Fire Regime Condition Class (FRCC) Interagency Handbook
Reference Conditions

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PNVG Code: MABA

Potential Natural Vegetation Group: Maple-Basswood

Geographic Area: This forest type extends from northern Minnesota and Wisconsin southward into Iowa and Illinois, and from the forest-prairie margin eastward to Lake Michigan. This forest type is fringed by northern hardwoods to the north and prairies to the west. The western range of beech forms the eastern boundary, whereas its southern margin roughly parallels the maximum extent of past glaciation. The “Big Woods” of southeastern Minnesota is representative of this forest type (Grimm 1984).

Description: Following retreat of the glaciers, most of the present Big Woods became prairie between 9000 and 6000 years before present (Webb et al. 1993). Oak woodland began invading the prairie about 5000 years ago, becoming fully established 2400 years ago (Grimm 1981). Oak woodland persisted until 300 years ago, when elm, basswood, and sugar maple rapidly expanded and became dominant. The changes from prairie to oak woodland, and from oak woodland to 'bigwoods' must have resulted from reductions in fire frequency, which were probably caused by increased precipitation and possibly decreased temperatures (ibid).

Historically, elm dominated the overstory within the maple-beech component (Grimm 1981). However this species has been largely eliminated from this system due to Dutch elm disease. The elm-basswood-maple forests occurred on rich, mesic sites that were protected from fire by the oak-aspen buffer lying between this community and the prairie, as well as natural fuel breaks.

Fire Regime Description: Fire regime V dominated by high intensity, low frequency fires that occur at about a 1,000 year interval. Although low intensity fires are more frequent (average 500 year interval), they do little more that prolong the time it takes to develop mature, fire resistant stands. Composed of fire-sensitive species, historically this forest type was not disturbed by fire except during periods following catastrophic wind events or extreme drought. Grimm (1984) states “The fire regimes of deciduous forests, such as bigwoods, are much different from the commonly perceived model of fire regime, in which fuels and fire danger increase with time and in which intense crown fires cause great destruction of the forest.” In the Great Lakes region, this model is appropriate for some of the northern coniferous forests (Heinselman 1983, Ahlgren 1974). However, in the southern deciduous forests, decomposition of potential fuels is rapid, and is particularly rapid on base-rich soils (Bormann and Likens 1979), such as those of the Big Woods. Because of the dense shade, the cover of herbs and shrubs is sparse. Thus little fuel exists at the ground level; tree trunks are not very flammable; and the open tree crowns do not carry fire very well. Moreover, low solar radiation, high humidity, and low wind speeds prolong the moisture retention of ground-level fuels (Kucera 1952), thereby inhibiting the ignition and spread of fire. These forests are sometimes referred to as the “asbestos forests” because of their fireproof character (Vogl 1967). Ordinarily, only the leaf litter ever reaches a flammable state, and only patchy creeping ground fires occur (Hall and Ingall 1911, Niering et al. 1970, Barden and Woods 1973).”

Two primary disturbance factors are used to model this system. Catastrophic windthrow affects mature stands and occurs on approximately 600 year rotation. Replacement fire occurs primarily in young and windthrown stands and occurs on approximately a 1,000 year rotation. In addition surface fires occur in young stands < 100 years of age which contain a significant component of

oak. The disturbance probabilities by class applied in the model are contained in the VDDT documentation section.

Vegetation Type and Structure

Class*	Percent of Landscape	Description
A: Early seral all	5	Early-successional aspen, white birch, oak and openlands (< 60 yrs).
B: Mid seral 1 open	10	Mid-succession maturing forests (61-100 yrs)
C: Mid seral closed	10	Late-successional maturing forests (101-150 yrs)
D: Late seral closed	75	Old late seral forests (> 150 yrs)
Total	100	

*Formal codes for classes A-E are: AE1A, BM1O, CM1C, and DL1C, respectively.

Fire Frequency and Severity

Fire Severity	Fire Frequency (yrs)	Probability	Percent, All Fires	Description
Replacement Fire	1000	.001	35	Occurs primarily in windthown slash and young stands < 100 years old.
Non-Replacement Fire	500	.002	65	Occurs in stands < 100 yrs with significant oak component
All Fire Frequency*	333	.003	100	

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

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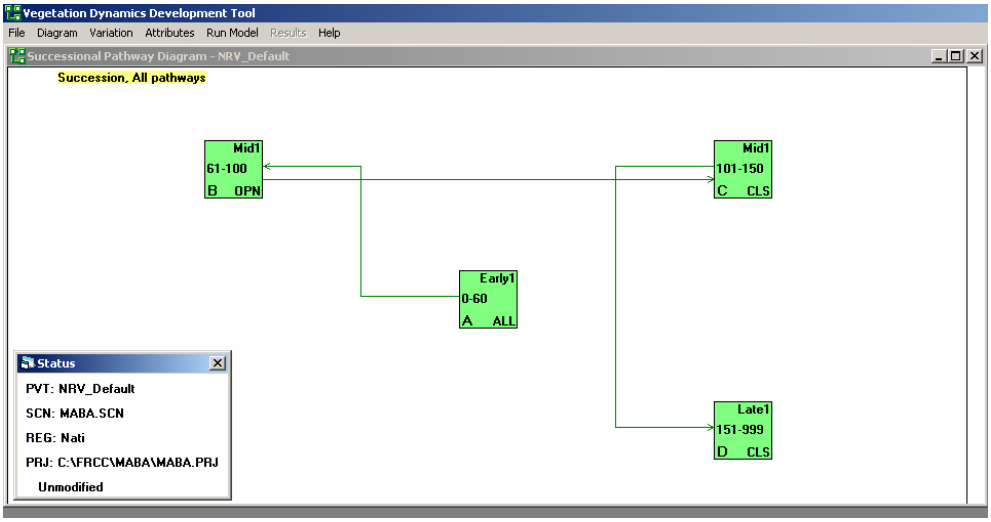
VDDT File Documentation: Model is located in C:\FRCC\MABA. Text files must be located in C:\FRCC for project file to work. Diagram shows succession only.

Model structure



Disturbance probabilities by class: VDDT model MABA

Class	To	Agent	Prob	TSD	Freq/ FRI	Rel Age
A	A	Surface fire	.016	0	62	0
A	A	Replacement fire	.004	0	250	-60
B	B	Surface fire	.014	0	71	0
B	A	Replacement fire	.006	0	166	0
C	A	Replacement fire	.0002	0	5000	0
C	B	Wind/weather/stress	.002	0	500	0
D	A	Replacement fire	.0002	0	5000	0
D	B	Wind/weather/stress	.002	0	500	0

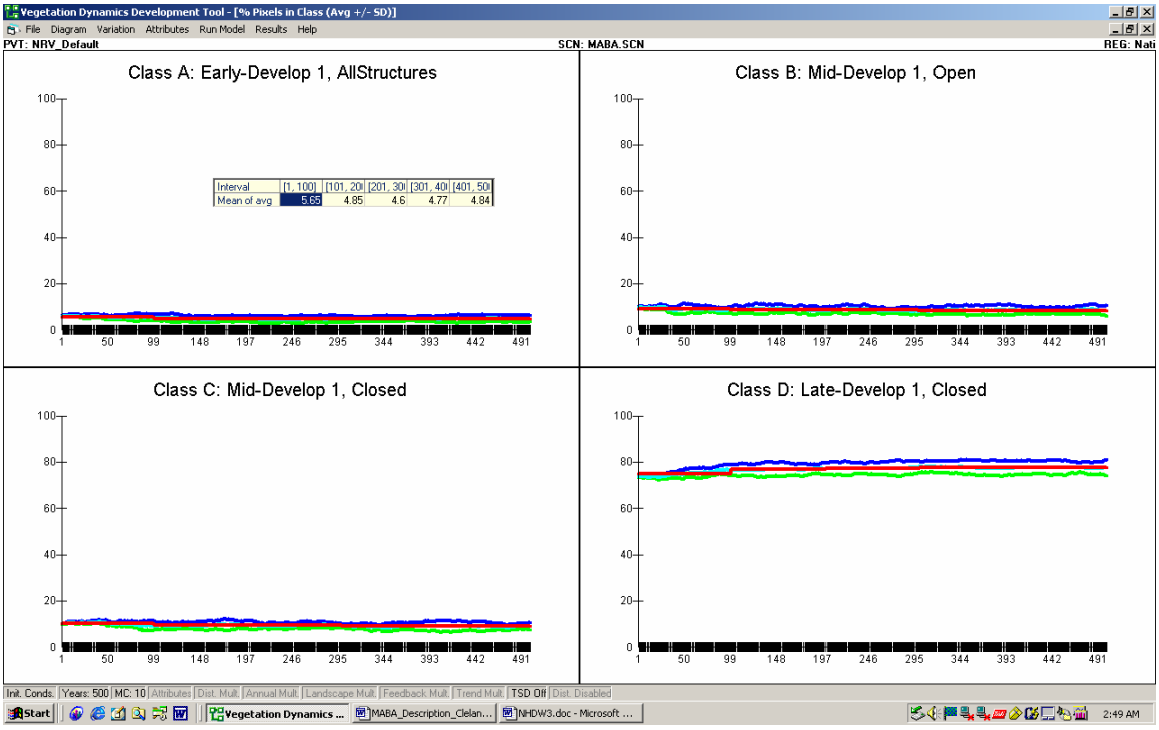
Class A – early seral aspen, birch, oak < 60 yrs: A succeeds to mid age stands (Class B). Burn frequency of 50 years due to presence of oak and openings (20 % replacement; 80 % surface)

Class B - Mid-succession maturing forests (61-100 yrs): Succeeds to class C. Windthrow in older classes returns vegetation to this class. Replacement fires (mostly in slash) result in early seral. Surface fires associated with oak component.

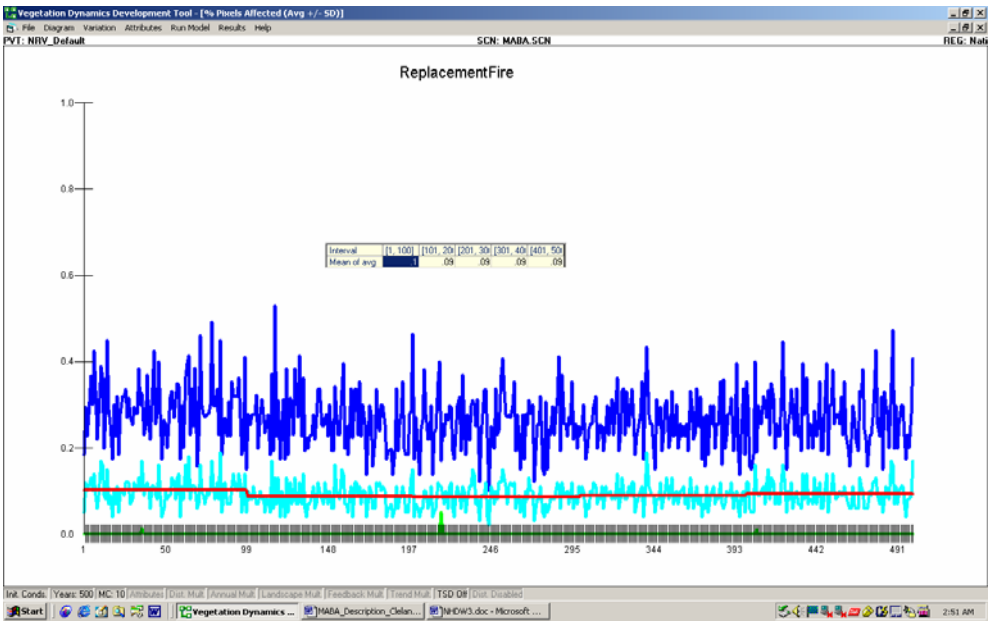
Class C – Late-successional maturing forests (101-150 yrs): Succeeds to class D. Windthrow exceeds fire probabilities by a factor of 10.

Class D – Old late seral forests (> 150 yrs): End point of succession. Small gap disturbances predominate to maintain a high proportion of the acreage in this class.

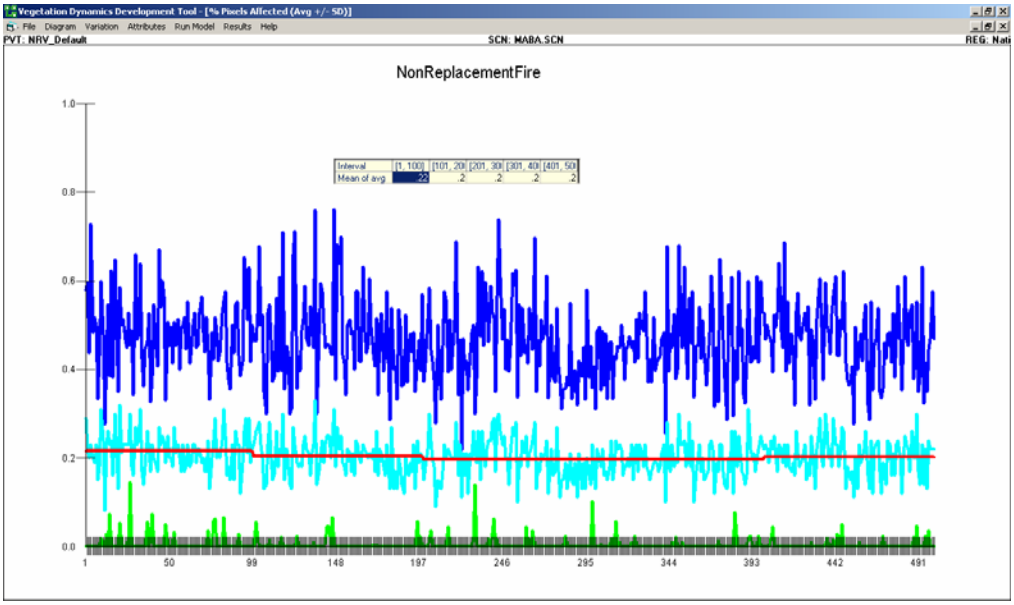
Results: Per cent of area by class for 500 years. Average values + or - 2 SD's



Percent of area affected by replacement fires per year (0.09 %/yr corresponds to a 1100 fire frequency). Replacement fires occur primarily in young stands < 20 years of age and stands that have been windthrown.



Percent of area affected by non-replacement fires per year (0.20 %/yr corresponds to a 500 fire frequency). Non-replacing surface fires occur only in the early seral classes (A and B) that contain a significant composition of oak.



Per cent of area affected by stand replacing windthrow per year. The overall windthrow rotation is approximately 600 years. Windthrow occurs at a rate of 0.2 % per year in mature mid and late seral closed stands.