Ecological site R080BY144TX
Clayey Bottomland
26-33" PZ

Last updated: 9/19/2023
Accessed: 06/07/2026

General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

MLRA notes

Major Land Resource Area (MLRA): 080B–Texas North-Central Prairies

MLRA 80B consists of gently rolling, dissected plains with very steep hillsides and sideslopes and narrow flood plains associated with small streams. Loamy and clayey soils range from very shallow to deep and developed in sandstones, shales, and limestones of Pennsylvanian age.

Classification relationships

This ecological site is correlated to soil components at the Major Land Resource Area (MLRA) level which is further described in USDA Ag Handbook 296.

Ecological site concept

These sites occur over tight clay alluvial soils on floodplains. The reference vegetation is native midgrass species with scattered forbs and some trees and shrubs along the watercourses. Without fire or other brush management, woody species may dominate the site, especially mesquite. These soils can be quite droughty during dry periods due to the high clay content.

Associated sites

R080BY146TX	**Clay Loam 26-33" PZ** Clay Loam Site is often adjacent and up hill.
R080BY161TX	**Shallow Clay 26-33" PZ** Shallow Clay Site is often adjacent and up hill.
R080BY164TX	**Tight Sandy Loam 26-33" PZ** Tight Sandy Loam Site is often adjacent and uphill.

Similar sites

R080BY151TX	**Loamy Bottomland 26-33" PZ** Loamy Bottomland is found on similar physiographic position and has somewhat more production.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Panicum obtusum* (2) *Tridens albescens*

Physiographic features

This site occurs on linear to concave flood plains and flood-plain steps in the Texas North-Central Prairies. The site is characteristically a water receiving site. Slopes are typically less than 2 percent.

Table 2. Representative physiographic features

Landforms	(1) Alluvial plain > Flood plain (2) Alluvial plain > Flood-plain step
Runoff class	Medium to high
Flooding frequency	Rare to frequent
Ponding frequency	None
Elevation	230 – 730 m
Slope	0 %
Water table depth	180 cm
Aspect	Aspect is not a significant factor

Climatic features

The climate is subtropical subhumid and is characterized by hot humid summers and relatively mild winters. Tropical maritime air controls the climate during spring, summer and fall. In winter and early spring, frequent surges of polar Canadian air cause sudden drops in temperatures and add considerable variety to the daily weather. The average first frost generally occurs about November 5 and the last freeze of the season usually occurs about March 19. The average frost free period ranges from 215 days in the northern counties, to 240 days in the south.

The average relative humidity in mid-afternoon is about 60 percent in the summer months. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines 75 percent of the time possible during the summer and 50 percent in winter. The prevailing wind direction is from the southwest and highest windspeeds occur during the spring months.

Approximately 75% of annual rainfall occurs between April 1 and October 31. Rainfall during the months of April through September typically occurs during thunderstorms which tend to be intense and brief, resulting in large amounts of rain in a short time. The wettest months of the year are May, June, September, and October. The driest months during the growing season are July and August. The winter months of November, December, January, and February are the driest months overall.

Average annual precipitation for the entire MLRA is approximately 28 inches. There is a noticeable difference in the average annual precipitation in the northern counties in comparison to the southern and western counties of this Major Land Resource Area. Jack, Clay, Young, and Palo Pinto Counties all have an average annual precipitation of more than 31 inches. Stephens, Eastland, McCulloch, and San Saba Counties all have an average annual precipitation of less than 28 inches.

Winters tend to be mild, with occasional periods of very cold temperatures which can be accompanied by strong northerly winds and freezing precipitation. Snow is infrequent and significant accumulations are rare. These periods of very cold weather are generally short-lived. Summers tend to be hot and dry. Drought conditions are common during most summers. Air temperatures of more than 95oF are common from mid-June through September. In the northern counties nearest to the Red River, temperatures are generally slightly cooler during winter months and slightly warmer during summer months than in the other counties in the North Central Prairie.

Table 3 Representative climatic features

Frost-free period (characteristic range)	180-200 days
Freeze-free period (characteristic range)	210-230 days
Precipitation total (characteristic range)	760-810 mm
Frost-free period (actual range)	180-200 days
Freeze-free period (actual range)	210-230 days
Precipitation total (actual range)	740-840 mm
Frost-free period (average)	190 days
Freeze-free period (average)	220 days
Precipitation total (average)	790 mm

- (1) SAN SABA 7NW [USC00417994], Richland Springs, TX
- (2) BROWNWOOD 2ENE [USC00411138], Early, TX
- (3) EASTLAND [USC00412715], Eastland, TX
- (4) MINERAL WELLS AP [USW00093985], Millsap, TX
- (5) BRECKENRIDGE [USC00411042], Breckenridge, TX
- (6) GRAHAM [USC00413668], Graham, TX
- (7) JACKSBORO [USC00414517], Jacksboro, TX

Influencing water features

These sites receive run off water from adjacent upland areas. Water shed from these bottomland areas should be minimal under reference vegetation.

Wetland description

Site specific evaluation is necessary to determine presence of wetland areas.

Soil features

Representative soil components for this ecological site include: Deleon, Westfork

The site is characterized by deep, moderately well drained, slowly permeable clayey soils that formed in clayey and loamy alluvial sediments. These soils with very high shrink-swell potential.

Table 4. Representative soil features

Parent material	(1) Alluvium – claystone (2) Alluvium – limestone
Surface texture	(1) Silty clay (2) Clay
Drainage class	Moderately well drained to well drained
Permeability class	Very slow to slow
Soil depth	180 cm
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	20.32 – 25.4 cm
Calcium carbonate equivalent (0-101.6cm)	0 – 10 %
Electrical conductivity (0-101.6cm)	Not specified
Sodium adsorption ratio (0-101.6cm)	Not specified
Soil reaction (1:1 water) (0-101.6cm)	6.1 – 8.4

Subsurface fragment volume <=3" (0-101.6cm)	0 – 10 %
Subsurface fragment volume >3" (0-101.6cm)	Not specified

Ecological dynamics

The Clayey Bottomland Ecological Site occupies narrow bands of moderately well drained soils on nearly level flood plains of rivers and streams. Inundation by flood water occurs once or more times a year to once every 4 to10 years. Overflow from adjacent up-slope sites during rainy season may enhance plant growth, but the fine textured soils often restrict plant growth during dry years. Proper grazing management is made difficult by the proximity to water of the adjacent stream and the gentle slopes.

The reference plant community of the Clayey Bottomland site evolved under frequent fire and periodic heavy grazing by bison, pronghorn antelope, Rio Grande turkey and deer. It is postulated that fires re-occurred in four to six-year intervals in this region prior to European settlement (Frost 1998). The frequent fires likely were as influential in shaping the site into an open Mixed-grass Prairie Plant Community (1.1) as was the climate or grazing by bison and pronghorns.

White tridens , Arizona cottontop and vine-mesquite, buffalograss and Reverchon bristlegrass, characterized the Mixed-grass Prairie Plant Community (1.1). Little bluestem, switchgrass and Indiangrass probably occurred infrequently in areas of enhanced moisture relationships, or recent immature soil inclusions. Wildrye and Texas wintergrass were also common. Hackberry, elm, live oak and a very few shrubs and vines were scattered along the stream edge and drainages.

The Mixed-grass Community (1.1) was relatively stable and resilient within the climate, soil and fire regime until European settlement in the 1800’s. The mid 1800’s brought elimination of the bison herd, removal of the American Indian and a large increase of domestic livestock. The development of the windmill and barbed wire fencing during the 1870’s and 1980’s promoted overgrazing throughout the region. Overstocking by domesticated livestock induced a reduction of palatable grasses and forbs. Total herbage production declined as the grazing resistant shortgrasses and forbs began replacing the midgrasses and reference forbs. Texas wintergrass and buffalograss were major increasers under grazing. There was a concomitant decline in vegetative ground cover, mulch and soil organic matter.

The shift in composition of the plant cover and decline in soil properties favored woody plant encroachment. This, along with the reduction in intensity and frequency of fires, allowed invasion of species from adjacent sites or the increase of more grazing resistant endemic species. Under the above scenario, the site transitioned into a Shortgrass Plant Community (1.2) being invaded by woody plants. In this plant community grasses still dominate ecological processes, but the encroaching woody species contribute an increasing amount to the total annual production.

If the Shortgrass Community (1.2) is continuously overgrazed and fire is excluded, the transition toward woody plant dominance continues. The primary encroaching woody species are mesquite and pricklypear. Texas wintergrass, buffalograss and other unpalatable or more grazing resistant grasses increase and palatable climax forbs and midgrasses continue to decline. Grass cover, litter and soil organic matter decline as bare ground, erosion and other desertification processes increase. When the woody plant component reaches approximately 20 percent canopy, grazing management strategies, such as rest from grazing, generally will not reverse the transition to shrubland. A combination of proper grazing and prescribed burning should be successful in maintaining the grass dominant community, however. With continued livestock grazing and no brush management the Shortgrass Community (1.2) will transition into a Shortgrass/Mixed-brush Community (2.1), where woody plants dominate.

Mesquite often dominates the woody cover of the Shortgrass/Mixed-brush Community (2.1). Pricklypear and lotebush are characteristic understory shrubs. American elm and hackberry trees increase in size and density. The grass component is a mixture of midgrasses, shortgrasses and low quality forbs, initially. With continued livestock overgrazing buffalograss, threeawn and meadow dropseed, Texas wintergrass and annual bromes replace the more palatable mid and tall grasses and forbs. The transition to woodland can be reversed with moderately intensive mechanical and/or chemical brush control methods plus prescribed burning. Prescribed burning generally does not kill mesquite once plants reach >2 years of age, but fire can suppress mesquite of any age if the fire can cause top kill. Prescribed burning systems have been developed to aid in enhancing and utilizing this vegetation type.

If overgrazing continues and brush control practices are not applied, the woody canopy will increase in size and density until a dense woody plant dominant community develops. Woody plant dominance occurs at about 35 to 40 percent woody plant canopy cover. Upon reaching this threshold, the grassland component will not produce enough fine fuel for fires to effectively suppress the woody plants and expensive brush control practices are required to reverse the transition to dense woodland. The site transitions into a new plant community type, the Mixed-brush/Shortgrass Woodland (2.2) when this occurs.

The Mixed-brush/Shortgrass Woodland Community (2.2) is dominated by mesquite, elm, hackberry and mixed-brush. Western soapberry and pecan may become invasive. Texas wintergrass, buffalograss and annuals dominate the herbaceous layer. Once canopy cover exceeds 40 percent woody plants, forage production is very limited except in wet periods when annuals provide extra forage. Shortgrasses and cool-season grasses and forbs are present but sparse due to shading and competition from the woody plants. Annual bromes are often present during the cool-season, especially during wet periods. The trees and understory brush continue to increase in size and density regardless of grazing management. Large areas of bare ground may appear between woody plants where small depressions occur. Desertification, including erosion, continues in the interspaces until maximum ground cover by woody species is approached. Once shrub cover reaches potential the hydrologic processes, energy flow and nutrient cycling stabilize under the woody vegetation environment.

Major expense and energy are required to restore the Mixed-brush/Shortgrass Woodland Community (2.2) back to a grassland state. Restoration of site in this stage is very difficult to accomplish because of soil characteristics. Therefore, maintaining the site in at least the Shortgrass/Mixed-brush (2.1) stage, or better, the Shortgrass (1.2) stage, through controlled grazing and brush management, including the use of prescribed burning, is recommended.

The following diagram suggests some pathways that the vegetation on this site might take. There may be other states not shown on the diagram. This information is intended to show what might happen in a given set of circumstances; it does not mean that this would happen the same way in every instance. Local professional guidance should always be sought before pursuing a treatment scenario.

State and Transition Model:

State and transition model

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					
0	**Tallgrasses**			336-673	
1	**Midgrasses**			1681-3363	
	vine mesquite	PAOB	*Panicum obtusum*	673-1345	–
	white tridens	TRAL2	*Tridens albescens*	560-1121	–
	Arizona cottontop	DICA8	*Digitaria californica*	280-560	–
	alkali sacaton	SPAI	*Sporobolus airoides*	56-112	–
	sideoats grama	BOCU	*Bouteloua curtipendula*	56-112	–
	silver beardgrass	BOLAT	*Bothriochloa laguroides ssp. torreyana*	56-112	–
2	**Shortgrasses**			336-673	
	buffalograss	BODA2	*Bouteloua dactyloides*	168-336	–
	hairy grama	BOHI2	*Bouteloua hirsuta*	28-56	–
	fall witchgrass	DICO6	*Digitaria cognata*	28-56	–
	plains lovegrass	ERIN	*Eragrostis intermedia*	28-56	–
	Reverchon's bristlegrass	SERE3	*Setaria reverchonii*	28-56	–
	Drummond's dropseed	SPCOD3	*Sporobolus compositus var. drummondii*	28-56	–
	threeawn	ARIST	*Aristida*	28-56	–
3	**Cool-season grasses**			673-1345	
	Texas wintergrass	NALE3	*Nassella leucotricha*	336-673	–
	Canada wildrye	ELCA4	*Elymus canadensis*	168-336	–
	western wheatgrass	PASM	*Pascopyrum smithii*	112-224	–
	Virginia wildrye	ELVI3	*Elymus virginicus*	56-112	–
	cedar sedge	CAPL3	*Carex planostachys*	0-7	–
Forb					
4	**Forbs**			168-336	

	Cuman ragweed	AMPS	*Ambrosia psilostachya*	11-22	–
	white sagebrush	ARLUA	*Artemisia ludoviciana ssp. albula*	11-22	–
	leather flower	CLEMA	*Clematis*	11-22	–
	tickseed	COREO2	*Coreopsis*	11-22	–
	purple prairie clover	DAPU5	*Dalea purpurea*	11-22	–
	bundleflower	DESMA	*Desmanthus*	11-22	–
	Engelmann's daisy	ENPE4	*Engelmannia peristenia*	11-22	–
	beeblossom	GAURA	*Gaura*	11-22	–
	trailing krameria	KRLA	*Krameria lanceolata*	11-22	–
	dotted blazing star	LIPU	*Liatris punctata*	11-22	–
	Florida mimosa	MIQUF	*Mimosa quadrivalvis var. floridana*	11-22	–
	upright prairie coneflower	RACO3	*Ratibida columnifera*	11-22	–
	white heath aster	SYERE	*Symphyotrichum ericoides var. ericoides*	11-22	–
	greenthread	THELE	*Thelesperma*	11-22	–
	vervain	VERBE	*Verbena*	11-22	–
	vetch	VICIA	*Vicia*	11-22	–
Shrub/Vine					
5	**Shrubs/Vines**			67-135	
	Christmas cactus	CYLE8	*Cylindropuntia leptocaulis*	13-27	–
	pricklypear	OPUNT	*Opuntia*	13-27	–
	bully	SIDER2	*Sideroxylon*	13-27	–
	greenbrier	SMILA2	*Smilax*	13-27	–
	lotebush	ZIOB	*Ziziphus obtusifolia*	13-27	–
Tree					
6	**Trees**			101-202	
	pecan	CAIL2	*Carya illinoinensis*	17-34	–
	hackberry	CELTI	*Celtis*	17-34	–
	mesquite	PROSO	*Prosopis*	17-34	–
	Texas live oak	QUFU	*Quercus fusiformis*	17-34	–
	western soapberry	SASAD	*Sapindus saponaria var. drummondii*	17-34	–
	elm	ULMUS	*Ulmus*	17-34	–

Table 6. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 7. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 8. Community 2.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 9. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Animal community

Many types of wildlife use the Clayey Bottomland Ecological Site. Being associated with flood plains and water courses, it probably received concentrated animal use at times. Deer, turkey and quail were plentiful, and bison often utilized the site heavily during migrations prior to European settlement. Grassland insects, reptiles, birds and mammals frequent the site, either as their base habitat or

from the adjacent sites. Small mammals include rodents, jackrabbit, cottontail rabbit, raccoon, skunk, opossum and armadillo. Predators include coyote, fox and bobcat. Game birds, songbirds, and birds of prey were indigenous or frequent users. Except for bison, most indigenous wildlife species are still plentiful. White-tailed deer and turkey utilize the Clayey Bottomland site in its various states. The site in reference condition is very suited to primary grass eaters such as cattle. With long term abusive grazing by livestock and no, or limited brush control, the Mixed-grass Prairie Community (1.1) transitions into a Woodland State (2.0). As woody plants increase it becomes better habitat for browse eating animals, such as deer and goats, because of the predominance of woody plants and cool season grasses. Livestock should be stocked in proportion to the available grass, forb and browse forage, keeping deer competition for forbs and browse in mind. If the animal numbers are not kept in balance with herbage and browse production through grazing management and good wildlife population management, the late Mixed-brush/Shortgrass Woodland (2.2) community will have little to offer as wildlife habitat except cover.

Hydrological functions

The Clayey Bottomland Ecological Site is a moderately well-drained, very slowly permeable bottomland on nearly level flood plains. It may receive water from surrounding soils and the site may be covered with by water during flooding events. Flooding occurs once in two to three years. Soil moisture holding capacity is high and percolation is slow. The soil generally cracks to great depth when dry, allowing rapid water intake when rainfall occurs on dry soil. When moist the soil is very slowly permeable, however. The deep soils, with moderate to good water holding capacity, are conducive to high herbage production during above average moisture years but restrictive to growth during normal or dry periods. Essentially no water passes through the soil profile to underground water. In reference condition, the grassland vegetation probably intercepted and utilized much of the incoming rainfall in the soil profile. Litter and soil movement was slight. Standing plant cover, duff and organic matter decrease as the Mixed-grass Prairie Community (1.1) transitions to the Shortgrass Prairie Community (1.2). These processes continue in the spaces between woody plants in the Shortgrass/Mixed-brush Community (2.1) and the Mixed-brush/Shortgrass Woodland Community (2.2). Once the woodland matures, the hydrologic and ecological processes, nutrient cycling and energy flow stabilize within the woody plant canopy.

Recreational uses

This site along with adjacent upland sites provides diverse scenic beauty and many opportunities for recreation and hunting. The clayey soils are not conducive to campsite or playground development.

Wood products

Most of the woody species are useable as firewood. Mesquite is sometimes used for posts and charcoal. Pecan and mesquite are used for furniture and specialty products.

Other products

Jams and jellies are made from fruit bearing species. Honeybees are utilized to harvest honey from the many flowering plants, such as mesquite.

Other information

None.

Inventory data references

Information presented has been derived from Clayey Bottomland 30-40 RSD (8-16-79) and Clayey Bottomland PE 31-44 (7-25-1972), literature, personal experience, field observations and personal contacts with range-trained personnel. Photos by: J.L. Schuster --taken at sheet 28 and 36 of Eastland County, TX. Special thanks to the following for assistance and guidance with development of this ESD: John Paclik NRCS Graham, TX, Mark Moseley NRCS, Boerne, Texas and Justin Clary NRCS Temple, Texas.

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Approval

Bryan Christensen, 9/19/2023

Acknowledgments

Site Development and Testing Plan: Future work, as described in a Project Plan, to validate the information in this Provisional Ecological Site Description is needed. This will include field activities to collect low, medium and high intensity sampling, soil correlations, and analysis of that data. Annual field reviews should be done by soil scientists and vegetation specialists. A final field review, peer review, quality control, and quality assurance reviews of the ESD will be needed to produce the final document. Annual reviews of the Project Plan are to be conducted by the Ecological Site Technical Team.

Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

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Date	05/13/2009
Approved by	

Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** None.

2. **Presence of water flow patterns:** Water flow patterns are common and follow old stream meanders. Deposition or erosion is uncommon for normal rainfall but may occur during intense rainfall events.

3. **Number and height of erosional pedestals or terracettes:** Pedestals or terracettes would have been uncommon for this site.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Expect no more than 20% bare ground randomly distributed throughout.

5. **Number of gullies and erosion associated with gullies:** Any gullies should be stable and vegetated.

6. **Extent of wind scoured, blowouts and/or depositional areas:** None to slight.

7. **Amount of litter movement (describe size and distance expected to travel):** Little or no litter movement or deposition during normal rainfall events; however, litter of all sizes may move long distances depending on obstructions under intense storm events. This is a flood plain with occasional out of bank flow.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil surface in HCPC is resistant to erosion. Stability range is expected to be 5-6.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** 0-44 inches thick with colors from brown to dark brown clay with generally moderate medium, granular structure and moderate fine angular blocky structure. SOM is approximately 1-6%. See soil survey for more information.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Under HCPC, the bottomland of tallgrasses, midgrasses, forbs, and trees having adequate litter and little bare

ground can provide for maximum infiltration and little runoff under normal rainfall events.

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11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site): None.**

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12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

    Dominant: Warm-season midgrasses >

    Sub-dominant: Cool-season grasses >

    Other: Warm-season tallgrasses = Warm-season shortgrasses > Shrubs/Vines > Trees

    Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence): Perennial grasses will naturally exhibit a minor amount (less than 5%) of senescence and some mortality every year.**

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14. **Average percent litter cover (%) and depth (in): Litter is primarily herbaceous.**

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production): 3000-6000 pounds per acre**

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16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site: Honey mesquite, Prickly pear, Bermudagrass, Johnsongrass and King Ranch bluestem.**

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17. **Perennial plant reproductive capability: All perennial species should be capable of reproducing every year unless disrupted by extended drought, overgrazing, wildfire, insect damage, or other events occuring immediately prior to, or during the reproductive phase.**
