UNIVERSITY OF FLORIDA
EXTENSION
Institute of Food and Agricultural Sciences

Fire in the Wildland-Urban Interface: Considering Fire in Florida's Ecosystems[1]

Anna L. Behm and Mary L. Duryea[2]

Many Floridians live close to or within natural **ecosystems** of Florida in an area termed the **wildland-urban interface**. The wildlands associated with the interface depend on fire to maintain biodiversity and health. In the absence of fire, vegetation quickly grows, creating **fuel** for very intense wildfire. In many wildlands, fire in these ecosystems is inevitable because of lightning or human-caused ignitions. With this threat of wildfire, the serenity of living in these environments can be disrupted. Because of the differences in plant species, soils, and water availability, wildfire **frequency** and **intensity** vary among the ecosystems which are associated with the wildland-urban interface.

Preparing for Wildfire

Fire information for Florida's dominant ecosystems is summarized in Table 1. This information was synthesized primarily from *Ecosystems of Florida* (Myers and Ewel, eds. 1990) and the *Guide to the Natural Communities of Florida* (Florida Natural Areas Inventory 1990). Hazard ratings were taken from the *Wildfire Hazard Assessment Guide for Florida Homeowners* (FL DOF 2002). Information about the wildland-urban interface was gathered from *Human Influences on Forest Ecosystems: The Southern Wildland-Urban Interface Assessment* (Macie and Hermansen 2002). Maps were adapted from Myers and Ewel (1990) indicating the location of ecosystems at the county level. All photographs were taken by Larry Korhnak. Highlighted terms are defined in the glossary.

It is important for interface residents to be aware of the natural wildfire cycles of ecosystems adjacent to their homes. This knowledge will assist residents in preparing their homes and families for wildfire. Minimal efforts include removal of dropped pine needles from roofs, gutters, and around structures on a regular basis. Dead pine needles are highly flammable and can spread a low intensity fire on the ground to a structure or ignite easily on roofs by **firebrands**. **Ladder fuels** also need to be removed from the area around a home to reduce the risk of a wildfire spreading into higher vegetation or structures. Based on the hazard rating for the ecosystem, landscape, and structure, many other techniques could also be used.

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2. Anna L. Behm, Graduate Research Assistant, School of Forest Resources and Conservation and Mary L. Duryea, Assistant Dean of Research and Assistant Director, Florida Agricultural Experiment Station, Institute of Food and Agricultural Sciences, University of Florida.

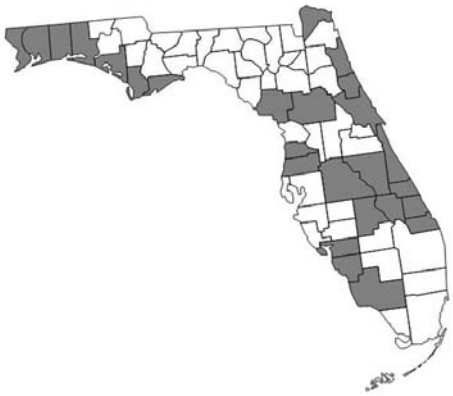
This publication describes the natural fire cycles and relative wildfire hazard of nine of Florida's ecosystems commonly occurring in interface areas. For those residents living close to or in an ecosystem with medium to extreme wildfire risk, a more detailed fire risk assessment should be conducted to determine what **mitigation** techniques should be performed to help protect structures in a wildfire. Fire mitigation techniques include building fire-resistant structures, reducing vegetative fuels (mechanically, chemically, or through prescribed burning), and creating personal or community **defensible space**. These techniques and other related information are outlined in detail in extension publications available from county Cooperative Extension Service offices or at http//edis.ifas.ufl.edu.

Table 1. Fire Characteristics of nine ecosystems found in Florida's Wildland-Urban Interface.

Ecosystem	Fire Frequency (years)*	Wildfire Hazard**
Scrub Pine	10-100	Extreme
Pine Rockland	3-10	Extreme
Pine Flatwood	1-8	Extreme
Dry Prairie	1-4	High
Marsh	1-5	High
High Pine/ Sandhill	1-8	Medium
Swamp	5-200	Medium
Hardwood Hammock	30-50+	Low
Hardwood Rockland/ Tropical Hammock	50+	Low

*Frequency of natural wildfire (ignition by lightning) without any human intervention.
**A relative comparison of wildfire hazard to homeowners living within or near the ecosystem type. Hazard is presented at its highest ranking for each ecosystem described in *Wildfire Hazard Assessment Guide for Florida Homeowners* (FL DOF 2002).

Scrub Pine
Extreme Wildfire Hazard



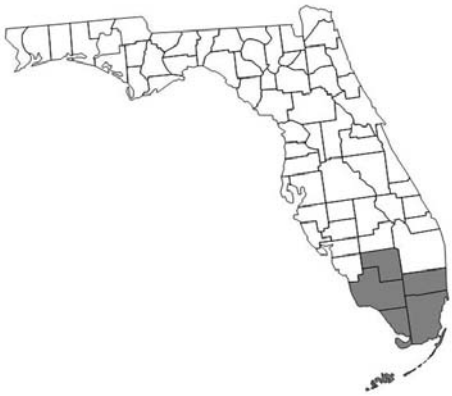
Description

The scrub pine ecosystem has very dense vegetation produced by sand pine, scrub oaks, Florida rosemary, wax myrtle, and rusty lyonia. The soils are generally sandy and dry. The scrub ecosystem is typically found isolated in other pine ecosystems. Areas of scrub pine are becoming rare due to development and human alterations to the environment. For these reasons, many **endemic** species to the scrub pine ecosystem are becoming threatened and endangered. The vegetation is continuous from the ground into the **crowns** of scattered trees facilitating **torching**, or the ignition of tree crowns. Intense wildfires occur every 10 to 100 years.

Fire Considerations

During dry conditions, scrub pine is one of the most dangerous ecosystems for homes and homeowners with regard to wildfire hazard. The thick vegetation causes an ignited wildfire to produce a lot of heat. The high heat increases the amount and dispersal distance of firebrands making structures near a scrub pine wildfire susceptible to the air-borne embers. Homeowners living within or near the scrub pine ecosystem need to utilize hazard reduction strategies, including the creation of defensible space. Because the associated plants and animals of the scrub pine ecosystem are sensitive to disturbance, residents should consider using a comprehensive approach to defensible space with considerations for wildlife as well as wildfire. In addition, homeowners should be aware that many of the threatened and endangered species in this ecosystem need periodic fire for survival and that **prescribed fire** might be the best chance for the survival of these species.

Pine Rockland
Extreme Wildfire Hazard



Description

Limestone outcroppings support the growth of South Florida slash pine in pine rockland ecosystems. The patchy **understory** consists of shrub and palm species. Due to development in South Florida, little of this ecosystem remains. In remaining areas, the ecosystem requires fire every three to ten years to prevent understory build-up. Undeterred shrub growth for eight to ten years can lead to high intensity fires. Similar to shrub pine ecosystems, pine rocklands depend on fire for continued health of the endemic plants and animals.

Fire Considerations

Slash pine growing on rockland does not achieve the same height as slash pine in pine flatwood or high pine ecosystems. The shorter trees make the crown of the tree more susceptible to ignition or torching during a wildfire. Residents need to keep roofing free of fallen pine needles and to remove pine litter from the ground around structures. It is important for the continued health of the remaining pine rockland ecosystems to be periodically burned. Residents near pine rockland ecosystems should understand the need for periodic fire in these ecosystems which could be facilitated through prescribed fire.

Pine Flatwood
Extreme Wildfire Hazard

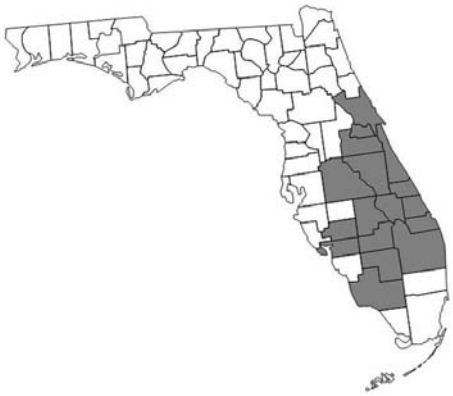
Description

Pine flatwood ecosystems are dominated by pine trees including longleaf pine, slash pine, and pond pine with an understory of saw palmetto and gallberry. Most pines planted for commercial use function similar to the pine flatwoods natural ecosystem with respect to fire. There is a natural separation of tree crowns and understory vegetation. This is an adaptation to wildfire that serves to keep fire on the ground at low intensities and to prevent spread into the crown. Fire frequency in pine flatwoods is typically one to eight years. If fire is excluded from these areas for longer periods, understory shrubs, invading hardwoods, and vines can greatly increase the risk of crown fire. The pictures show pine flatwoods with periodic prescribed fire.

Fire Considerations

Saw palmetto accumulates large amounts of dead material that is highly flammable. Saw palmetto plants that are tall and dense can sustain a high intensity wildfire and should be removed from the area surrounding a structure. It is also important to prevent pine needles from accumulating in the area surrounding a structure or on roofing and gutters. Dead pine needles are highly flammable and ignite easily by firebrands when draped on plants, roofs, and gutters. Also, excluding ladder fuels from the area around a home will reduce the risk of a wildfire spreading into higher vegetation or structures. Thinning of pine trees surrounding a structure can also reduce the risk of fire spreading into tree crowns.

Dry Prairie
High Wildfire Hazard



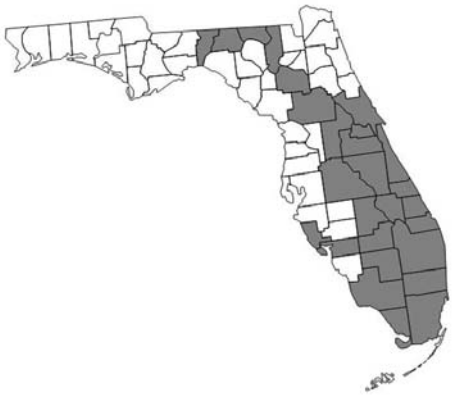
Description

Dry prairie ecosystems have scattered, isolated trees with shrubs typical of the pine flatwood ecosystem. Wiregrass typically dominates the herbaceous layer and low shrubs include saw palmetto, gallberry, fetterbush, and rusty lyonia. The lack of tree canopy or crowns supports the rapid growth of shrubs and herbaceous plants, which can burn readily during the dry season. Fire frequency is one to four years in dry prairies.

Fire Considerations

If your home is near a dry prairie, create a break between the **surface fuels** and buildings. Without tree crowns, plants in a dry prairie are exposed to windy and sunny conditions that can rapidly dry out plants. For this reason, dry prairie fires can spread rapidly depending on the weather and moisture content of the vegetation.

Marsh
High Wildfire Hazard



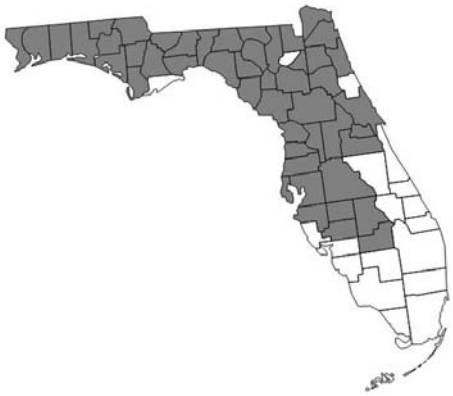
Description

Marshes are areas where standing water exists for much of the year. The vegetation is primarily herbaceous and small shrubs. The typical fire season for the marsh ecosystem is during the summer when lightning strikes are frequent. Under the right weather conditions, fires in marshes can occur even when plants are green and in the presence of standing water. Fire frequency is one to five years in marsh ecosystems.

Fire Considerations

When weather conditions are dry, water may not be present in a marsh. This increases the risk of wildfire because accumulated plants and fuel on the soil surface can carry and sustain a fire. These dry season or **drought** fires can result in **muck fires** which are very difficult to put out and produce a lot of smoke. Breaks in surface fuels and **ground fuels** around structures are needed near marsh areas.

High Pine/ Sandhill
Medium Wildfire Hazard



Description

Longleaf pine is the dominant tree species in the high pine or sandhill ecosystem. This ecosystem is highly dependent on frequent fire. Sparsely dispersed longleaf pines are replaced with dense stands of loblolly pine and turkey oaks if fire is suppressed or if the site is disturbed. In the wildland-urban interface additional oaks and hardwoods will become part of the understory. A healthy high pine or sandhill ecosystem will have an understory dominated by wiregrass and contain other grasses and forbes. It has less of a shrub layer than pine flatwood ecosystems. Frequent, low-intensity fires occurring every one to eight years are necessary to maintain this ecosystem and rejuvenate the understory.

Fire Considerations

Similar to the pine flatwoods, high pine or sandhill ecosystems can become fire hazards if fire is excluded. Residents need to eliminate ladder fuels and remove pine needles from roofs, gutters, and the ground around structures.

Swamp
Medium Wildfire Hazard

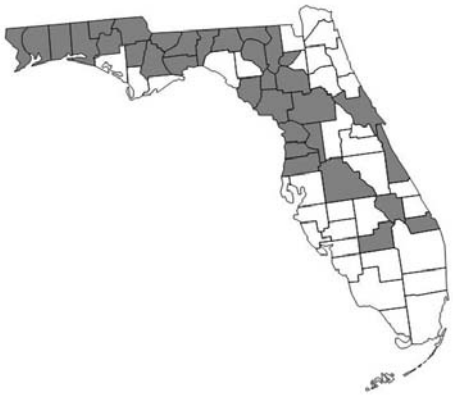
Description

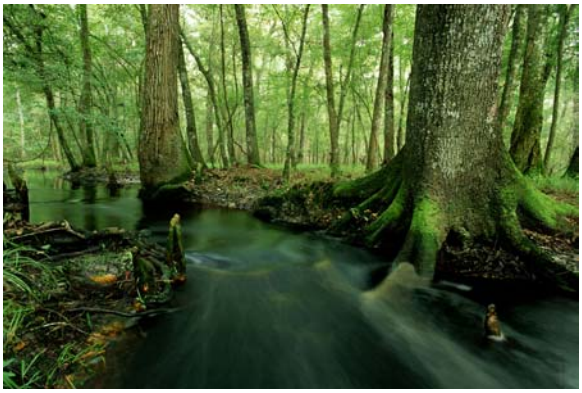
Forested wetlands, or swamps, typically contain cypress, black gum, water tupelo, and several bay species. Other tree species that occur in Florida swamps are sweetgum, laurel oak, and red maple. These ecosystems are present throughout Florida and occur in isolated depressions within other ecosystems or along waterways. Even swamps can burn. Swamp fires typically originate in a neighboring ecosystem and are spread into the swamp by ground fuels. Fires in swamps occur more frequently in south Florida than in north Florida. Periodic low intensity fires are needed to maintain natural species composition. Wildfires in swamps occur every 5 - 200 years.

Fire Considerations

Like marsh fires, swamp fires can become more of a hazard in dry conditions. During drought, fires can become intense and long-lived if the organic portion (dead plant matter) of the soil begins to burn creating hard-to-control muck fires. These muck fires can be more difficult to control than marsh muck fires because of the massive amounts of fuel accumulation. Muck fires also produce a lot of smoke which is a potential health and traffic hazard. High intensity fires in swamps can also be carried into tree crowns especially during a drought, or with the presence of ladder fuels.

Hardwood Hammock
Low Wildfire Hazard





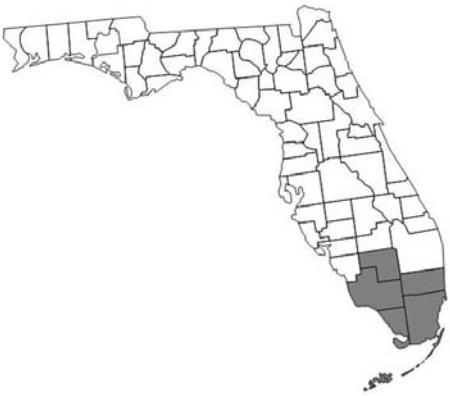
Description

Hammock ecosystems are dominated by hardwood, non-coniferous trees such as oaks, magnolia, pignut hickory, sweetgum, cabbage palm, and maples. These ecosystems span a range of soil moisture environments from dry to wet soils. Fire frequency for dry hammocks (upland hardwoods) is more frequent than wet hammocks (bottomland hardwoods). However, most hammocks burn at a frequency of 30 years or much longer. Typical fires within a hammock ecosystem are isolated and do not cover large areas.

Fire Considerations

Hammocks are not highly susceptible to fire, except during drought. Hammock ecosystems have the lowest wildfire hazard in Florida. Many people live in or near hardwood hammocks and do not need to create dramatic changes in their landscape to reduce their risk of fire. Picking up dead branches, reducing ladder fuels (like vines), and keeping roofs clean are good fire prevention practices.

Hardwood Rockland/ Tropical Hammock Low Wildfire Hazard



Description

Hardwood rockland or tropical hammock ecosystems consist of hardwood species growing on outcroppings of limestone. These ecosystems are found only in south Florida and contain many species that are found nowhere else in the United States. Fire is very infrequent in these ecosystems and typically does not occur unless under severe drought. Wildfire frequency is usually longer than 50 years.

Fire Considerations

Under severe drought conditions, pruning trees and shrubs and keeping your lawn free of debris is advisable. Hardwood rocklands are typically found in regions that have not experienced fire in almost 100 years.

Human Influences in the Wildland-Urban Interface

The ecosystems mentioned in this publication are described in their natural condition. However, most ecosystems in Florida have been directly affected by humans. Deforestation, fragmentation of forests, and loss of natural areas are obvious forms of these disturbances. Less obvious are the impacts of the wildland-urban interface on **hydrology**, species composition, and natural processes such as fire. These impacts become more of a concern as population growth, changing land use patterns, and other factors increase the amount of wildland-urban interface in the South. Fire suppression in interface areas has led to an unnatural build-up of vegetation, which greatly increases fire intensity when a wildfire occurs. In addition, the chances for ignition (arson or accidental) increase in wildland-urban interface areas because of increased human presence and activity.

Invasive exotic plants also can change the fire behavior of an ecosystem. Invasive exotic plants are species not native to an area which have invaded and become dominant. Some of these exotic species are highly flammable and can increase the risk to structures in a wildfire. More information about wildland-urban interface issues in the South is available in the publication *Human Influences on Forest Ecosystems: The Southern Wildland-Urban Interface Assessment* (Macie and Hermansen 2002). This publication and other related interface information are available from the Southern Center for Wildland-Urban Interface Research and Information website, www.interfacesouth.org, or by writing the USDA Forest Service, 408 W. University Ave., Suite 101, Gainesville, FL 32601.

Conclusions

Florida's natural ecosystems are dependent on fire for periodic renewal. Living within or near these ecosystems, particularly within Florida's wildland-urban interface, means living with the threat of wildfire. If you live in one of these fire dependent ecosystems, you need to know the natural fire regimes of that ecosystem to help you prepare for wildfire and determine mitigation techniques appropriate for your home and family.

Scrub pine, pine rockland, and pine flatwood ecosystems are extreme wildfire hazards to homeowners. In these ecosystems, homeowners should prepare themselves for wildfire. Dry prairie and marsh ecosystems are high wildfire hazards and are highly susceptible in drought conditions. High pine or sandhill and swamp ecosystems are medium wildfire hazards. High pine or sandhill ecosystems burn more regularly than swamps, but swamp fires can produce a lot of smoke and are difficult to extinguish. Hardwood ecosystems in Florida present low fire hazard to homeowners, but can burn under certain conditions.

Techniques to reduce wildfire hazard in addition to prescribed fire include herbicides, mechanical treatments (crushing, mowing, or chopping), and livestock grazing. For homeowners living in ecosystems at medium to extreme risk of wildfire, an assessment of individual risk can be made to determine the appropriate actions to reduce risk of damage from wildfire.

Glossary

Crown—the upper portion of trees containing its leaves or needles.

Defensible space—the area between wildland fuels and structures that allows firefighters to protect the structure or, in the absence of fire fighters, allows the structure to better survive on its own.

Drought—a period of below-average rainfall.

Ecosystem—an ecological community (plants, animals, and microbes) and the environment (soil, weather, etc.).

Endemic—a species which is only found in a specific area or region.

Firebrands—air-borne embers that are capable of igniting plants or homes at great distances from a wildfire.

Fire frequency—the typical time (years) between naturally occurring wildfires in an area.

Fuel—any material that can burn; the primary fuels in wildfires are plant materials.

Fire intensity—refers to the amount of heat produced by a fire in a given area. Fire intensity is dependent on fuel and weather conditions.

Ground fuels—decomposed and partially decomposed material at and below the surface of the soil.

Hydrology—relates to water movement as it circulates from land, bodies of water, and the atmosphere.

Ladder fuels—material of intermediate height that can ignite and carry fire from the ground to tree crowns or structures.

Mitigation—an action that moderates or lessens the severity of a wildfire hazard or risk.

Muck fire—a fire that burns into the organic matter in the soil. Muck fires produce a lot of smoke and are very difficult to extinguish.

Prescribed fire—the use of fire by trained professionals as a management tool to reduce potential fuel for wildfire and to improve ecosystem health.

Surface fuels—trees up to 6 feet, shrubs, grasses and other herbaceous plants, litter (fallen leaves or needles), and downed woody material.

Torching—ignition of a single tree crown.

Understory—includes vegetation underneath tree crowns.

Wildland-urban interface—an area where human structures exist within or near natural areas.

Acknowledgements

Pictures by Larry Korhnak

Literature Cited

Florida Division of Forestry. 2002. Wildfire hazard assessment guide for Florida homeowners. FL Division of Forestry, Tallahassee, FL. 40 p.

Florida Natural Areas Inventory. 1990. Guide to the natural communities of Florida. FL Natural Areas Inventory and FL DNR. Tallahassee, FL. 100 p.

Macie, E. A. and Hermansen, L. A. (eds.). 2002. Human influences on forest ecosystems: The southern wildland-urban interface assessment. Gen. Tech. Rep. SRS-55. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southern Research Station. 159 p.

Myers, R. L. and Ewel, J. J. (eds.). 1990. Ecosystems of Florida. University of Central Florida Press, Orlando, FL. 765 p.

Appendix

Common Name	Scientific Name
bay species	*Gordonia lasianthus, Persea borbonia, Persea palustris*
black gum	*Nyssa sylvatica*
cabbage palm	*Sabal palmetto*
cypress	*Taxodium* spp.
fetterbush	*Lyonia lucida*
Florida rosemary	*Ceratiola ericoides*
gallberry	*Ilex glabra*
laurel oak	*Quercus hemisphaerica*
loblolly pine	*Pinus taeda*
longleaf pine	*Pinus palustris*
magnolia	*Magnolia grandiflora*
maples	*Acer* spp.
oaks	*Quercus* spp.
pignut hickory	*Carya glabra*
pond pine	*Pinus serotina*
red maple	*Acer rubrum*
rusty lyonia	*Lyonia ferruginea*
sand pine	*Pinus clausa*
saw palmetto	*Serenoa repens*
scrub oaks	*Quercus inopina, Q. myrtifolia, Q. geminate, Q. chapmanii*
slash pine	*Pinus elliottii*
South Florida slash pine	*Pinus elliottii* var. *densa*
sweetgum	*Liquidambar styraciflua*
turkey oak	*Quercus laevis*
water tupelo	*Nyssa aquatica*
wax myrtle	*Myrica cerifera*
wiregrass	*Aristida* spp. *Sporobolus* spp.