Ecological site R042AC247TX
Igneous Hill and Mountain, Desert Grassland

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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.

Similar sites

R042AC249TX	**Limestone Hill and Mountain, Desert Grassland** The Igneous Hill and Mountain Desert Grassland Desert Grassland site is similar to the Limestone Hill and Mountain Desert Grassland, but is formed from igneous (volcanic) parent material instead of limestone parent material.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

The site occurs on rolling to very steep hills and mountains. Slopes range from 5 to 60 percent and elevation ranges from 3,500 to 4,500 feet.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Mountain (3) Ridge
Flooding frequency	None
Ponding frequency	None
Elevation	1,070 – 1,370 m

Slope	10 – 60 %
Aspect	Aspect is not a significant factor

Climatic features

The average annual precipitation usually ranges from 11 to 13 inches but extreme variations may range from 3 to 32 inches. There is a gradual decrease in precipitation from north to south in the area. Approximately 75 percent of the precipitation occurs as thunderstorms of short duration and high intensity during the months of June through October. Rainfall distribution is variable and a general rain during these months is uncommon. Rainfall is approximately 25 percent below average four years out of every ten years.

The optimum growing season usually ranges from July 1 through September, but is governed by time and amount of rainfall. Although frost-free days begin in April, sufficient moisture for growing plants to reach maturity is usually not available until late summer or early fall.

Frost-free period is approximately 224 days in the northern part of the zone, extending from about April 1 to November 1, and about 234 days in the southern part, extending from about March 21 to November 10.

High winds are common from March to mid-April. Daytime temperatures exceeding 100 degree F. are common from May through July.

Annual evaporation is about 100 inches.

Table 3 Representative climatic features

Frost-free period (average)	230 days
Freeze-free period (average)	260 days
Precipitation total (average)	360 mm

Influencing water features

None.

Soil features

Soils range from very shallow to shallow over igneous bedrock. Permeability is moderately slow and the soils are well drained. Runoff is medium on 5 to 20 percent slopes, and high on slopes greater than 20 percent. The regolith consists of a thin mantle of loamy earth, containing many coarse fragments. Underlying rocks are fine grained igneous rocks. Rock outcrops are common on slopes of more than 20 percent.

Soil mapunit components include Pantak, Scotal, Sauceda, Decoty, Holguin, Lingua, Reduff, Horsetrap, Bofecillos, Ohtwo, and Lampshire.

Table 4. Representative soil features

Parent material	(1) Residuum – rhyolite (2) Colluvium – trachyte

Surface texture	(1) Very gravelly loam (2) Extremely gravelly clay loam (3) Very cobbly
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Slow
Soil depth	10 – 50 cm
Surface fragment cover <=3"	30 – 50 %
Surface fragment cover >3"	30 – 40 %
Available water capacity (0-101.6cm)	0 – 10.16 cm
Calcium carbonate equivalent (0-101.6cm)	0 – 20 %
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 – 7.8
Subsurface fragment volume <=3" (Depth not specified)	20 – 50 %

Subsurface fragment volume >3" (Depth not specified)	10 – 30 %

Ecological dynamics

The Historic Climax Plant Community (HCPC) on the Igneous Hill and Mountain (Desert Grassland) site consists of bunch and stoloniferous grasses along with a variety of perennial forbs and woody shrubs.

Probably the factor that most influenced the historic vegetative composition of the site was extended dry weather. High rainfall events did occur but were episodic. However, insects and grazers such as rodents, deer, and infrequent fire certainly played a part. Bison were not documented in the historical record as being present in any significant amount. A lack of water was probably a contributing factor. The perennial grasses dominating the site could survive the periodic droughts as long as the density of woody plants did not become excessive, and top-removal of the grass plants did not occur too frequently. Overgrazing amplifies the effects of drought.

Early historical records do not always provide information specific to a site but can provide insight as to conditions existing in a general vicinity. Accounts suggest cattle, sheep, and horses were introduced into the southwest from Mexico in the mid-1500's. However, extensive ranching did not begin in the Trans-Pecos region until the 1880s. Early explorers described the vegetation as they traveled over parts of the Trans-Pecos. For instance, Captain John Pope in 1854 described a portion of the Trans-Pecos area as "…destitute of wood and water, except at particular points, but covered with a luxuriant growth of the richest and most nutritious grasses known to this continent…". Other early travelers describe the scattered springs and water sources that were found in the region. Wagon travel could only be accomplished, along trails that had both water and forage sufficient for overnight stops. Livestock numbers peaked in the late 1880's following the arrival of railroads. Some historical accounts document ranches with stocking rates as high as one animal unit per four acres; however, this was far from sustainable in this environment.

Decades of overgrazing with loss of vegetation and erosion make it a slow process to return to the HCPC community. In 1944 the southernmost portion of the Trans-Pecos area was set aside as Big Bend National Park. Grazing activities with livestock ceased. For example, in 1944, most of the Igneous Hill and Mountain Desert Grassland sites accessible to livestock were probably degraded and dominated by woody shrubs. After 60 years of no grazing, the majority of sites have not recovered to the historic plant community which provides insight into the length of time it takes for recovery in this environment.

The large livestock herds brought in during the favorable years, mainly sheep, could not be sustained during the drought. Overgrazing became a major issue as the extended dry weather was a harsh taskmaster to the early stock growers.

Cattle use on rangeland declines significantly on slopes steeper than 15 percent, however cattle numbers were never very large. Sheep and goats are however able to utilize slopes up to about 45 percent and can negotiate the surface rock cover better than cattle. It should be noted that abusive grazing by different kinds and classes of livestock will result in different impacts on the site. One effect of the removal of vegetated cover was to expose bare ground to erosion. Another effect was the deterioration of perennial grasses which removed the source of fine fuel to sustain periodic fires. More than likely, fires were not very frequent and when they did occur, the burn pattern was a mosaic governed by terrain and vegetative features.

Lehmann's lovegrass (Eragrostis lehmanniana) can occur throughout the, Desert Grassland and Mixed Prairie Land Resource Units. This non-native species has the potential to displace native species.

The following diagram suggests general pathways that the vegetation on this site might follow. 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

Figure 3. MLRA 42 - Igneous Hill & Mtn - DG - State & Transi

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					
1	**Midgrasses**			404-644	
	sideoats grama	BOCU	*Bouteloua curtipendula*	112-280	–

	black grama	BOER4	*Bouteloua eriopoda*	67-112	–
	tanglehead	HECO10	*Heteropogon contortus*	62-112	–
	cane bluestem	BOBA3	*Bothriochloa barbinodis*	62-112	–
2	**Midgrass**			84-135	
	green sprangletop	LEDU	*Leptochloa dubia*	84-135	–
3	**Shortgrasses**			41-67	
	blue grama	BOGR2	*Bouteloua gracilis*	22-34	–
	hairy grama	BOHI2	*Bouteloua hirsuta*	22-34	–
4	**Shortgrasses**			41-67	
	tobosagrass	PLMU3	*Pleuraphis mutica*	41-67	–
5	**Midgrasses**			84-135	
	Arizona cottontop	DICA8	*Digitaria californica*	22-56	–
	bush muhly	MUPO2	*Muhlenbergia porteri*	17-39	–
	plains bristlegrass	SEVU2	*Setaria vulpiseta*	11-28	–
	plains lovegrass	ERIN	*Eragrostis intermedia*	11-28	–
6	**Shortgrasses**			41-67	
	threeawn	ARIST	*Aristida*	22-34	–
	slim tridens	TRMU	*Tridens muticus*	11-34	–
	fall witchgrass	DICO6	*Digitaria cognata*	11-22	–
7	**Shortgrasses**			17-27	
	low woollygrass	DAPU7	*Dasyochloa pulchella*	6-17	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	6-17	–
Forb					
8	**Forbs**			45-85	
	gumhead	GYGL	*Gymnosperma glutinosum*	11-22	–
	menodora	MENOD	*Menodora*	11-22	–
	chickenthief	MEOL	*Mentzelia oligosperma*	11-22	–
	awnless bushsunflower	SICA7	*Simsia calva*	11-22	–
	vervain	VERBE	*Verbena*	6-17	–
	Gregg's tube tongue	JUPI5	*Justicia pilosella*	6-17	–
	spreading buckwheat	EREF	*Eriogonum effusum*	6-17	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	6-17	–
9	**Annual Forbs**			0-22	
	Forb, annual	2FA	*Forb, annual*	0-22	–
Shrub/Vine					
10	**Shrubs/Vines**			58-94	
	resinbush	VIST	*Viguiera stenoloba*	17-28	–
	featherplume	DAFO	*Dalea formosa*	6-17	–
	black prairie clover	DAFR2	*Dalea frutescens*	6-17	–
	Texas swampprivet	FOAN	*Forestiera angustifolia*	6-17	–
	littleleaf ratany	KRER	*Krameria erecta*	6-17	–
11	**Shrubs/Vines**			25-40	
	bush croton	CRFR	*Croton fruticulosus*	6-17	–
	gumhead	GYGL	*Gymnosperma glutinosum*	6-17	–
	mariola	PAIN2	*Parthenium incanum*	6-17	–
	skunkbush sumac	RHTR	*Rhus trilobata*	6-17	–

12	**Shrubs/Vines**			8-17	
	lechuguilla	AGLE	*Agave lechuguilla*	2-11	–
	tree cholla	CYIMI	*Cylindropuntia imbricata var. imbricata*	2-11	–
	sotol	DASYL	*Dasylirion*	2-11	–
	Texas sacahuista	NOTE	*Nolina texana*	2-11	–
	pricklypear	OPUNT	*Opuntia*	2-11	–
	yucca	YUCCA	*Yucca*	2-11	–
13	**Shrubs/Vines**			0-17	
	acacia	ACACI	*Acacia*	0-6	–
	brickellbush	BRICK	*Brickellia*	0-6	–
	Drummond's clematis	CLDR	*Clematis drummondii*	0-6	–
	Christmas cactus	CYLE8	*Cylindropuntia leptocaulis*	0-6	–
	lotebush	ZIOB	*Ziziphus obtusifolia*	0-6	–

Table 6. Community 2.1 plant community composition

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

Table 7. Community 3.1 plant community composition

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

Table 8. Community 4.1 plant community composition

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

Animal community

The Mid & Shortgrass/Shrub Community (1) is habitat for antelope, mule deer, songbirds, birds of prey, small mammals, and predators such as coyote, bobcat, and mountain lion. As the site changes to the Shrub/Shortgrass Community (2) it becomes less suitable for some species due to the increase in bare ground and erosion and corresponding lack of cover, structure and food plants. When it transitions to the Introduced Grassland/Shrub Community (3) the introduced grasses displace many of the native grasses and forbs utilized by indigenous wildlife. The Shrub/Introduced Grassland Community (4) provides low diversity. Cattle, sheep, and goats can use this site, but the rocky ground and slopes make it difficult for livestock, especially cattle, to reach some forage areas. Cattle find the best forage in the Mid & Shortgrass/Shrub Community (1). As this site reaches the Shrub/Shortgrass Community (2), they usually cannot find enough forage to be thrifty. More grass forage is available in the Introduced Grassland/Shrub Community (3). As the site transitions to the Shrub/Introduced Grassland Community (4) the amount of forage for cattle declines until they can no longer find enough to meet their needs. Carrying capacity in the Trans-Pecos will vary greatly from year to year depending on the episodic precipitation. Mule deer find good overall habitat on the Igneous Hill and Mountain Desert Grassland. They need to eat high protein forbs and browse to survive and cannot utilize the lower-protein high-fiber grasses. Quail and dove prefer a combination of low shrubs, bunch grass, bare ground, and forbs. Game bird species such as mourning and white dove and scaled quail are usually present on the site. Smaller mammals present include rodents, jackrabbit, cottontail rabbit, raccoon, skunk, possum and armadillo. Mammalian predators like coyote, bobcat, and mountain lion are likely to be found at the site. Numerous species of snakes and lizards are native to the site. Non-game species of birds found on this site include songbirds and birds of prey. Habitat on this site that provides a large diversity of grasses, forbs and shrubs will support a variety and abundance of songbirds. Birds of prey are important to keep the numbers of rodents, rabbits and snakes in balance. Because wildlife species are specialized in their habitat, no attempt is made in this document to provide complete habitat information. Professional guidance should be sought specific to the species of interest. Plant Preference by Animal Kind: This rating system provides general guidance as to animal preference for plant species. Grazing preference changes from time to time, especially between seasons, and between animal kinds and classes. It also changes depending upon the grazing experience of the animals. Grazing preference does not necessarily reflect the ecological status of the plant within the plant community. Preferred – Percentage of plant in animal diet is greater than it occurs on the land Desirable – Percentage of plant in animal diet is similar to the percentage composition on the land Undesirable – Percentage of plant in animal diet is less than it occurs on the land Not Consumed – Plant would not be eaten under normal conditions. Plants are only consumed when other forages are not available. Toxic – Rare occurrence in diet and, if consumed in any tangible amounts results in death or severe illness in animal

Hydrological functions

The Igneous Hill and Mountain Desert Grassland is a well-drained, shallow, stony upland. Its soils are moderately to very slowly permeable. Under historic climax condition the grassland vegetation intercepted and utilized much of the incoming rainfall in the soil. There was some runoff during extended rains. Good ground cover kept runoff clear and slow. Outcrops of igneous bedrock allowed

limited deep percolation to ground water. The presence of stones and rock outcrops enhance the effectiveness of rainfall, especially small rainfall events, by concentrating it on a smaller surface area. When the site changes from grassland to shrub community there is a loss of vegetated cover resulting in faster runoff that carries soil particles away. Less of the rainfall is intercepted and infiltrated into the soil.

Recreational uses

The Igneous Hill and Mountain Desert Grassland site is well suited for many outdoor recreational uses including hunting, hiking, and bird watching. Its scenic beauty and topography make it a unique site, and colorful forbs can be found on or near the site throughout the spring and summer. Big Bend National Park is found in the southern portion of MLRA 42. It is well known for its scenic mountain desert grass and shrublands, including many Igneous Hill and Mountain Desert Grasslands.

Wood products

None.

Other products

None.

Other information

None.

Other references

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The following individuals assisted with the development of this site description:
Mr. Charles Anderson –Rangeland Management Specialist- NRCS; San Angelo, Texas
Dr. Louis Harveson – Department Chair Department of Natural Resource Management, Sul Ross State University
Mr. Preston Irwin – Rangeland Management Specialist-NRCS; Fort Stockton, Texas
Dr. Lynn Loomis - Soil Scientist-NRCS; Marfa, Texas
Mr. Rusty Dowell, Resource Soil Scientist, NRCS, San Angelo, Texas
Mr. Wayne Seipp, Resource Team Leader, NRCS, Marfa, Texas
Mr. Justin Clary – Rangeland Management Specialist – NRCS; Temple, Texas
Dr. AM Powell, Professor Emeritus – Sul Ross State University, Alpine, Texas

Contributors

Duckworth-Cole, Inc., College Station, Texas, Michael Margo, RMS, NRCS, Marfa, Texas
Unknown

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.

Author(s)/participant(s)	Michael Margo, RMS, NRCS, Marfa, Texas
Contact for lead author	Zone RMS, San Angelo, Texas, 325-944-0147
Date	02/02/2010
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: None, except following high intesity storms, when short (less than 1 m) and discontinuous flow patterns may appear. Flow patterns in drainages are linear and continuous.**

3. **Number and height of erosional pedestals or terracettes: None.**

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground): 1-3% bare ground.**

5. **Number of gullies and erosion associated with gullies: None.**

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

7. **Amount of litter movement (describe size and distance expected to travel):** In drainages, there can be significant amounts of litter moved long distances. On most of the site, minimal and short distance (<5ft) of litter movement associated with high intense rainfall.

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8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Stability class ranging from 4-5 at the surface.

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Soil surface 2-4 inches thick, brown (10YR 4/3), weak fine granular structure ranging to a medium subangular blocky structure.

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** A high canopy cover of midgrass bunch and stoliniferous grasses will help minimize runoff and maximize infiltration. Grasses should comprise approximately 80% of total plant compostion by weight. Shrubs will comprise about 15% by weight.

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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 stoloniferous grasses >

    Sub-dominant: Warm-season perennial bunchgrasses > Warm-season narrowleaf bunchgrasses > Shrubs >

    Other: Subshrubs > Fibrous and Succulent leaves > Perennial forbs > Annual forbs > Annual grasses > Warm-season narrowleaf shortgrasses

    Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** All grasses will show some mortality and decadence in addition to annual forbs. Mid/tall perennial shrubs will show some mortality or decadence only after prolonged and severe droughts. Subshrubs will be less resistant to severe droughts than mid/tall perennial shrubs.

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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):** 750-1200 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: Lehmann's lovegrass is one potential invasive species that may occur on this site.**

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17. **Perennial plant reproductive capability: All species should be capable of reproduction except during periods of prolonged drought conditions, heavy natural herbivory, or intense wildfires.**
