VOLUSIA COUNTY
WILDLAND/URBAN INTERFACE
WILDFIRE HAZARD
ASSESSMENT GUIDE

The Volusia County Wildland/Urban Interface Wildfire Hazard Assessment Guide is a compilation of work by The Nature Conservancy (for Volusia County Fire Services) and the Volusia County Fire Chief's Association.

The first section, the *Volusia County Wildland/Urban Fire Interface Hazard Methodology*, defines the steps necessary to perform the assessment. This methodology was developed by a committee from the Volusia County Fire Chief's Association and chaired by Mike Kuypers, Bunnel District Manager, Florida Division of Forestry.

The following section, the *Fuel Hazard Assessment Guide for Volusia County, Florida*, is a photographic and descriptive guide for assessing the wildland fuels in Volusia County. The Nature Conservancy created this guide as part of a project funded by Volusia County Fire Services from monies donated during the 1998 Wildfires. This guide was designed to integrate with the Volusia County Wildland Hazard Severity Checklist found in the first section.

Use this guide to begin assessing and rating the interface/intermix hazards in your locale. With the collective efforts of all local and state jurisdictions as well as private landowners, progress can be made to reduce the wildfire hazard in Volusia County.

VOLUSIA COUNTY WILDLAND/URBAN INTERFACE FIRE HAZARD ASSESSMENT METHODOLOGY

Volusia County Fire Chiefs Association
January 24, 2000

INTRODUCTION

Following the devastating wildfires of 1998, the Volusia County Fire Chief's Association established a committee to develop a wildland/urban interface fire hazard assessment methodology that would accurately determine the relative risk to structures within the interface throughout Volusia County. The goal was to develop a procedure that all fire agencies in the county could use with minimal training to complete the assessment. By using the same measuring instrument, a uniform comparative assessment of all interface areas in the county can be completed.

Initially the committee reviewed the Wildland/Urban Interface Fire Hazard Assessment Methodology developed by the National Wildland/Urban Interface Fire Protection Program and the NFPA 299 wildfire hazard severity form checklist. It was decided that a simplified version of the NFPA checklist should be developed that would localize the rating characteristics to Volusia County conditions. Additionally, a pictorial guide to wildland fuels would be developed to make it easier for fire personnel to make fuel hazard determinations in the field.

The following methodology is the product of the committee's work. Special acknowledgement goes to The Nature Conservancy for their help in putting together the fuels guide. This assessment is but a first step in developing an action plan for hazard mitigation in Volusia County. It will take the combined efforts of all local and state jurisdictions as well as private land managers to make significant progress toward reducing the wildfire hazard in Volusia County.

METHODOLOGY

The assessment process is divided into five distinct steps, each necessary to efficiently and accurately perform the assessment. The steps should be completed in order; however, Step 5 can be completed separately from the rest of the assessment if desirable.

STEP 1: IDENTIFY AREAS TO BE EVALUATED

There are two types of subdivisions that are at risk to wildland fire. Subdivisions that form a distinct boundary between the wildland and the developed lots are called boundary interfaces. Examples of this type in Volusia County would be Pelican Bay and Hunters Ridge. All (or a sampling of) structures within 300 feet of this boundary should be assessed.

Subdivisions where developed lots are interspersed within a wildland area are called intermix interfaces. Examples of this type would be Daytona Park Estates and some of the less developed sections of Florida Shores. All (or a sampling of) structures that border wildland fuels within the intermix area should be assessed.

There is a point reached when blocks within the intermix area become built out enough that the danger of a wildfire burning through the block is greatly reduced. Generally, this occurs once the block is more that 75% built out. Blocks where this occurs need not be assessed unless they border a boundary interface or the wildland fuels adjacent to the structures are rated in the high or extreme hazard classifications. Individual undeveloped parcels completely surrounded by developed land (green islands) of less than 5 acres need not be assessed unless you feel it poses a high risk to neighboring structures due to high fuel loads or high structural flammability characteristics.

For the purposes of this assessment, developed subdivisions with lot sizes greater than 10 acres are considered rural and would be identified but not be assessed as an interface area. This is not to say that there is no danger to these homes. These lot sizes are large enough; however, that the property owner should be able to perform any needed hazard mitigation on his/her own property without any government intervention to achieve results. A public information effort would be a good strategy for these rural areas.

Once you have determined the interface areas to be assessed, give them a name and designate on a map. If the subdivision is very large you may want to break it down by neighborhood, particularly if the characteristics of the subdivision are not the same throughout the subdivision (e.g. different lot sizes or roofing materials used).

STEP 2: IDENTIFY VEGETATIVE FUEL HAZARD CLASSIFICATION

Assess all wildland fuels within the intermix and within 1/4 mile of the interface boundary. Use the pictorial guide to help classify the fuels in the assessment area. If you have a mix of fuel types in the area, pick the type most likely to do structural damage. This will probably be fuels that are closest to the structures.

Once the fuel hazard classification has been determined, an adjective (low, medium, and high) can be assigned that will then be used in the severity checklist.

STEP 3: IDENTIFY RISK

Determine if the area has had a history of wild fires. This can be either a history of large fires burning in to the interface or a history of man caused fires started in the assessed area. Compare with the average of the county as a whole. If the number is above average you will need to assign risk points on the checklist.

STEP 4: COMPLETE WILDIFRE HAZARD SEVERITY CHECKLIST

There are two options that can be used to perform the actual assessment. One option is to complete a survey of each structure and average the total scores to come up with the overall rating of the subdivision. This option would be the most accurate but also the most time consuming. Use this method if the home or subdivision characteristics are quite varied throughout the assessment area.

A second option is to complete the checklist on a sample of the total structures in the assessment area. This would be applicable if the subdivision design and structures are fairly homogeneous. For example, if the road system, water supply, lot size and building style of the home were generally the same within the assessed area, a sample would give an accurate rating. In this case every fourth structure may be assessed. Average all the total scores to come up with an overall rating.
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STEP 5: IDENTIFY CRITICAL FACILITIES TO BE PROTECTED

Critical facilities are those that will need special consideration for protection from wildfire either because they are necessary to maintain infrastructure functions, are smoke sensitive or would be very hazardous if set on fire by an encroaching wildfire. This process can be completed at any stage of the assessment. Once identified, a strategy specific to mitigating the hazard can be formulated. For example, for a power substation, brush clearance may be needed to provide defensible space. In the case of a nursing home, wildfire evacuation plans may be necessary to transport patients out of smoky conditions.

STEP 6: DEVELOP ACTION PLAN TO MITIGATE IDENTIFIED HAZARDS

Although not part of the assessment process, the whole reason for completing the process is to develop plans to mitigate the hazard and/or develop fire response/evacuation plans for each assessed area. Mitigation and fire response plans should be done on the highest rated areas first. There are many strategies that can be used for hazard mitigation from fuel reduction to building codes to subdivision regulations. Some fuel mitigation strategies that have proved useful include:

- prescribed burning
- brush mowing/disking/chopping
- herbicides
- tree thinning

Because interface problems cross jurisdictional lines, it is essential that departments work together to solve them. By soliciting the cooperation of private and public land managers, builders and developers, we can implement an effective mitigation program that will allow our residents to live more harmoniously with nature.

FREQUENCY OF REASSESSMENT

The dynamic nature of vegetative management and development within interface areas makes it necessary to reevaluate your interface areas periodically. Typical fuels management techniques such as mowing or prescribed burning will be effective in substantially reducing the wildfire hazard for a period of only 3 to 5 years, thus requiring repeated treatments. As structures are built in intermix areas, some subdivisions will drop from consideration for hazard mitigation treatments once they exceed 75% build out.

Because of these changing conditions, it is recommended that your interface areas be re-evaluated on a 3 year schedule. For boundary interface areas, this can be as simple as reassessing the wildland fuels. Intermix areas may require an assessment of fuels and structural components. The checklist is also an excellent toll to use for assessing subdivision plans prior to development to assure that new development is designed with wildfire safety in mind.

VOLUSIA COUNTY WILDLAND FUELS HAZARD CLASSIFICATION

LOW	Hardwood swamp Upland Hardwood Hammock Pine Flatwoods - Palmetto/gallberry less than 2 feet tall Sandhill – grasses cover more than 50% of surface; palmetto less than 2 feet Short grasses - broom sedge, spartina, wire grass Scrub – shrub layer less than 3 feet tall Dense pine – small pine with sparse pine needle ground cover (1)
MEDIUM	Cypress swamp Baygall/Bayhead Pine Flatwoods - Palmetto/gallberry 2 to 4 feet tall (2) Sandhill – grasses 25-50% of ground cover; palmetto 2-4 feet tall Tall grass - saw grass, cogon grass Scrub - shrub layer 3 to 6 feet tall (2) Dense pine – small pine with heavy pine needle ground cover (1)
HIGH	Pine Flatwoods - Palmetto/gallberry 4-6 feet tall Sandhill – Grasses cover less than 25% of surface; palmetto greater that 4 feet Scrub – shrub layer greater than 6 feet tall Dense Pine – in combination with palmetto/gallberry less than 4 feet (1)
EXTREME	Pine Flatwoods – Palmetto/gallberry greater than 6 feet Scrub – shrub layer greater than 6 feet with dense pine overstory Dense Pine in combination with palmetto/gallberry greater that 4 feet

NOTES: (1) Pine canopies must have at least 75% crown closure to be considered dense pine

(2) A combination of this fuel with a dense pine overstory would be considered a high fire risk

Burn history will have a great bearing on the hazard. Lands managed by frequent fire will not pose the same hazard as lands not managed by fire.

VOLUSIA COUNTY WILDFIRE HAZARD SEVERITY CHECKLIST

SUBDIVISION NAME - _____ DATE - _____

LOCATION - _____

TYPE – ( ) RESIDENTIAL ( ) COMMERCIAL ( ) INDUSTRIAL

ELEMENT

POINTS

A. Subdivision Design

1. Ingress and egress
   - Two or more primary roads 1 ___
   - One primary road plus one or more emergency roads 3 ___
   - One way in and out 5 ___

2. Primary road width
   - Minimum of 20 ft 1 ___
   - Less than 20 ft 3 ___

3. Road accessibility
   - All weather road (paved, gravel, shell, lime rock) 1 ___
   - Dirt road 3 ___

4. Dead end roads (skip if none)
   - >50' radius or hammer head 1 ___
   - < 50' radius or hammer head 3 ___

   - <800' long 1 ___
   - >800' long 3 ___

5. Average lot size
   - More than 5 acres 1 ___
   - 1 to five acres 3 ___
   - less than 1 acre 5 ___

6. Street signs
   - present 1 ___
   - not present 3 ___

B. Vegetation

1. Fuel hazard classification (from guide)

Low	1 ___
Medium	5 ___
High	10 ___
Extreme	15 ___

2. Defensible Space

more than 60'	1 ___
30-60 ‘	5 ___
Less than 30', boundary interface	10 ___
Less than 30’, intermix interface	15 ___

C. Buildings – If more than 25% of the buildings within 300’ the interface or within the intermix exhibit these characteristics:

1. Roofing

Class A, B, or C roofing	1 ___
Non rated (wood Shingles)	5 ___

2. Soffit vents

1. Noncombustible screening or metal soffits	1 ___
2. Combustible screening or plastic soffits	5 ___
Note: If mobile home community add 5 points if no skirting	5 ___

D. Water Supply

1. Water available within assessment area

Hydrants w/ min. 500 gpm less than 1000' from structures	1 ___
Hydrants greater than 1000' from structures	2 ___
Dry hydrants or draft sites available	3 ___
none available	4 ___

2. Water sources off site (skip if water is available on site)

<20 min. round trip	1 ___
20-45 min round trip	5 ___
> 45 min round trip	9 ___

E. Risk

1. Area has history of higher than average fire occurrence or history of large fires burning in to area	3 ___
TOTAL	____

Rating Class - Low <30 Moderate 30-40 High 41-50 Extreme >50

CRITICAL FACILITIES CHECKLIST

The following facilities, will need special consideration for protection from wildfire to maintain infrastructure functions.

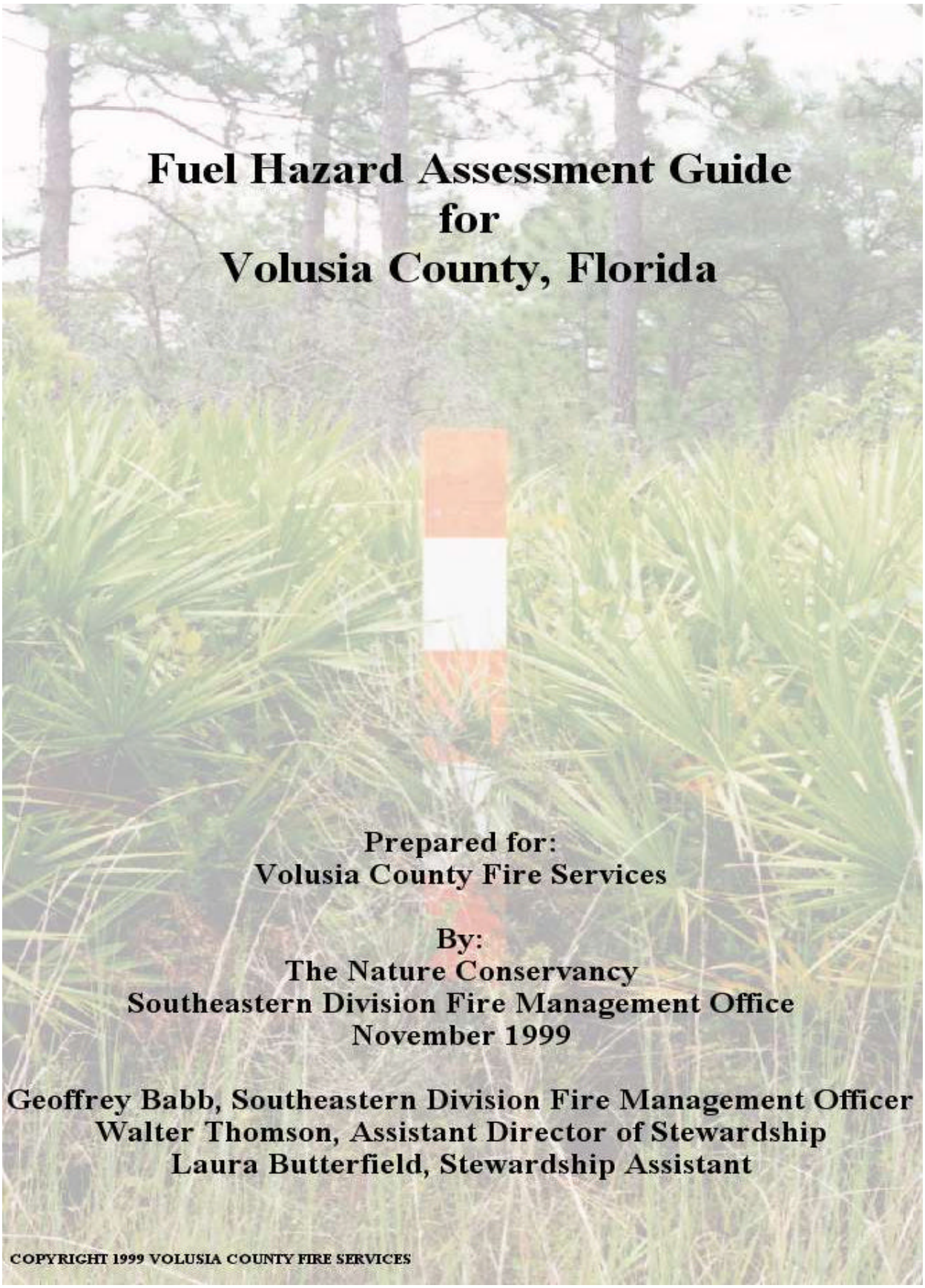
__ Power plants/substations
__ Power transmission lines
__ Water plants/Well fields
__ Treatment plants
__ Fire and police stations

The following facilities need special protection due to their flammability

__ Flammable liquid storage tanks
__ Landfills/dumps/junk yards

The following facilities are smoke sensitive

__ Schools
__ Nursing homes/Assisted living facilities
__ Medical facilities
__ Airports



Fuel Hazard Assessment Guide for Volusia County, Florida

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INTRODUCTION:

The following serves as a photographic and descriptive guide for the assessment of wildland fuels in Volusia County, Florida. There are four basic fuel assessment categories, ranging from low to extreme, which integrate with the Volusia County Wildland Hazard Severity Checklist. Hazard categories are based on fuel vegetation type, fuel loading, and typical fire behavior during dry climatic conditions. It is important to note that not all of the diversity of fuel types found in the county are depicted. The user will have to use judgement to match real fuels observed in the landscape with one of the descriptions given in the guide.

Fuel depth and thickness, for each photograph, is indicated by a 6 foot density board marked in 1 foot increments. Users of this guide should compare the general or average fuel bed in the landscape they are observing to those shown in the guide. Users should also compare the fuel complex description elements to verify a "best match".

The fire behavior table given for each fuel type is also intended for use as a guide to indicate relative fire behavior for fuel hazard assessments only. Fuel descriptions were matched (best fit) to the 13 Fire Behavior Prediction System (FBPS) fuel models (Anderson H. E., 1982. Aids to Determining Fuel Models for Estimating Fire Behavior. NFES 1574.). Specific weather and fuel moisture parameters were used (as recommended in Anderson) to run the Behave model (Andrews, P. A., 1986. Behave: Fire Behavior Prediction and Fuel Modeling System, Part 1. INT-GTR 194.) for each fuel model selected. The following table lists input values used in the Behave modeling for the guide's fire behavior outputs.

Behave Input Parameters

Parameters:	Values:
Fine Fuel Moisture (1 Hour) (FFM)	8%
10 Hour Fuel Moisture	8%
100 Hour Fuel Moisture	9%
Live Fuel Moisture (LFM)	125%
Slope	0
Mid Flame Wind Speed (MFW)	5 mph
Direction of Spread From Wind	0, 90 degrees

Values in the output tables that over or underestimate typical fire behavior (based on experience) are so noted.

LOW FUEL HAZARD
Pine Flatwoods

Vegetation Type: ***Pine Flatwoods***: Palmetto/gallberry and grass understory and groundcover with yellow pine overstory.

Grasses (Ground Cover): Typically, bunch grasses such as Wiregrass, Bluestem, or Broomsedge dominate. Grasses in the low fuel hazard category occupy 50% or greater of the surface fuel cover area.

Shrubs (Ground Cover): Typically, short Saw Palmetto and Gallberry – less than 2 feet in average height. Other dwarf shrubs such as Runner Oak, Lyonia, Tar Flower and Fetterbush are also common.

Overstory: Yellow Pines, either Longleaf Pine, Slash Pine, Pond Pine or Loblolly Pine dominate, with a crown closure of less than 75%.

Woody Debris And Litter: Little dead downed tree limbs or other dead woody debris. Sparse pine needle litter and palmetto chaff.

Soils: Mineral (gray in color and sandy in texture)

Typical Fire Behavior: [Using FBPS: FM7, FFM 8, LFM 125, MFW 5] (Refer to page 1)

	Rate of Spread (Ft./Min.)	Flame Length (Ft.)	Fire Line Intensity (BTU/Ft./Sec.):
Head fire:	23	5.5	211
Flank Fire:	3	2	22

MEDIUM FUEL HAZARD
Pine Flatwoods

Vegetation Type: ***Pine Flatwoods:*** Palmetto/gallberry and grass understory and groundcover with yellow pine overstory.

Grasses (Ground Cover): Typically, bunch grasses such as Wiregrass, Bluestem, or Broomsedge. Grasses in the medium fuel hazard category dominate 25 to 50% of the surface fuel cover area.

Shrubs (Ground Cover): Typically, moderately tall Palmetto and Gallberry – 2 to 4 feet in average height. Other dwarf shrubs such as Runner Oak, Lyonia, Tar Flower and Fetterbush also are commonly found.

Overstory: Yellow Pines, either Longleaf Pine, Slash Pine, Pond Pine or Loblolly Pine with a crown closure of less than 75%. **Note:** If crown closure is greater than 75%, this would be considered High Fuel Hazard.

Woody Debris And Litter: Widely scattered dead downed tree limbs or other dead woody debris.

Soils: Mineral (gray in color sandy in texture)

Typical Fire Behavior: [Using FBPS: FM6, FFM 8, LFM 125, MFW 5] (Refer to page 1)

	Rate of Spread (Ft./Min.)	Flame Length (Ft.)	Fire Line Intensity (BTU/Ft./Sec.):
Head fire:	30	6	238
Flank Fire:	3	2	25

HIGH FUEL HAZARD
Pine Flatwoods

Vegetation Type: ***Pine Flatwoods:*** Palmetto/gallberry and grass understory and groundcover with yellow pine overstory.

Grasses (Ground Cover): Typically, bunch grasses such as Wiregrass, Bluestem, or Broomsedge. Grasses in the high fuel hazard category dominate only 25% to 10% of ground cover area.

Shrubs (Ground Cover): Typically, tall Palmetto and Gallberry – 4 to 6 feet in average height. Other dwarf shrubs such as Runner Oak, Lyonia, Tar Flower and Fetterbush also are common.

Overstory: Yellow Pines, either Longleaf Pine, Slash Pine, Pond Pine or Loblolly Pine with a crown closure of 75%. **Note:** If crown closure is greater than 75%, this would be considered Extreme Fuel Hazard.

Woody Debris: Significant build of dead downed tree limbs and pine needle litter as well as other dead woody debris.

Soils: Mineral (gray in color and sandy in texture)

Typical Fire Behavior: [Using FBPS: FM4, FFM 8, LFM 125, MFW 5] (Refer to page 1)

	Rate of Spread (Ft./Min.)	Flame Length (Ft.)	Fire Line Intensity (BTU/Ft./Sec.):
Head fire:	61	17.3	2782
Flank Fire:	6	6	290

EXTREME FUEL HAZARD
Pine Flatwoods

Vegetation Type:	***Pine Flatwoods:*** Palmetto/gallberry and grass understory and groundcover with yellow pine overstory.
Grasses (Ground Cover):	Typical bunch grasses such as Wiregrass, Bluestem, or Broomsedge. Grasses in the extreme fuel hazard category dominate <u>10% or less</u> of the surface fuel cover area.
Shrubs (Ground Cover):	Typically tall Palmetto and Gallberry – <u>greater than 6 feet in average height</u>. Other dwarf shrubs such as Runner Oak, Lyonia, Tar Flower and Fetterbush also are commonly found.
Overstory:	Yellow Pines, either Longleaf Pine, Slash Pine, Pond Pine or Loblolly Pine.
Woody Debris And Litter:	Significant build of dead downed tree limbs and pine needle litter and palm thatch. Extensive ladder fuels extending to tree crowns.
Soils:	Mineral (gray in color and sandy in texture – with thick duff and humus)

Typical Fire Behavior: [Using FBPS: FM4, FFM 8, LFM 125, MFW 5] (Refer to page 1)

	Rate of Spread (Ft./Min.)	Flame Length (Ft.)	Fire Line Intensity (BTU/Ft./Sec.):
Head fire:	61	17.3 *(Typically, double this)	2782
Flank Fire:	6	6 *(Typically, double this)	290

LOW FUEL HAZARD
Sandhill

Vegetation Type:	***Sandhill (Longleaf Pine/Turkey Oak):*** Predominant Wiregrass understory and groundcover with turkey oak and Longleaf Pine overestory.
Grasses (Ground Cover):	Typically, bunch grasses such as Wiregrass, Bluestem, or Broomsedge. Grasses in the low hazard fuel category dominate 50% or greater of the surface fuel cover area.
Shrubs (Ground Cover):	Typically short sparse individual Saw Palmetto or in small short clumps with sparse Turkey Oak. Palmetto less than 2 feet in average height. Short/sparse Turkey oak as well as other dwarf shrubs such as Runner Oak, Dwarf Live Oak and Sand Post Oak also are commonly found.
Overstory:	Yellow Pine predominantly Longleaf Pine. Pine overstory open, having a crown closure of less than 75%.
Woody Debris:	Little dead downed tree limbs or other dead woody debris. Sparse pine needle litter.
Soils:	Mineral (pale-yellow in color and sandy in texture)

Typical Fire Behavior: [Using FBPS: FM1, FFM 8, LFM 125, MFW 5] (Refer to page 1)

	Rate of Spread (Ft./Min.)	**Flame Length (Ft.)**	**Fire Line Intensity (BTU/Ft./Sec.):**
Head fire:	81 (*exagerated)	4.1	125
Flank Fire:	8	1.5	13

MEDIUM FUEL HAZARD
Sandhill

Vegetation Type: (General)	***Sandhill (Longleaf Pine/Turkey Oak):*** Dominant Wiregrass groundcover with numerous clumped Saw Palmetto, Live Oak and Turkey Oak ground cover with dense but open Longleaf Pine overstory.
Grasses (Ground Cover):	Bunch grasses such as Wiregrass dominate other grasses such as Bluestem, or Broomsedge are common. Grasses in the low fuel hazard category dominate 25% to 50% of the surface fuel cover area.
Shrubs (Ground Cover):	Typically, large Saw Palmetto, found individually or in interspersed clumps with small to mature Turkey Oak. Palmetto is between 2 to 4 feet in average height. Other dwarf shrubs and oaks are also commonly found.
Overstory:	Yellow Pine, predominantly Longleaf Pine. Pine overstory moderately open, still having a crown closure of less than 75%.
Woody Debris and Litter:	Some dead downed tree limbs (particularly Turkey Oak) or other dead woody debris together with significant groundcover pine needle litter.
Soils:	Mineral (pale-yellow in color and sandy in texture)

Typical Fire Behavior: [Using FBPS: FM7, FFM 8, LFM 125, MFW 5] (Refer to page 1)

	Rate of Spread (Ft./Min.)	Flame Length (Ft.)	Fire Line Intensity (BTU/Ft./Sec.):
Head fire:	30	5.7	249
Flank Fire:	3	2.0	26

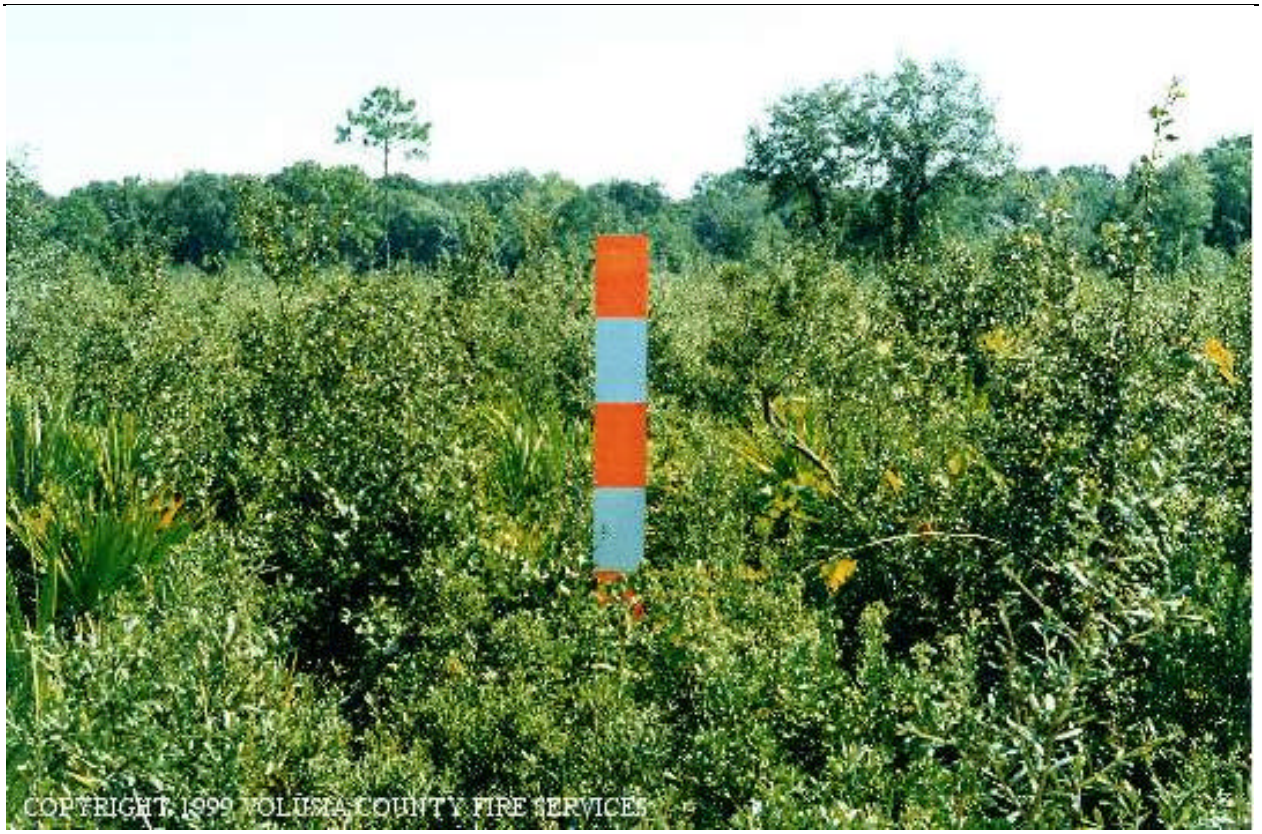
HIGH FUEL HAZARD
Sandhill

Vegetation Type:	***Sandhill (Longleaf Pine Turkey Oak):*** Predominantly Wiregrass and Palmetto understory and groundcover. Palmetto is found in large broad clumps an is tall in stature. Dense Turkey Oak and Longleaf Pine overstory.
Grasses (Ground Cover):	Typical bunch grasses such as Wiregrass, Bluestem, or Broomsedge. Grasses in the this fuel category occupy 25% or less of surface fuel cover area.
Shrubs (Ground Cover):	Typically dense, tall, broadly clumped Saw Palmetto with more numerous Dwarf Live Oak and Turkey Oak, the latter, often found in thickets. Palmetto usually greater than 4 feet in average height.
Overstory:	Yellow Pine, predominantly Longleaf Pine. Pine overstory is closed. Commonly, thickets of post size to mature Sand Pines are observed, usually invading from adjacent scrub areas.
Woody Debris and Litter:	Abundant dead downed tree limbs (particularly Turkey Oak). Pine needle litter forms abundant ground cover and ladder fuels.
Soils:	Mineral (pale-yellow in color and sandy in texture)

Typical Fire Behavior: [Using FBPS: FM4, FFM 8, LFM 125, MFW 5] (Refer to page 1)

	Rate of Spread (Ft./Min.)	Flame Length (Ft.)	Fire Line Intensity (BTU/Ft./Sec.):
Head fire:	61	17.3	2782
Flank Fire:	6	6.1	290

LOW FUEL HAZARD
Scrub



Vegetation Type: ***Oak Scrub:*** Predominantly dwarf oak dominated understory with short sparse Palmetto. Few if any overstory pines or oaks.

Grasses (Ground Cover): Very sparse grass cover. Some native bunch grasses such as Wiregrass or Bluestem, and Broomsedge may be present.

Shrubs (Ground Cover): Typically, short sparse individual scrub oak and Saw Palmetto 3 feet or less in height. Oaks such as Scrub Live Oak, Chapman's Oak and Myrtle Oak are common. Exposed soil openings 10 to 30%.

Overstory: Very few Yellow Pine in the overstory. If any, short stature seedling to sapling size Sand Pine may be observed.

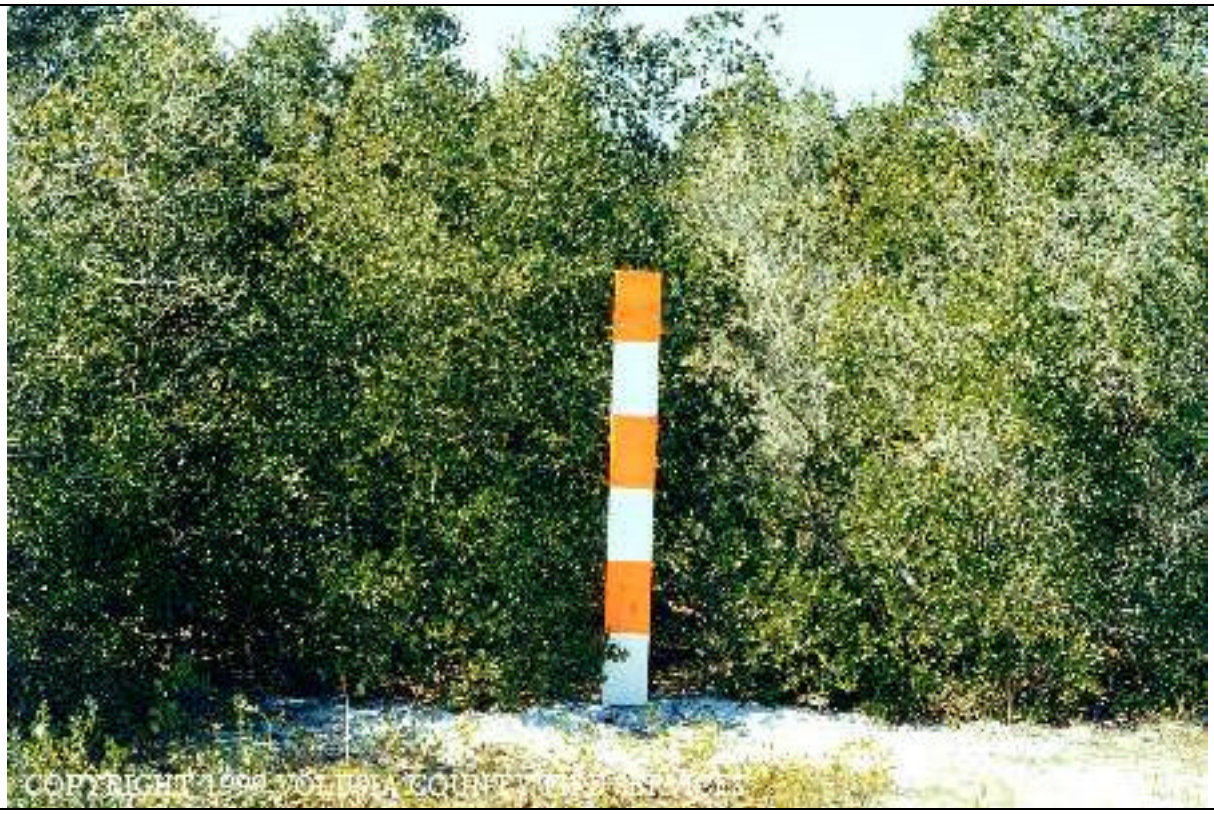
Woody Debris and Litter: Little dead downed tree limbs or other dead woody debris. Sparse leaf and needle litter.

Soils: Mineral (pale-white and sandy in texture)

Typical Fire Behavior: [Using FBPS: FM5, FFM 8, LFM 125, MFW 5] (Refer to page 1)

	Rate of Spread (Ft./Min.)	Flame Length (Ft.)	Fire Line Intensity (BTU/Ft./Sec.):
Head fire:	7	2.2	31
Flank Fire:	1	.8	1

MEDIUM FUEL HAZARD
Scrub



Vegetation Type:	***Tall Oak Scrub with Pine :*** Moderately tall oak shrub dominated understory and overstory together with individual and clumped Saw Palmetto. Pines, particularly Sand Pine , may be common forming an open overstory.
Grasses (Ground Cover):	Very sparse grass cover. Some native bunch grasses such as Wiregrass or Bluestem, and Broomsedge may be present, as well as, other sparse herbaceous plants.
Shrubs (Ground Cover):	Moderately tall Scrub Oaks and Saw Palmettos forming continuous thickets, 3 to 6 feet in height. Exposed soil openings 10% or less.
Overstory:	Pine (particularly Sand Pine) common, forming an open overstory. Additional short stature seedling to sapling size Sand Pine may be observed. Note: if crown closure is greater than 75%, this would be considered a high fuel hazard.
Woody Debris and Litter:	Downed tree limbs or other dead woody debris common. Moderate amounts of leaf and needle litter.
Soils:	Mineral (pale-white in color and sandy in texture)

Typical Fire Behavior: [Using FBPS: FM6, FFM 8, LFM 125, MFW 5] (Refer to page 1)

	Rate of Spread (Ft./Min.)	**Flame Length (Ft.)**	**Fire Line Intensity (BTU/Ft./Sec.):**
Head fire:	30	5.6	238
Flank Fire:	3	2.0	25

HIGH FUEL HAZARD
Scrub

Vegetation Type:	***Mature Sand Pine/Oak Scrub:*** Tall oak shrub dominated understory and midstory with a closed overstory canopy of mature (pole size) Sand Pine.
Grasses (Ground Cover):	Very sparse grass and herbaceous plant cover. Some native bunch grasses such as Wiregrass or Bluestem, and Broomsedge may be present with other sparse herbaceous plants.
Shrubs (Ground Cover):	Tall Scrub Oaks and Saw Palmettos forming more a mostly open midstory greater than 6 feet in height. Exposed soil openings, few if any.
Overstory:	Pine (particularly Sand Pine) common, forming an dense, mature, overstory. Crown closure 75%. **Note:** If greater than 75%, this would be considered Extreme Fuel Hazard.
Woody Debris and Litter:	Downed tree limbs or other dead woody debris abundant. Significant amounts of palm chaff and needle litter forming continuous ladder fuels.
Soils:	Mineral (pale white in color and sandy in texture – some duff and humus)

Typical Fire Behavior: [Using FBPS: FM4, FFM 8, LFM 125, MFW 5] (Refer to page 1)

	Rate of Spread (Ft./Min.)	**Flame Length (Ft.)**	**Fire Line Intensity (BTU/Ft./Sec.):**
Head fire:	61	17.3	2782
Flank Fire:	6	6.1	290

EXTREME FUEL HAZARD
Scrub

Vegetation Type:	***Mature Sand Pine/Oak Scrub:*** Tall and dense oak shrub and sapling dominated understory and midstory with a closed overstory canopy of mature (pole size) Sand Pine.
Grasses (Ground Cover):	Very sparse grass and herbaceous plant cover. Some native bunch grasses such as Wiregrass or Bluestem, and Broomsedge may be present with other sparse herbaceous plants.
Shrubs (Ground Cover):	Tall Scrub Oak, Saw Palmetto and Sand Pine saplings forming a more dense midstory greater than 6 feet in height. Exposed soil openings, few if any.
Overstory:	Pine (particularly Sand Pine) common, forming a dense, mature, overstory. Crown closure 75% and greater.
Woody Debris and Litter:	Downed tree limbs or other dead woody debris abundant. Significant amounts of palm chaff and needle litter forming continuous ladder fuels.
Soils:	Mineral (pale white in color and sandy in texture – some duff and humus)

Typical Fire Behavior: [Using FBPS: FM4, FFM 8, LFM 125, MFW 5] (Refer to page 1)

	Rate of Spread (Ft./Min.)	Flame Length (Ft.)	Fire Line Intensity (BTU/Ft./Sec.):
Head fire:	61	17.3	2782
Flank Fire:	6	6.1	290

LOW FUEL HAZARD
Short Grass

Vegetation Type:	***Marsh/Prairie Grass (Short):*** Dominance of short, flammable grasses such as Wiregrass, Switch Grass, Cordgrass, Broomsedge and Bahia that dominate the surface fuel bed.
Grasses (Ground Cover):	Typical bunch grasses such as Wiregrass and Dropseed as well as other common grasses such as, Bluestem, Broomsedge, Cordgrass, Maidencane and non-native Bahias. Grasses in the low fuel hazard category dominate 100% of the ground cover and are 1 ½ feet or less in average height..
Shrubs (Ground Cover):	At best infrequent Palmetto or Wax Myrtle
Overstory:	None.
Woody Debris and Litter:	None
Soils:	Mineral

Typical Fire Behavior: [Using FBPS: FM1, FFM 8, LFM 125, MFW 5] (Refer to page 1)

	Rate of Spread (Ft./Min.)	Flame Length (Ft.)	Fire Line Intensity (BTU/Ft./Sec.):
Head fire:	81	4.1	125
Flank Fire:	8	1.5	13

MEDIUM FUEL HAZARD
Tall Grass

Vegetation Type:	***Marsh/Prairie Grass (Tall):*** Dominance of tall, flammable grasses such as native Switch Grass, Cordgrass, Broomsedge, and Saw-grass or exotic Cogon Grass that dominate the entire surface fuel bed.
Grasses (Ground Cover):	Typical bunch grasses such as Switch Grass, Cordgrass and Saw-grass found in marsh and wet prairie habitats. Grasses in the medium fuel hazard category dominate 100% of the ground cover and are 1 ½ feet to greater than 3 feet in average height..
Shrubs (Ground Cover):	At best infrequent and sparse Palmetto or Wax Myrtle
Overstory:	None.
Woody Debris and Litter:	None
Soils:	Mineral or Organic

Typical Fire Behavior: [Using FBPS: FM3, FFM 8, LFM 125, MFW 5] (Refer to page 1)

	Rate of Spread (Ft./Min.)	Flame Length (Ft.)	Fire Line Intensity (BTU/Ft./Sec.):
Head fire:	102	12.1	1290
Flank Fire:	11	4.3	134

LOW FUEL HAZARD
Dense Pine

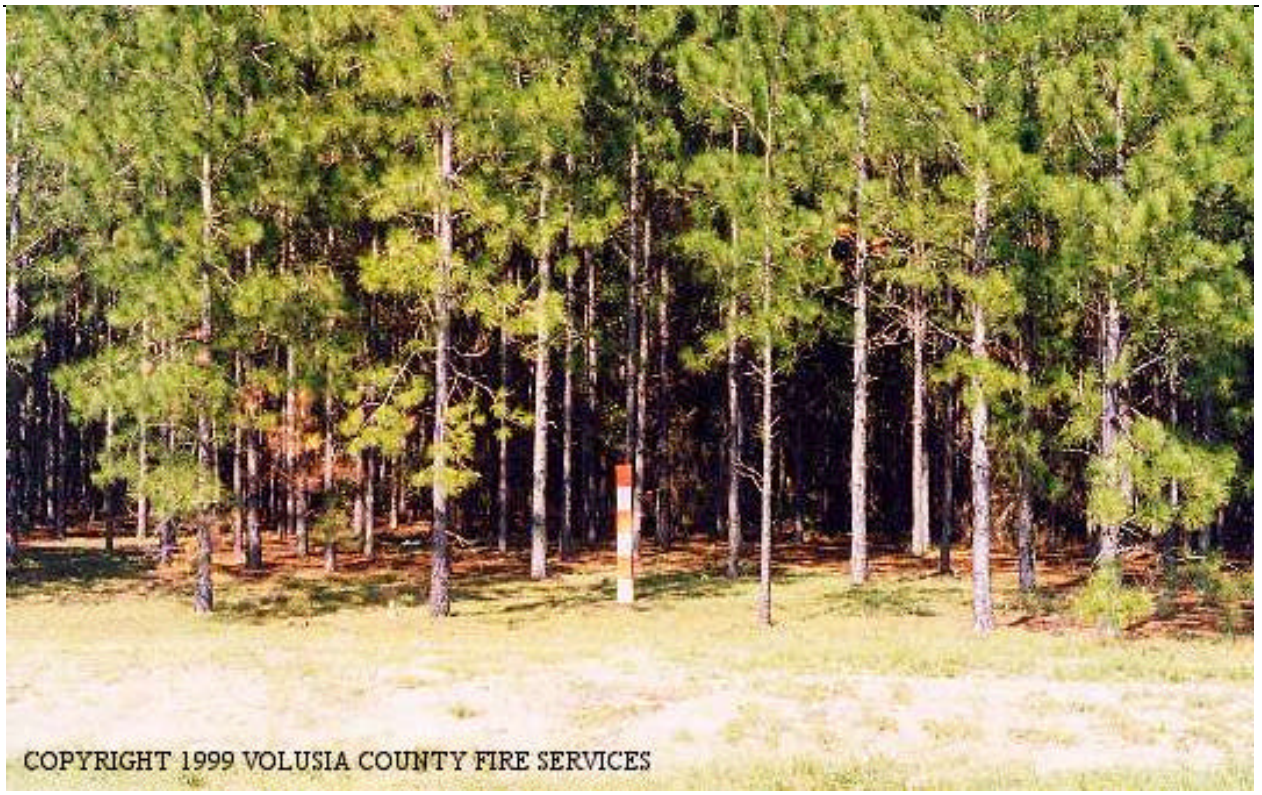
Vegetation Type:	***Dense Pine:*** Overstory of post size or smaller natural or planted Slash Pine with a sparse to light pine needle litter surface cover.
Grasses (Ground Cover):	Very sparse broomsedges and other old-field grasses.
Shrubs (Ground Cover):	Some very sparse Palmetto and Gallberry or Lyonia
Overstory:	Natural or planted Slash Pine, post size and smaller.
Woody Debris and litter:	None to very light woody debris. Some light pine needle litter.
Soils:	Mineral (gray in color and sandy in texture)

Typical Fire Behavior: [Using FBPM 8: FM9, FFM 8, LFM 125, MFW 5] (Refer to page 1)

	Rate of Spread (Ft./Min.)	**Flame Length (Ft.)**	**Fire Line Intensity (BTU/Ft./Sec.):**
Head fire:	2	1	6
Flank Fire:	.5*	..5	1

*Experience

MEDIUM FUEL HAZARD
Dense Pine



Vegetation Type:	***Dense Pine:*** Overstory of post size or smaller natural or planted Slash Pine with a thick pine needle litter surface cover.
Grasses (Ground Cover):	Very sparse broomsedges and other old-field grasses. Most of the surface cover is pine needle litter.
Shrubs (Ground Cover):	Some very sparse Palmetto and Gallberry or Lyonia
Overstory:	Natural or planted Slash Pine, post size and smaller.
Woody Debris and litter:	Very light to pockets of moderate (less than 3 inches diameter) woody debris. Significant pine needle litter.
Soils:	Mineral (gray in color and sandy in texture)

Typical Fire Behavior: [Using FBPM 9: FM9, FFM 8, LFM 125, MFW 5] (Refer to page 1)

	Rate of Spread (Ft./Min.)	Flame Length (Ft.)	Fire Line Intensity (BTU/Ft./Sec.):
Head fire:	8	2.7	48
Flank Fire:	1	.9	5

HIGH FUEL HAZARD
Dense Pine

Vegetation Type: ***Dense Pine:*** Palmetto, Gallberry and grass understory and groundcover with closed natural or planted yellow pine overstory.

Grasses (Ground Cover): Typically, native old-field grasses such as Bluestem, or Broomsedge. Grasses in the high fuel hazard category dominate 10% to 25% of ground cover area.

Shrubs (Ground Cover): Typically, tall ,dense Palmetto and Gallberry – 2 to 4 feet in average height. Other dwarf shrubs such as Runner Oak, Lyonia, Tar Flower and Fetterbush are common.

Overstory: Yellow Pine, typically Slash Pine with a crown closure of 75% or greater.

Woody Debris: Significant build of dead downed tree limbs and pine needle litter as well as other dead woody debris.

Soils: Mineral (gray in color and sandy in texture)

Typical Fire Behavior: [Using FBPS: FM4, FFM 8, LFM 125, MFW 5] (Refer to page 1)

	Rate of Spread (Ft./Min.)	Flame Length (Ft.)	Fire Line Intensity (BTU/Ft./Sec.):
Head fire:	61	17.3	2782
Flank Fire:	6	6	290

EXTREME FUEL HAZARD
Dense Pine

Vegetation Type: ***Dense Pine:*** Palmetto/grass understory and groundcover with yellow pine overstory.

Grasses (Ground Cover): Typical old-field grasses such as Bluestem, or Broomsedge. Grasses in the extreme fuel hazard category dominate 10% or less of the surface fuel cover area.

Shrubs (Ground Cover): Typically tall very dense Palmetto and Gallberry – greater than 4 feet in average height. Other dwarf shrubs such as Runner Oak, Lyonia, Tar Flower and Fetterbush are commonly found.

Overstory: Yellow Pine, typically mature Slash Pine with a crown closure of 75% or greater.

Woody Debris And Litter: Significant build of dead downed tree limbs and pine needle litter and palm thatch. Extensive ladder fuels extending to tree crowns.

Soils: Mineral (gray in color and sandy in texture – with thick duff and humus)

Typical Fire Behavior: [Using FBPS: FM4, FFM 8, LFM 125, MFW 5] (Refer to page 1)

	Rate of Spread (Ft./Min.)	Flame Length (Ft.)	Fire Line Intensity (BTU/Ft./Sec.):
Head fire:	61	17.3 *(Typically, double this)	2782
Flank Fire:	6	6 *(Typically, double this)	290

LOW FUEL HAZARD
Hardwood Swamp

Vegetation Type:	***Hardwood Wetland Forest:*** Closed canopy forest dominated by mature deciduous hardwood trees. Midstory is sparse and dominated by sapling or larger size classes of similar tree types. Cabbage palm is also common. Ground cover is often sparse and dominated by herbaceous wetland plants.
Grasses (Ground Cover):	Very Sparse to non-existent. Herbaceous wetland plants such as Arrowhead, Pickerelweed, Lizard's-tail, Royal and Cinnamon Fern are common.
Shrubs (Ground Cover):	Typically short sparse individual shrubs and small trees such as Ironwood, Basswood, Willow, Buttonbush, Swamp Dogwood and Cabbage Palm..
Overstory:	Various mature deciduous hardwoods creating a tall closed canopy. Tree types such as Red Maple, Sweetgum, Water Oak, Laurel Oak, Swamp Ash, and Yellow-poplar are common.
Woody Debris and Litter:	Significant dead downed tree limbs or other dead woody debris are common as well as abundant Cabbage Palm thatch.
Soils:	Organic (will burn if dry)

Typical Fire Behavior: [Using FBPM: FM9, FFM 8, LFM 125, MFW 5] (Refer to page 1)

	Rate of Spread (Ft./Min.)	Flame Length (Ft.)	Fire Line Intensity (BTU/Ft./Sec.):
Head fire:	8	2.7	48
Flank Fire:	1	.9	5

MEDIUM FUEL HAZARD
Cypress Swamp

Vegetation Type:	***Cypress Forest:*** Closed canopy of mature Pond Cypress or Bald Cypress dominating the overstory, with an understory of grasses such as Broomsedge and Maidencane as well as flammable wetland shrubs such as Saltbush, Wax Myrtle and Black or Coastalplain Willow.
Grasses (Ground Cover):	Typically, continuous but light grass cover. Grasses such as Bluestem, Maidencane or Broomsedge together with other herbaceous wetland plants are common. Grasses in this fuel hazard category dominate 50% or greater of the surface fuel area.
Shrubs (Ground Cover):	Typically, sparse to continuous Wax Myrtle, Saltbush or Coastalplain Willow as well as other shrubs such as Primrose Willow and Red Bay, 2 to 6 feet in average height.
Overstory:	Closed canopy of mature Pond Cypress or Bald Cypress.
Woody Debris:	Little dead downed tree limbs or other dead woody debris.
Soils:	Mineral to Mineral/Organic

Typical Fire Behavior: [Using FBPS: FM2, FFM 8, LFM 125, MFW 5] (Refer to page 1)

	Rate of Spread (Ft./Min.)	Flame Length (Ft.)	Fire Line Intensity (BTU/Ft./Sec.):
Head fire:	30	5.7	249
Flank Fire:	3	2.0	26

MEDIUM FUEL HAZARD
Baygall/Bayhead

Vegetation Type:	***Bayhead/BayGall:*** Closed canopy forest dominated by mature hardwood trees. Midstory is sparse and dominated by sapling or larger specimens of the same species, as well as, flammable shrubs.
Grasses (Ground Cover):	Very Sparse to non-existent. Herbaceous wetland plants such as Arrowhead, Pickerelweed, Lizard's-tail, Royal and Cinnamon Fern are common.
Shrubs (Ground Cover):	Typically short sparse individual shrubs and small trees such as Red Bay, Sweet Bay , Loblolly Bay and Red Maple. Other flammable shrubs such as Fetterbush (Lyonia) and Gallberry are common.
Overstory:	Various mature bay type hardwoods creating a moderately tall closed canopy. Tree types such as Red Bay, Sweet Bay and Loblolly Bay dominate.
Woody Debris and Litter:	Significant dead downed woody debris are common . Abundant peat moss and fern thatch material dominate surface fuel cover.
Soils:	Organic: (will burn if dry)

Typical Fire Behavior: [Using FBPS: FM7, FFM 8, LFM 125, MFW 5] (Refer to page 1)

	Rate of Spread (Ft./Min.)	Flame Length (Ft.)	Fire Line Intensity (BTU/Ft./Sec.):
Head fire:	23	5.3	211
Flank Fire:	2	1.9	22

LOW FUEL HAZARD
Upland Hardwood Hammock

Vegetation Type:	***Hardwood Forest:*** Closed canopy forest dominated by mature hardwood trees primarily native oaks. Midstory is sparse and dominated by sapling or larger size classes of similar tree types. Sparse palmetto common. Little ground cover vegetation is apparent. Soil surface is oak litter dominated
Grasses (Ground Cover):	Very Sparse to non-existent.
Shrubs (Ground Cover):	Typically short sparse individual shrubs and small trees such of the same types in the overstory and some individual Cabbage Palm.
Overstory:	Mature hardwoods, primarily oaks, forming a closed canopy. Hardwoods such as Live Oak, Laurel Oak and Water Oak dominate with some Magnolia possible.
Woody Debris and Litter:	Some dead downed tree limbs and other small dead woody debris are common. Oak leaf litter is the most common surface fuel.
Soils:	Mineral (dark gray in color and partly sandy)

Typical Fire Behavior: [Using FBPM: FM8, FFM 8, LFM 125, MFW 5] (Refer to page 1)

	Rate of Spread (Ft./Min.)	Flame Length (Ft.)	Fire Line Intensity (BTU/Ft./Sec.):
Head fire:	2	1	6
Flank Fire:	0	.4	1

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