11110

Western Great Plains Mesquite Woodland and Shrubland

BpS Model/Description Version: Aug. 2020

**Reviewer:** Tim Christiansen, timothy.a.christiansen.nfg@mail.mil

Vegetation Type

Shrubland

Map Zones

27, 33

Geographic Range

Southern high plains Texas, Oklahoma, and New Mexico. Pre-settlement this Biophysical Setting (BpS) was highly restricted to deep mesic alluvial soils. BpS has expanded greatly in modern day and occurs over much of the Southern Great Plains. It is thought that this BpS occurs in the east portion of map zone (MZ) 27. Overall, this is primarily a Texas type of system, and it has generally not been described or sampled in New Mexico. Historically, it would have certainly been uncommon in New Mexico. Mesquite shrublands do occur in ECOMAP (Cleland et al. 2007) subsections 315A and 315Ba but primarily as upland incursion into piedmont grasslands or as coppice dunes in sandy lands. The riparian version is likely rare, particularly north of I-40. Mesquite does make it all the way to subsection 331Bc as scattered individuals in riparian but not as a type.

Biophysical Site Description

Deep alluvial soils along drainages in relation to short-grass or mixed-grass prairie types. This is a semi-riparian type.

Vegetation Description

Honey mesquite (*Prosopis glandulosa*) canopy with a shortgrass or mixedgrass prairie of little bluestem (*Schizachyrium scoparium*) in the east and sideoats grama (*Bouteloua curtipendula*) in the west. Mesquite in most cases is migrating northward up the Pecos drainage out of the Chihuahuan Desert and hence is more likely a type with an understory of *Sporobolus airoides* or *Pleuraphis muticus*.

BpS Dominant and Indicator Species

Species names are from the NRCS PLANTS database. Check species codes at http://plants.usda.gov.

Disturbance Description

Frequent fire is the dominant disturbance type in this BpS with a fire regime (FRG) of I or II. FRG II might be more appropriate given that when mesquite dominates a riparian zone as a thicket, a stand-replacement fire would be the norm.

The fire frequency is determined by the fire behavior in the adjacent prairie, which is speculative or unknown in terms of intervals.

Grazing by bison is also a disturbance in the BpS, which would reduce fuel loading and influence the fire intensity and frequency by increasing the interval. The modelers assumed grazing was a natural process when setting the fire return interval.

Modelers in MZ26 felt that widespread regional drought would also reduce fuel loads and could drive the open woodland back to a grassland system infrequently. However, this was questioned during MZ27 review, as it is thought that drought rather increases the spread of mesquite.

Flooding is another disturbance that might affect this system.

Fire Frequency

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. Percent of all fires is the percent of all fires modeled in that severity class. Minimum and Maximum FIs show the relative range of fire intervals as estimated by model contributors, if known.

Scale Description

Linear or small patch.

Adjacency or Identification Concerns

This BpS always occurs adjacent to short- or mixed-grass prairie.

This BpS is currently much more widespread on the landscape due to the spread of mesquite with grazing disturbance and lack of fire in the Southern Great Plains. If mesquite is native and non-invasive anywhere, it is under this condition.

This system might be confused for the Chihuahuan version

Today, herbicide treatments leading to riparian graminoid meadows might be occurring and causing a type conversion so that the historical condition might not be identifiable today.

Issues or Problems

This BpS is currently much more widespread on the landscape due to the spread of mesquite with grazing disturbance and lack of fire in the Southern Great Plains. However, during MZ27 review, this statement was questioned as being speculative for this semi-riparian native type: there is no evidence for the statement above.

A further increase in mesquite can be expected due to increased drought. Wind and water erosion can be expected to increase the instability of the soil surface and loss of the soil biocrust. Fire will decrease due to loss of fine fuels in many places due to drought and erosion.

Native Uncharacteristic Conditions

The spread of mesquite in the Southern Great Plains has reduced the grassland class (A) and has increased the shrubland and woodland class (B) in current conditions.

Comments

This model for MZ27 was adapted from the model from the same BpS from MZ26 created by Lee Elliott. At time of MZ27 adaptation, the model had no reviewers for MZ26. MZ27 model altered slightly from MZ26: mean fire return interval (MFRI) increased (less fire), drought disturbance, and upper-layer lifeform changed for Class C, based on review comments and Regional Lead (RL) decisions.

Succession Classes

**Mapping Rules**

Succession class letters A-E are described in the Succession Class Description section. Some classes use a leafform distinction where a qualifier is added to the class letter: Brdl (broadleaf), Con (conifer), or Mix (mixed conifer and broadleaf). UN refers to uncharacteristic native or a combination of height and cover that would not be expected under the reference condition. NP refers to not possible or a combination of height and cover which is not physiologically possible for the species in the BpS.

**Description**

Class A 13 Early Development 1 - Open

Indicator Species

Description

This class is an open mixed- or short-grass prairie dominated by little bluestem in the eastern range and side-oats grama in the west.

Replacement fire is the dominant disturbance type.

Grazing is occurring; however, the modelers assumed this is a natural process when setting the MFRI.

*Maximum Tree Size Class*  
None

Class B 4 Mid Development 1 - Closed

Indicator Species

Description

This class is dominated by a dense canopy of honey mesquite.

Replacement fire is the dominant disturbance type.

*Maximum Tree Size Class*  
None

Class C 83 Late Development 1 - Open

Indicator Species

Description

This class is an open woodland with a canopy of 3-5m honey mesquite trees. The grass is sparser in this class than in the surrounding grassland.

For MZ26, this was modeled with both replacement and surface fires occurring in this class. Surface fire will maintain the woodland condition. However, this short interval was questioned during MZ27 review and thus changed slightly for both replacement and low-severity fires. This did not change class percentages.

For MZ26, widespread drought was modeled as infrequently driving the class to A. However, this was questioned during MZ27 review and therefore removed.

*Maximum Tree Size Class*  
None

Model Parameters

Deterministic Transitions

Probabilistic Transitions

References

Ansley, R.J., Jones, D.L. and Kramp, B.A. 1995. Response of honey mesquite to single and repeated summer fires. In Research Highlights vol. 26 Lubbock, TX. Texas Tech Univ., 13-14.

Ansley, R.J., Cadenhead, J.F. and Kramp, B.A. 1996a. Mesquite savanna: A brush management option. The Cattleman 82: 10-12.

Ansley, R.J., Jones, D.L. and Kramp, B.A. 1996b Use of different intensity fires to convert Prosopis woodlands to grasslands or savannas. In: West, N. ed. Proceedings of the 5th International Rangelands Congress, vol. 1. Soc. Range management. pp 13-14.

Ansley, R.J., Jones, D.L., Tunnel T.R. Kramp, B.A. and Jacoby, P.W. 1998. Honey mesquite canopy response to single winter fires: relation to fine fuel, weather and fire temperatures. International J. of Wildland Fire. 8: 241-252.

Archer, S. 1994. Woody plant encroachment into southwestern grasslands and savannas: ratios, patterns, and approximate causes. In: Vavra, M, Laycock, W. A., Pieper, R. D. eds. Ecological implications of livestock herbivory in the West. Soc. For Range Management: 13-68.

Box, T.W. and Gould, F.W. 1959. An analysis of the grass vegetation of Texas. Southwestern Naturalist 3: 124-129.

Britton, C.M. and Wright, H.A. 1971 Correlation of weather and fuel variables to mesquite damage by fire. J. of Range Management 24: 136-141.

Brown, D.E. 1982. Plains and Great Basin grasslands. In: Brown, David E., ed. Biotic communities of the American Southwest—United States and Mexico. Desert Plants 4(1-4) 115-121.

Brown, J.K. and J. Kapler-Smith, eds. 2000. Wildland fire in ecosystems: effects of fire on flora. Gen. Tech. Rep. RMRS-GTR-42. vol 2. Ogden, UT: USDA Forest Service, Rocky Mountain Research Station. 257 pp.

Cleland, D.T.; Freeouf, J.A.; Keys, J.E.; Nowacki, G.J.; Carpenter, C.A.; and McNab, W.H. 2007. Ecological Subregions: Sections and Subsections for the conterminous United States. Gen. Tech. Report WO-76D [Map on CD-ROM] (A.M. Sloan, cartographer). Washington, DC: U.S. Department of Agriculture, Forest Service, presentation scale 1:3,500,000; colored

Ethridge, D.E., Pettit, R.D., Suddeth, R.G and Stoecher, A.L. 1987. Optimal economic timing of range improvement alternatives: Southern High Plans. J. of Range Management 40(6): 555-559.

Fisher, C.E. 1977. Mesquite and modern man in southwestern North America. In: Simpson, B B. ed. Mesquite: its biology in two desert ecosystems. US/IBP Synthesis Series 4. Stroudsburg, PA: Dowden, Hutchinson and Ross, Inc. 177-188.

Garrison, G.A, Bjugstand, A., Jr., Duncan, D.A., Lewis, M.E. and Smith, DR. 1977. Vegetation and environmental features of the forest and rangeland ecosystem. Ag. Handb. 475. Washington, DC: USDA 68 pp.

Herbal, C.H. 1979. Utilization of grass and shrublands of the southwestern United States. In Walker, B.H. ed. Management of semiarid ecosystems. Vol. 7. Developments in agriculture and managed forest ecology. Amsterdam: Elsevier Scientific Publishing.

Kuchler, A.W. 1964. Manual to accompany the map of potential vegetation of the conterminous United States. Special Publications No. 36. New York: American Geographical Society. 77 pp.

NatureServe. 2007. International Ecological Classification Standard: Terrestrial Ecological Classifications. NatureServe Central Databases. Arlington, VA. Data current as of 10 February 2007.

NatureServe. 2006. International Ecological Classification Standard: Terrestrial Ecological

Classifications. NatureServe Central Databases. Arlington, VA, U.S.A. Data current as of

18 July 2006.

Schmidt, K.M., J.P. Menakis, C.C. Hardy, W.J. Hann and D.L. Bunnell. 2002. Development of coarse-scale spatial data for wildland fire and fuel management. Gen. Tech. Rep. RMRS-GTR-87. Fort Collins, CO: USDA Forest Service, Rocky Mountain Research Station. 41 pp. + CD.

Steinberg, P. 2001. Prosopis glandulosa. In: Fire Effects Information System, [Online]. USDA Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ [2007, February 2].

Wright, HA. 1978. Use of fire to manage grasslands of the Great Plains: Central and Southern Great Plains. In Hyder, D.N. ed. Proceedings, 1st international rangelands congress; 1978 14-18.

Wright, H.A. and R. Thompson. 1978. Fire effects. In: Fire Management: Prairie plant communities: proceedings of a symposium and workshop; USDA Forest Service, Intermountain Research Station, Fire Sciences Lab, Missoula MT.