

DDB628 (Revised)

3rd Edition

Range Judging Handbook for North Dakota



**Rangeland Judging for
Livestock and Wildlife**

FFA and 4-H Members Guide



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Contents

Introduction	2
History of North Dakota Contest	3
Objectives of Range Judging	3
Contest Layout and Design	4
Contest Rules and Scoring	6
Ecological (Range) Sites	7
Similarity Index (Range Condition Evaluation)	10
Beef Cattle Range Evaluation	24
Guide to Range Management Practices Beef Cattle	30
Sharp-tailed Grouse Habitat Evaluation	31
Guide to Habitat Management Practices Sharp-tailed Grouse	33
Range Judging Cards	35
Contest Examples	40
Plant List	44
Situation Maps	51
Sources of Information	60

Introduction

North Dakota once was covered with a vast array of rangeland, interrupted occasionally by woodlands along river and stream systems. Natural vegetation included grasses, sedges, forbs and shrubs, varying in type and amount by plant communities. The major plant communities found in the state included the tall-grass prairie in the extreme east, mixed-grass prairie in the west, and a transition drift prairie in the central region. These rangelands provide habitat for many native plants and animals, and today play a major role in North Dakota's livestock industry

The majority of present-day North Dakota rangeland lies in the western two-thirds of the state, with remnant populations found in the southeastern and northeastern regions. The acreage of rangeland increases from east to west within the state. As soils, climate and topography change westward, plant communities also change. North Dakota has a wide diversity of plant species, each responding differently to climate and management. Plant communities of North Dakota contain more than 1,200 species. This biological diversity is a result of thousands of years of interaction among precipitation, temperature, topography, soils, grazing, fire and Native Americans. As Europeans settled the state, a significant altering of the historic landscape has occurred and biological diversity forever changed.

The North Dakota Range Judging Contest Manual

Judging Rangeland for Livestock and Wildlife

Contest Committee

Kevin Sedivec	Michael Humann
Doug Vannurden	Dennis Froemke
Michele Doyle	Amanda Hancock
Joshua Peterson	

Copies of the contest manual, "Range Judging Handbook for North Dakota," can be purchased by contacting:

North Dakota State University
Distribution Center
Morrill Hall 7, Box 5655
Fargo, ND 58105-5655
(701) 231-7883



History of North Dakota Contest

North Dakota became one of five north-central states to start a state and regional range judging contest in 1976. This contest was called the “Old West Regional Range Judging Contest.” North Dakota held its first official state range judging contest and South Dakota the first Old West Regional range judging contest. The state contest evolved from the North Dakota Youth Range Camp activity started in 1975 by the North Dakota chapter of the Society for Range Management. The North Dakota chapter has sponsored both events every year, celebrating the 25th anniversary of the North Dakota Range Youth Camp in 1999. The year 2000 marked the 25th anniversary of the Old West Regional Contest hosted by North Dakota. The contest has grown from about 40 participants in 1976 to more than 150 FFA and 4-H youth judges annually. Traditionally, the contest was designed to consider managing of livestock on range and pastureland. This manual initiates a more contemporary approach to the rangeland ecosystems, evaluating the resource for livestock production, wildlife habitat and site integrity.

Objectives of Range Judging

Range judging is learning to “read” the range to make proper management decisions. As humans place greater pressure on our limited natural resources, stewardship of the land must not be overlooked. Contestants learn to recognize the components of the range resource, evaluate the ecosystem’s current condition, develop management practices to improve the ecosystem and develop better understanding of the plant communities.

Although range judging is designed in a contest setting, a greater value is applying the information and principles to an actual rangeland unit. Since the demise and/or reductions of bison, prairie dogs, elk and antelope, and the suppression of natural fires, some natural ecosystems have declined in health (biological diversity). We can begin to restore rangeland ecosystems to their former biological diversity by grazing/browsing animals and applying fire to fill missing natural functions.

Learning to judge range provides effective tools that are used to manage the range resource. The objective of the contest is to teach participants some basic principles of range ecology, including soil-plant interaction, plant-animal interaction and plant succession. We have chosen beef cattle and sharp-tailed grouse to demonstrate the concept of range evaluation and management. Cattle are North Dakota’s most important livestock class economically and ecologically, while sharp-tailed grouse, the most common native upland game bird, are used as an indicator of range health.

Contest Layout and Design

Rangeland judging involves a five-part program. Contestants are asked to:

1. Determine the ecological site and similarity index.
2. Evaluate the value of the ecological site for beef cattle.
3. Evaluate the value of the ecological site for sharp-tailed grouse.
4. Make improvement practice recommendations based on the current resource values.
5. Make improvement practice recommendations based on a given situation on a map (**team event**).

Other information needed for a contest include:

- a. Allow 25 minutes at each of five locations.
- b. Allow five minutes at the end of the contest to finish card and verify score sheet.
- c. Divide contestants into five groups prior to start of contest, one group per site.
- d. Evaluate the same location for beef cattle and sharp-tailed grouse to facilitate learning an integrated management approach.
- e. Use beef cattle improvement practices for beef cattle, sharp-tailed grouse improvement practices for sharp-tailed grouse.
- f. Determine vegetation zone and provide proper similarity index guide to contestants.
- g. Degree of use by examination will be conducted from a marked grass plant. An individual plant will be used for sharp-tailed grouse.
- h. Contestants will be given distance to water on **site key**.
- i. Contestants provided number and class of livestock, months grazed and carrying capacity of pasture on **site key**.
- j. Provide a soil judging pit outside ecological site boundary.

- k. Three practice sites should be set up, with contestants, coaches and others having the opportunity to judge the practice sites and discuss them with instructors.
- l. Provide all contestants with an ecological site key.
- m. Provide a situation map with judging card to team to judge either prior to or after the field portion of the judging contest.

Contest Set-up Includes:

1. Six site locations (five in field, one as a separate session with team).
2. Ecological sites should be 100 by 100 feet; 15 plants per plant identification site; one situation map.

Location 1

Determine ecological site
Determine similarity index for site
Evaluate resource value for beef cattle
Evaluate resource value for sharp-tailed grouse
Determine range improvement practice for beef cattle and sharp-tailed grouse

Location 2

Determine ecological site
Determine similarity index for site
Evaluate resource value for beef cattle
Evaluate resource value for sharp-tailed grouse
Determine range improvement practice for beef cattle and sharp-tailed grouse

Location 3

Determine ecological site
Determine similarity index for site
Evaluate resource value for beef cattle
Evaluate resource value for sharp-tailed grouse
Determine range improvement practice for beef cattle and sharp-tailed grouse

Location 4

Identify plants and give their characteristics

Location 5

Identify plants and give their characteristics

Location 6

Evaluate situation map for management issues and determine range improvement practices for beef cattle

For locations 1 to 3, mark the ecological site boundary with flags. Mark a select plant with different color flag on edge of boundary for judging utilization by livestock as it affects sharp-tailed grouse (label grouse). Place the soil judging pit outside the site boundary.

For location 4, mark 15 individual plants for plant identification.

For location 5, mark 15 individual plants for plant identification.

For Location 6, provide a situation map for the team to judge.

3. Each contestant is given appropriate ecological site guides and score cards

4. Each ecological site should have a **site key** (either on poster or display board) giving distance to water, class and number of livestock, carrying capacity, and if abandoned cropland is present.

Contest Rules and Scoring

A team (FFA) consists of three to five individuals, (4-H) unlimited, with scores of the top three combined for the total team score. Individuals can compete in an FFA, 4-H, open, or adult. Scoring for each site includes:

Ecological site	15 points
Similarity index	15 points if Ecological Site is correct; 10 points if Ecological Site is incorrect
Beef cattle evaluation	10 points for Forage Value 10 points for Stocking Rate 5 points for Slope 6 points for Grazing Restraints (3 for Terrain, 3 for Woody Canopy)
Sharp-tailed grouse evaluation	10 points each for Food Habitat, Protective Cover, and Nesting Cover part A 5 points for Nesting Cover part B
Beef cattle management practices	3 points per practice to include all correct answers checked and those left blank that were supposed to be not checked.
Sharp-tailed grouse management practices	3 points per practice to include all correct answers checked and those left blank that were supposed to be not checked.
Plant identification	10 points per plant (3 for name, 1 for each characteristic), must have plant name correct to receive points for characteristics.
Situation map	300 points (see card for details).

In case of a tie in team scoring, use the score of the fourth-place individual, followed by the fifth-place individual, if tie continues. If one team has only three members, the team with the fourth member is the winner. Follow the same rules if one team has four individuals and the other five. Plant identification score is used to break ties in the individual categories. If a tie still exists, use location 1, followed by location 2, followed by location 3.

Ecological (Range) Sites

Dennis Froemke and Kevin Sedivec

Different kinds of rangeland are called ecological sites or range sites. Rangeland is a kind of land that is made up of combinations of many individual plant communities. These subunits are the basic framework for decision making in range management.

The ecological site is the product of all the environmental factors responsible for its development. Differences in kind, proportion and production of plants are, in large measure, the result of differences in environmental factors. For example, sandy soils produce different kinds and amounts of vegetation than clay soils. Vegetation also changes with amount and distribution of rainfall. Native vegetation in eastern North Dakota is much different than the western portion of the state due to decreased precipitation going from east to west.

An ecological (range) site is an area with similar soil, climate and topography capable of producing certain kinds and amounts of vegetation. The major factors influencing the characteristic vegetation of ecological sites include: 1) surface soil depth, 2) soil texture, 3) available soil moisture, 4) land slope and exposure, 5) precipitation and 6) biological factors.

Eighteen major ecological sites with similar soil/plant relationships are identified in North Dakota, with three minor sites also recognized. Ten of these ecological sites will be described and comprise potential sites used for range judging in North Dakota. These sites and their description include:

Shallow

This site occurs on gently rolling to steeply sloping uplands with slopes from 3 percent to 70 percent. The soils are shallow with bedrock within 0 to 20 inches of the soil surface. Bedrock may be solid rock or unconsolidated (smaller fragments such as gravel, small rocks, etc.) as with scoria, gravel or rock. Root growth is restricted, with most (not all) downward movement unable to penetrate

the layer. Potential vegetation on this site includes blue grama, plains muhly, side-oats grama, needle-and-thread, western wheatgrass and upland sedges. If the soil texture is sandy, prairie sandreed may be present. Little bluestem may be present if calcium carbonate is found in the upper soil profile.

Claypan

This site occurs on nearly level to gently sloping uplands and occasionally on nearly level bottomlands. These sites have moderately fine to moderately coarse-textured topsoils that are underlain by a dense, slowly permeable restrictive subsoil due to high sodium content at a depth of 0 to 20 inches below the soil surface. This hard claypan has round-topped columnar or prismatic structures often referred to as "biscuit tops." Potential vegetation on this site includes western wheatgrass, prairie Junegrass and blue grama. Green needlegrass and inland saltgrass may be found on some sites.

Sands

This site occurs on nearly level to strongly rolling uplands and stream terraces or flood plains. Soils are deep, loose, excessively drained fine, loamy sands or sand. Potential vegetation on this site includes needle-and-thread, sand dropseed and western wheatgrass. Blue grama and sand bluestem may occur in lesser amounts.

Sandy

This site occurs on nearly level to rolling uplands. Slopes may be from 1 percent to 15 percent. Soils are deep and well-drained with a sandy loam or fine, sandy loam surface texture and may be found over a sand subsoil. Potential vegetation on this site includes prairie sandreed, needle-and-thread and blue grama. Upland sedges and sand bluestem may occur in lesser amounts.

Silty

This site occurs on nearly level to rolling uplands. Slopes may be from 1 percent to 15 percent. Soils are deep, moderately well-drained to moderately fine textured and feel like flour when dry. Predominant vegetation on this site includes western wheatgrass and green needlegrass. Prairie Junegrass, blue grama and upland sedges are common understory grasses and sedge. Needle-and-thread may be present but not abundant.

Clayey

This site occurs on nearly level to undulating uplands. Soils are deep and have silt loam to clay surfaces with a silty clay to clay subsoil. Soils are fine to moderately fine textured and feel greasy when wet. Predominant vegetation on this site is western wheatgrass. Green needlegrass, blue grama and prairie Junegrass are prominent on this site. Buffalograss and upland sedges are also common, especially in southwestern North Dakota.

Thin Upland

This site occurs mostly on steep uplands and on hillsides. Soils are weakly developed, with soil textures ranging from sandy loam to clay loam. Unweathered parent material is near the soil surface, but it is soft with no restrictive layer. Slopes generally range from 15 percent to 25 percent. Potential vegetation on this site includes little bluestem, needle-and-thread, plains muhly, western wheatgrass, side-oats grama and blue grama.

Overflow

This site occurs on nearly level to gently sloping lands that receive additional water from overflowing rivers, streams or runoff from higher sloping lands. Soils are deep, sandy loam to clay textured. The water table is generally 5 feet or more below the surface. Potential vegetation on this

site includes green needlegrass, western wheatgrass and big bluestem in wetter climates. Slender wheatgrass, bearded wheatgrass, Canada wildrye, switchgrass, porcupine grass and midsized sedges are major grasses and sedges. Western snowberry (buckbrush) is common on this site in much of North Dakota.

Wet Meadow

This site occurs on swales and depressions in glacial till plains, glacial lake plains and outwash channels. Slopes are commonly less than 1 percent. Additional water is received by runoff and/or underground seepage. These soils are deep, poorly drained and medium to fine textured, and are briefly flooded in the spring and summer. Although these soils dry up in midsummer, free water is present in the root zone. The water table usually is found between 0 and 5 feet from the surface. Predominate vegetation on this site includes midsedges and prairie cordgrass. Other plants found may include northern reedgrass, fowl bluegrass, switchgrass, Baltic rush and common spikerush.

Saline Lowland

This site occurs on low terraces and bottomlands along larger streams, lakes or wetlands. Additional water is received by run-in, overflow or seepage. Slopes are commonly less than

1 percent. Soils are saline and/or alkaline with salts evident on the surface when dry. These soils are deep, poorly drained and medium to fine textured. Some sites may have a water table between 3 and 5 feet from the surface. Potential vegetation on this site includes nuttall alkaligrass, inland saltgrass and western wheatgrass. Foxtail barley may become dominant under poor management.

North Dakota Ecological Site Key

A way to simplify ecological site identification is to use the ecological site key. Using the above information, individual sites can be identified using this key, which follows.

North Dakota Ecological Site Key

I. Restrictive to Root Growth

These sites have a limiting layer within 20 inches of the surface of either rock, gravel, stone, or restrictive clay (hard pan), which restricts **most** root growth beyond this layer. (If no restriction, go to II).

- A. Limiting layer is rock, scoria, gravel, or stone **Shallow**
- B. Limiting layer is restrictive clay **Claypan**

II. Non-Restrictive to Root Growth

These sites do not have a restrictive layer within 20 inches of the soil surface.

C. Lowlands — These sites receive additional moisture from occasional stream overflow, run-in from adjacent slopes, or during major flooding events. (If no additional moisture occurs, go to D).

- 1. No water table within 5 feet from surface, typically found in swales, no salt deposits on soil surface **Overflow**
- 2. Water table within 5 feet from surface
 - a. This site has a water table within 2 to 3 feet, root zone wet, and no salts evident on the soil surface **Wet Meadow**
 - b. This site will have salts evident on the surface when dry (note: look for key plant species) **Saline Lowland**

D. Uplands — These sites do not receive additional moisture from occasional stream overflow, run-in from adjacent slopes, or during major flooding events.

- 1. These sites occur on slopes usually less than 15%
 - a. Soils will not form a firm ball when wet, coarse **Sands**
 - b. Soils will form a firm ball and produce a short ribbon less than 1 inch, feel gritty **Sandy**
 - c. Soils will form a ribbon up to 2 inches and not feel gritty, like flour when dry **Silty**
 - d. Soils form a ribbon greater than 2 inches, support their own weight and feel greasy when wet **Clayey**
- 2. These sites occur on sidehills with slopes usually greater than 15%
 - a. This site is found on glaciated soils, thin top soil **Thin Upland**

Similarity Index

Dennis Froemke and Kevin Sedivec

The similarity index, formally known as range condition evaluation, is an evaluation or index of an ecological site. Herbivory by mammals and invertebrates above and below ground, wildfires and drought were major disturbances to the land before early settlement by European immigrants. The kind of plants that are present on an ecological site, and subsequent similarity indexes, will vary due to present and past activities by mammals, invertebrates and humans.

The similarity index varies among sites due to the presence of desirable and undesirable kinds of plants for a particular use. For example, if cattle have grazed at a heavy stocking rate for an extended period of time, some plants not preferred by cattle will increase through time. These plants are classified as increasers. Plants that decrease through time with heavy grazing pressure are termed decreasers. Any disturbance of the ecological site affects the species composition and similarity index. Remember, disturbances are a natural occurrence on all sites.

Before European settlement, ecological sites occurred in their natural condition. The plant communities evolved with natural disturbances of grazing (free-roaming herds), wildfires and drought. Remnants of the original plant communities still are found in North Dakota. The original plant communities describe the ecological sites (composition maximums). The similar index compares present plant communities with historic plant communities on an ecological site.

The present and historic plant species compositions are presented by weight at the end of growing season in an ungrazed condition as described by the Natural Resources Conservation Service (NRCS). The composition maximum is the percent of air dry weight of each plant species in the original plant community. Ungrazed plants at the end of the growing season and many years of data were used to determine the average air dry weights.

For example, if we were judging the similarity index of a silty site in the Badlands' vegetative zone, we would determine the plant composition by weight at the end of the growing season and compared with Ecological Site Guide. You can count no more than the percent allowable on the Ecological Site Guide or total of the amount present for an individual plant species or group of plant species. Simply count the smaller of the two values (maximum site composition and observed composition). The similarity index is expressed as a percentage from 0 to 100 percent. All native plants found on a site that are not specifically listed in a category are counted as "other." Invader and introduced plants do not count in percent composition toward the similarity index. In example 1, when we compare the observed values with the site composition maximum, we achieved a similarity index of 73 percent and checked on the judging card "GOOD CONDITION (51 percent to 75 percent)." In example 2, we achieved a similarity index of 60 percent and checked on the judging card "GOOD CONDITION (51 percent to 75 percent)."

Ecological Site Vegetation Index

The Natural Resource Conservation Service (NRCS) has determined the historic plant community for each ecological site by vegetative zones in North Dakota. The historic plant community has been determined based on plant species composition prior to European settlement, with natural disturbances by wildlife, wildfires and drought. This plant community is labeled “site composition maximum” and is the projected dry weight of vegetation at end of the growing season. Since North Dakota has variability in precipitation and temperature across the state from west to east and north to south, five vegetative zones were developed for native rangeland to compensate for the variability in species composition. These

vegetative zones are Badland, Missouri Slope, Coteau, Border and Drift Prairie and are illustrated in Figure 1.

Once you select the vegetative zone you are judging in, the ecological site being judged is determined and an estimate is made of the percentage (by weight) of each plant species or group of species. Using the provided ecological site guides (site composition maximum) for the vegetative zone, the percentage acceptable for each species or group of species is calculated to arrive at a similarity index (see examples 1 and 2). The ecological site vegetation index for each zone is found on pages 14-23.

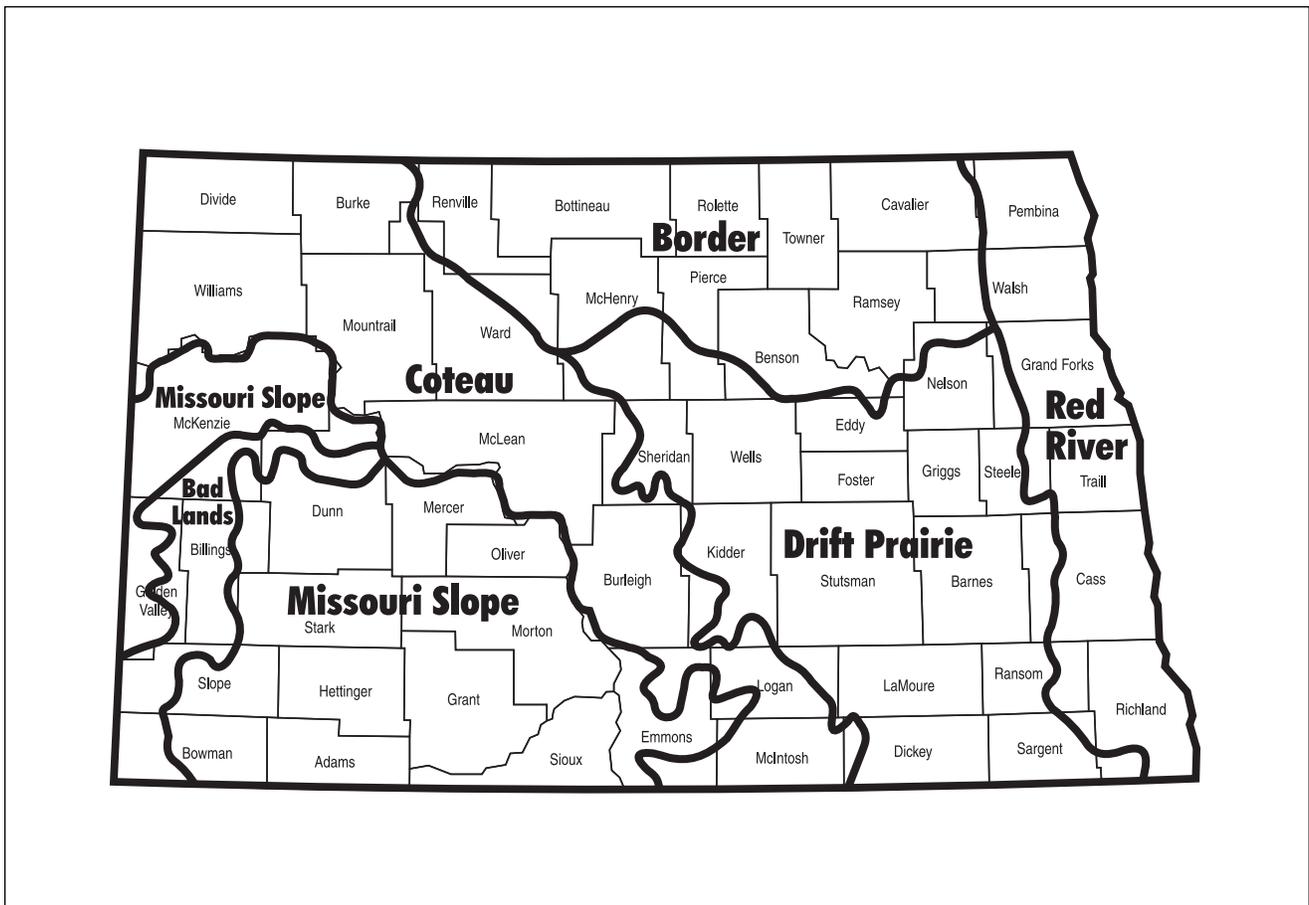


Figure 1. Vegetative zones of North Dakota.

Example 1 - Similarity Index of a silty ecological site in Badlands Vegetative Zone

Vegetation	Site Composition Maximum ¹	Observed Composition ²	Amount Allowable ³
Grasses	80		
Green needlegrass } Porcupine grass }	5	<u>3</u>	<u>3</u>
Western wheatgrass } Slender wheatgrass }	30	<u>15</u>	<u>15</u>
Needle-and-thread	10	<u>5</u>	<u>5</u>
Prairie sandreed			
Blue grama	20	<u>25</u>	<u>20</u>
Little bluestem Side-oats grama Big bluestem Switchgrass Sand bluestem Nuttall alkaligrass Inland saltgrass Prairie Junegrass Plains muhly Sand dropseed Blue bunch wheatgrass Red threeawn Sandberg bluegrass Other native grass	15	<u>10</u>	<u>10</u>
Invaders (Kentucky bluegrass)		<u>5</u>	<u>0</u>
Sedges	5		
Upland sedges	5	<u>10</u>	<u>5</u>
Midland sedges			
Forbs and legumes	10		
Natives	10	<u>10</u>	<u>10</u>
Invaders (Leafy spurge)		<u>7</u>	<u>0</u>
Woodies	5		
Natives	5	<u>10</u>	<u>5</u>
Invaders			<u>0</u>
	<u>100%</u>	<u>100%</u>	<u>73%</u>

Similarity Index: 0 to 25 = POOR 26 to 50 = FAIR
 51 to 75 = GOOD 76 to 100 = EXCELLENT

Index	<u>Good</u>
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¹Modified from NRCS Technical Guide
²Visual estimation made by judge
³The smaller value from two previous columns

Example 2 - Similarity Index of a shallow ecological site in Badlands Vegetative Zone

Vegetation	Site Composition Maximum ¹	Observed Composition ²	Amount Allowable ³
Grasses	75		
Green needlegrass Porcupine grass	5	1	1
Western wheatgrass Slender wheatgrass	5	10	5
Needle-and-thread	15	10	10
Prairie sandreed	5	1	1
Blue grama	10	25	10
Little bluestem Side-oats grama	25	5	5
Big bluestem Switchgrass Sand bluestem Nuttall alkaligrass Inland saltgrass Prairie Junegrass Plains muhly Sand dropseed Blue bunch wheatgrass Red threeawn Sandberg bluegrass Other native grass	10	8	8
Invaders (Crested wheatgrass)		5	0
Sedges	10		
Upland sedges Midland sedges	10	15	10
Forbs and legumes	5		
Natives Invaders (Sweetclover)	5	10 5	5 0
Woodies	10		
Natives Invaders	10	5	5 0
	100%	100%	60%

Similarity Index: 0 to 25 = POOR 26 to 50 = FAIR
 51 to 75 = GOOD 76 to 100 = EXCELLENT

Index Good

¹Modified from NRCS Technical Guide

²Visual estimation made by judge

³The smaller value from two previous columns

BADLANDS VEGETATIVE ZONE

Vegetation	Ov	SL	Sw	Cp	Observed Composition ²	Amount Allowable ³
	- Site Composition Maximum ¹ -					
Grasses	80	90	75	75		
Green needlegrass Porcupine grass	20		5			
Western wheatgrass Slender wheatgrass		25	40	5	25	
Needle-and-thread	10		15	15		
Prairie sandreed			5			
Blue grama	5		10	25		
Little bluestem Side-oats grama			25			
Big bluestem Switchgrass Sand bluestem	10					
Nuttall alkaligrass		20				
Inland saltgrass		20				
Prairie Junegrass Plains muhly Sand dropseed Blue bunch wheatgrass Red threeawn Sandberg bluegrass Other native grass	10	10	10	10		
Invaders						0
Sedges	5	5	10	10		
Upland sedges	5		10	10		
Midland sedges		5				
Forbs and legumes	5	5	5	5		
Natives	5	5	5	5		
Invaders						0
Woodies	10	-	10	10		
Natives	10		10	10		
Invaders						0
	100 %				100 %	
	Index					

Similarity Index: 0 to 25 = POOR; 26 to 50 = FAIR; 51 to 75 = GOOD; 76 to 100 = EXCELLENT

Ov - Overflow SL - Saline Lowland Sw - Shallow Cp - Claypan

¹Modified from NRCS Technical Guide

²Visual estimation made by judger

³The smaller value from two previous columns

BADLANDS VEGETATIVE ZONE

Vegetation	Sa	Sy	Si	Cy	Observed Composition ²	Amount Allowable ³
- Site Composition Maximum ¹ -						
Grasses	75	75	80	85		
Green needlegrass Porcupine grass			5	5	_____	_____
Western wheatgrass Slender wheatgrass	5	10	30	45	_____	_____
Needle-and-thread	25	25	10		_____	_____
Prairie sandreed	20	15			_____	_____
Blue grama	10	15	20	15	_____	_____
Big bluestem Switchgrass Sand bluestem	5				_____	_____
Prairie Junegrass Plains muhly Sand dropseed Little bluestem Blue bunch wheatgrass Red threeawn Sandberg bluegrass Other native grass	10	10	15	20	_____	_____
Invaders						0
Sedges	10	10	5	5		
Upland sedges	10	10	5	5	_____	_____
Forbs and legumes	10	10	10	5		
Natives	10	10	10	5	_____	_____
Invaders					_____	0
Woodyes	5	5	5	5		
Natives	5	5	5	5	_____	_____
Invaders					_____	0
	100 %				100 %	_____
	Index					_____

Similarity Index: 0 to 25 = POOR; 26 to 50 = FAIR; 51 to 75 = GOOD; 76 to 100 = EXCELLENT

Sa - Sands Sy - Sandy Si - Silty Cy - Clayey

¹Modified from NRCS Technical Guide

²Visual estimation made by judger

³The smaller value from two previous columns

DRIFT PRAIRIE VEGETATIVE ZONE

Vegetation	Ov	SL	Sw	Cp	Sa	Observed Composition ²	Amount Allowable ³
	- Site Composition Maximum ¹ -						
Grasses	80	90	75	75	75		
Green needlegrass Porcupine grass	15		15	15	5		
Western wheatgrass Slender wheatgrass	5	40	15	30	5		
Needle-and-thread	5		30	10	25		
Prairie sandreed					15		
Blue grama			10	15	5		
Little bluestem Side-oats grama	5						
Big bluestem Switchgrass Sand bluestem	35				5		
Nuttall alkaligrass		15					
Inland saltgrass		25					
Plains muhly Sand dropseed Prairie dropseed Prairie Junegrass Red threeawn Other native grass	15	10	10	10	15		
Invaders							0
Sedges	5	5	5	10	10		
Upland sedges	5		5	10	10		
Midland sedges	5	5					
Forbs and legumes	5	5	5	5	10		
Natives	5	5	5	5	10		
Invaders							0
Woodies	10	-	10	10	5		
Natives	10		10	10	5		
Invaders							0
	100 %						
						100 %	
						Index	

Similarity Index: 0 to 25 = POOR; 26 to 50 = FAIR; 51 to 75 = GOOD; 76 to 100 = EXCELLENT

Ov - Overflow SL - Saline Lowland Sw - Shallow Cp - Claypan Sa - Sands

¹Modified from NRCS Technical Guide

²Visual estimation made by judger

³The smaller value from two previous columns

DRIFT PRAIRIE VEGETATIVE ZONE

Vegetation	Sy	Si	Cy	WM	TU	Observed Composition ²	Amount Allowable ³
- Site Composition Maximum ¹ -							
Grasses	75	80	85	20	75		
Green needlegrass Porcupine grass	10	20	30		15		
Western wheatgrass Slender wheatgrass	5	15	25		5		
Needle-and-thread	20	20	5		25		
Prairie sandreed	15						
Blue grama	5	5			5		
Little bluestem Side-oats grama					5		
Prairie cordgrass				10			
Prairie Junegrass Plains muhly Sand dropseed Sandberg bluegrass Blue bunch wheatgrass Red threeawn Other native grass	20	15	20	10	20		
Invaders							0
Sedges	10	5		70	5		
Upland sedges	10	5			5		
Midland sedges				70			
Forbs and legumes	10	10	5	10	10		
Natives	10	10	5	10	10		
Invaders							0
Woodies	5	5	5		10		
Natives	5	5	5		10		
Invaders							0
	100 %						
						100 %	
						Index	

Similarity Index: 0 to 25 = POOR; 26 to 50 = FAIR; 51 to 75 = GOOD; 76 to 100 = EXCELLENT

Sy - Sandy Si - Silty Cy - Clayey WM - Wet Meadow TU - Thin-upland

¹Modified from NRCS Technical Guide

²Visual estimation made by judger

³The smaller value from two previous columns

MISSOURI SLOPE VEGETATIVE ZONE

Vegetation	Ov	SL	Sw	Cp	Sa	Observed Composition ²	Amount Allowable ³					
	- Site Composition Maximum ¹ -											
Grasses	80	90	75	80	80							
Green needlegrass Porcupine grass	20			5								
Western wheatgrass Slender wheatgrass		20	40	5	25	5						
Needle-and-thread	5		10	15	25							
Prairie sandreed			10		20							
Blue grama	5		5	20	10							
Little bluestem Side-oats grama			30		5							
Big bluestem Switchgrass Sand bluestem	20				5							
Nuttall alkaligrass			15									
Inland saltgrass			20									
Plains muhly Sand dropseed Sandberg bluegrass Prairie Junegrass Red threeawn Other native grass	10	15	15	15	10							
Invaders										0		
Sedges						5	-	10	10	5		
Upland sedges						5		10	10	5		
Midland sedges												
Forbs and legumes						10	10	10	5	10		
Natives	10	10	10	5	10							
Invaders							0					
Woodies	5	-	5	5	5							
Natives	5		5	5	5							
Invaders							0					
	100 %											
						100 %						
						Index						

Similarity Index: 0 to 25 = POOR; 26 to 50 = FAIR; 51 to 75 = GOOD; 76 to 100 = EXCELLENT

Ov - Overflow SL - Saline Lowland Sw - Shallow Cp - Claypan Sa - Sands

¹Modified from NRCS Technical Guide

²Visual estimation made by judger

³The smaller value from two previous columns

MISSOURI SLOPE VEGETATIVE ZONE

Vegetation	Sy	Si	Cy	WM	TU	Observed Composition ²	Amount Allowable ³
- Site Composition Maximum ¹ -							
Grasses	80	80	85	50	75		
Green needlegrass Porcupine grass	5	10	10		20		
Western wheatgrass Slender wheatgrass	10	25	45		10		
Needle-and-thread	25	15			10		
Prairie sandreed	20						
Blue grama	10	15	10		5		
Switchgrass				5			
Little bluestem Side-oats grama	5				15		
Prairie cordgrass				25			
Northern reedgrass				10			
Prairie Junegrass Plains muhly Sand dropseed Sandberg bluegrass Blue bunch wheatgrass Red threeawn Other native grass	5	15	20	10	15		
Invaders							0
Sedges	5	5	5	45	10		
Upland sedges	5	5	5		10		
Midland sedges				45			
Forbs and legumes	10	10	5	5	10		
Natives	10	10	5	5	10		
Invaders							0
Woodies	5	5	5	-	5		
Natives	5	5	5		5		
Invaders							0
	100 %						
						100 %	
						Index	

Similarity Index: 0 to 25 = POOR; 26 to 50 = FAIR; 51 to 75 = GOOD; 76 to 100 = EXCELLENT

Sy - Sandy Si - Silty Cy - Clayey WM - Wet Meadow TU - Thin-upland

¹Modified from NRCS Technical Guide

²Visual estimation made by judger

³The smaller value from two previous columns

COTEAU VEGETATIVE ZONE

Vegetation	Ov	SL	Sw	Cp	Sa	Observed Composition ²	Amount Allowable ³
	- Site Composition Maximum ¹ -						
Grasses	80	85	75	80	70		
Green needlegrass Porcupine grass	20		5	5			
Western wheatgrass Slender wheatgrass	10	45	10	40	5		
Needle-and-thread	10		10	5	20		
Prairie sandreed					20		
Blue grama	5		5	20	5		
Little bluestem Side-oats grama			25				
Big bluestem Switchgrass Sand bluestem	20				5		
Nuttall alkaligrass		15					
Inland saltgrass		15					
Plains muhly Sand dropseed Prairie dropseed Prairie Junegrass Red threeawn Other native grass	15	10	20	10	15		
Invaders							0
Sedges	5	5	10	10	10		
Upland sedges			10	10	10		
Midland sedges	5	5					
Forbs and legumes	10	10	10	5	15		
Natives	10	10	10	5	15		
Invaders							0
Woodies	5	-	5	5	5		
Natives	5		5	5	5		
Invaders							0
	100 %						
						100 %	
						Index	

Similarity Index: 0 to 25 = POOR; 26 to 50 = FAIR; 51 to 75 = GOOD; 76 to 100 = EXCELLENT

Ov - Overflow SL - Saline Lowland Sw - Shallow Cp - Claypan Sa - Sands

¹Modified from NRCS Technical Guide

²Visual estimation made by judger

³The smaller value from two previous columns

COTEAU VEGETATIVE ZONE

Vegetation	Sy	Si	Cy	WM	TU	Observed Composition ²	Amount Allowable ³
- Site Composition Maximum ¹ -							
Grasses	75	75	80	30	75		
Green needlegrass Porcupine grass	5	15	10		20		
Western wheatgrass Slender wheatgrass	5	20	35		10		
Needle-and-thread	25	20	5		10		
Prairie sandreed	20						
Blue grama	5	10	10		5		
Little bluestem Side-oats grama					15		
Prairie cordgrass				10			
Switchgrass				5			
Northern reedgrass				10			
Prairie Junegrass Plains muhly Sand dropseed Sandberg bluegrass Blue bunch wheatgrass Red threeawn Other native grass	15	10	20	5	15		
Invaders							0
Sedges	10	10	5	60	10		
Upland sedges	10	10	5		10		
Midland sedges				60			
Forbs and legumes	10	10	10	10	10		
Natives	10	10	10	10	10		
Invaders							0
Woodies	5	5	5	-	5		
Natives	5	5	5		5		
Invaders							0
	100 %						
						100 %	
						Index	

Similarity Index: 0 to 25 = POOR; 26 to 50 = FAIR; 51 to 75 = GOOD; 76 to 100 = EXCELLENT

Sy - Sandy Si - Silty Cy - Clayey WM - Wet Meadow TU - Thin-upland

¹Modified from NRCS Technical Guide

²Visual estimation made by judger

³The smaller value from two previous columns

BORDER VEGETATIVE ZONE

Vegetation	Ov	SL	Sw	Cp	Sa	Observed Composition ²	Amount Allowable ³
	- Site Composition Maximum ¹ -						
Grasses	75	90	75	80	75		
Green needlegrass Porcupine grass	15			15	5		
Western wheatgrass Slender wheatgrass	5	55	10	30	5		
Needle-and-thread	5		35	10	25		
Prairie sandreed					15		
Blue grama			10	15	5		
Little bluestem Side-oats grama							
Big bluestem Switchgrass Sand bluestem	30				5		
Nuttall alkaligrass		10					
Inland saltgrass		10					
Plains muhly Sand dropseed Prairie dropseed Prairie Junegrass Red threeawn Other native grass	20	15	20	10	15		
Invaders							0
Sedges	5	-	10	10	10		
Upland Sedges			10	10	10		
Midland Sedges	5						
Forbs and legumes	10	10	10	5	10		
Natives	10	10	10	5	10		
Invaders							0
Woodies	10	-	5	5	5		
Natives	10		5	5	5		
Invaders							0
	100 %						
						100 %	
						Index	

Similarity Index: 0 to 25 = POOR; 26 to 50 = FAIR; 51 to 75 = GOOD; 76 to 100 = EXCELLENT

Ov - Overflow SL - Saline Lowland Sw - Shallow Cp - Claypan Sa - Sands

¹Modified from NRCS Technical Guide

²Visual estimation made by judger

³The smaller value from two previous columns

BORDER VEGETATIVE ZONE

Vegetation	Sy	Si	Cy	WM	TU	Observed Composition ²	Amount Allowable ³
- Site Composition Maximum ¹ -							
Grasses	75	75	85	20	75		
Green needlegrass Porcupine grass	10	30	30		15		
Western wheatgrass Slender wheatgrass	5	10	25		5		
Needle-and-thread	20	20	5		25		
Prairie sandreed	15						
Blue grama	5	5	5		5		
Little bluestem Side-oats grama					5		
Prairie cordgrass				5			
Switchgrass				5			
Northern reedgrass				5			
Prairie Junegrass Plains muhly Sand dropseed Sandberg bluegrass Blue bunch wheatgrass Red threeawn Other native grass	20	10	20	5	20		
Invaders							0
Sedges	10	5		70	5		
Upland Sedges	10	5			5		
Midland Sedges				70			
Forbs and legumes	10	10	10	10	10		
Natives	10	10	10	10	10		
Invaders							0
Woodies	5	10	5	-	10		
Natives	5	10	5		10		
Invaders							0
	100 %					100 %	
						Index	

Similarity Index: 0 to 25 = POOR; 26 to 50 = FAIR; 51 to 75 = GOOD; 76 to 100 = EXCELLENT

Sy - Sandy Si - Silty Cy - Clayey WM - Wet Meadow TU - Thin-upland

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²Visual estimation made by judger

³The smaller value from two previous columns

Beef Cattle Range Evaluation

Kevin Sedivec and Doug Vannurden

Cattle are classified as grazers, preferring grasses and sedges. Cattle diets in North Dakota comprise about 75 percent grasses and sedges, 15 percent forbs (herbaceous plants) and 10 percent shrubs (woody), depending on preference, availability and nutritional status. Cattle grazing on native rangeland is a management technique to maintain the plant species composition when conducted in a proper manner. Proper grazing management includes matching the needs of the plant community with the needs of the livestock, minimizing or eliminating grazing more than 50 percent of the plant production. Maintaining the stocking rate at or below the carrying capacity will achieve proper management when combined with proper timing of grazing (Ex., not grazing too early or prior to range readiness).

This evaluation guide to judging range is a systematic habitat evaluation for an ecological site's value to cattle. The evaluation section will assist in the development of an inventory and analyze the existing range condition to determine range improvement practices to improve the value for cattle grazing. This evaluation will allow the range judge to determine existing condition and identify weak or missing elements that are limiting cattle numbers or performance.

Forage Value

The beef cattle diet consists of grasses and sedges, legumes and some forbs and shrubs. Cattle will select plants based on palatability (taste), availability and nutritional status. Determine the percent composition (by weight) of desirable food-producing plants. This percentage will be between 0 percent and 100 percent and classified as poor (0 percent to 25 percent), fair (26 percent to 50 percent), good (51 percent to 75 percent) and excellent (76 percent to 100 percent). Although invaders and introduced plants cannot be counted for the similarity index, if the plant is desirable for cattle grazing, it will count for forage value.

Example 3 will show the forage value for the silty ecological site in the Badlands' vegetative zone found in Example 1, and Example 4 will show the forage value for the silty ecological site in the Badlands' vegetative zone found in Example 2. In these examples, we used the similarity index guide filled out to determine observed composition and developed a column for forage value (this column is not part of the guide; however, you can make your own column when judging). You base your forage value on the amount of plants that are desirable for cattle grazing, including native, introduced and invader plants. In the example, a "D" was used to denote desirable, "Un" for undesirable. In example 3, we determined all forbs and shrubs were undesirable; however, not all forbs and shrubs are undesirable (Ex., leadplant). In example 3, 68 percent were desirable, 32 percent undesirable. The forage value would be "GOOD." In example 4, 86 percent were desirable, 14 percent undesirable. The forage value would be "EXCELLENT."

Example 3 - Forage value as determined from the Similarity Index of a silty ecological site in Badlands Vegetative Zone (D=Desirable, Un=Undesirable)

Vegetation	Site Composition Maximum ¹	Observed Composition ²	Amount Allowable
Grasses	80		
Green needlegrass			
Porcupine grass	5	<u>3</u>	<u>3 D</u>
Western wheatgrass			
Slender wheatgrass	30	<u>15</u>	<u>15 D</u>
Needle-and-thread	10	<u>5</u>	<u>5 D</u>
Prairie sandreed			
Blue grama	20	<u>25</u>	<u>25 D</u>
Little bluestem			
Side-oats grama			
Big bluestem			
Switchgrass			
Sand bluestem			
Nuttall alkaligrass			
Inland saltgrass			
Prairie Junegrass			3 D
Plains muhly			2 D
Sand dropseed			
Blue bunch wheatgrass	15	<u>10</u>	
Red threeawn			3 Un
Sandberg bluegrass			2 Un
Other native grass			
Invaders (Kentucky bluegrass)		<u>5</u>	<u>5 D</u>
Sedges	5		
Upland sedges	5	<u>10</u>	<u>10 D</u>
Midland sedges			
Forbs and legumes	10		
Natives (Fringed sagewort)	10	<u>10</u>	<u>10 Un</u>
Invaders (Leafy spurge)		<u>7</u>	<u>7 Un</u>
Woodies	5		
Natives (Prairie rose)	5	<u>10</u>	<u>10 Un</u>
Invaders			<u>0</u>
	<u>100%</u>	<u>100%</u>	<u>68% D</u>
Similarity Index:	0 to 25 = POOR	26 to 50 = FAIR	
	51 to 75 = GOOD	76 to 100 = EXCELLENT	
			Index <u>Good</u>

¹Modified from NRCS Technical Guide

²Visual estimation made by judge

Example 4 - Forage value as determined from the Similarity Index of a shallow ecological site in Badlands Vegetative Zone (D=Desirable, Un=Undesirable)

Vegetation	Site Composition Maximum ¹	Observed Composition ²	Amount Allowable
Grasses	75		
Green needlegrass			
Porcupine grass	5	<u>1</u>	<u>1 D</u>
Western wheatgrass			
Slender wheatgrass	5	<u>10</u>	<u>10 D</u>
Needle-and-thread	15	<u>10</u>	<u>10 D</u>
Prairie sandreed	5	<u>1</u>	<u>1 D</u>
Blue grama	10	<u>25</u>	<u>25 D</u>
Little bluestem			
Side-oats grama	25	<u>5</u>	<u>5 D</u>
Big bluestem			
Switchgrass			
Sand bluestem			
Nuttall alkaligrass			
Inland saltgrass			
Prairie Junegrass			3 D
Plains muhly			2 D
Sand dropseed			
Blue bunch wheatgrass	10	<u>8</u>	
Red threeawn			3 Un
Sandberg bluegrass			
Other native grass			
Invaders (Crested wheatgrass)		<u>5</u>	<u>5 D</u>
Sedges	10		
Upland sedges	10	<u>15</u>	<u>15 D</u>
Midland sedges			
Forbs and legumes	5		
Natives (4% fringed sagewort, 4% sunflower, 2% other undesirable)	5	<u>10</u>	4 D 6 Un
Invaders (Sweetclover)		<u>5</u>	<u>5 D</u>
Woodies	10		
Natives (western snowberry)	10	<u>5</u>	<u>5 U</u>
Invaders			<u>0</u>
	<u>100%</u>	<u>100%</u>	<u>86%</u>
Similarity Index:	0 to 25 = POOR 51 to 75 = GOOD	26 to 50 = FAIR 76 to 100 = EXCELLENT	
		Index	<u>Excellent</u>

¹Modified from NRCS Technical Guide

²Visual estimation made by judge

Forage Utilization

Overutilization of forage plants reduces the competitiveness of the plant against increasing and invading plants. Moderate to full-use grazing followed by rest allows regrowth, creating a higher nutritional quality plant, compared with ungrazed plants. To maintain the proper plant species composition with high quality, moderate to full-use grazing is recommended for desirable cattle pastures. To determine livestock use, the stocking rate will be determined and compared with the carrying capacity of the land.

Stocking Rate

Stocking rate is the number and kind of animals grazed on an area of range for a specific length of time. Stocking rates should be determined by the available forage of the total range area, taking into consideration the kinds of sites, condition and amount of usable forage available for grazing.

To determine the number of animal unit months (AUMs) of grazing required by livestock, simply multiply the number of animals times their animal unit equivalent (AUE) (See Table 1) and then multiply times the number of months grazing is required.

Table 1. Animal Unit Equivalents (AUE) by class of livestock.

ANIMAL	AUE
Cow/calf pairs	1.00
Beef cows, 2 years and over	1.00
Yearling cattle	0.75
Dairy cows	1.30
Bulls	1.25
Mature sheep with or without lambs	0.17
Mature goats with or without kids	0.15
Deer	0.15
Mature horse	1.50
Mature buffalo with or without calves	1.00

EXAMPLE 1 - Determine the AUMs required to graze 60 cows, 3 bulls, and 10 yearlings for six months.

$$\begin{array}{r}
 \text{Cows} \quad 60 \times 1.00 \text{ AUE} = 60.00 \\
 \text{Bulls} \quad 3 \times 1.25 \text{ AUE} = 3.75 \\
 \text{Yearlings} \quad 10 \times 0.75 \text{ AUE} = 7.50 \\
 \hline
 71.25 \text{ Animal Units (AU)} \\
 \times 6.0 \text{ months} \\
 \hline
 \mathbf{427.5 \text{ AUMs} = \text{STOCKING RATE}}
 \end{array}$$

EXAMPLE 2 - Determine the AUMs required to graze 200 sheep for five months and 10 horses for seven months.

$$\begin{array}{r}
 \text{Sheep} \quad 200 \times 0.17 \text{ AUE} = 34.00 \text{ Animal Units} \\
 \quad \quad \quad \times 5.0 \text{ months} \\
 \quad \quad \quad \hline
 \mathbf{170.0 \text{ AUMs for sheep}} \\
 \\
 \text{Horse} \quad 10 \times 1.50 \text{ AUE} = 15.00 \text{ Animal Units} \\
 \quad \quad \quad \times 7.0 \text{ months} \\
 \quad \quad \quad \hline
 \mathbf{105.0 \text{ AUMs for horses}}
 \end{array}$$

Total AUMs = 170.0 AUMs for sheep + 105.0 AUMs for horses:
275.0 AUMs = STOCKING RATE

Carrying Capacity

Carrying capacity is the amount of forage available from a given piece of land to support a given herd size for a specific time period (months). The stocking rate (AUMs) should equal the carrying capacity (in AUMs) in terms of AUMs needed for the grazing animals with AUMs available from the pasture. Two factors must be considered to determine the AUMs available from a range area. These are ecological sites and similarity index. Ecological sites differ in their potential to produce native vegetation due to climate, soil and the kind of plants they support. The similarity index is determined by the amount and kinds of plants produced on the ecological site.

To determine the carrying capacity (AUMs) available from a range area, you first must evaluate the range and determine the percentage of makeup in difference kinds of ecological sites. Then simply multiply the number of acres of each site times the initial stocking rate for the index class for your zone, then total.

EXAMPLE: You have 500 acres of rangeland in the Missouri Slope vegetative zone of North Dakota. Fifty percent is classified as silty ecological site, 35 percent is sandy, and 15 percent is shallow. How many AUMs (carrying capacity) of grazing will this area support?

Ecological Site	Acreage	AUMs	Total AUMs
50 % silty	250	X 0.7 =	175.0
35 % sandy	175	X 0.8 =	140.0
15 % shallow	75	X 0.5 =	37.5
			<u>352.5 AUMs</u>

Comparison of Stocking Rate and Carrying Capacity

If the stocking rate and carrying capacity are the same, you would **keep** stocking rate **the same**. If stocking rate is greater than the carrying capacity, **decrease** the stocking rate. If stocking rate is lower than the carrying capacity, **increase** the stocking rate.

EXAMPLE: In the stocking rate and carrying capacity examples, the stocking rate of example 1 was 427.5 AUM while the carrying capacity 352.5 AUMs. You would **decrease** the stocking rate when comparing these examples.

EXAMPLE: In the stocking rate and carrying capacity examples, the stocking rate of example 2 was 275.0 AUM while the carrying capacity 352.5 AUMs. You would **increase** the stocking rate when comparing these examples.



Table 2. Initial stocking rate guide for excellent-condition native range in animal unit months per acre (AUM/acre) by ecological site and vegetative zones.

	ANIMAL UNIT MONTH (AUM) / ACRE						
	Vegetation Zone						
	Badlands	Missouri Slope	Coteau	Central	Border	Drift Prairie	Altamont
Wet meadow	—	1.6	1.6	1.7	1.6	1.7	1.8
Saline lowland	0.8	1.0	1.1	1.1	1.1	1.2	1.2
Overflow	0.8	1.0	1.1	1.2	1.2	1.3	1.4
Sands	0.6	0.8	0.9	0.9	1.0	1.0	1.1
Sandy	0.6	0.8	0.9	0.9	1.0	1.0	1.1
Silty	0.6	0.7	0.8	0.8	1.0	0.9	1.1
Clayey	0.6	0.7	0.8	0.8	0.9	0.9	1.0
Shallow	0.4	0.5	0.7	0.7	0.6	0.6	0.7
Thin upland	—	0.7	0.7	0.8	0.8	0.9	
Claypan	0.4	0.5	0.6	0.6	0.7	0.7	

Distribution Factors

Beef cattle graze within a pasture based on forage accessibility, distance from watering source and topography. The rougher the land and steeper the slopes, the less distance they will travel, especially from water. If the land is smooth to gently rolling, cattle freely roam throughout the pasture in search of forage. If the land is rough, with steep, deep canyons, bare rock or woody canopy, grazing distribution of the land will be limited.

Forage Accessibility

Beef cattle prefer to graze on level ground. As the slope increases, grazing use declines and the distance they graze from water is reduced. If the slope is less than 5 percent, water can be one to 1½ miles away. If the slope is 5 percent to 10 percent, water can be up to one mile away. If the slope is 11 percent to 15 percent, water can be up to 0.75 (¾) mile away. If the slope is greater than 15 percent, water must be within 0.5 mile away.

Forage accessibility on the ecological site will be based on slope and categorized as a percentage at 5 percent intervals. Slope will be used to de-

termine if the water available is adequate or needs to be developed. The four slope categories are:

- < 5 % - smooth
- 5-10 % - gently rolling
- 11-15 % - rolling to steep
- > 15 % - very steep

Grazing Restraint

Beef cattle prefer to graze open grasslands with limited amounts of woody cover to restrict their movement. If woody canopy cover increases or dominates, cattle will have to spend more time searching for food, increasing energy and reducing performance. You will categorize the ecological site as three classes: smooth, rough and woody canopy cover. When judging the ecological site, you will decide if the area is smooth or rough. To be classified as rough, bare rock, scoria or heaving from water pressure should be common. You then will classify the woody canopy cover as greater than or less than 30 percent. If the woody canopy makes up greater than 30 percent, cattle will have a difficult time grazing the area and woody plant control will be needed. The restraint classes to judge include:

- 1) Terrain Smooth Rough
- 2) Woody canopy cover < 30% or > 30%

Guide to Range Management Practices — Beef Cattle

- 1. Continue as is** — Use when forage factor is good to excellent, slope less than 11 percent, terrain smooth, woody canopy cover less than 30 percent, water adequate and stocking rate **not** increased or decreased.
- 2. Develop water** — If slope is less than 5 percent, water can be 1½ miles away; if slope is 5 percent to 10 percent, water can be one mile away; if slope is 11 percent to 15 percent, water can be .75 mile away; or if slope is greater than 15 percent, water must be within 0.5 mile. When water location does not meet these requirements, development of water is needed.
- 3. Decrease stocking rate** — Use when stocking rate is greater than carrying capacity.
- 4. Increase stocking rate** — Use when stocking rate is less than carrying capacity.
- 5. Apply woody plant control** — Use when woody canopy cover is greater than (>) 30 percent.
- 6. Apply undesirable grass and forb control** — Use when forage factor is poor or fair due to undesirable forbs or grasses.
- 7. Change kind of livestock** — Use when 1) all of the following occur: terrain is rough, woody canopy cover is greater than 30 percent, slope greater than 15 percent, or 2) if leafy spurge is greater than 40 percent of the vegetation by weight.
- 8. Burn or mow old grass** — Use when old growth dominants (greater than 70 percent by cover) the contest site.
- 9. Defer part of grazing season** — Use whenever you decrease stocking rate to increase health of spring growth or whenever you burn or mow old grass to eliminate grazing of new plant growth.
- 10. Defer one or more grazing seasons** — Use whenever you seed adapted forage species.
- 11. Seed adapted forage species** — Use when forage factor is poor because of lack of desirable plants or when abandoned cropland occurs.
- 12. Control noxious weeds** — Use whenever a noxious weed is present in the site. The noxious weeds on North Dakota's rangeland include leafy spurge, absinth wormwood, spotted knapweed, Canada thistle and Russian knapweed.
- 13. Begin a planned grazing system** — Use whenever your site is evaluated to have one or more of these problems: lacks proper water, forage value is poor or fair, terrain rough, increased or decreased stocking rate, and/or old grass (greater than 70 percent by cover) dominants.

Note: Distance to water, the presence of abandoned cropland, and number and class of livestock grazing, months grazed and carrying capacity will be given.

Sharp-Tailed Grouse Range Evaluation

Kevin Sedivec and Doug Vannurden

The sharp-tailed grouse is the most common upland game bird native to North Dakota's rangeland. Sharp-tailed grouse are found throughout North Dakota, particularly in parts of the state where rangeland remains a dominant resource in the landscape. Populations of sharp-tailed grouse are directly related to land use and management practices, increasing or decreasing with changes in habitat quality and quantity. As with many upland game birds, farming has the greatest main effect on landscape and subsequent sharp-tailed grouse habitat. Cultivated lands prove to have the greatest negative impact on sharp-tailed grouse nesting and brood-rearing habitat. However, cultivated lands are important areas for food habitat.

The major influences on rangeland that alter sharp-tailed grouse habitat are grazing and fire. Sharp-tailed grouse have evolved with the grazing of wild ungulates (Ex., bison, antelope, deer) and fire. Grazing with domestic livestock (Ex., cattle) can be beneficial when managed properly and overgrazing is eliminated. For the most part, light to moderate stocking rates are beneficial to sharp-tailed grouse habitat and, in many areas, necessary to maintain high-quality nesting and protective habitats. North Dakota's rangelands currently provide habitat for sharp-tailed grouse varying from poor to excellent, depending on land use and site factors. Always remember, weather and predators also influence sharp-tailed grouse populations and can be the primary factor for reductions or increases in populations.

The purpose of this habitat evaluation guide is to provide a tool for a systematic evaluation of a tract of land for sharp-tailed grouse suitability. The evaluation is designed to inventory and analyze existing habitat condition and determine the limiting factors to improve the

habitat when needed. This evaluation will allow a determination of the overall quality of the range in its existing condition and identify the weak or missing elements that are limiting grouse numbers so that management improvements can be developed.

Sharp-tailed grouse restrict their activities to a home range that varies in size, depending on the kind, amount, condition and interspersed of the required habitat components. All the requirements for the animal's livelihood must be found within this home range. In reality, the actual size and shape of the home range is determined by the inherent limits of how far the animal can travel and quality of various habitat elements within the home range.

Although actual home ranges are not marked by permanent boundaries (boundaries change from season to season and year to year), a conceptual home range boundary is designed for the contest. The ordinary limits of movement for a species are assumed in the boundary area, with all potential habitats available to provide a convenient area for planning within which habitat elements are measured.

Nesting Cover

Sharp-tailed grouse hens nest within a one- to two-mile radius of the male dancing ground. The sharp-tailed grouse engages in the most energetic display of all grouse during the breeding and nesting season. The males gather to perform before dawn and dance for several hours while courting females. The hens will locate a nest within this one- to two-mile radius of the ground in cover suitable for hiding from predators and protective from the environment.

Hens select a nesting site in cover that is tall and dense, usually 8 to 16 inches high. They almost exclusively nest in permanent cover, such as rangeland. Tall to midsized bunch grass and upright sod-formers provide the best grass cover while dense shrubs greater than 1 foot tall provide safe habitat for nesting. Of the 41 grasses and grass-like plants, 16 provide tall enough cover for nesting hens. The wet meadow and saline lowland plants are classified as undesirable due to the potential of flooding destroying nests. Sweetclover is the only forb from the plant list that achieves sufficient height and cover for nesting. All shrubs except creeping juniper, broom snakeweed, prairie rose, yucca and winterfat provide good nesting cover. Trees are classified as undesirable since they limit low-growing cover.

Desirable Nesting Plants

Desired nesting plants should be common throughout the home range of sharp-tailed grouse. These plants should comprise 30 percent by aerial cover of the home range to provide adequate cover for nesting hens. If less than 30 percent by aerial cover of the contest site is desired nesting plants, improved nesting cover must be added to the recommended management practices. For contest purposes, judge the site for desirable nesting plants as:

- > 30% aerial cover
- 10 to 30% aerial cover
- < 10% aerial cover

Nesting Cover Height

Sharp-tailed grouse hens tend to nest in cover 8 to 16 inches tall and greater. Nesting cover less than 4 inches tall lacks hiding cover from predators and is classified as poor. For contest purposes, if the height of the "specially marked plant" is less than 4 inches, decreasing the stocking rate is recommended. If the height of the marked plant is greater than 16 inches, increasing stocking rate or burning is recommended. Judge the contest site as:

- > 16 inches
- 4 to 16 inches
- < 4 inches

Food Habitat

Sharp-tailed grouse feed extensively on rangeland unless adjacent cereal crops are present. Laboratory tests have shown that 90 percent of the grouse diet is composed of vegetation (seeds, fruit, leaves) and the remaining 10 percent chiefly of insects (grasshoppers, beetles, caterpillars, etc). Of the vegetative matter, 31 percent consists of leaves, flowers and buds; 27 percent fruit; 20 percent grain (grass seeds and cereal crops); 7 percent weed seeds; and the balance is miscellaneous plant material. The sharp-tailed grouse's favorite foods include wheat, clover leaves, dandelion, prairie rose, sunflower seeds, chokecherry, buffaloberry, willows, poplar (cottonwood, quacking aspen) and alfalfa.

Plants tend to be selected as a food source for sharp-tailed grouse if they produce a hard seed and fleshy fruit. Grouse also prefer the plant tissue of a select group of plants. Of the 117 plants listed in the North Dakota Range Judging Manual, six of the 41 grasses and sedges are desirable plants as food for sharp-tailed grouse. Of the 50 forbs, 28 are desirable food, seven of the 13 shrubs are desirable and six of the 10 trees are desirable food.

Desirable Food Plants

Food plants should be common throughout the home range of sharp-tailed grouse. These plants should comprise 30 percent by weight of the home range to provide adequate food for the grouse. If less than 30 percent by weight of the contest site is desired food plants, improved food habitat must be added to the recommended management practices. For contest purposes, judge the site for desirable food plants as:

- > 30% by weight
- 10 to 30% by weight
- < 10% by weight

Protective Cover

During the spring and summer months, sharp-tailed grouse spend all their time on the ground searching for food, nesting and loafing (sleeping, resting). Protective cover is important for grouse for loafing and is necessary for escaping predators. Low-growing woody plants and upright forbs and grass are used for this type of cover because they provide dense overhead screening and protective cover from environmental conditions.

Percent Woody Canopy

For contest purposes, protective cover will be categorized as woody canopy, such as western snowberry, willows, big sagebrush, silver sagebrush and other low-growing trees that grow in clumps and shrubs. Desirable levels of woody canopy cover in a sharp-tailed grouse's home range should be 10 percent to 30 percent by aerial cover. Less than 10 percent by aerial cover would be insufficient, while greater than 30 percent excessive, reducing the amount of food habitat and potential nesting cover. For contest purposes, judge the site for percent woody cover as:

- > 30% aerial cover
- 10 to 30% aerial cover
- < 10% aerial cover

Guide to Habitat Management Practices — Sharp-Tailed Grouse

1. **Continue as is** — Use when desirable nesting plants are greater than 30 percent aerial cover and 4 to 16 inches in height, desirable food plants are greater than 30 percent by weight and woody canopy cover 10 percent to 30 percent by aerial cover of site.
2. **Improve nesting cover** — Use when desirable nesting plants are less than 30 percent by aerial cover and/or marked plant less than 4 inches tall.
3. **Decrease stocking rate** — Use when marked plant is less than 4 inches tall.
4. **Add more livestock grazing or burn** — Use when marked plant is greater than 16 inches.
5. **Improve food habitat** — Use when desirable food plants are less than 30 percent by weight.
6. **Improve protective cover** — Use when woody canopy cover is less than 10 percent by aerial cover.
7. **Apply woody plant control** — Use when woody canopy cover is greater than 30 percent by aerial cover.

Contestant Name/# _____ County/Chapter _____ Site # _____

North Dakota Range Judging Card

Ecological Site



North Dakota Ecological Site Key (Choose one)

I. Restrictive to Root Growth: These sites have a limiting layer within 20 inches of the surface of either rock, gravel, stone, or restrictive clay (hard pan), which restricts **most** root growth beyond this layer. (If no restriction, go to II).

- A. Limiting layer is rock, scoria, gravel, or stone **Shallow**
- B. Limiting layer is restrictive clay **Claypan**

II. Non-Restrictive to Root Growth: These sites do not have a restrictive layer within 20 inches of the soil surface.

C. Lowlands — These sites receive additional moisture from occasional stream overflow, run-in from adjacent slopes, or during major flooding events. (If no additional moisture occurs, go to D).

- 1. No water table within 5 feet from surface, typically found in swales, no salt deposits on soil surface **Overflow**
- 2. Water table within 5 feet from surface
 - a. This site has a water table within 2 to 3 feet, root zone wet, and no salts evident on the soil surface **Wet Meadow**
 - b. This site will have salts evident on the surface when dry **Saline Lowland**

D. Uplands — These sites do not receive additional moisture from occasional stream overflow, run-in from adjacent slopes, or during major flooding events.

- 1. These sites occur on slopes usually less than 15%
 - a. Soils will not form a firm ball when wet, coarse **Sands**
 - b. Soils will form a firm ball and produce a short ribbon less than 1 inch, feel gritty **Sandy**
 - c. Soils will form a ribbon up to 2 inches and not feel gritty, like flour when dry **Silty**
 - d. Soils form a ribbon greater than 2 inches, support their own weight and feel greasy when wet **Clayey**
- 2. These sites occur on sidehills with slopes usually greater than 15%
 - a. This site is found on glaciated soils, thin top soil **Thin Upland**

Similarity Index (Choose one)

- Excellent (76 to 100%)
 Good (51 to 75%)
 Fair (26 to 50%)
 Poor (0 to 25%)

Sharp-tailed Grouse Site Evaluation

Nesting Cover

- A) Desirable Nesting Plants
- > 30% aerial cover
 - 10 to 30% aerial cover
 - < 10% aerial cover
- B) Nesting Cover Height (marked plant)
- > 16 inches
 - 4 to 16 inches
 - < 4 inches

Food habitat (desirable plants)

- > 30% by weight
- 10 to 30% by weight
- < 10% by weight

Protective Cover (% woody cover)

- > 30% aerial cover
- 10 to 30% aerial cover
- < 10% aerial cover

Recommended Management Practices SHARP-TAILED GROUSE

- Continue Present Management
- Improve Nesting Cover
- Decrease Stocking Rate
- Add More Livestock Grazing or Burn
- Improve Food Habitat
- Improve Protective Cover
- Apply Woody Plant Control

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Beef Cattle Site Evaluation

Forage Value (desirable plants)

- Excellent (76 to 100%)
- Good (51 to 75%)
- Fair (26 to 50%)
- Poor (0 to 25%)

Stocking Rate (Given on Site Key)

- Increase
- Decrease
- Keep the Same

Distribution Factors

- A) Slope
- < 5%
 - 5 to 10%
 - 11 to 15%
 - > 15%
- B) Grazing Restraints
- 1) Terrain: Rough
 - Smooth
 - 2) Woody Canopy: > 30%
 - < 30%

Recommended Management Practices BEEF

- Continue Present Management
- Develop Water
- Decrease Stocking Rate
- Increase Stocking Rate
- Change Kind of Livestock
- Apply Woody Canopy Control
- Apply Undesirable Grass & Forb Control
- Burn or Mow Old Grass
- Defer Part of Grazing Season
- Defer One or More Grazing Seasons
- Plant Adapted Forage Species
- Control Noxious Weeds
- Begin A Plan Grazing System

Contestant Name/# _____ County/Chapter _____ Site # _____

North Dakota Range Judging Card

Plant Identification



Instructions: Clearly print the **plant ID number** from the key (back side of card) in the appropriate blank. Place an X in the appropriate column(s) describing characteristics and ecological factors

Plant Identification Number	Life Span			Season of Growth		Grazing Response			Plant Origin		Ecological and Resource Rating				SCORE		
											Desirable = De		Undesirable = Un				
	P	A	B	C	W	D	Ic	Iv	N	I	Sharp-tailed Grouse Food		Cattle Food				
											De	Un	De	Un	De	Un	
1																	
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	
11																	
12																	
13																	
14																	
15																	

Key to symbols:

- P = Perennial C = Cool-season D = Decreaser N = Native
- B = Biennial W = Warm-season Ic = Increaser I = Introduced
- A = Annual Iv = Invader

Plant Key

GRASSES

1. American sloughgrass
2. Bearded wheatgrass
3. Big bluestem
4. Blue bunch wheatgrass
5. Blue grama
6. Buffalograss
7. Canada wildrye
8. Cattail species
9. Crested wheatgrass
10. Cheatgrass
11. Foxtail barley
12. Green needlegrass
13. Indian ricegrass
14. Indiangrass
15. Inland saltgrass
16. Kentucky bluegrass
17. Little bluestem
18. Needle-and-thread
19. Northern reedgrass
20. Nuttall alkaligrass
21. Plains muhly
22. Porcupine grass
23. Prairie cordgrass
24. Prairie dropseed
25. Prairie Junegrass
26. Prairie sandreed
27. Red threeawn
28. Reed canarygrass
29. Sand bluestem
30. Sand dropseed
31. Sandberg bluegrass
32. Sideoats grama
33. Smooth brome grass
34. Switchgrass
35. Tumblegrass
36. Western wheatgrass
37. Wilcox panicum

SEDGES and RUSHES

38. Baltic rush
39. Slough sedge
40. Three sedge
41. Upland sedge

CRYPTOGAMS

42. Clubmoss
43. Horsetail

FORBS

44. Absinth wormwood
45. American licorice
46. American vetch
47. Ball cactus
48. Beards tongue
49. Black samson
50. Blanket flower
51. Blue-eyed grass
52. Bracted spiderwort
53. Canada thistle
54. Cudweed sagewort
55. Curly dock
56. Curlycup gumweed
57. Cutleaf goldenweed
58. Daisy fleabane
59. Deervetch
60. Dotted gayfeather
61. Fringed sagewort
62. Goatsbeard
63. Green sagewort
64. Hairy goldaster
65. Heath aster
66. Hoods phlox
67. Indian breadroot
68. Lamberts crazyweed
69. Leafy spurge
70. Mariposa lily
71. Milkvetch species
72. Missouri goldenrod
73. Pasque flower
74. Plains pricklypear
75. Prairie coneflower
76. Prairie thistle
77. Prairie smoke
78. Purple prairie clover
79. Pussytoes
80. Scarlet globemallow
81. Scarlet gura
82. Silverleaf scurfpea

FORBS (continued)

83. Skeletonweed
84. Soft goldenrod
85. Stiff goldenrod
86. Sunflower species
87. Western wallflower
88. Western yarrow
89. White milkwort
90. White prairie clover
91. Sweetclover
92. Wild flax
93. Wild onion
94. Wooly plantain

SHRUBS and HALF-SHRUBS

95. Big sagebrush
96. Broom snakeweed
97. Creeping juniper
98. Leadplant
99. Nuttall saltbush
100. Prairie rose
101. Rabbit brush
102. Shrubby cinquefoil
103. Silver sagebrush
104. Skunk brush sumac
105. Yucca
106. Western snowberry
107. Winterfat

TREES

108. Boxelder
109. Buffaloberry
110. Bur oak
111. Chokecherry
112. Cottonwood
113. Green ash
114. Quaking aspen
115. Rocky Mountain juniper
116. Juneberry
117. Silverberry

Contestant Name/# _____ County/Chapter _____ Site # _____

North Dakota Range Judging Card

Situation Map



Carrying Capacity (Total AUMs +/- 5): _____

Stocking Rate (Compare Stocking Rate of animals grazed to calculated Carrying Capacity above.) (Check one box.)

- Increase
- Decrease
- Keep the same

Recommended Management Practices:

- Continue present management
- Decrease stocking rate.....
- Increase stocking rate
- Water development
- Fence development
- Burn or mow old grass
- Move salt and mineral
- Control blowouts and gullies
- Contour furrowing or pitting applied
- Apply woody canopy control
- Control noxious weeds
- Change season of use
- Defer part of grazing season
- Defer one or more grazing seasons
- Begin a plan grazing system

Total Points: 300

- Carrying Capacity: 100 points
- Stocking Rate: 50 points
- Recommended Management Practices: 150 points
 - Each practice worth 10 points

CONTEST EXAMPLE #1

Ecological Site — Sandy; **Vegetative Zone** — Missouri Slope

Site Key: Distance to water — 0.8 miles
Livestock class and number — 100 cow/calf pairs (AUE=1.0)
Grazing season — 6 months
Carrying Capacity — 550 AUMs

Species composition include:

Grasses — 5% green needlegrass, 5% western wheatgrass,
30% needle-and-thread, 20% blue grama, and 10% Kentucky bluegrass
Sedges — 10% upland sedge
Forbs — 5% sweetclover, 5% leafy spurge, 2% silverleaf scurfpea,
3% fringed sagewort
Shrubs — 5% prairie rose

Degree of Use (marked grass plant): Sharp-tailed grouse — 5 inches

Slope — 7%; Terrain - smooth; **Woody canopy** — see species composition

ANSWER KEY:

Ecological Site: Sandy
Similarity Index: Good (60%)
Beef Cattle Site Evaluation
Forage Value: Excellent (85%)
Distribution Factors
Slope: 5 to 10%
Grazing Restraints
Terrain: Smooth
Woody Canopy: < 30% (5%)
Stocking Rate: Decrease
Sharp-tailed Grouse Site Evaluation
Nesting Cover
Desirable Nesting Plants: .. > 30% (45%)
Nesting Cover Height: 4 to 16 inches
Food Habitat: 10 to 30% (17%)
Protective Cover: < 10% (5%)

Recommended Management Practices — Beef: decrease stocking rate,
defer part of grazing season, control noxious weeds, begin a plan grazing system

Recommended Management Practices — Grouse: improve food habitat,
improve protective cover

CONTEST EXAMPLE #2

Ecological Site — Silty; **Vegetative Zone** — Drift Prairie

Site Key: Distance to water — 1.6 miles
Livestock class and number — 200 sheep (AUE=0.17),
25 cow/calf pairs (AUE=1.0)
Grazing season — 5 months
Carrying Capacity — 295 AUMs

Species composition include:

Grasses — 5% green needlegrass, 5% western wheatgrass,
10% needle-and-thread, 15% blue grama, and 30% Kentucky bluegrass
Sedges — 10% upland sedge
Forbs — 2% purple prairie clover, 3% milkvetches, 2% silverleaf scurfpea,
5% fringed sagewort
Shrubs — 8% western snowberry, 5% prairie rose

Degree of Use (marked grass plant): Sharp-tailed grouse — 6 inches

Slope — 8%; **Terrain** — smooth; **Woody canopy** — see species composition

ANSWER KEY:

Ecological Site: Silty
Similarity Index: Fair (45%)
Beef Cattle Site Evaluation
Forage Value: Excellent (77%)
Distribution Factors
Slope: 5 to 10%
Grazing Restraints
Terrain: Smooth
Woody Canopy: < 30% (13%)
Stocking Rate: Keep the Same
Sharp-tailed Grouse Site Evaluation
Nesting Cover
Desirable Nesting Plants: .. > 30% (33%)
Nesting Cover Height: 4 to 16 inches
Food Habitat: 10 to 30% (25%)
Protective Cover: 10 to 30% (13%)

Recommended Management Practices — Beef: develop water, begin a plan grazing system

Recommended Management Practices — Grouse: improve food habitat

CONTEST EXAMPLE #3

Ecological Site — Shallow; **Vegetative Zone** — Badlands

Site Key: Distance to water — 0.4 miles
Livestock class and number — 50 cow/calf pairs (AUE=1.0) ,
2 bulls (AUE=1.25)
Grazing season — 6.5 months for cow/calf pairs, 2 months for bulls
Carrying Capacity — 400 AUMs

Species composition include:

Grasses — 10% western wheatgrass, 15% needle-and-thread, 10% blue grama,
20% little bluestem, 5% side-oats grama, 5% plains muhly, 5% sandberg
bluegrass
Sedges — 10% upland sedge
Forbs — 2% purple prairie clover, 1% black samson, 2% silverleaf scurfpea,
3% fringed sagewort
Shrubs — 5% lead plant, 7% western snowberry

Degree of Use (marked grass plant): Sharp-tailed grouse — 18 inches

80% Old Grass; **Slope** — 4%; **Terrain** — rough (exposed rock);
Woody canopy — see species composition

ANSWER KEY:

Ecological Site: Shallow
Similarity Index: Excellent (85%)
Beef Cattle Site Evaluation
Forage Value: Excellent (88%)
Distribution Factors
Slope: < 5%
Grazing Restraints
Terrain: Rough
Woody Canopy: < 30% (12%)
Stocking Rate: Increase
Sharp-tailed Grouse Site Evaluation
Nesting Cover
Desirable Nesting Plants: .. > 30% (50%)
Nesting Cover Height: > 16 inches
Food Habitat: 10 to 30% (27%)
Protective Cover: 10 to 30% (12%)

Recommended Management Practices — Beef: increase stocking rate

Recommended Management Practices — Grouse: add more livestock grazing
or burn, improve food habitat

CONTEST EXAMPLE #4

Ecological Site — Overflow; **Vegetative Zone** — Coteau

Site Key: Distance to water — 0.6 miles
Livestock class and number — 100 yearling cattle (AUE=0.75),
4 bulls (AUE=1.25)
Grazing season — 5 months for yearlings, 2 months for bulls
Carrying Capacity — 300 AUMs

Species composition include:

Grasses — 3% porcupine grass, 5% bearded wheatgrass, and
52% Kentucky bluegrass
Sedges — 5% midland sedge
Forbs — 15% absinth wormwood
Shrubs — 20% western snowberry

Degree of Use (marked grass plant): Sharp-tailed grouse — 3 inches

Slope — 2%; **Terrain** — smooth; **Woody canopy** — see species composition

ANSWER KEY:

Ecological Site: Overflow
Similarity Index: Poor (18%)
Beef Cattle Site Evaluation
Forage Value: Good (65%)
Distribution Factors
Slope: < 5%
Grazing Restraints
Terrain: Smooth
Woody Canopy: < 30%
Stocking Rate: Decrease
Sharp-tailed Grouse Site Evaluation
Nesting Cover
Desirable Nesting Plants: .. < 30% (28%)
Nesting Cover Height: < 4 inches
Food Habitat: 10 to 30% (20%)
Protective Cover: 10 to 30% (20%)

Recommended Management Practices — Beef: decrease stocking rate,
apply undesirable grass & forb control, defer part of grazing season, control noxious
weeds, begin a plan grazing system

Recommended Management Practices — Grouse: improve nesting cover,
decrease stocking rate, improve food habitat

Plant List

Michael Humann, Kevin Sedivec, Michele Doyle, Doug Vannurden, Dennis Froemke

The plants selected for the contest are common plants found on the 10 selected ecological sites in North Dakota. Plant characteristics and their ratings for sharp-tailed grouse and beef cattle are based on ecological criteria and value to the particular animal. Native plants classified as invaders are those that did not occur historically on the ecological site under influences of grazing, fire and drought. Introduced plants that escape or move from where they are planted are classified as invaders.

The starting point for most range management decisions is knowing range plants by name and knowing their growth habits, response to grazing, span of life and other characteristics. A total 117 plants make up the plant list. Scientific names are included because confusion can exist when a particular plant has several common names. However, common names will be used for range judging contest purposes.

Correct plant identification is very important because plants can be desirable, as well as undesirable. In the Sources of Information section, you can find a list of publications and plant material sources that will aid you in identifying and classifying range plants.

Types of Range Plants

Plants on the range are so numerous and different in their forms and growth habits that they should be grouped for convenience and ease of identification. The following groupings and definitions will help you learn important characteristics of range plants.

Grasses

These are plants with joint stems that usually are hollow. The leaves are in two rows on the stem, and leaf veins parallel. Grasses are the most common of all range plants and most important forage-producing plants in North Dakota.

Sedges and Rushes

These plants are grasslike, resembling true grasses, but have a solid stem and no joints. The stems are triangular with the sedges or round with the rushes. Leaves on rushes are in three rows on the stem. Veins in the leaf are parallel.

Cryptogams

These are plants without flowers or seeds, often reproducing by free spores. These spores can be found on the lower side of ordinary leaves or on special leaves, or parts of leaves or stems.

Forbs

These are herbaceous, broadleaf, nongrasslike plants with tops that die back each year. Most forbs have net veining in the leaf and exhibit showy flowers. Many different plants are represented in this large range plant group.

Shrubs and Half-Shrubs

These plants have persistent woody stems that live through the winter and regenerate new leaves each year. The stems branch from near the base of the plant and do not have a definite trunk (trees). These plants have a relatively low growth habit. Stems will have annual growth rings and leaves net veining.

Trees

They are a taller, woody plant distinguished from a shrub by having greater height and a single trunk, rather than several woody stems.

Origin of Range Plants

Range plants either originated in North America or were brought over from another continent by human activity. These plants are classified as having a native or introduced origin.

Native

Native plant species are those that were present here prior to settlement of the continent. An example is western wheatgrass. An “N” will represent native plants.

Introduced

Introduced species are those that were brought into North America after European settlement. Two examples are crested wheatgrass and alfalfa. An “I” will represent introduced plants.

Life Span of Range Plants

Range plants may be short-lived plants or long-lived plants. Those that are short-lived are classified as annual and biennial, while long-lived plants are considered perennial. Most plants on native rangeland are long-lived, with a select few short-lived.

Annual

Plants that complete their life cycle in one year or less are classified as annuals. They reproduce by seed and do not regrow a second year from the root or crown. An example would be cheatgrass. An “A” will represent an annual plant.

Biennial

Plants that live for two years, producing vegetative growth the first year and usually flowering and fruiting the second year, then dying, are classified as biennials. They reproduce only by seed. Two examples are sweetclover and curlycup gumweed. A “B” will represent a biennial plant.

Perennial

A plant that has a life cycle of three years or more is classified as a perennial. They reproduce primarily by root or crown tissue but can reproduce by seed as well. An example is black samson. A “P” will represent a perennial plant.

Season of Growth

All range plants have a growth period characterized as a cool-season or warm-season growth pattern.

Cool Season

These plants make their principle growth during the cool weather seasons of spring and fall. They typically set their seed in May or June and become mature during the hot growing period of midsummer. An example is green needlegrass. A “C” will represent a cool-season plant.

Warm Season

These plants begin growing in late spring and grow during the warmer months of June, July and August. Some plants begin setting seed in late June, with most setting seed in July and August. An example is little bluestem. A “W” will represent a warm-season plant.

Range Plant Response to Grazing

All plants respond differently to grazing, with some plants increasing from grazing pressure, while others decrease as grazing becomes heavy at critical time periods. Range plants can be classified as increasers, decreasers or invaders.

Increaser

Plants that have a low growing point or a growth characteristic (Ex., does not taste good or contains plant parts that hurt the mouth) that limits animals from grazing tend to increase with grazing pressure. Some of these plants have poor grazing value, while others are important to grazing animals. These plants should be found on all ecological sites but not dominant. To note, some of these plants eventually will decrease with grazing pressure during a long period of time. An example is blue grama. A “In” will represent an increaser plant.

Decreaser

Plants that have a high growing point, have no physiological characteristics to reduce grazing pressure and taste good (palatable) to animals tend to decrease with grazing pressure. Some native plants, such as Indian breadroot, that are not palatable to animals also decrease when the ecological integrity (health) of the site is reduced. Fewer of these plants will be found on a site as the similarity index is reduced. An example is big bluestem. A “D” will represent a decreaser plant.

Invaders

Plant species that historically were not part of the presettlement vegetation (introduced plants) and short-lived plants (annuals and biennials) are classified as invader plants. They may invade a site following a disturbance (overgrazing, burn, cultivation) or a lack of disturbance (long-term nonuse). These plants can be both desirable or undesirable to grazing animals, depending on species of plants and class of animal. Examples include smooth brome grass (introduced) and daisy fleabane (annual). An “Iv” will represent an invader plant.

Forage Value for Cattle

Range plants are either palatable or unpalatable to cattle and will have a forage value based on their taste. These plants are classified as desirable or undesirable.

Desirable

Plants that are desirable to cattle include forage plants that are palatable during all or part of their grazing season, nutritious and lack growth characteristics that reduce the grazing or browsing activity. Examples include Kentucky bluegrass and leadplant. A “De” will represent a desirable plant.

Undesirable

Plants that do not taste good (unpalatable) or have a growth characteristic that keeps cattle from grazing are classified as having an undesirable forage value for cattle. Examples include pasque flower (unpalatable) and prairie rose (thorns on stems). An “Un” will represent an undesirable plant.

Food Value for Sharp-tailed Grouse

Sharp-tailed grouse prefer specific range plants for food, while others have little to no food value. These plants will be classified as desirable and undesirable for food.

Desirable

Plants that are desirable food to sharp-tailed grouse include plants that have fleshy fruit, tasty leaves and/or hard seeds. Examples include prairie rose (fleshy fruit), switchgrass (hard seed) and American vetch (tasty leaves). A “De” will represent a desirable plant.

Undesirable

Plants that do not taste good or have plant parts that are unpalatable are classified as undesirable feed for sharp-tailed grouse. Examples include leafy spurge (unpalatable) and little bluestem (fluffy seed). An “Un” will represent an undesirable plant.

Cover Value for Sharp-tailed Grouse

Desirable

Plants that provide a dense cover and mid to tall height, and stand erect, are considered desirable cover for sharp-tailed grouse. Examples include big bluestem (dense and tall) and western snowberry (dense, tall and erect). A “De” will represent a desirable plant..

Undesirable

Plants that are short, single-stalked or stemmed, or tall with no understory growth, are classified as undesirable cover for sharp-tailed grouse. Examples include buffalo grass (short) and green ash (tall with no understory growth). An “Un” will represent an undesirable plant.

Plant List for North Dakota Range Judging

Key to symbols:

Perennial = P Cool-season = C Decreaser = D Native = N Desirable = De
 Biennial = B Warm-season = W Increaser = Ic Introduced = I Undesirable = Un
 Annual = A Invader = Iv

GRASSES						Wildlife Value Sharp-tailed Grouse	Forage Value Cattle	
Plant Number	Plant Name	Life Span	Season of Growth	Grazing Response	Origin	Food	Nesting Cover	Food
1	American sloughgrass (<i>Beckmannia syzigachne</i>)	P	W	Ic	N	Un	Un	De
2	Bearded wheatgrass (<i>Agropyron subsecundum</i>)	P	C	D	N	Un	De	De
3	Big bluestem (<i>Andropogon gerardii</i>)	P	W	D	N	Un	De	De
4	Bluebunch wheatgrass (<i>Agropyron spicatum</i>)	P	C	D	N	Un	De	De
5	Blue grama (<i>Bouteloua gracilis</i>)	P	W	Ic	N	Un	Un	De
6	Buffalograss (<i>Buchloe dactyloides</i>)	P	W	Ic	N	Un	Un	De
7	Canada wildrye (<i>Elymus canadensis</i>)	P	C	D	N	Un	De	De
8	Cattail (<i>Typha</i> spp.)	P	W	D	N	Un	Un	Un
9	Crested wheatgrass (<i>Agropyron cristatum</i>)	P	C	Iv	I	De	De	De
10	Cheatgrass (<i>Bromus tectorum</i>)	A	C	Iv	I	Un	Un	De
11	Foxtail barley (<i>Hordeum jubatum</i>)	P	C	Ic	N	Un	Un	Un
12	Green needlegrass (<i>Stipa viridula</i>)	P	C	D	N	Un	De	De
13	Indian ricegrass (<i>Oryzopsis hymenoides</i>)	P	C	D	N	De	De	De
14	Indiangrass (<i>Sorghastrum nutans</i>)	P	W	D	N	Un	De	De
15	Inland saltgrass (<i>Distichlis spicata</i>)	P	W	Ic	N	Un	Un	Un
16	Kentucky bluegrass (<i>Poa pratensis</i>)	P	C	Iv	I	Un	Un	De
17	Little bluestem (<i>Andropogon scoparium</i>)	P	W	D	N	Un	De	De
18	Needle-and-thread (<i>Stipa comata</i>)	P	C	Ic	N	Un	De	De
19	Northern reedgrass (<i>Calamagrostis stricta</i>)	P	C	D	N	Un	Un	De
20	Nuttall alkaligrass (<i>Puccinellia nuttalliana</i>)	P	C	D	N	Un	Un	De
21	Plains muhly (<i>Muhlenbergia cuspidata</i>)	P	W	D	N	Un	Un	De
22	Porcupine grass (<i>Stipa spartea</i>)	P	C	D	N	Un	De	De
23	Prairie cordgrass (<i>Spartina pectinata</i>)	P	W	D	N	Un	Un	De
24	Prairie dropseed (<i>Sporobolus heterolepis</i>)	P	W	Ic	N	De	Un	De
25	Prairie Junegrass (<i>Koeleria pyramidata</i>)	P	C	Ic	N	Un	Un	De
26	Prairie sandreed (<i>Calamovilfa longifolia</i>)	P	W	D	N	Un	De	De
27	Red threeawn (<i>Aristida longiseta</i>)	P	C	Ic	N	Un	Un	Un
28	Reed canarygrass (<i>Phalaris arundinacea</i>)	P	C	D	N	Un	Un	De
29	Sand bluestem (<i>Andropogon hallii</i>)	P	W	D	N	Un	De	De
30	Sand dropseed (<i>Sporobolus cryptandrus</i>)	P	W	Ic	N	De	Un	De
31	Sandberg bluegrass (<i>Poa sandbergii</i>)	P	C	Ic	N	Un	Un	Un
32	Sideoats grama (<i>Bouteloua curtipendula</i>)	P	W	D	N	Un	Un	De
33	Smooth brome grass (<i>Bromus inermis</i>)	P	C	Iv	I	Un	De	De
34	Switchgrass (<i>Panicum virgatum</i>)	P	W	D	N	De	De	De
35	Tumblegrass (<i>Schedonnardus paniculatus</i>)	P	W	Ic	N	Un	Un	Un
36	Western wheatgrass (<i>Agropyron smithii</i>)	P	C	D	N	De	De	De
37	Wilcox panicum (<i>Dichanthelium wilcoxianum</i>)	P	W	D	N	Un	Un	Un

SEDGES and RUSHES						Wildlife Value Sharp-tailed Grouse	Forage Value Cattle	
Plant Number	Plant Name	Life Span	Season of Growth	Grazing Response	Origin	Food	Nesting Cover	Food
38	Baltic rush (<i>Juncus balticus</i>)	P	C	D	N	Un	Un	Un
39	Slough sedge (<i>Carex atheroides</i>)	P	C	D	N	Un	Un	De
40	Three square (<i>Scirpus americanus</i>)	P	C	D	N	Un	Un	Un
41	Upland sedge (<i>Carex</i> species)	P	C	lc	N	Un	Un	De

CRYPTOGAMS						Wildlife Value Sharp-tailed Grouse	Forage Value Cattle	
Plant Number	Plant Name	Life Span	Season of Growth	Grazing Response	Origin	Food	Nesting Cover	Food
42	Clubmoss (<i>Selaginella densa</i>)	P	C	lc	N	Un	Un	Un
43	Horsetail (<i>Equisetum arvense</i>)	P	W	lc	N	Un	Un	Un

FORBS						Wildlife Value Sharp-tailed Grouse	Forage Value Cattle	
Plant Number	Plant Name	Life Span	Season of Growth	Grazing Response	Origin	Food	Nesting Cover	Food
44	Absinth wormwood (<i>Artemisia absinthium</i>)	P	W	lv	I	Un	Un	Un
45	American licorice (<i>Glycyrrhiza lepidota</i>)	P	W	D	N	De	Un	Un
46	American vetch (<i>Vicia americana</i>)	P	C	D	N	De	Un	De
47	Ball cactus (<i>Coryphantha vivipara</i>)	P	W	lc	N	De	Un	Un
48	Beards tongue (<i>Penstemon</i> spp.)	P	C	D	N	De	Un	Un
49	Black samson (purple coneflower) (<i>Echinacea angustifolia</i>)	P	W	D	N	De	Un	De
50	Blanket flower (<i>Gaillardia aristata</i>)	P	W	lc	N	De	Un	Un
51	Blue-eyed grass (<i>Sisyrinchium angustifolium</i>)	P	C	D	N	Un	Un	Un
52	Bracted spiderwort (<i>Tradescantia bracteata</i>)	P	W	D	N	Un	Un	Un
53	Canada thistle (<i>Cirsium arvense</i>)	P	W	lv	I	Un	Un	Un
54	Cudweed sagewort (<i>Artemisia ludoviciana</i>)	P	W	lc	N	Un	Un	Un
55	Curly dock (<i>Rumex crispus</i>)	P	W	lv	I	Un	Un	Un
56	Curlycup gumweed (<i>Grindelia squarrosa</i>)	B	W	lv	N	Un	Un	Un
57	Cutleaf goldenweed (<i>Haplopappus spinulosus</i>)	P	W	lc	N	Un	Un	Un
58	Daisy fleabane (<i>Erigeron strigosus</i>)	A	C	lv	N	De	Un	Un
59	Deervetch (<i>Lotus purshianus</i>)	A	C	lv	N	De	Un	De
60	Dotted gayfeather (<i>Liatris punctata</i>)	P	W	D	N	Un	Un	Un
61	Fringed sagewort (<i>Artemisia frigida</i>)	P	C	lc	N	Un	Un	Un
62	Goatsbeard (<i>Tragopogon dubius</i>)	B	C	lv	N	De	Un	Un
63	Green sagewort (<i>Artemisia dracunculus</i>)	P	W	lc	N	Un	Un	Un
64	Hairy goldaster (<i>Heterotheca villosa</i>)	P	W	lc	N	Un	Un	Un
65	Heath aster (<i>Aster ericoides</i>)	P	W	lc	N	De	Un	Un
66	Hoods phlox (<i>Phlox hoodii</i>)	P	C	lc	N	Un	Un	Un
67	Indian breadroot (prairie turnip) (<i>Psoralea esculenta</i>)	P	C	D	N	De	Un	Un
68	Lamberts crazyweed (<i>Oxytropis lambertii</i>)	P	C	lc	N	De	Un	Un
69	Leafy spurge (<i>Euphorbia esula</i>)	P	C	lv	I	Un	Un	Un

FORBS (cont.)						Wildlife Value Sharp-tailed Grouse		Forage Value Cattle
Plant Number	Plant Name	Life Span	Season of Growth	Grazing Response	Origin	Food	Nesting Cover	Food
70	Mariposa lily (<i>Calochortus gunnisonii</i>)	P	C	D	N	Un	Un	Un
71	Milkvetches (<i>Astragalus</i> spp.)	P	C	D	N	De	Un	Un
72	Missouri goldenrod (<i>Solidago missouriensis</i>)	P	W	lc	N	De	Un	Un
73	Pasque flower (crocus) (<i>Anemone patens</i>)	P	C	D	N	De	Un	Un
74	Plains pricklypear (<i>Opuntia polyacantha</i>)	P	W	lc	N	De	Un	Un
75	Prairie coneflower (<i>Ratibida columnifera</i>)	P	W	lc	N	De	Un	Un
76	Prairie thistle (<i>Cirsium</i> spp.)	P	W	lc	N	De	Un	Un
77	Prairie smoke (torch flower) (<i>Geum triflorum</i>)	P	C	lc	N	Un	Un	Un
78	Purple prairieclover (<i>Petalostemon purpureum</i>)	P	W	D	N	De	Un	De
79	Pussytoes (<i>Antennaria neglecta</i>)	P	C	lc	N	Un	Un	Un
80	Scarlet globemallow (<i>Sphaeralcea coccinea</i>)	P	C	lc	N	Un	Un	Un
81	Scarlet gura (<i>Gaura coccinea</i>)	P	C	lc	N	Un	Un	Un
82	Silverleaf scurfpea (<i>Psoralea argophylla</i>)	P	C	lc	N	De	Un	Un
83	Skeletonweed (<i>Lygodesmia juncea</i>)	P	W	lc	N	Un	Un	Un
84	Soft goldenrod (<i>Solidago mollis</i>)	P	W	lc	N	De	Un	Un
85	Stiff goldenrod (<i>Solidago rigida</i>)	P	W	lc	N	De	Un	Un
86	Sunflower species (<i>Helianthus</i> spp.)	P	W	D	N	De	Un	De
87	Western wallflower (<i>Erysimum asperum</i>)	B	C	lv	N	De	Un	Un
88	Western yarrow (<i>Achillea millefolium</i>)	P	C	lc	N	Un	Un	Un
89	White milkwort (<i>Polygala alba</i>)	P	C	lc	N	Un	Un	Un
90	White prairieclover (<i>Petalostemon candidum</i>)	P	W	D	N	De	Un	De
91	Sweetclover (<i>Melilotus</i> spp.)	B	C	lv	I	De	De	De
92	Wild flax (<i>Linum lewisii</i>)	P	C	D	N	De	Un	Un
93	Wild onion (<i>Allium</i> spp.)	P	C	lc	N	Un	Un	Un
94	Woolly plantain (<i>Plantago patagonica</i>)	A	C	lv	N	De	Un	Un

SHRUBS and HALF-SHRUBS						Wildlife Value Sharp-tailed Grouse		Forage Value Cattle
Plant Number	Plant Name	Life Span	Season of Growth	Grazing Response	Origin	Food	Nesting Cover	Food
95	Big sagebrush (<i>Artemisia tridentata</i>)	P	W	lc	N	Un	De	Un
96	Broom snakeweed (<i>Gutierrezia sarothrae</i>)	P	W	lc	N	Un	Un	Un
97	Creeping juniper (<i>Juniperus horizontalis</i>)	P	W	D	N	De	Un	Un
98	Leadplant (<i>Amorpha canescens</i>)	P	W	D	N	De	De	De
99	Nuttall saltbush (<i>Atriplex nutallii</i>)	P	W	D	N	De	De	De
100	Prairie rose (<i>Rosa arkansana</i>)	P	C	lc	N	De	Un	Un
101	Rabbitbrush (<i>Chrysothamnus nauseosus</i>)	P	W	lc	N	Un	De	Un
102	Shrubby cinquefoil (<i>Potentilla fruticosa</i>)	P	W	lc	N	Un	De	Un
103	Silver sagebrush (<i>Artemisia cana</i>)	P	W	lc	N	Un	De	Un
104	Skunkbrush sumac (<i>Rhus trilobata</i>)	P	W	lc	N	De	De	Un
105	Yucca (<i>Yucca glauca</i>)	P	C	lc	N	De	Un	Un
106	Western snowberry (Buckbrush) (<i>Symphoricarpos occidentalis</i>)	P	C	lc	N	De	De	Un
107	Winterfat (<i>Ceratoides lanata</i>)	P	C	D	N	Un	Un	De

TREES

TREES						Wildlife Value Sharp-tailed Grouse		Forage Value Cattle
Plant Number	Plant Name	Life Span	Season of Growth	Grazing Response	Origin	Food	Nesting Cover	Food
108	Boxelder (<i>Acer negundo</i>)	P	W	D	N	Un	Un	Un
109	Buffaloberry (<i>Shepherdia argentea</i>)	P	W	Ic	N	De	Un	Un
110	Bur oak (<i>Quercus macrocarpa</i>)	P	W	D	N	Un	Un	Un
111	Chokecherry (<i>Prunus virginiana</i>)	P	W	D	N	De	Un	Un
112	Cottonwood (<i>Populus deltoides</i>)	P	W	D	N	De	Un	Un
113	Green Ash (<i>Fraxinus pennsylvanica</i>)	P	W	D	N	Un	Un	Un
114	Quacking aspen (<i>Populus tremuloides</i>)	P	W	D	N	De	Un	Un
115	Rocky Mountain juniper (<i>Juniperus scopulorum</i>)	P	W	D	N	Un	Un	Un
116	Juneberry (<i>Amelanchier alnifolia</i>)	P	W	D	N	De	Un	Un
117	Silverberry (<i>Elaeagnus comutata</i>)	P	W	Ic	N	De	Un	Un

Situation Maps

Amanda Hancock, Joshua Peterson and Kevin Sedivec

One of the most important parts of range management is having a grazing plan. This plan need not be complex. Using a ranch “situation” map allows ranchers to evaluate the conditions of their ranch and use that information to plan range improvements to maximize production and range health. In range judging, the situation map is used to recommend some of the most common of these range improvements. For contest purposes, teams will be required to evaluate the current situation and stocking rate for a range situation map. They also will be required to suggest practices that can be used to improve the rangeland based on their observations. Situations encountered could range from undeveloped ranches to complex planned rotational grazing systems. In the contest, the situation map utilizes all of the information learned about rangeland through ecological sites and plant identification. Much of the information in this section likely is a review of these concepts.

Part 1: Range Evaluation

Before any management can be done on rangeland, the rancher first must know what conditions exist on his/her land. The two most important pieces of information are ecological site and similarity index (SI). In the range judging contest, this information will be indicated on the situation map, as will the acreage of each site/similarity combination.

EXAMPLE:

Silty

45 acres good condition (SI = 53%)

30 acres fair condition (SI = 38%)

Sandy

15 acres excellent condition (SI = 78%)

50 acres fair condition (SI = 42%)

Carrying Capacity

Ecological sites play a major role in the production of the plant community that grows on them. The soil properties can help or hinder production of herbage (green plant tissue). The similarity index of rangeland also is a factor in determining how much herbage will be produced. The vegetative zone in which this combination of site and similarity rests is the last major factor impacting production on rangeland.

The combination of an ecological site and similarity index, in a particular vegetative zone, will produce a base amount of forage for grazing livestock. This information has been collected by professional agencies and will be made available to judges during the contest. This total production will support a given number of animals, which will be discussed later.

Carrying capacity of the rangeland can be determined by using the site/similarity index combination and multiplying the similarity index value by the value listed in Table 2 (page 29) for the appropriate ecological site and vegetative zone.

EXAMPLE:

45 acres silty with a similarity index rating of good condition (60%) in the Missouri Slope vegetative zone.

45 acres X 0.70 AUMs/acre (from Table 2)
X 0.60 (SI) = 18.9AUMs

45 acres of silty rangeland in good condition (60%) can support 18.9 AUMs.

Stocking Rate

Different types of livestock and wildlife differ in their monthly consumption of forage because of differences in size and physiology. Therefore, knowing how much the grazing animals will eat is important so too many animals are not put on an area that cannot support them. Animal Unit Equivalents (AUEs) are assigned to each species depending on forage intake. This information is presented in Table 1 (page 27).

Stocking rate is calculated the same way on the range situation map as it is for the ecological sites. Multiply the number of animals by the AUE by the number of months grazed.

EXAMPLE:

100 cow/calf pairs grazed from May 1 through Oct. 1

1 cow/calf pair = 1 AUE

100 pairs x 1 AUE x 5 months = 500AUMs

The stocking rate should be as close to the carrying capacity as possible for maximum use. Overuse and underuse can result in the deterioration of rangeland. For this reason, if the stocking rate exceeds carrying capacity, the rate should be decreased. If the stocking rate is less than the carrying capacity, the rate should be increased. Always round your final stocking rate to the nearest number to eliminate decimal points (e.g., 178.8 AUMs would be 179 AUMs).

Part 2: Range Improvements

The goal of range improvements is to use all grazing land to its optimum potential for maximum vegetation and forage production. By using range improvement practices, a rancher can distribute grazing evenly over all of the land. This will minimize overuse on some areas and underuse on others. Range improvements will result in healthier, more productive rangeland. Several practices are used in contest situations.

Water Developments

Water should be provided in plentiful quantity and good quality with accessibility in all pastures. While lakes and streams/rivers provide natural water sources, livestock can cause damage to shorelines and banks. Experts recommend that additional water supplies, such as stock tanks or dams, dugouts or other water sources, be available, especially in large pastures. Water always should be within 1.5 miles over level to gently rolling terrain, and within one-half mile over rough or hilly terrain (Table 3). In large pastures (greater

Table 3. Minimum distance to water based on slope.

Slope	Distance to Water Must be Less Than
Less than 5%	1.5 miles
5% to 10%	1.0 mile
11% to 15%	0.75 mile
Greater than 15%	0.5 mile

than 640 acres), having only one water source will lead to overuse around the site because cattle will travel to this source twice a day to drink. Areas most distant from the tank will see less use. Additional water sources should be added in this case.

Fencing

While being both costly and labor-intensive at times, fencing is one of the most effective tools to control grazing distribution. Cross fences should be used to divide areas of different production potential (e.g., different ecological sites and different similarity indexes). Producers with pastures less than 10 acres in size need not worry about additional fencing in normal situations. Cross fences also are used to establish a rotational grazing system. Temporary fences, or drift fences, can be used in conjunction with natural barriers to encourage grazing in lightly used areas.

Old or improperly placed fences can hinder distribution of grazing animals. This can lead to areas of heavy use or areas of no use. In cases where fences encourage bunching or poor distribution, the fence should be either removed or relocated.

Burning and Mowing

When pastures are left idle or are undergrazed for long periods, as well as when dominated by undesirable plant species, burning or mowing the old growth is necessary to restore rangeland health. Because these areas will see a revitalization of fresh, green herbage, livestock will be attracted to these locations. **Part of the growing season should be deferred** to prevent damage to mowed or burned areas. Burning is recommended for rough, rocky areas and where terrain limits machinery. Experts recommend burning or mowing when old growth is greater than 70 percent.

Salt and Mineral

Fencing may be the most effective way to fix distribution problems, but placement of salt and mineral is the easiest and cheapest. This

practice should be done regularly (at least once a year, though more often is preferred). Without movement, these areas can become overused, much like water locations. Salt and mineral should be placed away from water, in areas that are more lightly used. New locations of salt and minerals should be within sight of the old location so livestock do not have to search for them. While placing salt licks on the ground is common practice, experts do not recommend it. Salt can be incorporated into the soil, leading livestock back to old salt locations. Experts recommend always changing salt and mineral locations.

Reseed (full seed) Specific Areas

Land that previously has been cultivated or disturbed by mining and similar activities should be tilled and reseeded into native or specific introduced grass species. This practice eliminates many undesirable plants and improves production on these areas. Because of the establishment time and severe disturbance of the soil required for this practice, **deferring two or more growing seasons** is required.

Interseed Specific Areas

Rangelands in poor condition or with large quantities (greater than 75 percent by weight) of undesirable plants can benefit from interseeding desirable species into existing land. Legumes and decreaser plants often are selected for interseeding. This practice will improve the similarity index and forage value of the land. As with reseeding, deferment is required for establishment of these species. However, the **deferment need not last more than one growing season**. This practice should be done on land in poor condition.

Control Blowouts and Gullies

Coarse surface soils with poor plant cover are subject to severe wind and water erosion. These blowouts or gullies always should be controlled. Mulching and reseeding, or similar sod-replacing techniques, should be used to control blowouts

when present on the range situation map.

Deferment of one growing season is needed to allow these plants to establish and stabilize the topsoil if the total erosion sites comprise more than 10 percent of the pasture.

Contour Furrowing or Pitting

Mechanical treatments can be used to slow runoff and aid in water infiltration. The practices of contour furrowing and pitting can be used to accomplish this goal. They are best used on fine-textured soils with nearly level to moderate slopes. Because of the mechanical disturbance, **deferment of one growing season** is necessary.

Apply Woody Plant Control

When greater than 30 percent of a pasture consists of woody species, they should be controlled. When the similarity index is fair or poor, experts also recommend control of these plants when woody species create the low similarity index.

Control Noxious Weeds

Noxious weeds are a major problem facing rangelands. Without control, these species can overtake a site and reduce forage quality and rangeland health. Controlling noxious weeds whenever they are present is important. Noxious weeds in North Dakota include leafy spurge, Canada thistle, spotted and Russian knapweed, diffuse knapweed, absinthe wormwood, salt cedar, yellow starthistle, dalmation toadflax, field bindweed, musk thistle and purple loosestrife.

Change Season of Use

If a pasture is dominated by cool-season plants, but is being grazed in the warm season (or vice versa), full utilization of these plants is impossible. This can occur when a pasture is grazed at the same time every year. When a pasture is dominated by either cool- or warm-season plants, or when the pasture is grazed at the same time period every year, experts recommend changing the season of use,

Begin a Planned Grazing System

Grazing lands in North Dakota and many other Plains states developed under periodic grazing from wildlife herds. Weather patterns differ from year to year, causing differences in potential forage production (and consequently, differences in carrying capacity). For these reasons, experts always recommend implementing a planned grazing system to maximize forage production on native rangelands. This practice need not be used on temporary or early spring pastures, or if a properly managed rotation system already is in effect.

Deferments

As has been noted in several of the practices, deferment of part, one, two or more growing seasons is at times recommended to maximize effect of the improvement practice. In contest situations, only the longest time period required for deferment needs to be checked.

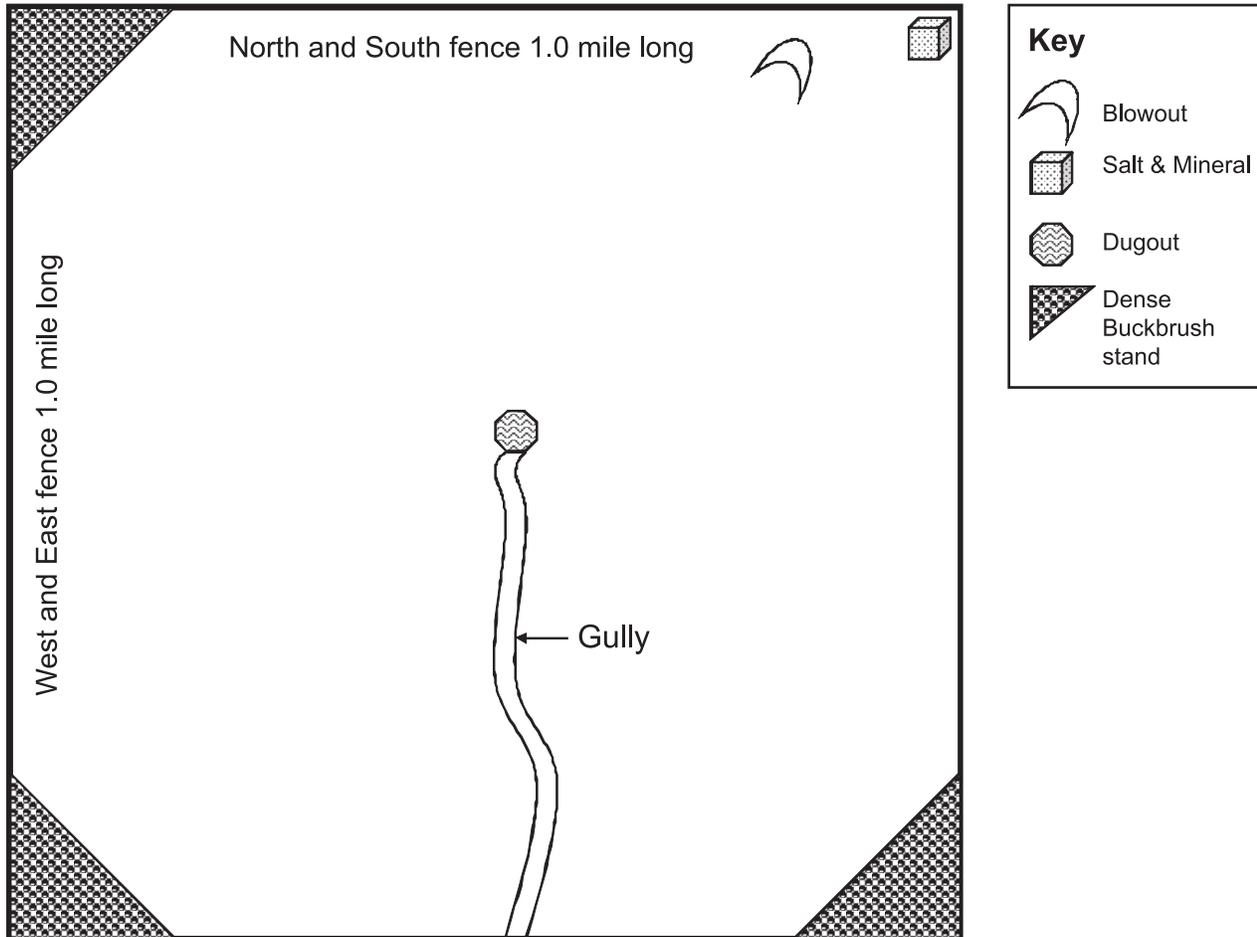
EXAMPLE:

If reseeding is used (defer two or more grazing seasons) and mowing also is needed (defer part of a grazing season) within the same pasture, then only the box for “defer two or more growing seasons” needs to be checked.

Conclusion

A key is provided with each map to help decipher map symbols. All information necessary for determining stocking rates, carrying capacities and any practices is included with the map. Some example situation maps follow this section.

Situation 1



640-acre pasture, no cross fences, in the Missouri Slope vegetation zone (Table 2).

- 100 acres of overflow in fair condition (45% similarity index)
- 100 acres of silty in good condition (60% similarity index)
- 300 acres of silty in fair condition (40% similarity index)
- 100 acres of silty in poor condition (22% similarity index)
- 40 acres of shallow in good condition (65% similarity index)

Stocking rate:

- 100 cow/calf pairs grazing from May 15 - Sept. 15

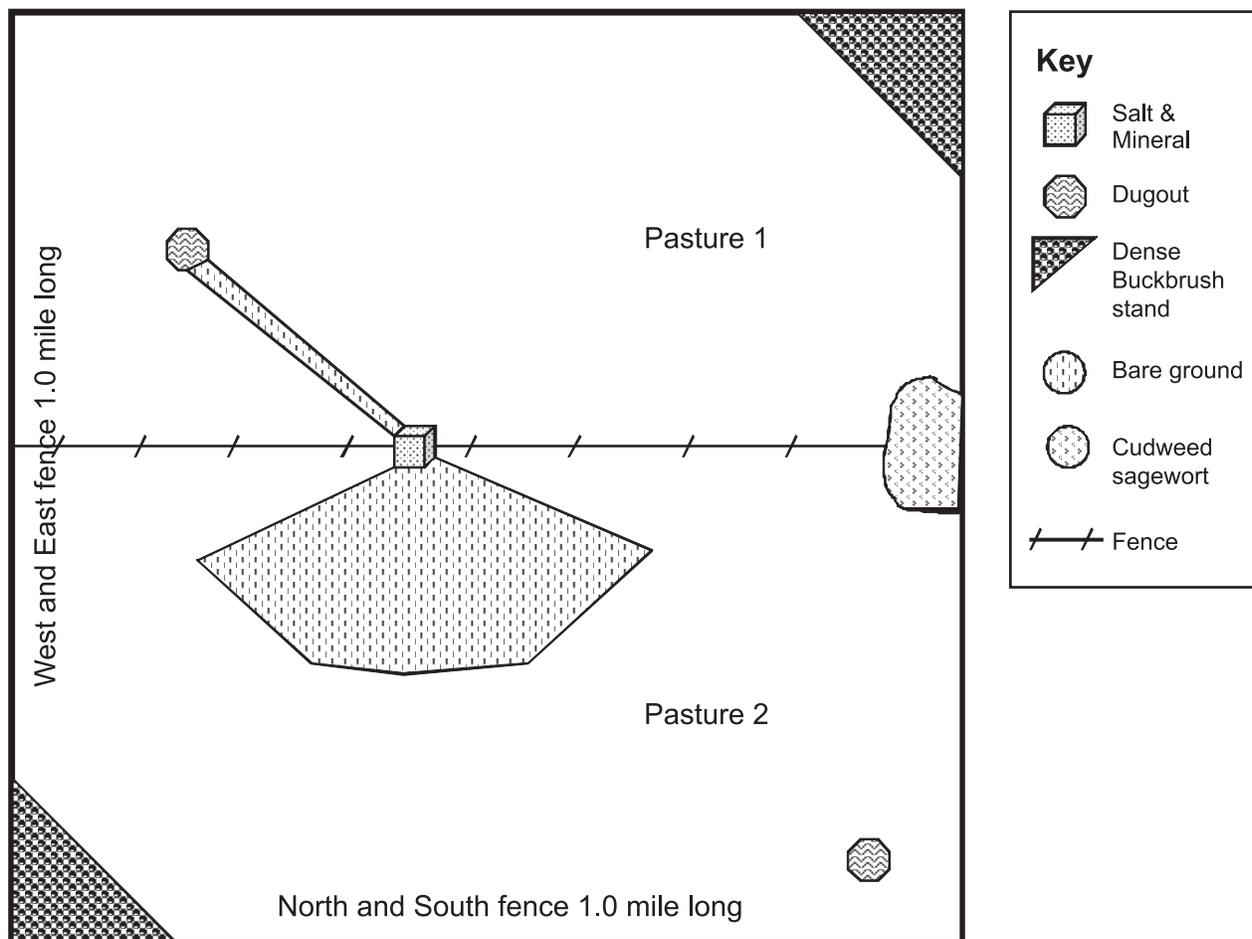
Water source:

- One dugout fed by a natural perennial spring in roughly the middle of the pasture, slope averages 7 percent.

Concerns:

- Gully running south to pasture fence from dugout totaling 7 acres.
- Blowout in northeast corner of pasture approximately 1 to 2 acres in size.
- Buckbrush growing in dense stands at three (northwest, southwest, southeast) corners of pasture. The patches are 50, 60, and 95 acres in size.

Situation 2



640 acres, 1 cross fence (2 pastures, 320 acres each), in the Badlands vegetative zone (Table 2).

Pasture 1:

- 50 acres of overflow: fair condition (45%)
- 75 acres of overflow: poor condition (18%)
- 75 acres of sandy: fair condition (30%)
- 50 acres of sandy: poor condition (20%)
- 70 acres of shallow: fair condition (35%)

Pasture 2:

- 50 acres of overflow: fair condition (30%)
- 85 acres of overflow: poor condition (15%)
- 60 acres of silty: good condition (55%)
- 100 acres of silty: fair condition (40%)
- 25 acres of saline lowland: poor condition (20%)

Stocking rate:

- 40 cow calf pairs, 2 bulls
- Pasture 1: May 15 - July 15
- Pasture 2: July 15 - Sept. 15

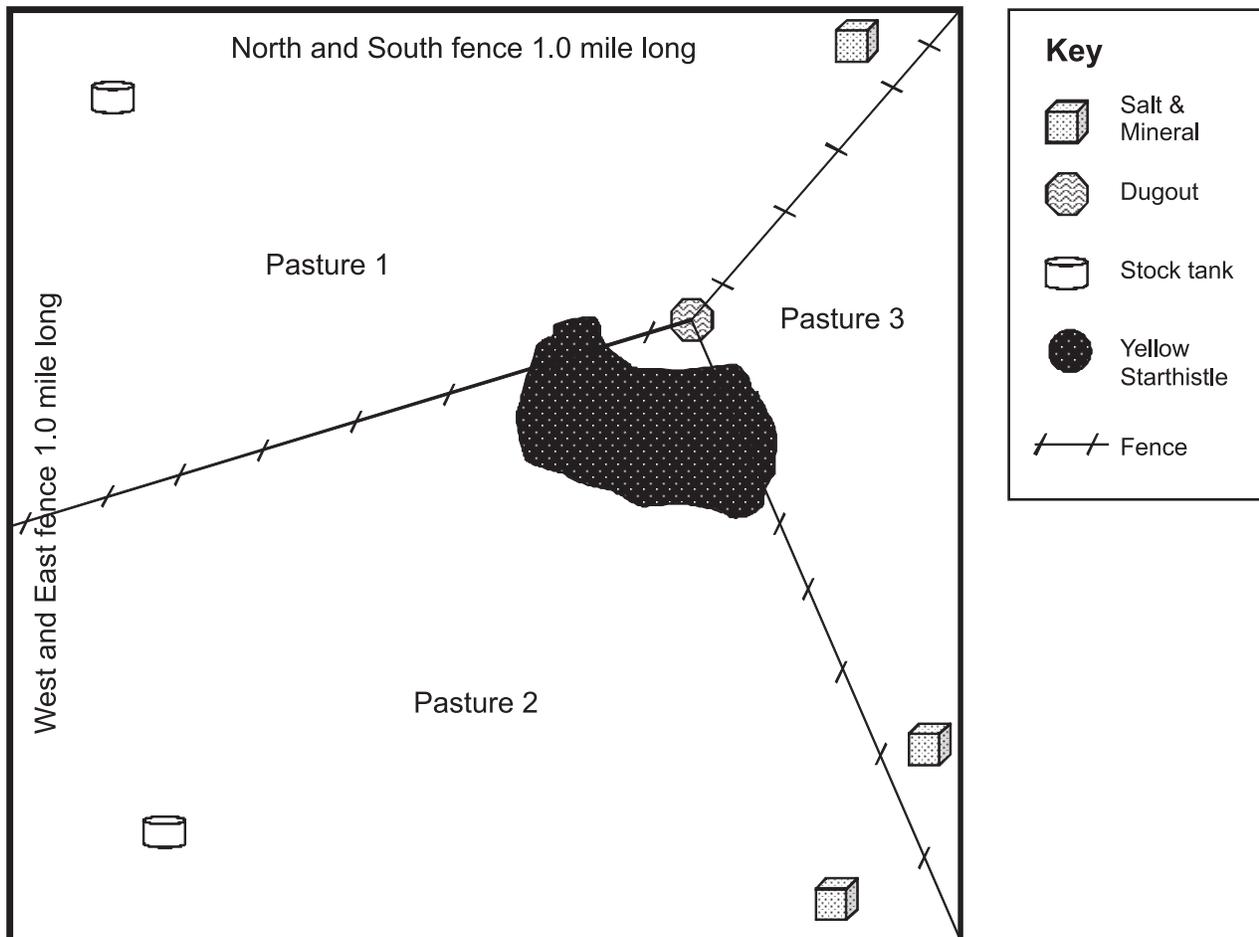
Water sources:

- One dugout in each pasture
- Dugout in Pasture 1 goes dry by Aug. 1 each year

Concerns:

- Mineral in middle of two pastures and has a significant amount of bare ground surrounding it.
- Dense stands of buckbrush in northeast corner of Pasture 1 and southwest corner of Pasture 2 totaling 24% of both pastures.
- 10 acres of cudweed (5 acres in each pasture) in the southeast corner of Pasture 1 and northeast corner of Pasture 2.
- Old growth is 72% of Pasture 1.

Situation 3



640 acres, 3 cross fences in the Drift Prairie vegetative zone (Table 2)

3 pastures: Pasture 1: 165 acres, Pasture 2: 340 acres, Pasture 3: 71 acres

Pasture 1:

- 40 acres of overflow in good condition (70%)
- 32 acres of sandy in good condition (65%)
- 12 acres of silty in excellent condition (79%)
- 71 acres of silty in good condition (58%)
- 10 acres of shallow in good condition (62%)

Pasture 2:

- 63 acres of overflow in good condition (70%)
- 12 acres of sandy in good condition (65%)
- 38 acres of sandy in fair condition (40%)
- 180 acres of silty in fair condition (40%)
- 19 acres of shallow in good condition (62%)
- 28 acres of thin upland in fair condition (43%)

Pasture 3:

- 17 acres of overflow in fair condition (50%)
- 12 acres of sandy in good condition (65%)
- 32 acres of silty in good condition (58%)
- 10 acres of shallow in fair condition (35%)

Stocking rate:

- 75 head of yearlings

Water Sources:

- Central dugout watered by a perennial spring
- Pasture 1 has a tank in the northwest corner
- Pasture 2 has a tank in the southwest corner

Concerns:

- 62 acres of dense yellow starthistle stand falling:
 - 6 acres in Pasture 1
 - 48 acres in Pasture 2
 - 8 acres in Pasture 3

Pasture rotation schedule:

	Pasture 1	Pasture 2	Pasture 3
Year 1	June 1 - July 1	July 1 - Aug. 15	Aug. 15 - Aug. 30
Year 2	Aug. 1 - Aug. 30	June 1 - July 15	July 15 - Aug. 1
Year 3	June 15 - July 15	July 15 - Aug. 30	June 1 - July 15

Slope:

- Pasture 1:
 - Pasture 1 has an average slope of 5% to 10%
- Pasture 2:
 - Pasture 2 has an average slope of 5% to 10%
- Pasture 3:
 - Pasture 3 has an average slope of 10% to 15%

■ Situation 1 Answers:

Carrying Capacity:

Fair overflow: $100 \times 1.0 \text{ AUM/ac} \times 0.45 = 45 \text{ AUMs}$

Good silty: $100 \times 0.7 \text{ AUM/ac} \times 0.60 = 42 \text{ AUMs}$

Fair silty: $300 \times 0.7 \text{ AUM/ac} \times 0.40 = 84 \text{ AUMs}$

Poor silty: $100 \times 0.7 \text{ AUM/ac} \times 0.22 = 15.4 \text{ AUMs}$

Good shallow: $40 \times 0.5 \text{ AUM/ac} \times 0.65 = 13 \text{ AUMs}$

Total: 199.4 AUMs

Management Practices:

- Decrease stocking rate
- Defer grazing
- Control blowout
- Apply woody plant control
- Move salt and mineral
- Begin a planned grazing system
- Fencing

■ Situation 2 Answers:

Carrying Capacity:

Pasture 1:

Fair overflow: $50 \times 0.8 \text{ AUM/ac} \times 0.45 = 18$

Poor overflow: $75 \times 0.8 \text{ AUM/ac} \times 0.18 = 12.6$

Fair sandy: $75 \times 0.6 \text{ AUM/ac} \times 0.30 = 13.5$

Poor sandy: $50 \times 0.6 \text{ AUM/ac} \times 0.20 = 6$

Fair shallow: $70 \times 0.40 \text{ AUM/ac} \times 0.35 = 9.8$

Total for Pasture 1: 58.1 AUMs

Total AUMs: 128.1 or 128 AUMs

Pasture 2:

Fair overflow: $50 \times 0.8 \text{ AUM/ac} \times 0.30 = 12$

Poor overflow: $85 \times 0.8 \text{ AUM/ac} \times 0.15 = 10.2$

Good silty: $60 \times 0.6 \text{ AUM/ac} \times 0.55 = 19.8$

Fair silty: $100 \times 0.6 \text{ AUM/ac} \times 0.40 = 24$

Poor saline lowland: $25 \times 0.8 \text{ AUM/ac} \times 0.2 = 4$

Total for Pasture 2: 70.0 AUMs

Management Practices:

- Burn or mow
- Defer two or more growing seasons
- Decrease stocking rate
- Move salt and mineral
- Water development
- Reseed
- Begin a planned grazing system
- Change season of use

■ Situation 3 Answers:

Carrying Capacity:

Pasture 1:

Good overflow: $40 \times 1.3 \text{ AUM/ac} \times 0.70 = 36.4$

Good sandy: $32 \times 1.0 \text{ AUM/ac} \times 0.65 = 20.8$

Excellent silty: $12 \times 0.9 \text{ AUM/ac} \times 0.79 = 8.5$

Good silty: $71 \times 0.9 \text{ AUM/ac} \times 0.58 = 37.1$

Good shallow: $10 \times 0.6 \text{ AUM/ac} \times 0.62 = 3.7$

Total for Pasture 1: 106.5 AUMs

Pasture 2:

Good overflow: $63 \times 1.3 \text{ AUM/ac} \times 0.70 = 57.3$

Good sandy: $12 \times 1.0 \text{ AUM/ac} \times 0.65 = 7.8$

Fair sandy: $38 \times 1.0 \text{ AUM/ac} \times 0.40 = 15.2$

Fair silty: $180 \times 0.9 \text{ AUM/ac} \times 0.40 = 64.8$

Good shallow: $19 \times 0.6 \text{ AUM/ac} \times 0.62 = 7.1$

Fair thin upland: $28 \times 0.9 \text{ AUM/ac} \times 0.43 = 10.8$

Total for Pasture 2: 163.0 AUMs

Pasture 3:

Fair overflow: $17 \times 1.3 \text{ AUM/ac} \times 0.5 = 11.1$

Good sandy: $12 \times 1.0 \text{ AUM/ac} \times 0.65 = 7.8$

Good silty: $32 \times 0.9 \text{ AUM/ac} \times 0.58 = 16.7$

Fair shallow: $10 \times 0.6 \text{ AUM/ac} \times 0.35 = 2.1$

Total for Pasture 3: 37.7 AUMs

Total AUMs: 307.2 or 307 AUMs

Management Practices:

- Increase stocking rate
- Control noxious weeds
- Move salt and mineral
- Begin a planned grazing system

Sources of Information

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