DRAFT

Fire Regime Condition Class (FRCC) Interagency Handbook Reference Conditions

Modeler: Mike Schafale **Date:** **PNVG Code: PCSN**

Potential Natural Vegetation Group: Deep Peat Pocosins

Geographic Area: Southeastern Virginia to South Carolina

Description: Shrubby vegetation on peat soils generally 1-3 meters deep. Pinus serotina is present as sparse, stunted trees, forming an important structural component but not a true canopy. The shrub layer, consisting largely of Lyonia lucida, Ilex glabra, Cyrilla racemiflora, Zenobia pulverulenta, and Chamaedaphne calyculata, is dense. Shrub height and tree height and density vary with peat depth as well as fire history, with the deepest peats incapable of supporting shrubs over 1 meter tall (Low Pocosin) while shallower peats may have shrubs 2-3 meters tall (High Pocosin). Small (usually 2-5 meter) openings dominated by mosses, ferns, sedges, or forbs may be present, as may small clumps of taller shrubs. Otherwise the vegetation may be uniform over areas of tens to hundreds or even thousands of acres.

Deep Peat Pocosins may be distinguished from Pond Pine Woodland by having a more stunted and less well-developed tree layer, though the shrub component may be similar. The most extensive examples are on large domed peatlands in the outer Coastal Plain, but medium to small patches occur in peat-filled Carolina bays and other depressions.

This reference condition model differs substantially from most models. [See explanation below.]

Extreme site conditions make pocosin vegetation relatively resilient to conversion to atypical states. Logging of trees, in rare cases where it is economically viable, creates a state resembling D. Intensive artificial drainage, bedding, and pine plantation establishment , if successful, create conditions that differ somewhat from any of the reference condition state. Pine plantations without intensive site alteration are generally unsuccessful. Successful fire exclusion for long periods leads to stagnation in a state resembling D or E, with lost productivity and increased dead fuels but little superficial change in structure.

Fire Regime Description: Fires are generally intense and extensive, killing all above-ground shrub parts and often trees as well. These are called “mosaic fires” here to distinguish them from peat fires. In some intense fires, peat may ignite locally, burning for weeks to produce holes that take years to recover. Unsuppressed fires can be expected to cover hundreds to thousands of acres, though it is possible more natural fires would create a smaller patch size as they encountered other recently burned patches. Most of the area of these fires would be top-killing “mosaic” fires, with small spots in fires during dry periods creating peat burns in patches well less than one acre.

Vegetation Type and Structure

Class*	Percent of Landscape	Description
A: peat fire hole	3	Depressions caused by peat fires, filled with water or herbs
B: post-fire without tree survival	24	Bare ground or low shrub sprouts with few or no trees or only tree seedlings.
C: post-fire with tree survival	6	Bare ground, shrub sprouts, or shrub/herb mosaic, with open tree canopy.

D: mature shrub seral treeless	1	Dense shrub layer at maximum height, with few or no trees present.
E: mature shrub with trees	66	Dense shrub layer at maximum height, with open canopy of stunted trees (including trees with recent epicormic sprouts).
Total	100	

*Formal codes for classes A-E are: AESP, BMSC, CMSO, DLSO, and ELSC, respectively.

Fire Frequency and Severity

Fire Severity	Fire Frequency (yrs)	Probability	Percent, All Fires	Description
Peat Fire ("Replacement Fire")	100+ years	.001	1%	Small patches in more extensive burns where peat is ignited, killing vegetation and leaving a hole.
Surface Replacement Fire ("Mosaic Fire")	12 years	.081	99%	Intense surface fires that top-kill shrubs and may kill trees.
All Fire Frequency*	12 years	.082	100	

*All Fire Probability = sum of replacement fire and non-replacement fire probabilities. All Fire Frequency = inverse of all fire probability (previous calculation).

Model assumptions:
The herb-dominated openings are created by peat fires (widely believed but difficult to prove.)

Taller shrub patches in low pocosins are a result of factors other than fire, and are implicitly included in other model states. They are not equivalent to state E. (The origin of them is not known, but they burn when the surrounding areas burn and are not the result of escaping fire.)

There are three crucial strata that may be affected differently by fire and must be accounted for in the model – trees, shrub layer, and the peat itself. The 5 box model is a serious simplification of dynamics.

Areas following peat burns are not very flammable until much time has passed. Such fires do not re-burn the peat but only burn shrubs and herbs, so the effect is not a full reset of state A but only a setback of a few years.

Trees are more susceptible to fire mortality in the younger range of state E than older. This is not accounted for except in the average probability of tree mortality (probability of transition from E to B vs. to C) in mosaic fires.

Explanation/justification of non-standard classes and model parameters:
The model needs to track the state of both trees and shrub layer. The true contiguous canopy that determines competition levels and fire behavior is the shrub layer, so the stand development terminology is applied to it. The open vs. closed terminology is applied to the presence of trees.

Essentially, there are 3 early successional pathways that start at age 0 after fire: rare peat burns (A), uncommon burns that kill trees and top-kill shrubs (B), and common burns that top-kill shrubs but not trees (C). Shrub layers recover rapidly by sprouting but peat takes a long time to recover.

There are 2 late successional pathways, with trees (E) or without (D). Trees may have survived the previous fire or may have regenerated after the previous fire, and these are not distinguished. Age of trees is not really tracked -- the tree canopy is sparse enough to offer little competition, tree size and cover varies more with peat depth than age, and the loss of branches and epicormic sprouting after fire make crown size correlate poorly with age. (But greater fire-resistance in older trees is not accounted for in this model, which averages probability of tree mortality across the age range of the stage).

"Replacement fire" here is used to mean rare peat fire patches.

"Mosaic fire" here is used to mean common high-intensity fires that top-kill shrubs and may or may not kill trees. Thus, "mosaic fires" are generally replacement fires for the vegetation.

Following a "mosaic fire" that kills trees (state B), trees may regenerate from seed or not, which must occur in the first few years after fire before the shrub layer closes. The typical successional pathway is for tree regeneration to occur (to E), so this is made the default. Compnoseedmtc is used to indicate regeneration failure, leading the alternative pathway in which shrub competition prevents future tree regeneration until another fire (D).

The prevailing dynamic is a fire-driven cyclic succession from B or C to E. Repeated fires may make possible lower intensity fires that would maintain the vegetation in a state more like C than E.

Tree regeneration is assumed to be possible with time in peat burn patches, so all succession from A is assumed to follow the path to E. Trees are likely to come in fairly late, so not to be that old when they enter state E.

References

Brown, James K.; Smith, Jane Kapler, eds. 2000. Wildland fire in ecosystems: effects of fire on flora. Gen. Tech. Rep. RMRS-GTR-42-vol. 2. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 257 p.

Frost, Cecil C. 1995. Presettlement fire regimes in southeastern marshes, peatlands and swamps. Pages 39-60 *in* Susan I. Cerulean and R. Todd Engstrom, eds. Fire in wetlands: a management perspective. Proc. Tall Timbers Fire Ecol. Conf. No. 19.

Schmidt, Kirsten M, Menakis, James P., Hardy, Colin C., Hann, Wendel J., Bunnell, David L. 2002. Development of coarse-scale spatial data for wildland fire and fuel management. Gen.

Tech. Rep. RMRS-GTR-87. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 41 p. + CD.

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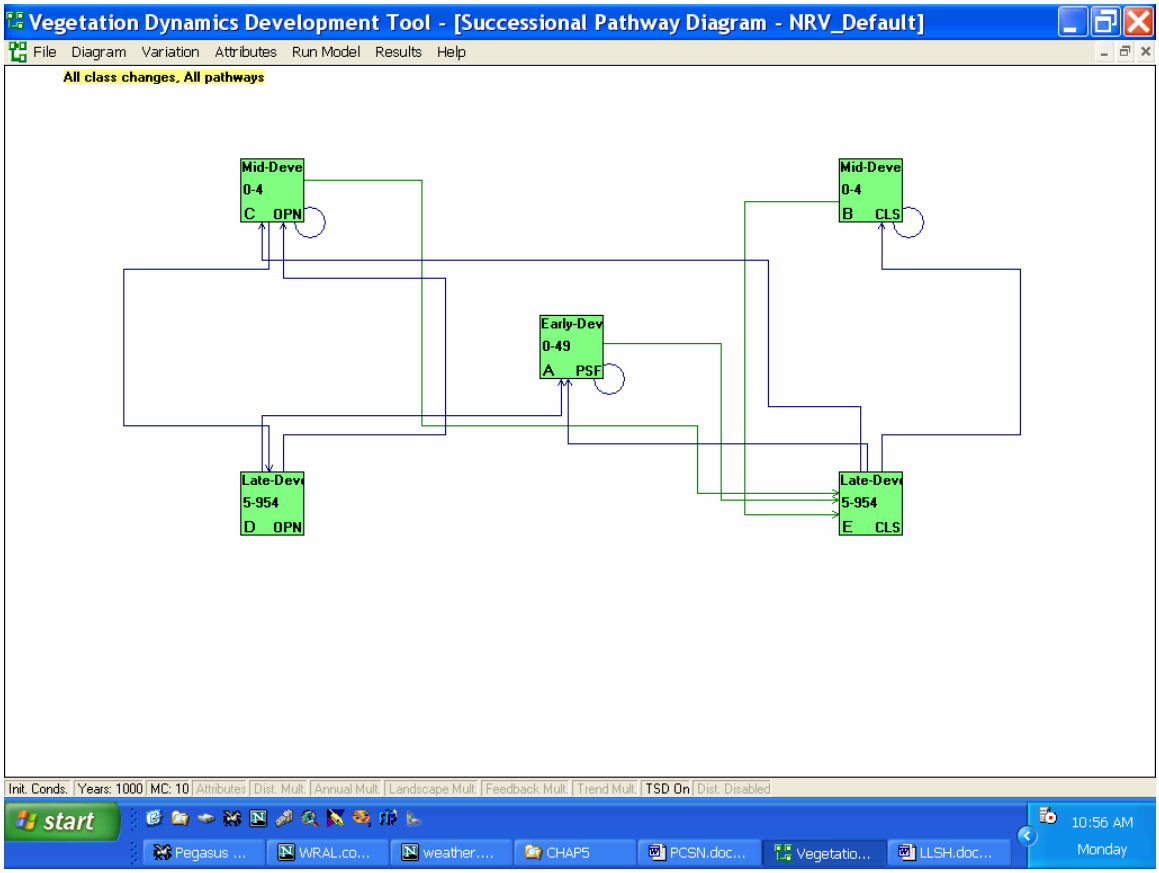
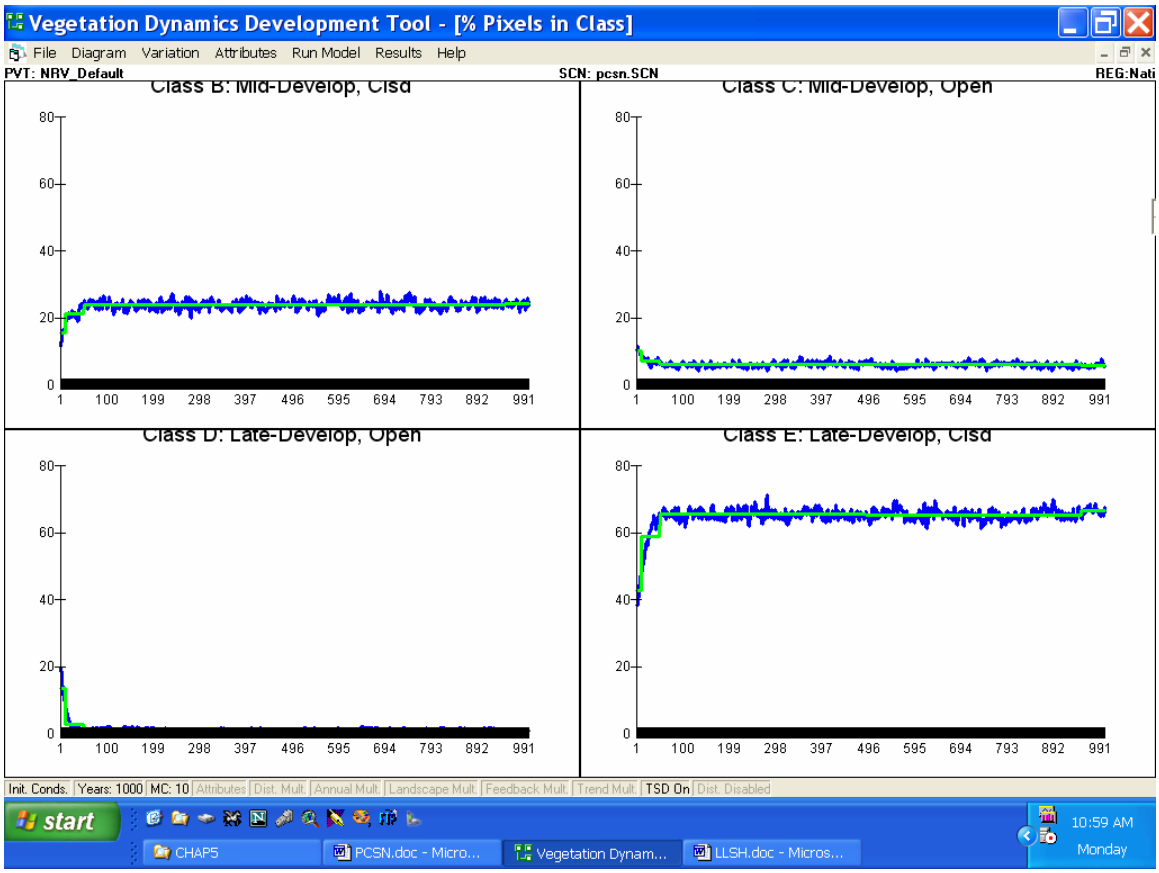
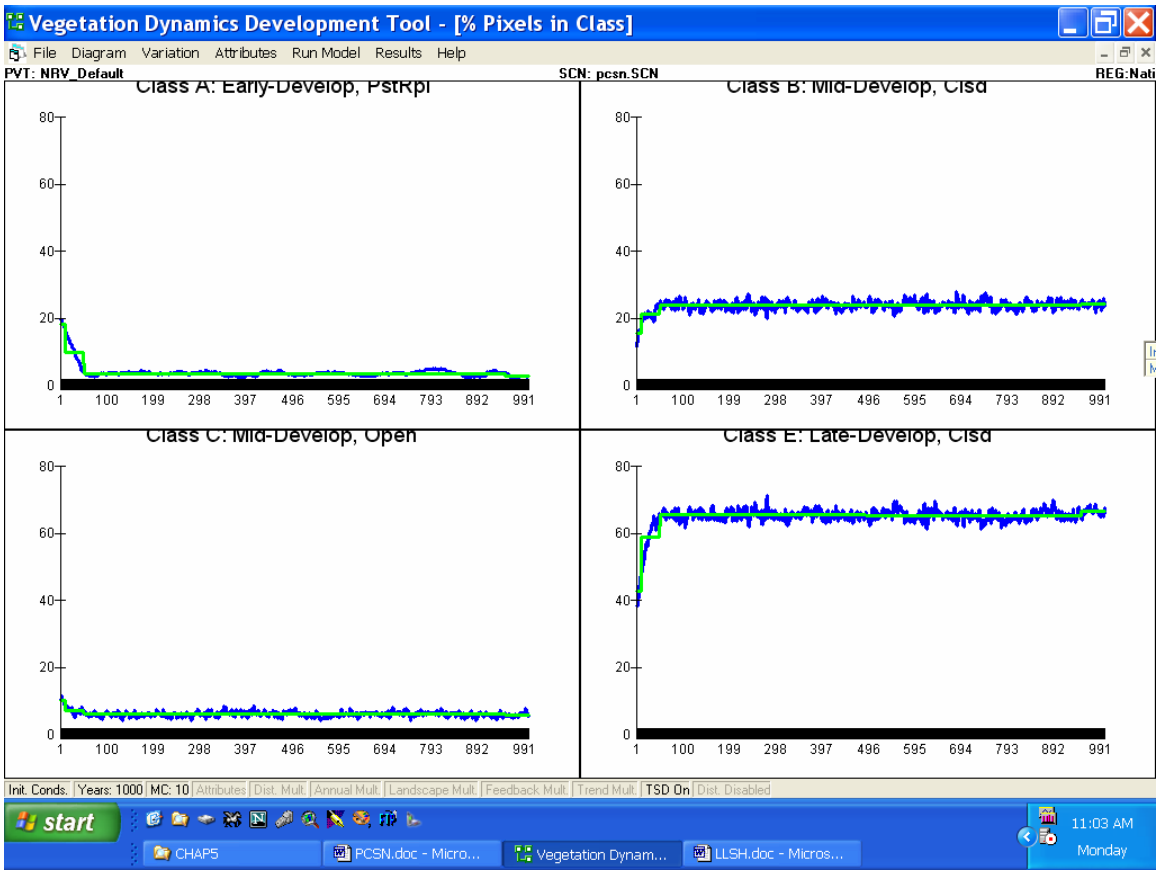
PERSONAL COMMUNICATION (if applicable):

VDDT File Documentation
Include screen captures (print-screens) from any of the VDDT graphs that were used to develop **Note the non-standard definitions of the classes. Mid-development is early post-fire for non-peat fires. Open is without trees, closed is the more typical natural state with sparse to open tree canopy.**
reference conditions.



Note that this model is slow to equilibrate from an even initial distribution of classes, so output is for a 1000 year time period. Note the non-standard definitions of the classes. "Mid-development" is early post-fire for non-peat fires. Open is without trees, "closed" is the more typical natural state with sparse to open tree canopy.

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Class B: Mid-Develop, Clsd
Class C: Mid-Develop, Open
Class E: Late-Develop, Clsd
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Note the nonstandard definitions of fire. Replacement fire is rare peat fires. Mosaic fire is common shrub-replacing fires.