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 2004-2005. For more information, please visit www.landfire.gov. Please direct questions to helpdesk@landfire.gov.

Potential Natural Vegetation Group (PNVG):

R9POPI **Pond Pine**

General Information

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Vegetation Type

Woodland

Dominant Species*

PISE CYRA
GOLA LYLU
MAVI
ARGI

General Model Sources

- [x] Literature
- [x] Local Data
- [x] Expert Estimate

LANDFIRE Mapping Zones

46 58
55 60
56

Rapid Assessment Model Zones

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

Geographic Range

Pond pine occurs in the Atlantic coastal plain from southern New Jersey south to central Florida, and west to southeast Alabama in the southeast coastal plain.

Biophysical Site Description

Pond pine is a widespread community type found on the outer parts of domed peatlands, on poorly drained interstream flats, and in peat-filled Carolina bays and shallow swales. It occurs on moderately fertile wetland soils in flat terrain and on shallow organic deposits or deeper peats with some input of mineral sediment (shallow Histosols or oligotrophic mineral soils). The soils series include Croatan (Typic Medisaprist), Murville (Typic Haplaquod), Lynn Haven (Typic Haplaquod), Torhunta (Typic Humaquept), Ponzer (Terric Medisaprist), Roper (Histic Humaquept), and Pungo (Typic Medisaprist).

Pond pine is a temporarily flooded or saturated palustrine wetland. The water table drops down to the level of the underlying mineral sediment during the dry season, allowing plants to root there. These areas may also receive some influx of water with nutrients from adjacent areas (Schafale & Weakley, 1990).

Vegetation Description

This PNVG includes an open to nearly closed canopy of pond pine (Pinus serotina), sometimes codominant with loblolly bay (Gordonia lasianthus), and lesser amounts of sweet-bay magnolia (Magnolia virginiana), red maple (Acer rubrum), loblolly pine (Pinus taeda), swamp bay (Persea palustris), and Atlantic white cedar (Chamaecyparis thyoides). The shrub layer is greater than five meters tall and very dense, except when recently burned. Common shrubs are titi (Cyrilla racemiflora), black titi (Cliftonia monophylla), fetterbush (Lyonia lucida), maleberry (Lyonia ligustrina), large gallberry (Ilex coriacea), gallberry (Ilex glabra), huckleberry (Gaylussacia frondosa), sweet pepperbush (Clethra alnifolia), and Persea palustris. Switchcane (Arundinaria gigantean) is often present and may even dominate the shrub layer. Greenbrier

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

(Smilax laurifolia) is usually common. Herbs are nearly absent under the dense woody cover, although occasional Virginia chain fern (Woodwardia virginica), net-vein chain fern (W. areolata), and Sphagnum clumps may occur.

Where pond pine woodlands borders wet pine flatwoods or upland communities, a distinct ecotone often occurs where the more frequent fire of the uplands interacts with the wetter soils of the pond pine woodland. This ecotone, while too small to be classified as a separate community, often resembles a pine savanna, and includes a high diversity of herbaceous plants frequently absent from both of the adjoining communities. This ecotone is the primary habitat for a number of rare plant species.

Disturbance Description

Historically the fire regime was characterized by frequent fires (3-5 year fire return interval) from lightening and anthropogenic ignitions. A combination of landscape fragmentation, fire suppression, changes in anthropogenic ignitions from presettlement (mostly in the last 60 years), the use of fire plows, and land use changes, have severely altered historically fire dependent vegetation from open cane breaks to closed pond pine forest. This is likely to turn into hardwood/ bay forest with lack of fire and other disturbances.

Wind, weather, and insect disturbances also impact this PNVG. The mean return interval for category 2-5 hurricanes is 10-30 years, and 20-50 years for category 3-5 hurricanes. Beetle outbreaks are probably more common in the current landscape than historically, because pine density has increased with reduced fire frequency, compared to presettlement conditions. However, cycles of beetle outbreaks are unknown to author.

Adjacency or Identification Concerns

Pond pine woodlands often grade into high pocosin, bay forest, non-riverine swamp forest, pine savanna, or wet pine flatwoods. It may occasionally grade to brackish or tidal freshwater marsh, estuarine fringe loblolly pine forest, or tidal cypress-gum swamp. Present day pond pine woodlands are distinguished from other peatland communities by the substantial Pinus serotina canopy. Mixed canopy stands are most easily classified by the predominant tree species into pond pine woodland, bay forest, peatland Atlantic white cedar forest, or non-riverine swamp forest. The affinities of Pinus taeda dominated stands are not known. The shrub layer is generally taller than that in high pocosin. Both the tall shrubs and the pine canopy may be absent for periods of years following severe or frequent fire, but remnant woody debris often remains to offer clues to past vegetation structure. Many sites that are called low pocosin or high pocosin because of the low stature of the shrubs are probably an early successional stage of pond pine woodland. (Schafale & Weakley, 1990).

Scale Description

Sources of Scale Data	☐ Literature	☑ Local Data	☑ Expert Estimate

This community was historically probably extensive (10 Mill acres of canebreak, Frost pers. Com). It grades into tall/low pocosin on deeper organic soils.

Issues/Problems

Pond pine woodlands may be hard to distinguish from adjacent communities if county soil maps are not used to achieve national consistency in mapping. Subsidence/sea level rise in the northern outer North Carolina coastal plain will threaten or reduce habitat to 10-15% of current levels by 2050 (see Poulter's thesis).

Model Evolution and Comments

Suggested reviewers include Dr. Robert Mickler who is working on vegetation map and fuel loads at Alligator River/ Dare Co. Bombing Range, NC (get his address from Margit), Cecil Frost; Mike Schafale; Jim Reardon-IFSL; Ben Poulter & Norm Christensen-Duke University; Dennis Stewart- Alligator River

NWR; Rick Meyrs-VADNH.

One change was made to the VDDT model as a result of the editorial and peer review. The starting age for Class B was reduced to match the time since disturbance transition from Class A to B of through an alternative succession pathway after 7 years. This resulted in no change to the Class percentages or fire frequencies in the model.

Succession Classes

Succession classes are the equivalent of "Vegetation Fuel Classes" as defined in the Interagency FRCC Guidebook (www.frcc.gov).

Class A 40 %

Early1 Open

Description

Class A is characterized by dense canebreak dominated by Arundinaria gigantea, with sparse to no Pinus serotina canopy. Some scattered Andropogon glomeratus may be mixed in with the cane. Hughes (1957), Biswell and Foster (1942), and some earlier writers described vast canebrakes on the wetlands of the coastal plain. This class has an average Fire Return Interval of 2-8 yrs based on Frost 1995.

Indicator Species* and Canopy Position

ARGI	Lower
PISE	Upper
ANGL	Lower

Upper Layer Lifeform

- ☐ Herbaceous
- ☐ Shrub
- ☑ Tree

Fuel Model 3

Structure Data (for upper layer lifeform)

	Min	Max
Cover	10 %	30 %
Height	Tree Medium 10-24m	Tree Medium 10-24m
Tree Size Class	Pole 5-9" DBH	

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

The dominant lifeform in this class is the cane which grows very dense and has a height up to 8 meters. This class has been reported in the literature but disappeared from the landscape by the 1980's, probably through a combination of land use conversion, fire suppression, a change in fire management applications, changes in use of the landscape, free range grazing by cattle and pigs combined with fire (eliminated cane est. 1700-1950's), and conversion of sites to plantations. The lack of micro topography would make this type fairly resistant to ground fire.

Class B 20 %

Mid1 Closed

Description

Class B includes a tall pond pine canopy with a shrubby understory (Cyrilla racemiflora, Lyonia lucida, Lyonia ligustrina, Ilex coriacea, Ilex glabra, Gaylussacia frondosa, Clethra alnifolia, and Persea palustris) and very little cane. An average Fire Return Interval of 10-25 yrs would maintain conditions (Frost 1995).

Indicator Species* and Canopy Position

PISE	Upper
CYRA	Lower
PEPA	Middle
CLAL	Lower

Upper Layer Lifeform

- ☐ Herbaceous
- ☐ Shrub
- ☑ Tree

Structure Data (for upper layer lifeform)

	Min	Max
Cover	50 %	80 %
Height	Tree Medium 10-24m	Tree Medium 10-24m
Tree Size Class	Pole 5-9" DBH	

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

The dominant lifeform in this class is the dense shrubby understory. The denser shrub canopy leads to more micro topography and increased evapotranspiration, making this class more susceptible to ground fire than class A.

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

Fuel Model 2

Class C 30 %

Mid1 Open

Description

Class C includes an open Pinus serotina canopy with Arundinaria gigantea often dominating shrubs such as Cyrilla racemiflora, Lyonia lucida, Lyonia ligustrina, Ilex coriacea, Ilex glabra, Gaylussacia frondosa, Clethra alnifolia, and Persea palustris. An average Fire Return Interval of 6-12 yrs. is expected to maintain conditions (Frost 1995).

Indicator Species* and Canopy Position

ARGI	Lower
PISE	Upper
CYRA	Low-Mid
PEPA	Middle

Upper Layer Lifeform

- ☐ Herbaceous
- ☐ Shrub
- ☑ Tree

Fuel Model 7

Structure Data (for upper layer lifeform)

	Min	Max
Cover	30 %	50 %
Height	Tree Medium 10-24m	Tree Medium 10-24m
Tree Size Class	Medium 9-21"DBH	

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

The dominant lifeform in this class is the cane and shrubby understory. This class was last observed by Frost in the 1980's in Pamlico Co., NC (Frost, pers com. 2005)

Class D 5 %

Late1 Open

Description

Class D is characterized by a fairly open to nearly closed canopy of Pinus serotina, sometimes codominant with Gordonia lasianthus, with lesser amounts of Magnolia virginiana, Acer rubrum, Pinus taeda, Persea palustris, and Chamaecyparis thyoides. The shrub layer is tall (> 5m) and very dense except when recently burned. Common shrubs are Cyrilla racemiflora, Lyonia lucida, Lyonia ligustrina, Ilex coriacea, Ilex glabra, Gaylussacia frondosa, Clethra alnifolia, and Persea palustris. Arundinaria gigantea remains present in the shrub layer. Smilax laurifolia is usually common. Herbs are generally nearly absent under the dense woody cover, although occasional Woodwardia virginica, W. areolata, and Sphagnum clumps may occur.

Indicator Species* and Canopy Position

PISE	Upper
MAVI	Mid-Upper
GOLA	Middle
CYRA	Lower

Upper Layer Lifeform

- ☐ Herbaceous
- ☐ Shrub
- ☑ Tree

Fuel Model 7

Structure Data (for upper layer lifeform)

	Min	Max
Cover	30 %	50 %
Height	Tree Medium 10-24m	Tree Medium 10-24m
Tree Size Class	Medium 9-21"DBH	

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

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

The assumption is that a Fire Return Interval of 12-20 yrs would maintain this class. It will require moderate duff/peat fires in pockets to get back to class C, fires in more extensive pockets to get to A. To get from D to A assumes that Arundinaria rhizomes respond faster to opening than resprouting shrubs (unknown). Andropogon glomeratus may also assume the role of Arundianaria in the early stages of recovery.

This class is still observed in the landscape since it is maintained with a reduced fire frequency, characteristic of what has occurred since the 1950's.

Class E 5%

Late1 Closed

Description

In Class E, pond pine may be dominant or co-dominant in a canopy with Acer rubrum, Magnolia virginiana, Gordonia lasianthus, and occasionally Chamaecyparis thyoides with a shrubby understory, which is also described as bay forest/Atlantic white cedar forest (Schafale & Weakley). This class is more fire resistant than the other classes, and probably would burn only under dry, windy conditions. Replacement fires (peat fire) would lead back to class A. Since Arundinaria is absent or very sparse in class E, Andropogon glomeratus may seed in and take the place of Arundinaria until Arundinaria recolonizes patches opened by fire. Pinus serotina rarely survives for more than 15-180 yrs. It does not reproduce in shade. Without fire it will

Indicator Species* and Canopy Position

PISE	Upper
MAVI	Mid-Upper
GOLA	Mid-Upper
CHTH	Upper

Upper Layer Lifeform

- ☐ Herbaceous
- ☐ Shrub
- ☑ Tree

Fuel Model 7/9

Structure Data (for upper layer lifeform)

	Min	Max
Cover	70 %	90 %
Height	Tree Medium 10-24m	Tree Tall 25-49m
Tree Size Class	Medium 9-21"DBH	

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

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disappear from the canopy and be replaced by hardwoods. Mixed fire regimes would lead to Class D if moderate canopy openings are created, and to Class C if mostly the understory shrubs and mid-story trees are topkilled.

This is likely to become the most prevalent class in the landscape with lack of fire.

Disturbances

Non-Fire Disturbances Modeled

- [x] Insects/Disease
- [x] Wind/Weather/Stress
- [ ] Native Grazing
- [ ] Competition
- [ ] Other:
- [ ] Other:

Historical Fire Size (acres)

Avg: 80000
Min: 4000
Max: 120000

Sources of Fire Regime Data

- [x] Literature
- [ ] Local Data
- [x] Expert Estimate

Fire Regime Group: **2**

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

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 the 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.

	Avg FI	*Min FI*	*Max FI*	*Probability*	*Percent of All Fires*
Replacement	7	5	500	0.14286	64
Mixed	18	8	150	0.05556	25
Surface	43	2	50	0.02326	10
All Fires	5			0.22167	

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