

## Rapid Assessment Reference Condition Model

The Rapid Assessment is a component of the LANDFIRE project. Reference condition models for the Rapid Assessment were created through a series of expert workshops and a peer-review process in 2004 and 2005. For more information, please visit [www.landfire.gov](http://www.landfire.gov). Please direct questions to [helpdesk@landfire.gov](mailto:helpdesk@landfire.gov).

### Potential Natural Vegetation Group (PNVG)

R9WPSAgu Gulf Coast Wet Pine Savanna

#### General Information

**Contributors** (additional contributors may be listed under "Model Evolution and Comments")

**Modelers**

Sharon Hermann hermasm@auburn.edu  
Carl Nordman carl\_nordman@natureserve.org

**Reviewers**

**Vegetation Type**

Grassland

**Dominant Species\***

ARBE  
PIPA2

**General Model Sources**

- Literature
- Local Data
- Expert Estimate

**LANDFIRE Mapping Zones**

55  
46

**Rapid Assessment Model Zones**

- California
- Great Basin
- Great Lakes
- Northeast
- Northern Plains
- N-Cent. Rockies
- Pacific Northwest
- South Central
- Southeast
- S. Appalachians
- Southwest

**Geographic Range**

Gulf coast wet pine savannah occurs along the lower Gulf coastal plain from north central Florida to eastern Louisiana.

**Biophysical Site Description**

This PNVG occurs as wet woodlands or savannas growing on wet mineral soils, that are seasonally flooded (late winter to early spring) at least 2-3 times per decade.

**Vegetation Description**

Gulf coast savannahs are characterized by a very sparse canopy dominated by longleaf pine (*Pinus palustris*), sometimes mixed with sparsely scattered cypress (*Taxodium* spp.) and/or slash pine (*Pinus elliottii*). In Mississippi in the mid-1800's, Hilgard described this PNVG as having scattered stunted longleaf (25 feet tall and generally less than 4 in dbh) with spacing of 50 feet between trees. There is generally little shrubby understory on reference condition sites, but a variety of hardwoods begin to encroach with infrequent and/or dormant season fire. The ground cover is dense and generally diverse. Grasses such as wiregrass (*Aristida beyrichiana*) (in the eastern part of the range), toothache grass (*Ctenium aromaticum*), and dropseeds (*Sporobolus* spp.), and grass-like species (such as *Cyperus* spp., *Juncus* spp., *Fimbristylis* spp. And *Dichromena* spp.) are dominate. Forbs, including many species of carnivorous plants, orchids, and composites are common and highly diverse, however, legumes are rarely present. The ground cover exhibits one of the highest small-scale (m<sup>2</sup>) species richness levels recorded for any habitat-type, world-wide. Unlike many other types of long-leaf pine communities, the distribution of trees is usually not strongly patchy. Instead, most trees are isolated, even as young individuals.

**Disturbance Description**

Gulf coast wet pine savannahs experience frequent growing season surface fires, every 2-5 years, that generally burn across large expanses. The fires are usually low intensity overall, but will occasionally kill

\*Dominant Species are from the NRCS PLANTS database. To check a species code, please visit <http://plants.usda.gov>.

young individuals, and rarely kill older trees. Because this PNVG was originally very open, with only sparse trees, lightning and wind may have been major sources of tree mortality. A major effect of burning is to minimize the coverage of hardwood species (especially species such as black titi [Cliftonia monophylla]) that encroach from wetter adjoining areas. Periods of inundation may have been the dominant factor in keeping hardwoods in drier areas from encroaching. The primary disturbance dynamic is the gap phase regeneration of longleaf pine. The model classes are small patches widely dispersed on the landscape. A secondary dynamic (closed vs. open path) is the invasion of shrubs and hardwood trees in patches that escape fire. Once shrubs are established, they slightly decrease the probability of fire, but increase the probability that fires will kill the canopy pines. Once established, shrubs are not easily eliminated by single fires, but may sometimes be eliminated by multiple fires. We have simulated this by using mosaic fire to represent the last of a series of surface fires that eliminates invading hardwoods without killing canopy pines.

This vegetation type occupies much less of its original area and is now considered a habitat type of special concern due to the lack of fire and/or alteration of the hydrology. Many of the larger original areas have been permanently degraded by bedding (in attempts to establish pine plantations), and ditching or tiling to create drier areas for many types of uses including pastures and sod farms. Past establishment of plowed fire lanes may also slowly degrade the habitat by altering hydrology. Lack of fire has degraded much of the remaining areas. Uncharacteristic vegetation types include even-aged canopy stands in which age structure has been increased in density and/or homogenized by logging activities. Scattered longleaf have been replaced with dense stands of loblolly or slash pine. In addition, there are many areas where shrubs have become dense due to inadequate burning, and examples where the grass dominated ground cover has been lost due to soil disturbance or past canopy closure.

#### Adjacency or Identification Concerns

This PNVG is distinguished from other longleaf pine-dominated communities by the presence of wetland herbs and shrubs and seasonally fluctuating hydrology that, in some years, ranges from inundation to excessive drying that may produce cracking in the soil. It does not include the Gulf Coast flatwoods sites with saw palmetto (*Serenoa repens*) as a common species. Existing patches of savanna may be adjacent to large areas of Class B and E. Slight rises above the elevation of the savanna support mesic flatwoods. Wetter areas are pond cypress (*Taxodium ascendens*) or gum (*Nyssa* spp.) sloughs. Also hypericum (*Hypericum* spp.) ponds are found within this community.

#### Scale Description

**Sources of Scale Data**  Literature  Local Data  Expert Estimate

Natural lightning initiated fires may have been on the scale of 50 - 50,000 acres, depending on conditions. The larger fires likely burned through savanna, flatwoods, cypress ponds, and may have crossed narrow sloughs if they were dry. The size of savanna patches was probably on the scale of 100 to 2,000 acres, but areas could have had more savanna separated by wet sloughs.

#### Issues/Problems

The VDDT model and description of Southern (Gulf Coast) Wet Pine Savanna was developed by Sharon Herman in 2004 and reviewed 3/7/2005 by Carl Nordman. The model was modified to reduce the frequency of fire in Class E, which resulted in Class E being 3% of the landscape rather than less than 1%. When the model is run without fire nearly all the vegetation comes out as Class B and Class E. This occurs on much of the current landscape, which is not managed with prescribed fire. Historical fire size (minimum, maximum, and average) was based on conjecture by Carl Nordman.

#### Model Evolution and Comments

Suggested reviewers - William Platt (LSU), Guy Anglin (USFS - Florida NFs Supervisors Office), Jean Huffman (FL DEP), Ann Johnson (FNAI)  
SWPS is the original FRCC code.

Several changes were made to the VDDT model as a result of the editorial review to ensure the information in the Modeltracker description and the model were the same. These changes included:

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1. In classes A, B, C, and E, changing the age range of the classes to match the database description.
2. In Class A, changing the time since disturbance in the alternative successional pathway from A to B from 8 years to 15 years to match the starting age of Class B.
3. In Class A, changing the relative age for replacement fire event maintaining the class to -15 years.
4. In Class B, changing the primary succession pathway from B to E.
5. In Class B, removing the alternative successional pathway to E.
6. In Class D, changing the alternative succession pathway from B to E to correspond with the age class of the trees.

These changes resulted in minimal changes to the percentages contained within each class. Class E did increase from 1% originally to 7%. The overall fire frequencies did not change.

<b>Succession Classes**</b>														
<i>Succession classes are the equivalent of "Vegetation Fuel Classes" as defined in the Interagency FRCC Guidebook (www.frcc.gov).</i>														
<p><b>Class A     10 %</b></p> <p>Early1 All Struct</p> <p><b>Description</b></p> <p>Class A includes scattered pine regeneration up to 15 years old or no pine regeneration because no mast year has occurred since the gap opened. The native grassy ground cover is dominated by grass or grass-like species. Tree cover ranges between 0 to 25%. Replacement means death of the longleaf pines as single trees or small clumps. Most replacement fires occur in the earliest stage (class A). Older trees are very resilient to fire.</p>	<p><b>Dominant Species* and Canopy Position</b></p> <p>ARBE7 Lower CTAR Lower</p> <p><b>Upper Layer Lifeform</b></p> <p><input type="checkbox"/> Herbaceous <input type="checkbox"/> Shrub <input checked="" type="checkbox"/> Tree</p> <p><b>Fuel Model 2</b></p>	<p><b>Structure Data (for upper layer lifeform)</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th style="text-align: center;">Min</th> <th style="text-align: center;">Max</th> </tr> </thead> <tbody> <tr> <td>Cover</td> <td style="text-align: center;">0 %</td> <td style="text-align: center;">100 %</td> </tr> <tr> <td>Height</td> <td style="text-align: center;">Tree Regen &lt;5m</td> <td style="text-align: center;">Tree Short 5-9m</td> </tr> <tr> <td>Tree Size Class</td> <td colspan="2" style="text-align: center;">Sapling &gt;4.5ft; &lt;5"DBH</td> </tr> </tbody> </table> <p><input checked="" type="checkbox"/> Upper layer lifeform differs from dominant lifeform. Height and cover of dominant lifeform are:</p> <p>The dominant lifeform is the herbaceous component. Canopy closure ranges between 25-100% and is composed of medium height herbs, 0.5-0.9m tall.</p>		Min	Max	Cover	0 %	100 %	Height	Tree Regen <5m	Tree Short 5-9m	Tree Size Class	Sapling >4.5ft; <5"DBH	
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Cover	0 %	100 %												
Height	Tree Regen <5m	Tree Short 5-9m												
Tree Size Class	Sapling >4.5ft; <5"DBH													
<p><b>Class B     3 %</b></p> <p>Mid1 Closed</p> <p><b>Description</b></p> <p>Class B is characterized by scattered pines 15-75 years old, with a substantial component of mid-story hardwoods or shrubs encroaching in the absence of fire. Grasses and forbs are declining in cover and vigor. The hardwood/shrub cover is greater than 50%. Canopy pine cover generally is less than 25%. A secondary dynamic (closed vs. open path) is the invasion of shrubs and hardwood trees in patches that escape fire.</p>	<p><b>Dominant Species* and Canopy Position</b></p> <p>ILGL Middle ILCO Middle CLMO2 Middle</p> <p><b>Upper Layer Lifeform</b></p> <p><input type="checkbox"/> Herbaceous <input type="checkbox"/> Shrub <input checked="" type="checkbox"/> Tree</p> <p><b>Fuel Model 7</b></p>	<p><b>Structure Data (for upper layer lifeform)</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th style="text-align: center;">Min</th> <th style="text-align: center;">Max</th> </tr> </thead> <tbody> <tr> <td>Cover</td> <td style="text-align: center;">25 %</td> <td style="text-align: center;">100 %</td> </tr> <tr> <td>Height</td> <td style="text-align: center;">Tree Regen &lt;5m</td> <td style="text-align: center;">Tree Medium 10-24m</td> </tr> <tr> <td>Tree Size Class</td> <td colspan="2" style="text-align: center;">Medium 9-21"DBH</td> </tr> </tbody> </table> <p><input checked="" type="checkbox"/> Upper layer lifeform differs from dominant lifeform. Height and cover of dominant lifeform are:</p> <p>The dominant lifeform are shrubs with a canopy closure between 50-100%, and heights ranging from a minimum of 1-2.9m and a maximum of greater than 3m.</p>		Min	Max	Cover	25 %	100 %	Height	Tree Regen <5m	Tree Medium 10-24m	Tree Size Class	Medium 9-21"DBH	
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Once shrubs are established, they slightly decrease the probability of fire, but increase the probability that fires will kill the canopy pines. Once established, shrubs are not easily eliminated by single fires, but may sometimes be eliminated by multiple fires. We have simulated this by using mosaic fire to represent the last of a series of surface fires that eliminates invading hardwoods without killing canopy pines.

**Class C 35 %**

Mid1 Open  
**Description**

Class C includes scattered pines 15-75 years old. There are few hardwoods and only sparse shrubs due to frequent fire. The ground cover is dominated by grass and grass-like species. The canopy pine cover generally is less than 25%.

**Dominant Species\* and Canopy Position**

ARBE7 Lower  
CTAR Lower

**Upper Layer Lifeform**

- Herbaceous
- Shrub
- Tree

**Structure Data (for upper layer lifeform)**

	<i>Min</i>	<i>Max</i>
<i>Cover</i>	0 %	25 %
<i>Height</i>	Tree Short 5-9m	Tree Medium 10-24m
<i>Tree Size Class</i>	Medium 9-21"DBH	

- Upper layer lifeform differs from dominant lifeform. Height and cover of dominant lifeform are:  
The dominant lifeform is the herbaceous component. Canopy closure ranges between 25-100% and is composed of medium height herbs, 0.5-0.9m tall.

**Fuel Model 2**

**Class D 45 %**

Late1 Open  
**Description**

Class D includes scattered canopy pines 75 or more years old, with few hardwoods and only sparse shrubs due to frequent fire. Grass and grass-like species dominate the ground cover. The canopy pine cover generally is less than 25%.

**Dominant Species\* and Canopy Position**

ARBE7 Lower  
CTAR Lower

**Upper Layer Lifeform**

- Herbaceous
- Shrub
- Tree

**Structure Data (for upper layer lifeform)**

	<i>Min</i>	<i>Max</i>
<i>Cover</i>	0 %	25 %
<i>Height</i>	Tree Short 5-9m	Tree Medium 10-24m
<i>Tree Size Class</i>	Large 21-33"DBH	

- Upper layer lifeform differs from dominant lifeform. Height and cover of dominant lifeform are:  
The dominant lifeform is the herbaceous component. Canopy closure ranges between 25-100% and is composed of medium height herbs, 0.5-0.9m tall.

**Fuel Model 2**

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**Class E 7%**

Late I Closed

**Description**

Class E is characterized by canopy pines 75 or more years old, with a substantial component of hardwoods and/or shrubs in either the overstory or understory. Forbs and grasses are sparse. The hardwood/shrub cover is greater than 50%. The canopy pine cover generally is less than 25%. A secondary dynamic (closed vs. open path) is the invasion of shrubs and hardwood trees in patches that escape fire. Once shrubs are established, they slightly decrease the probability of fire, but increase the probability that fires will kill the canopy pines. Once established, shrubs are not easily eliminated by single fires, but may sometimes be eliminated by multiple fires. We have simulated this by using mosaic fire to represent the last of a series of surface fires that eliminates invading hardwoods without killing canopy pines.

**Dominant Species\* and Canopy Position**

CLMO2 Mid-Upper  
 ILGL Middle  
 ILCO Middle

**Structure Data (for upper layer lifeform)**

	Min	Max
Cover	25 %	100 %
Height	Tree Short 5-9m	Tree Medium 10-24m
Tree Size Class	Medium 9-21"DBH	

**Upper Layer Lifeform**

- Herbaceous
- Shrub
- Tree

Upper layer lifeform differs from dominant lifeform. Height and cover of dominant lifeform are:

**Fuel Model** 4

**Disturbances**

**Disturbances Modeled**

- Fire
- Insects/Disease
- Wind/Weather/Stress
- Native Grazing
- Competition
- Other:
- Other

**Fire Regime Group: 1**

- I: 0-35 year frequency, low and mixed severity
- II: 0-35 year frequency, replacement severity
- III: 35-200 year frequency, low and mixed severity
- IV: 35-200 year frequency, replacement severity
- V: 200+ year frequency, replacement severity

**Historical Fire Size (acres)**

Avg: 5000  
 Min: 50  
 Max: 50000

**Fire Intervals (FI)**

Fire interval is expressed in years for each fire severity class and for all types of fire combined (All Fires). Average FI is central tendency modeled. Minimum and maximum show the relative range of fire intervals, if known. Probability is the inverse of fire interval in years and is used in reference condition modeling. Percent of all fires is the percent of all fires in that severity class. All values are estimates and not precise.

**Sources of Fire Regime Data**

- Literature
- Local Data
- Expert Estimate

	Avg FI	Min FI	Max FI	Probability	Percent of All Fires
Replacement	165	10	500	0.00606	2
Mixed	500			0.002	1
Surface	3	1	10	0.33333	98
All Fires	3			0.34139	

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## **References**

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