USDA Natural Resources Conservation Service

Ecological site R042AB263TX
Basalt Hill, Hot Desert Shrub

Accessed: 04/25/2024

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.

Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

Associated sites

R042AB585TX	**Flagstone Hill, Hot Desert Shrub** The Flagstone Hill site may be encountered on shoulders and crests above with limestone bedrock.
R042AB735TX	**Gravelly, Hot Desert Shrub** The Gravelly site is encountered on lower piedmont slopes.

Similar sites

R042AB264TX	**Igneous Hill and Mountain, Hot Desert Shrub** The Igneous Hill & Mountain site is similar in that both sites are of igneous origin and are located on similar topography. The Basalt Hills site is less productive and the igneous material is basalt rather than rhyolite and/or trachyte. Very steep map units of basalt soils (Terlingua Series) will be correlated with Igneous Hill & Mountain ecological site.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

The Basalt Hill ecological site is located on mesas, ridges and side slopes of igneous hills. Rocky outcrops and gravelly surfaces are common in these areas. Slopes are mostly 5 to 20 percent but range from 2 to about 30 percent. Elevation ranges from 2,000 to 3,900 feet above sea level. The site is typically in a position to receive and generate runoff. North and South aspect influences species richness and productivity.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Mesa
Flooding frequency	None
Ponding frequency	None
Elevation	2,000–3,900 ft
Slope	2–30%

Aspect	N, S

Climatic features

The average annual precipitation ranges from 10 to 13 inches and highly variable from 2 to 21 inches. Most of the precipitation occurs as widely scattered thunderstorms of high intensity and short duration during the summer. Occasional precipitation occurs as light rainfall during the cool season. Negligible amounts of precipitation falls in the form of sleet or snow.

Mean annual air temperature is 70° F. Daytime temperatures exceeding 100° F are common from May through September. Frost free period ranges from 254 to 295 days.

The average relative humidity in mid-afternoon is about 25 percent. Relative humidity is higher at night, and the average at dawn is about 57 percent. The sun shines 81 percent of the time in summer and 75 percent in winter. The prevailing wind is from the southwest. Average wind speed is highest, around 11 miles per hour, in March and April.

The combination of low rainfall and relative humidity, warm temperatures, and high solar radiation creates a significant moisture deficit. The annual Class-A pan evaporation is approximately 94 inches.

Table 3. Representative climatic features

Frost-free period (average)	295 days
Freeze-free period (average)	334 days
Precipitation total (average)	13 in

Influencing water features

None.

Soil features

The site consists of shallow, well-drained, moderately permeable, gravelly soils that formed in material weathered from extrusive igneous bedrock. In a representative profile, the surface layer is yellowish brown very gravelly coarse sandy loam about four inches thick. From 4 to 8 inches is a very gravelly sandy loam. At a depth of 8 to 16 inches is weathered igneous bedrock with discontinuous and thin calcium carbonate coatings. Indurate igneous bedrock is usually found below 16 inches in depth. Igneous gravel, cobbles, stones, and boulders cover 50 to 80 percent of the soil surface. Available water capacity is very low. Maximum calcium carbonate equivalent to a depth of 40 inches is 15 percent. In the profile, there are neither saline, nor sodic horizons. Rock outcrops are common features within the mapunits. Due to high presence of surface fragments, the soil's susceptibility to sheet and rill erosion by water is low (erosion factor, Kw = 0.10 - 0.15). The soil temperature is classified as hyperthermic.

The representative soil mapunits is:

Rock outcrop-Terlingua complex, 10-30 percent slopes. (Terlingua component)

Table 4. Representative soil features

Parent material	(1) Residuum–basalt
Surface texture	(1) Very gravelly coarse sandy loam (2) Extremely gravelly sandy loam (3) Loam
Family particle size	(1) Loamy

Drainage class	Moderately well drained to well drained
Permeability class	Slow to moderate
Soil depth	4–16 in
Surface fragment cover <=3"	30–52%
Surface fragment cover >3"	22–34%
Available water capacity (0-40in)	0.03–0.1 in
Calcium carbonate equivalent (0-40in)	2–15%
Electrical conductivity (0-40in)	0–2 mmhos/cm
Sodium adsorption ratio (0-40in)	0
Soil reaction (1:1 water) (0-40in)	7.9–8.4
Subsurface fragment volume <=3" (Depth not specified)	39–49%
Subsurface fragment volume >3" (Depth not specified)	8–10%

Ecological dynamics

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

Composition and production will vary with yearly weather conditions, location, aspect, and the natural variability of the soils. 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. 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. However, insects, rodents and herbivores such as, mule deer, desert bighorn sheep, 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.

Early records suggest cattle, sheep, and horses were introduced into the southwest from Mexico in the mid-1500's. However, extensive ranching began in the Trans-Pecos region in the 1880s. Early explorers described the lushness of vegetation in parts of the Trans-Pecos. Captain John Pope in 1854 described 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 springs and water sources that were found in the region. Wagon travel could be accomplished, under favorable conditions, with overnight stops having both water and forage. Livestock numbers peaked in the late 1880's following the arrival of railroads. Historical accounts document ranches with stocking rates as high as one animal unit per four acres.

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 cattle ceased. In 1944, most of the Basalt Hill (Hot Desert Shrub) sites 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 however are able to utilize steeper slopes. 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.

Due to a combination of climate, soils, and geology, the Basalt Hill ecological site is highly susceptible to disturbances and management prescriptions, either alone or in combination. Disturbances may quickly cause one stable community to cross a compositional and functional threshold into an alternative and often nonreversible stable community.

Indication of vegetation change because of disturbance, namely overgrazing, includes a shift from a shrub/mid and short grass community to a shrub/short grass community and ultimately to a nonreversible annual grass (or no grass) shrub community. Drought conditions can hasten this transition. Loss of herbaceous cover caused from frequent disturbance can create more of an inhospitable environment for some shrubs and forbs to encroach or even survive. This is probably due to higher soil temperatures and less water infiltration and soil stability. A few species, such as creosotebush, are able to increase and colonize following retrogression mostly due to their preference for gravelly and droughty soils that provides a competitive advantage over other plants. However, in many ecosystems, few plants are able to colonize and complete their life cycle between frequent or continuous disturbance. Consequently, the degraded shrub state is a sparse and less diverse plant community.

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

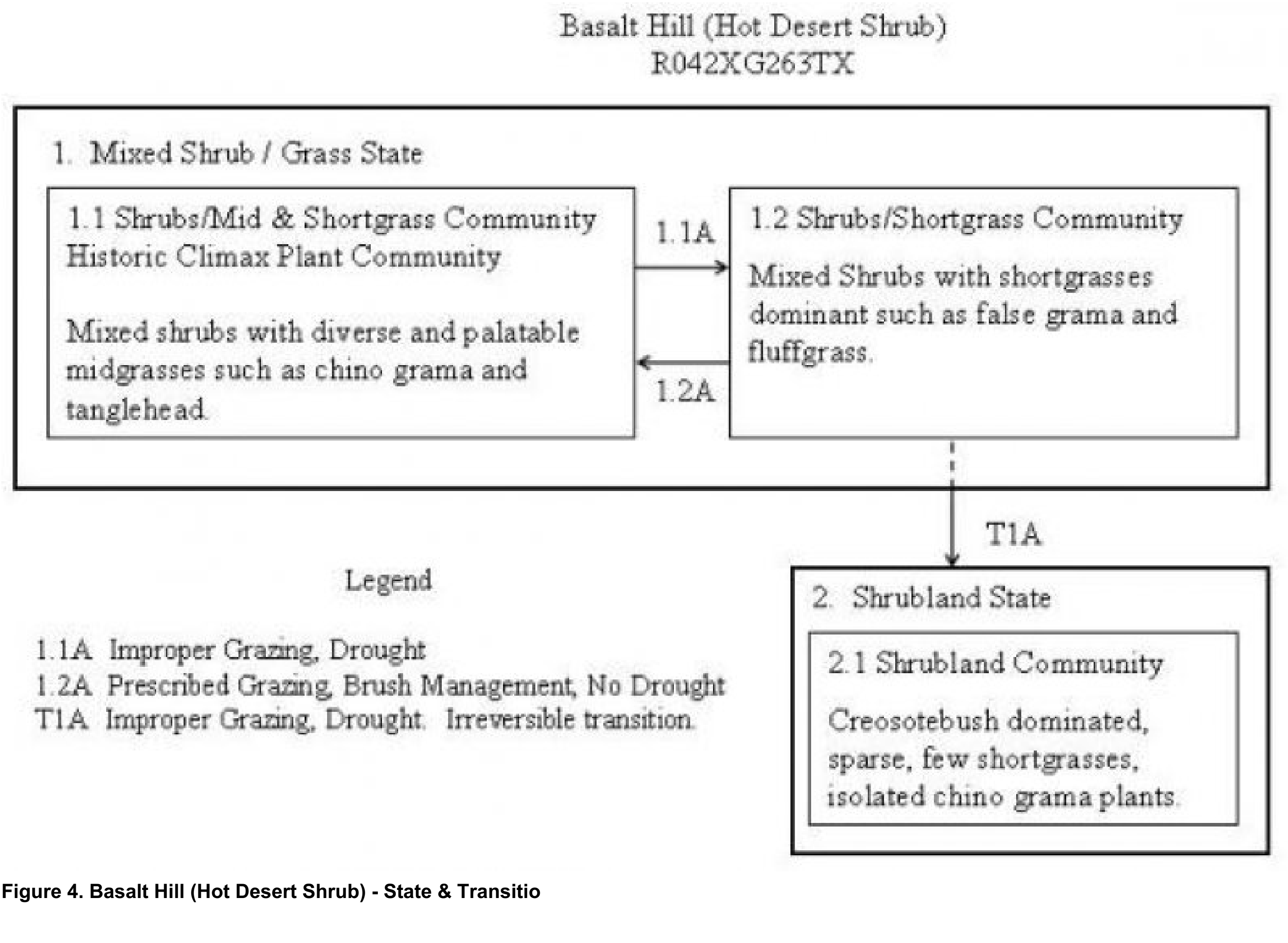

Figure 4. Basalt Hill (Hot Desert Shrub) - State & Transitio

State 1
Mixed-Shrub/Grass State

Community 1.1
Shrubs/Mid and Shortgrass Community

Figure 5. 1.1 Shrubs/Mid and Shortgrass Community

The Shrubs/Mid & Shortgrass Community (1.1) is the representative plant community for the Basalt Hill Ecological Site. Grasses in the HCPC total approximately 50% of the species composition, while mixed shrubs and forbs account for 40% and 10%, respectively. Dominant midgrasses in the HCPC are Chino grama, tanglehead, and bush muhly. Shortgrasses include false grama, fluffgrass, and slim tridens. Common shrubs include ocotillo, lechuguilla, and leatherstem. Spiderling, woollypod spurge, and rosemallow are common forbs. Areas with more available moisture such as north facing slopes and depressions or drainages have the potential of supporting plants such as yellow trumpet flower (*Tecoma stans*), elbowbush (*Forestiera pubescens*), whitebrush (*Aloysia gratissima*), and resurrection fern (*Selaginella pilifera*). These areas are typically the most productive and resilient. In addition to increased water holding capacity, the steeper slopes have larger and varying surface fragment size that limits livestock accessibility and assists with plant protection from herbivory. These productive and species rich slopes and drainages are important wildlife habitat and provide a protected travel corridor. Lower elevation foothills generally have smaller surface fragment size and have historically more accessible to livestock. Retrogression due to drought is caused by an overall decline in grass cover and production based on the species drought tolerance. Overgrazing can cause an immediate decrease in the most palatable midgrasses. Separately, or in combination, these disturbances can expedite a shift in the HCPC to a Shrubs/Shortgrass Community (1.2) and ultimately into a naturally nonreversible Shrubland Community (2.1). Due to the inherently low production potential of the site, shrub encroachment following grass removal is slow. Of the shrub species in HCPC, there is evidence suggesting creosotebush as the primary increaser following retrogression. Lower succession annual forbs or pioneer species increase in highly disturbed areas. Conservation practices such as prescribed grazing, and and/or woody plant control can help maintain ecological integrity in already healthy sites. In the absence of any disturbance, the community may eventually be composed of the species that are the most effective competitors for limited resources.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	75	125	175
Shrub/Vine	60	100	140
Forb	15	25	35
Tree	0	0	0
Total	**150**	**250**	**350**

Figure 7. Plant community growth curve (percent production by month).
TX0018, Mixed Shrub Dominated Community (Mid & Shortgrasses/Shrubs).
Drought tolerant mixed shrubs dominate with mid and shortgrasses..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	1	2	2	2	8	8	20	25	15	15	1

Community 1.2
Shrubs/Shortgrass Community

Figure 8. 1.2 Shrubs/Shortgrass Community

The Shrubs/Shortgrass Community (1.2) is the result of both overgrazing by livestock and drought. Overgrazing initially reduces the most palatable and deeper rooted midgrasses such as tanglehead, bush muhly, and Chino grama. Shallow rooted shortgrasses such as slim tridens, fluffgrass, and false grama remain stable and in some cases increase depending upon available resources. Competitive woody plants such as creosotebush begin to increase at the exclusion of other vegetation. Community appearance is slightly sparser. Exposed areas of surface gravels become evident due to displaced plants and decreased litter. Most of the climax perennial forbs persist. Prescribed grazing and some woody plant control can help prevent this community from crossing a compositional and functional threshold and into a naturally nonreversible and stable Shrubland State (3). A transition back towards HCPC, or a similar community, will require prescribed grazing and protection from any unnatural disturbance due to the inherently slow recovery rates within the Chihuahuan Desert.

Table 6. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Shrub/Vine	140	245	350
Grass/Grasslike	20	50	75
Forb	20	40	50
Tree	0	0	0
Total	**180**	**335**	**475**

Figure 10. Plant community growth curve (percent production by month). TX0010, Mixed Shrub Dominated Community (Shortgrasses/Shrubs). Shrubs and shortgrasses dominate – Growth is predominately shrubs and shortgrasses from May through October with peak growth from July to September..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	1	2	2	2	8	8	20	25	15	15	1

Pathway 1.1A
Community 1.1 to 1.2

Shrubs/Mid and Shortgrass Community

Shrubs/Shortgrass Community

Improper Grazing and Droughts lead to Shrubs/Shortgrass Community.

Pathway 1.2A
Community 1.2 to 1.1

Shrubs/Shortgrass Community

Shrubs/Mid and Shortgrass Community

Prescribed Grazing, Brush Management, and No Droughts can revert back to Shrubs/Mixed Grass Community.

Conservation practices

Brush Management
Prescribed Grazing

State 2
Shrubland State

Community 2.1
Shrubland Community

Figure 11. 2.1 Shrubland Community

The Shrubland State is the result of excessive overutilization of plant resources. Drought conditions will only worsen the health of the site. Sparse woody plants, specifically creosotebush, dominate the Shrubland State with few shortgrasses and forbs. Lack of sufficient herbaceous cover exposes the dark surface fragments creating an inhospitable environment for plant seedlings to survive. Runoff is rapid with decreased infiltration. Surface fragments, to some degree, stabilize the soil surface. The Shrubland State is located on many of the lower foothills that have historically been most accessible to livestock. Due to climate, shallow soils, geology, and altered hydrology, this state does not have the potential to return to the Mixed Shrub/Grass State even with prolonged deferment of grazing and woody plant control.

Table 7. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Shrub/Vine	140	245	350
Forb	25	40	50
Grass/Grasslike	1	5	10
Tree	0	0	0
Total	**166**	**290**	**410**

Figure 13. Plant community growth curve (percent production by month). TX0018, Mixed Shrub Dominated Community (Mid & Shortgrasses/Shrubs). Drought tolerant mixed shrubs dominate with mid and shortgrasses..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	1	2	2	2	8	8	20	25	15	15	1

Transition T1A
State 1 to 2

Improper Grazing and Drought leads to irreversible transition to the Shrubland State.

Additional community tables

Table 8. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Midgrass-bunchgrass-warm season-perennial**			45–105	
	Chino grama	BORA4	*Bouteloua ramosa*	30–70	–
	tanglehead	HECO10	*Heteropogon contortus*	15–35	–
2	**Stoloniferous shortgrasses**			15–35	
	black grama	BOER4	*Bouteloua eriopoda*	8–18	–
	false grama	CAER2	*Cathestecum erectum*	8–18	–
3	**Midgrass-bunchgrass-warm season -perennial**			8–18	
	sideoats grama	BOCU	*Bouteloua curtipendula*	4–9	–
	Arizona cottontop	DICA8	*Digitaria californica*	4–9	–
4	**Warm season, perennial bunchgrasses**			5–15	
	threeawn	ARIST	*Aristida*	3–7	–
	slim tridens	TRMU	*Tridens muticus*	3–7	–
	low woollygrass	DAPU7	*Dasyochloa pulchella*	2–4	–
Shrub/Vine					
5	**Shrubs**			23–53	
	lechuguilla	AGLE	*Agave lechuguilla*	8–18	–
	ocotillo	FOSP2	*Fouquieria splendens*	8–18	–
	leatherstem	JADI	*Jatropha dioica*	8–18	–
6	**Shrubs**			15–35	
	shortleaf jefea	JEBR	*Jefea brevifolia*	5–11	–
	littleleaf ratany	KRER	*Krameria erecta*	5–11	–
	plumed crinklemat	TIGR	*Tiquilia greggii*	5–11	–
	featherplume	DAFO	*Dalea formosa*	3–7	–

7	**Shrubs**			15–35	
	creosote bush	LATR2	*Larrea tridentata*	8–18	–
	whitethorn acacia	ACCO2	*Acacia constricta*	5–11	–
	catclaw acacia	ACGR	*Acacia greggii*	3–7	–
8	**Succulents**			8–18	
	Christmas cactus	CYLE8	*Cylindropuntia leptocaulis*	3–7	–
	pricklypear	OPUNT	*Opuntia*	3–7	–
	Big Bend pricklypear	GRSC6	*Grusonia schottii*	2–4	–
Forb					
9	**Perennials**			15–30	
	Shrub, other	2S	*Shrub, other*	5–10	–
	Forb, perennial	2FP	*Forb, perennial*	3–6	–
	slimstalk spiderling	BOGR	*Boerhavia gracillima*	1–3	–
	croton	CROTO	*Croton*	1–3	–
	beetle spurge	EUER2	*Euphorbia eriantha*	1–3	–
	snakecotton	FROEL	*Froelichia*	1–3	–
	paleface	HIDE	*Hibiscus denudatus*	1–3	–
	plains blackfoot	MELE2	*Melampodium leucanthum*	1–3	–
	menodora	MENOD	*Menodora*	1–3	–
	Durango senna	SEDU	*Senna durangensis*	1–3	–
10	**Annuals**			0–5	
	Forb, annual	2FA	*Forb, annual*	0–3	–
	mustard	BRASS2	*Brassica*	0–1	–
	golden crownbeard	VEEN	*Verbesina encelioides*	0–1	–

Animal community

The site at or near HCPC is suited for a properly managed (proper stocking rates) grazing system for the production of livestock, including cattle, sheep, and goats. Continuous grazing causes a gradual decline in range health reducing livestock nutrition and habitat quality for wildlife. Livestock should be stocked at carrying capacity in proportion to the grazeable grass, forb, and browse. Vegetative growth is episodic mirroring the rainfall. For that reason, stocker type livestock operations may be more suitable than year-round stocking.

Many types of wildlife used the HCPC of this site. Invertebrates, reptiles, birds, and mammals either use the sit as their primary habitat or visit from adjacent sites. Common mammals include mule deer, jackrabbit, cottontail rabbit, javelina, coyote, ground squirrel, skunk, woodrats, many nocturnal mice, and occasionally mountain lions. Game birds include scaled quail and dove. Numerous songbirds and raptors also occur in the area. Desert bighorn sheep are currently being restored to the region.

Plant Preference by Animal Kind:
These preferences are somewhat general in nature as the preferences for plants is dependent upon grazing experience, time of year, availability of choices, and total forage supply.

Legend: P=Preferred D=Desirable U=Undesirable N=Not Consumed T=Toxic X=Used, but not degree of utilization unknown
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. Only consumed when other forages 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 existing plant community with representative plant species, current soil conditions (soil health), current management, and climate determine the dynamics of the water cycle. Plant and litter cover are important factors, which protect the site from erosion. However, total production and the types of plant species present have greater impact on hydrologic dynamics (infiltration capacity, runoff, and soil losses).
With reference to the transitional pathway diagram, the Mixed Shrub/Grass State (1.1 & 1.2) is associated with optimum hydrologic function within this site. The high degree of hydrologic function in state 1 is due to the adequate vegetative cover and dominance of deep-rooted midgrasses compared to more shallow rooted shortgrasses. When properly managed, these species provide adequate cover that will minimize runoff. One of the key concepts to high hydrologic function is the structure and morphology of the root system and other biotic and abiotic factors as explained above. During high rainfall periods, water will percolate beyond the immediate surface root zone via fractures in the bedrock. As this water moves downward, it contributes to the recharge of groundwater.

In the HCPC, some runoff naturally occurs due to the low overall biomass production and common occurrence of high intensity summer rainfall. However, his site has a high percentage of rock fragments that assist with minimizing runoff and reducing raindrop impact.

In the Shrubland State 2, improper grazing accelerated by periodic drought has caused loss or reduction of most of the grasses. Lack of sufficient herbaceous vegetative cover has impaired hydrologic function on this site. During the transition phase from Mixed Shrub/Grass State 1 to the Shrubland State 2, infiltration decreases, runoff increases, and significant soil loss occurs due to loss of herbaceous plant cover and organic matter. Hydrologic conditions worsen with continued improper management. Rock surface fragments helps minimize some soil loss. Restoration to State 1 hydrology may not be possible or realistic.

Recreational uses

The Basalt Hills Site is limited for outdoor recreational uses. Small stones, slope, and depth to bedrock make campsite preparation difficult. Hiking and horseback riding is difficult because of surface stones and bedrock.

Wood products

Ocotillo branches are used for fencing and landscaping. When harvesting, it is important not to remove an entire plant, but only a few stems to help preserve the integrity of the donor plant.

Other products

None.

Other information

None.

Inventory data references

Information presented here has been derived from the revised Hot Rocky Range Site description, literature, NRCS clipping and cover data, field observations, and personal contacts with range and wildlife trained personnel.

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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	11/17/2011
Approved by	Kent Ferguson
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):** 1-5% bareground.

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.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil stability values of 4-6 under vegetation and 2-3 in the interspaces

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** 1-4 inche thick brown surface horizon with a medium granular 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 at least 30% of total plant compostion by weight. Shrubs will always dominate.

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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: Mid/tall shrubs > bunchgrasses

    Sub-dominant: Stoloniferous grasses > subshrubs

    Other: perennial forbs = succulents > annual forbs and grasses

    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):**

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 150-350 lbs

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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:** None

17. **Perennial plant reproductive capability:** All species should be capable of reproducing.