Fire Regime Condition Class (FRCC) Interagency Handbook
Reference Conditions

Modeler: Ron Masters **Date:** 11-12-04 **PNVG Code:** PRAR5

Potential Natural Vegetation Group: Bluestem Prairie, mixed and tallgrass prairie

Geographic Area: Central US from North Dakota and Minnesota south through parts of Kansas and Oklahoma, to the east bordering and mingling with Oak-Hickory forest.

Description: Tallgrass prairie. Dominated by big bluestem (*Andropogon gerardii*), little bluestem (*Schizachyrium scoparium*), Indiangrass (*Sorghastrum nutans*) and switchgrass (*Panicum virgatum*). Secondary species vary in importance regionally depending on topography and soil moisture relations and include sideoats grama (*Bouteloua curtipendula*), needlegrass (*Achnatherum spartea*), Junegrass (*Koeleria macrantha*), buffalo grass (*Buchloe dactyloides*), and blue grama (*Bouteloua gracilis*). At the southwestern extent of this type sideoats grama (*Bouteloua curtipendula*), buffalo grass (*Buchloe dactyloides*), and blue grama (*Bouteloua gracilis*) increase in percent cover. Western wheatgrass (*Pascopyrum smithii*), porcupine grass (*Hesperostipa spartea)* and various *Nassella* and *Hesperostipa* become more important in the northern half of this type. Several short stature grasses such as *Dicanthelium* spp. and *Carex* spp. are also important throughout the type, particularly following heavy grazing. Conspicuous perennial forbs include the genera *Helianthus*, *Soladago*, *Liatris*, *Dalea*, *Viola*, and *Antennaria*. Shrubs that are important include *Rosa* spp., *Salix*, *Symphoricarpos*, *Rhus* and in the southern part of the region *Juniperus virginiana* is rapidly increasing in the absence of fire. Bison disturbance was historically an important disturbance that increased heterogeneity of patches on the landscape. A problem with much of the literature on fire in prairies, and therefore a caution, is that it does not include interaction with herbivory (Engle and Bidwell 2001).

Fire Regime Description: Fire regime group II, with frequent surface fires, both lightning and anthropogenic in origin (Higgins 1986). Natural fire was possible during the dormant season through spring and during the late-growing season (Bragg 1982, Higgins 1986, Engle and Bidwell 2001) and dependant on the availability of dry fine fuels sufficient to carry a fire. Historic accounts from the 1800's often depict very large landscape scale burns where an entire landscape was described as burning (Irving 1935, Jackson 1965). However it must be noted that these accounts occurred following aggressive market hunting and depletion of bison herds and were not characteristic of reference conditions. Bison grazing affected fire patterns and thus the landscape patterns in tallgrass prairie (Risser 1990). Bison and other grazing/browsing wildlife species preferentially seek out the new growth of recently burned areas affecting patch composition (e.g., Coppedge and Shaw 1998, Jackson 1965, Risser 1990, Steuter 1986, Fuhlendorf and Engle 2004). The large burn accounts are in contrast to the patch burn model where small burns are preferentially grazed by bison. Using the fire/bison interaction model first proposed by Steuter (1986) recent modifications propose that anywhere from 1/6 to 1/3 of a 20,000 acre (8,094 hectares) landscape likely burned (Fuhlendorf and Engle 2004). This caused earlier green-up and increased nutrient content of native grasses. Typically following green-up, fire is followed by intensive bison grazing pressure to the point that structural classes shifted over the landscape in response to an interaction between bison grazing pressure and fire (Steuter 1986; Fuhlendorf and Engle 2001, 2004). Heavily grazed and trampled areas would not burn in the next year to three years creating a one-way closed path. Following this type disturbance the patches are dominated with forbs and will not burn in the succeeding dormant and growing season because of lack of fuel. Whereas previous years unburned post-grazing re-growth would be the next patch to burn. Bison grazing drove the fire regime or at the least strongly influenced fire return intervals. Fire occurrence in turn influenced bison grazing distribution. This model depicts a landscape composed of a continuously shifting mosaic of patches with a short time period of duration. The small patch burn scenario is essential to perpetuate suitable lek sites and

brood rearing habitat for prairie chickens (*Tympanicus cupido*) in the number accounted for presettlement (Sparks and Masters 1996).

Vegetation Type and Structure

Class*	Percent of Landscape	Description
A: post replacement	17	Post fire community that is short duration (weeks to months-depending on time of burning) before transitioning into one of the other community stages
B: mid-seral closed	36	Mixed forb and grass community either somewhat recovered from bison grazing, or continuing post burn development
C: mid- seral open	15	Forb dominated site with sparse bunchgrass clumps, derived from heavy bison grazing and trampling pressure, wallowing and horning
D: late- seral closed	32	Tallgrass dominated, tillering and overall plant vigor reduced by mulching effect from accumulation of ungrazed, unburned plant litter, over extended periods woody encroachment may occur.
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
Replacement Fire	5.6	0.1776	96	Surface fire during dormant to early growing season and late growing to dormant season fire
Non-Replacement Fire	154	0.0065	4	Mid-growing season fires that burn a given patch incompletely
All Fire Frequency*	5.4	0.1841	100	

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

References

Adams, D. E., and R. C. Anderson. 1978. The response of a central Oklahoma grassland to burning. Southwestern Naturalist 23:623-632.

Adams, D. E., R. C. Anderson, and S. L. Collins. 1982. Differential response of woody and herbaceous species to summer and winter burning in an Oklahoma grassland. Southwestern Naturalist 27:55-61.

Anderson, K. L. 1964. Burning Flinthills bluestem ranges. Proc. Tall Timbers Fire Ecology Conference 3:89-103.

Anderson, K. L. 1965. Time of burning as it affects soil moisture in upland bluestem prairie in the Flint Hills. Journal of Range Management 18:311-316.

Anderson, K. L., C. E. Owensby, and E. F. Smith. 1970. Burning bluestem range. Journal of Range Management 23:81-42.

Anderson, R. C. 1972. Prairie history, management and restoration in southern Illinois. Pages 15-22 in J. Zimmerman, ed., Proc. Second Midwest Prairie Conference Madison, WI 242 pp.

Anderson, R. C. 1990. The historic role of fire in the North American grassland. *in* S. L. Collins and L. L. Wallace, eds. Fire in North American tallgrass prairies. University of Oklahoma Press, Norman. 175p.

Anderson, R. C. and L. E. Brown. 1986. Stability and instability in plant communities following fire. American Journal of Botany 73:364-368.

Axelrod, D. I. 1985. Rise of the grassland biome, central North America. Botanical Review 51:163-201.

Bailey, D.W., J.E. Gross, A.L. Emilio, L.R. Rittenhouse, M.B. Coughenour, D.M. Swift, and P.L. Sims. 1996. Mechanisms that result in large herbivore grazing distribution patterns. Journal of Range Management 49(5):386-400.

Bidwell, T. G. 1988. Fire behavior and fire effects on tallgrass prairie. Ph.D. Thesis, Okla. State Univ., Stillwater. 60p.

Biondini, M.E., and A.A. Steuter. 1998. Spatial distribution of bison grazing as a function of fire and range site. Pages 71-80. L. Irby, and J. Knight (eds.). In: International Symposium on Bison Ecology and Management in North America, Montana State University, Bozeman, MT.

Biondini, M.E., A.A. Steuter, and R.G. Hamilton. 1999. Bison use of fire-managed remnant prairies. Journal of Range Management 52(5):454-461.

Box, T. W., and R. S. White. 1969. Fall and winter burning of south Texas brush ranges. Journal of Range Management 22:373-376.

Bragg, T. B. 1982. Seasonal variations in fuel and fuel consumption by fires in a bluestem prairie. Ecology 63:7-11.

Bragg, T. B., and L. C. Hulbert. 1976. Woody plant invasion of unburned Kansas bluestem prairie. Journal of Range Management 29:19-24.

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.

Bruner, W. E. 1931. The vegetation of Oklahoma. Ecological Monographs 1:99-188.

Christisen, D. M. 1985. The greater prairie chicken and Missouri's land-use patterns. Terr. Series No. 15. Missouri Dept. Cons., Jefferson City. 51p.

Clements, F. E. 1949. Dynamics of vegetation. Selections from the writings of Clements by B. W. Allred and Edith S. Clements. H. W. Wilson Co., New York. 296p.

Collins, S. L. 1990. Introduction: fire as a natural disturbance in tallgrass prairie ecosystems. *in* S. L. Collins and L. L. Wallace, eds. Fire in North American tallgrass prairies. University of Oklahoma Press, Norman. 175p.

Coppedge, B.R., D.M. Engle, C.S. Toepfer, and J.H. Shaw. 1998. Effects of seasonal fire, bison grazing and climatic variation on tallgrass prairie vegetation. Plant Ecology 139:235-246.

Coppedge, B.R., S.D. Fuhlendorf, D.M. Engle, and B.J. Carter. 1999. Grassland soil depressions: relict bison wallows or inherent landscape heterogeneity? American Midland Naturalist 142(2):382-392.

Coppedge, B.R., Jr.D.M. Leslie, and J.H. Shaw. 1998. Botanical composition of bison diets on tallgrass prairie in Oklahoma. Journal of Range Management 51(4):379-382.

Coppedge, B.R., and J.H. Shaw. 1997. Effects of horning and rubbing behavior by bison (*Bison bison*) on woody vegetation in a tallgrass prairie landscape. American Midland Naturalist 138(1):189-196.

Coppedge, B.R., and J.H. Shaw. 1998. Bison grazing patterns on seasonally burned tallgrass prairie. Journal of Range Management 51(3):258-264.

Coppedge, B.R., and J.H. Shaw. 1998. Diets of bison social groups on Tallgrass Prairie in Oklahoma. The Prairie Naturalist 30(1):29-36.

Coppedge, B.R., and J.H. Shaw. 2000. American bison *Bison bison* wallowing behavior and wallow formation on tallgrass prairie. Acta Theriologica 45(1):103-110.

Coppock, D.L., and J.K. Detling. 1986. Alteration of bison and black-tailed prairie dog grazing interaction by prescribed burning. Journal of Wildlife Management 50(3):452-455.

Coppock, D.L., J.E. Ellis, J.K. Detling, and M.I. Dyer. 1983. Plant-herbivore interactions in a North American mixed-grass prairie. Oecologia 56:10-15.

Daubenmire, R. 1968. Ecology of fire in grasslands. Adv. Ecol. Research 5:209-266.

de Pourtales, C. (G. F.Spaulding, ed.) 1832. On The Western Tour with Washington Irving; The Journal and Letters of Count de Pourtales. University of Oklahoma Press. Norman OK.

Duck, L. G., and J. B. Fletcher. 1943. A game type map of Oklahoma. Okla. Game and Fish Comm., Oklahoma City. 1p.

Ehenreich, J. H. 1959. Effects of burning and clipping on native prairie in Iowa. Journal of Range Management 12:133-137.
Engle, D.M., and T.G. Bidwell. 2001. Viewpoint: The response of Central North American prairies to seasonal fire. Journal of Range Management 54:2-10.

Engle, D.M., and P.M. Bultsma. 1984. Burning of northern mixed prairie during drought. Journal of Range Management 37:398-401.

Engle, D. M., R. L. Mitchell, and R. L. Stevens. 1998. Growing-season fire effects on forage production in mid-successional tallgrass prairie. Journal of Range Management 51:115-121.

Engle, D. M., W. M. Palmer, J. S. Crockett, R. L. Mitchell, and R. Stevens. 2000. Influence of late season fire on and early successional Oklahoma prairie. Journal of Vegetation Science 11:135-144.

Ewing, A. L., and D. M. Engle. 1988. Effects of late summer fire on tallgrass prairie microclimate and community composition. American Midland Naturalist 120:212-223.

Fuhlendorf, S. D. and D. M. Engle. 2001. Restoring heterogeneity on rangelands: ecosystem management based on evolutionary grazing patterns. BioScience 51:625-632.

Fuhlendorf, S. D. and D. M. Engle. 2004. Application of the fire-grazing interaction to restore a shifting mosaic on tallgrass prairie. Journal of Applied Ecology 41:604-614.

Gibson, D. J. 1988. Regeneration and fluctuation of tallgrass prairie vegetation in response to burning frequency. Bulletin of Torrey Botanical Club. 115:1-12.

Higgins, K. F. 1984. Lightning fires in grasslands in North Dakota and in pine-savannah lands in nearby South Dakota and Montana. Journal of Range Management 37:100-103.

Higgins, K. F. 1986. Interpretation and compendium of historical fire accounts in the northern Great Plains. Res. Pub. 161. USDI Fish and Wildlife Service. 39p.

Hoagland, B. W. 2000. The vegetation of Oklahoma: a classification for landscape mapping and conservation planning. Southwestern Naturalist 45:385-420.

Hulbert, L. C. 1969. Fire and litter effects in undisturbed bluestem prairie. Ecology 50:874-877.

Hulbert, L. C. 1988. Causes of fire effects in tallgrass prairie. Ecology 69:46-58.

Humphrey, R. R. 1962. Range ecology. Ronald Press Co., New York. 234p.

Irving, W. 1935. A tour of the prairies. Harlow Publ., Oklahoma City, OK. 252 pp.

Jackson, A. S. 1965. Wildfires in the Great Plains grasslands. Proc. Tall Timbers Fire Ecology Conference 4:241-259.

Knapp, A. K. 1984. Post-burn differences in solar radiation, leaf temperature and water stress influencing production in a lowland tallgrass prairie. American Journal of Botany 71:220-227.

Komarek, E. V. 1965. Fire ecology, grasslands and man

Kucera, C. L. 1978. Grasslands and fire. Pages 90-111 in Proc. Conference Fire regimes and ecosystem properties. Gen. Tech. Rep. WO-26. USDA For. Ser., Washington, DC.

Kucera, C. L., and J. H. Ehrenreich. 1962. Some effects of annual burning on central Missouri prairie. Ecology 43:334-336.

Kucera, C. L., and M. Koelling. 1964. The influence of fire on composition of central Missouri prairie. American Midland Naturalist 72:142-147.

Kucera, C. L., J. H. Ehrenreich, and C. Brown. 1963. Some effects of fire on tree species in Missouri prairie. Iowa State Journal of Science 38:179-185.

Manske, L.L., and W. T. Barker. 1987. Habitat usage by prairie grouse on the Sheyenne National Grasslands. Pages 8-20 in A. J. Bjugstad (Tech. Coordin.). Prairie chickens on the Sheyenne National Grasslands. USDA Forest Service Gen. Tech Rept. RM-159. Rocky Mtn. For. and Range Exp. Sta., Fort Collins.

McMurphy, W. E., and K. L. Anderson. 1965. Burning Flint Hills range. Journal of Range Management 18:265-269.

Newell, J. A., J. E. Toepfer, and M. A. Rumbel. 1987. Summer brood-rearing ecology of the Greater prairie chicker on the Sheyenne National Grasslands. Pages 24-31 in A. J. Bjugstad (Tech. Coordin.). Prairie chickens on the Sheyenne National Grasslands. USDA Forest Service Gen. Tech Rept. RM-159. Rocky Mtn. For. and Range Exp. Sta., Fort Collins.

Peet, M., R. Anderson, and M. S. Adams. 1975. Effects of fire on big bluestem production. American Midland Naturalist 94:15-26.

Penfound, W. T. 1968. Influence of a wildfire in the Witchita Mountains Wildlife Refuge, Oklahoma. Ecology 49:1003-1006.

Petranka, J. W., and J. K. McPherson. 1979. The role of Rhus copallina in the dynamics of the forest-prairie ecotone in north-central Oklahoma. Ecology 60:956-965.

Pfeiffer, K.E., and D.C. Hartnett. 1995. Bison selectivity and grazing response of little bluestem in tallgrass prairie. Journal of Range Management 48(1):26-31.

Plumb, G.E., and J.L. Dodd. 1993. Foraging ecology of bison and cattle on a mixed prairie: implications for natural area management. Ecological Applications 3(4):631-643.

Rice, E. L., and R. L. Parenti. 1978. Causes of decreases in productivity in undisturbed tallgrass prairie. American Journal of Botany 65:1091-1097.

Risser, P. G., E. C. Birney, H. D. Blocker, S. W. May, W. J. Parton, and J. A. Wiens. 1981. The true prairie ecosystem. Hutchinson Ross Pub. Co., Stroudsburg. 557p.

Risser, P. G. 1990. Landscape processes and the vegetation of the North American grassland. *in* S. L. Collins and L. L. Wallace, eds. Fire in North American tallgrass prairies. University of Oklahoma Press, Norman. 175p.

Sala, O. E., W. J. Parton, L. A. Joyce, and W. K. Lauenroth. 1988. Primary production of the central grassland region of the United States. Ecology 69:40-45.

Sauer, C. O. 1950. Grassland climax, fire and man. Journal of Range Management 3:16-21.

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.

Shaw, J.H. 2000. How many bison originally populated western rangelands? *Bison World* January:38-41.

Shaw, J.H., and M. Lee. 1997. Relative abundance of bison, elk, and pronghorn on the southern plains, 1806-1857. Plains Anthropologist 42(159, Memoir 29):163-172.

Sparks, J. C. and R. E. Masters. 1996. Fire seasonality effects on vegetation in mixed-, tall- and southeastern pine-grassland communities: a review. Transactions of the 61st North American Wildlife and Natural Resources Conference 61:246-255.

Steuter, A. A. 1986. Fire behavior and standing crop characteristics on repeated seasonal burns-northern mixed prarie. Pages 54-59 *in* A. L. Koonce, ed., Prescribed burning in the Midwest: State-of-the-art, Proceedings of a symposium. University of Wisconsin, Stevens Point. 162 p.

Steuter, A. A., M.E. Biondini, and C.E. Grygiel. 1989. Role of fire, bison and gophers on grassland patch dynamics studied by restoration, management techniques (Nebraska). Restoration and Management Notes 7(1):34-35.

Steuter, A.A., E.M. Steinauer, G.L. Hill, P.A. Bowers, and L.L. Tieszen. 1995. Distribution and diet of bison and pocket gophers in a sandhills prairie. Ecological Applications 5(3):756-766.

Stewart, O. C. 1963. Barriers to understanding the influence of use of fire by aborigines. Proc. Tall Timbers Fire Ecology Conference 2:117-126.

Svejcar, T. J. 1989. Animal performance and diet quality as influenced by burning on tallgrass prairie. Journal of Range Management 42:11-15.

Svejcar, T. J., and J. A. Browning. 1988. Growth and gas exchange of Andropogon gerardii as influenced by burning. Journal of Range Management 41:239-244.

Towne, G., and C. Owensby. 1984. Long-term effects of annual burning at different dates in ungrazed Kansas tallgrass prairie. Journal of Range Management 37:392-397.

Vogl, R. J. 1965. Effects of spring burning on yields of brushy prairie savannah. Journal of Range Management 18:202-205.

Vogl, R. J. 1974. Effects of fire on grasslands. Pages 139-194 in T. T. Kozlowski, and C. E. Ahlgren (eds.). Fire and ecosystems. Academic Press, New York.

U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (2002, December). Fire Effects Information System, [Online]. Available: http://www.fs.fed.us/database/feis/.

Vinton, M.A., and D.C. Hartnett. 1992. Effects of bison grazing on *Andropogon gerardii* and *Panicum virgatum* in burned and unburned tallgrass prairie. Oecologia 90:374-382.

Vinton, M.A., D.C. Hartnett, E.J. Finck, and J.M. Briggs. 1993. Interactive effects of fire, bison (*Bison bison*) grazing and plant community composition in tallgrass prairie. American Midland Naturalist 129:10-18.

Weaver, J. E., and F. E. Clements. 1938. Plant ecology. McGraw-Hill, New York. 601p.

White, A. S. 1986. Prescribed burning for oak-savannah restoration in central Minnesota. Res. Pap. NC-266. USDA Forest Service North Cent. For. Exp. Stn. 12p.

Barker, W. T., and W. C. Whitman. 1994. Bluestem Prairie SRM 601. in T. N. Shiflet, ed. Rangeland cover types of the United States. Society for Range Management, Denver, CO. 152p.

Wright, H. A. 1974. Effect of fire on southern mixed prairie grasses. Journal of Range Management 27:417-419.

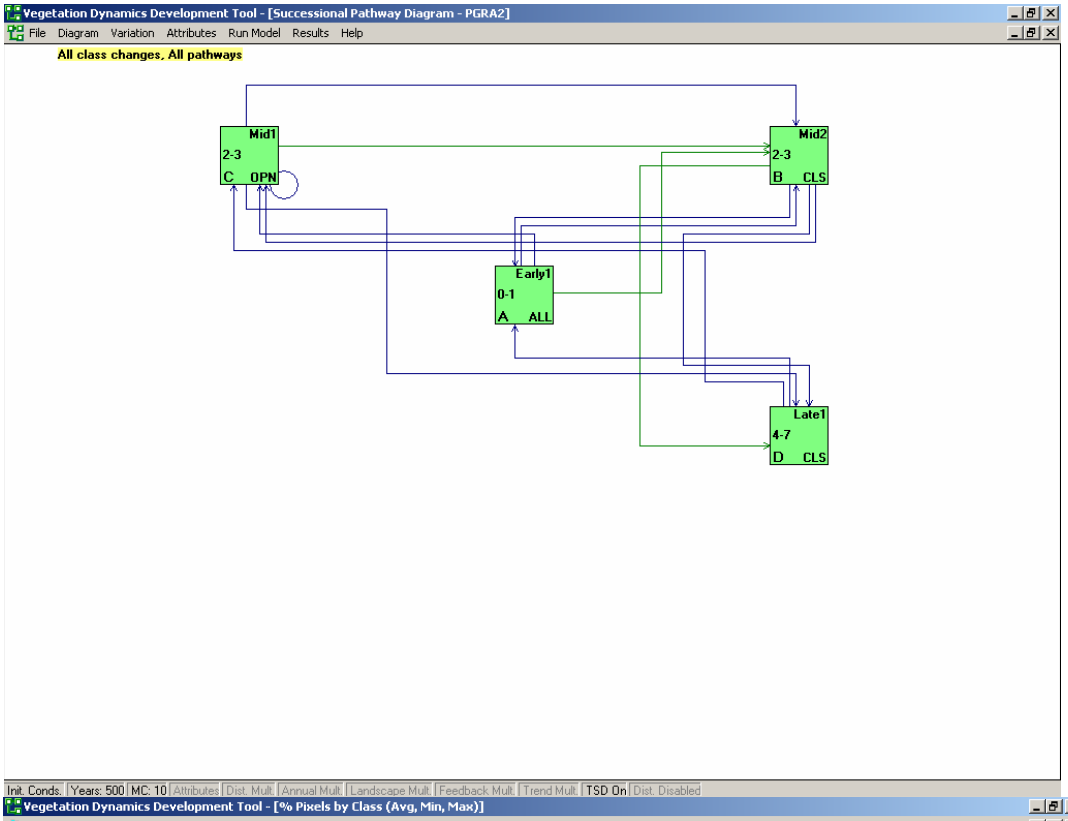
Wright, H. A., and A. W. Bailey. 1982. Fire ecology: United States and southern Canada. John Wiley and Sons, New York. 501p.

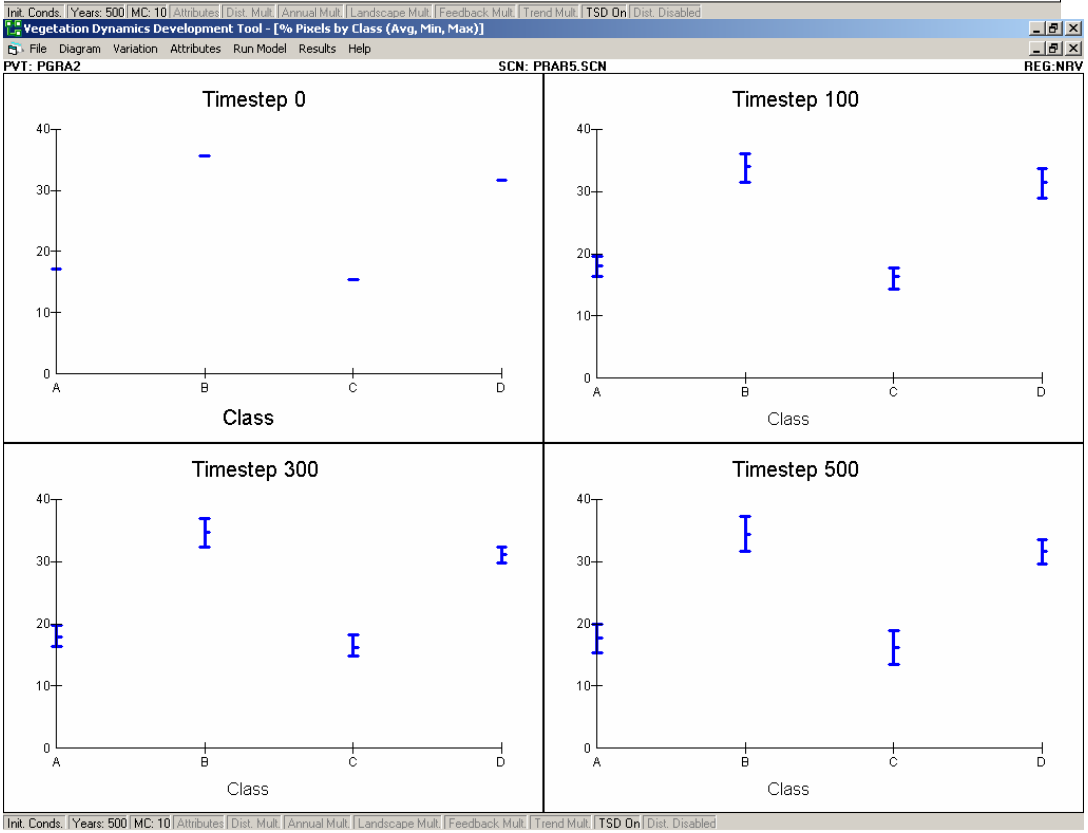
PERSONAL COMMUNICATION (if applicable):

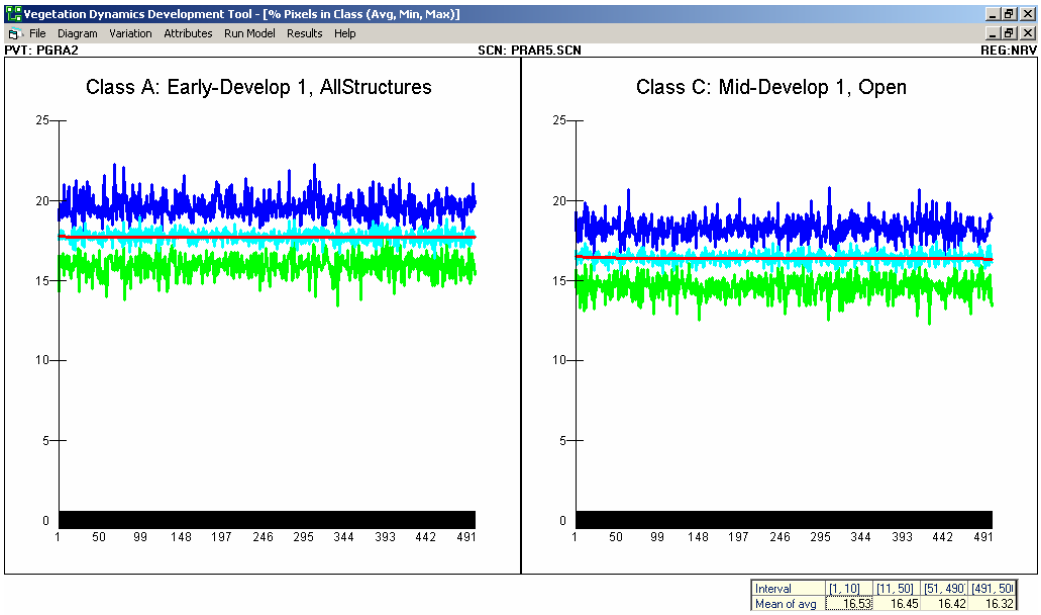
David M. Engle, Professor, Oklahoma State University
Terrance Bidwell, Professor, Oklahoma State University
Sam Fuhlendorf, Assistant Professor, Oklahoma State University
Jim Shaw, Professor, Oklahoma State University
Brian Coppedge, Dean, Tulsa Community College

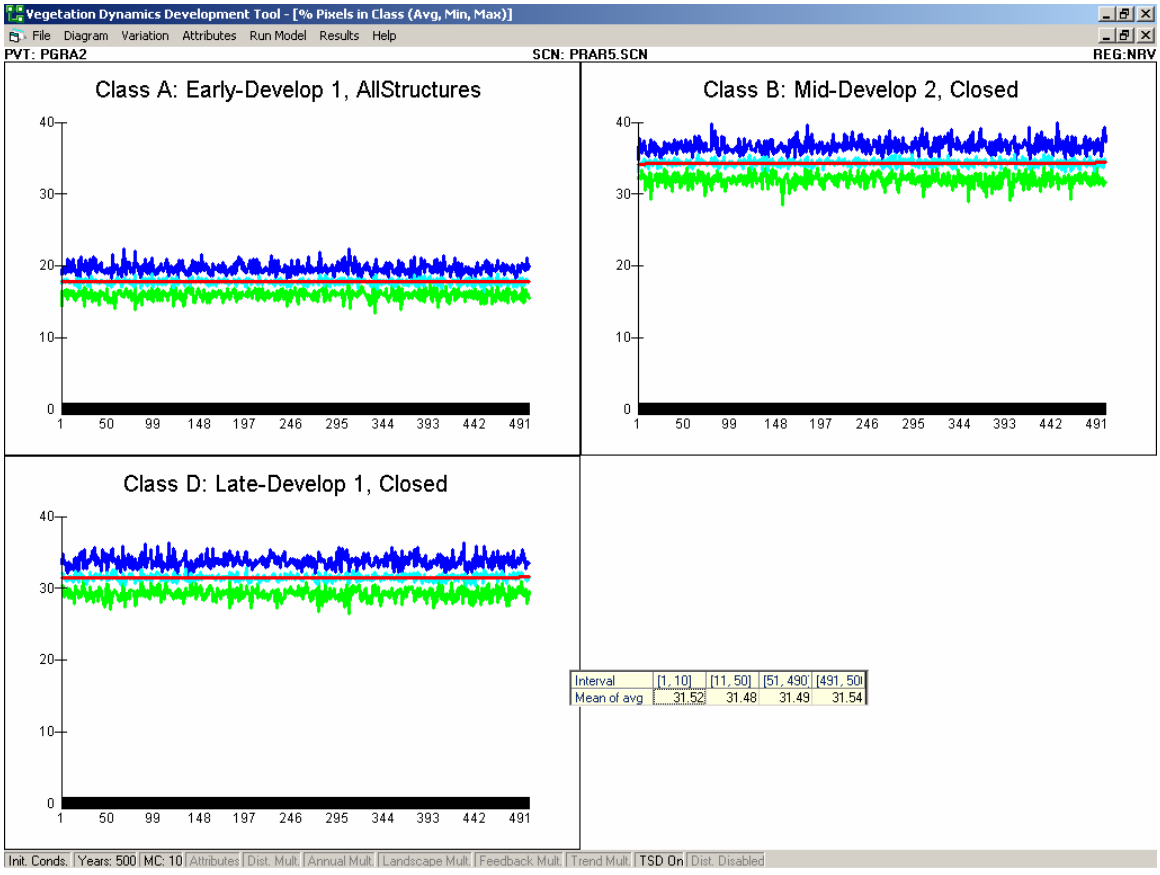
VDDT File Documentation

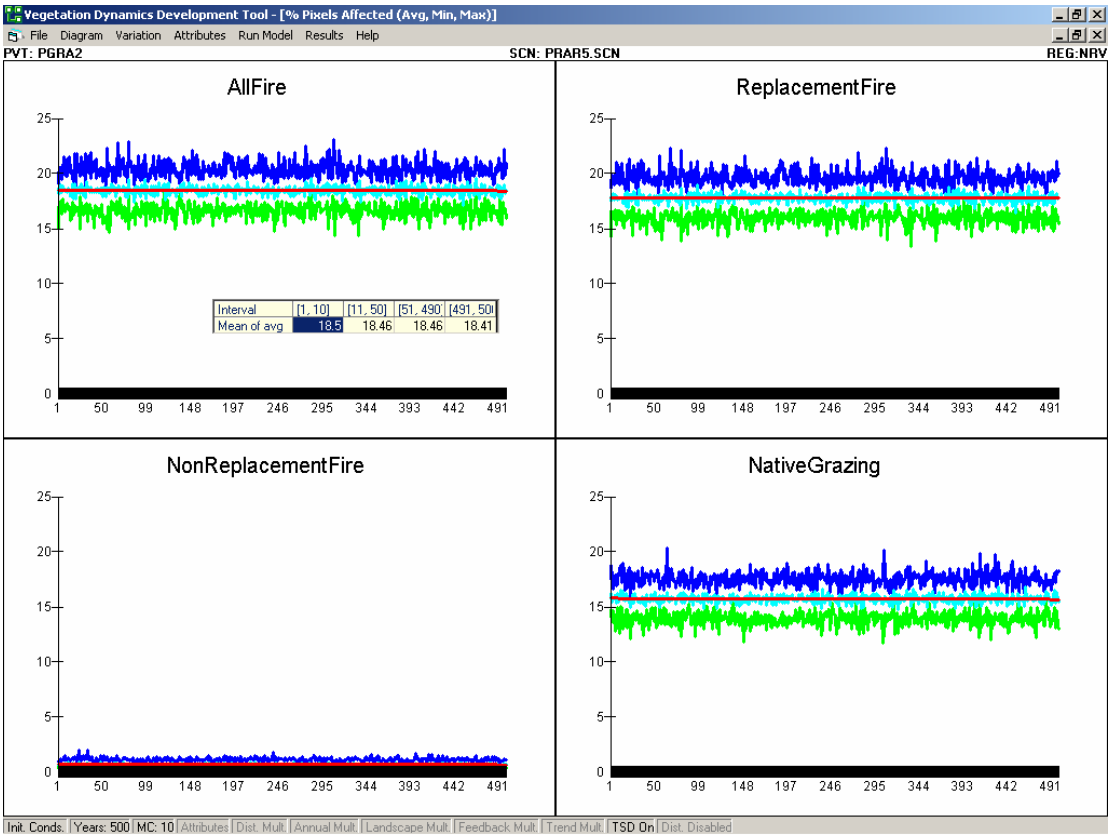
Include screen captures (print-screens) from any of the VDDT graphs that were used to develop reference conditions.

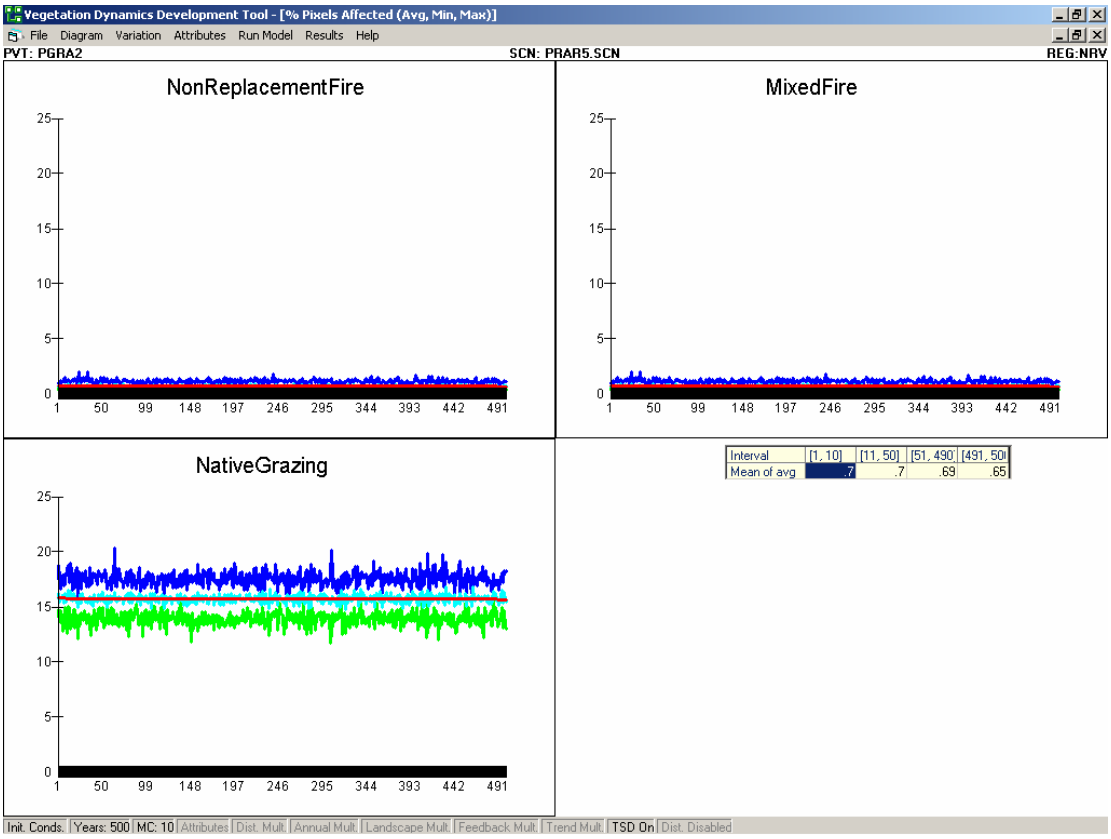


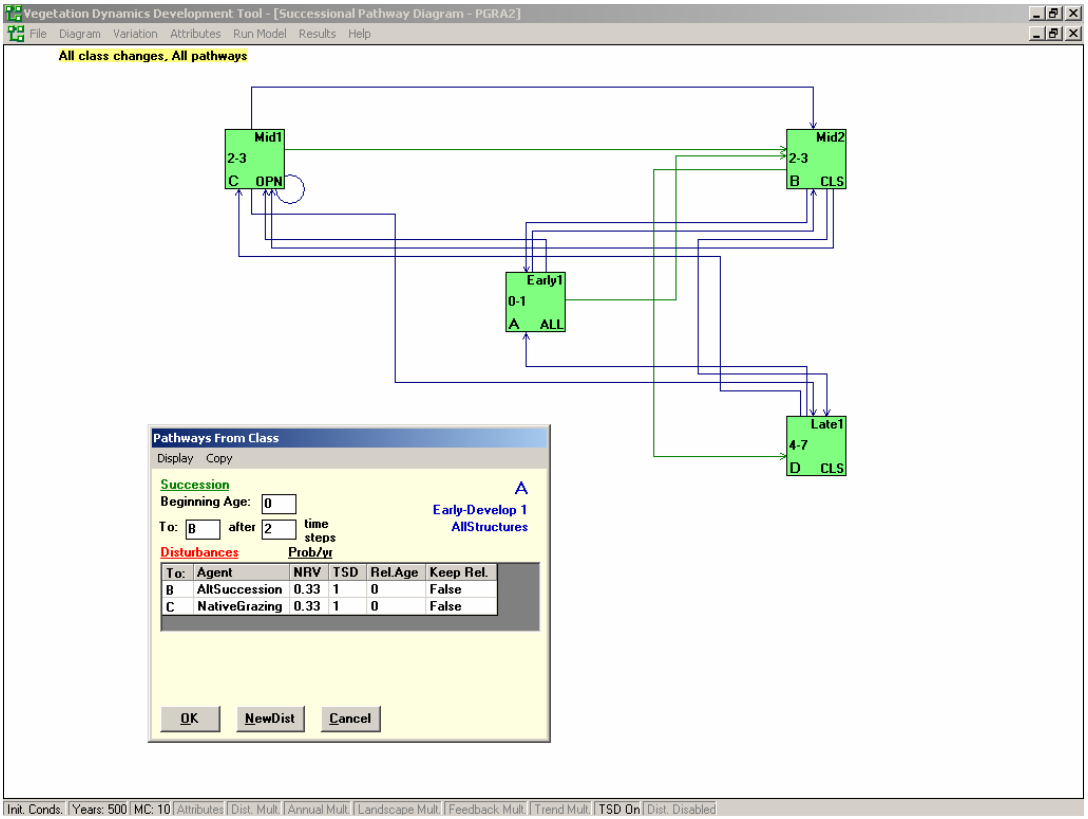


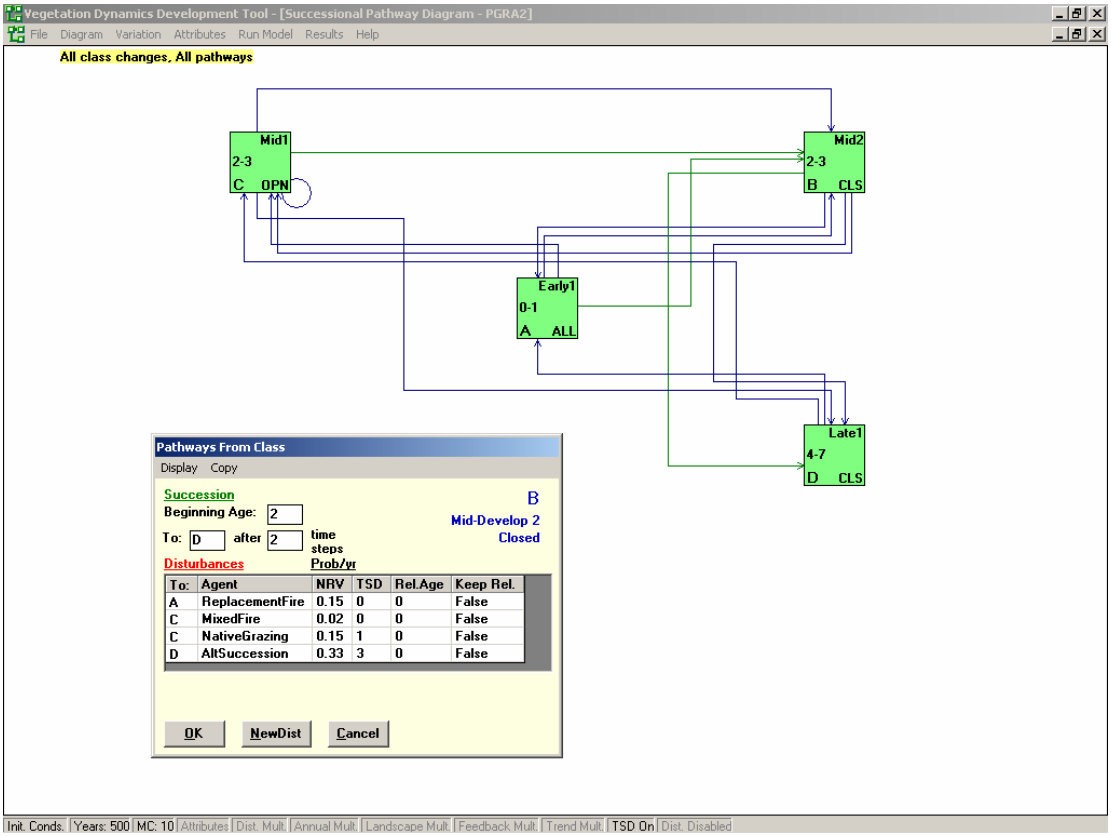

Vegetation Dynamics Development Tool - [% Pixels in Class (Avg, Min, Max)]
File Diagram Variation Attributes Run Model Results Help
PVT: PGRA2
SCN: PRAR5.SCN
REG:NRV
Class A: Early-Develop 1, AllStructures
Class C: Mid-Develop 1, Open
25
20
15
10
5
0
1 50 99 148 197 246 295 344 393 442 491
Interval [1, 10] [11, 50] [51, 490] [491, 50]
Mean of avg 16.53 16.45 16.42 16.32
Init. Conds. Years: 500 MC: 10 Attributes Dist. Mult. Annual Mult. Landscape Mult. Feedback Mult. Trend Mult. TSD On Dist. Disabled

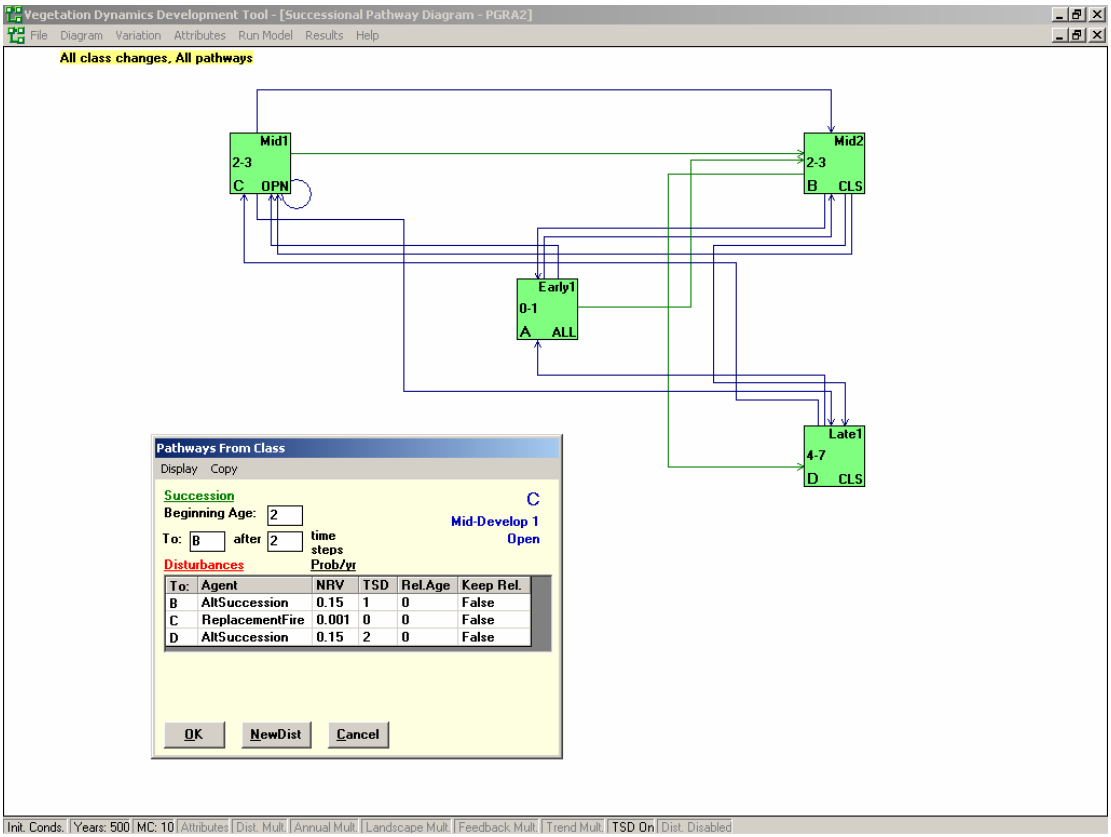

Vegetation Dynamics Development Tool - [% Pixels in Class (Avg, Min, Max)]
File Diagram Variation Attributes Run Model Results Help
PVT: PGRA2
SCN: PRAR5.SCN
REG:NRV
Class A: Early-Develop 1, AllStructures
Class B: Mid-Develop 2, Closed
Class D: Late-Develop 1, Closed
40
30
20
10
0
1 50 99 148 197 246 295 344 393 442 491
Interval [1, 10] [11, 50] [51, 490] [491, 50]
Mean of avg 31.52 31.48 31.49 31.54
Init. Conds. Years: 500 MC: 10 Attributes Dist. Mult. Annual Mult. Landscape Mult. Feedback Mult. Trend Mult. TSD On Dist. Disabled

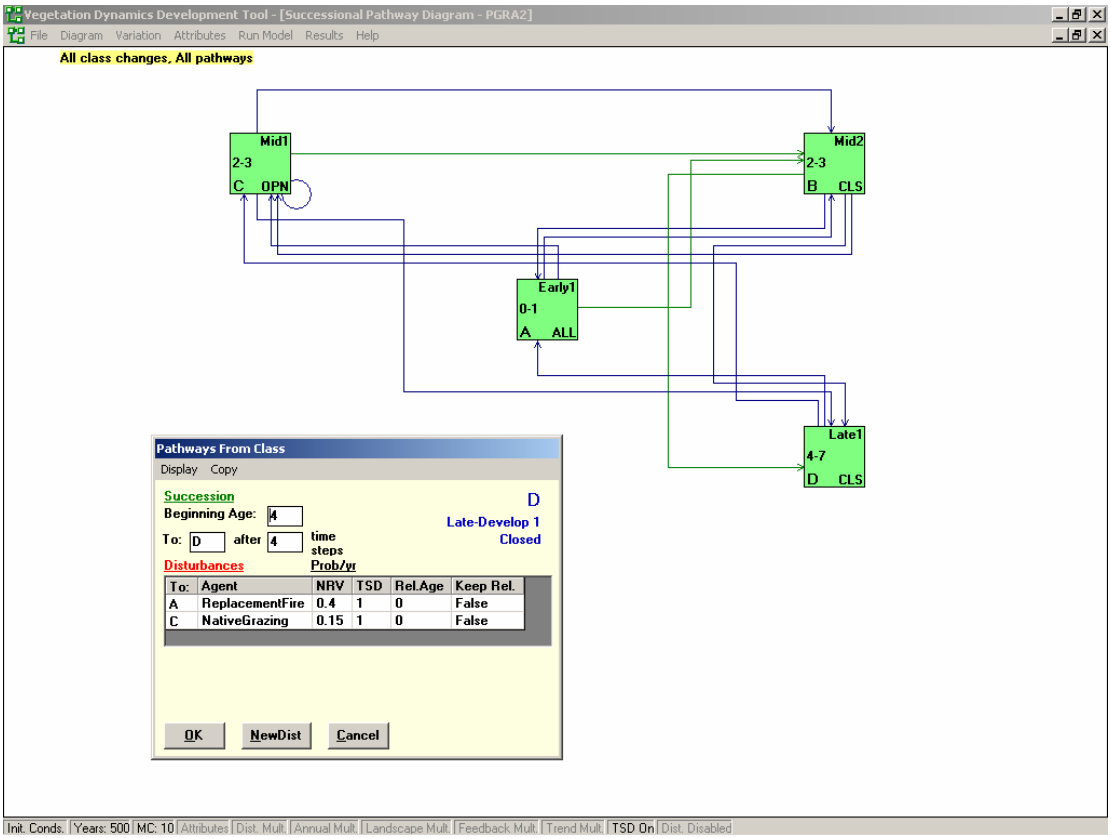

Vegetation Dynamics Development Tool - [% Pixels Affected (Avg, Min, Max)]
File Diagram Variation Attributes Run Model Results Help
PVT: PGRA2
SCN: PRAR5.SCN
REG:NRV
AllFire
ReplacementFire
NonReplacementFire
NativeGrazing
Interval [1, 10] [11, 50] [51, 490] [491, 501]
Mean of avg 18.5 18.46 18.46 18.41
Init. Conds. Years: 500 MC: 10 Attributes Dist. Mult. Annual Mult. Landscape Mult. Feedback Mult. Trend Mult. TSD On Dist. Disabled

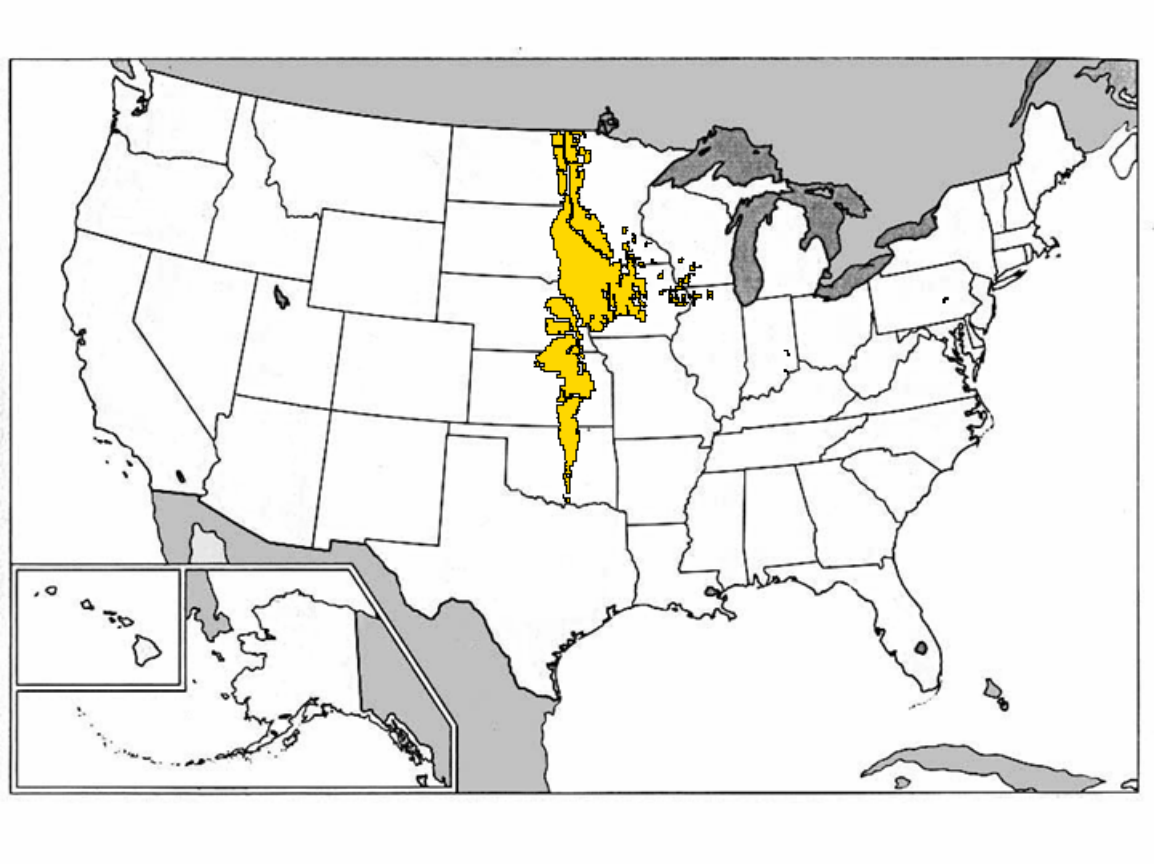

Vegetation Dynamics Development Tool - [% Pixels Affected (Avg, Min, Max)]
File Diagram Variation Attributes Run Model Results Help
PVT: PGRA2
SCN: PRAR5.SCN
REG:NRV
NonReplacementFire
MixedFire
NativeGrazing
Interval [1, 10] [11, 50] [51, 490] [491, 501]
Mean of avg .7 .7 .69 .65
Init. Conds. Years: 500 MC: 10 Attributes Dist. Mult. Annual Mult. Landscape Mult. Feedback Mult. Trend Mult. TSD On Dist. Disabled


Vegetation Dynamics Development Tool - [Successional Pathway Diagram - PGRA2]
File Diagram Variation Attributes Run Model Results Help
All class changes, All pathways
Mid1
2-3
C OPN
Mid2
2-3
B CLS
Early1
0-1
A ALL
Late1
4-7
D CLS
Pathways From Class
Display Copy
Succession
Beginning Age: 0
To: B after 2 time steps
A
Early-Develop 1
AllStructures
Disturbances
Prob/yr
To: Agent NRV TSD Rel.Age Keep Rel.
B AltSuccession 0.33 1 0 False
C NativeGrazing 0.33 1 0 False
OK
NewDist
Cancel
Init. Conds. Years: 500 MC: 10 Attributes Dist. Mult. Annual Mult. Landscape Mult. Feedback Mult. Trend Mult. TSD On Dist. Disabled


Vegetation Dynamics Development Tool - [Successional Pathway Diagram - PGRA2]
File Diagram Variation Attributes Run Model Results Help
All class changes, All pathways
Mid1
2-3
C OPN
Mid2
2-3
B CLS
Early1
0-1
A ALL
Late1
4-7
D CLS
Pathways From Class
Display Copy
Succession
Beginning Age: 2
To: D after 2 time steps
B
Mid-Develop 2
Closed
Disturbances
Prob/yr
To: Agent NRV TSD Rel.Age Keep Rel.
A ReplacementFire 0.15 0 0 False
C MixedFire 0.02 0 0 False
C NativeGrazing 0.15 1 0 False
D AltSuccession 0.33 3 0 False
OK
NewDist
Cancel
Init. Conds. Years: 500 MC: 10 Attributes Dist. Mult. Annual Mult. Landscape Mult. Feedback Mult. Trend Mult. TSD On Dist. Disabled


Vegetation Dynamics Development Tool - [Successional Pathway Diagram - PGRA2]
File Diagram Variation Attributes Run Model Results Help
All class changes, All pathways
Mid1
2-3
C OPN
Mid2
2-3
B CLS
Early1
0-1
A ALL
Late1
4-7
D CLS
Pathways From Class
Display Copy
Succession
Beginning Age: 2
To: B after 2 time steps
C
Mid-Develop 1
Open
Disturbances
Prob/yr
To: Agent NRV TSD Rel.Age Keep Rel.
B AltSuccession 0.15 1 0 False
C ReplacementFire 0.001 0 0 False
D AltSuccession 0.15 2 0 False
OK
NewDist
Cancel
Init. Conds. Years: 500 MC: 10 Attributes Dist. Mult. Annual Mult. Landscape Mult. Feedback Mult. Trend Mult. TSD On Dist. Disabled


Vegetation Dynamics Development Tool - [Successional Pathway Diagram - PGRA2]
File Diagram Variation Attributes Run Model Results Help
All class changes, All pathways
Mid1
2-3
C OPN
Mid2
2-3
B CLS
Early1
0-1
A ALL
Late1
4-7
D CLS
Pathways From Class
Display Copy
Succession
Beginning Age: 4
To: D after 4 time steps
D
Late-Develop 1
Closed
Disturbances
Prob/yr
To: Agent NRV TSD Rel.Age Keep Rel.
A ReplacementFire 0.4 1 0 False
C NativeGrazing 0.15 1 0 False
OK
NewDist
Cancel
Init. Conds. Years: 500 MC: 10 Attributes Dist. Mult. Annual Mult. Landscape Mult. Feedback Mult. Trend Mult. TSD On Dist. Disabled



Bluestem prairie adapted from Kuchler 1964.