

Texas FFA Range Evaluation and Management CDE Guidebook



Ninth Revision 1/25/18

INTRODUCTION

Rangeland is a kind of land, not a land use, on which the native vegetation is predominately herbaceous plants and shrubs. Rangeland is the most extensive kind of land in the world, comprising more than 47% of the earth's land surface. In the contiguous 48 states, rangeland makes up 45% of the land surface. Although some of Texas's rangelands have been destroyed by farming or conversion to introduced plants, 59% of the state (over 100 million acres) remains in native rangeland, making it the most extensive kind of land in the state.

The rangeland ecosystem is characterized by many organisms. Mixtures of native grasses, forbs, or shrubs exist as unique native plant communities. These plant communities include tallgrass prairie, shortgrass prairie, mixed grass prairie, oak grassland, mesquite grassland, and cross timbers. The cross timbers is a mixture of vegetation that includes post oak and blackjack oak forests, oak mottes and oak savannas interspersed with tallgrass prairie. Many plants that occur in rangeland also occur in the forests of eastern Texas in forest openings or in the forest understory.

Looming large in both popular imagination and in biological diversity, Texas ranks highly in botanical diversity. Occupying a central position along the nation's southern border, Texas overlaps several major ecological regions, including the southwestern deserts, the Great Plains, the humid Gulf Coast, and, at the state's southern tip, the Mexican subtropics. As a result, many species reach distributional limits in Texas, and a strange blend of eastern and western species commingle within the state. Certain unusual landforms contribute to the state's high rankings, including the Edwards Plateau, a limestone region that supports some of the rarest species in the nation.

Rangeland provides habitat for many native plants and animals as well as domestic livestock. As greater pressure is placed on our limited natural resources by a growing human population desiring a higher standard of living, stewardship of the land must not be overlooked. A part of land stewardship is conserving and restoring native plant communities, ecosystems, and landscapes.

HOW THE CONTEST IS CONDUCTED

Judging rangeland is combined into a four-part program. Contestants are asked to:

1. Determine the ecological site and similarity index.
2. Determine the value of the ecological site for beef cattle.
3. Make management recommendations based on the resource value ratings stated in the objectives.
4. Identify plants and give their value for beef cattle.

OTHER CONTEST INFORMATION

- Spend 20 minutes at each location.
- Use 10 minutes at the end of the contest to make sure the score sheet is properly filled out.
- The contest is divided into three phases;
 - (1) Resource Inventory
 - (2) Resource Management.
 - (3) Plant Identification
- Start by making the resource inventory of present or bench mark conditions which involves determining what kind of ecological site is being evaluated and the similarity index of the site. The limiting factors revealed during this process are those to be marked. Then move to the management decisions for cattle. Do not return to marked items on resource inventory.
- If more than one limiting factor occurs (two or more limiting factors with the same value), then make sure that all factors with the lowest value are marked.
- The contest committee should carefully evaluate each location before deciding on the management scenario and numerical objective(s).
- Assume that if a management practice is checked to correct a limiting factor for a criteria, then the value for the component is raised to 40. However, if the component has more than one criteria, use the lowest number. Keep raising limiting factors by checking management practices until the lowest number meets or exceeds the stated objective.

CONTEST SET-UP

Select Four Locations — Ecological sites should be approximately 30' x 60' but may be smaller if deemed necessary by the contest officials.

Location 1 - Determine the ecological site.
Determine the similarity index for the site.
Determine the resource value rating of the site for beef cattle.
Make management recommendations based on the stated objective(s).

Location 2 - Determine the ecological site.
Determine the similarity index for the site.
Determine the resource value rating of the site for beef cattle.
Make management recommendations based on the stated objective(s).

Location 3 - Identify the plants and give their characteristics.
Location 4 - Identify the plants and give their characteristics.
Location 5 – Identify the plants and give their characteristics

For ecological sites 1 and 2:

- mark the site boundary with white flags
- mark a selected plant with a red flag close to the edge of the site boundary for judging utilization by beef cattle
- place the soil judging pit outside the site boundary

For Plant Identification Site 3, flag 10 plants.

For Plant Identification Site 4, flag 10 plants.

For Plant Identification Site 5, flag 10 plants.

The contestant is given the following:

1. The management scenarios and objectives for each ecological site
2. Appropriate Ecological Site Guides
3. One Beef Cattle Habitat Evaluation Form
4. One score card

TEXAS FFA RANGE PLANT LIST WITH CHARACTERISTICS

No.	Name	ST	LH	SG	OR	IN	Food
Grasses							
1	Annual Threeawn (<i>Aristida</i> sp.)	S	A	W	N		U
2	Annual Brome (<i>Bromus</i> sp.)	S	A	C	In	Iv	U
3	Bermudagrass (<i>Cynodon dactylon</i>)	S	P	W	In	Iv	D
4	Big Bluestem (<i>Andropogon gerardii</i>)	T	P	W	N		D
5	Blue Grama (<i>Bouteloua gracilis</i>)	S	P	W	N		D
6	Broomsedge Bluestem (<i>Andropogon virginicus</i>)	T	P	W	N		U
7	Buffalograss (<i>Buchloe dactyloides</i>)	S	P	W	N		D
8	Curly Mesquite (<i>Hilaria berlanderi</i>)	S	P	W	N		D
9	Eastern Gamagrass (<i>Tripsacum dactyloides</i>)	T	P	W	N		D
10	Fall Witchgrass (<i>Leptoloma cognatum</i>)	S	P	W	N		D
11	Hairy Grama (<i>Bouteloua hirsute</i>)	S	P	W	N		D
12	Hairy Tridens (<i>Erioneuron pilosum</i>)	S	P	W	N		U
13	Indiangrass (<i>Sorghastrum nutans</i>)	T	P	W	N		D
14	Johnsongrass (<i>Sorghum halapense</i>)	T	P	W	In	Iv	D
15	Little Barley (<i>Hordeum pusillum</i>)	S	A	C	In	Iv	U
16	Little Bluestem (<i>Schizachyrium scorparium</i>)	T	P	W	N		D
17	Old World Bluestem (<i>Bothriochloa ischaemum</i>)	M	P	W	I	IV	D
18	Perennial Dropseed (<i>Sporobolus</i> sp.)	T	P	W	N		D
19	Perennial Threeawn (<i>Aristida</i> sp.)	M	P	W	N		U
20	Purpletop (<i>Tridens flavus</i>)	T	P	W	N		U
21	Red Grama (<i>Bouteloua trifida</i>)	S	P	W	N		U
22	Sand Dropseed (<i>Sporobolus crytandrus</i>)	M	P	W	N		D
23	Sand Lovegrass (<i>Eragrostis trichodes</i>)	M	P	W	N		D
24	Scribner Panicum (<i>Panicum oligoanthes</i>)	S	P	C	N		D
25	Sedge (<i>Carex</i> sp.)	S	P	C	N		D
26	Sideoats Grama (<i>Bouteloua curtipendula</i>)	M	P	W	N		D
27	Silver Bluestem (<i>Bothriochloa saccharoides</i>)	M	P	W	N		U
28	Splitbeard Bluestem (<i>Andropogon ternaries</i>)	M	P	W	N		U
29	Switchgrass (<i>Panicum virgatum</i>)	T	P	W	N		D
30	Texas Bluegrass (<i>Poa arachnifera</i>)	M	P	C	N		D
31	Texas Grama (<i>Bouteloua rigidisetia</i>)	S	P	W	N		U
32	Texas Wintergrass (<i>Nasella leucotricha</i>)	S	P	C	N		D
33	Tumblegrass (<i>Schedonnardus paniculatus</i>)	S	P	W	N		U
34	Vine Mesquite (<i>Panicum obtusum</i>)	M	P	W	N		D
35	Weeping Lovegrass (<i>Eragrotis curvula</i>)	M	P	W	In		D
36	Western Wheatgrass (<i>Pascopyrum smithii</i>)	M	P	C	N		D
37	Wildrye (<i>Elymus</i> sp.)	M	P	C	N		D
38	Windmillgrass (<i>Chloris</i> sp.)	S	P	W	N		U
Legumes							
39	Catclaw Sensitivebriar (<i>Mimosa quadrivalis</i>)		P	W	N		D
40	Bundleflower (<i>Desmanthus</i> sp.)		P	W	N		D
41	Prairie Clover (<i>Dalea</i> sp.)		P	W	N		D
42	Scurfpea (<i>Psoralidium</i> sp.)		P	C	N		U
43	Slender Dalea (<i>Dalea enneandra</i>)		P	W	N		D
44	Vetch (<i>Vica</i> sp.)		A	C	In		D
45	Yellow Neptune (<i>Neptunia lutea</i>)		P	W	N		D

Forbs

46	Annual Sunflower (<i>Helianthus annuus</i>)	A	W	N		D
47	Antelopehorn Milkweed (<i>Asclepias viridis</i>)	P	C	N		U
48	Beebalm (<i>Monarda citriodora</i>)	A	W	N		U
49	Common Broomweed (<i>Gutierrezia dracunculoides</i>)	A	W	N		U
50	Compass Plant (<i>Silphium</i> sp.)	P	W	N		D
51	Croton (<i>Croton</i> sp.)	A	W	N		U
52	Curlycup Gumweed (<i>Grindelia squarrosa</i>)	P	W	N		U
53	Daisy Fleabane (<i>Erigeron strigosus</i>)	A	C	N		U
54	Dotted Gayfeather (<i>Liatris punctata</i>)	P	W	N		U
55	Engelmann Daisy (<i>Engelmannia peristenia</i>)	P	C	N		D
56	Giant Ragweed (<i>Ambrosia trifida</i>)	A	W	N		U
57	Halfshrub Sundrop (<i>Calyophus serrulatus</i>)	P	W	N		U
58	Heath Aster (<i>Aster ericoides</i>)	P	W	N		U
59	Horseweed (<i>Conyza canadensis</i>)	A	W	N		U
60	Maximilian Sunflower (<i>Helianthus maximiliani</i>)	P	W	N		D
61	Pepperweed (<i>Lepidium virginicum</i>)	A	C	N		D
62	Prairie Coneflower/Mexican Hat (<i>Ratibida columnifera</i>)	P	W	N		U
63	Plains Yucca (<i>Yucca glauca</i>)	P	C	N		U
64	Prickly Pear Cactus (<i>Opuntia macrorhiza</i>)	P	W	N	Iv	U
65	Sagewort (<i>Artemisia ludoviciana</i>)	P	W	N		U
66	Silverleaf Nightshade (<i>Solanum elaeagnifolium</i>)	P	W	N		U
67	Snow-on-the-Mountain (<i>Euphorbia marginata</i>)	A	W	N		U
68	Wax Goldenweed (<i>Haplopappus cilicatus</i>)	A	W	N		U
69	Western Ironweed (<i>Vernonia baldwinii</i>)	P	W	N		U
70	Western Ragweed (<i>Ambrosia psilostachya</i>)	P	W	N		U
71	Yarrow (<i>Achillea lanulosa</i> or <i>millefolium</i>)	P	C	N		U

Woodies

72	Blackjack Oak (<i>Quercus marilandica</i>)	P	W	N		U
73	Cedar (<i>Juniperus</i> Sp.)	P	C	N	Iv	U
74	Buttonbush (<i>Symphoricarpus orbiculatus</i>)	P	W	N		U
75	Chittamwood (<i>Bumelia lanuginose</i>)	P	W	N		D
76	Eastern Cottonwood (<i>Populus deltoids</i>)	P	W	N		D
77	Elm (<i>Ulmus</i> sp.)	P	W	N		D
78	Fragrant Sumac/Skunkbush (<i>Rhus aromatic</i>)	P	W	N		U
79	Greenbriar (<i>Smilax bona-nox</i>)	P	W	N		D
80	Hackberry (<i>Celtis</i> sp.)	P	W	N		D
81	Sumac (<i>Rhus</i> sp.)	P	W	N		U
82	Live Oak (<i>Quercus virginiana</i>)	P	W	N		U
83	Mesquite (<i>Prosopis glandulosa</i>)	P	W	N	Iv	U
84	Post Oak (<i>Quercus stellata</i>)	P	W	N		U
85	Plum (<i>Prunus</i> sp.)	P	W	N		U
86	Redbud (<i>Cercis canadensis</i>)	P	W	N		D
87	Soapberry (<i>Sapinudus drummondii</i>)	P	W	N		U

ECOLOGICAL SITES

An ecological site is an area of land with a combination of soil, climatic, topographic, and natural vegetation features that set it apart significantly from adjacent areas. Ecological sites are expressed in terms of soil depth, topography, slope, plant production, and plant composition. Vegetation on a particular site will vary in composition and production from one geographical region to another and from year-to-year because of changes in precipitation. The following descriptions of plant composition represent the assumed pre-European settlement conditions under the influence of periodic fire followed by herbivory.

The following pages have a description of each of the different ecological sites used in the Texas FFA Range Evaluation and Management Career Development Event. **For contest purposes, only plants listed on the Texas Range Plant List will be used in determining the Similarity Index of a site.**

Bottomland
Deep Prairie
Shallow Prairie
Deep Savanna
Shallow Savanna
Steep

Bottomland

Alluvial soils that are subject to flooding and include riparian zones and overflow areas. The site is composed of deep productive soils subject to frequent or occasional overflow.

	Site Composition Maximum	Observed Composition		Percent Counted Toward SI	
		Site 1	Site 2	Site 1	Site 2
Grasses					
Little Bluestem	20%	_____	_____	_____	_____
Big Bluestem	40%	_____	_____	_____	_____
Switchgrass					
Indiangrass					
Eastern Gamagrass					
Sideoats Grama	10%	_____	_____	_____	_____
Silver Bluestem					
Wildrye					
Texas Wintergrass					
Annual Threeawn	5%	_____	_____	_____	_____
Perennial Threeawn					
Buffalograss					
Hairy Grama					
Fall Witchgrass					
Vine Mesquite					
Texas Bluegrass					
Perennial Dropseed					
Other Natives					
Forbs and Legumes					
Broomweed	5%	_____	_____	_____	_____
Western Ragweed					
Sagewort					
Croton					
Prairie Clover					
Engelmann Daisy					
Snow-on-the-Mountain					
Maximilian Sunflower					
Dotted Gayfeather					
Beebalm					
Compass Plant					
Heath Aster					
Other Natives					
Woody					
Eastern Cottonwood	20%	_____	_____	_____	_____
Fragrant Sumac					
Flameleaf Sumac					
Greenbriar					
Buttonbush					
Hackberry					
Plum					
Live Oak					
Western Soapberry					
Elm					
Other Natives					
Invasives					
	0%	_____	_____	_____	_____
Total Percentage					
		_____	_____	_____	_____

Deep Prairie

Upland soils more than 20 inches in depth with slopes of less than a 15%.

	Site Composition Maximum	Observed Composition		Percent Counted Toward SI	
		Site 1	Site 2	Site 1	Site 2
Grasses					
Little Bluestem	34%	_____	_____	_____	_____
Big Bluestem	23%	_____	_____	_____	_____
Switchgrass					
Indiangrass					
Eastern Gamagrass					
Sideoats Grama	6%	_____	_____	_____	_____
Silver Bluestem	6%	_____	_____	_____	_____
Wildrye	6%	_____	_____	_____	_____
Texas Wintergrass					
Annual Threeawn	6%	_____	_____	_____	_____
Perennial Threeawn					
Buffalograss					
Hairy Grama					
Fall Witchgrass					
Vine Mesquite					
Texas Bluegrass					
Perennial Dropseed					
Other Natives					
Forbs and Legumes	10%	_____	_____	_____	_____
Western Ragweed					
Sagewort					
Halfshrub Sundrop					
Croton					
Prairie Clover					
Engelmann Daisy					
Snow-on-the-Mountain					
Maximilian Sunflower					
Dotted Gayfeather					
Yellow Neptune					
Heath Aster					
Other Natives					
Woody	9%	_____	_____	_____	_____
Fragrant Sumac					
Flameleaf Sumac					
Hackberry					
Plum					
Other Natives					
Invasives	0%	_____	_____	_____	_____
Total Percentage		_____	_____	_____	_____

Shallow Prairie

Upland soils less than 20 inches in depth with slopes of less than 15%.

	Site Composition Maximum	Observed Composition		Percent Counted Toward SI	
		Site 1	Site 2	Site 1	Site 2
Grasses					
Little Bluestem	48%	_____	_____	_____	_____
Big Bluetem } Switchgrass } Indiangrass }	18%	_____	_____	_____	_____
Sideoats Grama	10%	_____	_____	_____	_____
Annual Threeawn } Perennial Threeawn } Buffalograss } Hairy Grama } Silver Bluestem } Fall Witchgrass } Wildrye } Texas Wintergrass } Vine Mesquite } Perennial Dropseed } Other Natives }	9%	_____	_____	_____	_____
Forbs and Legumes	9%	_____	_____	_____	_____
Western Ragweed					
Sagewort					
Halfshrub Sundrop					
Croton					
Prairie Clover					
Engelmann Daisy					
Snow-on-the-Mountain					
Maximilian Sunflower					
Dotted Gayfeather					
Yellow Neptune					
Compass Plant					
Heath Aster					
Other Natives					
Woody	6%	_____	_____	_____	_____
Fragrant Sumac					
Flameleaf Sumac					
Hackberry					
Plum					
Other Natives					
Invasives	0%	_____	_____	_____	_____
Total Percentage		_____	_____	_____	_____

Deep Savanna

Upland soils more than 20 inches in depth, slopes of less than a 15%, and with scattered post oaks, or blackjack oaks, or live oaks of any size in any combination.

	Site Composition Maximum	Observed Composition		Percent Counted Toward SI	
		Site 1	Site 2	Site 1	Site 2
Grasses					
Little Bluestem	26%	_____	_____	_____	_____
Big Bluestem	15%	_____	_____	_____	_____
Switchgrass					
Indiangrass					
Buffalograss	7%	_____	_____	_____	_____
Sideoats Grama	10%	_____	_____	_____	_____
Hairy Grama					
Silver Bluestem					
Scribner Panicum					
Wildrye					
Sand Lovegrass					
Texas Wintergrass					
Vine Mesquite					
Perennial Dropseed					
Purpletop					
Other Natives					
Forbs and Legumes	15%	_____	_____	_____	_____
Prairie Clover					
Bundleflower					
Engelmann Daisy					
Snow-on-the-Mountain					
Dotted Gayfeather					
Catclaw Sensitivebriar					
Yellow Neptune					
Scurfpea					
Plains Yucca					
Other Natives					
Woody	15%	_____	_____	_____	_____
Hackberry					
Plum					
Blackjack Oak					
Post Oak					
Live Oak					
Flameleaf Sumac					
Fragrant Sumac					
Greenbriar					
Elm					
Other Natives					
Invasives	0%	_____	_____	_____	_____
Total Percentage		_____	_____	_____	_____

Shallow Savanna

Upland soils less than 20 inches in depth, slopes of less than a 15%, and with scattered post oaks, or blackjack oaks, or live oaks of any size in any combination.

	Site Composition Maximum	Observed Composition		Percent Counted Toward SI	
		Site 1	Site 2	Site 1	Site 2
Grasses					
Little Bluestem	35%	_____	_____	_____	_____
Big Bluestem } Switchgrass } Indiangrass }	15%	_____	_____	_____	_____
Sideoats Grama } Silver Bluestem } Texas Wintergrass } Perennial Dropseed } Perennial Threeawn }	20%	_____	_____	_____	_____
Buffalograss } Sedges } Fall Witchgrass } Wildrye } Curly Mesquite } Other Natives }	10%	_____	_____	_____	_____
Forbs and Legumes	5%	_____	_____	_____	_____
Western Ragweed					
Sagewort					
Halfshrub Sundrop					
Prairie Clover					
Bundleflower					
Engelmann Daisy					
Dotted Gayfeather					
Catclaw Sensitivebriar					
Scurfpea					
Prairie Coneflower					
Heath Aster					
Other Natives					
Woody	15%	_____	_____	_____	_____
Redbud					
Hackberry					
Blackjack Oak					
Post Oak					
Live Oak					
Flameleaf Sumac					
Fragrant Sumac					
Greenbriar					
Elm					
Other Natives					
Invasives	0%	_____	_____	_____	_____
Total Percentage		_____	_____	_____	_____

Steep

Upland soils with slopes of greater than 15%.

	Site Composition Maximum	Observed Composition		Percent Counted Toward SI	
		Site 1	Site 2	Site 1	Site 2
Grasses					
Little Bluestem	30%	_____	_____	_____	_____
Big Bluestem } Indiangrass }	20%	_____	_____	_____	_____
Sideoats Grama	15%	_____	_____	_____	_____
Perennial Threeawn } Hairy Grama } Silver Bluestem } Sedges } Fall Witchgrass } Texas Wintergrass } Perennial Dropseed } Other Natives }	10%	_____	_____	_____	_____
Forbs and Legumes	10%	_____	_____	_____	_____
Western Ragweed					
Sagewort					
Prairie Clover					
Bundleflower					
Engelmann Daisy					
Maximilian Sunflower					
Dotted Gayfeather					
Catclaw Sensitivebriar					
Scurfpea					
Vetch					
Plains Yucca					
Other Natives					
Woody	15%	_____	_____	_____	_____
Redbud					
Hackberry					
Plum					
Elm					
Other Natives					
Invasives	0%	_____	_____	_____	_____
Total Percentage		_____	_____	_____	_____

SIMILARITY INDEX

The SIMILARITY INDEX (SI) of the ecological site is dictated by many factors. Historically, herbivory by mammals and invertebrates above and below the soil surface, extensive fires, and periods of drought were major disturbances to the land. The kinds of plants that are present on an ecological site may be desirable or undesirable for a particular use. For example, if cattle have been grazed at a heavy stocking rate on a site for a long period of time, some of the plants that have increased over that period of time are not preferred by cattle. Plants preferred by cattle have decreased over this period of time. Any disturbance of the ecological site will affect the SI. Disturbances are a natural occurrence on all sites and are necessary to maintain ecological structure and function.

For contest purposes, the SI will be determined by comparing the present vegetation (species composition by weight at the end of the growing season in an ungrazed condition) to the presumed original dominant plants on that site historically and before European settlement. Specific ecological site descriptions can be obtained from the Natural Resource Conservation Service (NRCS). **When determining the percentage Plains Yucca and Prickly Pear Cactus in an ecological site, canopy cover will be used although they are in the forb category.**

For example, if we were judging the SI for a Deep Prairie Site, we would determine the composition of plant species. By convention, however, we can count no more than the percent allowable on the Ecological Site Guide. The SI is expressed as a percentage from 0 to 100%. Plants native to the site count in percent composition toward the SIMILARITY INDEX (SI). Plants native to the site but not specifically listed in categories are counted as “other.”

The Similarity Index is expressed as a percent of how close or similar the plant community on the present site is as compared to the original plant composition prior to European settlement. The Similarity Indexes are:

- 76% - 100%
- 51% - 75%
- 26% - 50%
- 0% - 25%

The following page gives an example of similarity index calculation.

Example of calculating the similarity index for a deep prairie. **For contest purposes, only plants that are listed on the Texas Range Plant List will be used in calculating the similarity index.** The contestant may use all of the percentage of the plant, or up to its allowable limit, in calculating the similarity index. Any percentage over the maximum amount cannot be used. For example, a site could be 50% Little Bluestem but since the maximum allowed percentage of Little Bluestem 34%, then only 34% could count towards the site total.

	Site Composition Maximum	Actual Composition Site 1	Percent Site 2
Grasses			
Little Bluestem	34%	<u>22</u>	_____
Big Bluestem	23%	<u>7</u>	_____
Switchgrass			
Indiangrass			
Eastern Gamagrass			
Sideoats Grama	6%	<u>6</u>	_____
Silver Bluestem	6%	<u>6</u>	_____
Wildrye	6%	<u>3</u>	_____
Texas Wintergrass	6%	<u>3</u>	_____
Annual Threeawn			
Perennial Threeawn			
Buffalograss			
Hairy Grama			
Fall Witchgrass			
Vine Mesquite			
Texas Bluegrass			
Perennial Dropseed			
Other Natives			
Forbs and Legumes			
Western Ragweed	10%	<u>10</u>	_____
Sagewort			
Halfshrub Sundrop			
Croton			
Prairie Clover			
Blacksamson			
Engelmann Daisy			
Snow-on-the-Mountain			
Maximilian Sunflower			
Dotted Gayfeather			
Yellow Neptune			
Heath Aster			
Other Natives			
Woody			
Fragrant Sumac	9%	<u>9</u>	_____
Flameleaf Sumac			
Hackberry			
Plum			
Other Natives			
Invasives			
	0%	<u>(5)</u>	_____
Total Percentage			
		<u>66</u>	_____

The percentages of allowable plants totals up to 66%. The percentage of invasives is not included in the total percentage since the allowable percentage is 0%. The similarity index for this site would be 66%.

RESOURCE VALUE RATING

The DESIRED PLANT COMMUNITY is the Similarity Index (SI) that meets the land manager's objective(s). For example, a land manager may want the management unit to have an SI of 60% to 70% for cattle. Estimating the percent composition of grasses, grasslike plants, forbs, legumes, and shrubs/trees should be done at the end of the growing season. However, since the contest is held in the spring, the contestants must be able to visualize what the plants would look like at the end of the growing season.

For contest purposes, the contribution of woody plants (shrubs and trees) will be evaluated as percent canopy cover. Resource value ratings for cattle will be determined by comparing the habitat requirements of the animal to the plant community existing on the ecological site. Management guidelines will be used to move the SI to attain the objective(s).

Introduced plants, those that did not evolve with the native ecosystems, will count toward the resource value rating for domestic livestock if their value rating is desirable. Introduced plants were not introduced to replace native plants, but to provide complementary forage for domestic livestock. Some exotic plant introductions threaten the integrity of native plant communities because they spread from where they were planted. Some examples of introduced invasive plants that invade native plant communities in Texas include Bermudagrass and Johnsongrass.

Some native plants have also become major problems because of removal of natural influences such as fire and are classified as invasive. These include cedar and mesquite.

BEEF CATTLE HABITAT EVALUATION

Introduction

Cattle can graze or browse many different kinds of plants (herbaceous and woody) depending on plant preference, plant availability, and nutritional status of the animal. Cattle grazing in native plant communities, rangeland or forestland, is compatible with land stewardship provided that it is done in a proper manner. Proper grazing management means balancing the needs of the plant community with the needs of the grazing animal. The elements of proper grazing management include maintaining the herd at or below carrying capacity and using prescribed grazing. Some rangelands and forestlands are more suited to managing for wildlife or other grazing or browsing animals than cattle because of the economic and environmental costs of changing the habitat to make it suitable for cattle production.

The purpose of this evaluation guide is to systematically evaluate habitat on the site for its value to cattle. The evaluation guide is designed to assist in inventorying and analyzing existing habitat conditions and to determine an overall habitat value, and identify the limiting factor for cattle. These values will indicate the overall quality of habitat that rangeland or forestland provides in its existing condition. The evaluation guide will also identify weak or missing elements (limiting factors) that are limiting cattle numbers so that management alternatives can then be developed to improve the habitat for cattle. In an actual situation, both economic and ecological considerations must be evaluated.

Background Information on the Habitat Evaluation Guide Components

Beef cattle restrict their home range to an area that provides their needs of food, water, and shelter, or that is controlled by fencing. The actual size and shape of the home range is controlled by how far the animal can travel and the quality of the various habitat elements within the home range. Actual home ranges are not marked by permanent boundaries (except for fencing) nor are they the same from season to season. Beef cattle prefer open areas that provide good air flow and thermal cover (either shade in warm weather or windbreaks during cold weather). However, they will use shrub or forested areas if that is all that is available or if environmental conditions are favorable.

Habitat Requirements

Forage factors: The diet of beef cattle consists of grasses, forbs, legumes, woody browse, and mast. Food preference is acquired through grazing experience and nutritional status of the animal. Beef cattle are opportunistic foragers and adapt to a wide variety of conditions. Because they are ruminants, they can digest lower quality forages than monogastrics. In general, diet requirements are higher for young grazing animals and declines as the animal matures except, in certain reproductive stages.

A. Forage Criteria

- A.1. *Forage Condition for Cattle:* Beef cattle prefer certain grasses, forbs, legumes, woody browse, and mast. These preferred plants decline in vigor and dominance over time if they are not properly grazed.
- A.2. *Forage Diversity:* Beef cattle will eat many different plants during the year. Grazing preferences change with season of the year and stage of plant growth. Having a variety of grasses, forbs, legumes, and woody plants available makes it more likely that the diet is properly balanced.
- A.3. *Forage Utilization:* In general, diet quality is highest at the beginning of the growing season and declines as the season progresses because of plant maturity. However, forage quality is also related to forage utilization. As a plant is grazed from leaves to stem, quality declines. Thus overutilization of forage causes a decline in quality and intake. If herbaceous plants are lightly to moderately grazed and then rested to allow regrowth, the regrowth will be of higher quality than ungrazed plants. Utilization on cool season plants is judged on current growth during the spring. Utilization on warm season plants is judged on prior years growth before May 15 for contests held during the spring. **The May 15 deadline for utilization applies only to utilization and is not applicable to the ecological sites or any other part of the contest.**

Distribution factors: Beef cattle move within their home range based on many interacting factors. The main factors include slope of the land, brush and tree cover, availability of water, wind direction, and shade or windbreaks. Cattle movements and grazing patterns can be especially damaging to the soil and vegetation depending on the extent and severity of disturbance by hoof action, trailing, rubbing, and grazing.

B. Distribution Criteria

- B.1. Forage Accessibility:* Beef cattle prefer to graze on level ground. As the slope increases or the surface of the ground becomes rough from rocks, grazing use declines.
- B.2. Grazing Restraint:* Beef cattle prefer to graze in open areas that allow easy movement and comfortable environmental conditions (e.g., summer conditions of air temperature, air movement, relatively low fly numbers). Increasing brush canopy cover tends to restrict movements, reduce air movement, and increase fly populations. Evaluate the brush cover at 6 feet and below.
- B.3. Water:* Beef cattle prefer to graze around water if forage is available. They move away from water for thermal protection (shade - summer, windbreak - winter) or when forage becomes unavailable. They seldom will move over 2 miles to meet their forage requirements.

C. Site Integrity

- C.1. Check for invasive plants on the ecological site.*

Instructions For Completing The Beef Cattle Habitat Evaluation Form

General Instructions. An overall habitat quality value and an overall limiting factor for beef cattle can be calculated from the values assigned to each habitat requirement. A formula uses the requirement values to derive an overall habitat quality value. The overall limiting factor value is determined by selecting the lowest limiting factor value assigned to any of the requirements. These values represent the general quality of habitat and the factor that is limiting the beef cattle population within the home range.

The following procedures describe the method for inventorying existing habitat conditions, rating the habitat criteria and calculating the habitat quality and limiting factor values. The system is based primarily on the kinds, amounts, condition, and arrangement of plants.

Ratings. Ratings for the various habitat criteria range from 0 (poor) to 40 (excellent). The number of ratings per criteria depend on the number of variables that can be practically measured and levels of management that can be practically applied.

GUIDE TO MANAGEMENT PRACTICES FOR BEEF CATTLE

- 1. CONTINUE PRESENT MANAGEMENT** — Use when the current management objective is met by the present condition of the site.
- 2. BEGIN A PLANNED GRAZING SYSTEM** — Use when forage production and/or forage diversity is the limiting factor.
- 3. APPLY FORB OR GRASS CONTROL** — Use when forage production and/or forage diversity is the limiting factor because of undesirable forbs or grasses **when they exceed 50% (by weight) of the plant community.**
- 4. APPLY WOODY PLANT CONTROL** — Use when forage production, forage diversity, or grazing restraint is the limiting factor because of woody plants **when they exceed 30% canopy cover.**
- 5. DECREASE STOCKING RATE FOR BEEF CATTLE**— Use when forage utilization is the limiting factor because of overuse.
- 6. INCREASE STOCKING RATE FOR BEEF CATTLE**— Use when forage utilization is the limiting factor because of lack of use.
- 7. CHANGE THE KIND OF GRAZING/BROWSING ANIMAL** — Use when grazing accessibility or grazing restraint is the limiting factor because of terrain or woody cover.
- 8. DEVELOP WATER FOR BEEF CATTLE** — Use when water is the limiting factor because of distance to water.

Note: Distance to water will be given.
- 9. APPLY INVASIVE PLANT CONTROL** — Use when invasive plants are the limiting factor because of their presence on the site. Use to maintain the integrity of the ecological site when any invasive herbaceous or woody plant occurs. Control may be in the form of prescribed fire, herbicide, biological, mechanical, or grazing/browsing. Often, combinations of the above treatments are required. Some invasive plants are difficult to control with existing technology. If more than one invasive plant occurs on the site, choose the plant with the lowest resource value rating.
- 10. PLANT ADAPTED FORAGE SPECIES**— Use when forage production is the limiting factor and the Similarity Index is 10% or less. This usually occurs on land that has been farmed and not reseeded. Defer grazing until the Desired Plant Community is established. Control competitive plants and invasive species with fire, grazing, or herbicide.

BEEF CATTLE HABITAT EVALUATION FORM

Habitat Requirements: Essential habitat components needed for survival and propagation of the species.

For beef cattle, evaluate (A) forage, (B) distribution factors, and (C) site integrity.

A. Forage Components: Forage of annual and perennial grass, forbs, legumes, and woody plants.

				Circle Correct Value	
				Site	
				1	2
1. Forage Production - How abundant (composition by weight) are the desirable food producing plants?					
Site has 76-100% by weight of desirable forage plants for beef cattle				<u>40</u>	<u>40</u>
Site has 51-75% by weight of desirable forage plants for beef cattle				<u>30</u>	<u>30</u>
Site has 26-50% by weight of desirable forage plants for beef cattle				<u>20</u>	<u>20</u>
Site has 0-25% by weight of desirable forage plants for beef cattle				<u>10</u>	<u>10</u>
2. Forage Diversity - How diverse is the desirable food producing plant community? (plant types = grasses, forbs, legumes, and woodies.)					
Food plants represented by 4 of the 4 major plant types				<u>40</u>	<u>40</u>
Food plants represented by 3 of the 4 major plant types				<u>30</u>	<u>30</u>
Food plants represented by 2 of the 4 major plant types				<u>20</u>	<u>20</u>
Food plants represented by 1 of the 4 major plant types				<u>10</u>	<u>10</u>
3. Forage Utilization - How long is the residue of key (marked) utilization plants?					
	Tallgrass	Midgrass	Shortgrass		
Light Use	(>8")	(>5")	(>4")	<u>30</u>	<u>30</u>
Moderate Use	(>5-8")	(4-5")	(3-4")	<u>40</u>	<u>40</u>
Heavy Use	(4-5")	(2-3")	(1-2")	<u>20</u>	<u>20</u>
Severe Use	(<4")	(<2")	(<1")	<u>10</u>	<u>10</u>
Lowest score of 3 rated criteria = Limiting Factor for Forage Factors				<input style="width: 30px; height: 20px; border: 1px solid black;" type="text"/>	<input style="width: 30px; height: 20px; border: 1px solid black;" type="text"/>

B. Distribution Components - Physical factors that limit the grazing animal

				Circle Correct Value	
				Site	
				1	2
1. Grazing Accessibility - How accessible are the forage plants to grazing animals?					
Slope less than 5%				<u>40</u>	<u>40</u>
Slope 5-10% and smooth				<u>35</u>	<u>35</u>
Slope 5-10% and rough (exposed surface rock)				<u>25</u>	<u>25</u>
Slope 11-15% and smooth				<u>30</u>	<u>30</u>
Slope 11-15% and rough (exposed surface rock)				<u>20</u>	<u>20</u>
Slope greater than 15% and smooth				<u>15</u>	<u>15</u>
Slope greater than 15% and rough (exposed surface rock)				<u>10</u>	<u>10</u>

2. Grazing Restraint - How much woody cover is there below 6 feet?

Brush canopy cover less than 30%	<u>40</u>	<u>40</u>
Brush canopy cover 31-50%	<u>30</u>	<u>30</u>
Brush canopy cover 51-80%	<u>20</u>	<u>20</u>
Brush canopy cover greater than 80%	<u>10</u>	<u>10</u>

3. Water - How far is water from the grazing site? (Given)

Distance less than or equal to 1/2 mile	<u>40</u>	<u>40</u>
Distance greater than 1/2 up to 1 mile	<u>30</u>	<u>30</u>
Distance greater than 1 up to 1 1/2 miles	<u>20</u>	<u>20</u>
Distance greater than 1 1/2 up to 2 miles	<u>10</u>	<u>10</u>
Distance greater than 2 miles or not available in the grazing unit	<u>0</u>	<u>0</u>

Lowest score of 3 rated criteria for Distribution Factors

<input type="text"/>	<input type="text"/>
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C. Site Integrity - Invasive plants.

1. Are invasive plants present?

No – or does not exceed 5%	<u>40</u>	<u>40</u>
Yes – resource value rating desirable	<u>20</u>	<u>20</u>
Yes – resource value rating undesirable	<u>10</u>	<u>10</u>

Lowest score of 1 rated criteria = Limiting Factor for Site Integrity

<input type="text"/>	<input type="text"/>
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Record your observations for each site

Site 1. Summary	(A) Forage Components	(B) Distribution Components	(C) Site Integrity
	<input type="text"/>	<input type="text"/>	<input type="text"/>

Habitat Rating Based on the Limiting Factor (lowest value)

Excellent_____ Good_____ Fair_____ Poor_____

(31 to 40) (21 to 30) (11 to 20) (<11)

Site 2. Summary	(A) Forage Components	(B) Distribution Components	(C) Site Integrity
	<input type="text"/>	<input type="text"/>	<input type="text"/>

Habitat Rating Based on the Limiting Factor (lowest value)

Excellent_____ Good_____ Fair_____ Poor_____

(31 to 40) (21 to 30) (11 to 20) (<11)

EXAMPLE OF EVALUATING AN ECOLOGICAL SITE

The contestant is given the Beef Cattle Habitat Evaluation Form to use in the contest so they will not have to memorize the rating criteria and the values that go with each of them.

The contestant examines the ecological site and determines the site is a deep prairie. After evaluating the existing plant community on the site and comparing it to the allowable plant community for the site, it is determined that the site has a similarity index of 66%. (Refer back to the example of similarity index calculation.) The contestant would mark Deep Prairie on the Ecological Site section of the scorecard and then mark 51-75% in the Similarity Index section of the scorecard.

The contestant now evaluates the site for beef cattle. The contestant is given a desired goal that the producer wishes to attain for the site. For this example the producer desires a goal of 30.

The contestant evaluates the site for beef cattle using the Beef Cattle Habitat Evaluation Form. Each criteria on the form is rated using the information on the form. This is done by the contestant observing the site from its perimeter. The contestant is not allowed to enter the site.

For this example the contestant observes the following:

- A1 - Forage Production: The contestant observes the site has 51-75% of desirable forage plants by weight for beef cattle. The rating for this would be 30.
- A2 - Forage Diversity: The contestant observes that there are 2 out of the 4 major plant types in the site. The rating for this would be 20.
- A3 - Forage Utilization: The contestant evaluates the marked plant for forage utilization and determines the degree of use. For this example, a little bluestem plant has been marked. The contestant measures the plant and determines it to be 7". Since little bluestem is tall in stature, the degree of use would be moderate. The rating for this would be 40.
- B1 - Grazing Accessibility: The contestant observes that the slope for the site is less than 5% and smooth. The rating for this would be 40.
- B2 - Grazing Restraint: The contestant observes that the site has a brush canopy cover of less than 30%. The rating for this would be 40.
- B3 - Distance to Water: The contestant will be given this information. The distance to water for this site is 1.25 miles. The rating for this would be 20.
- C1 - Site Integrity: The contestant observes that there are more than 5% invasive plants on the site that have an undesirable resource value rating for beef cattle. The rating for this would be 10.

There are three limiting factors in the site that are below the producer's target of 30.

- Forage Diversity - 20
- Distance to Water - 20
- Site Integrity - 10

The contestant then marks on the scorecard the Beef Cattle Limiting Factor(s) by marking the most limiting factor. In this example, the most limiting factor is site integrity, so it would be the only factor marked. If more than one most limiting factor has the same rating, then all them would need to be marked. It is possible that every limiting factor could be marked. If all the limiting factors are above the goal of the producer, then you still need to mark the most limiting factor(s) even though the contestant will not use a management practice to correct it.

The contestant then marks the Beef Cattle Habitat Rating on the scorecard. The habitat rating for beef cattle for this site would be poor since the most limiting factor is less than 11.

The contestant is now ready to recommend what practices to use in the Management for Beef Cattle section of the scorecard. This is accomplished by the contestant recommending the management practices that will correct all of the limiting factors that are below the management goal of the producer. Since the management goal of the producer in this example is 30, then the contestant only needs to correct those limiting factors that are below 30. The three limiting factors that were determined in the contestant's evaluation will be corrected by using the following management practices which would be marked on the scorecard.

Forage Diversity – mark Begin a Planned Grazing System

This management practice is used because the contestant observed that there were only 2 out of the 4 major plant types in the site which had a rating of 20 which is below the producer's goal of 30

Distance to Water - mark Develop Water for Beef Cattle

This management practice is used because the contestant was given the information that the distance to water on the site was 1.25 miles which has a rating of 20 which is below the producer's goal of 30.

Site Integrity – mark Apply Invasive Plant Control

This management practice is used because the contestant observed that there were more than 5% invasive plants on the site that had an undesirable resource value rating for beef cattle. The rating for this is 10 which is below the producer's goal of 30.

All of the other factors were 30 or higher which meet the producer's goal, so no other practices need to be recommended.

In the case of all of the factors meeting the producer's goal, then the contestant would mark the first practice which is Continue Present Management.

PLANT IDENTIFICATION

There will be 30 plants flagged for identification in three different sites. The contestant will have 20 minutes to identify and mark the characteristics for each site of 10 plants. The contestants will move through the plants at their own pace. The group leader will let the contestants know when there are 5 minutes left in the 20 minute time period. The contestants may not physically touch any of the flagged plants. The contestant may use their pencil to steady the plant in order to observe it more closely unless otherwise directed by the group leader. The plants selected will be from the Texas Range Plant List.

For each plant the contestant will:

Identify the plant and mark it on the scorecard by marking the number of the plant on the Texas Range plant list

Mark the characteristics of the plant in the appropriate section of the scorecard. The characteristics for each plant are identified on Texas Range Plant List.

The characteristics to be marked are:

- Life history (annual or perennial)
- Season of Growth (cool or warm)
- Origin (native or introduced)
- Invasive (mark those plants identified as invasive)
- Food Value for Beef Cattle (desirable or undesirable)