Evaluation of joint training exercises or joint educational programs may provide feedback on the plan's effectiveness.

Benefits of Developing a CWPP

The main benefit of preparing a CWPP is that it provides an opportunity for the community to develop a locally coordinated approach to wildfire risk reduction. The collaborative nature of the CWPP process raises awareness of wildfire risk and empowers the community to take action to protect itself.

The CWPP will influence where and how the various partners implement fuel management projects and may influence how hazard mitigation funds are distributed for wildfire risk reduction projects. For example, at least 50% of all funds appropriated for projects under the HFRA must be used within the WUI defined by the CWPP.

Case Study:

Lower Florida Keys CWPP

A CWPP was created for the Lower Florida Keys, including Sugarloaf, Cudjoe, Big Pine, No Name, and Little Pine Keys. On these islands, many houses near the fire-dependent pine rockland ecosystem are creating a complicated WUI fire management problem. Partners in the planning efforts were The Nature Conservancy, US Fish and Wildlife Service, DOF, Monroe County, and local volunteer fire departments.

The goals of the plan are to educate residents, to train and equip firefighters, and to assess and mitigate the wildfire hazard. A number of specific projects and needs are identified in the plan.

- Train firefighters in basic wildfire fighting and WUI tactics
- Equip firefighters with appropriate wildland fire protective equipment, tools, etc.
- Install new fire hydrants where water supply is sufficient
- Install dry wells where water supply is not sufficient
- Maintain mapping of high-fire danger homes
- Maintain existing firebreaks
- Complete clearing around high fire danger homes and maintain low fuel areas around homes that have already been cleared
- Educate residents about fire hazard reduction options (e.g. media, topical workshops, outreach to existing groups, one-on-one outreach, signs)
- Conduct ecologically sensitive prescribed burns
- Experiment with mechanical pre-prescribed fire treatment for areas that are difficult to burn and mechanical fire surrogate treatment for areas that are impractical to burn
- Develop vegetation pick up days to encourage people to remove fuels around homes
- Remove impediments to emergency vehicle access (e.g. replace concrete barricades with locked gates, maintain firebreaks, etc.)
- Develop on-site fire management staff or USFWS staffing
- Increase prevention/outreach role of local DOF rangers

Barriers to CWPP Implementation

In 2007, the Joint Fire Science Program conducted a study to analyze a national sampling of CWPPs (Jakes et al. 2010). The results of this study provide tips, guidance, and lessons learned for other communities seeking to develop a CWPP. The findings reveal that one of the biggest barriers to successful implementation is a lack of financial resources. This arises in part because of the expectation that

state or federal funding will be available for implementing the risk reduction projects. Although some grant funding is available (refer to the funding section below), there are no guarantees on how much funding will be available for proposed projects. It is therefore recommended that CWPP developers include revenue generating projects if feasible (e.g., sale of undesirable hardwoods, sale of Melaleuca mulch, sale of biomass) in addition to relying

on grants. Locally funded revenue generating projects, such as wood chipping programs, can expand community support and broaden the scope of risk reduction projects.

Another barrier to implementation may be the community's level of acceptance of the CWPP. Community values, attitudes, and perceptions of risk vary widely. For example, some property owners may believe that risk reduction does not make a difference in protecting their property. Others may place a higher value on keeping nature "as is" rather than implementing fuel management techniques in high risk areas.

These incompatible attitudes can be partly addressed during the CWPP development process by encouraging diverse stakeholder participation in the process. Although the stakeholders may not always serve directly on the CWPP Working Group, they can contribute – and learn – during public workshops or in an advisory capacity. This is the beauty of a truly collaborative process – collaboration almost always serves to bring people closer together and to a better understanding of the issues, rather than enhancing conflict. Conducting education and awareness events as part of a long-term action plan can also raise a community's level of acceptance and continue to inform the community of implementation updates. Chapter 2 includes a discussion of public attitudes toward fuel management and wildfire risk reduction activities and how collaboration and outreach programs can be designed to shift public knowledge and attitudes.

Plan Implementation and Integration: Coordinating Local Efforts

The Comprehensive Plan, LMS, and CWPP are designed to provide effective and long-term approaches to wildfire mitigation. A community may engage in one or more of these planning strategies at the same time or over a number of years. Coordination among people and between plans is a key to success. Like other natural hazards, wildfires do not respect political or jurisdictional boundaries. An important aspect of effective wildfire risk reduction programs is ensuring cooperation among agencies, private landowners, and citizens. Agencies and citizens in the WUI must develop partnerships for a coordinated approach to address the wildfire problem.

"Plan integration" means that a county hazard mitigation plan is coordinated with existing local, state, and/or regional planning efforts, with federal planning efforts (e.g., FEMA mitigation programs), and with other initiatives that provide guidance to local and regional agencies. Assessing other ordinances and/or adopted policy references, such as NFPA guidance, is also helpful for understanding the regulatory framework for wildfire risk reduction. Barriers to integration may include lack of awareness among agencies, avoidance or fear of additional responsibilities or collaboration, real or perceived sense of lack of resources to accomplish collaborative projects, and unwillingness to share resources or turf.

If these obstacles can be overcome, plan integration is an effective means for reinforcing wildfire risk reduction across county agencies and other nongovernmental participants. It can also increase efficiency by avoiding repetition and duplication of effort and ensure that approaches are consistent. There are a number of plans that should be consulted during a plan integration review process.

- Comprehensive Plan and Land Development Regulations
- Local Mitigation Strategy (LMS)
- Comprehensive Emergency Management Plan
- Post-Disaster Redevelopment Plan
- Community Wildfire Protection Plans (CWPPs)
- State Wildfire Hazard Mitigation Plan Annex
- Firewise Communities program documentation

Case Study:**Taylor CWPP, Baker County, Florida**

Taylor is a small, unincorporated community located in Baker County in north central Florida. It is surrounded by heavily forested federal, state, and private/industrial timber lands. The community has an active recent wildfire history, including the 34,000 acre Impassable Bay Fire (2004) and the 4,800 acre Suwannee Road One Fire (2004), which burned into the community. Area land managers rely heavily on prescribed burning to reduce wildfire risk.

The Taylor CWPP was initiated in 2006 to address the community's wildfire hazard. Planning participants included a DOF Wildfire Mitigation Specialist, a DOF Forest Area Supervisor, a USFS Forester from the Osceola National Forest, the Baker County Fire Chief, an individual timber company representative (Rayonier Timber), and representatives from the Sheriff's Office and Emergency Management. In addition, the captain from the Taylor Volunteer Fire Department and a pastor from a local church played key roles in fostering com-

munity participation. The CWPP working group conducted a collaborative community risk assessment of Taylor in 4 meetings over 6 months.

The group created a CWPP that focuses on increasing fuel management, increasing suppression capacity by upgrading water resources, enhancing wildland firefighter training for all volunteer firefighters in Baker County, and enhancing community education. The CWPP group also held a *Living on the Edge in Florida* educational workshop for members of the community. Homeowners learned how to increase the probability that their homes could survive a wildfire disaster and were given an opportunity to comment on the completed CWPP. Homeowners and emergency managers hold Firewise events twice each year and many community partnerships have been formed for wildfire prevention and protection.

Among the committee's specific wildfire protection objectives was the establishment of a 25-to-30-foot-wide control line (or Community Protection Zone) around Taylor. This control line serves as a fuel break between pine forests and residential areas, a strategic base for firefighting

operations, and a targeted location for conducting prescribed fire and other fuel management projects. The DOF and the USFS Osceola National Forest staff collaboratively created the 11-mile-long control line, which crosses state, federal, and private industrial forest land.

The control line was tested during the Florida Bugaboo Wildfire on May 8, 2007. A strong wind pushed the wildfire through the bordering John Bethea State Forest. Two hundred houses were evacuated in the community of Taylor. The fast moving wildfire flanked the boundaries of the Taylor community for more than 4 days. The Baker County Fire Chief, DOF, and USFS supervisors attribute their successful containment efforts to the control line, which allowed quick and safe access around the edges of the community. Because the control line was already clear of vegetation and debris, back-firing operations could be immediately conducted. Fire personnel also could safely patrol the area during mop up operations. The CWPP activities effectively redirected the fire around the community and prevented the loss of any houses in Taylor.



Photo: DOF



Photo: DOF

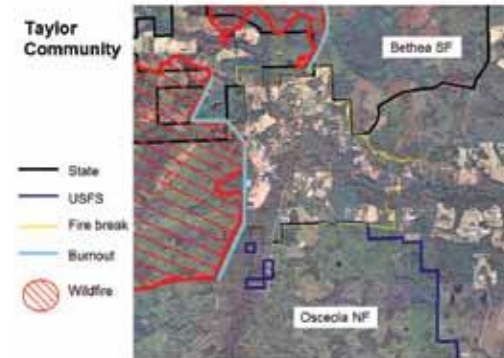


Photo: DOF

Wildfire Planning Resources

- *Planning for Wildfires*, American Planning Association:
www.planning.org/research/wildfires
- *Preparing a Community Wildfire Protection Plan – A Handbook for Wildland-Urban Interface Communities*, Communities Committee, National Association of Counties, National Association of State Foresters, Society of American Foresters, and Western Governors' Association: www.communitiescommittee.org/pdfs/cwpphandbook.pdf
- *Community Guide to Preparing and Implementing a Community Wildfire Protection Plan*:
www.forestsandrangelands.gov/communities/documents/CWPP_Report_Aug2008.pdf
- *Leaders Guide for Developing a Community Wildfire Protection Plan*, National Association of State Foresters, International Association of Fire Chiefs, and The Wilderness Society:
http://csfs.colostate.edu/pdfs/CWPP_LG.pdf
- *Community Wildfire Protection Plan Evaluation Guide*, University of Oregon:
http://ri.uoregon.edu/documents%20and%20pdfs/eval_9-8-08_web.pdf
- Joint Fire Science Program study results and CWPP resources:
<http://jfsp.fortlewis.edu>
- California Fire Alliance CWPP statewide review and implementation recommendations:
www.cafirealliance.org/cwpp

LOCAL PLANNING STRATEGIES FOR SUCCESSFUL WILDFIRE RISK REDUCTION

Roles and Actions for Long-Term Wildfire Mitigation

Planning and Growth Management Departments

- Incorporate wildfire mitigation into Comprehensive Plan, planning, and zoning processes, local regulations, and development review
- Periodically update significant planning documents (CWPPs, LMSs)
- Ensure intergovernmental agency collaboration (e.g., among LMS Committee, CWPP Working Group, planning and growth management departments, etc.)
- Encourage or regulate the creation of wildfire mitigation landscapes around homes, buildings, and communities, based on NFPA standards
- Establish creative incentives for others to take appropriate mitigation actions
- Enforce code and other wildfire mitigation maintenance requirements

Local Fire Protection Services

- Expand participation in wildfire risk reduction prevention education programs
- Encourage the long-term maintenance of wildfire risk reduction practices through the adoption of regulations in concert with local governments
- Develop programs that increase public awareness of wildfire danger and necessary risk reduction actions (e.g., annual brush-clearing days, “wildfire preparedness” activities)

- Help citizens understand that fire agencies cannot guarantee protection, especially for residents of areas of known wildfire hazard

Local, Regional, State Forestry Departments (e.g., DOF)

- Continue efforts in implementing wildfire risk reduction, prevention, and education programs, especially to encourage acceptance of prescribed fire and fuel management programs
- Continue efforts in implementing wildfire risk assessment programs
- Continue leadership with Florida’s Firewise Communities and CWPP development

State Planning Agencies (e.g., DCA)

- Encourage and support local efforts, particularly in rural areas where a low tax base may prevent smaller communities from funding efforts to address crucial wildfire risk reduction
- Raise public awareness of the connection between land use planning and wildfire risk reduction issues
- Incorporate wildfire risk reduction into state-level hazard planning efforts

Local and State Emergency Management Agencies (e.g., DEM)

- Coordinate update and implementation of LMS and state hazard mitigation strategy
- Continue to partner with local, regional, and state forestry departments on wildfire risk reduction efforts
- Notify partners of funding availability

Community Leaders and Elected Officials

- Encourage wildfire risk reduction actions in high risk areas of the community to enhance public safety and welfare
- Raise public awareness of the need for wildfire risk reduction actions and regulations
- Sponsor and promote local wildfire risk reduction activities and events

Homeowners and Neighborhood Associations

- Foster neighborhood awareness of wildfire issues concerning personal property and safety
- Perform home and landscape assessments and risk reduction activities
- Assume more responsibility for maintaining community greenspace and properties
- Support fuel management strategies, including increased prescribed burning, on community property and neighboring private lands

Developers

- Incorporate wildfire risk reduction strategies into subdivision design
- Incorporate Firewise landscape design for subdivisions in high-risk areas
- Encourage or require construction of buildings that are resistant to wildfire in high-risk areas

LOCAL PLANNING STRATEGIES FOR SUCCESSFUL WILDFIRE RISK REDUCTION

Private Forest Landowners

- Incorporate wildfire risk reduction (prescribed fire) into forest management practices, especially in WUI areas

Outreach, Education, and Collaboration Specialists

- Design and present public education programs for homeowners and other community members who may be affected by wildfire
- Train teachers to bring wildfire prevention and prescribed fire acceptance activities into the classroom
- Encourage schools to take students on field trips to fire-adapted and fire-maintained ecosystems in Florida
- Assist communities to engage in collaborative planning for wildfire risk reduction

Media

- Provide coverage of local community events to increase public awareness of wildfire risk and meaningful risk reduction actions
- Provide balanced coverage of wildfires and prescribed fires so that community members begin to learn the different effects of each type of fire

Business Leaders

- Sponsor community education events and collaborative planning activities
- Use Firewise landscaping and building construction for businesses in high-risk areas

Nonprofit and Volunteer Groups

- Participate in community events that foster awareness of wildfire risk
- Assist homeowners in performing home risk reduction projects (e.g., clearing debris, trimming landscapes, soffit replacement)

Insurance Industry

- Consider providing discounts for homeowners who maintain wildfire risk reduction status in high-risk zones
- Consider future rules requiring wildfire risk reduction actions as a precondition to fire insurance in certain high-risk areas

EFFECTIVE AND LONG-TERM COMMUNITY WILDFIRE RISK REDUCTION

Effective and long-term maintenance of wildfire risk reduction plans requires the ongoing cooperation and participation of a number of partners, as well as the “integration” of multiple planning mechanisms. Many actions can be taken by cooperating partners to keep a long-term wildfire risk reduction strategy working in Florida communities. The Actions and Roles information below highlights a number of actions that various agency and community partners can take. Please also refer to the discussion in Chapter 8 about the roles/responsibilities of the major Florida agencies in wildfire risk reduction, prevention, and suppression activities.

Long-term maintenance of wildfire risk reduction projects in high risk areas is of special concern. Many wildfire risk reduction processes address wildfire hazards only at the time of site preparation or development. It is particularly important for communities, neighborhoods, and developments to assign roles and responsibilities for long-term wildfire risk reduction and fuel management practices. This can be accomplished through neighborhood associations or by including maintenance requirements in deed restrictions. These long-term approaches to wildfire risk reduction will be further elaborated on in the rest of this manual, especially in Chapters 4 and 5.

Wildfire Mitigation in the Florida Hazard Mitigation Plan

In 2009, the State of Florida was awarded federal Hazard Mitigation Grant Program (HMGP) funds to update the wildfire portion of the State Hazard Mitigation Plan. This is a statewide effort led by DOF that will result in a Wildfire Mitigation Plan Annex. The goal of the Annex is to develop a prioritized list of wildfire mitigation projects to receive funding support. As part of this effort, the state is updating its wildfire risk assessment to include current fuels and values-at-risk data for each county. This information will be available to each county for use in CWPPs, LMSs, Comprehensive Plans, Firewise Communities projects, and other wildfire mitigation efforts.

FUNDING SOURCES FOR WILDFIRE RISK REDUCTION

Funding for strategic and functional mitigation plans is often shared among local government planning agencies with some costs passed on to developers and landowners. Grant funding is one potential source of support for wildfire risk reduction planning activities. Grant sources are worth pursuing when funding becomes a major impediment to planning or implementation of wildfire risk reduction activities for a community. Grant requirements should be carefully reviewed – many federal grant programs only offer funding to states or to local governments in partnership with a state agency.

Other potential grant funding sources include programs of FEMA and the U.S. Fire Administration (USFA). FEMA has recently added a provision that makes all types of wildfire risk reduction retrofits fundable through their grant programs. These competitive grant programs, described below, require thoughtful

and well-documented proposals. There is often a waiting period between submission and receipt of funds.

Hazard Mitigation Grant Program (HMGP), Federal Emergency Management Agency

The federal HMGP funding cycle opens up following a federal declared disaster and allows local governments of the affected state to apply for funds to implement mitigation actions and projects prioritized in their LMS. The purpose of the HMGP is to reduce the loss of life and property due to natural disasters and to enable mitigation measures to be implemented during the immediate recovery from a disaster.

The HMGP is authorized under Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act. Projects may be of any nature that will result in protection of public or private property from natural hazards. The amount of money available for HMGP grants depends on the total disaster

assistance cost calculated by FEMA and the status of the State Hazard Mitigation Plan.

Specific policy guidance for wildfire mitigation projects was released by FEMA on September 8, 2008, at www.fema.gov/government/grant/hma/mrr-2-08-1.shtm. Grant information is available from several sources.

- www.floridadisaster.org/Mitigation/Hazard
- www.fema.gov/government/grant/hmgrp
- www.fema.gov/government/grant/hma

Examples of local government wildfire risk reduction strategies that have been completed through competitive HMGP funds include the State of Florida's Wildfire Mitigation Plan Annex to the State Hazard Mitigation Plan (2010).

Pre-Disaster Mitigation (PDM) Grant Program, Federal Emergency Management Agency

The PDM grant program is a nationally competitive grant cycle that was created to assist state and local governments, including Indian Tribe governments, with the implementation of cost-effective hazard mitigation activities prior to disasters. The intent of this program is to reduce overall risk to people and property, while also minimizing the cost of disaster recovery. Eligible projects may include hazard mitigation planning projects and the implementation of mitigation projects included on the community's LMS prioritized list. In Fiscal Year 2007, Congress appropriated \$100 million in PDM competitive grants, technical assistance, and program support.

Specific policy guidance for wildfire mitigation projects was released by FEMA on September 8, 2008, at [\[ment/grant/hma/mrr-2-08-1.shtm\]\(http://www.fema.gov/government/grant/hma/mrr-2-08-1.shtm\). Grant information is available from two sources.](http://www.fema.gov/govern-</p>
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- www.floridadisaster.org/Mitigation/PreDisaster
- www.fema.gov/government/grant/pdm

Fire Prevention and Safety (FP&S) Grants, Federal Emergency Management Agency

Fire Prevention and Safety (FP&S) grants are part of the Assistance to Firefighters Grants (AFG) program and are under the purview of FEMA's National Preparedness Directorate. The FP&S grants support projects that enhance the safety of the public and firefighters from fire and related hazards. The primary goal is to target high risk populations and mitigate high incidences of death and injury. In Fiscal Year 2005, Congress reauthorized funding for FP&S and expanded the eligible uses of funds to include Firefighter Safety Research and Development. More information is available at www.firegrantsupport.com/content/html/fps.

Examples of the types of projects supported by FP&S include fire prevention and public safety education campaigns, Firewise programs, CWPP development processes, media campaigns, juvenile fire-setter interventions, and arson prevention and awareness programs. An example of a CWPP process being funded through the FP&S grant program is the Highlands County CWPP.

Fire Management Assistance Grant Program (FMAGP), Federal Emergency Management Agency

The Fire Management Assistance Grant program supports local government efforts to mit-

igate, manage and control fire hazards that could burn publicly or privately owned forests or grassland. This grant provides a 75% federal cost while the state pays the remaining 25%. FEMA lists eligible firefighting costs as expenses for field camps, equipment use, equipment repair/replacement; tools, materials and supplies, and mobilization and demobilization activities. More information is available at www.fema.gov/government/grant/fmagp.

Emergency Management Preparedness Assistance (EMPA) Grant Program, Florida Division of Emergency Management

The Florida EMPA Grant Program makes funds available annually to eligible applicants for one-time projects that will further state and local emergency management objectives (Rule 9G-19, F.A.C.). More information is available at www.floridadisaster.org/grants. There are several categories of eligible projects for EMPA grants.

- Public education efforts on disaster preparedness and recovery issues
- Projects that will enhance coordination of relief efforts of statewide private sector organizations
- Projects that will improve the training and operations capabilities of agencies assigned lead or support responsibilities in the State Comprehensive Emergency Management Plan
- Other projects that will further state and local emergency management objectives that have been designated by the State of Florida as a priority

Examples of past local government wildfire risk reduction strategies that have been com-

Alachua County Comprehensive Plan, Conservation and Open Space Element

GOAL: To conserve, manage and restore or enhance the natural and human-related resources of Alachua County to ensure long-term environmental quality for the future

5.0 HUMAN-RELATED RESOURCES 5.6. WILDFIRE MITIGATION

Objective 5.6: Protect life, property, and the economy by eliminating or minimizing the present and future vulnerability to wildfire hazards.

Policy 5.6.1 Areas of wildfire hazard within Alachua County shall be mapped and ranked using features such as plant community type and development stage, canopy cover, hydrography, soils, slope, aspect, and elevation. The initial mapping shall be based on the Fire Risk Assessment Model contracted by the Florida Division of Forestry for completion in 2002. Mapping shall be reviewed annually and, as necessary, updated in response to changing fuel conditions.

Policy 5.6.2 The County shall educate the public, especially those at high risk from wildfires, and make them aware of proactive steps that they can take to mitigate wildfire damage.

Policy 5.6.3 The County shall advance the directives and policies of local emergency management operational plans and the Alachua County Local Mitigation Strategy.

Policy 5.6.4 The County shall implement a Firewise Medal Community Program that involves community fire preparation, evaluation and awards for program involvement. The County shall seek recognition of this program by the state Firewise Communities Recognition Program.

Policy 5.6.5 Alachua County shall carefully consider all land uses in areas at risk from wildfire and restrict or prohibit certain land uses as necessary to assure public health, safety, and welfare and the protection of property. Land uses and specific development plans for which adequate wildfire mitigation cannot be provided, or that would preclude or severely limit the use of wildfire mitigation or natural resource management options such as prescribed fire, shall not be authorized in severe wildfire hazard areas.

Policy 5.6.6 Development in wildfire hazard areas shall comply with the following minimum standards:

1. All new development shall complete and implement a wildfire mitigation plan specific to that development, subject to review and approval by the Alachua County Fire Rescue Department, which shall be incorporated as part of the development plan approved for that development.

a. The mitigation plan shall include project and parcel design features, such as defensible project perimeters, interior project fuel breaks, individual site defensible space, landscaping guidelines and plant material suggestions, and the placement of structures.

b. The mitigation plan shall include provisions for periodic inspection by the County to verify construction, implementation, and maintenance of the wildfire mitigation features in accordance with the plan. The inspection period may range from once a year to once every three years depending upon the site conditions.

c. The wildfire mitigation plan requirements shall be implemented for the entire life cycle of all developments requiring plans.

2. Structures shall be designed to minimize the potential for loss of life and property from wildfires, through requirements for outdoor sprinkler systems, fire-resistant building materials or treatments, landscaping with appropriate vegetation species, and site design practices.
3. Water storage facilities, accessible by standard fire-fighting equipment, shall be provided, dedicated, or identified for fighting wildfires. Where public supply is available, fire hydrants of sufficient pressure shall be required.
4. Streets, roads, driveways, bridges, culverts, and cul-de-sacs shall be designed to assure access by firefighting equipment, providing for weight class, cornering, turnaround and overhead clearance.

Policy 5.6.7 The County shall pursue available funding for community/volunteer service programs for fuel management on lands owned or managed by Alachua County

Policy 5.6.8 The County shall implement a fuels management program that consists of the following:

1. Practices such as prescribed burning, mechanical fuel management, and thinning, as necessary and appropriate to reduce wildfire hazards consistent with natural resources protection.
2. Increased public awareness of the benefits of prescribed burning and the inevitability of resulting smoke.
3. Acknowledgment by occupants in areas where prescribed burning is appropriate that they have been informed that prescribed burning may be used to manage wildfire hazards and that smoke will be present.
4. Special focus on the wildland-urban interface as an area exposed to wildfire hazard.

Amendments as adopted April 8, 2002

Alachua County Department of Growth Management, Gainesville, FL 32601

Grant Writing Tips for Wildfire Risk Reduction

- Read over every detail in the grant application packet and make sure to strictly follow all formatting guidelines, page limitations, and submission requirements.
- Use the correct terminology and jargon that are commonly exchanged in the emergency management and wildfire communities.
- Make all responses clear, concise, and to the point and in the required format.
- For a higher score, connect your project proposal to an established plan's goals and objectives and also to the goals of the funding program. For example, in the case of a CWPP, connect the project to the Comprehensive Emergency Management Plan and local Comprehensive Plan element that calls for wildfire risk reduction. For specific mitigation projects, connect the projects to the LMS. In some cases (HMGP and PDM), a project will not be funded unless it clearly connects to one or more established plans.
- Look for opportunities for collaboration with other local and state agencies. In some cases (especially FEMA grants) there may be additional grant funds available that are channeled through the DOF.

pleted through competitive grant funds from EMPA include emergency management training and education activities, coordination of Community Emergency Response Teams (CERTs), enhanced communications systems, facilities and infrastructure improvements, wildland firefighting equipment, and other wildfire risk reduction projects. For example, EMPA funds supported the development of Indian River County's 2000 *Comprehensive Wildfire Mitigation Plan* and Okeechobee County's 2002 *Local Countywide Wildfire Mitigation Plan*.

Additional funding and information sources

- Fire Grants Help for Florida includes state, federal, and corporate grants for various fire activities at www.firegrantshelp.com/search-grants/bystate/15
- Firewise Communities includes a summary of potential grant support for Firewise projects at www.firewise.org/usa/grant_funding_sources.htm
- One-time or periodic funding sources are pools of governmental money appropriated for specific purposes. For example, the DOF is preparing ten CWPPs with high-risk counties



In March-May of 2007, the U.S. Department of Homeland Security's Federal Emergency Management Agency (FEMA) authorized five Fire Management Assistance Grants to help Florida fight fires in 16 counties. Here the Florida Bugaboo Fire rages out of control as Florida firefighters wait for a helicopter water drop.

Photo: Mark Wolfe/FEMA

in Florida under funding from the American Recovery and Reinvestment Act of 2009 (ARRA), money which was appropriated to stimulate the economy by providing jobs.

- The DOF provides the majority of the annual budget for the state Wildfire Management Teams. Supplemental assistance is also provided by the USFS through the National Fire Plan. These teams are available to assist with local wildfire risk reduction activities.

chapter

4

REGULATORY APPROACHES TO WILDFIRE RISK REDUCTION



The 1985 fire that burned our Palm Coast home really blindsided us. We didn't know this kind of thing could happen in Florida....I don't want anyone to go through what we went through. In 1999, I participated in writing our first wildfire mitigation ordinance, which required owners of vacant property to mow hazardous underbrush within 30 feet of homes. We have written Comprehensive Plan provisions and are revising our Land Development Code.... You can make your property as Firewise as possible, but if your neighbor isn't doing the same thing and their property is close to your house, that isn't really going to help you.

– Bill Butler, Landscape Architect, City of Palm Coast

THE OPPORTUNITY FOR REGULATORY APPROACHES

In addition to the planning approaches and strategies discussed in Chapter 2, communities may want to pursue regulatory approaches to wildfire risk reduction. Regulatory approaches are especially helpful in high risk areas and where there is public or cultural reluctance to address the wildfire hazard. Regulations may naturally follow from the Comprehensive Plan, Local Mitigation Strategy (LMS), or Community Wildfire Protection Plan (CWPP) process or they may be undertaken as a stand-alone approach in communities vulnerable to wildfire damage.

This chapter identifies processes and regulatory language that can be adopted by local governments to address the wildfire hazard, following upon the planning information in Chapter 3. This chapter discusses a number of regulatory approaches and reviews the balance that must be sought between wildfire risk reduction activities and other local ordinances and regulations. Included here are some exam-

ples of local Florida wildfire risk reduction regulations as well as examples from the western U.S.

Local governments and homeowners associations (HOA) have many wildfire risk reduction options to choose from for the building blocks of local ordinances or covenants. For example, communities might consider including recommendations on development design and review (Chapter 5), landscaping (Chapter 7), and building construction (Chapter 6). This

Regulations Protect Health and Safety, Raise Awareness

Regulations are useful to carry out the goals of a major planning effort (e.g., a Comprehensive Plan) or to compel favorable behaviors where there is significant risk to citizen health, safety, and welfare. The process of developing regulations raises community awareness of the need for wildfire risk reduction.

chapter discusses a number of durable local government regulatory mechanisms for accomplishing wildfire risk reduction. In addition, model neighborhood covenants, a model vegetation management ordinance, a model wildfire mitigation ordinance, and the text from an actual draft wildfire mitigation ordinance are appended at the end of this manual. These models may be modified and adopted by local jurisdictions to provide standards for existing and new neighborhoods and developments in wildfire-prone areas.

Benefits and Costs of a Regulatory Approach

There are many advantages to regulatory approaches to wildfire risk reduction. Regulations can carry out the goals of and be consistent with major local planning efforts such as the Comprehensive Plan or a CWPP. Regulations can potentially reduce wildfire risk in new developments in wildfire-prone areas by providing methods to protect houses from neighboring high risk areas. The benefits of wildfire risk reduction to public health, safety, and welfare are potentially large in high risk areas.

Wildfire risk reduction regulations can be very flexible and responsive to local needs. For example, local regulations can be sensitive to seasons and conditions (e.g., going into effect during local drought or heat conditions). Regulations, codes, and zoning districts that are locally designed will be more fair and responsive to local needs and conditions. Local regulations can be easily justified based on factual information derived from community risk assessments, GIS maps of wildfire risk data (such as the Florida Wildfire Risk

Assessment discussed in Chapter 1), and other information sources. Costs for regulatory approaches can be minimized if the ordinance or code being adopted is fit into an existing governmental structure.

The major costs involved in new regulation are for government oversight, review, or enforcement activities. Regulations may also be viewed as unnecessarily restrictive by homeowners or developers. New wildfire risk reduction regulations may incur additional costs to developers, builders, and landscapers, but those costs often can be passed on to consumers. While these costs may not be acceptable to consumers in some cases, there may be a marketing advantage for Firewise homes in high risk areas.

A challenge with any wildfire risk reduction regulation is maintenance and enforcement over time. There is no guarantee that newer residents will maintain the risk reduction standards unless these provisions are included in deed restrictions or required in an HOA plan for management of common areas. Community greenspace sometimes is not managed or maintained after final development approval as residents tend to view greenspace as untouchable or self-maintaining. The type of maintenance needed in community greenspace should be spelled out in the development order or in the covenants and restrictions of the subdivision. See Chapter 4 for information on Firewise greenspace management.

Finally, most regulatory approaches are not retroactive. Alternative approaches, such as incentives for Firewise retrofits or fuel management approaches, may be more realistic for developments and single-family houses that already exist in high-wildfire-risk areas.



When regulations are in place, assessment teams can make sure that property owners participate in reducing wildfire risk. Photo: Cotton Randall, University of Florida

Designing Local Wildfire Risk Reduction Regulations

A wildfire risk reduction ordinance is a regulatory measure that can develop from the framework of a planning process such as the Comprehensive Plan required in Florida's local jurisdictions. Statutory authority guides the planning process, which then leads to creation of necessary regulations at the local level. Local regulations are usually developed by city or county staff or by consultants and then pass through a series of public hearings for citizen comment and input.

As a local regulation is being designed and considered, local governments should be asking themselves typical questions that are asked before any new regulation is promulgated.

- Is this regulation realistic?
- How can the desired behavior be encouraged with incentives?
- Are the punitive measures enforceable?
- How can this measure be administered in a cost-effective manner?

Homeowners Should Be Prepared to Follow Rules

In one recent wildfire study, 69% of respondents agreed that people choosing to live near rangelands and forests should be prepared to accept the inherent risk. In fact, only 11% of respondents disagreed with this statement. By a nearly 7 to 1 ratio, this suggests a buyer-beware attitude on the part of the general public.

Respondents also agreed by a 4 to 1 margin that, where wildfire is common, homeowners should follow government guidelines to manage for wildfire risk (Bowker et al. 2005).

- How can the public best be engaged in the process of developing helpful regulations?

The intent of most wildfire risk reduction regulations is to set criteria to be met in high-risk areas. Identifying and delineating areas that are at risk from wildfire is often the first step in any regulatory action. Ensuring that Florida Division of Forestry (DOF) and local fire protection services are involved in ordinance creation and are included on development review boards is another important feature of successful regulations. These wildfire professionals bring an expert perspective to the wildfire implications of land development in a given area.

Timing of regulation is also important. Regulations can be adopted all at once or through a phased approach to wildfire risk reduction. The main goal is for high-risk communities to begin taking concrete steps toward wildfire risk reduction and to develop local

Some Features of Wildfire Mitigation Regulations

- Public involvement in designing helpful and practical regulations
- Treatment measures that are carefully selected to be specific to the local area covered by the regulation
- Clear standards for delineating high risk wildfire zones
- Clear criteria to be met in high risk zones, especially in guidelines for landscaping, building construction, vegetation management, infrastructure design, and firefighting water supply
- A plan and procedures for long-term maintenance
- Involvement of local fire protection services and DOF representatives on wildfire mitigation review boards
- Initiation of fees to fund fuel management programs, if necessary

ordinances or covenants that are meaningful and useful in promoting public safety and wildfire risk reduction objectives.

A number of local Florida governments have integrated wildfire risk reduction requirements into existing Land Development Regulations (LDRs) or in additional regulations. These communities have carefully chosen which requirements are necessary for their regulations. Florida wildfire risk reduction ordinances typically focus on fuel management (reduction of fuels), wildfire-resistant building materials, and development standards as well as requiring a minimum of two access routes into proposed developments in high risk areas. Wildfire risk reduction regulations typically reference standards set by the National Fire Protection Association (NFPA), particularly NFPA 1144 *Standard for Reducing Structure Ignition Hazards from Wildland Fire*, NFPA 1141 *Standard for Fire Protection Infrastructure for Land Development in Suburban and Rural Areas*, and others. Case studies of these regulations are

placed throughout this chapter and a set of model regulations is appended at the end of this manual.

REGULATORY STRATEGIES FOR WILDFIRE RISK REDUCTION

Types of Wildfire Risk Reduction Regulations

The development of local wildfire risk reduction regulations is a process of selecting from a variety of options. There are a number of regulatory strategies and methods that can be employed, and an assortment of behaviors or materials that can be regulated. While all regulations attempt to be responsive to local conditions and needs and provide for protection of public health and safety, different communities will have reasons for choosing the type of regulations that they employ. Each county or

municipality should choose the things that are most important in their given situation. For example, one county might choose to incorporate wildfire risk reduction guidelines in their existing Land Development Regulations (LDRs), while another community might use zoning regulations or an overlay district to carry out a wildfire risk reduction policy. The table provides a summary of the features of common regulatory and voluntary wildfire risk reduction mechanisms, which are further described in the text that follows.

Land Development Regulations and Development Review

Land Development Regulations (LDRs)

Land Development Regulations (LDRs, sometimes called Uniform Land Development Codes or ULDCs) are local regulations that implement the objectives and policies laid out in the local Comprehensive Plan as discussed in Chapter 3. LDRs give the force of law to the vision set forth in the Comprehensive Plan and provide for orderly development and the protection of the health, safety, and general welfare of citizens. LDRs typically include provisions for subdivision and development review processes and may also include zoning and other local development regulations.

LDRs must be consistent with and function to implement the Comprehensive Plan. If a Comprehensive Plan includes provisions for wildfire risk reduction, then the LDRs for that area should include wildfire risk reduction rules to implement the Comprehensive Plan. In addition to this information, a model wildfire mitigation development regulation is appended at the end of this manual.

Comparison of Regulatory Approaches to Wildfire Risk Reduction

Type of Regulatory Approach	LDRs and Development Review	Zoning or Special Overlay District (may be part of LDRs)	Vegetation Management Ordinances	Neighborhood Covenants or Deed Restrictions	Community Protection Zone (may be part of a mitigation plan)	Building Codes or Standards
Typical Requirements						
Limited development in high-wildfire-risk areas.	✓	✓				
Development design criteria	✓					✓
Local fire department or DOF review process	✓		✓		✓	
Landscaping standards (Defensible Space, maintenance)	✓		✓	✓		✓
Building construction standards						✓
Fuel management zones around developments	✓				✓	
Education, collaboration, and other social approaches	✓	✓	✓	✓		
Advantages						
Can be built into or work with existing regulations	✓	✓	✓	✓	✓	✓
Can reference NFPA standards	✓		✓	✓		✓
High-risk areas are scientifically determined and mapped	✓	✓	✓		✓	
Additional development requirements can be identified and required	✓	✓				✓
Voluntary and cooperative				✓	✓	
May prevent wildfire from ever reaching neighborhood	✓	✓	✓		✓	
Disadvantages						
May incur additional government review and/or action	✓	✓	✓			✓
May incur additional government costs for review, enforcement	✓	✓	✓			✓
May incur additional government costs for fuel management			✓		✓	
Regulations may be viewed as onerous by developers	✓	✓		✓		✓
Regulations may be viewed as onerous by homeowners, businesses		✓		✓		✓
Enforcement may be difficult				✓		

Typical Wildfire Mitigation Provisions for Inclusion in LDRs

- Restrictions on development in wildfire-prone areas
- Requirements that development in wildfire-prone areas entail a wildfire risk assessment and Wildfire Mitigation Plan
- Requirements that development in wildfire-prone areas meet certain design criteria, such as clustering
- Requirements for Community Protection Zones around developments in high risk areas
- Requirements that development in wildfire-prone areas meet landscaping and/or building construction standards
- Requirements for additional wildfire protection measures that correspond to the level of risk as identified by the wildfire risk assessment
- Requirements that a fire services representative (local fire department and/or DOF) participate in the risk assessment and development review
- Requirements for long-term maintenance, monitoring, and inspection of vegetation management and infrastructure maintenance activities

Case Study: Alachua County LDRs, Article 19: Wildfire Mitigation

The Alachua County LDRs, which are appended at the end of this manual, demonstrate one approach to the risks to life and property from wildland fire. The goal of the regulations is to form an alliance between property owners and fire services that will minimize the necessity for structural protection from wildfire. The Alachua County LDRs have a number of requirements to protect property owners from wildfire risk.

- All new development in wildland-urban interface and intermix areas of the county must prepare and have approved a Wildfire Mitigation Plan.
- Zoning is modified according to wildfire risk. Development in “high risk” areas would be required to meet more stringent site, structural, landscaping, access, water supply, and lifetime maintenance requirements. High risk areas are technologically defined (see Chapter 1 for a discussion of wildfire risk assessment techniques).
- A fuel management program is implemented for all properties owned and/or managed by the county. Fuel management services would also be extended to private properties by contract.
- A countywide public education and information program is implemented to promote the benefits of prescribed fire as a land management tool; to promote the concepts of Firewise site, structure, and landscape design; to introduce wildfire and prescribed fire programs in the schools; to promote “prescribed fire awareness week” and “wildfire awareness week” each year; and to organize Firewise Communities workshops in the county.

The process to develop the LDRs began with the introduction of new language into the Alachua County Comprehensive Plan: Conservation and Open Space Element: Policy 5.6 Wildfire Mitigation (see Chapter 3). After the Comprehensive Plan element was adopted in 2005, fire staff began development of the LDRs, which were completed in February 2009, and have begun the public hearing process. Meanwhile, the wildfire mitigation review process for new developments in Alachua County is being enforced as a provision of the Comprehensive Plan. Firewise Communities workshops and educational programs have been sponsored in the county to raise awareness of the importance of wildfire risk reduction. (Complete LDR language appears in Appendix 2, page 140.)

Development Review

Development review is a step in the local development or subdivision process where local planning authorities review the landowner's or developer's site plan proposal, which shows the location of buildings, septic systems, roads, lots, public areas, easements, utilities, etc. Through the development review process, local planners ensure regulatory compliance. Development review usually involves a local development review board made up of development and building experts, planners, and fire protection professionals. Citizens are involved through the public hearing process.

During development review, the board and planners may potentially negotiate for infrastructure improvements, dedications for schools and parks, use restrictions, and performance guarantees. There are statutory and constitutional limitations on what or how much a local government may require, but it is not uncommon for local governments to require

Wildfire Review Opportunity

Development review is an opportune time for local authorities to require wildfire risk reduction plans and actions for developments in high or extreme risk areas.

special actions at the time of development review. Required risk reduction and management planning actions may include wildfire risk reduction, storm and flood planning, visual aesthetics, protection of wildlife habitat and groundwater, surface water storage areas, and measures to address other hazards and environmental concerns.

Development review is the opportune time for local authorities to require wildfire risk reduction plans and actions for developments in high or extreme risk areas. It is also the point where Comprehensive Plan policies in the form of LDRs directed at wildfire risk

reduction are applied. For example, a developer may be required to write and implement a Wildfire Mitigation Plan that reduces wildfire risk prior to development (see Chapter 5). As a part of the plan, the local authority or review board may also require a long-term vegetation management, monitoring, and inspection plan for greenspace in and around a development as is sometimes done with storm water management systems.

Zoning Regulations and Special Overlay Districts

Zoning

Zoning is the way in which governments regulate the physical development of land and the specific uses to which property may be put. A zoning map adds specificity to the more generalized FLUE and FLUM of the Comprehensive Plan. The FLUE and FLUM show the general areas in which residential, industrial, recreational, or commercial activities may take place. Based on the FLUE/FLUM, zoning regulations specify the character and types of uses allowed within each land use category. There may be one or several specific zoning districts within each land use category. In some local jurisdictions, zoning is now becoming included as a part of unified LDRs.

Zoning is a locally controlled activity. Though the existence of zoning is fairly universal, the classifications used to describe zoning are not necessarily the same from one jurisdiction to the next. The zoning classification on a particular piece of land is changed or updated through an application process for rezoning or through exceptions granted as variances.

Case Study:

Collier County Rural Fringe, Wildfire Mitigation and Prevention Planning

In 2004, Collier County adopted language into its Comprehensive Plan and Land Development Code to require a Wildfire Prevention and Mitigation Plan (WPMP) for all new developments in lands zoned as Rural Fringe, which is equivalent to wildland-urban interface. Each WPMP must, at a minimum, address project structural design, use of materials and location of structures to reduce wildfire risk, firebreaks and buffers, water features, and the impacts of prescribed burning on adjacent or nearby lands. The WPMP must be developed cooperatively with the DOF, Collier County Emergency Management, and managers of nearby or adjacent conservation lands.

The code is tied in with the County's Transfer of Development Rights provision, which encourages the conservation of important environmental lands by transferring development rights to "Receiving Lands" that are in low-risk areas or that comply with the WPMP requirements.

Typical Zoning Regulations

- Describe uses that can be made of land and buildings
- Control density and intensity of development
- Set dimensional requirements for lots and buildings
- Limit activities, such as types of businesses or other uses
- Guide extraction of natural resources from land within zoned areas
- Designate areas for hospitals, parks, schools, and open space
- Recognize places of historical significance
- Provide for variances and uses by special exception

Wildfire concerns may be addressed through the zoning process with mapping and zoning of high-wildfire-risk areas. Local governments may then require wildfire risk reduction activities in order for a development or subdivision to be approved in the high risk areas. In some cases, zoning regulations are varied through a “planned development” process, which offers greater flexibility and creativity in land use and may also include wildfire risk reduction requirements.

Special Overlay Districts

Special Overlay Districts, also called “floating zones,” are mapped areas with additional requirements beyond those of the underlying zoning district. An overlay district is typically applied when there is a special public interest

The [Palm Coast] ordinance was the most controversial aspect of the new approach to wildfire preparedness... If the lot owner does not cooperate, the city will clear the underbrush and charge the owner the cost plus a fine. If no payment is made, the city will place a lien on the property that must be paid before the lot can be sold or improved. This ordinance was the result of many years of discussion and debate. As observed by one Palm Coast resident, “There was a concern about property rights. No one was against it, but there was resistance as they thought that their traditional civil rights were threatened.”

—Pamela J. Jakes, *Improving Wildfire Preparedness*, 2007

in an area that is not served by existing zoning. It is most useful if the overlay district is limited to one or several large areas rather than small areas scattered throughout a community.

Because the special feature – such as wildfire risk – mapped by the overlay district may physically overlap several different zoning categories, it is sometimes easier to set up an overlay district than to rewrite multiple zoning categories. Generally, the underlying zoning determines the specific land use, while the overlay district makes additional requirements for building design, setbacks, or other features or activities such as wildfire risk reduction actions.

Overlay districts are enacted through a purposeful ordinance and are best used to focus on a special land use topic or issue, which makes them suited to the wildfire hazard in many communities. Overlay districts are not arbitrary; they are designed to be based on factual evidence, such as a wildfire risk assessment as discussed in Chapter 1. The model ordinance appended to this manual includes an example of

implementation of a special overlay district strategy.

Vegetation Management Ordinances

Vegetation management ordinances may be enacted as part of a local government’s LDRs or as stand-alone ordinances in the local code. Some Florida communities encourage the management of vegetative fuels in home landscaping. For example, some local Florida communities have regulatory provisions aimed at the removal of weeds, brush, and debris for health, safety, and aesthetic reasons. Pasco County requires the removal of “grass, weeds, brush, or undergrowth exceeding 12 inches in height, debris or any noxious material of any kind that...tends to create a fire hazard endangering the lives and property of the citizens of the county” [Pasco County Code 42-1(a)]. The City of Palm Coast now requires vegetation management on undeveloped lots scattered among houses in the extreme risk subdivision. A model vegetation management ordinance is appended to this manual for reference of local governments.

Case Study:**Flagler County Ordinance 98-14 and City of Palm Coast Wildfire Hazard Reduction Ordinance 2001-11**

In 1998, Flagler County passed Ordinance 98-14, which was designed to mitigate the effects of wildfire within the unincorporated community of Palm Coast. The ordinance calls for clearing flammable vegetation on vacant lots adjacent to those that are developed in order to create a 30-foot Defensible Space around structures. The ordinance was developed as a direct response to the spring and summer wildfires of 1998 that ravaged Palm Coast.

After the community became incorporated, a nearly identical ordinance was adopted as the City of Palm Coast Wildfire Hazard Reduction Ordinance 2001-11. If property owners do not comply, the City of Palm Coast can put a lien on the property to enforce the ordinance. To date there have been no major wildfire threats to test the effectiveness of this measure.

The ordinance has created new opportunities for landscape maintenance companies, several of which have added bush-hog type equipment to take advantage of the work of clearing thick vegetation on undeveloped lots. In addition, two Firewise Communities – Cypress Knoll and Grand Haven – have been created in Flagler County in response to the growing awareness of the high level of wildfire risk in the area.



A house lost in the 1998 Florida wildfires.

Photo: FDOF

Neighborhood Covenants or Deed Restrictions

Neighborhood covenants or deed restrictions are a legal attachment to each deed in a group of houses or lots that are part of a specific development or subdivision. Deed restrictions are not a government regulation per se, but they are a regulatory mechanism, being recorded in the public record and with provisions for noncompliance. Covenants usually are put in place by the original developer. The developer or seller of a house is required to provide the covenants to the buyer before a contract is made.

Covenants give a development a more standard appearance, control some of the

activities that take place within its boundaries, and generally protect property values. Covenants nearly always specify the minimum size residence allowed, how many houses may be built on one lot, and what type of construction the houses must follow. Covenants also may address other topics, such as setbacks from streets and lot lines, utility and access easements, fees for road maintenance or community amenities, rules about pets and other animals, rules about in-home businesses and rentals, rules limiting tree cutting, rules about fencing, rules to reduce clutter and vehicles on lots, and rules governing the changing or voiding of the covenants. Covenants that address wildfire risk may include requirements for creation of Defensible Space, notification of pre-

scribed burns, homeowner education, and other wildfire risk reduction activities.

Over time, the covenants typically are managed, monitored, and amended by the HOA. The major drawbacks are that covenants sometimes are not enforced by the HOA and that penalties for noncompliance usually are minor. The enforcement issue can be overcome by including third party oversight and enforcement by design. With enforcement mechanisms, covenants offer an excellent vehicle for protecting neighborhoods and encouraging residents of a high risk subdivision or development to create and maintain Defensible Space. Model neighborhood covenants are appended at the end of this manual for adaptation by developers or HOAs.

REGULATORY APPROACHES TO WILDFIRE RISK REDUCTION

Building Codes and Building Permit Requirements

Building Codes

The purpose of building codes is to regulate new construction and renovation by establishing minimum requirements for building systems to safeguard public health, safety, and general welfare. Building codes address all aspects of building construction from fire protection and structural strength to plumbing, electrical, and other systems. Building code standards for wildfire risk reduction (such as NFPA standards) may be adopted into local

building code requirements. Building codes and building construction for wildfire risk reduction are discussed in Chapter 6. Building requirements are also addressed in the Model Wildfire Mitigation Ordinance appended to this manual.

Building Permits

Prior to the issuance of a building permit, local governments verify that the parcel is zoned for the proposed use. If there were a regulation that required wildfire risk reduction prior to construction in certain high risk areas, it should be noticed at this time. Language in

the final development plan or plat would remind code officials and the developer, builder, or landscaper to assess whether the development is in a high risk zone and to comply with wildfire risk reduction requirements set forth in the local government's LDRs or other ordinances.

COMPATIBILITY WITH OTHER STANDARDS

Local governments, developers, or neighborhood groups should do legal research to ensure

Case Study:

Typical Language for Neighborhood Covenants and Restrictions, Alachua County, Florida

These sections fall under the General Provisions of the Articles of Incorporation or Declaration document of the Homeowners Association, which also includes measures for enforcement of provisions. This covenant language was developed pursuant to wildfire mitigation provisions in Alachua County's Comprehensive Plan.

Wildfire Prevention. In accordance with the Alachua County Comprehensive Plan, Conservation and Open Space Element, Policy 5.6, the subdivision will incorporate defensible project perimeters and interior fuel breaks as part of its wildfire management plan. In areas where the perimeter of

the site abuts significant amounts of natural vegetation, the following techniques will be used.

- Selective thinning of fire-prone plant species to reduce fuel loads. A list of fire-prone species, as issued by the Environmental Protection Department, will be kept on record with the homeowners association.
- Removal of excessive forest litter (manual, mechanical, or prescribed burning).
- Interior areas of the site will use driveways, side-walks, and defensible space to provide fire-breaks between large areas of dense vegetation.

Firewise Landscaping. Landscape or planting plans within wildfire hazard areas shall incorporate Firewise landscaping techniques to help reduce the risk of wildfire. Such techniques shall include the following.

- Creating a defensible space zone around buildings. Such zones shall provide space for fire suppression equipment in the event of an emergen-

cy and progressively limit plantings near structures to carefully spaced, fire-resistant species.

- Placing low-growing species and groundcovers beneath canopy trees and rooflines to avoid creating a continuous fuel source from ground to tree or roof.
- Using driveways, lawn areas, and walkways to provide firebreaks between large areas of dense vegetation.
- Selective thinning of fire-prone plant species in existing vegetation areas to reduce fuel loads. A list of fire-prone species shall be available from the Environmental Protection Department.

Defensible Space. All structures subsequently built on this site that will have exposure to wild-land fuel – such as structures built adjacent to vegetated open spaces areas, stormwater basins, and habitat conservation areas – shall have at least thirty feet of defensible space surrounding them so as to minimize the vulnerability of these

that proposed ordinances or covenants do not conflict with existing tree protection, burning, or dumping regulations. Many potential hazards are already covered under existing Florida law, while others may be unenforceable and unduly restrictive items to include in regulations designed to encourage wildfire risk reduction. The goal is to develop local ordinances or covenants that are meaningful to local citizens and useful in promoting public safety and wildfire risk reduction.

Burning and Dumping Regulations

Some local jurisdictions have regulated sources of ignition in order to prevent wildfires. For example, some jurisdictions have restricted outdoor burning and dumping of waste materials, ashes, and coals. Some jurisdictions choose to restrict smoking and the use of fireworks as potential ignition sources.

In addition, Florida has regulations governing open burning. A DOF authorization (permit) is required for all agricultural, silvicultural, land clearing, pile, and acreage burning in Florida. No authorization is required to



Homeowners should check for local bans before burning yard waste. A better method of disposal is to compost yard waste. Photo: Kentucky DOF

structures to wildfire. Defensible space is defined as a “clean” zone where fuels have been cleared, reduced, or changed so as to act as a barrier between wildfire and the structure. These areas can be landscaped with trees and shrubs as long as the appropriate less-fire-prone plant material is used, placed, and maintained so as to not provide a means that would carry fire to a structure (discontinuous horizontal and vertical fuel arrangement). Defensible space shall be created so as to provide a measure of passive fire protection for these structures. This area of passive protection created around a structure should limit the movement of fire to a structure or reduce the intensity of any fire that did move to a structure so that the likelihood of exterior structural ignition is minimized or eliminated.

Use of Prescribed Fire. Periodic prescribed burning is a recognized land management tool and a recommended method of fuel management in this area for minimizing wildfire hazards. Prescribed

burning may result in the periodic occurrence of temporary smoke and ash. All prescribed burning management plans shall be in compliance with the Common Open Space Management Plan as well as Alachua County Comprehensive Plan Policy 5.6. Additionally, all prescribed burning management plans shall be in compliance with Florida Statutes Chapter 590 Forest Protection and Florida Administrative Code Chapter 51-2 Open Burning.

Emergency Access. Emergency access will be provided to the site and will meet all of the provisions of Section 407.75 of the LDR and specifically the following criteria.

- It shall be available prior to the issuance of the first certificate of occupancy in the subdivision.
- It shall have a clear zone of 20 horizontal feet (area) and 14 vertical feet (area).
- It shall be stabilized to a limerock bearing ratio of 35.

Maintenance of Fire Protection Facilities. The homeowners’ association will be responsible for the maintenance of the onsite fire protection assistance infrastructure improvements and constructed as part of the subdivision infrastructure. The facilities include a well to withdraw groundwater to fill a water storage facility, a water storage facility, and a fire department apparatus connection (FDC) structure. The well and associated pumps/pressure system must be maintained in full operational condition. The water storage facility should be inspected annually for operation and function. The FDC should be maintained fully operational and clear of obstructions.

Compliance Inspections. The site will be inspected for compliance with the wildfire mitigation strategy once per year during the construction of the subdivision, and once every three years thereafter. The homeowners association will be responsible for ensuring that inspections occur on schedule.

Summary of Florida Outdoor Burning Regulations

- It is illegal to burn household garbage including paper products, treated lumber, plastics, rubber materials, tires, pesticide containers, paint containers, or aerosol containers.
- A DOF authorization (permit) is required for all agricultural, silvicultural, land clearing, pile, and acreage burning in Florida.
- Yard waste or silvicultural debris piles greater than 8 feet in diameter will require a DOF authorization, suppression equipment on hand, and additional setback requirements.
- Yard waste is vegetative debris such as grass clippings, brush, leaves, tree limbs, palm fronds, etc., that are a result of yard maintenance. Yard waste may be burned in Florida under the following conditions.
 - There currently are no local restrictions on burning
 - The waste was generated on the property
 - The waste fits in an 8-foot diameter pile or noncombustible container
 - The waste meets setbacks of 25 feet from forests, 25 feet from the house on the property, 50 feet from paved public roads, and 150 feet from other occupied buildings
 - The fire is ignited after 9am Eastern Time (8am Central Time) and extinguished one hour before sunset
 - The smoke is not a hazard or nuisance
 - For piles, an area around the pile is cleared down to bare soil to prevent fire spread
 - For containers, a wire mesh screen is installed over the container to prevent sparks from flying out and starting new fires

burn yard wastes as long as the burner meets the required setbacks and there are no local, city, or county ordinances in place that prohibit burning. Burning of garbage is strictly prohibited in Florida.

Any person hoping to burn anything in Florida should check with local (city and county) officials to find out if there are any restrictions, and should seek an authorization from their DOF Field Unit for a large-pile, agricultural, or silvicultural burn. See Chapter 8 for a map of the local DOF Field Units.

Tree and Vegetation Protection Ordinances

With an eye toward protection of the state's lush tree canopy, tree protection ordinances are an almost universal component of modern local land use regulation in Florida. Tree protection ordinances are generally aimed at preserving larger canopy trees, while wildfire risk reduction activities typically focus on the reduction of surface vegetation and shrubs. Nevertheless, it is important to ensure that landscaping

Tree Protection Pays

Tree protection is particularly important in light of the direct benefits that trees provide in wildland-urban interface areas. For example, recent research demonstrates that shade trees reduce utility bills in Florida (Jensen 2002). Another study finds that trees provide benefits at least twice their management costs in reduced energy use, cooler summer temperatures, reduced air pollution, improved water quality, reduced storm water runoff, enhanced wildlife habitat, and greatly enhanced human health and quality of life.

(*Georgia Forestry Magazine* 2001)

modifications for wildfire risk reduction do not conflict with existing tree protection ordinances.

There are several potential points of contradiction between tree protection and wildfire risk reduction activities.

- Mechanical fuel management approaches may damage tree roots
- Thinning of trees to reduce wildfire risk will result in loss of tree canopy
- Wildfire risk reduction may affect values in protected natural communities (although the

use of prescribed fire to manage fuels will generally enhance ecological values)

- Tree ordinances may protect a tree canopy that is too thick in a high risk wildfire area
- Some community ordinances that protect natural vegetation or “natural forest communities” (e.g., Broward County Ordinance 27-411) may inadvertently prevent wildfire risk reduction activities (although the use of prescribed fire to manage fuels will generally enhance ecological values)

In some cases, thinning of trees may be necessary to accomplish wildfire risk reduction objectives – especially in the case of thickly planted pine trees. Tree thinning on development sites may require a permission or exception if there is an applicable tree protection ordinance.

Tree removal and vegetation management for wildfire risk reduction should always be coordinated by local government staff during the development review process so that conflicts with tree removal ordinances are avoided. When establishing wildfire risk reduction standards in high or extreme risk areas, local officials should evaluate any potential conflicts and discuss proposed risk reduction practices with wildfire and forestry experts. The local officials responsible for implementing tree protection ordinances should recognize the value of fuel management in protecting both houses and forests from extreme wildfire events. See Chapter 8 for further discussion of prescribed burning and other fuel management options.

What’s Happening in Other States: Approaches from the Western United States

Local communities considering regulatory options may be able to learn lessons from other communities that have implemented wildfire risk reduction regulations. Here are several examples of regulatory approaches to wildfire risk reduction from high-risk areas of the western U.S.

Santa Fe County, New Mexico – Urban Wildland Interface Code, Ordinance 2001-11

This ordinance deals with onsite fuel reduction/modification and fire-resistant building practices and materials in defined risk zones. The ordinance supplements the building and fire codes of Santa Fe County to mitigate the threat to life and property from the intrusion of wildland fire exposures, fire exposures from adjacent structures, and prevention of structure fires from spreading to wildland fuels. Vegetation management and Defensible Space regulations are voluntary, and the county works with individual communities toward education and compliance. It addresses structural renovations and additions with threshold square footage that triggers compliance with the new code.

Central Yavapai Fire District, Arizona – Fuel Management Requirements for New Developments

Central Yavapai’s 2001 amendment to the Fire District Standards is designed to assist in control-

ling the accumulation of hazardous fuels around structures and along roadways in new developments. The rule addresses the clearance of brush and vegetative growth from structures and roads and requires developers to carry out fuel management and to establish subdivision covenants requiring the creation and maintenance of Defensible Space by property owners. The Fire Chief is responsible for enforcement and may issue citations for violations.

Eagle County, Colorado – Requirements for Vegetation Management and Defensible Space

Eagle County adopted wildfire regulations in 2003. New homes or remodels, and new subdivisions and Planned Unit Developments (PUDs) in an area rated as moderate, high, or extreme wildfire risk in unincorporated Eagle County must have a Vegetation Management Plan. Vegetation Management Plans must be prepared by a natural resource professional with expertise in the field. The plan must include a site-specific wildfire analysis, a vegetation inventory, map of vegetation, and wildfire mitigation activities. All applications and plans are referred to the Colorado State Forest Service (CSFS) for review. The amended Building Code regulations establish minimum design and construction standards within the wildland-urban interface area. Defensible Space is required when a site is determined to be at moderate, high, or extreme wildfire risk.

Case Study:**Santa Barbara's
Wildland Fire
Suppression Benefit
Assessment District**

The Santa Barbara, California, Wildland Fire Suppression Benefit Assessment District (WFSBAD) is funded by self-imposed fees on 4,000 residents of the high wildfire risk foothills zone above the city. The taxing district was originally approved in 2006 and was unanimously renewed in 2010 by the city council. Half of the program's money (about \$200,000) comes from the general fund and another \$221,000 comes from district fees.

- Families in the lower foothills pay about \$70 annually, while homeowners higher in the hills – what is called the “extreme foothill zone” – pay closer to \$90 per year. For the fee, the City of Santa Barbara Fire Department provides a range of fire protection, prevention, and educational services. The services that are provided for the benefit of properties within the district are vegetation road clearance, defensible space chipping, vegetation management, and defensible space inspection and assistance. Results of the effort were summarized as of March 2010.
- The vegetation road clearance effort has improved over 50 miles of response and evacuation routes in the high fire hazard areas with the removal of 1070 cubic yards (300 tons) of flammable vegetation, 97% of which was chipped and distributed back onto public and private lands.
- The defensible space chipping service removed an additional 3128 cubic yards (800

tons) of flammable vegetation, with 100% of material being chipped and distributed back to the homeowners.

- The vegetation management effort was aimed at creating community protection areas in the extreme foothill zone, treating over 70 acres of land with a combination of fire hand crews, browsing goats, and privately contracted brush crews. Vegetation has been managed in open areas affected by wildfires in the past, such as the land near Westmont College that was burned by the 2008 Tea and Jesusita Fires. The nearby St. Mary's Seminary survived both fires when brush clearance around the seminary had been done just a few weeks prior.
- The voluntary defensible space inspection and assistance effort has provided valuable information and assistance directly to over 250 homeowners, with fire crews performing inspections on a weekly basis.

More information: www.santabarbaraca.gov/Resident/Safety/WFSBAD

Program weblog: <http://wfsbad.blogspot.com>



Photos: City of Santa Barbara

chapter

5

COMMUNITY DESIGN TO REDUCE WILDFIRE RISK



The wildland-urban interface will not be going away. Its roots are not a fire problem at all. The interface is a result of urban sprawl, changing lifestyles, decentralized e-business, population growth, and other non-fire-specific conditions.

— Jim Smalley, Firewise Communities

REDUCING WILDFIRE RISK FOR FLORIDA COMMUNITIES

Florida's natural lands offer many amenities to residents, including fresh air and water, abundant wildlife, and beautiful surroundings for houses and neighborhoods. Because wildfire is inevitable in Florida and development frequently is adjacent to natural areas, it is important to design communities with wildfire in mind. With some advance planning, planners, builders, developers, architects, and homeowners can play a significant role in reducing the potential for wildfire to impact Florida communities. Whether a neighborhood is in the development phase or is already in existence, there are steps that can be taken to reduce and even minimize risk. This chapter will outline some of the important steps communities can take to reduce wildfire risk.

Many factors affect how vulnerable a community is to wildfire. Post-fire studies have identified some of these factors that increase wildfire risk in Florida developments. For example, analyses of the Palm Coast wildfire of 1985, in which 99 houses were destroyed in one day, identify major risk factors that existed there.

- Vinyl or fiberglass soffits and soffit vents
- Flammable vegetation around the house

- Undeveloped lots interspersed in a subdivision

Factors that reduced risk of structural damage included concrete block or other non-combustible building construction and cleared vegetation in the direction of wildfire approach. (Abt et al.1987)

Despite knowledge of these factors, little action was taken to reduce risk after the 1985 Palm Coast wildfire. As a result, the wildfires of 1998 burned or damaged 370 houses and businesses, many of which were in the same Palm Coast subdivision that burned in 1985. Wildfires again threatened the area in 2004-2005.

While the occurrence of an extreme wildfire on unmanaged neighboring property may be beyond the influence of a site owner, the other factors can be addressed through development design and, in many cases, by simple homeowner actions. Many of the structures that survived wildfires in Palm Coast benefited from developers and homeowners who took responsibility to reduce wildfire risk.

The analysis and the on-the-ground evidence support the use of Firewise recommendations in all stages of development design for houses, landscapes, greenspace, storm water features, utilities, and infrastructure. This chapter will describe the basic steps involved in



Golden Gate Estates in Collier County, Florida is an example of intermix development where it is very difficult to protect homes from wildfire in thickly vegetated undeveloped lots. To reduce risk, a community protection zone has been carved around the community, visible as a cleared line in this photograph.

Photo: DOF

designing a Firewise development in Florida. See Chapters 6 and 7 to learn more about Firewise building and landscaping practices.

Designing a Florida Firewise Development

There is a series of basic steps for creating Firewise developments and neighborhoods in Florida.

1. Assess Wildfire Risk:

Identify the area to be evaluated. Is the development being built in a high risk area? What is the level of wildfire risk? To answer these questions, review the Risk Assessment Decision Tree in Chapter 1 and look at two major factors on the site.

- a. Land use: If the development is in an urban or suburban area that is basically “built out” and surrounded by other developments, it is probably at lower risk from wildfire.
- b. Vegetation: The type of vegetation on and within 300 feet of the property is a key factor in its vulnerability to wildfire, as is its proximity to undeveloped land.

2. Plan and Design the Firewise Development:

Plan the development to include wildfire risk reduction features (discussed below). Final development approval in high-risk areas should hinge on the completion of a Wildfire Mitigation Plan and long-term maintenance scheme.

3. Construct Firewise Landscapes, Structures, and Infrastructure:

See Chapters 6 and 7 for Firewise building and landscaping best practices in wildfire-prone areas.

4. Manage the Development to Minimize Wildfire Risk:

Create and fund a system for long-term and ongoing fuel management to continuously reduce fuels that build up in natural areas or community greenspace. Management is often carried out by a management agency or homeowners association (HOA), but third-party

monitoring and management is usually more successful over the long term. See Chapter 8 for a discussion and comparison of various fuel management approaches.

5. Raise Awareness and Build Support:

Implement strategies to raise resident awareness of wildfire risk and fuel management approaches, particularly the value of prescribed fire if it is being used on the property or neighboring properties. Homeowners’ covenants should require prescribed fire disclosure for new residents. If residents accept and support fuel management activities, there will be less conflict and the community will be safer from wildfire in the long run. See Chapter 2 for a discussion of successful awareness-building and outreach tactics.

Development Planning for Wildfire Risk Reduction



Wildfire Risk Assessment for Florida Developments

If the level of risk in the area is uncertain, consult the Risk Assessment Decision Tree in Chapter 1 for guidance. If necessary, developers and communities can assess their area's wildfire risk using the *Wildfire Hazard Assessment Guide for Florida Homeowners* (DOF 2002), which was designed to assist developers, designers, property associations, and homeowners with the three major steps of wildfire risk assessment. The complete guide is available at http://fl-dof.com/wildfire/wf_pdfs/haz-

[ard_wf_risk_scoresheet.pdf](#). It is helpful for the developer or HOA to work with a Florida Division of Forestry (DOF) representative or other wildfire expert to perform the risk assessment. For very large developments, the developer and local planners and advisors will want to consult the Florida Wildfire Risk Assessment project for more detailed GIS maps of wildfire risk in Florida at www.southernwildfirerisk.com.

No development is an island in a wildfire-prone area. Through the wildfire risk assessment process, the developer or HOA may real-

ize that some of the wildfire risk stems from a lack of appropriate fuel management on adjacent public or private lands. Because wildfire easily crosses property lines, it is essential that neighbors and landowners work together to address the fuel management problem.

Chapters 2 and 3 include information about collaborative programs and planning efforts that can be undertaken to reduce risk in wildfire-prone communities. Programs such as Firewise Communities can provide guidance to communities working through a wildfire risk hazard assessment process.

Creating a Wildfire Mitigation Plan

A Wildfire Mitigation Plan is a strategy employing techniques to lower the wildfire risk of a community. A Wildfire Mitigation Plan may be a requirement of a local development review process or ordinance, such as the model ordinance appended to this manual. In other cases, a developer will voluntarily prepare a Wildfire Mitigation Plan to reassure investors and residents that all wildfire prevention and risk reduction needs are met. Having a Wildfire Mitigation Plan may actually be an advantage in marketing houses in a high-risk area.

To prepare a Wildfire Mitigation Plan, a wildfire expert will work with the developer, engineers, and/or homeowners to complete a series of logical steps.

1. Perform a risk assessment to analyze the characteristics of the site and establish a wildfire risk level for the site
2. Make specific recommendations for reducing the site's wildfire risk before and after development

Firewise Communities/USA for Florida Developments

Firewise Communities/USA is a program that recognizes developments or neighborhoods that demonstrate the spirit, resolve, and willingness to take responsibility for wildfire risk reduction and prevention. Participating in Firewise Communities is a way to help prevent and reduce losses from wildfire and foster community participation in applying Firewise principles. In Florida, the program is administered by the Florida Division of Forestry (DOF).

To be recognized as a Firewise Community/USA, subdivisions and neighborhoods must satisfy a set of risk reduction requirements.

- Enlist a wildfire mitigation specialist to complete a wildfire risk assessment
- Use the assessment to create a wildfire mitigation plan that identifies locally agreed-upon solutions that the community can implement
- Sponsor a local Firewise working group, committee, task force, or commission that maintains the Firewise Community program and tracks its progress or status
- Observe a Firewise Communities Day each spring dedicated to a local Firewise project
- Invest a minimum of \$2.00 per capita annually in local Firewise Communities efforts (work by municipal employees or volunteers using municipal and other equipment can be included, as can state or federal grants dedicated to that purpose)
- Submit an annual report to Firewise Communities documenting continuing compliance with the program

See www.firewise.org for more information.

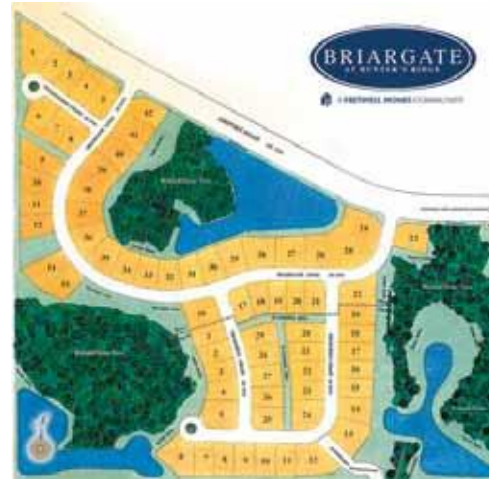
Additional Benefits of Wildfire Risk Reduction

Incorporating risk reduction features into development design proactively addresses wildfire concerns while also providing additional benefits.

- Increased safety with improved signage and access roads to structures that better accommodate all emergency vehicles
- Hazard protection from events such as hurricanes with increased structural stability and landscape resilience
- Recreation opportunities and increased home values provided by greenspace
- Increased security and crime deterrence as thinned vegetation provides more visibility
- Improved wildlife habitat when dense vegetation is prescribed burned or otherwise thinned
- Upland conservation opportunities when fuel management creates habitat for protected species such as the gopher tortoise
- Better insect and rodent control with reduction of vegetation near house walls

Case Study:

Using Firewise Principles Reduces Costs



Briargate was one of the earliest Florida neighborhoods built with Firewise principles. Located in the western suburbs of Ormond Beach, it features 89 houses on 60 acres with greenspace areas of pine forests and hardwood swamps. Developers worked with local fire officials and interested homebuyers for input as part of a planning committee.

The developers recognized opportunities to reduce costs by incorporating Firewise principles. For example, when selectively thinning trees in Briargate and surrounding forest areas, the developer sold the timber for additional income. Soil excavated for the stormwater retention ponds, which also were designed to

buffer the community from wildfire, was reused as fill in the development, saving the expense of purchasing fill and hauling/disposing of excavated soil. It is estimated that using Firewise principles in Briargate saved over \$130,000 in the development of the community.

Briargate used a number of Firewise Community design principles.

- Two entrances to the subdivision
- Minimum 24-foot road widths
- Fuel management of the adjacent forest and thinning of trees to 100 trees/acre
- Pressurized fire hydrants with a rating of 200 gallons per minute
- Creation and regular maintenance of a Community Protection Zone, with a management plan that was required and approved by the city
- Water retention ponds and lakes on the exterior of the development act as wildfire buffers from surrounding forest
- Location of a landscaping demonstration project in a common area
- One-million-gallon water tank for irrigation and firefighting purposes
- Underground utilities to prevent damage during wildfires and storms
- Firewise landscaping required within 30 feet of all structures
- Conducting regular Firewise community meetings

Briargate is a recognized *Firewise Community/USA* development and has attracted much local media attention. (Contact: Mike Garrett at 386-676-3255 or garrett@ormondbeach.org)

COMMUNITY DESIGN TO REDUCE WILDFIRE RISK

3. Work with the development team to incorporate wildfire risk reduction features into the development design
4. Review the landscape and building plans for wildfire risk reduction features
5. Review factors related to emergency response
 - a. Water supply
 - b. Proximity to fire protection services
 - c. Emergency access and infrastructure
 - d. Greenspace and vegetation management
6. Develop a plan for long-term management and maintenance of wildfire risk reduction status by a management firm or HOA

7. Develop an outreach and education plan to inform residents of special development features and new management approaches

DESIGN FEATURES TO REDUCE WILDFIRE RISK

Many wildfire risk reduction features can be designed into a community at little or no additional cost to the developer, but only if these features are considered during the early planning phases of the development. Addressing wildfire issues in the wildland-urban interface (WUI) is complicated, and it helps to have an expert opinion to guide the process of ensuring that a new community is less vulnerable to wildfire. Several factors are important for the

protection and survivability of developments during Florida wildfires. These factors are discussed in the following sections.

- Development Design
 - Lot configuration
 - Level and style of development
 - Strategic placement of greenspace and vegetation management
- Development Infrastructure
 - Roads and emergency access
 - Water supply for wildfire protection
 - Utilities
- Building Construction
- Wildfire Risk Reduction During Construction

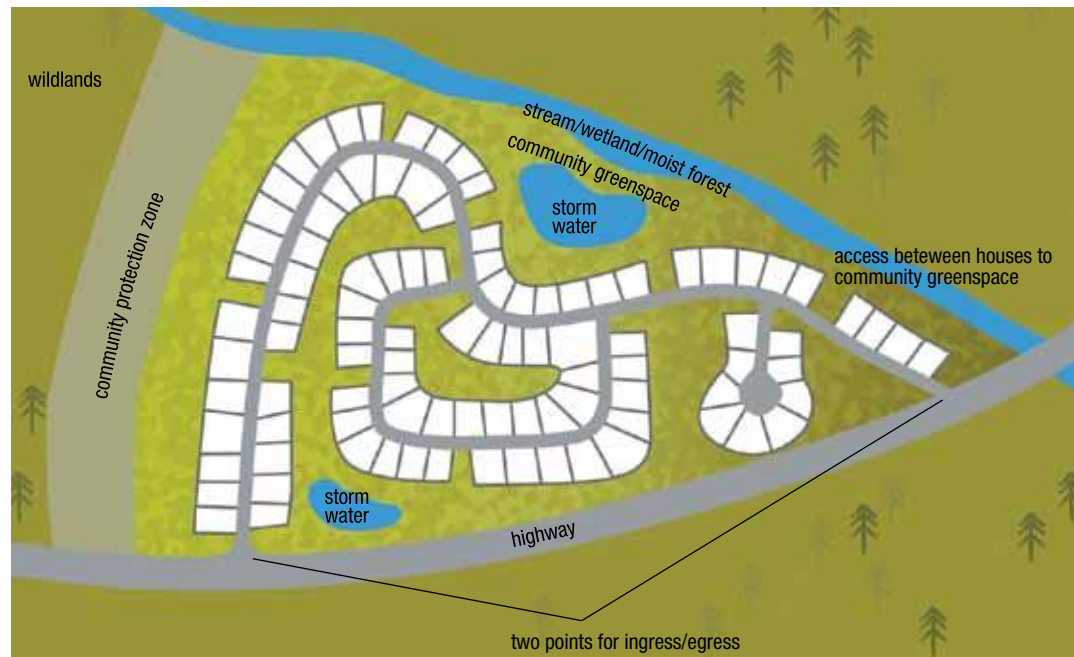
Development Design

Lot Configuration

During a wildfire, firefighter protection of individual houses may not be possible due to the extreme danger or the strain on limited structural protection resources. To help a house or other structure survive without the intervention of firefighters, lot design within the development should allow for a 30-foot-wide Defensible Space of reduced vegetation around each house (see Chapter 7). If zero lot lines are planned, then a Community Protection Zone around the unit or phase of the subdivision is needed, and hazardous fuels on all undeveloped parcels and adjacent land needs to be reduced and regularly managed.

The area around a house or structure can be designed as a Firewise landscape, with the most intensively managed area within 30 feet of the structure (Defensible Space) and the less intensively managed areas farther from the structure. The biggest concerns are the type of vegetation present, how close the vegetation is

Florida Subdivision Design for Wildfire Risk Reduction



Design for wildland fire safety should be done as part of the overall property development process if it is to be effective and economical, and all members of the development team should incorporate emergency fire conditions as an integral part of their development activities. Add-on fire safety, planned after a development has been designed or constructed, is inherently more expensive and generally less effective than that engineered as an integral part of the total residential development.

—Brooke Smith, Wildland-Urban Interface Fire Engineer

Best Practices: Lot Configuration for Wildfire Risk Reduction

- At least 30-feet of Defensible Space surrounding houses and structures
- Firewise landscaping
- Driveways at least 12 feet wide with vegetation cleared to a width and height of 15 feet
- House numbers readily visible from the street
- Fences connecting to the house are made of nonflammable material or have a nonflammable break near the structure (e.g., metal gate)

to structures, and how dense the vegetation is. See Chapter 7 for information on how to create a Firewise landscape zone.

Level and Style of Development

Phased developments – undeveloped lots interspersed with developed lots – create what has been termed a wildland-urban “intermix” situation. If vegetation is not managed on the undeveloped lots, this situation may allow a wildfire to burn deep into a subdivision on many fronts. Because wildfire can become scattered throughout a development, firefighters frequently have insufficient resources to protect all of the structures. This situation led to the loss of many houses in wildfires that occurred in subdivisions in Palm Coast in

1985 and 1998 and Port St. Lucie in 1999. The City of Palm Coast is now taking steps to protect houses from future wildfire threats by performing fuel management activities on undeveloped lots within the development.

As a subdivision is “built out” with fewer undeveloped lots, the danger is reduced. A few undeveloped lots less than 5 acres in size are not considered to be a danger unless they have extremely high fuel loads with high flammability characteristics. These undeveloped lots can be managed with a variety of fuel management approaches (see Chapter 8), especially if an HOA or authority is pursuing such a strategy. Once a development is more than two-thirds built, the wildfire hazard typically becomes low enough that risk reduction treatments can



Photo: Cotton Randall, University of Florida

Best Practices: Level and Style of Development for Wildfire Risk Reduction

- A majority of the lots in the development are built (i.e., few vacant lots)
- Undeveloped lots in a development are regularly managed for fuel reduction
- Houses are situated within a well-managed encircling Community Protection Zone or greenspace for ease of wildfire protection
- Clustered developments use Firewise building construction

COMMUNITY DESIGN TO REDUCE WILDFIRE RISK

focus on the edges where the subdivision interfaces with lands with hazardous fuels (*Wildfire Hazard Assessment Guide for Florida Homeowners*, DOF 2002).

If houses are clustered, it is easier to protect them with an encircling greenspace or Community Protection Zone where fuels are regularly managed and reduced. In clustered developments, wildfire-resistant building construction (see Chapter 6) should be maximized to limit the movement of fire from structure to structure.

Greenspace and Community Protection Zones

Greenspace is defined as the open and undeveloped land within a community. Greenspace can be a barrier to the spread of wildfire into a development if it is properly located and strategically managed to reduce hazardous fuels. It can also provide recreation and lifestyle opportunities in the form of parks, trails, greenways, community gardens, golf courses, wildlife conservation areas, and scenic vistas. Since many new developments include the desirable amenity of greenspace, functional placement of greenspace for wildfire risk reduction purposes can be accomplished at little or no additional cost to the developer.

In areas of high or extreme risk, a wide greenspace for fuel management – called a Community Protection Zone – should be placed around the development to buffer houses from neighboring lands with unmanaged fuels. The Community Protection Zone is usually 100 to 300 feet wide, but sometimes as much as 1600 feet wide in extreme conditions. The width is based on an assessment of the flame heights that might be generated by the adjacent forest.

A Community Protection Zone protects the community and enhances the ability, safety, and range of suppression options for firefighters to defend a community at its boundary. Instead of defending individual homes, firefighters are able to more strategi-

cally defend an entire community. Community Protection Zones do not substitute for individual Defensible Space, but a combination of properly implemented Defensible Space around structures (see Chapter 7) and a Community Protection Zone is usually ade-

Best Practices: Greenspace/Community Protection Zone Design for Wildfire Risk Reduction

- Firewise greenspace and/or Community Protection Zone are provided within and around the development to protect houses that are adjacent to unmanaged wildlands
- Ponds, streams, lakes, stormwater drainage features, public access routes, and service roads are coordinated with the greenspace and Community Protection Zone to block wildfire without blocking firefighter access
- Parks, golf courses, waterways, and other greenspace are advantageously placed within the development to break up or surround large islands of hazardous fuels
- Perimeter and internal greenspace and Community Protection Zone are regularly maintained to reduce the accumulation of hazardous fuels
- Greenspace elements have all-weather access for firefighting equipment
- All individual structures use Firewise building construction and landscaping

Characteristics of Community Protection Zones for Wildfire Risk Reduction

- Surface vegetation is managed on a regular basis through prescribed burning or other methods
- Mature trees are thinned to interrupt the continuous tree canopy (less than 35% crown cover or minimum 10-foot spacing between the outer edges of tree crowns)
- Small-diameter understory trees are thinned to similar spacing as the mature trees
- Ladder fuels (e.g., vines) are removed and branches are trimmed 10 feet from the ground
- Large, fire-resistant trees (e.g., oaks) are retained, as these large trees slow the growth of brush through shading, reduce wind speeds, and block heat from an approaching wildfire
- Individual homes are still protected with Defensible Space, although the CPZ may form the outer zone of a home protection plan (see Chapter 7)

(Adapted from *The Community Protection Zone*, Center for Biological Diversity 2002)

quate to protect extreme-risk communities from wildfire. Community Protection Zones are equivalent to the forestry concept of Fuel Management Zones.

Mature trees are retained in the greenspace or Community Protection Zone, but hazardous surface fuels (e.g., palmetto, gallberry, other flammable vegetation) should be regularly managed through prescribed fire, mechanical means (e.g., mowing, chopping), or other approaches. The best greenspace location and design depends on the wildfire risk for each development or neighborhood. Chapter 8 includes a comparison of various fuel management approaches, and Chapters 3 and 4 include information on planning and regulatory approaches for creating and maintaining Firewise greenspace in Florida.

Community Protection Zones have much to offer WUI developments. There are several key goals shared by most Community Protection Zone projects.

- Protecting homes and communities against wildfire through fuel management and education actions
- Clearing small-diameter trees and brush while thinning and maintaining mature trees in a perimeter around the entire community and in areas adjacent to houses, with a focus on reduction of fire-prone species (e.g., pines) and regeneration of less flammable species (e.g., oaks)
- Restoring the natural role of fire with prescribed fire as a management tool in the protection zone, if appropriate

To maintain the wildfire protection benefits of greenspace and the Community Protection Zone, vegetation management



In the before-and-after photographs above, a new community protection zone has been provided for this subdivision next to San Felasco Hammock State Park in Alachua County, Florida. Underbrush has been cleared, but mature trees have been maintained in the buffer. The area will get green again as new vegetation begins to grow. Photos: USFS

Assessing and Addressing Wildfire Risk in Existing Developments

Wildfire risk is not just a concern for new developments. Wildfire is a greater risk in many of Florida's existing wildland-urban interface communities. Homeowners and property associations can evaluate and address wildfire risk in existing communities. There are some common reasons for high wildfire risk in existing communities.

- Undeveloped lots with vegetation buildup interspersed among developed lots
- Developed lots with excessive flammable vegetation and less than 30 feet of Defensible Space
- Close proximity to wildlands without adequate Defensible Space, buffers (e.g., wetlands, road), or Community Protection Zone
- Structures and lots that do not meet Firewise landscaping and building standards
- Lack of a formal homeowners' organization or association to share knowledge, pool community assets, and maintain or monitor wildfire risk reduction activities

Many actions can be taken to reduce wildfire risk. These actions could be as complex as providing additional access points to a neighborhood with only one entrance or as simple as clearing debris from a roof and yard. The bottom line is that an existing community must begin to ask questions and take actions to reduce risk before a wildfire strikes.

Best Practice: Road Infrastructure and Access for Wildfire Risk Reduction

- Two or more roads lead in/out of every neighborhood of more than 100 households
- Roadways and bridges are constructed of a hard, all-weather surface designed to support all legal loads of the jurisdiction
- Roadways have a minimum clear width of 12 feet for each lane of travel, excluding shoulders and parking
- Turns in roadways have a minimum radius of 60 feet to the outside of the turn
- Roadways incorporate emergency pull-offs and space for fire hydrant access without blocking traffic
- Where road grades are less than 0.5%, roads are crowned to prevent pooling of water and intersections are sloped to prevent the accumulation of water
- Bridges and culverts are designed to accommodate a minimum of 100-year flood elevations and flows
- At least one approved means of fire apparatus access is provided to each building
- Dead-ends that exceed 300 feet in length have a minimum 120-foot diameter turnaround at the closed end
- Entrance gates are located a minimum of 30 feet from the roadway and open away from the road and the clear opening through gates is at least 2 feet wider than the lane
- Street signs are visible and made of noncombustible materials
- Canals or other water bodies do not limit firefighting access to buildings or greenspace
- Roads, driveways, bridges, and other access facilities are continuously maintained

(Adapted from *NFPA 1141: Standard for Fire Protection Infrastructure for Land Development in Suburban and Rural Areas*, 2008 Edition)

should be regularly conducted to reduce fuel buildup. Experience in Florida shows that when wildfires start in unmanaged greenspace, major structural losses are more likely to occur in neighboring subdivisions if there is no area of reduced fuels. These “wildfires with a head start” are very difficult to stop when they encroach on developments in the WUI. Structures at the edge of the interface are most vulnerable to these wildfires in high risk areas.

Neighboring lands with hazardous fuels should also receive regular fuel management treatments in order to reduce wildfire risk to the developed area. This protects both the built community and the natural resources from disastrous wildfires. Golf courses, utility corridors, roads, stormwater ponds, and other landscape elements may also be used as barriers to wildfire and thus need fuel management attention. See Chapter 8 for information on fuel management options.



This subdivision has only one access route. Residents could be trapped if a wildfire closed off the entry road.

Photo: USFS

Development Infrastructure

Roads and Emergency Access

Development design plays a critical role in how quickly firefighters can respond to an advancing wildfire. Roadway and shoulder widths, road maintenance standards, turn-arounds (cul-de-sacs), bridge design, road surface materials, visibility of street signs, and other features are important for support of wildfire suppression activities. These features affect how quickly and efficiently emergency crews can respond as well as how easily residents can evacuate.

It is important to have two routes of access into a property or subdivision, even if one is only for emergency use. Dead-end roads may force residents to pass through a wildfire in order to evacuate and may increase the chance that firefighters and their equipment are cut off from escape routes. Designing subdivisions with more than one access route is good general practice for other emergency purposes as well.

Well-designed infrastructure may also be used to act as a fuel break for wildfire protec-

Best Practices: Water Supply for Wildfire Risk Reduction

- Most new developments will link to municipal water supplies
- Fire department connections (FDC) shall be located to provide a continuous supplemental water supply where municipal-type water systems are not available
- All water supplies meet firefighting needs and are in compliance with local codes and with *NFPA 1142, Standard on Water Supplies for Suburban and Rural Fire Fighting*
- Water sources are located such that the required fire flow for any building in the development can be established and maintained within 5 minutes of fire department arrival
- Isolated houses in high-risk rural areas provide fire protection water systems in addition to individual wells, as recommended in Chapter 6

(Adapted from *NFPA 1141: Standard for Fire Protection Infrastructure for Land Development in Suburban and Rural Areas*, 2008 Edition, and *NFPA 1142, Standard on Water Supplies for Suburban and Rural Fire Fighting*, 2008 Edition)

tion. For example, in a neighborhood with houses inside a perimeter road, the right of way acts as a fuel management zone around the developed area. This is one way that roads, and other infrastructure elements (e.g., water features) can be creatively used to perform dual or multiple functions. Any water features

included in high risk developments should be designed with firefighter access in mind.

While topography is not a major concern in Florida wildfire behavior, topography does provide obstacles to firefighter access in the form of rivers, lakes, creeks, canals, and swamps. Just as water can act as a natural fire break, water features – extensive lake, ditch, canal, or drainage systems – can also impede firefighter access. Alternate routes of access should be created accordingly. Although many of these infrastructure guidelines conflict with “new urbanism” or “traditional neighborhood” design principles, it is usually not appropriate to place traditional neighborhoods in rural or wildfire-prone areas without the addition of features that can act as a fire break and help lower the wildfire risk.

Water Supply

A reliable local water source that is unaffected by loss of electrical power is important to firefighters’ ability to suppress wildfires and protect individual structures. Developments in hazardous areas with municipal water systems should have a pressurized hydrant system to support emergency firefighting needs. Land Development Regulations (see Chapter 4) should specify hydrant spacing and flow characteristics necessary to protect the development. In the absence of a pressurized firefighting water system, swimming pools and ponds located throughout the development are suitable and are better choices than individual residential well systems or trucked-in water.

In rural areas, helicopters are used to drop water on wildfires and save many houses threatened by wildfire. Lakes, ponds, and canals can be suitable helicopter dipping spots

if they are a minimum of 4 feet deep year round with a 45-foot radius clear of obstructions and a 75-foot approach clearance in at least one direction. Developments in rural areas can be designed to provide helicopter dipping spots if needed.

Developers may also consider providing all-weather ground access points and dry hydrants for lakes and ponds within developments for use by ground firefighting equipment.

Utilities

Gas pipelines, electric lines, and septic systems can hinder wildfire suppression efforts and endanger firefighters if not considered as part of development planning. Overhead power lines may stretch or arc when exposed to radiant heat or heavy smoke, may be a clearance problem for firefighting equipment, and may even cause a wildfire if windblown branches come into contact with live lines.

Existing overhead transmission lines should be regularly inspected and maintained by the local service provider to ensure that they are free of encroaching vegetation. Aboveground utility connections or wellheads

Best Practice: Utility Design for Wildfire Risk Reduction

- Underground utilities are safer than aboveground utilities in a wildfire emergency
- Existing aboveground utilities should have a well-maintained right-of-way
- All utilities and septic systems are clearly marked to prevent problems for heavy firefighting equipment

Case Study:**Verandah Reduces Wildfire Hazard from High to Low Using Firewise Practices**

The Verandah community is a good example of effective integration of Firewise development principles. Located 10 miles south of downtown Fort Myers, over 70% of this 1,456-acre community was retained for open space, including nature preserves, parks, lakes, and conservation areas.

An initial DOF wildfire risk assessment of the planned development area indicated a “high hazard” score of 98 points. The developer decided to make Firewise improvements in the community and building design, resulting in a subsequent “low hazard” score of 35.

Along with these Firewise modifications, Verandah is also implementing a public education effort to let its 1,600 residents know about fuel management approaches and how to incorporate Firewise landscaping.

- Two entrances to the subdivision
- Interior road width of 25 feet with 5 foot shoulders
- Roadway turnarounds have 50 feet radii to accommodate emergency vehicles
- Street signs are constructed from noncombustible materials and a minimum of four inches in diameter
- Underground utilities to minimize damage during wildfires and storms
- Small ponds and lakes serve as emergency water supplies and fuel breaks
- Nature trails, averaging 4-feet wide, also serve as fuel breaks
- Regular fuel reduction and Firewise landscape maintenance
- Firewise plant list distributed to homeowners



at rural houses must be protected from wildfire through vegetation clearance and/or noncombustible housings. All flammable home utility materials (e.g., woodpiles, LP gas tanks) should be stored at least 30 feet away from structures.

Well-marked underground utilities buried at least 30 inches below grade generally are preferable in high risk rural areas. Underground utilities that are not marked, however, can be a problem for wildfire suppression in Florida due to the common use of heavy crawler dozers and fire plows to fight wildfire. Heavy equipment may sever buried electric, water, or gas lines or collapse unmarked septic tanks (DOF 2002).

No matter the level of risk determined for a given subdivision, special protective measures should be planned for facilities such as utilities substations, public safety stations, communications facilities, facilities providing storage for flammable or hazardous materials, materials-oriented businesses such as lumber yards or recycling centers, and smoke sensitive facilities such as schools, hospitals, or care centers. Special facilities can be clustered in “industrial” or “school” or “health care” zones with additional fuel management protection provided around each zone.

Building Construction

Noncombustible building materials for the roof, soffits, siding, and skirting (for raised houses or mobile homes) can reduce the likelihood that a structure will ignite. Experience in Florida has shown that vinyl soffits and siding frequently melt and fall away from the house when exposed to the heat of a wildfire, leaving the attic and wall areas vulnerable to ignition. Firebrands or embers may also be blown under

raised houses, mobile homes, or wooden decks, igniting accumulated debris and the house's subfloor.

The closeness of adjacent structures may also present a hazard. For this reason, it is best if a majority of houses in a subdivision or development use Firewise construction so that the group of houses as a whole is more resistant to wildfire and so that houses don't ignite each other during a wildfire event. See Chapter 6 for complete information on Firewise building practices.

Wildfire Risk Reduction During Construction

While future wildfire risk reduction needs for a development are addressed in the development plan, wildfire protection during the development process is often overlooked. In smaller developments, wildfire protection during the development period may not be a significant need, but it can be a major problem in large or phased developments that are built over a

period of several years. Wildfire risk reduction planning should address the period of development as well as the long-term needs of the community. In high risk areas, it is prudent to have wildfire protection features in place before development begins. A wildfire mitigation expert can recommend what steps are necessary to protect the investment in a high-risk area.

LONG-TERM MAINTENANCE OF FIREWISE STATUS

Greenspace, common areas, and CPZs need regular and repetitive vegetation management, especially greenspace and CPZs that have been strategically placed for wildfire protection purposes. Creating a long-term fuel management plan is the best way to guarantee that greenspace and Community Protection Zones will be managed. By clearly stating responsibilities and setting benchmarks for greenspace management, a developer will guarantee that the wild-

fire hazard does not increase or return in their community. To this end, fuel management must be built into subdivision management contracts or covenants or contracts so that it is not neglected at some later date.

Plans for new or existing developments should provide for a contractor or HOA to take responsibility for long-term wildfire risk reduction efforts. Developers or homeowners' groups should consider adopting a set of covenants or deed restrictions with wording similar to the model documents appended to this manual and discussed in Chapter 4. Covenants would be adopted for the purpose of defining wildfire risk and establishing actions to protect the community from wildfire. The best way to ensure that covenant requirements are carried out is to provide for third-party management and monitoring of fuel management and home landscape actions. The Wildfire Mitigation Plan will specify which fuel management approaches are best for an area and how often fuel management needs to be per-

Best Practices: Building Construction for Wildfire Risk Reduction

- Individual structures are designed following Firewise building construction principles
- Houses have fire-resistant or noncombustible soffits and soffit vents
- Houses in the development have Class-A-rated or noncombustible roofing material
- A majority of the lots in the development are built out (i.e., few vacant lots)

Best Practices: Wildfire Risk Reduction During Construction

- Two access routes are provided to all phases of development until the permanent road system is completed
- Before the infrastructure is installed and prior to delivery of any combustible materials, a fire protection plan and fire protection water supply are approved and in place
- No residential occupancy is allowed in high risk areas until fuel management measures have been completed as defined in the Wildfire Mitigation Plan for the development
- Phased development plans ensure that early houses are not exposed to hazardous conditions (fuels) from adjacent undeveloped lots

(Adapted from *NFPA 1141: Standard for Fire Protection Infrastructure for Land Development in Suburban and Rural Areas*, 2008 Edition)

I live in a high wildfire risk area. After the Martin County Fire Prevention Officer spoke to our homeowners' organization membership, it was amazing to see how quickly – within days! – homeowners took charge and cleared underbrush from their properties, as well as from the development's common areas. Public outreach by the local fire prevention officer is invaluable and probably is a strategy that can be implemented quickly statewide since nearly all fire-rescue departments have someone charged with the responsibility of meeting with public groups.

–Link Walther, AICP, Florida Planning Consultant

formed. See Chapter 8 for information on various fuel management strategies.

In high risk developments where HOAs are inactive or nonexistent, local fire protection agencies and the DOF will encourage residents to take action to reduce wildfire risk. This process is already taking place as many local governments and DOF Field Units are working with the statewide DOF Wildfire Management Teams to reduce fuels in high risk WUI areas. It is important for the teams to identify one or several people in a neighborhood who can become leaders and promoters of the wildfire risk reduction effort. With the encouragement of fire agencies, peer-to-peer

outreach among neighbors may be more effective than outside pressure or additional regulation. If the wildfire risk story is well told, residents will gain a heightened awareness of their risk and will be willing to take action.

A good understanding of the wildfire risk in a development – among the developer, fire protection agencies, builders, and residents – can lead to an improved degree of fire protection for residents and improved public support for fire prevention and risk reduction practices. Although many people move to WUI areas for privacy and may be reluctant to get involved in community organizations, an active HOA can be very effective in reducing wildfire risk. Homeowners' associations will not only raise awareness within a development, but will also raise awareness in the community at large by inquiring about management of neighboring natural areas and encouraging fuel management on those neighboring lands. The end result may be a reduced risk of wildfires that start with fuel accumulations in neighboring wildland areas.

Education of residents about wildfire risk and encouragement of appropriate wildfire risk

Best Practices: Long-Term Vegetation Management and Maintenance

- Responsibility (Who determines the fuel management needs of the site? Who carries out the management activities?)
- Monitoring methods (Who checks that fuel management is being accomplished?)
- Guidelines for best vegetation management practices for the site, such as prescribed fire, mowing, and mechanical thinning
- Frequency of management (usually needed every 2 to 5 years)
- Management funding sources (i.e., homeowners' fees, government support, grants, private funding, etc.)

reduction strategies through social marketing can be valuable tools to maintain a Firewise development. Such educational information can be included in notification to new residents or as outreach and social marketing programs to existing residents. See Chapter 2 for a discussion of programs, resources, and tools for wildfire risk reduction education and social marketing, including the Firewise Communities program. In addition to educating residents about risk, consideration should be given to educating residents and developers about the natural role of fire in Florida so they understand that fire is part of our landscape. Chapter 8 includes a discussion of the natural role of fire in Florida.



Homeowners should make certain that wildfire risk reduction activities take place every few years in their neighborhood. Photo: Pandion Systems, Inc.

chapter
6

BUILDING CONSTRUCTION TO REDUCE WILDFIRE RISK



BUILDING CONSTRUCTION TO REDUCE WILDFIRE RISK

If residential fire losses did not occur during wildland fires, the wildland-urban interface fire problem would not exist. Thus, the principal wildland-urban interface fire issue becomes about residential structure survival.

—Jack Cohen, Wildfire Structural Ignition Specialist, U.S. Forest Service

THE WILDFIRE DANGER TO BUILDINGS AND STRUCTURES

At the heart of the wildfire problem in the wildland-urban interface (WUI) is the loss of houses, businesses, and other structures. From the perspective of wildfire, manmade structures are just another form of fuel. The dramatic increase in development in the WUI has made residential losses associated with wildfires a serious and growing problem. Firefighting resources are often stretched thin when a wildfire approaches a neighborhood and firefighters may not be able to protect each house.

Whereas residential fires usually involve one structure with a partial loss, major wildfires can result in hundreds of houses being destroyed. Wildfires in the WUI are characterized by conditions brought about by houses being near volatile natural fuels.

- Rapid approach of wildfire to residential areas
- Wildfire simultaneously threatening a large number of structures
- Overextended firefighting resources resulting in unprotected houses
- Ignited houses that typically are a total loss (Cohen and Butler 1998)

In an extreme wildfire event, Florida Division of Forestry (DOF) firefighters will focus on containing and controlling the wildfire, while local structural firefighters will work to protect houses and other structures. Under the extreme circumstances of some wildfires, structural firefighters may not be able to protect every house when faced with multiple houses threatened by the wildfire.

It is very important for residents of high risk areas to accept the responsibility for protecting their houses from wildfire by taking simple risk reduction measures. Homeowners will want to keep wildfire as far away from their house as possible through appropriate Firewise landscaping and neighborhood design. It is also sensible to address how houses are designed, built, and maintained to better survive the threat of an approaching wildfire. This chapter includes practical recommendations for Firewise construction and retrofitting of houses in the WUI. While vegetative fuels and weather are major factors in wildfire behavior (see Chapter 8), building construction determines the probability of structure survival when a wildfire occurs.



Defensible space and home maintenance are the most important factors in preventing loss of a structure to wildfire. Photo: DOF

The Top Four Protections from Wildfire

- Roof of noncombustible or fire-resistant material, kept clean of debris
- Eave soffits and vents of noncombustible material
- Siding of noncombustible material
- Defensible Space around the house, 30 feet clear of flammable vegetation (see Chapter 7)

Case Study: Little Things Lead to Disaster: Pine Needles, Grasses, and Fences

Photo: Timber Weller, DOF

Although some Firewise renovations are costly and labor intensive, there are many simple and inexpensive actions that can have dramatic results in preventing wildfire disaster. Attention to home maintenance could have easily prevented these unpredictable and damaging fires.

Sugar Mill, Flagler County, 2008

Planned around an extensive series of golf fairways, the Sugar Mill community seemed well protected. In 2008, a large wildfire stopped when it hit the first fairway, but high winds carried hot embers (firebrands) into the air over the community. Firebrands landed on a patio roof of a house on the far side of the fairway and in the gutter of another house even farther away. Both structures had thick layers of pine needles on them. While vegetation around these houses did not burn, both houses were destroyed as a result of fires that began in the dry pine needles. The fires quickly spread to the rafters of the houses and then to the rest of each structure. Firewise building maintenance involves seasonal cleaning of pine needles and other flammable debris from roofs and gutters.



Photo: Cotton Randall, University of Florida

Manufactured Home Fire, Eastern Polk County, 2009

Florida has over 1.2 million owners of manufactured (mobile) homes, some of which have no skirting around the base. A 2009 wildfire approached a Polk County mobile home by burning across a dry lawn. The flames were very low, but were enough to ignite dried grasses that had accumulated under the building. A few minutes later the entire home was consumed by fire. Fire can easily get under raised houses, raised outbuildings, and decks and destroy otherwise well-protected structures. Firewise building design advises that crawl spaces should be enclosed in fire-resistant sheathing and that flammable materials should never be stored in these vulnerable spaces.



Photo: Texas Forest Service

Fence Fire, Texas, 2006

Although this fire was in Texas, it underscores how one design element can undermine a Firewise structure. The wooden fence is the only “fuel” burning near these houses. The houses are threatened by the burning fence, which acts as a wick between the wildfire and the houses. Firewise building design advises that sections of fencing near houses be made of noncombustible materials.

BUILDING CONSTRUCTION TO REDUCE WILDFIRE RISK

How Structures are Ignited by Wildfire

Wildfire can move from vegetative fuels to structures in three ways.

- Radiation – heat coming from flames
- Convection – direct flame contact
- Firebrands – floating embers

Radiation – Heat Coming from Flames

Radiant heat from burning vegetation adjacent to a structure is the principal ignition factor for structures lost to wildfire. The burning vegetation of wildfire gives off heat – just like a radiator heats a room – which can ignite structures without direct flame contact. An example of the real-life implications of radiant wildfire heat in Florida is the loss of houses when vinyl or fiberglass soffit vents melt and fall away, allowing ignition of underlying materials or allowing firebrands to be drawn into the attic, which in turn ignites the house.

Distances for structural ignition from radiant heat sources have been tested at the U.S. Forest Service Science Laboratory. Because house ignitions depend on the characteristics of the structure and immediate surroundings, researchers have observed survival of between

Our understanding of fire ecology for most of North America indicates that fire exclusion is neither possible nor desirable. Therefore, homeowners who live in and adjacent to the wildland fire environment must take primary responsibility for ensuring that their homes have sufficiently low home ignitability... The wildland fire threat to homes is not a function of where it happens related to wildlands, but rather of how the home is ignited... The key to reducing wildland-urban interface home fire losses is to reduce home ignitability.

–Jack Cohen, Wildfire Structural Ignition Specialist, U.S. Forest Service

86% and 95% of houses with nonflammable roofs and a vegetation clearance of 10 meters (33 feet) or more (Cohen 2000) and survival of nearly 100% of houses with additional vegetation clearance of 40 meters (130 feet). The results of Cohen's research underscore the importance of Firewise construction and Defensible Space around structures in wildfire risk areas (see Chapter 7).

In addition, obstacles between the house and the wildfire can block incoming radiant heat from a wildfire. Fire-resistant vegetation, noncombustible walls, or features of the terrain (e.g., berms, hills) can be installed or taken advantage of as barriers to radiant heat.

Convection – Direct Flame Contact

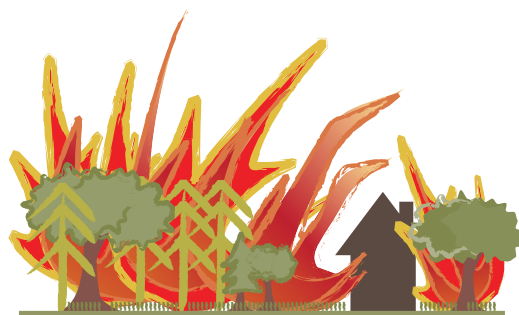
Convection occurs when flames make direct contact with a structure. The wildfire itself may engulf the building or a smaller fire may start in vegetation or dead fuels next to a house, on a roof, in a gutter, or near a wooden fence or deck attached to the building. Direct contact of flames that have ignited fuels next to a house is another ignition factor for houses lost to wildfires in both Florida and other states.

Firebrands – Floating Embers

Firebrands are airborne, burning materials or embers that are carried upward by a wildfire



Radiation



Convection



Firebrands



Even from 100 feet away, radiant heat from a wildfire can melt siding and contribute to ignition of the exposed wood sheathing. Photo: Texas Forest Service

and deposited elsewhere. Firebrands can be carried distances of a mile or more by rising hot air currents and winds associated with wildfire. Saw palmetto, cabbage palm, and other types of vegetation tend to form airborne embers when they burn, making firebrands a particular danger in Florida. If a house is within a mile of a large wildland area, firebrands will be a contributing factor to the overall wildfire risk.

If a firebrand lands on or under a combustible surface (such as a roof or a deck) or is pulled up through a melted soffit or attic vent, it can easily ignite a structure. Raised dwellings and decks are in danger from this type of combustion if they do not have fire-resistant skirting. Firebrands also may ignite debris that has accumulated under unprotected decks and raised homes. Firebrands may also ignite vegetation that in turn ignites the structure through radiant heat or convection. Protecting a house from ignition by firebrands involves maintaining a clean roof, an appropriate Defensible Space, a protected crawl space, fire-resistant

soffit and attic vents, and by following the other recommendations included in this chapter.

Assessing the Level of Risk from Wildfire

Before designers, builders, or homeowners proceed with the work of safeguarding structures from wildfire, it is important to identify and assess the actual level of risk, particularly if the house is in a WUI area. This manual includes risk assessment information that can be used by builders and homeowners. A Wildfire Risk Assessment Decision Tree is provided in Chapter 1. From the results of the decision tree, readers can determine whether they need to consult one of the more detailed wildfire risk assessment tools.

During a wildfire risk assessment, any feature of the property that is attached to the house should be considered a part of the building. For example, an attached garage, storage space, deck, fence, or other attached feature should be considered part of the potential fuel for wildfire.

The ultimate goal of the risk assessment process is to clearly identify risks in order to create and implement an action plan to reduce those risks. Risk reduction steps judged to be necessary should be prioritized based on the level of risk to maximize use of limited resources. A typical Wildfire Mitigation Plan (discussed fully in Chapter 5) will address the level of wildfire risk and construction, infrastructure, and fuel management approaches necessary to reduce that risk.

The DOF can assist developers and builders with the development of the Wildfire Mitigation Plan. In some counties (e.g., Collier County), a Wildfire Mitigation Plan is required

in the Land Development Regulations in order to receive development approval in rural fringe or high risk areas.

PROTECTING STRUCTURES FROM WILDFIRE IN FLORIDA

There are a number of building codes and standards that provide guidance for structural wildfire protection. After a review of the applicable standards, we will look at the best practices for Firewise building construction in Florida.

Building Codes and Standards for Wildfire Risk Reduction

There are a number of building codes and standards that include recommendations for Firewise building design and construction. If standards have been adopted or referenced in a local government rule, the local codes enforcement authority is then charged with the task of protecting the public health, safety, and wel-

Sources for Firewise Construction Guidelines

- The codes and standards referenced in this chapter (on page 98)
- The Firewise Construction Checklist found at www.firewise.org
- The Federal Alliance for Safe Homes (FLASH) *Blueprint for Safety*™ Multi-Hazard Training Program
- The Institute for Business and Home Safety (IBHS) *Fortified for Safer Living* guidelines and checklist

BUILDING CONSTRUCTION TO REDUCE WILDFIRE RISK

fare through enforcement of the code in the community.

Most states have not yet adopted codes that address wildfire concerns for houses being built in the WUI. For example, the Florida Building Code has not been modified to specifically address landscape and building design to reduce the risks of wildfire. By their nature, building codes are slow to change because builders and insurers need consistent requirements over time.

An alternative to building codes is for local communities in high risk areas to adopt ordinances that require planning for wildfire risk reduction, such as the model ordinances presented in Chapter 4. Increasing public and homebuilder awareness of the role of building construction in wildfire risk is also an important approach, as discussed in Chapter 2.

Where code requirements are absent, designers, architects, developers, builders, and homeowners must take the initiative for wildfire protection improvements and follow the guidelines in this manual or those offered by the National Fire Protection Association (NFPA) or other wildfire risk reduction programs.

Firewise Building Construction

The survival of structures in wildfires involves a two-pronged approach.

1. Protecting the structure from ignition through Firewise building construction
2. Providing support for wildfire protection and suppression efforts

If an extreme wildfire overcomes the Defensible Space around a house, the exterior of the building becomes the last line of defense. Research has shown that the most vul-

Case Study:

Building Characteristics in the 1985 Palm Coast Fire

In May 1985, an intense fire destroyed 99 houses and burned across 13,000 acres in and around Palm Coast in Flagler County. Researchers from the University of Florida and the DOF performed a systematic analysis immediately after the fire to determine significant factors that might have contributed to structural ignition. Not surprisingly, the results support many of the recommendations commonly made for Firewise building construction.

Three factors were found to be the most significantly correlated with the houses that burned.

- Fire intensity as indicated by a crown fire (wildfire in the tree canopy)
- Presence of brush near the house in the direction of wildfire approach
- Presence of vinyl soffits

A simulation model with 83% accuracy was constructed to predict which houses would have burned in the wildfire. The model pointed out the most important approaches to protecting houses and communities from wildfire.

- Intense fires are supported by high fuel loads. Fire intensity can be reduced by fuel management (fuel reduction) in high risk areas through the use of prescribed fire or mechanical treatments.
- The presence of brush near a house is an ignition factor. Houses surrounded by Defensible Space and Firewise landscaping were much less likely to ignite in the Palm Coast fire.
- Vinyl soffits were the foremost building attribute to predict the likelihood of a house being destroyed. Vinyl soffits easily melt in radiant heat and then allow firebrands to enter the attic and ignite rafters. Once firebrands enter the interior space of a house, the house is likely to be destroyed. This supports the Firewise building recommendation for the replacement of vinyl soffits with metal soffits.

The other factor that was more weakly correlated to house ignition was the presence of wood siding, which is more vulnerable to wildfire. Block houses were superior to wood frame houses in resisting ignition. Roof type was not significant in this study, nor was watering of the roof a helpful practice. This analysis supports the expert opinion that fire-resistant building construction and Firewise landscaping are critical factors in determining whether a structure survives when a Florida wildfire approaches.

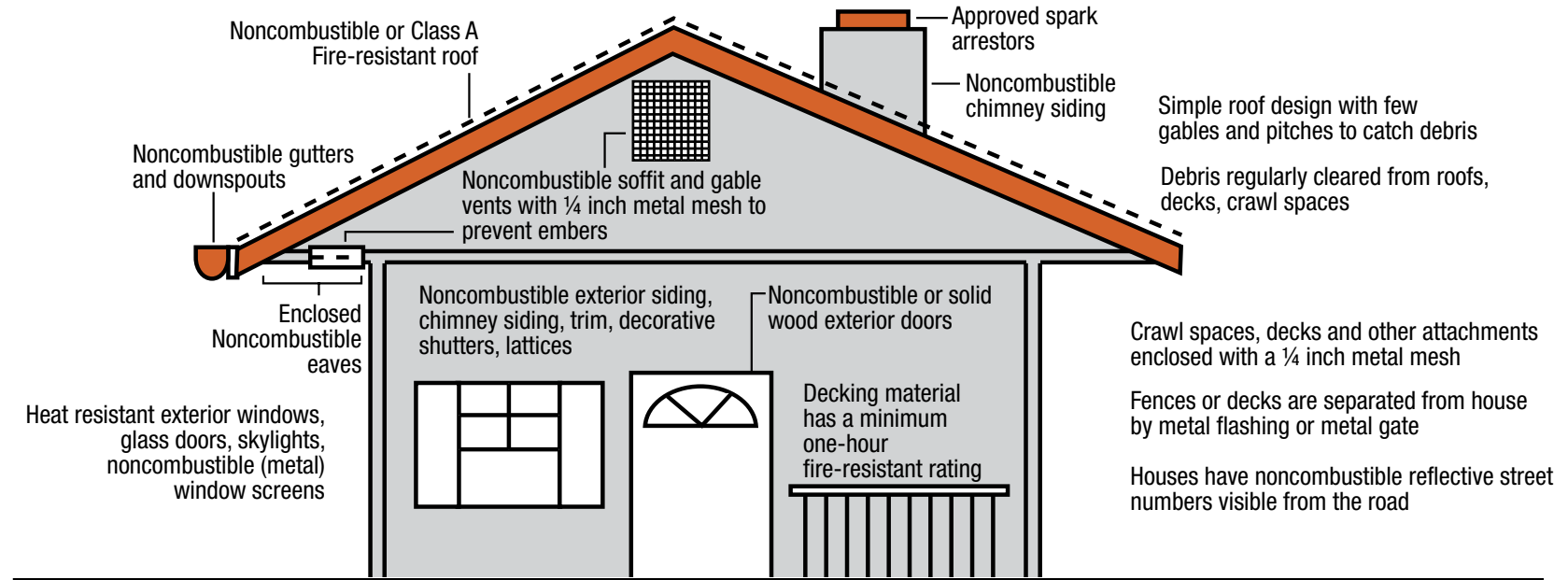
(Adapted from Abt et al. 1987)

nerable parts of a building during wildfires are the roof, eaves, vents and soffits, windows, and attached flammable structures such as wood decks or fences. If the house's exterior is breached and wildfire gets into eaves, crawl spaces, attics, or interior spaces, the house is likely to be destroyed.

Roof Materials and Design

The roof can be the most vulnerable part of a structure to wildfire. Roofs are susceptible to firebrands that may fall on them and are vulnerable to radiant heat in the case of an extreme wildfire. The wildfire risk assessment should indicate if an extreme crown wildfire

Building Features to Reduce Wildfire Risk.



event is a possibility so that extra protective action can be taken. Once a roof actually ignites, chances are high that the fire will destroy the rest of the structure. A well-designed roof is an important protective barrier to wildfire.

To avoid rooftop ignition, install a fire-resistant or noncombustible roof covering. Class A fire-resistant roofing materials include 20-year, 25-year, and architectural-grade fiberglass composition shingles as well as shingles and shakes made from recycled materials (e.g., EcoShake®).

Noncombustible roofing materials are completely appropriate for high risk areas. These materials include standing-seam or exposed-fastener metal roofing, fiber-cement shingles (such as HardiPlank® brand), con-

Fire-Resistant Roofing Materials

Fire-resistant roofing materials are categorized as Class A, B, and C in accordance with the ASTM E108-10a Standard Test Methods for Fire Tests of Roof Coverings, which is a test for determining the rate of spread of flame in roofing materials (ASTM International 2010).

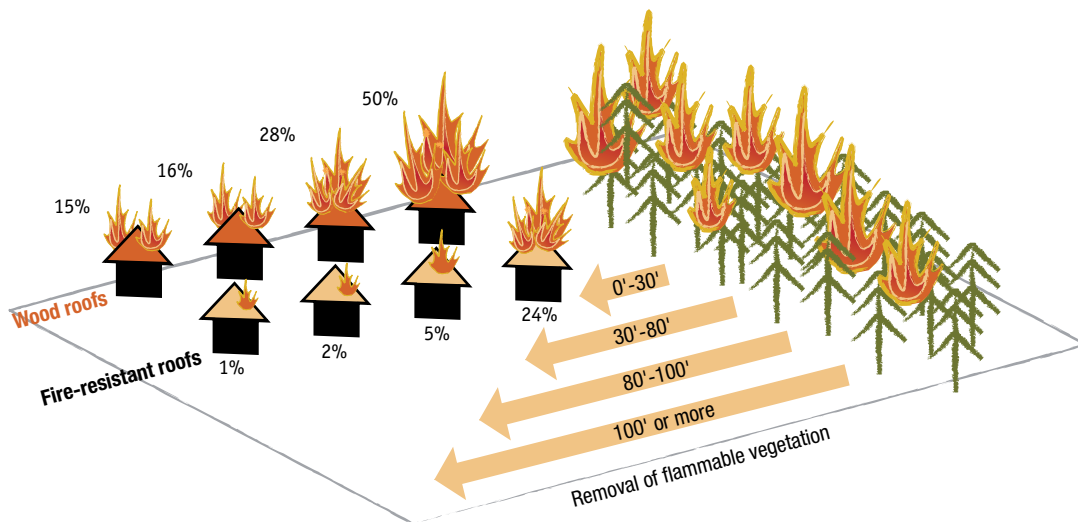
- Class A roof coverings are effective against severe fire exposures, affording a fairly high degree of fire protection to the roof decking.
- Class B roof coverings are effective against moderate fire exposures, affording a moderate degree of fire protection to the roof decking.
- Class C roof coverings are effective against light fire exposures, affording a measurable degree of fire protection to the roof decking.

Each class of roof coverings is also not readily flammable, does not slip from position, and poses no firebrand hazard. Note that the buildup on roofs of burnable organic debris can significantly reduce a roof's ability to withstand fire.

Case Study:**FLASH Blueprint for Safety™ Professional Multi-Hazard Training Program**

During June 2000, the Florida Department of Community Affairs (DCA) and the Federal Alliance for Safe Homes (FLASH) convened a blue-ribbon panel of experts to design an education curriculum for homebuilders, homeowners, inspectors, and other audiences interested in disaster-resistant construction. The curriculum focuses on wind, flooding, and wildfire risk reduction for new and existing homes. Through collaboration

with the DOF, the group adopted Firewise practices as its core wildfire principles and now delivers online, classroom, CD-ROM, and town-meeting courses and seminars. The award-winning *Blueprint for Safety™* program offers free professional wildfire mitigation training, awareness program resources, and technical support. It reaches tens of thousands of stakeholders throughout the U.S. with the most current information about wildfire risk reduction. Professionals from FEMA, the National Weather Service, and the fire services and emergency management community use *Blueprint for Safety™* to reach homebuilders, citizens, and others with crucial wildfire risk reduction information. See www.blueprintforsafety.org for more information.



Roof ignition as a function of material and distance from fire. (Adapted from Moore, 1981)

Firewise Roofs

- Noncombustible or Class A fire-resistant roofing materials in high-risk areas
- Simple roof design with few gables and pitches to catch debris
- Regular roof inspections and maintenance (clearing of debris)

crete or clay tiles, and natural slate roofing. ASTM does not rate noncombustible roofing materials because they cannot be ignited.

Wood shake shingles are the most flammable roofing material, but they are rarely used in Florida's humid climate. Wood shingles may be purchased with a fire-retardant coating, but they must be annually treated to maintain their fire-retardant qualities.

Another factor to consider during the design of a house for the WUI is the pitches and gables of the roof. Roofing planes or gables that tend to trap pine needles, leaves, and debris, or that could potentially trap flying firebrands, increase the chances of rooftop ignition if the roof is not regularly inspected and cleaned of debris. Keep the roof design simple (i.e., fewer gables and pitches) and perform regular maintenance in high risk areas.

Eaves, Soffits, Vents, and Gutters

The eaves of the house are often the closest point of the structure to the flames of a wildfire. Because eaves protrude from the edge of the house, they are vulnerable to both radiant and convective wildfire exposure. Because these features often are designed to ventilate attics or roof spaces and because of the strong

Firewise Eaves, Soffits, Vents, Gutters

- Eaves enclosed with noncombustible material
- Soffit vents and other vent covers of noncombustible or fire-resistant material that blocks the passage of firebrands (e.g., 1/4-inch-or-less metal mesh)
- If used, vinyl soffits and siding installed over a noncombustible liner
- Gutters and downspouts either noncombustible or designed to fall away from house in case of fire

Firewise Chimneys

- Chimneys fitted with approved spark arrestors (NFPA 1144)
- Noncombustible chimney siding

convection currents created during a wildfire, super-heated air and firebrands may be sucked into soffit or fascia vents and into the attic or interior roof space, creating an interior fire that usually cannot be stopped.

In medium or high risk areas, eaves should be enclosed with noncombustible materials. The size of the soffit vents in the eaves should be minimized and the vents themselves should be made of noncombustible and nonmelting material, such as metal. Plastic materials (e.g., PVC, fiberglass, vinyl) are vulnerable to melting or igniting under the influence of radiant heat. To limit the potential of combustion, all combustible vents should be replaced or underlain with noncombustible material to



The top left photograph shows the melted soffits and soffit vents on a house that has survived a wildfire. These melted soffits could have allowed embers to enter the eaves of the house. The bottom left photograph shows a house with noncombustible metal soffits, roofing, and gutters, and masonry siding. The top right photograph shows a house with vinyl siding that has melted in the radiant heat of a wildfire. The bottom right photograph shows a house with fire-resistant plank and masonry siding and melt-away vinyl railing that will fall away and not cause a fire hazard to the house. Photos: FDOF (top row), USFS (bottom row)

prevent firebrands from entering attics or crawl spaces.

If the roof has an internal space to ventilate summer heat, as is common in Florida, vents in the eaves or gables should be screened with 1/4-inch-or-less mesh to prevent the entrance of firebrands from a wildfire. The same recommendations apply for attic vents, subfloor vents, foundation vents, or other structural vents. Corrosion-resistant, noncombustible materials that minimize house mainte-

nance, such as galvanized steel or aluminum, are recommended for vent covers and protective mesh. If wind or convection currents push firebrands or flames through structural vents into a structure's crawl space or attic, the structure is likely to be destroyed. Gutters and downspouts also should be made of either noncombustible materials or vinyl, which will fall away during the intense heat of a wildfire instead of igniting the home. Needless to say, old-fashioned wood gutters are a fire hazard.

BUILDING CONSTRUCTION TO REDUCE WILDFIRE RISK

Chimneys

Chimneys can be a hazard in wildfire-prone areas. Embers from the fireplace can leave the chimney and ignite the roof, ignite a neighboring structure, or start a wildfire in the neighborhood, threatening the structure itself as well as neighboring structures and adjacent natural areas.

To easily protect both the structure and the surrounding forest from wildfire, every chimney should be fitted with an approved welded or woven wire-mesh spark arrestor. This feature has the added benefit of keeping birds and animals from entering or nesting in the chimney space. In addition, all siding on the chimney housing should be noncombustible material.

Exterior Walls

Fire-resistant exterior walls that do not ignite due to either radiant or convective ignition are significant protection for any building. If Defensible Space and a Firewise landscape have been installed around a building as described in Chapter 7, radiant heat is unlikely to ignite an exterior wall. Although a fire on an exterior wall will not automatically transfer to the interior through the wall itself, fire on an exterior wall is certainly undesirable and can easily enter the house through the eaves, soffits, vents, windows, or attic areas. Once the fire reaches the interior of the structure, the structure is likely to be destroyed.

Exterior wall materials that are resistant to radiant heat and flames include plaster, stucco, fiber cement, metal, and masonry (stone, brick, block). Some siding materials (e.g., vinyl, fiber-glass) will melt and fall away when exposed to very high temperatures, exposing the sheathing

Firewise Exterior Walls

- Exterior walls in high risk areas are built of fire-resistant materials (masonry, plaster/stucco, or fiber-cement)
- Trim, shutters, and lattices are fire resistant or noncombustible
- External doors are noncombustible or solid-core wood not less than 1-3/8 inches thick

or wall space to radiant heat or flames. If replacing exterior siding on an existing house is cost prohibitive, then it is even more important to maintain a Firewise landscape and take other wildfire risk reduction actions.

It is possible to treat existing wood siding with a fire-retardant mixture; however, these treatments must be repeated on an annual basis to maintain protection of the combustible siding. It is also possible to coat a vulnerable house with fire-retardant foam or gel as a wildfire approaches, but this practice involves considerable risk and cost to the homeowner and should only be considered as a last resort. Preventive measures are always better than last-minute actions when dealing with the wildfire threat.

Windows, Doors, and Skylights

Windows are another form of vent into the interior space of the house. Radiant heat from a wildfire can cause glass window panes to fracture, leaving an opening for flames or firebrands to enter the interior of a structure. Heat-resistant (tempered or double-paned) glass should be used for windows in houses

Firewise Windows, Doors, Skylights

- Exterior windows, glass doors, and skylights of heat-resistant glass (tempered or double-paned) or fire-resistant plastic
- Noncombustible (metal) window screens to prevent melting and entry of firebrands
- Solid-core wood or metal exterior shutters provide additional protection for vulnerable glazing in high risk areas



Keeping an appropriate Defensible Space is the best way to prevent the powerful radiant heat of wildfire from melting or igniting interior furnishings.

Photo: Brevard County Fire Rescue

being built in high risk or extreme risk areas. If a wildfire approaches a house with tempered or multi-layered glass, some part of the house will probably ignite before the windows fracture. Tempered glass is required in Florida for glass doors, and many houses are already built with multi-layer glass windows to meet Florida Energy Code requirements.

If heat-resistant glass products are too expensive, minimizing the size of the windows

Case Study: The Dairy Road Fire

Photo: Pandion Systems, Inc.

In May of 2007, at the same time as the more famous Bugaboo Fire was burning south from Georgia towards Lake City, the Dairy Road Fire threatened the residents of Little Lake Santa Fe in southeast Bradford County. An intense wildfire moved southeast across the thick vegetation of Santa Fe Swamp towards lake residences on Little Lake Santa Fe. Two buildings on the edge of the swamp provided a direct contrast in construction; one was a wooden shed full of garden tools and various flammable chemicals, the other an entirely metal structure that housed an

antique shop. The former burned to the ground and the latter received only charring. The wooden shed has been rebuilt as a metal structure.

About 100 yards away, a house with Defensible Space had some vegetation burn next to the side of the house. The walls of the house are composed of non-flammable, concrete-based fiber cement board. While the ground was charred right up to the base of the house, the noncombustible walls of the house showed no sign of fire damage. This case study demonstrates the importance of siding and roofing materials in protecting a structure from wildfire. If replacing exterior siding on an existing house is cost prohibitive, then it is even more important to maintain a Firewise landscape and take other wildfire risk reduction actions.

can be an advantage. Solid fire-resistant exterior shutters are an option for houses in high or extreme risk areas or for retrofitting existing houses where window replacement is cost prohibitive. Shutters have the added benefit of being able to resist the high winds of a hurricane.

Replacing nylon or plastic window screens with metal screens is a minimum first step for Florida houses in medium or high risk areas. Replacing the windows on an existing house is often cost prohibitive. Because of this, it becomes even more important in high risk areas to keep the radiant heat of wildfire away

from the building through Firewise landscaping described in Chapter 6.

Crawl Spaces, Decks, Balconies, Carports, Fences, and Other Attachments

Raised buildings without skirting – mobile homes, manufactured houses, lakeside houses, and pole buildings – are extremely vulnerable to wildfire because firebrands, or hot embers, can be blown into the crawl space under the structure, increasing the possibility of ignition. Likewise, decks, balconies, and other overhangs or attachments to a structure are often

Firewise Crawl Spaces, Decks, Balconies, Carports, Fences, Attachments

- Debris regularly cleared from crawl spaces
- Crawl spaces, decks, balconies, carports, and other attachments enclosed with noncombustible material or screened with 1/4-inch metal mesh
- Decking material has a minimum one-hour fire-resistive rating
- Combustible (wooden) sheds or fences are not attached to or adjacent to the house
- Combustible attachments (fences, decks) are separated from the house by noncombustible materials (aluminum flashing, metal gate)

more vulnerable to ignition from convective exposure (direct contact with nearby flames) and from firebrands being blown underneath them to ignite debris on the underside of the attachment.

A particular problem with these spaces is that homeowners use them as storage space for combustible materials such as firewood, boxes, propane grills, toys, yard furniture, and other materials. Twigs, pine needles, and leaves can accumulate and, where light is available, grass and weeds will grow and accumulate dead plant material. Clearing out this debris is the minimal maintenance required in wildfire-prone areas.

The solution is to always enclose these spaces with noncombustible sheet skirting or

Building Standards for Wildfire Risk Reduction

- The Florida Building Code (FBC) was developed to serve public safety, health, and general welfare through guidelines for structural strength, stability, adequate light and ventilation, and safety from structural fire and other hazards. The FBC applies to most structures being built, removed, repaired or altered, and it regulates the installation and maintenance of all electrical, gas, mechanical, and plumbing systems. The FBC does not specifically address building construction for wildfire risk reduction, although it does include comprehensive provisions for structural fire safety and for interior and exterior fire resistance.
- Structural fire prevention is further addressed through the Florida Fire Prevention Code (FFPC), which is mainly focused on the protection of life and property. The FFPC is Florida's statewide fire safety code, applying to most facilities in Florida. The FFPC is based on *National Fire Protection Association (NFPA) Standard 1 Fire Code and Standard 101 Life Safety Code* (2000). *NFPA 1144 Standard for Reducing Structure Ignition Hazards from Wildland Fire* (2008) is incorporated by reference in the FFPC. The FFPC applies to all jurisdictions in Florida and contains or incorporates by reference fire safety laws and rules pertaining to the design, construction, erection, alteration, modification, repair, and demolition of all buildings, structures, and facilities. There are provisions in the FFPC for local codes and amendments, which are to be submitted to the State Fire Marshal and the Florida Building Commission within 30 days of adoption. Many local jurisdictions have adopted local codes. Local wildfire mitigation ordinances may reference and be considered as amendments to the FFPC. See Chapter 4 for further discussion of local wildfire mitigation ordinances.
- Several national and international standards exist for wildfire risk reduction in the WUI. The goal of these national standards is to provide model codes for fire-resistant or ignition-resistant structures and landscapes that will offer reasonable protection from wildfire. They are intended to facilitate uniformity in the construction industry and are not enforceable until they are adopted or referenced by a local government code. These standards include *NFPA 1144 Standard for Reducing Structure Ignition Hazards from Wildland Fire* (2008), *NFPA 1141 Standard for Fire Protection Infrastructure for Land Development in Suburban and Rural Areas* (2008), *NFPA 1142 Standard on Water Supplies for Suburban and Rural Fire Fighting* (2007), *Urban-Wildland Interface Code* (International Fire Code Institute 2000), and *International Urban-Wildland Interface Code* (International Code Council 2003).

metal mesh to prevent the entry of firebrands. Florida Building Code also requires decks, fences, patios, planters, or other constructions that touch the exterior wall of the house or foundation to have removable skirting that allows for termite inspection.

Combustible (i.e., wooden) sheds should not be built adjacent to or touching a house. If possible, provide at least 12 feet of space between the house and shed. Do not store flammable materials anywhere close to the house. Wooden fences should not be directly attached to a house. They can act as a direct conduit for fire that will bring flames right up to a house. A section of fence at least 12 feet long made of noncombustible material should connect a wooden fence to the house. If gates are to be installed in a wooden fence, they are better placed near the home. Homeowners or firefighters can then open these gates to break the connection from the fire to the home. As discussed in Chapter 6, woodpiles should be kept outside of the 30-foot Defensible Space.

Utilities

Aboveground utilities can be problematic in wildfire-prone areas. Overhead power lines may stretch or arc when exposed to radiant heat, may be a clearance problem for firefighting equipment, and may even cause a wildfire if windblown branches come into contact with live lines. Existing overhead transmission lines should be regularly inspected and maintained by the local service provider to ensure that they are free of encroaching vegetation.

Aboveground utility connections or well-heads at rural houses must be protected from wildfire through vegetation clearance and/or noncombustible housings. Well-marked under-

Firewise Utilities

- Well-marked underground utilities
- Liquid propane (LP) gas containers and woodpiles located at least 30 feet from any structure and surrounded by 15 feet of cleared vegetation
- Septic tank locations marked to prevent collapse under heavy vehicles or equipment

ground utilities generally are preferable in high risk rural areas. Underground utilities that are not marked, however, can be a problem for wildfire suppression in Florida due to the common use of heavy crawler dozers and fire plows to fight wildfire in Florida. Heavy equipment may sever buried lines or collapse unmarked septic tanks (DOF 2002).

All flammable materials should be stored more than 30 feet away from structures. Aboveground liquid propane (LP) gas tanks and woodpiles should not be located within 30 feet of the structure, as discussed in Chapter 7. Additional information about planning for neighborhood-wide utility design is included in Chapter 5.

Support for Wildfire Protection and Suppression Efforts

In the worst-case scenario, a wildfire approaches and ignites a structure. At this point, any factors or hazards that slow the fire-fighter response create a greater chance that the house will be lost in the wildfire. The other half of the structural protection equation is to provide access and features that support fire-fighting activities such as Defensible Space, well-labeled houses, clear access, and the infrastructure and water supply needed to fight a wildfire.

Defensible Space

The first step is to create at least 30 feet of Defensible Space around the house, as described in Chapter 7. The Defensible Space is so named because it provides space for the structure to “defend itself” from wildfire. The primary purpose of Defensible Space is to separate the structure from wildland fuels so that the structure can survive even in the absence of firefighting assistance. Defensible Space secondarily allows firefighters the space to be better able to protect the house.

Street Signs and House Numbers

All street signs and house/site numbers should be visible from the road and should be made of noncombustible materials. Wooden signs may burn during a wildfire, making it difficult for firefighters who may not be familiar with the layout of the roads. Clear labels make it easier for firefighters to quickly locate and defend threatened structures. Clear signage is a requirement of most local government emergency management departments that is not always enforced. Numbers and lettering should

Firefighting Support and Access

- Houses have 30-foot Defensible Space; houses in high risk areas have a 100-foot-wide Firewise landscape
- Driveways are at least 12 feet wide with at least 15 feet of vertical and horizontal vegetation clearance
- Drives longer than 150 feet have turn-arounds; drives longer than 200 feet have both turnarounds and pullouts
- Gates open inward, have an entrance at least 2 feet wider than the driveway, and are at least 30 feet off the main road
- Locked gates have a key box approved by the local fire department
- Bridges have a capacity of 30 tons
- Neighborhoods in high risk areas have at least two access routes
- In remote areas without pressurized fire hydrants, a supply of firefighting water is provided (pool, pond, or tank)
- Houses have noncombustible reflective street numbers visible from the road

be at least 4 inches tall, mounted on a contrasting background, and visible from the road. Reflective numbers are useful in dark or smoky conditions. Adequate signage is especially important in Florida where firefighters sometimes must find the best way into areas laced with canals or drainage ditches.

Driveways and Gates

Driveways must be large enough to accommodate firefighting equipment. Typical fire trucks require a driveway at least 12 feet wide and



Helicopters and fixed-wing aircraft are often used to fight wildfire in Florida. Nearby water supplies are important to the aerial attack of wildfire. Photo: DOF

with 15 feet of clearance from vegetation on sides and above the driveway. A 16-foot-wide driveway is preferable. Driveways longer than 150 feet need to provide a turnaround. Driveways longer than 200 feet should have both turnarounds and turnouts, which are spaces for firefighting equipment to pull off the side of the drive so that another piece of equipment can pass.

Gates should open inward and be wide enough to accommodate firefighting equipment, at least 2 feet wider than the width of the driveway. Gates should be at least 30 feet off the main road so that the equipment can pull off the road to open the gate. If the gate is locked, the lock should not be so strong that firefighters are unable to break it in an emer-

gency. Gates should be equipped with a key box or electronic opener approved by the local fire department.

Road Infrastructure and Water Supply

Roads and bridges should be in good condition and should have a minimum clear width of 12 feet for each lane of travel (excluding shoulders and parking) to accommodate firefighting equipment and allow for evacuation at the same time. It is always better to have two routes of access into a property or subdivision, even if one is only for emergency use. This feature can be added to existing subdivisions and is good general practice for other emergency purposes as well. Other important aspects of road infrastructure are addressed in Chapter 5.

Sources of water for firefighting should be supplied in both rural and suburban WUI settings. In rural areas, lakes, ponds, canals, and other bodies of water may be suitable sources for helicopters with water buckets, which can drop water on a spreading wildfire. This water supply should be within 6 to 8 miles of the property to be effective for helicopter operations. In less remote areas, a pressurized hydrant system is ideal, but where there are no fire hydrants, elevated water tanks, pools, ponds, or other static water sources can work. If numerous structures are simultaneously threatened by wildfire, wells or water tankers cannot adequately supply firefighting needs. Regardless of source, the water supply should be within a 20-minute round trip to provide the best level of protection. Other important specifications for neighborhood water supplies are included in Chapter 4.

COSTS AND BENEFITS OF FIREWISE BUILDING PRACTICES

Modifying or retrofitting a house with Firewise features can be a good investment, particularly if the house is in an area at high risk for wildfire. Homeowners should consider the items in the accompanying table that are high priority and weigh the costs against the value of the property, the level of wildfire risk in the neighborhood, and the level of Firewise landscaping that is provided. This decision must be made on a case-by-case basis. If a homeowner lives in a high or extreme risk area, it probably is more important (i.e., more valuable) to complete the structural modifications in addition to Firewise landscaping.

Additional All-Hazard Benefits of Wildfire Risk Reduction

Incorporating risk reduction features into building construction and renovation proactively addresses wildfire concerns while also providing additional benefits.

- Increased storm resistance with higher grade and more sturdy roofing materials
- Increased storm and termite resistance with masonry construction
- Hazard protection from events such as hurricanes with increased structural stability and landscape resilience
- Increased safety with improved access roads and signage that better accommodate emergency vehicles

Costs and Benefits of Firewise Building Renovation or Construction

Item (in priority order)	Cost Range*	Benefit in High-Risk Areas**	Notes
Roof Maintenance	\$	👍👍👍👍	Debris on roofs is a major factor in firebrands setting houses on fire. Keeping a clean roof is a very inexpensive protective measure.
Vents – Modify soffit, attic, subfloor, or basement vents	\$ - \$\$	👍👍👍👍	Soffit vents are implicated in many Florida wildfire losses.
Enclose eaves, fascias, and soffits	\$ - \$\$\$	👍👍👍👍	Enclosing these parts of the building prevents firebrands or embers from getting under roof. Critically important.
Roof – (Re)Roof with noncombustible or Class A roofing	\$\$\$ - \$\$\$\$	👍👍👍👍	Roofs are very vulnerable in Florida wildfires. More expensive metal roofing has a longer life than shingles. Although this is expensive, it can help to protect a home under extreme risk.
Landscaping – Thin out existing and install new Firewise vegetation	\$ - \$\$\$	👍👍👍👍	No continuous lines of fuel up to house. No flammable shrubs or trees up close to house. See Chapter 7.
Landscaping – Maintain vegetation management	\$	👍👍👍👍	Maintenance is often neglected but very important. See Chapter 7.
Signage – Install fire-resistant signs and address numbers	\$	👍👍👍👍	Ensures firefighters can find specific properties threatened by fire.
Crawl Spaces - Enclose spaces under raised buildings, decks, overhangs, and attachments	\$ - \$\$	👍👍👍	Benefit depends on style of attachment. Landscaping can protect attachments.
Access – (Re)Build driveways and gates to handle firefighting equipment	\$ - \$\$\$\$	👍👍👍	Make gateways and driveways wider if necessary and provide space for emergency vehicles to turn around.
Chimneys – Install a spark arrestor	\$	👍👍👍	This very cheap addition can save a house from fire.
Siding - (Re)Cover exterior walls with fire-resistant material	\$\$\$ - \$\$\$\$	👍👍	Not necessary in most cases if other protective actions are taken (e.g., Firewise landscaping). Although this is expensive, it can help to protect a home under extreme risk.
Windows – (Re)Place single glazed with double glazed and consider heat-resistant glass or fire-resistant plastic panels	\$\$\$\$	👍	Not necessary in most cases if other protective actions are taken (e.g., shutters, Firewise landscaping).

*Cost Range: \$-No or Low, \$\$-Medium, \$\$\$-High, \$\$\$\$-Very High

**Benefit Range: 👍-Low, 👍👍-Medium, 👍👍👍-High, 👍👍👍👍-Very High

(Adapted from Institute for Business and Home Safety, http://www.disastersafety.org/resource/resmgr/wf_guides/wf_florida.pdf)

chapter

7

FIREWISE LANDSCAPING TO REDUCE WILDFIRE RISK



In Firewise workshops around Florida, it is obvious that many people just don't understand that by simply landscaping their properties with wildfire protection in mind – putting the right plants in the right place and then maintaining them – they would do away with one of the huge factors that invites wildfire home.

—Gerry LaCavera, Wildfire Mitigation Coordinator, Florida Division of Forestry

IMPORTANCE OF FIREWISE LANDSCAPING

As Florida's population increases and expands into rural and undeveloped areas, the wildland-urban interface (WUI) area is expanding. Since most of Florida's ecosystems are adapted to fire, many houses in the WUI have some level of wildfire risk. Just as coastal residents prepare for hurricane season, residents on the WUI should prepare for wildfire by adopting Firewise landscape features and maintenance.

In addition to reducing risk through Firewise building construction (Chapter 6), a house is more likely to withstand a wildfire if grasses, brush, trees, and landscape plants are selected and managed to reduce the intensity of a wildfire. Firewise landscaping slows the spread of wildfire and helps keep wildfire away from buildings as much as possible.

It is not necessary to remove all of the trees and vegetation in a landscape to protect the property from wildfire. Rather, the quantity, spacing, and flammability of surface-level fuels – such as pine needles, twigs, woodpiles, landscaping plants, shrubs, and small

trees – are some of the most important elements in reducing the wildfire threat to houses in the WUI.

A properly maintained Firewise landscape is one in which zones are created. The zones nearest the house or structure should be landscaped to offer the most protection from wildfire, protection being a function of the flammability and density of vegetation. The zones farther from the house can incorporate more naturalized landscaping and vegetation. This landscape gradient will ultimately lower the risk of damage when a wildfire occurs.

This chapter describes specific Firewise landscaping practices to reduce hazardous fuels and reduce wildfire risk.

- Assessing wildfire risk
- Designing a Firewise landscape
- Maintaining a Firewise landscape
- Balancing wildfire risk reduction and environmental protection
- Comparing costs and benefits of Firewise landscaping



A Florida-Friendly Landscape can be both beautiful and fire-resistant. Photo: DOF

Surface Fuels in the Landscape Determine Risk

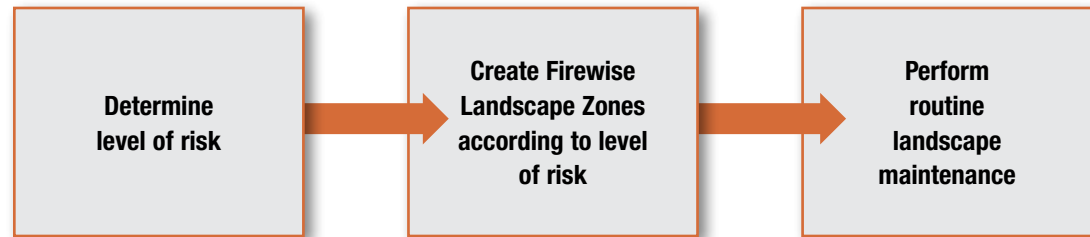
Surface fuels – including flammable landscaping, grasses, shrubs, pine needles, debris, woodpiles, and small trees – increase the risk of wildfire approaching and damaging a house more than any other factor. When surface-level fuels are reduced or removed, wildfires become easier to suppress. U.S. Forest Service research has concluded that managing surface-level vegetation within the immediate vicinity of homes is the best approach to preventing the vast majority of structural wildfire losses in the wildland-urban interface (e.g., Cohen 2000b, Cohen 1999).

THE FIREWISE LANDSCAPING PROCESS

Basic Steps to Reduce the Level of Wildfire Risk in the Landscape

These steps to Firewise landscaping can be used by anyone interested in protecting houses and other structures from wildfire.

Homeowners can employ these tactics in their backyards for minimal cost. Landscape architects, designers, installers, and developers have an important role to play in protecting homes in new Florida developments with Firewise



landscaping. In high risk areas, everyone should become involved in collaborative efforts to plan for community wildfire risk reduction, such as efforts discussed in Chapters 2 and 3.

Assessing the Level of Wildfire Risk

Before designers, builders, or homeowners proceed with the work of designing and maintaining landscapes to reduce wildfire risk, it is important to identify and assess the actual level

Case Study:

Landscaping at the Firewise/Fortified Retrofit Demonstration House

The Firewise/Fortified Retrofit Demonstration House in Alachua County is a typical 20-year-old Florida house located on a 2-acre property adjacent to state and private lands with high wildfire risk. When the house was built, fire-adapted vegetation remained within a few feet of the house.

The project demonstrated both Firewise building retrofits and Firewise landscaping. Firewise

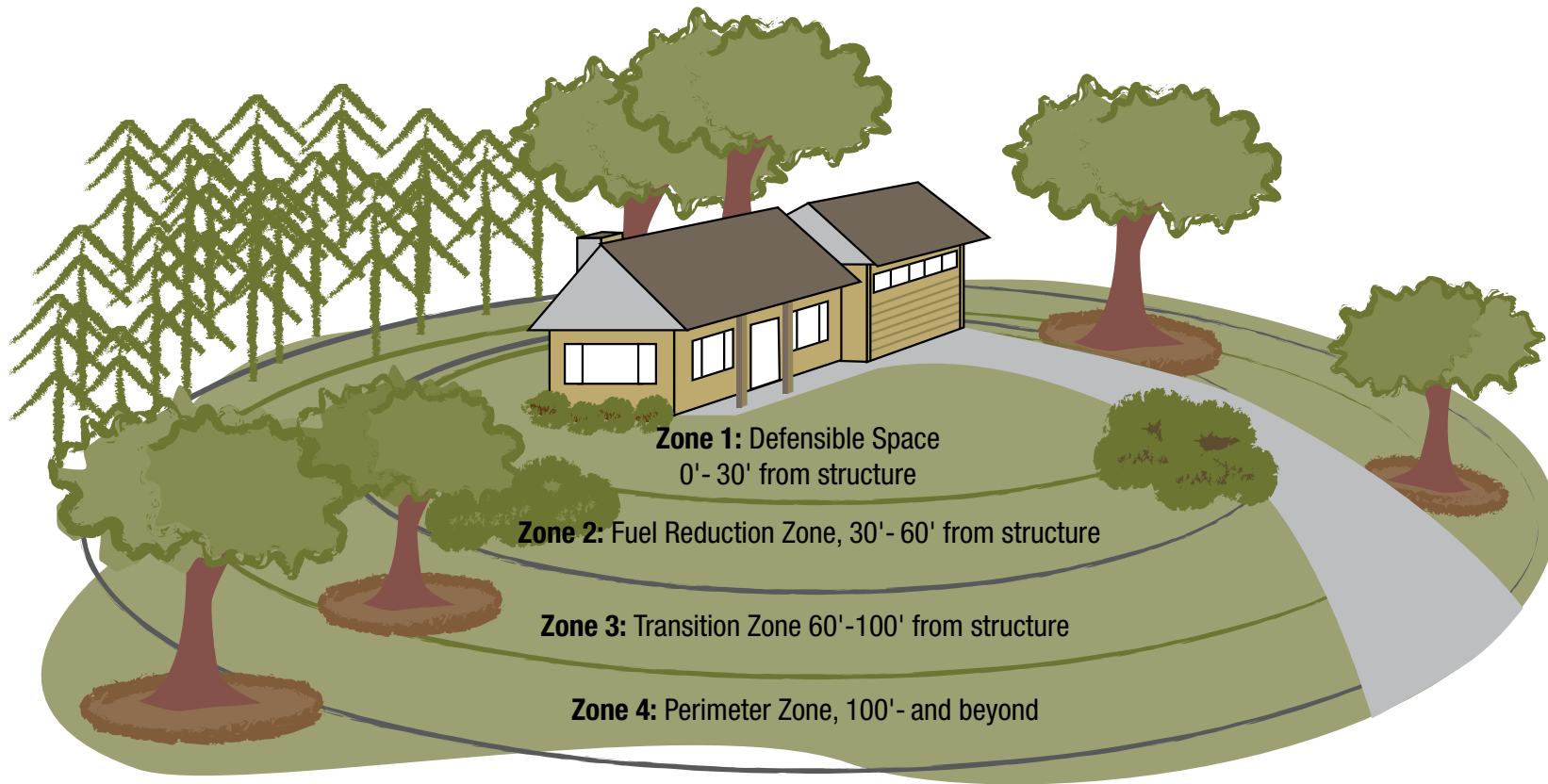
landscaping modifications included the creation of Defensible Space around the house with the removal of highly flammable plants, thinning of trees adjacent to the house, and reduction of flammable natural vegetation on the remainder of the lot.

The demonstration project was a joint effort of the U.S. Forest Service, the Florida Division of

Forestry, the Florida Division of Emergency Management, Institute of Business and Home Safety, University of Florida's Cooperative Extension Service, and Alachua County Fire Rescue. Please visit <http://www.interfacesouth.org/fire/firewise-home/> for photographs and explanations of the retrofit project.



Before and after photographs of the Firewise Demonstration House in Alachua County show landscaping improvements. Fire-prone vegetation has been removed from near the house and a wooden fence has been replaced with metal. The homeowner wanted turfgrass in the new landscape, but homeowners may use other living groundcovers or fire-resistant mulches around the Firewise landscape. Photos: USFS



Defensible Space Protects Houses

Research shows and wildfire experts agree that structures with a well-maintained Defensible Space are more likely to survive a Florida wildfire.

Zone 1: Defensible Space (0' - 30' from structure)
Thin trees and vegetation, prune branches, mow regularly, clear debris, use less flammable plants, allow for firefighting access, and irrigate regularly.

Zone 2: Fuel Reduction Zone (30' - 60' from structure)
Reduce fuels, use less flammable plants, mow seasonably, store combustibles, and irrigate wisely.

Zone 3: Transition Zone (60' - 100' from structure)
Reduce fuels, use less flammable plants, mow seasonably, store combustibles, and irrigate wisely.

Zone 4: Perimeter Zone (100' and beyond from structure) Manage Fuels

Collaborate for Firewise Landscaping

Reduction of surface vegetation is the most important factor in protecting your house. If lots are small, neighbors should agree to work together to be protected. Consult with a Florida Division of Forestry Field Unit representative or other wildfire expert for additional assistance.

of risk, particularly if the house is in a WUI area.

This manual includes risk assessment information that can be used by landscapers and homeowners. A Risk Assessment Decision Tree and risk assessment photographs are provided in Chapter 1. From the results of the decision tree, readers can determine whether they need to consult one of the more detailed wildfire risk assessment tools.

Vegetation is a critical factor in wildfire risk and it is a factor that can change fairly rapidly, building up to a dangerous level in just a few years. The level of wildfire risk can dramatically change over time, depending on vegetation present and accumulation of fuels. Wildfire risk also depends on factors such as land use, weather conditions, and predicted fire behavior.

Creating Firewise Landscape Zones

Fires need fuel to burn. Dead branches and needles burn quickly, as do some of Florida's fire-prone green shrubs and trees. Since surface fuels (vegetation and debris) contribute the most to wildfire risk, an area of reduced surface fuels and separated vegetation will make it

Ladder fuels carry fire from the ground to the treetops or eaves of a building

- Vines climbing on trees or walls
- Small pine trees (up to 15 feet tall) under taller pine trees or eaves
- Tall shrubs under pine trees or eaves
- Any flammable shrubs that are under pine trees or eaves



Vines, tall shrubs, and small trees or palms can act as ladders leading wildfire into the crowns of the pine trees.
Photo: (left) FDCA, (right) FDOF

difficult for a wildfire to get close enough to burn the landscape or buildings.

A Firewise landscape involves creating a series of concentric zones around a house, like the rings on a target, where your house is the bull's-eye. The objective of Firewise Landscape Zones is to progressively reduce flammable vegetation and debris closer to the house or other structure. These zones of reduced vegetation and debris act to slow a wildfire's approach and reduce its intensity.

The zone concept is designed with Florida's fire behavior, vegetation characteristics, and environmental conservation needs in mind. The zones define where specific actions should be taken. The landscaping around detached garages, storage buildings, barns, and other structures should be included in the zone plan.

- **Zone 1:** Defensible Space (0 to 30 feet from structure) – All houses
- **Zone 2:** Fuel Reduction Zone (30 to 60 feet structure) – Moderate, high, and extreme risk houses
- **Zone 3:** Transition Zone (60 to 100 feet from structure) – High and extreme risk houses
- **Zone 4:** Perimeter Zone (100 to 200 feet and beyond) – Extreme risk houses and rural/forested homesteads of 2 acres or more

Zone 1: Defensible Space (0 to 30 feet from structure) – All Houses

Zone 1, called the Defensible Space, is the most critical zone and is defined as an area around a structure where surface fuels are selected and maintained to improve the likelihood that the home will survive on its own

Case Study:**Defensible Space at the Cypress Knoll Firewise House**

In the wake of the 1998 wildfires in central Florida, which burned a number of houses in Palm Coast, the City of Palm Coast adopted Ordinance 2001-11 in an effort to reduce wildfire risk in residential areas. The Cypress Knoll Firewise House was planned as both a demonstration of Firewise landscaping principles and as a demonstration of the effects of the ordinance, which requires vegetation management on undeveloped lots adjacent to developed lots in the Palm Coast subdivisions.

The Cypress Knoll house was selected because it was at high risk from wildfire, had high-risk vegetation, had no Defensible Space around the house, and was surrounded by highly flammable vegetation on a neighboring undeveloped lot. Vegetation on the neighboring lot was mulched using a GyroTrac® machine and Firewise landscaping principles were applied around the Cypress Knoll house to further reduce risk of the wildfire.



At Cypress Knoll Firewise House in Palm Coast, before-and-after photographs show that islands of native vegetation and mature trees have been maintained, while fire-prone shrubs close to the house and under the eaves have been removed.

Photos: Bill Butler/Firewise

Mature Trees Save Energy and Provide Wildlife Habitat

Mature trees are unlikely to burn in a fire if surface vegetation has been maintained. Removing all of the trees around a house would eliminate shade and increase temperatures during hot weather. Homeowners should keep mature pine or oak trees and plant oak or other broadleaf trees in Zone 1 and Zone 2. Leaves from oak and broadleaf trees are less flammable than pine needles and may even prevent a fire from spreading. Make sure to keep trees 15 feet from structures and driveways to allow for equipment access.

even if firefighters cannot reach it. When multiple houses are threatened in a large wildfire, firefighting resources are stretched thin. Under these circumstances it is important for houses to be able to survive without added firefighter protection. Defensible Space also reduces the chance that a structural fire will spread from a house to the surrounding forest or other houses.

Defensible Space must be continually maintained to be effective.

- **Keep all vegetation and organic mulches at least 5 feet from the house** and other structures, including outbuildings. Use noncombustible separators such as gravel mulches, patios, walkways, driveways, stone walls, raised planters, or pools as fuel breaks directly adjacent to the house.

- **Replace flammable plants with less-flammable plants** in the landscape. Plant grasses, flowers, and small shrubs that stay green and growing when wildfires are most likely to start (January-May).

- **Arrange plants in separate mulched beds or islands** that are divided by at least 10 feet of a low groundcover or turf.

- **Remove stressed, diseased, or dying trees and plants.**

- **Remove or trim ladder fuels** under pine trees and eaves. Prune low branches to at least 6 feet above the ground.

- **Thin pine trees to a 15-foot spacing between tree crowns.** Space new saplings so that the crown of the mature trees will be at least 15 feet away from other tree crowns.

- **Keep mature, less-flammable trees for shade.** Tree crowns of oaks and other less-flammable trees may be touching since they

provide important shade for cooling and energy conservation in Florida's hot climate.

- **Maintain a 15-foot wide and tall clearance along driveway and around house** and other structures (including pools) for firefighting equipment access. This 15-foot clearance should be free of large shrubs, trees, and septic tanks so that heavy equipment can have access.

- **Prune tree branches 15 feet away from roof, chimney, stovepipe, and siding.**

- **Do not keep firewood, flammable materials, storage buildings, or compost in the Defensible Space.**

- **Irrigate wisely during dry seasons** without wasting water and within local water management guidelines.

Zone 2: Fuel Reduction Zone (30 to 60 feet from structure) – Moderate, High, and Extreme Risk Houses

Zone 2 is an area of fuel reduction and modification that should be used at sites with moderate or high wildfire risk. In Zone 2, thin and group shrubs and reduce the presence of highly flammable plants. Extend this zone along the driveway or other access roads in order to provide blockage of the access route by wildfire.

- **Replace flammable plants with less-flammable plants.** When it is not practical or desirable to remove a flammable plant, surrounding it with open space or less-flammable plants may reduce the hazard.

- **Mow or remove vegetation between shrubs to create separate islands.** Arrange new plants in mulched beds or islands separated by groundcover.

- **Remove stressed, diseased, or dying trees and plants.**

- **Remove or modify ladder fuels under pine trees.** Prune low branches to at least 6 feet above the ground.

- **Consider thinning pine trees to 15-foot spacing between tree crowns.** Keep mature trees for shade.

- **Maintain a 15-foot-wide-and-tall clearance along driveway** for firefighting equipment access. This 15-foot clearance should be free of large shrubs, trees, and septic tanks so that heavy equipment can have access.

- **Provide 15-foot vegetation clearance around flammable materials,** such as propane tanks, barbeque grills, firewood piles, paint/chemical storage, and other materials.

- **Irrigate wisely during dry seasons** without wasting water and within local water management guidelines.

Zone 3: The Transition Zone (60 to 100 feet from structure) – High and Extreme Risk Houses

Zone 3 is a Transition Zone between the inner zones and the natural landscape beyond. This is an important zone if the site is at high or extreme risk from wildfire. Vegetation maintenance in this zone can keep a hot crown fire from approaching and igniting the house or other structures.

- **Thin shrubs lightly.**

- **Mow or remove vegetation between shrubs to create separate islands.**

- **Remove or trim ladder fuels under pine trees.**

- **Consult with Florida Division of Forestry or a private wildfire expert to learn about additional protective measures.**

Zone 4: Perimeter Zone (100 to 200 feet and beyond) – Extreme Risk Houses and Rural/Forested Homesteads of 2 Acres or More

Zone 4 is the Perimeter Zone beyond the landscape immediately around the house. This zone extends beyond 100 feet from any structures that need protection. Periodic vegetation management in Zone 4 will help to protect the house and property in the event of a wildfire in extreme-risk or rural areas. The goal is to slow an approaching wildfire, reduce the intensity of the wildfire, and keep the wildfire low to the ground. Removal or trimming of ladder fuels is especially important in this zone to keep fire from climbing into the crowns of the trees. Vegetation reduction techniques include prescribed burning, mechanical methods (mowing, chopping), biomass removal (pine straw harvesting, thinning of trees), herbicides, and/or grazing. See Chapter 8 for more information on fuel management strategies for large properties. If properly managed, Zone 4 can become an effective buffer to wildfire in extreme risk areas.

- **Engage in fuel management (reduction) practices to reduce wildfire risk and protect property.** Fuel management should be carried out by the private property owner, the HOA, or management contractor for a community greenspace area. If the property is owned or managed by someone else, the homeowner should ask for, encourage, and tolerate prescribed burning and other fuel management activities on the adjacent lands.

- **Consult with DOF or a private wildfire expert to learn about additional protective measures.**

FIREWISE LANDSCAPING TO REDUCE WILDFIRE RISK

Plants for the Florida Firewise Landscape

Homeowners and landscape contractors will want to carefully consider the characteristics of any plants that are to be installed in a Firewise landscape.

- Low flammability
- Geographic suitability (matching USDA Plant Hardiness Zone)
- Location suitability (matching soil, water, and light needs)
- Low or easy maintenance

The most important plant feature to consider for the Firewise landscape is flammability. Flammability in plants depends on many variables including chemical composition, growing conditions, type of bark and leaves, amount of debris given off, and maintenance by the homeowner. In addition, installing the right plant in the right place and maintaining plants with regular pruning and raking of debris are important features of the Firewise landscape.

Refer to the descriptions below to find plants that are less flammable for the home landscape. A Firewise plant list is available from the DOF (www.fl-dof.com).

Highly Flammable Plants

There are a number of characteristics that cause highly flammable plants to easily ignite and burn.

- Low moisture content in leaves
- Narrow, needle-like leaves that are often evergreen (e.g., pine needles)
- Volatile oils or resins indicated by leaves that are aromatic when crushed

Remove flammable plants like saw palmetto, wax myrtle, yaupon holly, red cedar, pampas grass, cogongrass*, and gallberry within 30 feet of your home. These shrubs are appropriate farther from your home and in natural areas managed with prescribed fire. They contain resins, oils, and waxes that burn readily. Many other plants are not as flammable, such as dogwood, viburnum, redbud, sycamore, magnolia, beautyberry, oaks, red maple, wild azalea, sweetgum, coontie, winged elm, black cherry, persimmon, wild plum, sugarberry, Florida soapberry, fringetree, ferns, wild olive, blue beech, hophornbeam, and sparkleberry.*

—Martha Monroe and Alan Long, University of Florida (*plants added by editors)

- Waxy or fuzzy leaves
- Retention of dead leaves, twigs, or branches on the plant
- Fine or twiggy, dry/dead debris that accumulates under the plant
- Compact or tight form or branches/leaves that touch the ground
- Loose, papery, shaggy, corky, or thick bark

Highly flammable plants ignite quickly and release large quantities of heat even when healthy and well-watered. They plants should be removed from the Defensible Space and thinned in Zone 2 of the Firewise landscape. Highly flammable plants should never be left to grow under the eaves of a house. Keep them at least 30 feet or more from structures or planted in isolated landscape beds, separated vertically and horizontally from other plants and the structures. Note the height and width of each plant when selecting its location, to ensure that as it grows, it will fit the space according to Firewise principles.

The Right Plant for the Right Place

Well-designed landscapes that follow the principle of “the right plant for the right place” can be Firewise, can conserve water, can increase energy efficiency, and can provide improved wind storm protection.

Identifying Firewise Plants for Florida Landscapes

The DOF has recently developed a Firewise plant list for Florida landscapes. The list includes high-, medium-, and low-flammability ratings, as well as flower and foliage descriptions and cultivation requirements for over 370 plants. The list can be found by visiting the Mitigation pages at www.fl-dof.com.

Routine Maintenance is Essential

Even if Firewise landscaping principles are closely followed, wildfire can still burn houses if debris or other fuel accumulates in the Defensible Space. The most important maintenance practice is to keep the roof, gutters, foundation, deck, and vegetation in Zone 1 clear of flammable debris, especially as Florida's dry season arrives and wildfires occur more frequently.

Florida Firewise Landscape Routine Maintenance Calendar

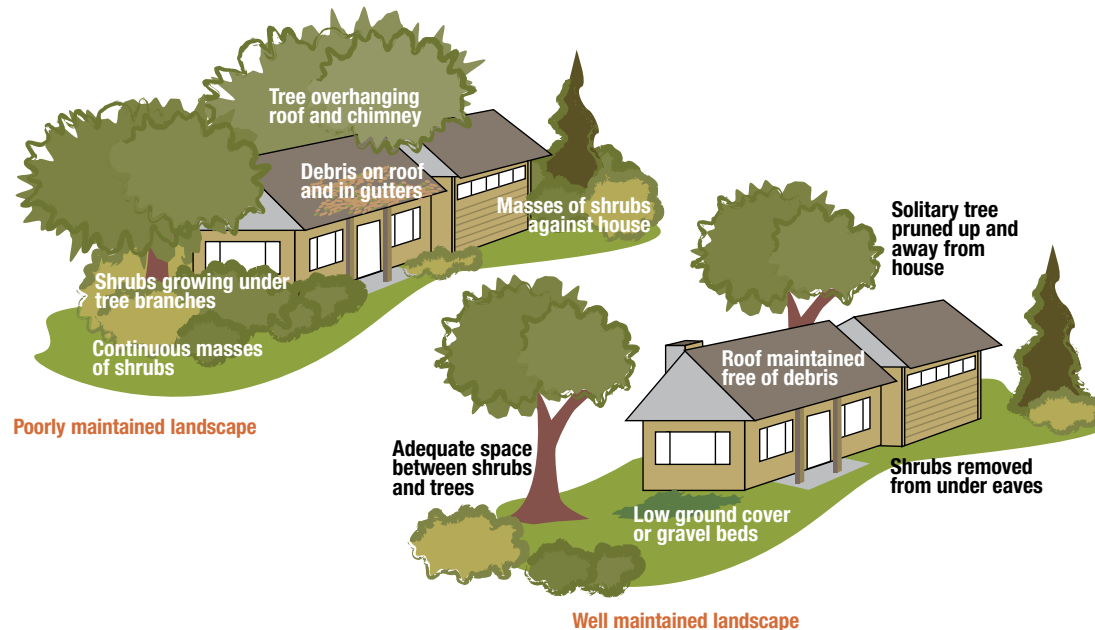
Annual (November) Inspection and Maintenance – All Houses

- Remove dry weeds, brush, pine needles, and branches that have accumulated in Zone 1 on the roof and in gutters.
- Keep trees and shrubs pruned and in healthy condition – prune branches 6 to 10 feet above the ground and 15 feet away from the roof, chimney, siding, outbuildings, and driveway.
- Remove yard trash, woodpiles, and debris accumulations from Zone 1.

Seasonal (Quarterly) Maintenance – Medium to High-Risk Areas

- Rake up leaves, pine needles, twigs, and dead limbs in Zone 1 Defensible Space and dispose of them outside of Zone 1.
- Mow grasses or other groundcovers between shrubs and trees. Mowing heights should be less than 8 inches (Zone 1), less than 12 inches (Zone 2), and less than 24 inches (Zone 3).
- Irrigate wisely (i.e., without wasting water) during dry seasons to keep groundcover green and mulch moist, especially in Zone 1 Defensible Space.

Maintaining the Florida Firewise Landscape



- Remove dry weeds and debris from Zone 1 Defensible Space (refer to page 106)
- Remove debris from roof and gutters
- Keep trees and shrubs healthy and pruned away from roof, chimney, siding, and driveway
- Remove yard trash, woodpiles, and debris from Zone 1 Defensible Space
- Mow grasses or groundcovers between shrub and tree islands
- Irrigate wisely during dry seasons in Zone 1 Defensible Space

FIREWISE LANDSCAPING TO REDUCE WILDFIRE RISK

Less-Flammable Plants

In place of highly flammable plants, use less-flammable landscape plants. Although no plant is absolutely fireproof, less-flammable plants have characteristics that cause them to take longer to ignite and be less likely to burn.

- High moisture content in leaves
- Broad, flat leaves
- Deciduous foliage (plants or trees that drop their leaves each year are often more resistant to fire)
 - Non-aromatic leaves indicating low oil or resin content
 - Open or loose branching habit
 - Limited foliage and few dead branches or leaves remain on the plant
 - Minimal seasonal accumulation of dead vegetation under the plant, or broad/flat leaves that hold moisture and discourage fire on the ground
- Easy maintenance and pruning

Low flammability plants are acceptable for planting within the Defensible Space in Firewise landscapes, and at least six feet away from the house. All plants planted near structures still require regular maintenance and removal of dead plant material. Note the height and width of each plant when selecting

its location, to ensure that as it grows, it will fit the space according to Firewise principles.

Designing and Installing a Firewise Landscape

Landscape Design

The best Firewise landscape design combines the fundamentals of good landscape design with Firewise landscaping principles to create a yard or greenspace that will conserve water, save energy, provide wildlife habitat, and look beautiful, while also protecting the property and neighborhood from wildfire.

- **Design the landscape with water-conserving and less-flammable plants.** Native plants are usually better adapted to Florida's soils and climate. Limit irrigation to areas within 30 feet of houses or structures.

- **Select the right plant for the right place considering a plant's soil, water, and sun/shade requirements.** Group plants with similar maintenance needs. Low-maintenance plants are those that require less constant attention from the homeowner. These plants are often pest-resistant, native or non-invasive, and thrive without supplemental fertilization.

- **Use noncombustible mulches and groundcovers near the house.** Use organic

mulches only in Zone 2 and beyond. If kept wisely irrigated, mulches help to reduce weeds, retain moisture, and slow runoff. Avoid cypress mulch.

- **Keep plants and groundcovers (turf) that require irrigation in Zone 1 Defensible Space of the landscape.** Design Zone 2 as a place for "drought-tolerant" or low-water plants that can survive on Florida's abundant rainfall. In Zone 3 and beyond, rely on natural landscaping with less-flammable native plants that are adapted to Florida. Keep irrigation in all zones except Zone 1 at the minimum required to maintain the plant.

- **Follow the Firewise landscape maintenance recommendations to the right.**

Landscape Installation

A homeowner can create a Firewise landscape by following these guidelines. If a property owner needs assistance in creating Defensible Space and the zoned landscape, contractors can be directed to follow these guidelines. For assistance with larger properties or developments, a list of qualified prescribed fire and fuel management contractors is available from the DOF Field Unit or local Cooperative Extension Service office.

Before planning a Firewise landscape, property owners should review deed restrictions and check with local authorities for ordinances that may regulate tree or shrub removal on residential property. Local ordinances also may govern clearance distances for brush and other flammable vegetation, disposal of debris, or other fire safety requirements. Refer to Chapters 3, 4, and 5 for descriptions of possible planning, regulatory, and deed guidelines for Firewise landscaping.

Maintaining the Firewise Landscape

Firewise landscapes require routine maintenance to retain their fire-resistant characteristics. Over time, plants grow and spread, mulches dry out, and debris, such as pine needles, palm fronds, and leaves, accumulates. These changes provide fuels that can accelerate a wildfire.

Even a less-flammable plant can become a fire hazard if it is overgrown, accumulates dry or dead needles or branches, or grows above dead vegetation or dry mulch. To maintain less-flammable plants, trim back dead vegetation and clear away debris during annual or seasonal maintenance. After pruning, the fresh, green growth on plants is less flammable.

Vines and groundcovers can build up a heavy layer of foliage and dead leaves, which should be removed to reduce fuel for wildfire. See the DOF's list of Firewise landscape plants at www.fl-dof.com for suggestions of less-flammable trees and shrubs that require minimal pruning and maintenance.

Making Firewise Landscapes Compatible with Other Landscaping Goals

When considering Firewise landscape guidelines to reduce wildfire risk, it is important to balance risk reduction with environmentally sound practices, including water and energy conservation, local tree ordinances, backyard wildlife habitat, and aesthetics. For example, removing all of the vegetation and trees around a house also removes protection from soil erosion and the hot summer sun. Trees that shade Florida houses help conserve energy, buffer noise, improve local air quality, provide wildlife habitat, and add to the quality of life.

Help for Achieving Multiple Landscaping Goals

There are several resources and publications that provide guidance for Firewise landscape design and plant selection.

- *Landscaping in Florida with Fire in Mind*, <http://edis.ifas.ufl.edu/fr076>
- *Selecting and Maintaining Firewise Plants for Landscaping* www.interfacesouth.org/products/fact_sheets/Selecting_Maintaining_Firewise_Plants_Landscaping.pdf
- *Florida Division of Forestry Firewise Plant List* www.fl-dof.com
- *Reducing Wildfire Risk While Achieving Other Landscaping Goals* www.interfacesouth.org/products/fact_sheets/Reducing_Wildfire_Risk.pdf
- *Making a local plant list for use in Firewise landscaping* www.interfacesouth.org/products/flammability_key.html

FIREWISE LANDSCAPING TO REDUCE WILDFIRE RISK

Energy Conservation

Maintaining tree cover provides ecological and energy conservation benefits. Because of Florida's hot climate, a program that encourages the modification of ground vegetation, removal of vines, separation of shrubs into landscape islands, and trimming of lower tree branches is more beneficial than removing all of the trees from around a house. Mature trees, especially oaks, may remain as an important part of a Firewise landscape. Use large leafy trees on the east and west sides of a house to help keep it cool in summer. Residents should check with their HOA and/or local government before removing trees to be sure they comply with any tree protection ordinances.

Water Conservation and Irrigation

Water conservation is important in Florida. Although yard irrigation is often recommended to help reduce wildfire risk, lack of irrigation is a wildfire risk factor only under extreme conditions. Water-conservation landscaping is compatible with Firewise landscaping. A water-conservation landscape uses less water through creative, efficient landscape design, emphasizing the use of the right plant in the right place with proper maintenance and waterwise irrigation.

The best Firewise landscape practices involve reducing and replacing highly flammable plants with less-flammable plants. Less-flammable native plants also are drought tolerant and may cut water use by 20% to 50% in

addition to reducing mowing, fertilizing, and pruning requirements.

Wind Storm Protection

Protecting a house and landscape from wind damage requires steps that are compatible with a Firewise landscape. A zoned Firewise landscape helps to protect against wind damage by having fewer trees around the house and spacing trees farther from each other. Many Firewise trees are also less vulnerable to wind damage. For example, native live oaks and magnolias are both less flammable and less prone to wind damage. In addition, trees that are pruned are less likely to be damaged by high winds and also have less flammable dead or dying limbs and debris. A list of wind-resistant tree species may be found in the University of Florida IFAS Extension publication *Assessing Damage and Restoring Trees after a Hurricane* at <http://edis.ifas.ufl.edu/pdf/EP/EP29100.pdf>. The DOF provides information about forest recovery after a hurricane at http://fl-dof.com/forest_management/cfa_hurricane.html.

Wildlife Benefits

Firewise landscapes that use native plants and trees can provide the extra benefit of food and shelter for native wildlife. Florida landscaping guidelines can be seen at University of Florida's Florida-Friendly Landscaping site at www.floridayards.org.

Wise Florida Irrigation Practices

Half of residential water use in Florida is for irrigation. Too much irrigation contributes to plant fungal diseases, wastes limited water resources, and raises water bills. Florida residents should use water-wise plants and low-water landscape principles.

- **Irrigate wisely.** Drought-tolerant and native plants can survive on normal rainfall in Florida. Experiment with gradual reductions in irrigation to see if plants can tolerate less water.
- **Irrigate Defensible Space when plants and turf are dry.** Limit irrigation in areas beyond Zone 1.
- **Water once a week or less in cooler months.** Turn off automatic systems when rainfall is consistent. Florida law requires that automatic sprinkler systems use a sensor to override irrigation when it rains.
- **Water deeply without overwatering.** Water in the early morning (4–7 am) and in accordance with local water restrictions. Plants are less susceptible to disease if water is applied in the morning.
- **Use drip heads or “soaker hoses” for increased efficiency.**

(Adapted from Florida's Water Management Districts and Florida-Friendly Landscaping Program at www.floridayards.org)

THE COSTS AND BENEFITS OF FIREWISE LANDSCAPING

Because conditions vary so much from site to site, an analysis of the costs versus the benefits of Firewise landscaping will be most meaningful when considered with a particular house or development in mind. Nevertheless, a general analysis can be used to compare costs for standard practices versus Firewise practices.

In the case of landscape installation and maintenance, there is no additional cost to install and maintain a Firewise landscape. Wise selection and placement of less-flammable plants is the only difference between a Firewise landscape and a standard landscape. Most

landscape architects and landscaping contractors can specify less-flammable plants from the lists provided in this manual or other sources. Less-flammable plants are readily available and do not cost more than fire-prone plants. Maintenance in concert with environmental guidelines (e.g., water conservation, energy conservation, retaining large trees around houses for shade) is always recommended for any landscape installation. These environmental practices save water, money, and energy while also resulting in a more aesthetically pleasing landscape and tree canopy.

The cost of modifying an existing landscape is expected to be less than the cost for installation of an entirely new landscape. In

some cases, the costs for modifying an existing landscape are low and involve simply pruning, raking, or mowing to reduce surface fuels. A higher, one-time investment may be justified if fire-prone plants are to be replaced with less-flammable plants

In all cases, the benefit is the protection of the structure and other improvements from wildfire. The higher the level of risk, the greater the benefit gained from landscape modification. One consideration is the value of the structural resources being protected. Value in this case can refer to monetary, cultural, historic, sentimental, or other forms of value. For example, landscape modification would provide the most perceived benefit for a high-value structure in a high risk environment.

Costs and Benefits of Firewise Landscape Retrofit or Installation

Type of landscape	Installation of new landscape	Retrofit of existing landscape	Ongoing landscape maintenance	Analysis of Benefits
Firewise Landscape	Same Cost as Conventional: Overall cost depends on area, design, size of lot, and extent of hired help.	Possible Additional Costs: Costs are only incurred if new plants are purchased and installed. Some existing landscapes only require a shift in maintenance practices to gain Firewise benefits.	Same Cost as Conventional: Both landscapes require maintenance, but the type of maintenance may differ.	Can provide wildfire protection in high risk areas. Can provide energy and water conservation and wildlife habitat if native plants are used.
Conventional Landscape	Overall cost depends on area, design, size of lot, and extent of hired help.	Not applicable.	Both landscapes require maintenance, but the type of maintenance may differ.	May not provide wildfire protection in a high risk area. Can provide energy and water conservation and wildlife habitat if native plants are used.

FIREWISE LANDSCAPING TO REDUCE WILDFIRE RISK

What's Happening in Other States: Firewise Landscaping and Community Programs

The Southeast

INTERFACESOUTH, a part of the U.S. Forest Service, Centers for Urban and Interface Forestry (CUIF), provides a variety of resources related to wildland-urban interface issues, including their website (www.interfacesouth.org) and publications, such as the Fire in the Interface fact sheet series, which explains wildland-urban interface fire concepts related to understanding fire and how to select appropriate plants for landscaping in interface areas. The Quick Guide to Firewise Shrubs ranks the 34 shrubs that were tested in a flammability study.

California

The California Fire Safe Council maintains a Grants Clearinghouse for California communities at <http://grants.firesafecouncil.org/>

Colorado

The Colorado Wildfire Mitigation Program Directory from Colorado State University Cooperative Extension (<http://www.ext.colostate.edu/pubs/natres/wildfiredirectory.pdf>) provides its own listing of programs, projects, funding sources, and places to get technical assistance in Colorado.

Kentucky

The Kentucky Firewise Community Grant Program at <http://www.forestry.ky.gov/programs/firewise/Firewise+Community+Grants.htm> describes its eligible high-priority projects to include development of local Firewise Councils or Boards; completion of a community wildfire hazard assessment; GIS mapping of at-risk communities; consulting services to complete a community wildfire hazard assessment or a community Emergency Action Plan; Firewise or fire mitigation activities that follow the intent of the National Fire Plan; Firewise or fire mitigation educational activities or materials that can be used to educate the community.

Minnesota

The Minnesota Department of Natural Resources has an excellent Firewise website that includes resources and tips for Firewise action at <http://www.dnr.state.mn.us/firewise/index.html>.

North Carolina

The North Carolina Firewise program at <http://www.ncfirewise.org/> provides guidance on how to become a Firewise Community and has established a community grant using National Fire Plan funds. North Carolina communities who have met the criteria for Firewise Communities/USA recognition status up to the point of developing a plan may be eligible for up to \$25,000 per year to implement projects identified in their plan. The application form at http://www.ncfirewise.org/NCCCommunity_app.pdf includes cost-share requirements and contact information for grant administrators.

North Dakota

North Dakota has developed a Community Firewise Landscape Challenge Grant http://www.ndsu.nodak.edu/ndsu/lbakken/forest/comm_forestry/firewise_home.htm and Community Wildfire Planning Grants http://www.ndsu.nodak.edu/ndsu/lbakken/forest/comm_forestry/com_fire_plan_home.htm

Ohio

The Ohio Department of Natural Resources provides Firewise grants to fire departments, see <http://www.dnr.state.oh.us/forestry/Fire/firewisegrants.htm>

Utah

The Utah State University Extension Forestry publishes Firewise Landscaping for Utah, a full-color manual on Firewise landscaping and a list of Firewise plants with photos. A pdf version of the manual is available online at <http://extension.usu.edu/forestry/HomeTown/Assets/PDFDocs/Firewise%20Landscaping.pdf>

Virginia

The Virginia Department of Forestry and Firewise Virginia maintains a Mitigation Grant Program at <http://www.dof.virginia.gov/fire/firewise-03-grant-prog-criteria.shtml>

Wisconsin

The Wisconsin Department of Natural Resources website has a "Grants, Plans and Programs" area in its Planners Toolbox webpage at <http://www.dnr.state.wi.us/org/land/forestry/SmartForestry/toolbox/grants.html> that includes grant listings for wildland-urban interface activities.

chapter
8

FIRE AND FUEL MANAGEMENT IN FLORIDA



We've probably got the most dangerous situation in Florida's history in the amount of fuel that is out there on the ground. One problem is that new Florida residents complain about smoke and are resistant to wide-scale prescribed burning because they are unfamiliar with it. In addition, the pulpwood industry grows trees in increasingly dense plantations that result in extraordinarily high fuel loadings. Both of these situations have allowed fuels to build up to extremely dangerous levels. The answer to the problem is a lot of prescribed burning, thinning of trees, and reduction of vegetation.

—Don West, DOF Waccasassa Field Unit Manager

FIRE IN FLORIDA

Natural Fire

Over half of Florida's land is adapted to natural fire, which is the fire from natural causes that has been shaping Florida's natural systems since the land first emerged from the sea. Florida's name is derived from the Spanish Pascua florida, meaning "flowery Easter." The name was inspired by the abundance of wildflowers encountered by early explorers, a reflection of the diverse natural land they found. An abundance of wildflowers is one of the unique benefits of natural fire in Florida.

Fire is an important force that helps keep Florida's natural systems balanced, beautiful, and diverse. Prior to the arrival of humans over 12,000 years ago, the occurrence of fires was determined by weather conditions and vegetation. Along with the periodic fires caused by lightning, fires set by early humans spread across the land, removing dead vegetation and maintaining the growth of herbs, berries, wildflowers, grasses, and low shrubs.

Native Americans used fire as a tool to shape the environment and improve hunting. Later, when European settlers began colonizing Florida, they remarked upon the open forests and grasslands maintained by fire. In the 1800s and early 1900s, Florida cattle ranchers commonly used fire to improve grazing conditions.

Many of Florida's plants have evolved with periodic fire and have developed adaptations to take advantage of low-intensity surface fires. For example, southern pine trees have



A fire-maintained ecosystem
Photo: USFS

thick bark that insulates the inner, living tissues from fire's heat. Longleaf pine is so fire resistant that both seedlings and mature trees normally escape injury during low severity fires and mature trees become seed trees that reforest new openings in the burned area. The Ocala sand pine exhibits another adaptation for coping with fire. Their "serotinous" cones remain closed until a fire's heat opens the cones and allows the seeds to fall on fresh soil exposed by the passing fire.

Seeds of many plants grow best under the conditions created by fire – exposed soil, increased nutrients provided by ash, and open areas with plenty of sunlight. In contrast, species less adapted to fire, such as oaks, gums, and bays, prefer partial shade and plenty of soil moisture to sprout. Species lacking adapta-



The virgin longleaf pine forests of the Putnam Lumber Company were managed with fire, as evidenced by the charcoal on these trees in a 1929 photograph.

Photo: State Library & Archives of Florida

tions to fire were gradually eliminated from frequently burned areas and were confined to areas where fires were less likely to occur, such as moist hammocks, river bottoms, or coastal zones.

Florida's Fire-Adapted Ecosystems

Understanding the different natural communities in Florida helps us to understand fire patterns and the importance of fire in Florida. The natural community, or ecosystem, is determined by the type of soil, amount of water present, and fire frequency. Therefore, the ecosystem that occurs on, adjacent to, or within a mile of a property can provide an indication of the fire pattern for that area.

It is beneficial for Florida residents to understand the typical fire pattern for their area. For example, knowing that flatwoods ecosystems naturally burn in moderately intense fires every few years helps us to better understand why wildfire continues to challenge neighborhoods in the Palm Coast flatwoods of east-central Florida. Ecosystems with frequent or intense fire will have some level of wildfire risk.

An **ecosystem** is a complex community of interdependence and competition among trees, shrubs, flowers, grasses, animals, and microbes for soil, minerals, water, nutrients, and air. Because all parts of an ecosystem are interrelated, no one part can change without some effect on the entire system.

The Benefits of Fire Outweigh the Impacts

Benefits of Fire in the Florida Landscape

- Prevents heavy buildup of fuels and reduces the occurrence and severity of wildfires
- Maintains native fire-adapted ecosystems in a balanced condition
- Maintains/improves habitat conditions for fire-adapted plants and animals
- Adds ash to the soil, enhancing nutrient cycling and reducing soil acidity
- Improves nutritional quality of plants for wild and domestic grazing animals
- Promotes flowering of herbaceous plants and fruit production of woody plants
- Controls some plant diseases
- Maintains natural species composition (e.g., reduces weedy hardwoods in pine forests)
- Reduces some weedy and invasive plants and helps to control others
- Reduces some insect pests
- Increases populations of insects that serve as food for game birds and other wildlife
- Creates aesthetically pleasing open forests and scenic vistas
- Increases visibility in the forest for recreation or hunting

Impacts of Fire in the Florida Landscape

- Contributes to temporarily reduced air quality
- Can contribute to smoke or fog conditions on low-lying highways (i.e., accident risk)
- Creates temporary visual degradation (char) of the land
- Can escape control if conditions unexpectedly change
- Causes damage to commercial forests and human property if it is uncontrolled
- May injure or kill some individual animals
- Contributes to the spread of some weedy and invasive plants in newly burned areas

Flatwoods and Wet Prairies



Flatwoods ecosystem

Photo: SFWMD

Flatwoods are the most common ecosystem in Florida. They occur on sandy soils with a clay underlayment and often have standing water during rainy seasons. Flatwoods are dominated by pine trees, saw palmetto, and a variety of shrubs. The plants and animals living in flatwoods are adapted to fire, which naturally occurs every 3 to 7 years. Several species depend on fire; for instance, after a fire many plants release seeds or send up new growth from underground stems or roots. However, fires that are too frequent or too hot can reduce regeneration of pine trees and eventually lead the system to become a treeless wet prairie. Without any fire, pine flatwoods will change into a hydric or mesic hammock ecosystem.

Many of Florida's flatwoods are currently in slash pine plantations, which are susceptible to severe wildfires due to lack of fuel management and close spacing of trees. Many of the severe Florida wildfires of 1998 were in flatwoods areas with dense pine plantations.

Sandhill



Sandhill ecosystem

Photo: FDEP

Sandhill (also known as “longleaf pine/turkey oak” or “high pine”) was once common throughout the Southeast, but is now a critically endangered ecosystem due to development and other human disturbances. As the name implies, sandhill occurs on gently rolling hills of deep, well-drained yellow sands. Widely spaced longleaf pine trees with sparse oak trees and dense grasses and herbs characterize sandhill vegetation.

Sandhills depend on frequent surface fires (every 2 to 5 years) to reduce competition with shrubs and to encourage the growth of pines, grasses, and herbs. Gopher tortoises, whose burrows are known to provide shelter for hundreds of other species, depend on fire to encourage the grasses and herbs they eat. Without frequent fire, sandhill changes into an oak hammock.

Scrub

The scrub ecosystem (also known as “Florida scrub” or “sand pine scrub” or “oak scrub”) occurs on ancient sand ridges and dunes. Many endemic (unique) plants and animals live in this endangered ecosystem. Because of this, there are strong efforts to conserve remaining patches of scrub in Florida. Scrub can be an open canopy of low scrub oaks and shrubs or a closed-canopy forest of sand pines above low scrub oaks and shrubs. The groundcover is generally very sparse with ground lichens or herbs and open patches of sand.

Scrub ecosystems naturally burn less frequently than other ecosystems (every 20 to 80 years), but when they do burn, the fire is very hot and all vegetation is reduced to ash and standing snags. This allows for the complete regeneration of scrub, which would change into a xeric hammock without this long fire regeneration cycle.

Freshwater Marshes and the Everglades

Freshwater marshes (also known as “basin marshes”) are wetlands with herbaceous and shrubby vegetation and no trees. Located in depressions or along a slight slope in the land, as in the Everglades, marsh ecosystems are wet an average of 200 days per year and the soils consist of acidic muck

Fires that happen during dry seasons every 1 to 3 years help maintain the marsh by reducing invading shrubs and limiting muck buildup, which would eventually fill in the marsh. Fires during severe droughts are problematic, however, because of the possibility of muck fires (fires burning in organic material under the soil surface). Prescribed fire must be used very carefully in marsh ecosystems. Without fire, a marsh will gradually fill up with shrubs and trees.

Other Ecosystems

Other Florida ecosystems, such as cypress swamps and hammocks, thrive in soils with more moisture and more organic matter than the sandy soils that support flatwoods, sandhills, and scrub systems. Oak leaves and other broad leaves tend to be less flammable than pine needles. These factors contribute to a reduced occurrence of fire in these systems. For example, cypress swamps in Florida burn an average of every 100 to 300 years. In severe drought, however, every Florida ecosystem has the potential to burn.



Sand pine scrub ecosystem

Photo: FDOP



Marsh ecosystem

Photo: FDCA

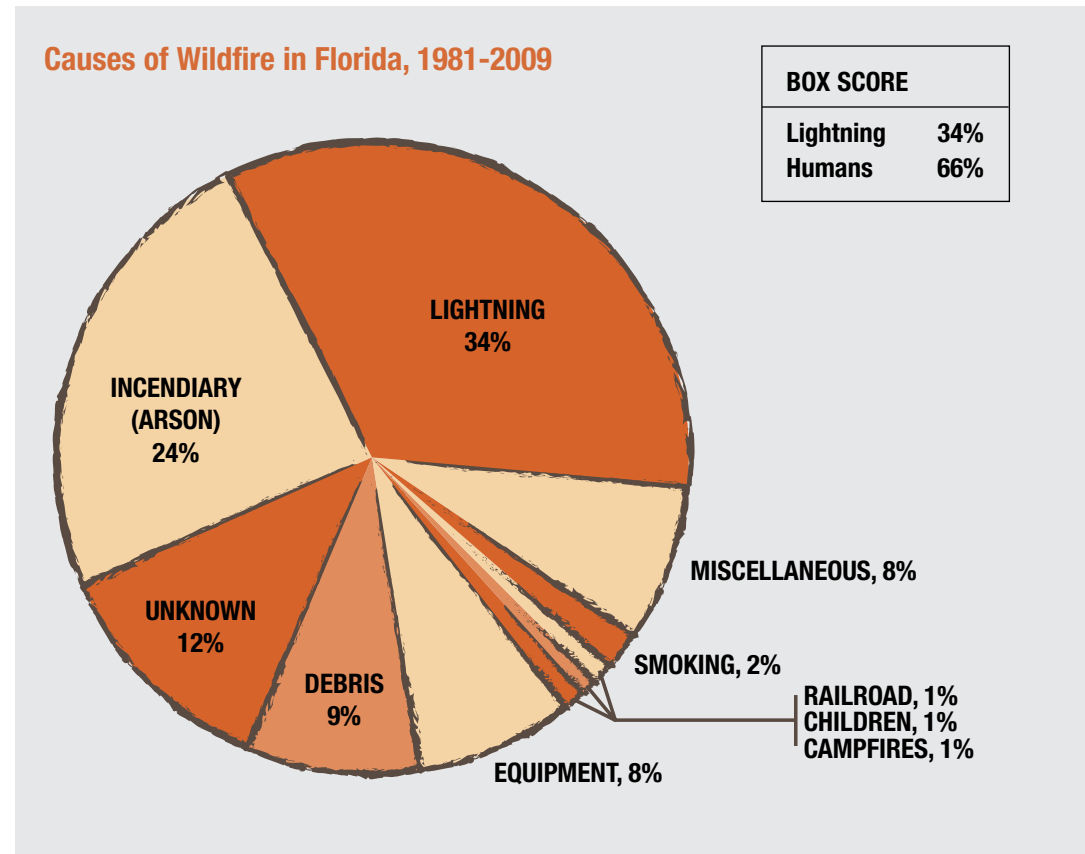


Wildfire is defined by the Florida Division of Forestry as "any fire that is not meeting management objectives or is out of control." Photo: DOF

Wildfire

Approximately 60% of Florida's land requires periodic burning (natural fire or prescribed fire) to maintain its unique ecosystem. Over time, however, natural fires have been excluded and damaging wildfires have become common. As more people moved to Florida in the 19th and 20th centuries, roads and settlements became barriers to fire's natural spread across the land. Without periodic natural fires, both dead and living vegetation began to accumulate in natural areas. Tree harvesting operations contributed to this accumulation by leaving behind debris and by excluding natural fire. As the vegetation has built up over time, the risk of severe wildfires has increased.

Wildfire is relatively common in North America with more than 100,000 wildfires reported every year in the U.S. Florida has about 5,550 wildfires in a given year and several wildfires are burning at just about any time in Florida. Most wildfires in Florida burn



less than 1,000 acres and are extinguished fairly quickly. During the 1980s, the average Florida wildfire was 37 acres. During the 1990s, the average wildfire was less than 30 acres in size. Nevertheless, these wildfires impact an average of about 218,000 acres each year in Florida (DOF data, 1981-2002). Between 2002 and 2009, the Florida Division of Forestry (DOF) responded to 25,847 new wildfires that burned over 1,064,500 acres (DOF 2010a).

Lightning historically has been the major single source of wildfire ignitions in Florida. More lightning strikes occur in Florida than

anywhere else in North America. Today, humans cause over 80% of Florida's wildfires, either from escaped debris fires, acts of carelessness, or intentional actions (incendiary/arson). Lightning now accounts for only about 20% of the wildfires reported.

The 20th Century closed and the 21st Century began with several years of large wildfires in Florida. Many houses were burned or damaged and many acres of timber were burned. This wildfire hazard will escalate as development continues to expand into wildland areas in the 21st Century.

Florida's Major 20th Century Wildfires

Large and fast-moving wildfires have burned in Florida during severe droughts during the 20th Century.

- The 1935 Big Scrub Fire burned 35,000 acres of the Ocala National Forest in four hours.
- The 1956 Buckhead Fire burned 100,000 acres between the Osceola National Forest and the Georgia line in a single spring day.
- In the early 1970s, several Everglades fires exceeded 50,000 acres in size.
- In 1981, Florida had 14,042 fires burning 587,404 acres.
- On May 17, 1985 – dubbed “Black Friday” – Florida experienced dozens of wind-driven fires in 29 counties, resulting in 400 houses lost that day. That year, Florida had 8,621 fires and 443,815 acres burned.
- In 1989, Florida experienced 7,291 fires burning 645,331 acres.
- During the 1998 Florida wildfires there were fewer wildfires but they were larger due to extreme drought conditions. Over 2,200 fires burned nearly 500,000 acres, 100,000 residents were evacuated, 2 interstate highways were closed, 337 houses and 33 businesses were damaged or destroyed, \$133 million was spent in fire suppression, and over \$600 million in tourism and other revenues were lost.
- In 1999, Florida's drought continued and, as a result, the state was again stricken with a severe wildfire outbreak. 1999 saw nearly 4,500 wildfires burn more than 365,000 acres statewide.
- In May 2001, a smoldering lightning fire flared up into the Mallory Swamp Fire. It became one of the largest wildfires in Florida's history at that time, burning more than 60,000 acres and causing over \$10 million in timber losses, even though it did not burn any houses because of its remote location in Dixie and Lafayette counties.
- In 2000-2003, Florida experienced extreme wildfires.
- The 2007 Bugaboo Scrub Fire raged from April to June, ultimately becoming the largest fire in both Georgia's and Florida's history and the largest fire complex ever recorded in the continental United States. The fire started in the Okefenokee Swamp and was fanned by the winds behind rainless subtropical storm Andrea. Before the fire was contained, it had burned over 600,000 acres, had forced the closure of three major highways, and had blanketed areas from central Florida to Atlanta, Georgia, with heavy smoke.



Human-associated fuels -- such as woodpiles, propane tanks, and landscape shrubs -- are particularly dangerous when they are directly adjacent to or under the eaves of a house. Photo: Pandion Systems, Inc.

Prescribed fire is a safe way to apply a natural process, ensure ecosystem health, and reduce wildfire risk.

—*One Message Many Voices* prescribed fire awareness campaign, Southern Group of State Foresters

The future of prescribed fire in Florida is uncertain. Public perception, population growth, EPA regulations and related issues are challenging our ability to use the safest and best tool that we have available for applying a natural and essential process to the land... Will we choose to use prescribed fires to sustain ecosystems and to protect human lives and property, or will we risk a future of costly, catastrophic wildfires?

—*Prescribed Fire in Florida, Strategic Plan, 2008-2020*

Strategic Goals for Prescribed Fire in Florida

Because of fire's importance for a healthy environment and for human well-being, the Florida Division of Forestry, Tall Timbers Research Station, and the Georgia Forestry Commission organized the *2008 Fire Summit: The Future of Fire in Florida and Georgia*. The purpose of the Summit was to develop a vision and a specific slate of strategic goals for the future of prescribed fire in Florida and Georgia.

- Continue to mitigate smoke impacts on air quality and traffic by better smoke management.
- Implement a focused, effective public communication and education campaign to garner support, acceptance, and recognition of the value of prescribed fire.
- Establish partnerships and acquire sufficient resources to promote and implement increased prescribed fire operations.
- Take a strategic, proactive role in growth management and transportation planning to mitigate future impacts of increasing urbanization on prescribed fire.
- Establish and sustain a high priority for prescribed fire on public lands.
- Enhance the credibility and professionalism of our prescribed fire practitioners.
- Increase incentives and financial assistance to land managers using prescribed fire.

(*Prescribed Fire in Florida, Strategic Plan, 2008-2020*)

Prescribed Fire

Prescribed fire is the carefully planned use of fire by land managers to provide the ecological and social benefits of fire while minimizing side effects. By the latter half of the 20th Century, the use of prescribed fire to reduce the accumulation of fuels was recognized as an important management tool to prevent wildfire. Prescribed fire is recognized as the most ecologically and economically effective way to manage fuels in Florida's undeveloped areas.

Florida is very aggressive in the use of prescribed fire, burning more acres each year than any other state. Despite this assertive approach, there is still a backlog of acres that need to be burned or treated with some other fuel reduction approach each year (see discussion of fuel management below). The discrepancy between the number of acres treated and those that need to be treated continues to contribute to fuel buildup in Florida.

Fuels that Feed Fire

Fuels that feed fire can be either natural or manmade. Natural fuels include any dead vegetation that will burn (such as pine needles, grasses, twigs, branches, and leaves) as well as live green vegetation with a tendency to burn (such as saw palmetto, gallberry, wiregrass, young pine trees, cabbage palm, and other shrubs and trees). While most exotic plants are not a wildfire hazard, a few, such as Melaleuca and cogongrass, are highly flammable and can contribute to wildfire risk.

Manmade fuels include houses or businesses, outbuildings, decks, wood fences, landscaping, woodpiles, yard furniture, propane tanks, and other items. Structures and land-

Fuel loads are the small trees, bushes, and other undergrowth in forests that, if built up over time, cause wildfires to burn faster and bigger....Forests with built-up undergrowth are ideal breeding grounds for high-intensity, high-speed fires.

—American Red Cross

Natural fuels in Florida can be divided into four fuel categories.

- grass
- brush/shrubs
- forest (timber) litter
- slash (tree harvest residue)

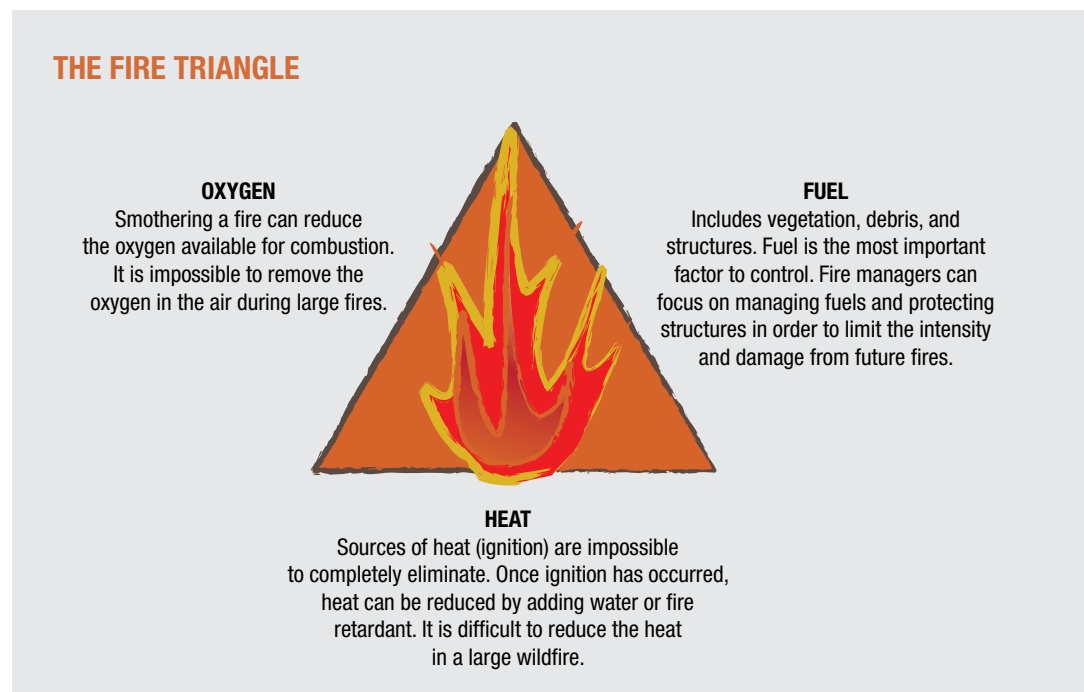
scapes that do not follow Firewise design principles can become fuels in the path of a wildfire.

Fire Behavior

Fire needs oxygen, heat, and fuel in order to burn. If any one of these is removed, a fire cannot burn. If one or more of these factors are reduced, damaging wildfires are easier to prevent or contain. The Fire Triangle can help us understand how to prevent or suppress wildfires.

• **Oxygen** –Smothering a fire can reduce the oxygen available for combustion, but it is impossible to do with large fires.

• **Heat** –Sources of heat/ignition are impossible to completely eliminate. Once ignition has occurred, heat can be reduced by adding



water but it is difficult to reduce the heat in a wildfire except in small areas.

• **Fuel** – Since oxygen and heat are difficult to control, fire managers focus on reducing fuels. Firefighters work to clear areas of vegetation to help with suppression of a wildfire and wildfire mitigation specialists work to manage fuels to limit the intensity and damages from future wildfires. Fuel reduction in the present results in smaller fires in the future.

After a fire starts, three main factors create the “fire environment” that influences fire behavior: topography, weather conditions, and fuel characteristics. Topography is the unchanging factor and the least important in Florida because of the generally flat lay of the land. Weather creates the conditions for fire and is the most variable influence on fire behavior.

Fuels are the one factor over which we have some control.

Topography

In Florida, two topographical features affect fire behavior: the relatively flat landscape, which holds water in wet and dry seasons, and the extensive length of our coastline, which brings sea breezes into play. Other features, which are much less important in Florida, include elevation, position on slope, aspect, and steepness of slope.

In wet seasons, Florida’s swamps, lakes, creeks, rivers, canals, and ponds act as natural firebreaks, slowing or preventing the spread of fires. These same water bodies, however, may be obstacles to access for firefighters and equipment. In dry years, organic matter (muck)

in these basins may instead become fuel for smoldering ground fires.

The length of Florida's coastline is second only to Alaska, which means that sea breezes often interact with convection currents over the peninsula. Florida's onshore breezes are enhanced in spring and summer months by the strong solar warming of the land, an effect that can result in extreme fire behavior anywhere in the state. One variation is the "cape effect," when a point of land receives incoming breezes from water on all sides due to upward-moving convection currents over the land. The area where these winds converge experiences atmospheric instability and high rates of atmospheric dispersion, which can cause the heat and smoke of a fire to rise rapidly, bringing more air into the area of the fire. These conditions contribute to extreme fire behavior. This effect can happen on capes (e.g., Canaveral, Apalachicola) or on a land-mass between two large water bodies (e.g., on a barrier island, between Lake Okeechobee and the Atlantic coast, between Tampa Bay and the Gulf of Mexico).

Weather Conditions

Weather affects the number and size of wildfires that occur each year in Florida. The elements that have the most direct effect are temperature (influences heat); wind speed, direction, and atmospheric stability (provides oxygen); and relative humidity and rain (affects the ability of fuels to burn).

High temperatures, low humidity, atmospheric instability (i.e., high rate of dispersion), and strong winds create conditions for disastrous wildfires. The highest wildfire danger occurs during extended droughts and some-

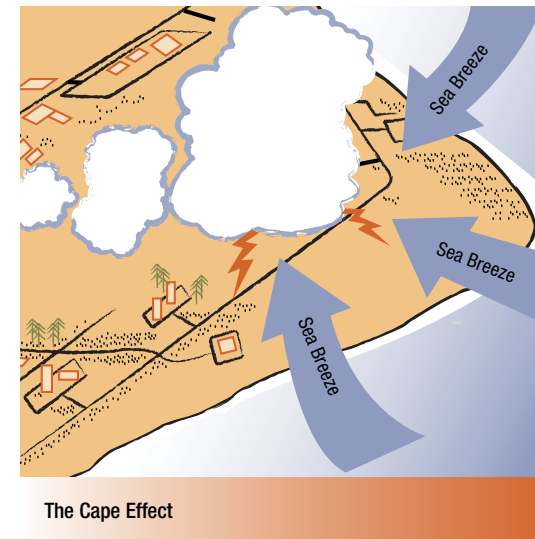
I think the real issue is that we have a situation that has been unparalleled in the last 50 years right now, and that has to do with what I call 'the perfect storm' phenomenon of weather and fuel loads. We have the hottest, driest weather in perhaps 50 years; we have thousands of lightning strikes an hour; we have 300 new fires every day in the West, largely because of lightning strikes.

—Dan Glickman, U.S. Secretary of Agriculture, about the Western wildfires of summer 2000

times after the passage of dry weather fronts or dry, freezing weather fronts that dry and kill vegetation. Longer weather cycles, such as the El Niño/La Niña Southern Oscillation (ENSO), produce long-term cycles of wet and drought, separated by long periods of neutral conditions where fire behavior is impacted by other long term climate phenomena such as the Quasi-Biennial Oscillation and North Atlantic Oscillation.

Wind speed and direction determine how fast a fire spreads and the direction it moves. Winds in Florida often are associated with the coast, with onshore winds during the day and offshore winds during the night. The "cape effect," discussed above, is a variation of the effects of coastline air movement on fire.

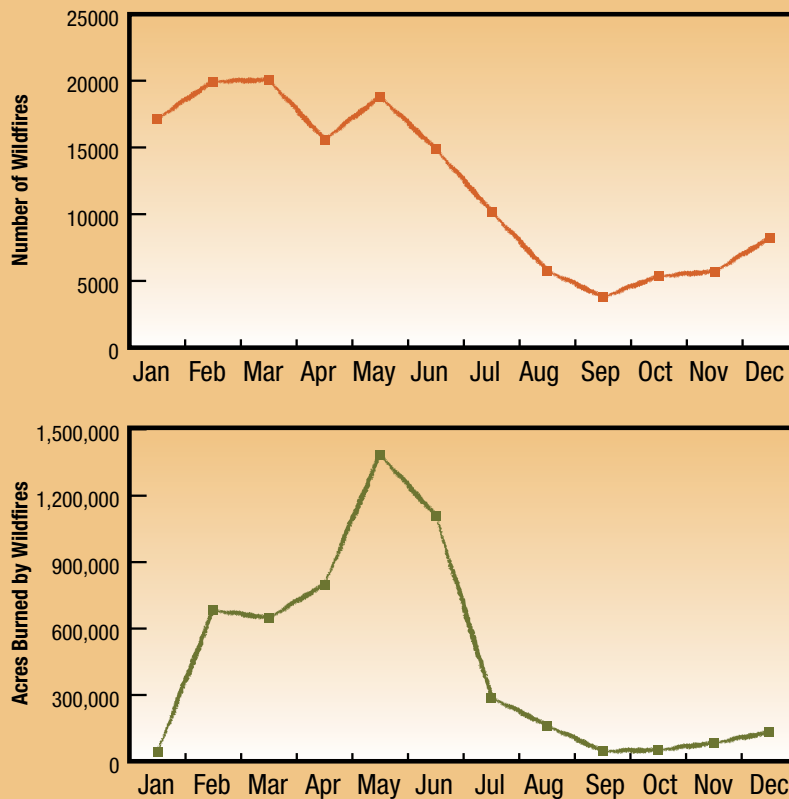
In the Wildland-Urban Interface (WUI), where houses and natural areas mix, the wind-channeling effects of buildings, land cover, and street layout have a more pronounced effect on wind speed and direction. Tree-lined streets, berms, and narrow spaces between buildings can act as wind channels, changing wind direction as much as 90 degrees and causing wind eddies and vortices that can lead to fire flare-ups and erratic fire behavior.



The Cape Effect

Fuel Characteristics

Florida's fuel types have been correlated with the National Fire Behavior Prediction System (FBPS) fuel models to make predictions of wildfire behavior in Florida. Because fuels have known characteristics that contribute to fire behavior, these correlations have enabled DOF wildfire experts to predict fuel loads and fire behavior in Florida. This information contributes to better planning for wildfire risk reduction through fuel management practices.



Florida's 12-Month Fire Season

Because late winter and spring bring dry weather, the largest number of Florida wildfires occur in January, February, March, and May. But wildfires can occur whenever a week or two goes by without rain. Florida has a 12-month fire season. The largest numbers of wildfires occur in January, February, and March in Florida, while wildfires that burn the most acreage occur in May and June (DOF data, 1981-2002). The dates of the main fire season in Florida may vary under drought or other extenuating conditions.

- **Fuel load and depth** – The fuel load is the total available quantity of fuel. Depth is the height of the surface fuels, such as grasses, shrubs, and small trees. If fuel load and depth are heavy and thick, or if fuels are strongly vertical, flames will be longer and more heat will be released.

- **Size and shape of fuel** – Size classes range from fine fuels to large fuels. Fine fuels (e.g., pine needles, grasses) ignite more readily and burn more quickly because they have more surface area for contact with oxygen. Large fuels (e.g., branches, fallen or standing trees)

burn more slowly but generate more heat energy and can be difficult to extinguish.

- **Compactness of fuel** – Tightly compacted fuels will not burn as well due to lack of oxygen, while lightly compacted fuels will burn better. Fuels that are very loose (e.g., sparse twigs or tree branches) may not burn unless a nearby fire heats them.

- **Horizontal continuity of fuels** – Fire is carried by or spreads through fuels in a continuous and unbroken layer on the ground. Breaks in horizontal continuity (e.g., fire-breaks) can help prevent the spread of wildfire.

- **Vertical continuity of fuels** – Vertical fuels, called ladder fuels, can carry fire from the surface to the crowns (or canopy) of trees or up the side of a house. Ladder fuels include vines, low hanging branches, or a high understory layer of shrubs and small trees. Breaks in vertical continuity, such as the removal of ladder fuels, can prevent a surface wildfire from going higher.

- **Chemistry of fuels** – Many Florida plants contain volatile oils or resins that encourage fire, including young pine trees, saw palmetto, gallberry, and the exotic cogongrass. Because

Case Study:**Severe Drought Influenced Fire Behavior in the 1998 Florida Wildfires**

The Florida wildfires of 1998 provide a vivid illustration of fire behavior factors at work. One of the strongest El Niño events ever recorded caused record rainfall across Florida during the winter of 1997-1998. After the wet winter, a very sudden and severe La Niña drought came into effect. Severe drought conditions associated with the rebound La Niña cycle began in late March and continued through July, combined with a record heat wave during May and June of 1998. The Keetch-Byram Drought Index (KBDI; on a scale of 0 to 800) reached a peak statewide average of 725 and was over 750 in much of north and central Florida in late June and early July 1998.

The combination of severe drought and Florida's normally abundant volatile fuels led to several months of widespread, damaging wildfires, especially in Brevard, Flagler, St. Johns, and Volusia counties. The first fires began in late April and May in north Florida, and numerous wildland-urban interface fires were burning in early June. From June 19 to 22 and again from June 30 to July 2, 1998, more than 80 new wildfires were starting each day, the vast majority of them caused by dry lightning.

With firefighters from all over the country, the 1998 Florida wildfires may have been the largest wildland-urban interface campaign in U.S. history. In the 6 weeks from June 1 to July 22, a total of 8 fire complexes (large fire groups) burned in north and central Florida, with a total of 2,282 new wildfires and 499,477 acres burned.

(Source: *Report of the Governor's Wildfire Response and Mitigation Review Committee*, 1998)

Florida's plants contain so many volatile oils, they are much harder to extinguish once they start burning. Thick palmetto forests are like "lakes of gasoline" to wildfire.

- **Fuel moisture and temperature** – Fuel moisture is closely related to humidity and precipitation levels as well as long-term wet and dry climate cycles. Drying of surface vegetation and fuels contributes to increased wildfire risk in the afternoon of any Florida day, particularly during the months of December to June. In addition, preheating of surface fuels by warmer air temperatures causes them to be more likely to burn and to burn hotter if a fire gets started.

- **Proportion of living and dead fuels** – Florida's long growing season, ample sunshine, and high annual rainfall produce large amounts of vegetative fuels each year. Although some of Florida's live fuels are very volatile, they generally only ignite and burn once they are heated by burning dead fuels. A higher-than-normal ratio of dead to live vegetation, such as after an extended drought, increases the heat output and severity of wildfires. This effect contributed to the behavior of the catastrophic 1998 wildfires in Florida.

(Adapted from DOF 2002, DOF 1989, DEM and DOF 2000)

Most of us thought we had lost the city of Waldo, but when the fire hit Mr. Smith's previously burned property we were able to stop it because the fire came back down out of the crown to the surface where we could deal with it.

—Don West, DOF Waccasassa Field Unit Manager, about the 1998 wildfire that threatened Waldo, Florida

How Fire Spreads

Depending on the conditions and the types of fuels available, an active wildfire can spread along the surface, into the crown or canopy of trees, or under the ground. If a fire does burn into the crown or under the ground, it is almost always started by a surface fire and supported by heavy surface level fuels. This makes surface level fuel management the most important factor in reducing the wildfire threat in Florida.

Surface Fires burn flammable materials that are close to the ground, including everything from pine needles and twigs and wood-piles to shrubs and small trees up to 10 feet

tall. The vast majority of wildfires in Florida are surface fires.

Crown or Canopy Fires burn living and dead foliage, branches, twigs, lichens, and wood in the tops of trees. It is rare for a wildfire to burn only in the crowns of the trees. Living canopies usually have a higher moisture content and lower density, so they are less likely to burn unless fire is carried to the canopy by excessive heat from a surface fire or by ladder fuels. Crown fire is characterized by a solid wall of flame extending from the ground to above the treetops. Crown fires are influenced by the wind and are difficult to suppress, presenting a greater threat to firefighter

safety and causing greater and longer lasting damage of all kinds.

Ground Fires burn and smolder below the surface of the ground in dried fuels such as duff, muck, roots, logs, or peat. Ground fires are ignited by surface fires in dry swamps or marshes. Because underground fuels are denser than surface or canopy fuels, they burn more slowly but may also burn at higher relative moisture content. Ground fires may burn and smolder for days, weeks, or months. A ground fire can injure roots of trees and shrubs, cause surface-collapse hazards for firefighters, and create smoke problems on highways.



Surface Fire
Photo: FDCA



Crown Fire
Photo: FDOF



Ground Fire
Photo: FDCA

Case Study:**Fuel Reduction Helped Fight the Unusual Bugaboo Scrub Fire**

Bugaboo smoke plumes are visible from space. Photo: NASA

The Bugaboo fire began on Bugaboo Island in the Okefenokee Swamp in Georgia on May 8, 2007, and persisted until June of the same year. After just 6 days, the fire had burned over 242,000 acres in both states. It ultimately became the largest fire in the history of both Georgia and Florida and the largest wildfire complex ever recorded in the continental U.S.

Severe drought, high winds, high temperatures, and low humidity were among the main weather factors that contributed to the sustained influence of this wildfire. In particular, the warmer and drier air between the bands of the rainless subtropical storm Andrea and the unusual wind direction created by the storm (flowing from northeast to southwest) brought a spike of dry air toward the lightning strikes that started the Bugaboo fire. Firefighters monitoring the conditions saw relative humidity dropping at 10 p.m.

that evening, which is a very unusual occurrence for Florida. The Bugaboo fire is visible to the left of Subtropical Storm Andrea in the satellite image.

Prescribed burns and fuel hazard reduction conducted by the Florida Fire Mitigation Team on the Osceola National Forest in February 2007 helped prevent the Bugaboo fire from moving closer to Lake City and Taylor, Florida. From the start of the fire, multiple 20 to 30-foot tall flame fronts were sweeping through mature timber. As the fire continued to expand and flame lengths grew to a massive 150 feet, the Incident Command Team was sure the fires were headed toward Taylor. The fire crew began to get control of the fire around Taylor but another major fire started in a nearby swamp. Shortly after the notice was given to evacuate Taylor, and the Columbia County Fire Department was in place to protect structures, the fire seemed to drop out of the trees and started to fade along the fire perimeter where prescribed burning and fuel hazard reduction had previously been conducted. The breaks created by the earlier mitigation work provided Taylor with protection from wildfire damage.

FUEL MANAGEMENT IN FLORIDA

The purpose of fuel management is to reduce the height and/or density of vegetation in order to favorably alter expected fire behavior. Recall that the fire environment – fuels, weather, and topography – influences fire behavior and that fuel is the one aspect of the fire triangle that humans can significantly influence.

Fuel management changes the way an area burns. In most cases, fuel management results in reduced spread rate, flame length, and intensity of a wildfire, which makes it easier for fire protection agencies to successfully suppress a wildfire. One of the main benefits of fuel management is that wildfires are smaller, less hazardous, and less costly to suppress. For example, research examining Florida's 1985 wildfires found that wildfires that occurred in areas that had previously been burned tended to be smaller and burn fewer acres. The study concluded that for each dollar spent in fuel management, \$2.14 in wildfire suppression and damages was saved (DOF 2010b).

This research did not attempt to quantify the many indirect benefits of prescribed fire to wildlife, other natural resources, and ecosystems. Prescribed burning and other fuel management approaches provide many of the same benefits to ecosystems that were once provided by natural fires.



Prescribed fire mimics the natural fire of Florida's ecosystems while reducing fuels that contribute to wildfire risk. Photo: DOF

A witness that was out there was amazed at how the fire was running hard and when it reached our [prescribed] burn units the fire just started backing and in some places went out.

—Peter Myers, Fire Management Officer, U.S. Forest Service, Osceola National Forest, about the Bugaboo Fire of 2007

About six of every ten acres in Florida—nearly 22 million acres—are considered fire-dependent. Research suggests that the optimum range of fire frequency ranges from one to five years, depending upon the types of plant and wildlife communities. Currently, about two million acres are permitted for burning each year. If that number approximates what is actually being burned, we are achieving an average 11-year fire return interval, dramatically longer than what fire-dependent ecosystems require. The lack of more frequent, but less intense fires could mean serious consequences for fire-dependent species, natural communities, and ecosystems, leading to ecosystem dysfunction at a staggering level.

—Prescribed Fire in Florida, Strategic Plan, 2008-2020

Types of Fuel Management Approaches

There is no general prescription or formula for managing fuels. In fact, treatments are designed to best fit the location where they are applied to ensure the outcome will be most effective. Treatments typically reduce wildfire risk for only 3 to 5 years, making regular maintenance a key requirement. Several fuel management approaches can be considered for use alone or mixed to achieve site-specific benefits.

- Prescribed burning
- Mechanical treatment (mowing, disking, chopping, mulching)

- Chemical treatment (herbicide application)
- Biomass removal (pine straw harvesting, vegetation or tree thinning, timber harvesting)
- Biomass conversion (grazing)

Fuel management approaches can effectively treat a variety of conditions, ranging from unmanaged wildlands to intensively managed forest plantations or recreation areas. To select the right fuel management approach or the right combination of approaches, land managers must understand the costs, advantages, concerns, and potential impacts of the treatments being considered in relation to the

specific characteristics and management goals of the site and surrounding community. Refer to the accompanying table for a comparison of various fuel management approaches.

Combining Fuel Management Approaches

Approaches can be mixed spatially (adjacent to each other) or temporally (in sequence on the same site). Combined fuel management treatments may particularly be necessary when treating thick exotic vegetation in Florida forests, such as the examples of integrated treat-

Mechanical treatments and herbicide often accelerated vegetation structure changes, but ecological benefits were generally greatest when they were combined with fire. Soil disturbances, weedy species increases, and rapid hardwood resprouting were sometimes problems with mechanical treatments. Fire itself was crucial for maintenance of individual species and species diversity. When feasible, mechanical and herbicide treatments should be used as pretreatments for fire rather than as fire surrogates. Managers should segue to fire-only approaches as soon as possible.

—Eric Menges and Doria Gordon, *Florida Scientist*, 2010

ments for hazardous exotic fuels such as Old World climbing fern, downy rosemyrtle, Melaleuca, cogongrass, Burma reed, and Guineagrass (O'Brien et al. 2010).

Examples of Spatial (Adjacent) Combining of Fuels Management Approaches

- Mowing, grazing, or herbicide treatment near a highway or airport or school combined with prescribed fire on the portion of the site farther from the smoke-sensitive facility.
- Grazing along a canal bank or in areas where trees are too thick to allow access combined with prescribed fire or mowing on open or flat areas of the site.
- Hand or machine piling and burning of fuels around at-risk houses combined with the use of regular prescribed fire to maintain the greenspace surrounding the high risk area.
- Repetitive roller chopping of thick flatwoods or grazing by sheep to reduce palmetto cover followed by regular prescribed fire every few years to maintain the site.

Examples of Temporal (Time-Sequence) Combining of Fuels Management Approaches

- Chopping, mowing, grazing, or thinning to reduce/remove high shrubby vegetation followed by the use of prescribed fire every few years to maintain the site.
- Grazing to increase visibility and expose hazards such as fixed improvements or debris that might harm equipment or be hazardous in a prescribed fire followed by the use of prescribed fire or mowing every few years to maintain the site.
- Chopping or thinning of vegetation to gain a short-term fuel reduction followed by an herbicide treatment to gain long-term fuel reduction benefits.
- Herbicide treatment to kill vegetation followed several months later by mowing or chopping to put the dead vegetation down on the ground, followed by prescribed burning when dry and on a regular schedule thereafter to maintain the site.

Public Concerns about Fuel Management Approaches

Many public concerns exist about the various fuel management approaches. A Survey of Florida Residents Regarding Three Alternative Fuel Treatment Programs (Loomis et al. 2000) revealed that the main factors influencing citizen support for various mitigation alternatives were program cost, confidence in the program to accomplish its objectives, comfort with the risks of the program, and perceptions of the effects of the program.

In particular, respondents were more supportive of programs that they understood, and support for fuel management programs was not influenced by citizens' past experience with wildfires. In other words, public outreach programs should go beyond simply promoting fears of destructive wildfire. Additional surveys and focus groups completed during the development of the One Message, Many Voices prescribed fire awareness campaign reaffirmed this conclusion about wildfire. In fact, the survey information showed that messages about prescribed fire were better framed in a forest health context rather than in a wildfire suppression or prevention context. (Southern Group of State Foresters 2009). These studies suggest that ongoing campaigns to increase public awareness and understanding of prescribed fire and other fuel management approaches will result in increased acceptance and support for wildfire risk reduction. See Chapter 2 for a discussion of collaborative and outreach programs for wildfire risk reduction.

Case Study: Fuel Management by Prescribed Fire Stops Wildfire

Southern Brevard County is a mix of pine forests and housing developments. Between the cities of Palm Bay and Malabar there are several housing developments surrounded by large tracts of pine forest. Some lands in this area are owned and managed by Brevard County's Environmentally Endangered Lands (EEL) Program, which has an active prescribed fire program in cooperation with the Malabar Fire Department.

In May of 2008, two large fires simultaneously threatened homes in Palm Bay and Malabar. The

"Mother's Day Fires" moved rapidly through dry brush, testing the ability of firefighters to protect property. Mowed fire breaks protected houses in some communities, but the fires raged on. Some houses could not be saved and a number of structures were destroyed or severely damaged.

The EEL program had treated the Jordon Scrub Sanctuary with prescribed fire in November 2007. When the main head of one of the fires reached the sanctuary, it died down from lack of fuel, easing the burden on firefighters. On the

other side of the preserve, the Harris Communications Industrial Complex and Rocky Point community could well have been threatened if the severity of the fire had not been diminished by the previous prescribed burn at the Jordan Scrub. Prescribed fire is the single most efficient tool that land managers and firefighters have to control dangerous accumulations of fuels and protect homes.



Photos: Malabar (FL) Fire Department



Fuel treatment	Advantages	Concerns	Potential impacts	Seasonality and intensity of treatment	Application in WUI	Duration of effect	Cost
Prescribed Fire	<ul style="list-style-type: none"> Removes available fuel and shrubs Encourages herbaceous growth and supports native species and ecosystems Recovery begins in weeks Does not disrupt groundcover Limited opportunity for invasive plants 	<ul style="list-style-type: none"> Complex planning and execution Requires significant equipment and personnel Smoke and fire sometimes create concern for public, neighbors, and news media Extremely dependent on weather 	<ul style="list-style-type: none"> Risk to public safety from both smoke impacts (e.g., on roads) and escape of fire Challenging to apply without harming overstory trees May cause some temporary degradation of local air quality 	<ul style="list-style-type: none"> Can be done in almost any season Spring and summer fires will kill more shrubs, but weather conditions are more variable Intensity is dependent on weather Can treat 100+ acres/day, depending on conditions 	Difficulty depends on number of factors	4-6 years	\$10-\$150 per acre
Hand or Machine Piling and Burning or Chipping	<ul style="list-style-type: none"> Moves most fuel to piles Reduces shrub fuels and encourages herbaceous growth Moderately easy Minimal site disturbance, so works well around overstory trees 	<ul style="list-style-type: none"> Requires significant personnel or machinery Piles must be small enough to be burned in one day Burning requires care and attention to mop up Burning is dependent on weather 	<ul style="list-style-type: none"> Smoke from burning can impact public, roads, and air quality Machine piling may disrupt root systems, which can limit regrowth or damage tree roots 	<ul style="list-style-type: none"> Can be done anytime Low-intensity treatment Piles can be chipped if weather does not allow burning Can treat up to 5 acres/day with enough personnel 	Useful, may require extensive labor	3-7 years	\$400-\$800 per acre, depending on fuels and labor
Mowing	<ul style="list-style-type: none"> Reduces shrubs to ground Turns some fuels into mulch Encourages herbaceous growth and generally increases species diversity Requires limited equipment and personnel Relatively independent of weather Causes little disturbance to ground cover 	<ul style="list-style-type: none"> Does not reduce amount of fuel, merely changes structure Has little impact to roots, so species like palmetto resprout quickly Unightly Difficult to apply with overstory present 	<ul style="list-style-type: none"> Low risk to public safety, except material can be thrown up to 300 feet from large mowers May cause some temporary degradation of local air quality from dust 	<ul style="list-style-type: none"> Can be done in almost any season, but must be done at moderate moisture levels to limit soil disturbance Intensity is dependent on the size and design of the mower. Larger mowers mulch material better but encounter more obstacles Can treat up to 10 acres/ day 	Difficulty depends on number of obstacles to machinery	3-5 years	\$40-\$900 per acre
Chopping, Disking, Harrowing	<ul style="list-style-type: none"> Reduces shrubs to ground Disrupts resprouting of some shrubs (palmetto) Encourages herbaceous growth Generally increases species diversity Requires limited equipment and personnel Relatively independent of weather Harrow exposes bare soil, limiting fire potential until regrowth occurs 	<ul style="list-style-type: none"> Does not reduce amount of fuel, merely changes structure Difficult to apply with overstory present Can disrupt root systems of some desirable vegetation (e.g., trees) Unightly Harrowing exposes bare soil, increasing potential for erosion and invasive plant colonization 	<ul style="list-style-type: none"> Low risk to public safety Significant risk to overstory trees due to root damage May cause some temporary degradation of local air quality from dust 	<ul style="list-style-type: none"> Can be done in almost any season, but must be done at moderate moisture levels to limit soil disturbance Intensity is dependent on the size and design of the chopper, disk or harrow Can treat up to 10 acres/ day 	Difficulty depends on number of obstacles to machinery	3-7 years	\$35-\$80 per acre

Fuel treatment	Advantages	Concerns	Potential impacts	Seasonality and intensity of treatment	Application in WUI	Duration of effect	Cost
Herbicide	<ul style="list-style-type: none"> • Can be applied to kill target species or all growth • Easy to apply • Provides long-term impact • Does not physically disturb soil • Limits opportunity for invasive plants • Generally independent of weather 	<ul style="list-style-type: none"> • May encounter public opposition • Does not remove fuel • Creates increased flammability for a period immediately following treatment (standing dead fuels) 	<ul style="list-style-type: none"> • May affect non-target species or overstory trees if improperly applied • May have unknown or unforeseen risks to public health, depending on chemical used 	<ul style="list-style-type: none"> • Must be applied during growing season • Intensity is dependent on chemical and application rates • Can treat up to 15 acres/day 	Difficulty based on concern of neighbors, level of toxicity	up to 10 years	\$70-\$110 per acre
Thinning (biomass removal)	<ul style="list-style-type: none"> • Reduces risk of crown fire by separating trees • May generate revenue • Equipment runs over and compacts shrubs • Minimal soil disturbance • Moderately dependent on weather • Encourages herbaceous growth 	<ul style="list-style-type: none"> • Removes some crown fuel, but does not remove ground-level fuel • May encounter public opposition • Requires proper (moderate moisture) conditions • Creates increased flammability for the period immediately following treatment (slash residue) • Requires >20 acres to generate positive revenue 	<ul style="list-style-type: none"> • Equipment may damage retained trees • May cause some temporary degradation of local air quality (dust) 	<ul style="list-style-type: none"> • Need to avoid excessively wet periods to limit soil disturbance • Intensity depends on volume of trees harvested • Can treat up to 15 acres/day 	Difficulty based on site features, concern of neighbors	5-7 years	Will produce revenue with enough volume and acreage
Grazing (biomass conversion)	<ul style="list-style-type: none"> • Defoliates most shrubs from ground up to 5 feet • Converts bulk of live and dead fuel to organic waste • Compacts duff, making it less likely to burn • Encourages herbaceous growth, favoring grasses • Generally increases species diversity • Easy to apply in the presence of obstacles • Minimal impact on non-target species (trees) and ground-cover • Requires limited personnel and equipment • Strong public approval 	<ul style="list-style-type: none"> • Costly on small lots due to animal transportation • Fencing or containment systems are necessary • Few operators are available • Need animal shelter or caretaker near site • Some desirable tree species may be girdled and killed by livestock eating bark • Supplemental mitigation methods may be necessary as livestock may not eat certain flammable plants (e.g., sheep eat saw palmetto but not gallberry) 	<ul style="list-style-type: none"> • Very low risk to public safety • Animals may transport invasive plants, diseases, or pest species to site 	<ul style="list-style-type: none"> • Can be implemented most of the year • Intensity depends on objectives: multiple treatments are necessary to kill woody plants; if used with other treatments, periodic grazing can maintain a site indefinitely • Can treat up to 10 acres/day with a large flock 	Very useful in most areas, costly in smaller areas	2-5 years, depending on vegetation type and number of passes	\$200-\$500 per acre; can be used to produce meat or revenue

(Adapted from Fuels Management in the Wildland-Urban Interface, Florida Division of Forestry, 2002)

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Model vegetation management and wildfire risk reduction ordinances are provided for consideration by local governments, fire districts, and HOAs. The ordinance language here is provided as a guideline for what local governments or neighborhood associations might do – it is not to be adopted verbatim, as most governments will have specific local form and content guidelines, as well as unique local wildfire issues that must be addressed. The discussion about regulatory approaches in Chapter 4 and these model ordinances provide a menu of choices. Local governments and homeowner associations should consult an attorney for help when drafting rules, ordinances, or covenants.

Appendix 1. Model Vegetation Management Ordinance

A model vegetation (brush) management ordinance is provided here as a guide for development of covenants/deed restrictions or a local ordinance. This model language is not meant to be used verbatim. The community or local government should carefully decide which components of this ordinance language would be most useful or appropriate to the local situation. In addition, most local governments will have specific guidelines as to ordinance form and content and other regulations that may impact the content of the vegetation management ordinance. Communities should consult a legal expert for help when drawing up an ordinance or a covenant document to be sure it doesn't conflict with existing regulations or a tree protection ordinance.

VEGETATION MANAGEMENT ORDINANCE

AN ORDINANCE RELATING TO THE PROTECTION OF HUMAN LIFE, STRUCTURES AND NATURAL RESOURCES FROM WILDFIRE BY PROVIDING FOR VEGETATION MANAGEMENT AROUND STRUCTURES LOCATED IN HIGH WILDFIRE HAZARD AREAS:

WHEREAS, the protection of human life, structures and natural resources serves the public interest of _____ (jurisdiction);

WHEREAS, vegetation management will provide for a defensible space that will provide better protection to the structure in the absence of trained firefighters and will allow firefighters better safety when protecting structures from wildfire; and,

WHEREAS, it is desirable to minimize destruction caused by wildfire in areas where brush and forests grow in close proximity to structures.

NOW THEREFORE BE IT ENACTED BY _____ (jurisdiction) as follows:

I. DEFINITIONS:

- **Brush** – Native or introduced vegetation growing in an uncultivated condition at a height of at least three feet.
- **Fuel** – Any living brush or dead litter (e.g., leaves, pine needles, twigs) that is capable of being burned in a wildfire.

- Person – Any individual, partnership, corporation, association, governmental agency, or other legal entity.
- Staff – The person(s) assigned with the responsibility of administering and enforcing the provisions contained within.
- Structure - Any human construction with a floor area of greater than 100 square feet.
- Wildlands – Any open or forested land covered with brush, with or without a tree canopy.

II. CLEARANCE OF BRUSH

Any person owning, leasing, controlling, operating, or maintaining any structure(s) upon or adjoining wildlands with moderate, high, or extreme wildfire risk, and any person owning, leasing, or controlling any land adjacent to such structure(s), shall at all times:

1. Maintain an area at least 30 feet wide around and adjacent to such structure(s) as an effective fuel break made by reducing brush or other flammable growth. This section shall not apply to mature trees, cultivated ornamental shrubbery, or low groundcovers, provided that they do not provide a means of readily transmitting a fire from wildlands to the structure.
2. Remove that portion of any tree or shrub that extends within 10 feet of a chimney or stovepipe.
3. Maintain the roof and gutters free of leaves, pine needles, or other flammable vegetative fuel.
4. Store firewood and exposed lumber piles at least 30 feet from any structure.
5. Keep areas used for outdoor cooking, yard debris burning, or fuel storage tanks at least 25 feet from the nearest brush.

III. ENFORCEMENT

1. Staff shall have the authority to enter upon said property to ensure compliance.
2. Violators of this ordinance will have 60 days upon written notification by Staff to correct violations.

3. If violations are not corrected within the prescribed 60 days, Staff shall have the authority to enter upon said property for the purpose of correcting said violations. The amount of the cost of correcting said violations may constitute a special assessment against each parcel and establish a lien on the property for the amount of the respective assessment until paid.

IV. VARIANCES –

Variances from this ordinance may be sought from _____ (authority or board).

V. PUNISHMENT FOR VIOLATION

VI. EFFECTIVE DATE

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Appendix 2. Draft Wildfire Mitigation LDR, Alachua County, 2009

ARTICLE 19. WILDFIRE MITIGATION

Section 406.109.1 Purpose

It is the purpose of this Article to implement the policies contained in the Alachua County Comprehensive Plan to protect life, property, and the local economy by eliminating or minimizing the present and future vulnerability to wildfire hazards.

Wildfire mitigation strategies and plans must result in an acceptable level of passive protection from wildfire that will reduce or remove the vulnerability of structures, property and resources to damage or destruction by wildfire. Wildfire mitigation plans that rely solely upon response by fire suppression entities to address wildfire hazards do not achieve this purpose.

Section 406.109.2 Applicability

All new development activities in areas where the risk of wildfire exists or can be reasonably predicted shall be subject to this Article and include but are not limited to:

1. Plats and subdivision of land.
2. Development plans.
3. All special use permits, special exceptions, and variances.

Section 406.109.3 Disclaimer of Liability

The wildfire mitigation activities required by this Article are considered reasonable for the purposes of this Article and are based upon best available information. This Article does not imply that compliance with the requirements of this Article or the implementation of some or all of the wildfire mitigation principles contained in this Article will prevent loss due to wildfires. This Article shall not create liability on the part of the County or by any officer or employee thereof for any wildfire damages that result from reliance on this Article or any decision lawfully made hereunder.

Section 406.109.4 Implementation and Administration - Wildfire Mitigation Program

The Alachua County Wildfire Mitigation Program shall be administered and implemented by the Alachua County Department of Public Safety [ACDPS] consistent with the provisions of and through the duties assigned to this department by section 401.20 of this ULDC and under the authority granted this department under Chapter 633, Florida Statutes, and Chapters 69A and 69A-60, Florida Administrative Code. The ACDPS Wildfire Mitigation Officer shall be responsible for the interpretation and enforcement of this code.

Section 406.109.5 Designation of Wildland Fire Hazard Areas

a) The areas of wildland fire hazard in Alachua County shall be determined by the Wildfire Mitigation Officer or a designee utilizing the Florida Department of Agriculture and Consumer Services, Division of Forestry Fire Risk Assessment System [FRAS] and as it may be updated by the Division of Forestry or refined by the Alachua County Department of Public Safety. The Fire Risk Assessment System shall generally be considered the best available data for determining the wildfire hazard areas on a county-wide basis. The Wildfire Mitigation Officer may also obtain, review, and reasonably apply wildland fire hazard information from other sources to determine areas at risk from wildland fire. Such sources may include:

1. *Wildfire Hazard Assessment Guide for Florida Homeowners* [September 2002] prepared by the Florida Department of Agriculture and Consumer Services, Division of Forestry;
2. National Fire Protection Association [NFPA] 1144 *Standard for Protection of Life and Property from Wildfire*;
3. Plant community or wildland fuel type mapping prepared by the Division of Forestry, the Florida Department of Environmental Protection, the Florida Natural Areas Inventory, water management districts, or other similar sources;
4. A site-specific assessment conducted using generally accepted professional methodologies as approved by the Wildfire Mitigation Officer.

- b) When determining areas of wildland fire hazard, a site specific determination will generally take precedence over an area-wide determination for the purposes of assessing wildland fire hazard and developing mitigation strategies. Such a site specific determination will take into account the changing characteristics of wildland fuels and land use patterns in the area surrounding a particular site as well as on the site itself.

Section 406.109.6 Wildfire Hazard Mitigation Standards

- a) Wildfire Mitigation Plans. All new development activities located in a Wildland Fire Hazard Area as determined in Section 406.109.5(a) shall provide for wildfire mitigation consistent with the following provisions:
 1. Wildfire mitigation activities must be consistent with and further the conservation and protection strategies implemented under the provisions of Chapter 406.
 2. Where proposed wildfire mitigation activities – such as fuel treatment activities - may have the potential to adversely affect regulated natural and historic resources, the Wildfire Mitigation Officer shall determine the appropriate wildfire mitigation activities in consultation with other County departments as necessary.
 3. The type and extent of the wildfire mitigation activities required of a particular development project shall be correlated to the level of wildfire hazard as determined using the criteria and procedures listed in Section 406.109.5. The nature of the development project and the degree of existing or reasonably predicted wildfire hazard within the project boundary and the surrounding area shall determine the components of the development project that must be addressed in an approved wildfire mitigation plan. Wildfire mitigation plans will be developed on a case by case basis to provide for the design and fuel management activities needed to mitigate wildfire hazard.
 4. Wildfire mitigation plans must provide for the periodic evaluation and revision so that the plans can appropriately react to changed conditions in and surrounding a development project or land use activity.

- 5. Wildfire mitigation plans and fuel management plans shall be prepared consistent with the provisions of Section 406.04 in that these plans shall be prepared by person(s) qualified in the appropriate fields of study, conducted according to professionally accepted standards, and based upon data that is considered to be recent and relevant with respect to the project area under consideration for development activity.

- b) Project Design. Consistent with the provisions of Chapter 406 and 407 of this ULDC concerning the protection of natural and historic resources and general development standards, development projects shall be designed, constructed, and maintained so as to minimize structural exposure to wildfire. Development projects shall be designed to minimize the extent of developed area that is contiguous with wildland fuels. The separation between structures and areas containing wildland fuel shall depend upon the degree of wildfire hazard. Project design features that can be used to address required performance standards include the use of infrastructure such as roadways and utility corridors to separate structures from wildland fuels, the use of managed open space such as active recreation areas to create fuel management zones, and the use of site features such as perennial water bodies or water courses and non fire-prone plant communities to separate structures from areas of wildfire hazard.
- c) Fuel Management Zones. Fuel management zones are areas where wildland fuel is removed, reduced, or managed to disrupt the vertical and horizontal continuity of wildland fuels so as to limit the movement of wildfire to structures. Fuel management activities should diminish as distance increases outward from exposed structures into wildland fuels. Individual structures, parcels or grouping of structures or parcels shall be separated from wildland fuels through the use of fuel management zones that may contain natural features, fire breaks, defensible space, and project infrastructure such as roadways or trails. Multiple fuel management zones may be required relative to the degree of wildfire hazard or the vulnerability of a structure to wildland fire due to structure design or construction materials

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Fuel management zones can be generally classified as follows:

1. Defensible Space. The first fuel management zone surrounding a structure is the defensible space zone and is the most intensely managed area. At a minimum, thirty feet of defensible space shall be created around structures at risk from wildfire. Larger areas of defensible space may be required due to the degree of wildfire hazard or the vulnerability of structures to wildfire. As applicable, final development plans, associated homeowner's documents [including a wildfire mitigation plan], and other documentation associated with development projects shall contain the following notice concerning the provision of defensible space as may be amended due to site specific considerations:

All structures subsequently built on this site that will have exposure to wildland fuel – such as structures adjacent to vegetated open space areas, stormwater basins, and habitat conservation areas – shall have at least thirty feet of defensible space surrounding them so as to minimize the vulnerability of these structures to wildfire. Defensible space is defined as a “clean” zone where fuels have been cleared, reduced, or changed so as to act as a barrier between wildfire and the structure. These areas can be landscaped with trees, shrubs, and groundcover as long as the appropriate plant material is used [less fire-prone], placed, and maintained so that no means is created to carry fire to a structure [discontinuous horizontal and vertical fuel arrangement]. Defensible space shall be created so as to provide a measure of passive fire protection for these structures. This area of passive protection created around a structure should limit the movement of fire to a structure or reduce the intensity of any fire that did move to a structure so that the likelihood of structural ignition is minimized or eliminated.

2. Fuel Reduction Zone. This zone is an area where additional fuel reduction and modification are applied to create an area of discontinuous fuel so that wildfire cannot move freely through this zone. Existing vegetation and plantings are modified and arranged into groupings or islands separated

by less fire-prone groundcovers. Fire-prone trees such as conifers are spaced so that adequate spacing between tree crowns is created to limit the movement of fire within the crowns of these trees. Lower tree branches are pruned 6-10 feet above the ground and ladder fuels are removed. Ladder fuels are shrubs or vines that could carry fire into the tree canopy. The fuel reduction zone extends along all access ways such as driveways to provide a means of access or escape in the event of wildfire.

3. Fuel Transition Zone. This zone provides a transition area from the managed areas surrounding structures to natural or wildland areas. This zone is managed to reduce surface fuels so as to reduce surface wildfire intensity should it occur and reduce the likelihood of crown fire by removing or modifying ladder fuels.
 4. Fuel Management Zone. This zone is an area of periodic surface fuel management to lessen the amount of available surface fuel and therefore reducing fire intensity should a wildfire occur. This area is less intensely managed than the other zones and would include common open space areas, strategic ecosystems, or other onsite conservation areas. Fuel management activities in this area would occur less frequently than in the other zones and on a larger scale and could include prescribed burning, or periodic mowing or chopping.
- d) Landscape Plans. Required landscaping plans shall minimize structural exposure to wildfire. All approved landscape plans for development projects – whether stand alone or as part of an approved wildfire mitigation or open space management plan – shall be compatible and consistent with the applicable wildfire mitigation requirements of this article. Landscape plant type, grouping, placement and maintenance will be factors in assessing compliance of landscape plans with this section. Approved landscape plans must provide for maintenance to remove or reduce the accumulations of vegetative fuels. Xeriscaping and the use of native plant species to promote water conservation and wildlife value are encouraged; however the placement of these plant species in a landscape shall be consistent with the requirements of this article.

Fire-prone plants that exhibit a high degree of flammability will not be used in the defensible space area in the absence of other mitigating activities. Fire-prone or fire-tolerant plants are found in fire-maintained plant communities and typically support fire. Fire –prone plants are characterized by narrow leaves or needles, volatile oils or resins, waxy leaf coatings, thick or papery bark, and accumulations of dry or dead plant material on the plant or on the ground under the plant.

- e) Implementation Guide. *Wildfire Risk Reduction in Florida: Home, Neighborhood, and Community Best Practices*, a document produced by the Florida Department of Community Affairs and the Department of Agriculture and Consumer Services, should be used as a guide for meeting the requirements of this Article.

Section 406.109.7 Wildland Fuels Management

- a) Fuel Management Requirements. All new development regulated by this ULDC shall provide for the management of wildland fuels to reduce the potential for structural damage and the loss of natural resources in the event of a wildfire. Fuel management requirements shall be applied to natural areas as well as landscaped and planted areas.
- b) Fuel Management Timeline. The management and treatment of wildland fuels within and adjacent to a land use activity regulated by this code shall be an ongoing activity for the life of that activity or for as long as wildland fuels are present and create a hazard as determined by the Wildfire Mitigation Officer.
- c) Inspections. The fuel management activities as specified in open space management plans or wildfire mitigation plans shall be periodically assessed for compliance with these plans by the Wildfire Mitigation Officer or designee. Wildfire mitigation plans, open space management plans, home owner association documentation, or other documentation guiding the activities of an entity responsible for a development project shall provide for ongoing, periodic fuel management and periodic compliance inspections and enforcement by ACDPS. The frequency of compliance inspections will be determined by the prevailing site conditions and the extent of the wildfire

hazards to be addressed but in no case shall these inspections occur less than once every three years.

- d) Fuel Management Activities. All fuel treatment and management activities must be consistent with and further the natural resource conservation and protection strategies of the adopted Alachua County Comprehensive Plan and this ULDC.
1. Prescribed Fire. Prescribed fire is the preferred option for the treatment and management of wildland fuels. Prescribed fire is of particular importance in dedicated conservation areas, strategic ecosystems, listed species habitats that are fire-maintained and onsite common open space areas containing fire-maintained or fire-dependent plant communities.
 2. Other Treatment Activities. Where the application of prescribed fire may be in question due to land use constraints or other limitations, the Wildfire Mitigation Officer or designee will determine other methods of fuel treatment and management that may be acceptable. This determination will be made in consultation with the Alachua County Environmental Protection Department and the land managing entity.
- e) Prescribed Fire Notice. As applicable, final development plans, associated homeowner's documents, and other documentation associated with a particular development project shall provide notice of the use of prescribed fire in the area – irrespective of the use of prescribed fire on the site itself. This notice shall be provided and recorded such that initial and subsequent residents and owners will be made aware of the use of prescribed fire in the area to manage wildland fuels. The following notice concerning the use of prescribed fire shall be provided:
- Periodic prescribed burning is a recognized land management tool and a recommended method of fuel management in this area for minimizing wildfire hazards. Prescribed burning may result in the periodic occurrence of temporary smoke and ash. Reference the Wildfire Mitigation section within the Common Open Space Easement Management Plan, Policy 5.6.8 of the Conservation and Open Space Element of the adopted Alachua County Comprehensive Plan, and*

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Article 19 of the Unified Land Development Code for additional details.

- f) Control of Invasive Fire-Prone Species. Invasive plant species - in particular Cogongrass [*Imperata cylindrica*] – can create additional wildfire hazards. Where invasive plant species such as Cogongrass create wildfire hazards they are to be controlled or eliminated consistent with the invasive species control provisions of this Unified Land Development Code. As a condition of approval for development projects, the Wildfire Mitigation Officer shall have the authority to require removal and control of invasive non-native plant species within fuel treatment or fuel management zones when these plants create increased wildfire hazards.

Section 406.109.8 Wildfire Structural Protection Standards

- a) Onsite Water Supply. Where the hazard of wildfire presents risk to a development project or land use activity regulated by this code, one or more onsite water supply sources shall be provided by the developer/builder/owner of the project for structural protection from wildfire. At a minimum one onsite water supply shall be provided for each development project in areas of high wildfire risk using the wildfire hazard assessments noted above. Additional onsite water supplies may be required when due to the size, configuration, or character of a project site, or the degree of wildfire risk one water supply would not be adequate. Factors that require the provision of more than one onsite water supply include extended distance to other available water supplies, distance onsite from water supply to hazard areas or exposed structures, the degree of structural exposure to wildfire hazard, hazardous vegetation, or unusual terrain. In the absence of a pressurized hydrant system, storage tanks are the preferred type of onsite water supply system. Appropriately plumbed, accessible and maintained swimming pools are an acceptable onsite water supply. In general manmade ponds do not provide a reliable onsite water supply and are not acceptable for this use. Perennial water bodies such as natural ponds or lakes may be acceptable as an onsite water supply as determined on a case-by-case basis.

1. Performance Standards. Onsite water supplies shall be capable of continuously delivering 250 gallons per minute of water for two hours. The onsite water supply shall be readily

accessible by fire fighting apparatus and meet the applicable standards for construction, installation, access, and fire department connections contained in NFPA 1, *Uniform Fire Code*, NFPA 1142, *Standard for Water Supplies for Suburban and Rural Fire Fighting*, and NFPA 22, *Standard for Water Tanks for Private Fire Protection*.

2. Maintenance. Onsite water supplies shall be maintained by a responsible entity such as a home owners association or the development project owner/developer consistent with the requirements of NFPA 25, *Standards for the Inspection, Testing, and Maintenance of Water-based Fire Protection Systems*. Should the onsite water supply become unsuitable as to water quality or quantity as determined by ACDPS or otherwise unserviceable for any reason the responsible entity shall repair or replace the onsite water supply in a timely manner.
3. Periodic Testing. ACDPS shall conduct periodic testing of the onsite water supply system(s) to assure that an adequate water supply is available and that the system is in good working order.
- b) Emergency Access. Residential and non-residential development projects must provide adequate access for emergency service vehicles. Section 407.79.5 of this Code and Chapter 18 of NFPA 1, *Uniform Fire Code*, specify the provisions and requirements for secondary emergency access. At a minimum, such access must provide 14 feet of vertical clearance and 20 feet of horizontal clearance for vehicles, be constructed and stabilized to a limerock bearing ratio of 35, and provide adequate clearance for the turning movements of at a minimum thirty-foot wheelbase design vehicles.
- c) Signage. When the configuration of a development project is such that the location of a secondary emergency access may not be readily apparent or the access is remotely located relative to a project's primary entrance(s), appropriate signage for emergency response purposes shall be provided by the property owner, developer, home owner's association, or other responsible entity indicating the roadway network internal to the project and the location of the emergency access way(s) in accordance with the standards for incidental signs in Section 407.31(b) of this ULDC.

Section 406.109.9 Non-Compliance

It shall be considered a violation of this Article of the Unified Land Development Code for:

1. Failure to develop an approved wildfire mitigation plan where it is determined necessary consistent with the provisions of this Article;
2. Failure to implement the required components of an approved wildfire mitigation plan;
3. Failure to adequately mitigate wildfire hazards as may be identified using the methodology specified in Section 406.109.5.
4. Failure to maintain required onsite water supplies consistent with the requirements of an approved wildfire mitigation plan and this Article;

The procedure for correcting violations of this Article shall be as follows:

- a) **Corrective Actions Timeline.** Where violation of or non-compliance with the provisions of this Article are determined, the property owner, home owners' association, and/or other responsible party for the development project or land use activity shall be given six months from the date of notice to correct or abate all noted deficiencies, violations or non-compliance issues. This timeframe may be extended for good cause up to an additional six months by the Wildfire Mitigation Officer. The Wildfire Mitigation Officer will develop an implementation plan and timeline to correct all noted violations or non-compliance issues in coordination with the responsible party.
- b) **Enforcement Proceedings.** Should the noted violations or non-compliance issues not be corrected in a timely manner, County Code Enforcement proceedings may be initiated by the Wildfire Mitigation Officer to compel compliance with the mitigation implementation plan. Violations of this Article which are not remedied within the timeframe provided may be referred to the Alachua County Code Enforcement Board in accordance with F.S. Chapter 162 and Chapter 24 of the Alachua County Code of Ordinances as specified

in Chapter 409 of the Unified Land Development Code regarding Violations, Penalties, and Enforcement.

- c) **Corrective Actions.** If a responsible party's failure to conduct appropriate fuel management, to maintain fuel treatment zones or defensible space, or other specified wildfire mitigation activities creates a high wildfire hazard as determined using the criteria noted above then ACDPS shall have the ability to conduct reasonable fuel treatment activities on private property as may be needed to reduce the wildfire hazard. Such activities may include but not be limited to mowing, chopping, chemical treatments, or the use of prescribed fire to control understory vegetation. ACDPS shall have the ability to recover costs from the property owner or other responsible party for all wildfire mitigation activities conducted to correct failures to comply with an approved wildfire mitigation plan, open space management plan, landscape maintenance plan, or other specified wildfire mitigation activities.
- d) **Notice.** Prior to conducting fuel treatment activities on private property, ACDPS will notify the landowner or responsible party of the areas to be treated and the type of treatment activity to be used. This notice shall be provided by certified mail. In addition to notice by certified mail, notice shall be posted on the site to receive fuel treatment. From the date of notice the responsible party shall have sixty days to correct all noted deficiencies before ACDPS initiates fuel treatment activities.

Nothing in this article shall prevent ACDPS, the Florida Division of Forestry, or any other wildfire suppression entity from taking all necessary and timely actions to suppress wildfire including, but not limited to, clearing brush from private property without notice to the landowners.

APPENDICES

Appendix 3. Annotated Model Wildfire Mitigation Regulation

The attached model regulation goes into more depth to address the wildfire problem as a land use issue. The model regulation is annotated with complete descriptions of the purpose and background of each section. Footnotes cite references as a source of further information. The model can serve as a guide for local governments by providing a framework for adaptation to local needs and circumstances. This model regulation would be an appropriate enabling act (incorporated into LDRs) to a wildfire mitigation requirement in a local Comprehensive Plan, such as the LDRs developed by Alachua County (see previous document).

Similar to coastal hazard reduction measures, the Wildfire Mitigation Regulation seeks to focus risk reduction in defined wildfire hazard areas. The ordinance provides for a Wildfire Mitigation Review Board and a Wildfire Mitigation Official. The Wildfire Mitigation Official is charged with implementing the requirements of the regulation. The Wildfire Mitigation Review Board appoints the Official and serves as an appellate body for affected landowners who wish to appeal an action of the Official. The Administration section of the regulation describes the mechanisms for establishing the rules and regulations set out within the ordinance.

The Wildfire Mitigation Regulation addresses three aspects of the wildfire hazard. First, classification of the Wildland-Urban Interface Area as an Overlay District delineates where the wildfire hazards are and what values need to be protected. Second, an assessment of areas within the Overlay District on the basis of their wildfire hazard characterizes the level of wildfire risk in each area. Finally, the wildfire hazard is abated through a Wildfire Mitigation Plan created and implemented by the landowner or developer and later maintained by the residents or community association. These measures are encouraged with a series of prohibitions, penalties, and incentives suggested in the ordinance.

Note that this model language is not meant to be used verbatim. A community or local government should carefully decide which components of this language would be most useful or appropriate to the local situation. In addition, most local governments will have specific guidelines as to regulation form and content and other pre-existing rules that may affect the content of a vegetation management ordinance.

Communities should consult a legal expert when drawing up a regulation or a covenants document to be sure it doesn't conflict with existing regulations or a tree protection ordinance.

City or County of _____, Florida

WILDFIRE MITIGATION ORDINANCE

(Note: The word "ordinance" is equivalent to "regulation" throughout.)

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City or County of _____, Florida

WILDFIRE MITIGATION ORDINANCE

ANNOTATED MODEL

ARTICLE 1. BASIS OF ORDINANCE

Commentary

Accurate and substantiated Findings of Fact are invaluable indicators that ordinances are warranted exercises of the police power by governments for the protection of the health, safety, and welfare of the governed. The Findings of Fact should be modified if necessary to be consistent with the adopting local government's normal formalities and procedures. Specific Findings of Fact should be tailored to the individual local government with respect to its specific resources, environmental conditions, and reason(s) for adopting the Wildfire Mitigation Ordinance.

Section I. Findings of Fact

This Ordinance shall be referred to as the City or County of _____ Wildfire Mitigation Ordinance. The Board of Commissioners hereby makes the following findings:

- A. Wildfire in the City or County of _____ has the potential to damage property and endanger human life.
- B. Wildfire crowning in the pine tree canopy, a buildup of brush in close proximity to buildings, and a general buildup of vegetative fuels significantly correlate to the destruction or damage of buildings and personal property.¹
- C. The use of combustible building materials and the lack of fire-resistant materials in structures significantly correlate to the destruction of structures from wildfire.²

- D. The continued presence and accumulation of highly flammable vegetation on real property in the City or County of _____ creates a present and imminent danger of wildfire, which could endanger the health, safety, and welfare of the citizens.³
- E. Mitigating the existing wildfire hazard is vital to the residents of the City or County of _____.
- F. City or County of _____ has the ability to identify areas that have a relatively severe risk of wildfire and the ability to prioritize those areas for systematic mitigation planning and implementation.
- G. Systematic mitigation measures are necessary to avoid catastrophic impact to the community's economy and quality of life. Such systematic mitigation, to the extent it limits wildfire damage, will also help the community conserve its natural resources for aesthetic, environmental, and stormwater management processes.⁴
- H. The risk of wildfire recurrence is substantial under expected droughty conditions. Dry weather patterns associated with increased wildfire activity are a part of the well-documented El Niño/La Niña Southern Oscillation phenomenon that occurs on a cyclic basis.⁵

¹Flagler County Ordinance No. 98-14, §1(D) citing a study conducted by the Florida Division of Forestry after the wildfires of May 1985.

²Protecting Florida Homes from Wildfire, A Guide for Planners, Developers and Fire Services. Florida Department of Agriculture and Consumer Services Division of Forestry at 13.

³Protecting Florida Homes from Wildfire at 1.

⁴Flagler County Ordinance No. 98-14, §1(J)(K).

⁵Flagler County Ordinance No. 98-14, §1(L).

Section II. Ordinance Purpose and Goals

Commentary

Section II “Ordinance Purpose and Goals,” should be developed so as to be consistent with the appropriate elements of the local government’s Comprehensive Plan as required by Florida Statutes Section 163.3177, “Required and optional elements of Comprehensive Plan; studies and surveys.” For example, Section 163.3177 requires the Comprehensive Plan to include a future land use element with map, a traffic circulation element, a conservation element, and a recreation and open space element, among others. Because local Comprehensive Plans provide a policy framework for local ordinances, it is important that wildfire mitigation provisions be integrated into the Comprehensive Plan either separately or into various plan elements. Refer to Chapter 2 for a discussion on incorporating wildfire mitigation into the Comprehensive Plan process.

This Ordinance recognizes that Florida’s population and land use patterns are changing. Residential and commercial development is increasing in what is known as the Wildland- Urban Interface. Fire is a natural and essential process in many Florida ecosystems bordering on new development including sandhills, pine flatwoods, scrub, and marsh. Without fire, these ecosystems change and the organisms unique to the original habitat maintained by fire are lost. Red-cockaded woodpeckers, scrub jays, gopher tortoises, longleaf pines, and wiregrass are some species that depend on fire. The threat to lives and property from uncontrolled wildfire is dramatically increased by urbanization and elimination of the natural role of fire, factors which have increased fuel loading and changed ecological conditions. In addition, there are increases in effective fuels (combustible materials) from new construction (often without appropriate hazard mitigation, without the use of fire resistant materials or construction techniques, and without defensible space or adequate water supply arrangements).⁶

This Ordinance is intended to promote the public health, safety, and general welfare of the citizens of the City or County of _____, Florida, to minimize the loss of life and property in the jurisdiction from uncontrolled wildfire, to provide for more efficient public expenditures in the protection of structures and facilities from wildfire, to regulate building construction so as to minimize the wildfire hazard to public and private property, and to encourage an added value concept to enhance aesthetics and property values.⁷

Section III. Definitions

Commentary

To the extent possible, these definitions follow applicable language from the 2002 Florida Statutes, 2002 Florida Administrative Code, and/or have been adapted from scholarly treatises and other research documents. In building the local government’s Wildfire Mitigation Ordinance, care should be exercised to use similar language where possible without creating conflicts with the terminology already adopted by the local government in its ordinances, regulations, or Comprehensive Plan.

“BIOMASS REMOVAL” means removal of fuel sources from wildfire-risk areas by methods including, but not limited to, grazing, pine straw harvesting, and brush removal, in a manner deemed appropriate by the Wildfire Mitigation Official in consultation with members of the local Wildfire Mitigation Review Board and the Florida Division of Forestry.

“BRUSH” means plant species that by virtue of their arrangement, chemical composition and growth pattern provide a ready path for fire to spread. Species included in this definition include saw palmetto, gallberry, fetterbush, and wax myrtle. Pine trees less than five (5) inches diameter at 4.5 feet above grade are included in this definition.⁸

⁶Adapted from Title 15, Chapter 15.13.020, Wildland Urban Interface/Intermix Ordinance, Clark County, Washington. See also Prescribed Fire, A Prescription for a Healthy Florida, a brochure produced by the St. Johns River Water Management District.

⁷Adapted from Title 15, Chapter 15.13.020, Wildland Urban Interface/Intermix Ordinance, Clark County, Washington.

⁸Flagler County Ordinance No. 98-14, §2 at 3.

“BUILDING” means any structure used or intended for supporting or sheltering any use or occupancy.⁹

“DEFENSIBLE SPACE” means the area, either natural or man-made, where material capable of allowing a fire to spread unchecked has been treated, cleared or modified to slow the rate and intensity of an advancing fire and to create an area for fire suppression operations to occur.¹⁰

“DRIVEWAY” means a vehicular ingress and egress route that serves no more than two (2) buildings or structures, not including accessory buildings, or more than five dwelling units.¹¹

“EMERGENCY” means circumstances that are recognized as presenting an imminent danger of wildfire ignition –or an ongoing wildfire.

“FIRE-PRONE VEGETATION” means native or non-native plant material generally recognized as having highly flammable characteristics, including, but not limited to, saw palmetto, wax myrtle, gallberry, ornamental arborvitae, redcedar, juniper, and pine trees.

“FIREWISE BUILDING MATERIALS” means the use of materials and systems in the design and construction of a building or structure to safeguard against the spread of fire within a building or structure and the spread of fire to or from buildings or structures to the Wildland-Urban Interface area.¹²

“FUEL BREAK” means an area, strategically located for fighting anticipated fires, where the native vegetation has been permanently modified or replaced so that fires burning into it can be more easily controlled. Fuel breaks divide high-risk areas into smaller areas, interrupt fuel continuity, allow for easier wildfire control, and provide access for fire-fighting equipment.¹³

“FUEL REDUCTION” means a method of modifying fuel load by lessening the amount of flammable material.¹⁴

“LANDOWNER” means owners, lessees, developers, or any other persons having control of any property.

“MECHANICAL TREATMENT” means the alteration of fuel structure and characteristics by methods including, but not limited to, mowing, chopping, and harrowing, and in a manner deemed appropriate by the Wildfire Mitigation Official in consultation with the local Wildfire Mitigation Review Board.

“NONCOMBUSTIBLE MATERIAL” means material of which no part will ignite and burn when subjected to fire. Any material conforming to ASTM E 136-79 shall be considered noncombustible or, material having a structural base of noncombustible material as defined above, with a surfacing material not over 1/8 inch thick, which has a flame-spread rating of 50 or less. Flame spread rating as used herein refers to rating obtained according to tests conducted as specified in ASTM E 84-91a.¹⁵

“NONCOMBUSTIBLE ROOFING MATERIAL” means cement shingles or sheets, exposed concrete slab roof, ferrous or copper shingles or sheets, slate shingles, clay or concrete roofing tile, or other approved roof covering of noncombustible material designated as Class A roofing material.¹⁶

“OVERLAY DISTRICT” means a zoning approach to land development regulation whereby property is classified and regulated supplemental to existing zoning regulations.

⁹Urban-Wildland Interface Code, International Fire Code Institute. Ch.2 §202 at 7.

¹⁰Urban-Wildland Interface Code, at 7.

¹¹Id.

¹²Id.

¹³Id.

¹⁴Id.

¹⁵Urban-Wildland Interface Code, at 7. ASTM refers to the American Society for Testing Materials. ASTM determines voluntary consensus standards for materials, products, systems, and services. These standards serve as a basis for manufacturing, procurement, and regulatory activities. www.astm.org.

¹⁶Id.

APPENDICES

“PRESCRIBED BURNING” means burning conducted by the State Division of Forestry, by the Official, by the Landowner, or by an agent acting on behalf of the landowner in accordance with regulations promulgated by the Florida Division of Forestry, intended to reduce the available fuel in a given area and also to achieve other land management goals.

“TIMBER HARVESTING” means the removal of commercially valuable timber.

“WILDLAND-URBAN INTERFACE (WUI)” means the geographical area where buildings and other human development meets or intermingles with wildland or vegetative fuels.¹⁷

“WILDFIRE” means the uncontrolled fire spreading through vegetative fuels, exposing and possibly consuming buildings.¹⁸

“WILDFIRE MITIGATION OFFICIAL (OFFICIAL)” is the official designated by the City or County of _____ to interpret and enforce this Ordinance, or the Official’s authorized representative.¹⁹

Section IV. Adoption of the Wildfire Mitigation Ordinance

Commentary

The Wildfire Mitigation Ordinance may also be adopted by a local government as a reference document.

There is hereby adopted by the City or County of _____ Board of Commissioners, for the purpose of prescribing regulations mitigating the hazard to life and property from intrusion of fire from adjacent wildlands and buildings, and the prevention of structural fires from spreading to wildland fuels, that certain rule known as the Wildfire Mitigation Ordinance, and the same is hereby adopted and incorporated as fully as set out at length herein, and from the date on which this Ordinance shall take effect, the provisions thereof shall be controlling within the limits of the City or County of _____.²⁰

Section V. Administration of the Wildfire Mitigation Ordinance²¹

Commentary

The Board of Commissioners is encouraged to designate an existing local government board as the Wildfire Mitigation Review Board. For example, the existing Development Review Committee could sit as the Wildfire Mitigation Review Board. The Wildfire Mitigation Review Board should have at least three members, and approximately one-third of the Review Board members will be replaced or renewed each year by the Board of Commissioners. It is important that a local fire official or representative of the Florida Division of Forestry serve on the Wildfire Mitigation Review Board.

A planning director, chief building inspector, or local fire chief may be designated as the Wildfire Mitigation Official. The Official does not sit on the Wildfire Mitigation Review Board. The duties and qualifications of the Official may vary greatly depending on the local government’s resources, size, and need for

¹⁷Id.

¹⁸Id.

¹⁹Id.

²⁰Id. at xi

²¹Id. at 1-3. This section was adapted from the administrative format laid out in the Urban-Wildland Interface Code. The legislative, judiciary, and executive functions of this format are designed to provide adequate risk assessment, risk characterization, and risk abatement procedures to effectuate the goal of reduced wildfires. The appellate body created by this section is a due process safeguard for Landowners affected by any part of the Wildfire Mitigation Plan, or the orders, rules and regulations derived therefrom.

coordination with other staff or departments. For example, the local government may need to evaluate how the Official's rights and responsibilities will interact with the rights and responsibilities of the fire chief or building inspector. With regards to Section D liability provisions, local government officials will generally be protected from unlimited liability by Sovereign Immunity (F.S. 768.28).

In developing a Wildfire Mitigation Ordinance for adoption by a local jurisdiction, this model Ordinance should be adapted depending on local needs and conditions. For example, sections in this Model Wildfire Mitigation Ordinance regarding subjects covered adequately by existing state or local laws may be deleted and/or cited by reference in the locally adapted Ordinance.

- A. Wildfire Mitigation Review Board. A Wildfire Mitigation Review Board (the Board) is hereby established to appoint the Official and serve as the appellate body set forth in Subsection G of this section.
 - a. Membership and Terms. The Board shall have ____ members, all residing in the City or County of _____, and appointed by the Board of Commissioners. Initial terms shall be ____ for one year, ____ for two years, and ____ for three years. Terms thereafter shall be for three years each. Board members shall have experience in firefighting, forestry, landscape architecture, agriculture, building, or a similar field.²²
 - b. Officers and employees. The Wildfire Mitigation Review Board shall elect a chairman from among its members. The City or County of _____ shall provide all clerical assistance.²³

- c. Meetings. The Wildfire Mitigation Review Board shall meet when a hearing is requested by a Landowner as described in Subsection G, to appoint an Official, or to conduct other official business as determined by the Board. A quorum shall be ____ members.²⁴

- d. Hearings before the Wildfire Mitigation Review Board. Any interested Landowner may appear before the Wildfire Mitigation Review Board to show that conditions or circumstances do not require the action prescribed by the Official. The Landowners may introduce witnesses as deemed necessary.²⁵

- B. Wildfire Mitigation Official. The designated Official herein shall enforce the Wildfire Mitigation Ordinance as adopted and amended. The Wildfire Mitigation Review Board shall appoint the Official, subject to the approval of the Board of Commissioners.²⁶

- C. Authority of the Wildfire Mitigation Official. The Official shall have the power to render interpretations of this Ordinance and to adopt and enforce supplemental rules to clarify the application of the Ordinance's provisions. Such interpretations and supplemental rules shall be in conformance with the intent and purpose of this Ordinance. A copy of such supplemental rules shall be filed with the clerk of the jurisdiction and shall be in effect immediately thereafter. Additional copies shall be available for distribution to the public.²⁷

²²Id.

²³Id.

²⁴Id.

²⁵Id.

²⁶Id.

²⁷Id.

D. Liability of the Wildfire Mitigation Official. The Official charged with the enforcement of this Ordinance, acting in good faith and without malice in the discharge of the duties required by this Ordinance or other pertinent law or ordinance, shall not thereby be rendered personally liable for damages that may accrue to person or property as a result of an act or by reason of an act or omission in the discharge of such duties. A suit brought against the Official or employee because of such act or omission performed by the Official or employee in the enforcement of any provision of this Ordinance or other pertinent laws or ordinances implemented through the enforcement of this Ordinance or enforced by the code enforcement agency shall be defended by this jurisdiction until final termination of such proceedings, and any judgment resulting therefrom shall be assumed by this jurisdiction. The code enforcement agency or its parent jurisdiction shall not be held as assuming any liability by reason of the inspections authorized by this Ordinance or any permits issued under this Ordinance.²⁸

E. Wildfire Mitigation Ordinance Management. In areas with overlapping jurisdictions, sections ____ [insert appropriate sections] shall be enforced by ____ [insert appropriate official or jurisdiction], and sections ____ [insert appropriate sections] shall be enforced by ____ [insert appropriate official or jurisdiction].²⁹

F. Wildfire Mitigation Ordinance Amendment. Amendments deemed necessary and approved by the Board of Commissioners shall be inserted in this Ordinance.³⁰

G. Appeals. Whenever the Official disapproves an application or refuses to grant a permit, or when it is claimed that the provisions of the Wildfire Mitigation Ordinance do not apply or that the true intent and meaning of the Ordinance have been misconstrued or wrongly interpreted, the applicant may appeal the decision of the Official to the Wildfire Mitigation Review Board. Appeals shall be made in writing and delivered or sent by U.S. Mail to the Wildfire Mitigation Review Board³¹ at the following address:

The appellant will then appear in a Hearing before the Wildfire Mitigation Review Board as described above.

Section VI. Severability

Should any court of competent jurisdiction declare any section or provision of this Ordinance invalid or unconstitutional, the declaration shall not affect the validity of this Ordinance as a whole or any part thereof that is not specifically declared to be invalid or unconstitutional.

²⁸Id.
²⁹Id.
³⁰Id.
³¹Id.

ARTICLE 2. WILDFIRE MITIGATION ORDINANCE

Section I. Purpose

The purpose of the Wildfire Mitigation Ordinance is to provide a mechanism to identify, characterize, and mitigate areas of high wildfire risk. Properties within the City or County of _____, determined to have a wildfire risk that exists to a greater degree than that customarily recognized as normal by persons in the public service regularly engaged in preventing, suppressing, and extinguishing wildfires shall be identified as high-risk areas. Identification of high-risk areas shall be based upon data obtained from the Florida Division of Forestry's Wildfire Risk Assessment (FRA), the Florida Division of Forestry's Wildfire Hazard Assessment Guide for Florida Homeowners, or any other wildfire risk assessment method supported by competent and substantial evidence. After identification and characterization of high-risk areas, rules shall be promulgated to reduce the risk of wildfire and to provide for ongoing fuel reduction in high-risk areas. Risk levels shall be reevaluated every three years or at more frequent intervals as determined by the Official.

Commentary

A wildfire risk assessment system generally has three components: a number of scaled risk variables, a system to analyze the relationship between the risk variables, and a graphic representation illustrating the level of risk. Common risk variables include fuel, topography, weather, and availability of fire protection services. For example, in its Wildfire Mitigation Ordinance, Indian River County has identified several wildfire risk factors pertinent to Florida wildfire risk assessment, including subdivision design, vegetation, lightning frequency, proximity to highways and railroads, building construction, fire protection infrastructure, and utilities. Because the many wildfire risk assessment systems that exist for the

Western United States are not tailored to Florida's needs, the Florida Division of Forestry has recently developed wildfire risk assessment systems that specifically apply to Florida.

The Florida Division of Forestry's Wildfire Risk Assessment System (FRA) provides an accurate broad-scale risk assessment and is one way to standardize methodology and promote inter-governmental cooperation. The FRA is a map-based GIS analysis of the level of wildfire risk for the entire state or for regions of the state. FRA will be available online for local governments, fire services, and other agencies and individuals to use. The FRA system can be used by the Official to determine wildfire risk for an entire jurisdiction or overlay district.

The Florida Division of Forestry's Wildfire Hazard Assessment Guide for Florida Homeowners provides various relevant factors and considerations for conducting on-site wildfire hazard risk assessment for individual buildings and neighborhoods. The Wildfire Hazard Assessment Guide can be used by the Official to determine wildfire risk for a specific area.

If a prescribed burn or other fuel reduction treatment is conducted in a high-risk area, the risk rating will be temporarily reduced because of the reduced availability of fuel. If fuel reduction treatments are continued on a regular basis, this reduced risk will be reflected in the wildfire risk assessment of the property and adjacent properties. Conversely, if fuel reduction practices are not carried out in a medium-risk area, the fuels may accumulate until the area becomes a high-risk area. This highlights the need to reevaluate the wildfire risk assessment on a regular basis. The Florida Division of Forestry plans to update the statewide FRA ratings every two years to adjust to changing conditions. Local governments may consider tying their regular wildfire risk reviews to FRA updates, to Comprehensive Plan reviews, to wildfire occurrences in the jurisdiction, or to a regular calendar schedule of some kind.

APPENDICES

Section II. Wildland-Urban Interface and High-Risk Areas³²

- A. Policy. The provisions of this section provide methodology to establish and record WUI areas based on the findings of fact. The objective of this section is to provide simple baseline criteria for determining WUI areas.³³
- B. Identification of Wildland-Urban Interface Areas. The Wildfire Mitigation Review Board shall identify the WUI areas within the jurisdiction. The WUI areas shall be based on the findings of fact attached hereto.
- C. Identification of High-Risk Areas. The Official shall identify areas within the WUI that constitute a wildfire hazard based upon data obtained from the Florida Wildfire Risk Assessment (FRA), the Wildfire Hazard Assessment Guide for Florida Homeowners (WHAGFH), or any study supported by competent and substantial evidence.³⁴
- D. Characterization of High-Risk Areas. The Official shall make a determination of the severity of wildfire risk of different areas within the WUI and rank such areas accordingly. Areas of highest wildfire risk shall be given priority in wildfire mitigation conducted by the Official.³⁵
- E. Mapping. Both WUI and high-risk areas within the WUI shall be recorded on maps, here incorporated by reference, and filed with the planning office of the City or County of _____. These areas shall become effective immediately thereafter.

- F. Periodic Review of Wildland-Urban Interface and High-Risk Areas. The Official shall reevaluate and recommend modification to the WUI and to the high-risk areas within the WUI, in accordance with Section II on a __-year basis or more frequently as deemed necessary by the Wildfire Mitigation Review Board.³⁶

Section III. Wildfire Hazard Mitigation Overlay District³⁷

Commentary

The Wildfire Hazard Mitigation Overlay District should be based on a policy included in the local government's Comprehensive Plan pursuant to portions of Florida Statutes Chapter 163.3177 Required and optional elements of comprehensive plan; studies and surveys that support wildfire mitigation planning. Local governments may tie identification of a Wildfire Hazard Mitigation Overlay District(s) to the Florida Division of Forestry's Wildfire Risk Assessment System (FRA), the Florida Division of Forestry's Wildfire Hazard Assessment Guide, or any other method supported by competent and substantial evidence (see previous commentary). Triggers for regular reassessment of fuel conditions will be included as well.

- A. Purpose. This Wildfire Hazard Mitigation Overlay District (the Overlay District) is intended to promote the ordinance purposes and goals in Article 1, Section II of this ordinance. Specific purposes are:
- (1) To develop and maintain a map or otherwise to identify areas within the jurisdiction that allow for preliminary identification of wildfire hazard areas.
 - (2) To identify the process for assessing the wildfire hazard concurrent with the land planning process.

³²Id. Section II is the identification and characterization mechanism of the Wildfire Mitigation Plan. Identification of the Wildland Urban Interface Area establishes what areas need to be protected from wildfire. Identification of the areas within the WUI containing a high degree of wildfire hazard establishes what areas are currently susceptible to wildfire. Ranking the hazardous areas is a mechanism by which the most susceptible areas may receive the needed mitigation first.

³³Id.

³⁴Id. See also Wildfire Hazard Assessment Guide for Florida Homeowners, Florida Division of Forestry, Department of Agriculture and Consumer Services, Charles H. Bronson, Commissioner. <http://flame.fl-dof.com>.

³⁵Id.

³⁶ The periodic review of the Wildland- Urban Interface Area is necessary because the characteristics and boundaries of the area are not static. The evolving danger from wildfire must be monitored on a regular basis to ensure that the appropriate classification and protection is achieved on a continual basis. County Land Use Planning, How Can Planners Help the Fire Services In Protecting Homes from Wildfire; Guy R. Groves; Jefferson County Planning Department; Golden, Colorado. Paper Presented at the Symposium and Workshop on Protecting People and Homes from Wildfire in the Interior West, Missoula, MT. October 6-8, 1987.

³⁷[Adapted from] Village of Ruidoso, California, Ordinance 2002-05. An ordinance establishing an Urban/Wildland interface overlay zone for the Village of Ruidoso.

- (3) To identify specific types of development to be subject to wildfire mitigation measures and the provisions of the Wildfire Mitigation Ordinance as adopted by the City or County of.
 - (4) To reference the standards with which development proposed in wildfire hazard areas must comply.³⁸
- B. Applicability of the Overlay District. The regulations contained in this article shall apply to all land areas identified as being within the Wildfire Hazard Mitigation Overlay District. Land use activities subject to this article are:
- a. Land use changes;
 - b. Subdivisions;
 - c. Site plans;
 - d. Building permits;
 - e. All special use permits, including conditional uses and variances.³⁹
- C. Identification of the Overlay District. The Overlay District shall be deemed an overlay on property in any zoning district that comes within the provisions of this article. The City or County of may create a map to identify properties within the Overlay District or by such other method as will serve the purposes listed above and sufficiently identify the property. Any property identified as being within the Overlay District shall lawfully be designated as such, regardless of whether or not it is identified on any map. Land proposed for development shall be subject to on-site inspection by the Official for the purpose of determining a wildfire risk rating.⁴⁰

- D. Duties of Official. The Official of the City or County of shall have responsibility for administration of this section.⁴¹

Section IV. Fuel Reduction

- A. Methods of Fuel Reduction. Prescribed burning, mechanical treatment, biomass removal, chemical treatment, livestock grazing, and timber harvesting are possible methods of fuel reduction for wildfire mitigation.
- B. Selection of Mitigation Method. The Landowner, developer, or other responsible party shall submit a proposal for wildfire mitigation to the Official. The Official, in consultation with the Mitigation Review Board, shall recommend the method of fuel reduction based on the nature and physical characteristics of area being mitigated. The Official shall not recommend a method of mitigation that would unreasonably endanger life or property. The landowner will prepare, or have prepared for the property, a Wildfire Mitigation Plan that includes a description of the initial fuel reduction method(s) and a description of ongoing fuel reduction practices and timetable.
- C. Performance of Mitigation Methods. The responsible party may perform, or hire performed, the prescribed mitigation work. If the City or County of performs the mitigation work or causes the work to be performed, their costs may be charged as a lien on the Landowner's property, net of any income derived from biomass removal (i.e., tree thinning or harvesting). The costs shall include all expenditures by the City or County of, or their authorized agents for labor, supplies, equipment use, contractors, and services related to implementing the Wildfire Mitigation Plan for the property.⁴²

³⁸Id.

³⁹Id.

⁴⁰Id.

⁴¹Id.

⁴² Flagler County Ordinance No. 98-14, §4 (B).

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Section V. Firewise Building Materials⁴³

Commentary

The installation of automatic sprinkler systems inside buildings is another requirement that might be considered by local governments. Because roofs and soffits are common entry points of embers in a wildfire, however, there is not universal agreement on the value of automatic sprinkler systems in saving structures threatened by wildfire.

A. Building Materials for New Construction. All new construction from development, including but not limited to, residential, commercial, or mobile home development shall use for construction materials:

- 1) Noncombustible roofing materials;
- 2) Noncombustible materials for balconies and decks;
- 3) Noncombustible screening for attic vents;
- 4) Heat-resistant (tempered, multi-layered, or wired) glass panels or fire-resistant plastic glazing for windows, glass doors, and skylights;
- 5) Approved spark arresters for chimneys;
- 6) Noncombustible skirting for raised homes or mobile homes.⁴⁴

B. Materials for Improvements on Existing Buildings. Existing buildings within the Overlay District, shall use, when making any significant improvement or addition to the existing building:

- 1) Noncombustible roofing materials;
- 2) Noncombustible materials for balconies and decks;
- 3) Noncombustible screening for attic vents;
- 4) Heat-resistant (tempered, multi-layered, or wired) glass panels or fire-resistant plastic glazing for windows, glass doors, and skylights;

- 5) Approved spark arresters for chimneys;
- 6) Noncombustible skirting for raised homes or mobile homes.⁴⁵

Section VI. Criteria for Fuel Reduction Areas⁴⁶

Commentary

Local governments may consider including a list of approved less-flammable plants and/or a list of hazardous fire-prone plants in this section for landscaping guidance. Plant lists are included in Chapter 6 of this handbook. Local governments will also want to consider how these provisions mesh with any other local environmental or tree protection ordinances, as discussed in the chapter introduction above. Fuel breaks (sometimes called fuel management zones) at the edge of a subdivision or development are usually between 100 to 300 feet wide.

A. Fuel Within the Critical Radius of Individual Buildings. Landowners of individual buildings shall manage fire-prone vegetation within thirty (30) feet of buildings, flammable materials, outdoor cooking areas, debris burning areas, and fuel storage tanks. Landowners shall not allow the accumulation of leaf litter and other flammable debris on roofs, eaves, gutters, or decks. Landowners shall trim back fire-prone vegetation that extends within ten (10) feet of the outlet of any chimney or stovepipe.⁴⁷

B. Environmental Considerations in Fuel Reduction. Vegetation or cultivated groundcover, such as green grass, succulent native plants, or similar plants used as groundcover are allowed to be within the designated defensible space provided they do not form a means of readily transmitting fire from fire-prone vegetation to the building. For all of their other benefits, trees are encouraged within the defensible space provided the horizontal distance between outer edges of the crowns

⁴³ Protecting Florida Homes from Wildfire at 14. These various components of building material represent the most hazardous ignition sources on individual structures. For purposes of the Wildfire Mitigation Plan, the definition of “noncombustible” was adapted from Federal Regulations embodied in the Urban-Wildland Interface Code. However, the definition of “noncombustible” could be modified, thereby altering the degree of wildfire protection required of builders.

⁴⁴ Id.

⁴⁵ Id.

⁴⁶ Id. at 9-12. Section VI was designed to meet the requirements necessary for effective protection on individual structures from wildfire. This section helps to ensure that structures are provided a buffer from ignition and fuel sources. It also allows emergency personnel adequate ground to defend structures in the event of a wildfire.

⁴⁷ Id.

of adjacent trees, and the outer edge of crowns of trees and buildings, chimney outlets, overhead electrical power lines, or unmodified fuel is not less than 15 feet.⁴⁸

- C. Maintenance of Defensible Space. Landowners are responsible for maintenance of defensible spaces. Maintenance of the defensible space shall include modifying or removing fire-prone vegetation within thirty (30) feet of buildings and keeping leaves, needles and other dead vegetative material regularly removed from roofs of buildings. Dead wood and litter shall be regularly removed from trees. Tree crowns extending near any building or chimney outlet shall be pruned to maintain a minimum horizontal clearance of ten (10) feet. Tree crowns within the defensible space shall be pruned to remove limbs within ten (10) feet of the ground. Ornamental conifers (such as cypress, cedars, junipers) that cannot be pruned to an aesthetically pleasing appearance should be removed.⁴⁹
- D. Fuel Outside the Critical Radius of Individual Buildings. Primary fuel breaks shall be constructed around the perimeter of new developments. Primary fuel breaks shall have a minimum width of 12 feet and be maintained clear of fire-prone vegetation. Maximum advantage shall be taken of planned or existing parks, golf courses, waterways, and other open spaces where low volume fuel conditions are maintained. For all of their other benefits, trees are encouraged in the fuel break area provided the horizontal distance between outer edges of the crowns of adjacent trees, and the outer edge of crowns of trees and buildings, chimney outlets, overhead electrical facilities, or unmodified fuel is not less than 5 feet.⁵⁰

Section VII. Tree Protection

Commentary

A major objective of the model wildfire mitigation ordinance is to reduce the vulnerability of structures within the overlay district or high-risk wildfire zone by regulating, to some degree, highly flammable vegetation in and around structures. It is not intended that the model wildfire mitigation ordinance denude the landscape nor render local tree protection ordinances ineffective. If the community does not already have a tree protection ordinance, provisions should be included in the wildfire mitigation ordinance to protect the urban tree canopy and the values associated with a healthy urban forest.

- A. Exempt Trees. Due to their flammability, the below-listed trees within thirty (30) feet of any structure in the special overlay district are exempt from the provision of the City or County of _____ Tree Protection Ordinance (Section ____, Ordinance ____) and do not require a permit for removal:

[Attach list of flammable native and ornamental trees in the local area. See lists in Chapter 6 or consult more recent publications for recommendations.]

- B. Recommended Replacement Trees. Because of their less-flammable nature, the below-listed trees are recommended for retention of existing trees or new planting within thirty (30) feet of any structure located in the special overlay district, and these trees qualify for any Tree Protection credits provided under the City or County of _____ Tree Protection Ordinance (Section ____, Ordinance ____):

[Attach list of less-flammable native and non-invasive ornamental trees appropriate for planting in the local area. See lists in Chapter 6 or consult more recent publications for recommendations.]

⁴⁸ Id.
⁴⁹ Id.
⁵⁰ Id.

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- C. Trees on Common Properties. Residents of subdivisions or neighborhoods in the special overlay district are encouraged to protect and manage the trees and other natural vegetation of any greenspaces or natural areas owned or controlled in common by residents in accordance with a Wildfire Mitigation Plan developed under the provisions of this Ordinance and approved by the Wildfire Mitigation Official.
- D. Removal of Hazardous Vegetation. In the performance of his/her duties, the Wildfire Mitigation Official may designate for removal any vegetation creating a wildfire hazard within thirty (30) feet of any structure in the special overlay district by requesting an exemption of any relevant sections of the City or County of _____ Tree Protection Ordinance (Ordinance ____).
- E. Pruning Standards. All pruning of trees for the purpose of implementing the provisions of this Ordinance shall be done according to the tree-pruning standards established by the American National Standards Institute, ANSI A300.⁵¹

Section VIII. Minimum Development Standards⁵²

Commentary

Use of wildfire mitigation practices such as firewise building and landscaping reduces the need for meeting these regulatory standards. The responsible agency should allow flexibility to adequately address these needs. For example, the need for adherence to the water system requirements could be offset by the presence of swimming pools or onsite wells. Waiver provisions could be incorporated. In addition, local lawmakers should consult with the Florida Division of Forestry and the National Fire Protection Association (NFPA) for standards that may be applicable to this section. Road, electrical, and water system requirements that might be appropriate for inclusion in this Ordinance or in the local Land Development Regulations (LDRs) are provided here.

- A. Road Construction Requirements. Every new development shall have access directly off a road conforming to the following requirements:
- a. Access Routes. Every new development shall have at least two ingress-egress routes for each subdivision. Every right of way shall include a minimum of two 12-foot all-weather traffic lanes and two 8-foot parking shoulders designed to accommodate firefighting equipment. Road curves shall have a centerline radius of at least 50 feet.
 - b. Driveways to all buildings shall be at least 12 feet wide and have a 16-foot high clearance.
 - c. Dead-end roads (Cul-de-sacs). Dead-end roads (Cul-de-sacs) shall provide turnarounds at road ends of at least 50-foot radius. Dead-end roads shall not be longer than 300 feet in length.
 - d. Bridges. Bridges shall have a minimum load capacity of a 30-ton gross vehicle weight capacity and a minimum width

⁵¹ Tree Care Operations - Tree, Shrub and Other Woody Plant Maintenance - Standard Practices. (Revision of ANSI A300 1995). The American National Standard for tree pruning is ANSI A300. Its development process was approved by the American National Standards Institute. The A300 standard addresses pruning specifications across all geographic areas. Knowledge of the growth habits of tree species within a given environment may alter how the recommendations of A300 are interpreted. See <http://www.ansi.org/>.

⁵² See Protecting Florida Homes from Wildfire at 14. This section addresses the wildfire risk from the perspective of land use and planning. These development standards represent the recommendations made in the above-cited source and are critical to establishing communities capable of effectively defending against wildfire. The measures are largely aimed at ensuring that development plan for the necessary emergency vehicle access and water supply. See also National Fire Protection Association, §1141-44, Standards for Protection of Life and Property from Wildfire, (2002 Edition).

equal to the road serving the bridge. Major ingress-egress roads serving a development should have a minimum load capacity on bridges of 40 tons. Minimum vertical clearance shall be 16 feet. The maximum load and clearance shall be clearly posted at the approaches to all bridges.⁵³

- B. Water System Requirements. All new structural developments shall have a public water system to service domestic and emergency fire needs meeting the following requirements:⁵⁴
- a. Water Mains. All water main systems shall be designed to permit circulating flow. The minimum size water distribution main on which fire hydrants are located should be 6 inches. Water source and storage shall have the capacity to support the required fire flow for a minimum duration of two hours in addition to the maximum daily flow for other consumptive uses.⁵⁵
 - b. Fire Hydrants. The type, size and location of fire hydrants shall meet the standard of the responsible fire authority or the NFPA. Hydrant spacing shall not exceed 1000 feet with minimum fire flow of 500 gallons per minute or equal to calculated fire flow, for developments with densities of two or less buildings per acre. Hydrant spacing shall not exceed 500 feet with a minimum fire flow of 750 gallons per minute at 20 pounds per square inch, for developments with densities of more than two buildings per acre.⁵⁶
 - c. Water Systems for Individual Buildings. Buildings with individual private water supplies shall provide a minimum water storage capacity accessible to fire apparatus of 2500 gallons within 500 feet of the building. Compliance with minimum water storage requirements may be accomplished by the installation of tanks or cisterns. Tanks and cisterns shall have

a hose connection valve to match _____[inset specifications of local fire protection responding agency]. Groups of buildings can provide a common source of water within 500 feet of all buildings and capacity that equals or exceeds 2500 gallons per building. Garden hose bibs shall be available near the building so that a garden hose can reach all the parts of the building.⁵⁷ If the water pressure is dependent on electrical power, a self-contained portable pump shall be readily available in case of power failure.⁵⁸

- d. Large Volume Water Sources. All potential large volume water sources shall be provided with all-weather access roads for fire-fighting equipment.⁵⁹
- e. Protection of Pumps and Water Storage Facilities. Water storage and pumping facilities shall be provided with a defensible space of not less than 30 feet clear of fire-prone vegetation or growth around and adjacent to such facilities. Portions of trees that extend to within 30 feet of combustible portions of water storage and pumping facilities shall be removed. When electrical pumps are used to provide the required water supply, such pumps shall be connected to a standby power source to automatically maintain electrical power in the event of power loss. The standby source shall be capable of providing power for a minimum of two hours in accordance with the Electrical Code of the City or County of _____.⁶⁰

C. Electrical Power System Requirements.

- a. Underground Installation. Electrical transmission lines shall be installed underground for all new structural developments. Underground electrical wires shall be buried at least 30 inches below grade.⁶¹

⁵³ Id.

⁵⁴ Id. Physical measurements for water system requirements should be determined by local standards as they may vary from the national standards provided. *See National Fire Protection Association, § 1142 (2007 Edition).*

⁵⁵ Id.

⁵⁶ Id.

⁵⁷ Id.

⁵⁸ Id.

⁵⁹ Id.

⁶⁰ Id.

⁶¹ Id.

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Section IX. Public Disclosure and Education⁶²

Commentary

A variety of educational literature and other materials are available from local, state, and federal agencies and charitable organizations that local governments should use to support this critical education component. These materials often are available at little or no cost for distribution to residents of high-risk wildfire areas.⁶³

- A. Purpose. Homeowner, Builder, Developer, and Realtor involvement is critical if effective wildfire mitigation is to be achieved. Many homeowners do not recognize that they live in an area that is susceptible to wildfire. Educating the homeowner begins with making the homeowner aware of the risks associated with wildfire, followed by a proactive program to provide the homeowner with information that identifies actions that they can take to help minimize the risks to themselves and their neighbors associated with uncontrolled wildfire.⁶⁴
- B. Disclosure. The fact that a building or undeveloped property is within a high-risk wildfire area or Overlay District must be revealed in writing to the buyer of said property by the selling Landowner, developer, or Realtor. All developers, builders, and Realtors shall be required to disclose to new residents the wildfire risks and potential nuisances posed by fuel management activities, including but not limited to, the smoke produced by prescribed burning activities.⁶⁵
- C. Public Workshops. The Official shall hold a series of public workshops at locations throughout the jurisdiction, designed to raise public awareness of the wildfire risk to public and private property. Builders, developers, and realtors shall be encouraged to attend at least one of these public workshops in order to gain a better under-

standing of the wildfire problem and the requirements of the Wildfire Mitigation Ordinance.

- D. Public Announcements and Informational Brochures. The Official shall make informational brochures available to builders, Realtors, and homeowners, summarizing the provisions of the Wildfire Mitigation Ordinance as they regulate landscaping and construction, and explaining what actions are needed by homeowners to maintain their homes and landscapes to comply with this Ordinance. Further, the Official shall make available public announcements, via the internet and in written form, that send a clear message about wildfires and steps to take to mitigate potential damage.⁶⁶

⁶² [Adapted from] Indian River County Wildfire Mitigation Plan at 35.

⁶³ See The Natural Role of Fire, Revised August 1999. Joint production of the Florida Department of Agriculture & Community Services, and the USDA Forest Service; See Save Your Home from Florida Wildfires, 1998. Joint production of the Federal Emergency Management Agency and the Florida Division of Forestry; See Fire in Florida's Ecosystems, January 1998. Joint production of the Florida Division of Forestry, USDA Forest Service, The Nature Conservancy, and Tall Timbers Research Station.

⁶⁴ Id.

⁶⁵ Id., See also Florida Firewise Communities.

⁶⁶ Id.

ARTICLE 3. ENFORCEMENT AND COMPLIANCE

Section I. Wildfire Nuisance

- A. Authority. The City or County of _____ has the authority to determine, prescribe, and conduct the necessary wildfire mitigation methods necessary to comply with the Wildfire Mitigation Ordinance.
- B. Landowner Duty and Liability. Landowners shall not create, maintain, or neglect to mitigate a wildfire nuisance on their property within the Wildfire Hazard Mitigation Overlay District, as determined by _____ [define standard wildfire risk assessment method to be used to determine nuisance]. If a Landowner fails to perform the necessary wildfire mitigation, the Official may issue a notice requiring the Landowner to develop a Wildfire Mitigation Plan to correct the situation within thirty (30) days of receiving notice. If the Landowner has not developed a Wildfire Mitigation Plan to mitigate the wildfire nuisance within thirty (30) days, the Official shall provide notice, in writing, that Landowner must plan for and perform the mitigation of the wildfire nuisance within ninety (90) days. If the Landowner does not plan for and perform the required mitigation within ninety (90) days of written notice, the Official may perform the required wildfire mitigation, at the expense of the Landowner. Cost shall be charged as a lien on Landowner's property, net of any income derived by the City or County of _____ from biomass removal (e.g., tree thinning or harvesting). The costs shall include all expenditures by the City or County of _____, or their authorized agents for labor, supplies, equipment use, contractors, and services related to implementing the Wildfire Mitigation Plan for the property.⁶⁷
- C. Removal of vegetation in emergency situations. In an emergency, the Official shall perform or have performed any wildfire mitigation, without notice, at the expense of the owner.
- D. Right of Entry. Whenever necessary to make an inspection to enforce any of the provisions of this Ordinance, or whenever the Official has reasonable cause to believe that there exists on any property any condition that makes such property unsafe, the Official is authorized to enter such property at all reasonable times to inspect the same or to perform any duty authorized by this Ordinance, provided that if such property is occupied, the Official shall first present credentials and request entry; and if such property is unoccupied, the Official shall first make a reasonable effort to locate the Landowner.⁶⁸
- E. Refusal of Entry. If such entry is refused, the Official shall have recourse to every remedy provided by law to secure entry. Landowners shall, after request is made as herein provided, promptly permit entry therein by the Official for the purpose of inspection and examination pursuant to Wildfire Mitigation Plan.⁶⁹
- F. Penalties. Persons operating or maintaining an occupancy, property, or vehicle subject to this Ordinance who allow a hazard to exist or fail to take immediate action to mitigate a hazard on such occupancy, property or vehicle when ordered or notified to do so by the Official shall be guilty of a misdemeanor and may be subject to civil penalty.⁷⁰

⁶⁷ Flagler County Ordinance No. 98-14, §4 (B).

⁶⁸ Adapted from Wildland- Urban Interface Code, International Fire Code Institute. Chapter 1 §107.3 at 4.

⁶⁹ Id.

⁷⁰ Id.

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Section II. Incentives

Commentary

Ad valorem tax exemptions for community development may be granted only by ordinance of the jurisdiction, and only after the electors vote on a referendum to authorize the jurisdiction to adopt such ordinances. Fla. Const. Art. VII, §3A details the purpose, amount, and period of ad valorem tax exemptions.

Some jurisdictions have implemented ordinances that increase insurance rates in areas with extremely high wildfire risk. The policy rationale for this differential is that policyholders in areas of lower risk should not be expected to subsidize the insurance rates of policyholders in areas of higher risk. These ordinances then offer reduced rate incentives to policyholders that comply with guidelines designed to mitigate property loss from wildfire.⁷¹

Some areas have instituted award or recognition programs for firewise landscaping and building practices. For example, the Firewise Communities/USA program recognizes communities that have met specific fire protection standards. Some local jurisdictions also offer firewise awards.

A. Ad Valorem Tax Exemption. The City or County of _____ shall grant a one-time ad valorem tax exemption to Landowners in the Overlay District. The exemption shall apply to all improvements to real property made by or for the purpose of wildfire mitigation and conducted in accordance with a Wildfire Mitigation Plan. The amount of the exemption shall be equal to the costs for improvements made by or for the use of wildfire mitigation and in accordance with the Wildfire Mitigation Plan. The exemption shall be assessed, one-time, against the Landowner's ad valorem tax for the following year.

B. Landowner Awards Program. The City or County of _____ shall identify Landowners in the Overlay District that have demonstrated results, collaboration and commitment to accomplish the goals of this Ordinance. The City or County of _____ shall duly recognize these Landowners for effective wildfire mitigation and reduced wildfire risk to communities and natural resources. Landowner Awards shall be displayed in a place of recognition at the regular place of meeting of the City or County of _____ Board of Commissioners.

Section III. Effective Date

This Ordinance shall take effect immediately upon passage and adoption.

ADOPTED on first reading the ____ day of _____, 20____.

ADOPTED on second reading after due notice and hearing the ____ day of _____, 20____.

BOARD OF COMMISSIONERS
CITY OR COUNTY OF _____, FLORIDA

By: _____

⁷¹ See California - Insurance FAIR Plan, See also 2001 Fire Safe Insurance Guide, Monrovia, CA Fire Department.

ACRONYMS AND ABBREVIATIONS



ACRONYMS AND ABBREVIATIONS

AFG	Assistance to Firefighters Grant (FEMA)
ARRA	American Recovery and Reinvestment Act (U.S., 2009)
BCWMG	Boulder County Wildlife Mitigation Group (Colorado)
BLM	Bureau of Land Management (USDOL)
CERT	Community Emergency Response Teams (USDHS)
CFR	Code of Federal Regulations (U.S.)
CPZ	Community Protection Zone
CSFS	Colorado State Forest Service
CUIF	The Centers for Urban and Interface Forestry (USFS)
CWPP	Community Wildfire Protection Plan
DCA	Department of Community Affairs (Florida)
DEM	Division of Emergency Management (DCA)
DEP	Department of Environmental Protection (Florida)
DMA	Disaster Mitigation Act (U.S., 2000)
DOF	Division of Forestry (FDACS)

EAR	Evaluation and Appraisal Reports (DCA)
EEL	Environmentally Endangered Lands Program (Florida counties)
EMPA	Emergency Management Preparedness and Assistance Grants (DEM)
ENSO	El Niño/La Niña Southern Oscillation
EPA	United States Environmental Protection Agency
F.A.C.	Florida Administrative Code
FBC	Florida Building Code
FBPS	Fire Behavior Prediction Systems (computer models)
FDACS	Florida Department of Agriculture and Consumer Services
FDC	Fire Department Connection (standpipe/sprinkler connections)
FEMA	Federal Emergency Management Agency (USDHS)
FFPC	Florida Fire Prevention Code
FIFE	Fire in Florida's Ecosystems (DOF educational program)

FLASH	Federal Alliance for Safe Homes (non-profit organization)
FLFRA	Florida Fire Risk Assessment (DOF/SGSF)
FLFRAS	Florida Fire Risk Assessment System (DOF/SGSF)
FLUE	Future Land Use Element (Florida Comprehensive Plan tool)
FLUM	Future Land Use Map (Florida Comprehensive Plan tool)
FMA	Flood Mitigation Assistance Program (FEMA)
FMAG	Fire Management Assistance Grant Program (FEMA)
FP&S	Fire Prevention and Safety Grants (FEMA)
F.S.	Florida Statute
FWC	Florida Fish & Wildlife Conservation Commission
GIS	Geographic Information System (electronic geographic information)
GOAL	Greater Okefenokee Association of Landowners (Georgia-Florida)

ACRONYMS AND ABBREVIATIONS

HFRA	Healthy Forests Restoration Act (U.S., 2003)
HMGP	Hazard Mitigation Grant Program (FEMA)
HOA	Homeowners Association (Florida neighborhoods)
IBHS	Institute for Business and Home Safety (non-profit organization)
IFAS	Institute of Food and Agricultural Sciences (UF)
KBDI	Keetch-Byram Drought Index (mathematical model)
LDR	Land Development Regulations (ULDC, Florida local government)
LMS	Local Mitigation Strategy (DMA County plan)
LOC	Level of Concern (FLFRA measure)
LOTE	Living on the Edge in Florida (DOF educational program)
LP	Liquid Propane
MSTU	Municipal Service Taxing Unit (Florida cities)

NASA	National Aeronautics and Space Administration (U.S.)
NASF	National Association of State Foresters (non-profit organization)
NFP	National Fire Plan (USDOJ/USFS)
NFPA	National Fire Protection Association (non-profit organization)
NPS	National Park Service (USDOJ)
NWCG	National Wildland Fire Coordinating Group (U.S. interagency group)
OSNWR	Okefenokee Swamp National Wildlife Refuge (USDOJ)
PDM	Pre-Disaster Mitigation Grant Program (FEMA)
PSA	Public Service Announcement
PUD	Planned Unit Development (Florida development process)
RFC	Repetitive Flood Claims Program (FEMA)
SGSF	Southern Group of State Foresters (non-profit organization)
SRL	Severe Repetitive Loss Program (FEMA)

UF	University of Florida
ULDC	Uniform Land Development Code (LDR, Florida local government)
U.S.	United States
USDA	United States Department of Agriculture
USDHS	United States Department of Homeland Security
USDOJ	United States Department of the Interior
USFA	United States Fire Administration (FEMA)
USFS	United States Forest Service (USDA)
USFWS	United States Fish and Wildlife Service (USDOJ)
WFSBAD	Wildland Fire Suppression Benefit Assessment District (local taxing district)
WFSI	Wildland Fire Susceptibility Index (FLFRA measure)
WPMP	Wildfire Prevention and Mitigation Plan (possible development requirement)
WUI	Wildland-Urban Interface

GLOSSARY



GLOSSARY

Adaptation – Alteration or change in or function of a plant or animal over successive generations that aids it in being better suited to live in its environment.

Aerial Fuels – Live and dead vegetation above the surface and in the forest canopy, including trees, branches, twigs, leaves and needles, cones, vines, and tall brush.

Aspect – A position facing a particular direction; exposure. For example, if a slope faces to the south, you would say that it has a southern aspect.

Canopy – Layer formed by the leaves and branches of the forest's tallest trees.

Chemical Reaction – Change in the nature of a material that prompts a transformation and/or release of energy. For example, fire transforms matter from solid into heat/energy, gas, and ash.

Combustion – A usually rapid chemical reaction in the presence of oxygen that produces heat and usually light.

Conifer – Cone-bearing tree or shrub. Some conifers are evergreens, like pines and cedars, and some conifers are deciduous, like cypress trees.

Convection – The continuous transfer of heat from one place to another, as from a wildfire flame to a building. Also, the circulatory motion that occurs when air heated by wildfire rises rapidly and new cooler air is pulled toward a wildfire. These air convection currents can carry firebrands up and deposit them elsewhere. Convection currents associated with an extreme wildfire can create a firestorm.

Crown Fire – A fire that burns primarily in the tops of live trees, spreading from tree to tree above the ground. Crown fires are almost always ignited by and supported by a surface fire below.

Debris Burning – Fire set for the purpose of clearing land or to burn yard trash (e.g., leaves, trimmings, dead branches). Escaped debris fires are a common cause of wildfire in Florida. Backyard burning of yard trash is regu-

lated by local and state government in Florida and may be banned under high-risk conditions. Burning of household garbage (e.g., plastics, packaging) is illegal in most areas of Florida, as fumes harm air quality.

Defensible Space – A “clean” zone where fuels have been cleared, reduced, or changed to act as a barrier between an advancing wildfire and property to be protected. Defensible space usually is a 30-foot-wide vegetation management zone around a structure, although fuels should be thinned beyond this first zone in high-risk areas.

Dry Lightning – Lightning accompanying a thunderstorm in which little or no rain reaches the ground. Lightning from a dry storm may spark a wildfire since there is no rain to moisten vegetation.

Duff – The layer of decomposing organic material lying above the mineral soil and just below the surface layer of freshly fallen litter (e.g., twigs, needles, leaves). In wildfires that occur during dry times, the duff layer may burn, causing damaging scorching of tree roots and danger to firefighting personnel.

Ecosystem – An interacting system of energy, nutrients, water and other living and non-living components.

El Niño / La Niña – The cyclical warming (El Niño) and cooling (La Niña) of the equatorial Pacific off South America that results in significant changes in weather patterns in North America. In Florida, El Niño results in cooler and wetter weather, which can cause overgrowth of vegetation that can feed wildfires during the next La Niña cycle, which brings warmer and drier weather in Florida.

Endemic – Native to, characteristic of, and restricted to a certain locality or region.

Fire – A self-sustaining chemical reaction (combustion), in the presence of oxygen, heat, and fuel.

Fire-Adapted Ecosystem – An area where periodic fire maintains the natural structure and function of the eco-

system, inhabited by plants and animals that have special adaptations that help them survive fire.

Fire Behavior – The manner in which a wildland fire reacts to conditions of fuel, weather, and topography. Common terms used to describe fire behavior include smoldering, creeping, running, spotting, torching, blowing up, and crowning.

Fire Break – A natural or constructed barrier of limited fuels used to provide a control line from which to work during an active or future prescribed fire or wildfire.

Fire Environment – The surrounding conditions of weather, topography, and fuels that influence wildfire behavior. These three factors simultaneously determine the likelihood of a fire starting, the speed and direction at which a wildfire spreads, the intensity at which a wildfire burns, and the ability to control and extinguish a wildfire. Although weather and topography cannot be changed, the fuels (vegetation) can be modified. Proper fuel management can reduce the risk to life and property.

Fire Exclusion – The act of keeping any and all fire out of a wildland or forest area. Fire exclusion usually is a combination of intentional or inadvertent actions. Intentional fire exclusion is when no fires are allowed to burn in an area (e.g., lack of support for prescribed burning). Inadvertent fire exclusion has resulted from human development blocking fire from its natural movement across the landscape. As more roads, highways, and developments stand in the way of natural fire, it is even more important for land managers to use prescribed fire to reduce fuels and maintain ecosystems in wildlands.

Fire History – The chronological record of the occurrence of fire in an ecosystem or at a specific site. The fire history of an area may inform planners and residents about the level of wildfire hazard in that area.

Fire Return Interval – The average time (in years) between successive fires in an area or ecosystem. For example, the historic fire interval in Florida flatwoods ecosystem is every 3 to 10 years.

Fire Season – Wildfires can occur during every month in Florida, but the highest months of wildfire activity are December through June. During this time wildland fires are most likely to occur, spread, and affect resources and homes.

Fire Suppression – The work of containing or fighting a wildfire, beginning with its discovery and continuing until the fire is extinguished and mop-up is completed.

Fire Triangle – An aid to understanding fire in which the sides of a triangle are used to represent the three factors – oxygen, heat, and fuel – necessary for combustion. Removal or reduction of any of the three factors can help control or extinguish the fire.

Firebrands – Burning embers that float up into the air on the convection currents created by a fire. Firebrands are usually carried ahead of a large wildfire on the wind, and may fall back to the ground to cause spot fires or ignite homes beyond the wildfire perimeter.

Fuel(s) – The dead and living materials in a natural environment that will burn. This includes dead pine needles, grasses, twigs, branches, and trees, as well as living grasses, shrubs (e.g., saw palmetto, gallberry), and trees. At the wildland-urban interface, fuels may also include buildings.

Fuel Management / Fuel Reduction – Manipulation or removal of fuels to reduce the likelihood of ignition and to reduce potential damage in case of a wildfire. Fuel reduction methods include prescribed fire, mechanical treatments (mowing, chopping), herbicides, biomass removal (thinning or harvesting of trees, harvesting of pine straw), and grazing. Fuel management techniques may sometimes be combined for greater effect. Prescribed fire is generally accepted as the most economically and ecologically sound method for treating large acreages.

Fuel Management Zone / Community Protection Zone – A zone of reduced and managed wildland fuels surrounding a community in a high-risk area and designed to protect the community from wildfire.

Grazing – The feeding of livestock on growing plants. Grazing is sometimes used as a fuel reduction method in Florida forests and prairies at risk of fire.

Ground Fire / Muck Fire – A fire that burns in duff (dried muck) beneath the surface of the ground, mostly by smoldering or slow-moving combustion. Ground fires usually occur in dry marshes or swamps during a drought and are ignited by a passing surface fire. Muck fires may burn for days or weeks, creating a smoke hazard and a safety problem for firefighters, because underground pockets of fire can collapse under the weight of humans or equipment.

Herbicide – Any chemical substance used to kill or slow the growth of unwanted plants.

Hydric – Moist or wet. For example, a hydric hammock is an ecosystem that would be wet for a brief time each year and would be moist and shady all year long.

Hydroperiod – The frequency and duration of saturation of an ecosystem with water. When characterizing wetlands, the term hydroperiod describes that length of time during the year that the soil is either saturated or covered with water.

Invasive Species – Species that move into an area and threaten the natural ecosystem by becoming dominant in terms of cover, resource use, or other ecological impacts. Invasive species may be either native or non-native “weeds.”

Keetch-Byram Drought Index (KBDI) – A continuous reference scale for estimating the moisture content of soil and duff layers, and thus vegetation. KBDI is used for fire management and planning purposes, with a numerical range from 0 (no moisture deficiency) to 800 (maximum drought). The Keetch-Byram Drought Index is posted daily at http://flame.fl-dof.com/fire_weather.

Ladder Fuels – Fuels that allow a fire to spread from the ground level up to the forest canopy, leading to a crown fire. Ladder fuels include vines, hanging branches, shrubs, or an understory layer of small/medium flammable trees,

such as young pines. Fuel reduction strategies often focus on reducing ladder fuels first.

Mechanical Treatment(s) – Ways to reduce hazardous fuels for the purpose of wildfire prevention, such as roller chopping, mowing, and crushing. A GyroTrac® mower is often used by the Florida Division of Forestry for mechanical treatments on lands determined to have hazardous fuel levels.

Mesic – Conditions of moderate moisture or water supply. For example, a mesic flatwoods is a moderate flatwoods that is not too wet and not too dry.

Mitigation – The practice of making something less harsh or less severe. In wildfire mitigation, fuels are reduced so that wildfire will be less likely to occur and will be less severe when it does occur.

Noncombustible – Not capable of burning. For example, metal roofing is considered to be noncombustible roofing.

Non-native Species – An introduced species that evolved elsewhere that has been purposefully or accidentally spread by humans. Some non-native species are beneficial (e.g., vegetables) and some non-native species can become invasive species (e.g., melaleuca, air potato). Also called “exotic species.”

Overstory – The tree layer of a forest ecosystem, as opposed to the midstory (shrub layer) and understory (ground cover layer).

Prescribed Fire – The planned application of fire to natural fuels in order to accomplish a specific management goal. Like a prescription for forest health, prescribed fire is done according a written plan for weather and safety conditions. Agencies use prescribed fire for many goals including to or reduce hazardous fuels that may increase the risk of wildfire. Prior to ignition, an authorization must be obtained from the Florida Division of Forestry.

GLOSSARY

Prescription – A plan of specific conditions under which a prescribed fire may be ignited for a given piece of land. A complete prescription must be prepared in advance of receiving an authorization to burn.

Pulpwood – Trees that are grown to be ground into pulp for making paper and other wood fiber products, such as diapers and rayon fiber. These trees are grown on a fairly short rotation, often 15 to 30 years.

Radiation – The transfer of heat by emitting energy in the form of waves or particles. A wildfire may give off enough radiant heat to ignite vegetation or structures from several feet away.

Serotinous – Any plant or plant part that is late in developing or flowering. Pinecones that have a delayed opening stimulated by fire are called serotinous. Florida pines that have serotinous cones include the pond pine and sand pine (Ocala variety).

Slash – Debris left after logging, pruning, thinning, or brush cutting. Slash includes logs, chips, bark, branches, stumps, and broken trees or brush that may be fuel for a wildfire.

Spark Arrester – An approved device installed atop a chimney, flue, or exhaust pipe to prevent the emission or entrance of sparks and embers.

Structural Fire – Fire originating in and burning any part or all of any home, building, shelter, or other structure.

Succession – The gradual replacement of one natural community by another as in the change from an open field to a mature, or climax, forest. In many areas of the eastern U.S., the climax forest is a hardwood forest. In the Southeast and West, however, many of the forests are fire-maintained climax forests of coniferous trees.

Surface Fire – A fire that burns leaf litter, fallen branches and other surface fuels on the forest floor, as opposed to ground fire and crown fire. The majority of wildfires in Florida are surface fires supported by accumulations of surface fuels and vegetation.

Timber – Trees suitable for sawing into lumber or plywood for building construction and other purposes. These trees are grown on a long rotation, often 50 years or more.

Understory – The plants of the lower levels of a forest ecosystem. The understory usually includes grasses, herbs, shrubs, and tree seedlings growing on the surface.

Wildfire – Any fire that is not meeting management objectives or is out of control, and thus merits a firefighting (suppression) response from the Florida Division of Forestry and/or local partners.

Wildland – An area with minimal development as evidenced by few structures and predominantly natural vegetation, and used for conservation, recreation, or agriculture/silviculture.

Wildland-Urban Interface – The zone where structures and other human development meets or intermingles with undeveloped wildland fuels and other natural features.

Xeric – Having very little moisture or dry conditions. The Florida Scrub is a xeric ecosystem.

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