

Developing Land in Florida with Fire in Mind: Recommendations for Designers, Developers, and Decision-Makers¹

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Fire in Florida

Fire protection is a necessary consideration when building homes and designing neighborhoods in Florida. Florida's natural landscapes provide clean air and water and support diverse plants and animals. Fire is essential for maintaining these ecological services (Fill and Crandall 2018), but there is always the chance of fire damage from lightning, accidental ignitions, or arson (Long and Prestemon 2013). Because fire promotes ecosystem health and reduces wildfire risk (Long and Oxarart 2017), developments must be designed for fire safety. Designs for new neighborhoods should enable the safe and ecologically appropriate use of prescribed burning while protecting the community from fire damage. In 1998 (the start of a severe statewide drought), wildfires destroyed or damaged 330 homes and businesses in Florida. In some places, homes were saved by firefighters or effective planning by builders or designers (Figure 1). Prescribed fire reduces wildfire risk and has been shown to have numerous benefits to humans and natural ecosystems (see resources provided by Southern Fire Exchange: <https://southernfireexchange.org/>).



Figure 1. New developments can be designed to help residents live safely with fire in Florida. A home will be low risk if it is protected by breaks in the ground-level vegetation between the yard and neighboring undeveloped land. After construction, use less-flammable native plants in landscaping when possible.

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Architects and developers can significantly reduce wildfire risk for those living and working in Florida by using fire-resistant landscaping around developments. For example, rather than removing all vegetation, developers can maintain a canopy of large trees while mowing lawns or reducing shrubs that can carry a fire. Less-flammable native plants are a win-win for preventing fire, conserving water, and benefiting wildlife. This publication is meant to guide designers, developers, decision-makers, landowners, and interested individuals to learn about building with fire in mind.

Are you building in a fire-prone area?

Several considerations will help determine if you are building in a fire-prone area. The types of trees, shrubs, and other plants in and around your planned development can dramatically affect that development's wildfire risk. Embers and flying debris carried by fire are the primary sources of ignition for buildings and other structures in urban areas (Cohen and Strohmaier 2020; Kays et al. 2020). If embers land directly on homes or vegetation nearby, they could destroy the home. Therefore, it is necessary to take stock of the trees, shrubs, and plants near and immediately surrounding homes, as well as the materials used for construction.

Walk or drive around the property that is being developed. What kinds of plants grow on the property? Will the spaces without structures have thick woods with continuous shrubbery? Will there be woodlands next to buildings? The area within 100 feet of a building, called "defensible space," is one of the most important factors determining a home's vulnerability to fire (Florida Division of Forestry 2010).

When designing your landscape, consider the type of vegetation within and near the development and structures and how it could affect the likelihood of fire ignition and spread. Florida has many types of vegetation that span a gradient of flammability and ignition potential. For example:

- *Hardwood hammocks*—These ecosystems with leafy trees rarely burn, except during periods of prolonged drought. They generally make shady, fire-safe home sites.
- *Longleaf pine/turkey oak sandhills*—Natural fire frequencies of 2 to 4 years lead to relatively cool, or low-intensity, fires that maintain the pine forest and promote the flowering of diverse grasses and herbs. This ecosystem thrives with frequent fires and is ideal for safe prescribed burning compatible with development (Lord, Fawcett, and Godwin 2021).

- *Pine/palmetto flatwoods*—Natural fire frequencies of 2 to 4 years maintain grasses and herbs and prevent shrubs from dominating the surface of the forest. Fires in Flatwoods are of medium intensity and can move quickly if the forest has not been maintained with periodic fire. The greater the shrub component, the higher the intensity of fires. More frequent fires during the growing season limit shrub accumulation. The timing and frequency of management are important for keeping risk low near Flatwoods (Kreye, Godwin, and Kobziar 2015).
- *Pine rocklands*—Natural fire frequencies of 3 to 7 years maintain this south Florida Flatwoods-like ecosystem and keep hardwood hammock species from crowding out rare plants. Fires are generally low intensity unless flammable invasive species, such as melaleuca, are present.
- *Sand pine/oak scrub*—Longer natural fire frequencies of 10 to 60 years result in high-intensity, forest-replacing fires, which are integral to maintaining this unique ecosystem. The hot fires in scrub are less compatible with development. However, some coastal areas have used carefully prescribed burning under the right conditions.
- *Wetlands*—Natural fire frequencies for wetlands vary from 10 to 100 years, promoting the flowering of grasses and herbs while reducing shrub competition and accumulating smoke-producing ground fuels like muck or duff. Development can successfully border periodically burned wetlands.

Although these vegetation types span a broad natural gradient of flammability and fire-proneness, weather and the amount of fuel and structure of fuels in any particular forest type will affect fire behavior. When planning developments within a natural area, it helps to understand how both vegetation (fuels) and weather affect fire behavior.

Surface-level fuels are the primary means by which wildfire spreads quickly through a forest. They can pose a high risk of fire damage when present in developed areas. These fuels include dead materials, such as dried grasses, weeds, and pine needles, and living green vegetation like palmettos, shrubs, grasses, plants, and small trees. Because they have lower water content, dead fuels ignite more easily than live fuels (Wade 2013), but all of these fuels burn more readily during drought conditions. When periodic fires occur in natural areas, vegetation stays at manageable levels. Many of these plants are adapted to fire: they burn easily and re-sprout quickly after fire. Without periodic fire or maintenance, plants grow more densely, and dead material accumulates, making vegetation more flammable. Under certain conditions, these built-up fuels support the rapid spread of dangerous wildfires. If a fire starts in a forest or defensible

space with heavy surface-level fuels, the fire can climb up vines or small trees, called *ladder fuels*, and get into the tops, or *crowns*, of tall pine trees and onto structures. In windy conditions, fires spread quickly through a forest with dense vegetation, making it very hard to manage. The worst wildfires of 1998 were crown fires or intensely hot surface fires in heavy accumulations of palmetto shrubs and pine needles (Florida Division of Forestry 2010).

Weather includes wind, relative humidity, temperature, rain-fall, and atmospheric stability. An unstable atmosphere (one conducive to hot air movement), gusty or down-drafting winds, low humidity, high temperatures, and drought conditions can contribute to fast-moving fires. Generally, wildfires burn out of control when there are heavy fuels and *several* dangerous weather conditions. In 1998, drought, low humidity, and gusty winds combined with high temperatures and heavy fuels to generate devastating wildfires (Florida Division of Forestry 2010).

Although vegetation is one type of fuel affecting wildfire risk in areas of potential development, the materials used for building structures and the arrangement of structures in the development directly relate to the risk that structures will burn. Structures within the development can ignite through radiant heat from adjacent structures already burning, through direct contact with flames in vegetation or flammable materials immediately touching the structures, or from floating embers or debris (Florida Division of Forestry 2010). Using flame-resistant or non-combustible building materials, landscaping with low-flammability plants, and regularly maintaining the fire resistance of vegetation and structures (e.g., pruning regularly, spacing plants appropriately, and removing debris from roofs and gutters) are essential for keeping the risk of fire damage low (Kays et al. 2020).

Keys to Fire-Safe Development

Fuels and weather are significant influences on fire in Florida. We cannot control the weather, but we can control fuel by managing vegetative fuels and building fire-safe neighborhoods, crucial strategies to prevent wildfire in fire-prone areas. Planners, developers, landscape designers and architects, builders, wildfire specialists, firefighters, and regulators should cooperate to establish guidelines for fire-safe communities in Florida, such as through community wildfire protection plans. For an example of a Community Wildfire Protection Plan, visit: https://www.srcity.org/DocumentCenter/View/30136/City-of-Santa-Rosa-Community-Wildfire-Protection-Plan-CWPP_91820.

Wildfire prevention is bigger than any single property. Owners of neighboring parcels of land must cooperate to prevent wildfire on their land. If two or more neighbors work together to manage vegetative fuels with prescribed fire, everyone will benefit from having their natural areas and developments better protected from fire risk. If only one of you manages vegetative fuels, both will benefit, but the benefit will be smaller. Because the other landowner is not managing vegetative fuels, both landowners will still be at an unnecessarily elevated risk of wildfire. Just as wildfires can come from undeveloped areas to threaten homes and businesses, fires often start from carelessness in human developments and threaten valuable natural resources on neighboring lands.

Recommendations for Designers, Developers, and Decision Makers

It should be a priority in new developments to help people safely live or conduct business within a natural landscape that includes periodic fire. Developers can assist by generating homeowner support for using prescribed fire and firewise practices. A wildfire mitigation plan or a community wildfire protection plan should help developers plan and design developments to include risk reduction features, firewise landscapes and structures, and long-term sustainability of firewise practices (Florida Division of Forestry 2010). The following recommendations to accomplish these goals apply to subdivisions, businesses, and individual homes built in or adjacent to high-risk, fire-prone ecosystems. Developments in low-risk areas should continue to be designed for aesthetic appeal, water and energy savings, and nature conservation.

1. Planning and Designing Defensible Developments in Fire-Prone Areas

- Design community protection zones around subdivisions, where vegetative fuels are reduced and managed to limit fire risk. Less flammable natural features such as ponds, wetlands, and mowed areas may serve as “fuel breaks” that can slow or stop fire spread while still providing ecological functions. Although walls or solid fences may provide some fire protection, they prevent the free movement of wildlife and do not protect against embers dispersing over the barriers. Community protection zones are typically 100 to 300 feet wide, depending on wildfire risk levels.
- Design green space (lawns and parks, for example) so that fuels can be periodically and safely reduced by prescribed fire or fire combined with mechanical means like mowing

(Long, Godwin, and Kobziar 2014). Include ongoing fuel reduction measures (burning, mowing, thinning of trees) in green space and rights-of-way management plans. Conduct a pre-construction prescribed burn and thinning of pine trees. (Florida Forest Service can assist.) Maintaining one larger green space (rather than scattered small areas) provides for more efficient fuel management, better wildlife habitat, and the development of a recreational area for residents.

- Provide, develop, or identify water sources for fighting wildfires. Areas with municipal water supplies should have a pressurized hydrant system. Firefighting crews can also use strategically placed storm-water drainage and retention features.
- Provide at least two access routes in and out of a development, preferably on opposite sides.
- Provide non-combustible metal street signs, signposts, and house numbers visible from 100 feet.
- Request review of development plans by the Florida Forest Service or local fire departments to provide the most appropriate levels of fire safety. Include projected fire-protection needs in plans.
- Have an emergency wildfire management plan for your development. Contact the Florida Forest Service or local fire department to discuss the elements of a wildfire management plan, including maps of fuel breaks and water sources, evacuation plans, and designated safety zones where residents can gather in the event of a wildfire.

2. Building Firewise Structures

- Construct large developments in phases to avoid prolonged exposure of homes to neighboring vacant or overgrown lots.
- Design a 100-foot-wide defensible space, or buffer zone, around buildings. Defensible space is an area of modified vegetation that allows access to firefighting equipment and protects the home by reducing nearby vegetative fuels. Tall trees and fire-resistant landscape plants (Behm et al. 2004; Doran et al. 2022) can be strategically placed and regularly maintained in this zone.
- Avoid combustible or heat-sensitive building materials such as vinyl or wood siding and soffits, vinyl soffit vents, or wood shingles. Brick, concrete, rock, stucco, or metal (roofing or screen soffit vents) are preferred building materials for homes adjacent to fire-prone undeveloped areas.
- Put spark-arresting screens on chimneys to prevent sparks from entering through your fireplace. This is a common way for wildfire's embers to enter homes.

- Provide hose bibs on all sides of the structure.
- Where possible, provide a fire-safe area for combustible items—propane tanks, woodpiles, or flammable materials—at least 100 feet from each building.

3. Managing Developments for Maximum Natural Areas and Minimum Wildfire Risk

- To protect both developments and natural resources, community wildfire protection plans can promote the use of prescribed fire for reducing fuels within your development and on adjacent undeveloped lands (Fawcett, Diaz, and Chung 2016). Prescribed burns should only be conducted by trained and equipped personnel. There are numerous opportunities for training in the Southeast (Godwin 2014).
- Design the development to accommodate fuel management or regular prescribed fires before times of high fire danger (spring months in Florida). Work with the Florida Forest Service (FFS) or a professional forester to perform a risk assessment and write a fuel management plan.
- Community covenants and restrictions should include wildfire prevention measures governing the appropriate placement of structures, management of vegetation, and maintenance of defensible space, as well as guidelines for burning yard waste and storage of combustible materials (Florida Division of Forestry 2010).
- Inform and prepare residents and businesses for the steps needed for managing fuels and preventing wildfire, such as prescribed burning.
- Educate residents about the major causes of wildfire in Florida—unattended backyard fires (e.g., unmonitored barbecuing or debris burning), arson, and other human activities (Long and Prestemon 2013). Post reminders about safe fire use and extinguishment around the home, including children in the discussion.
- Before spring wildfire season, take extra precautions such as burning or mowing fuel breaks, clearing accumulated vegetation around developments, and ensuring unobstructed access to water sources.
- Seek insurance credits for wildfire risk reduction.
- Assign long-term fire prevention and management responsibilities for the community to guarantee benefits in the future. For example, a management plan for natural lands that are property of the development could also be included into homeowners' association guidelines and supported by HOA funds collected from homeowners.

Balancing Risks and Costs

The cost of preventing wildfire is another form of insurance that should be included in the purchase price of a fire-safe home or business. Recent trends show that buyers are willing to pay more for a home near a natural or open space. Some wildfire prevention measures may increase the cost of energy or water, reduce privacy, or change the aesthetic features of the property, but these additional costs and potential detriments are insignificant for developments in fire-prone areas compared to the possible loss of lives and property.

Other wildfire protection measures may be free or nearly free of cost. Many low- or no-cost alternatives for achieving wildfire prevention objectives may also enhance the value of a development. Planning for defensible space around developments can still allow for trees and shrubs that provide shade and attract wildlife. Rather than removing all vegetation, developers can maintain a canopy of large trees while reducing the ground-level vegetative fuels that can carry a fire. Landscape architects and designers can substitute less-flammable native plants to gain fire prevention, water conservation, and wildlife habitat benefits. Designing the development to allow necessary features (roads, parking, water retention ponds, etc.) to double as fire breaks will reduce wildfire vulnerability at little or no cost.

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Additional Resources

The Florida Forest Service (FFS) provides an Internet mapping tool, Florida's Wildland Fire Risk Assessment System, that provides information about the potential risk from wildland fire for specific locations. Contact the FFS if you need help assessing wildfire risk (<https://www.fdacs.gov/Forest-Wildfire/Wildland-Fire/Resources/Fire-Tools-and-Downloads/Florida-s-Wildland-Fire-Risk-Assessment-System-FRAS>).

Visit the Florida Forest Service website to access several excellent resources and publications related to wildfire risk reduction (<https://www.fdacs.gov/Forest-Wildfire/Wildland-Fire> or <https://www.fdacs.gov/Divisions-Offices/Florida-Forest-Service>). For assistance with specific questions, contact your county's wildfire mitigation specialist from this website. See the *Wildfire Risk Reduction in Florida: Home, Neighborhood, and Community Best Practices* manual for detailed recommendations.

The Southern Fire Exchange provides information on the benefits of prescribed fire: <https://southernfireexchange.org/>. The exchange strives to improve access to and usefulness of southern fire science information and to offer opportunities for the fire community to interact and learn from one another.