

# Wrangler Guide

## to South Dakota Rangelands



**SOUTH DAKOTA STATE  
UNIVERSITY EXTENSION**



**Natural Resources Conservation Service**  
U.S. DEPARTMENT OF AGRICULTURE



Update: 2026

## Table of Contents

Foreword and History .....	3	Identifying Ecological Sites .....	15
Introduction.....	3	What are Ecological Sites?.....	15
Learning Goals for Wrangler .....	3	Brief Ecological Site Descriptions.....	16
What is Rangeland? .....	3	How to Identify Ecological Sites.....	18
Why Judge Rangeland?.....	4	Determining Similarity Index.....	21
Judging Contest Components for the Wrangler Division.....	4	Where do I start with Similarity Index?.....	22
Introduction to Soils.....	4	An Introduction to Beef Cattle Carrying Capacity Evaluation.....	23
Types of Soil .....	5	A Detailed Contest Example.....	23
How is soil formed?.....	5	Part I: Determine Ecological Site.....	23
Soil Layers .....	6	Part II: Determine Similarity Index.....	23
Water and Minerals .....	6	Part III: Beef Cattle Carrying Capacity .....	24
Slope .....	7	Example Scorecard:.....	27
Identifying Plants! .....	7	Wrangler Judging Contest Details.....	28
Why do we need to identify plants?.....	7	Plant Characteristics and Resource Rating Guide .	31
Scientific and Common Names .....	7	Grasses - Tall and Mid.....	34
Kinds of Range Plants .....	7	Grasses - Short.....	40
Parts of Plants .....	9	Forbs .....	43
Focusing on Grass .....	9	Shrubs .....	58
The Blade .....	9	Trees.....	62
The Sheath.....	10	Rangeland Judging Scranton.....	65
The Ligule.....	10	Contest Scorecards .....	67
The Collar .....	11	MLRA and SI Tables .....	71
The Auricles.....	11		
The Stem .....	11		
The Seedheads and Flowers.....	11		
Focusing on Forbs, Shrubs, and Trees.....	12		
Other Interesting Plant Characteristics .....	14		
Life Span .....	14		
Season of Growth.....	14		
Origin.....	14		
Poisonous.....	14		
Medicinal Value.....	14		
Edible for Humans .....	14		
Other Human Uses.....	14		
Noxious Weeds .....	14		

# Wrangler Guide to South Dakota Rangelands

## Revised and Reviewed:

**Kaylee Wheeler**, SDSU Extension Range Field Specialist  
**Emily Rohrer**, State Rangeland Management Specialist, NRCS  
**Thomas Nadgwick**, Area Rangeland Management Specialist, NRCS

**Revised and Reviewed: March 2026**

**Originally Published: 2009**

## Original Authors:

**Kathryn A. Reeves**, Former 4-H Youth Development Field Specialist, SDSU Extension  
**Dr. Roger N. Gates**, Former Range Management Specialist, SDSU Extension  
**Stanley Boltz**, Former Range Management Specialist, NRCS  
**Kent E. Cooly**, Soil Scientist, NRCS

## Foreword and History

South Dakota Rangeland Days began in the mid 1980s as a way to increase knowledge and awareness of rangelands for South Dakota youth. Youth from ages 8 to 18 could come and learn about rangeland plants and the ecosystem they are part of. Youth were split into four different age categories: “New Rangers”, “Wranglers”, “Scouts”, and “Go-getters” based on their age and experience level. Wranglers, the group this guide was developed for, are youth ages 11 to 13 (middle school aged students). While this event was first developed for 4-H and similar youth groups to attend – 4-H membership is not required for this event.

This guide was first developed by Kathryn Reeves, Roger Gates, Stan Boltz and Kent Cooley to help guide Wranglers during their time spent at the Rangeland Days event. Dave Ollila updated the guide in the mid 2010s, and it has evolved into a mixture of the New Ranger Guide and “Judging South Dakota Rangelands for Livestock and Wildlife Values” Guide used for Scouts and Go-Getters.

This guide is meant to provide instruction and information for the middle school aged student.

## Introduction

### Learning Goals for Wrangler

- Using the Wrangler Guide and “hands on” instruction, students will be able to identify commonly occurring range plants based on distinct plant anatomy characteristics.

- Using the Wrangler Guide and “hands on” instruction, students will be able to classify ecological sites based on soil properties, location of site in topography and the native plant community.
- Using the Wrangler Guide, the Major Land Resource Area Similarity Index Worksheets, and guided instruction, students will be able to calculate similarity indexes based on the Ecological Site and the inventory of plants present.

## What is Rangeland?

**Rangeland** in South Dakota is one of the richest and most important biological resources in the state. **Native** vegetation of rangeland is the economic backbone of ranching. Rangeland provides essential wildlife habitat. Rangeland is treasured for recreation, scenic beauty, and it is the lifeline of streams, ponds, and lakes.

Although grasses are the most common plants in our rangeland ecosystems, forbs, shrubs, and trees are integral components. Rangeland occurs as open rolling uplands, as lowland meadows, along river drainages, in association with glacial till of the northeastern counties, and as meadows in the Black Hills. South Dakota once was more than 90% rangeland, and today across the state rangeland occupies approximately half of the state. It still occupies more than 75% of the land area in western counties. In central and north-eastern counties, 40 to 60% rangeland is common. In the southeast, rangeland occupies from less than 10% of flatter terrain up to 25% where hills have prevented conversion to cropland or towns.

Rangeland is a kind of land, not a land use, and its management profoundly impacts the similarity index of rangeland and its value for livestock, wildlife, and humans.

## Why Judge Rangeland?

The purpose of rangeland judging is to provide an understanding of rangeland resources and a sense of stewardship in natural resource management. This manual describes parts of a contest with components that have a strong biological basis for habitat management of both beef cattle and prairie grouse. Beef cattle have been chosen because they are the most common livestock grazed on South Dakota rangelands. Prairie grouse represent wildlife because they are affected by management and have the potential to occur throughout the state. Prairie grouse is a collective term that encompasses the three species of grouse that occur in South Dakota: sharp-tailed grouse, prairie chicken, and sage grouse.

Management can achieve many desired rangeland uses. Vegetation, livestock, and wildlife respond in a predictable manner to management practices. Rangeland judging is built on rangeland changes that are known to be possible for stated management goals. South Dakota rangeland judging uses beef cattle production (habitat evaluation and carrying capacity), and prairie grouse habitat evaluation to demonstrate important range management concepts.

Judging:

- Integrates basic plant and soil management and the ecological principles necessary to evaluate habitat suitability.
- Provides an opportunity to develop a basic understanding of rangeland ecosystems.
- Instills a sense of rangeland stewardship.
- Is fun and instructive!

## Judging Contest Components for the Wrangler Division

Rangeland judging for the Wrangler includes multiple contest components. This guide provides an overview of each contest component.

Contest components include:

- Plant identification and characteristics
- Ecological Site Identification (including soil texture)
- Similarity Index

This guide also includes a broad overview of the beef cattle carrying capacity component of the higher level contests – but is meant to be an introduction and will not be part of the final contest.

The remainder of this guide provides information on soils and their relationship to ecological sites, plant characteristics, and how to identify plants based on those characteristics, an in-depth overview of ecological sites, an explanation of similarity index, an overview of beef cattle carrying capacity, and finally, an overview of the contest and an example.

The end of this guide provides a plant list with characteristics along with line drawings of most of the plants on the plant list.

## Introduction to Soils

Soil is a collection of naturally occurring forms. Its mixture of organic matter (which includes soil organisms), water, air, and minerals that formed in the surface of the earth (Figure 1). Soil supports the growth of plants. Is soil dirt? Well, it can be, depending on where it is found. Dirt is soil that has been misplaced and is non-living – like on mom's kitchen floor! Soil is a living entity and a precious resource that grows our food.

How much soil is there? That depends on where you live! Some parts of the earth, like Iowa, have very deep soil, in places, more than eight feet deep! The top of Pike's Peak has very little soil, less than one inch deep.

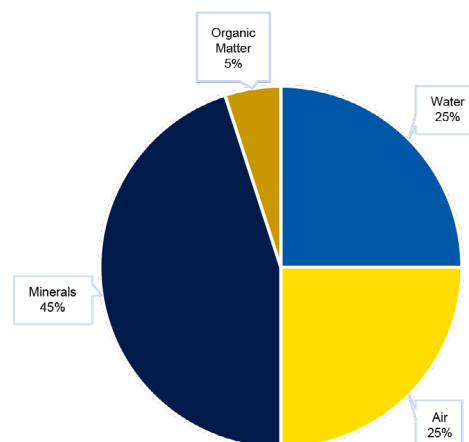


Figure 1. Pie chart depicting the amount of each medium that is found in healthy soil.

## Types of Soil

Soil types are divided based on many properties including the sizes of particles that form them. Most soils have three particles in varying amounts that give them a certain feel or texture. Clay has the smallest particles, less than 0.002 millimeters. Silt is next, with particles that measure 0.002-0.05 millimeters, and sand is the largest with particles measuring 0.05 – 2.0 millimeters. But no one carries a microscope around to decide which soil he has! Each soil, when lumped together, has a feel that gives clues to what texture it is. Add some water and you will see the difference between the soil textures.

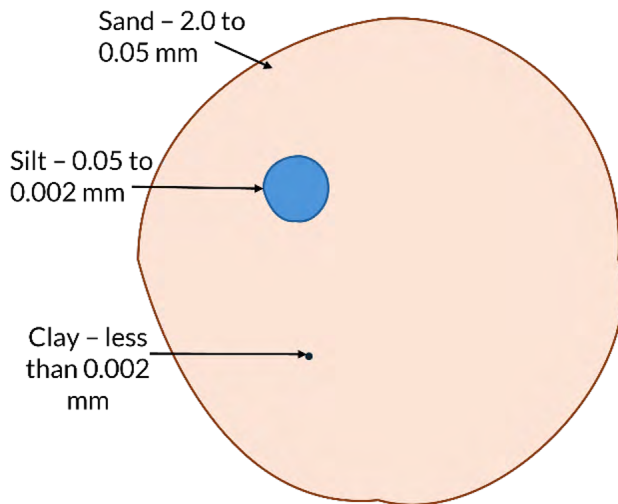


Figure 2. Schematic of how different soil particles compare in size.

Clayey soils have more clay than silt or sand. Moist clayey soils easily form a ribbon when pressed through your fingers and they feel sticky.

Silty soils are smooth like flour, but when wet, they crumble!

Sandy soils feel gritty and even when wet, they don't stick together.

Loam is a combination of all three. Think of rich black soil that grows a great garden; that is what loam feels like. It is slightly sticky and slightly crumbly.

Soil particles are most often mixed up together, so it's common to sample soil that has a mixture of all three particles with different amounts of sand, silt and clay. That is why soils are described as clayey, silty, and sandy. They are seldom one pure type.



Figure 3. Example of ribboning soil.

You can learn a soil's texture by using "the ribbon method". Press and roll moist soil between your thumb and forefinger until it forms a ribbon. Measuring the length of the ribbon give a clue about how much clay is in the soil. The more clay there is in the soil, the longer the ribbon will be. After a lot of

practice, one can estimate the percent of clay in the soil. After either the percent sand or silt content (sand is the easiest) is estimated, then the textural triangle (see below) can be used to determine the soil texture. All three particle amounts will add up to 100 percent.

## How is soil formed?

Most soils start out as a rock! Over many years (tens of thousands to millions), the weather and other rocks, even animals cause the rocks to break apart and grind down. Freezing temperatures, wind, and water speed the process and even the roots of a plant can break rocks into smaller pieces, causing them to move along in the process. Finally, the rock breaks down to their individual particles, go through physical and chemical changes, and combine with living and dead organisms to become soils.

Five Soil Texture Groups

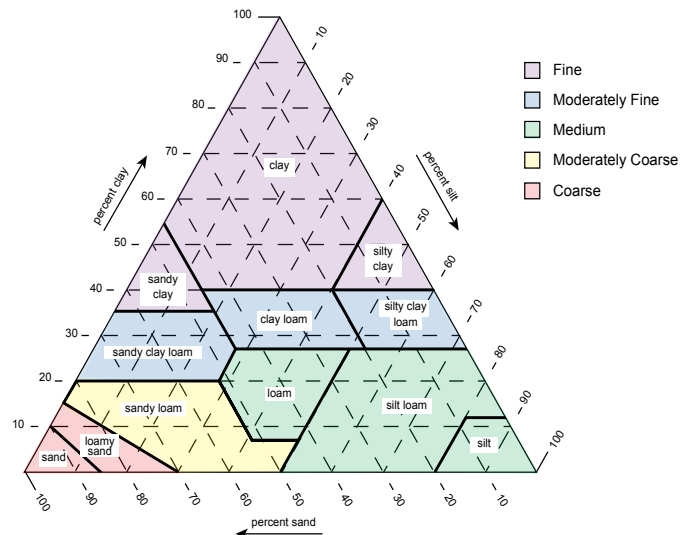


Figure 4. The soil texture triangle.

## Soil Layers

There are three layers of soil, topsoil, subsoil, and parent material (or bedrock). Topsoil is usually the best soil for growing things. It usually has plenty of decaying organic matter, which adds critical nutrients for the plants and animals living there. Topsoil is usually darker and looser than the other layers.

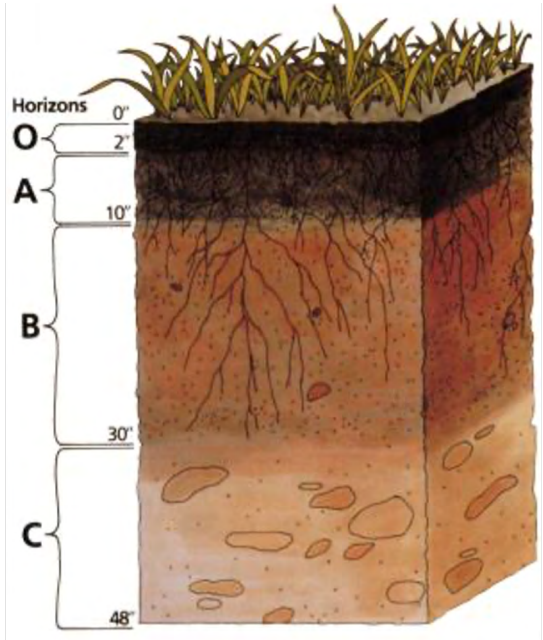


Figure 5. An example of a soil profile with an O, A, B, and C horizon. Graphic courtesy of NRCS.

Subsoil is the next layer. It is usually lighter in color and denser than the topsoil. It doesn't have much organic matter, and often contains small rocks. In cases of severe erosion, top soil may be completely absent, exposing the subsoil.

The parent material or bedrock is the material from which the soil is forming.

Topsoil depth measures anywhere from a few inches to a few feet. On the prairies of western South Dakota, the average depth is between 3 and 5 inches. In eastern South Dakota, topsoil depth averages 6 to 10 inches. For rangelands, the topsoil depth is not as important as the depth that plant roots can grow before reaching a barrier they can't grow through. The barriers are rocks, shale, gravel, or soil that is so dense or compacted that roots can't grow through.

When the different layers of soils are measured and identified, a soil profile is created. The different layers are called horizons. Most soils have three basic horizons: A, B, and C. In most cases the A horizon identifies the topsoil, the B horizon – the subsoil, and

the C horizon, the parent material. In the B horizon, suffixes such as “w” are used to show a change in soil color or structure, or “t” to note a buildup of clay, or “k” to describe a zone where calcium carbonate has accumulated. There are many more suffixes but these listed are most common. If the soil has hard bedrock within 80 inches of the surface, it is identified with a R horizon designation.

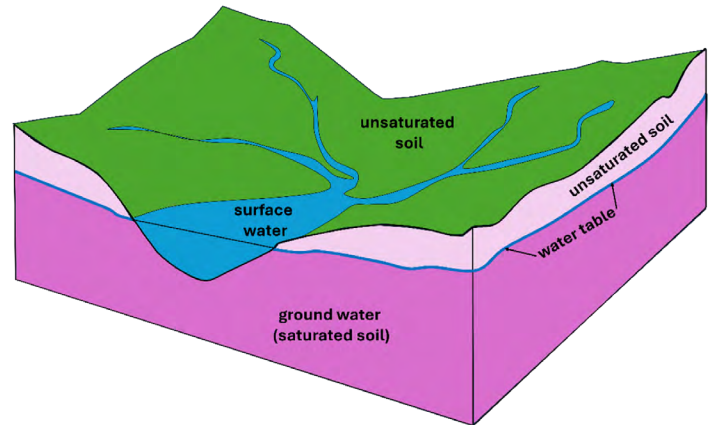


Figure 6. Cross-section of a piece of land and how the water table is situated on the landscape.

## Water and Minerals

Water and minerals can be important factors in describing soils. The amount of water in the soil can be described by its water table (Figure 6). To learn the depth of a soil's water table, dig a hole until water stands in it. In South Dakota, the depth to the water table is often very deep, 50 or more feet, which makes digging a hole deep enough to actually measure it very difficult. However, in low areas like those close to rivers and lakes, the water table is much higher, so it's easier to dig a hole and actually see the water. Water table is important because it affects the type and amount of plants that grow in the area, which will affect the amount of food available for livestock and wildlife, like grouse or deer. A high water table can increase the amount of tall grasses, sedges, and rushes which often results in an increase of organic matter in the soil. Larger amounts of grass mean there will be more food available for all the animals living on the range. However, when a soil is too wet, the quality of forage often decreases.

Water is also important to the development of soils. When rain falls, some of it percolates (just like water through coffee grounds) through the soil. As it percolates, it leeches minerals to other horizons in the soil, and helps to break down organic matter, a process known as soil development. Soils that are more weakly developed, as in western South Dakota, will have more minerals near the surface. In weakly developed soils,

there is not much difference in the colors between horizons. Well-developed soil horizons show layers more clearly, with more distinct differences in color and structure between the layers. Houdek, the state soil, is an example of a well developed soil.



Figure 7. The soil profile of a Houdek soil series. (Photo courtesy of NRCS.)

## Slope

Slope is another descriptive term that helps to identify the area where a soil is found. Slopes can be steep, shallow or somewhere in between. In algebra, slope is defined as a mathematical equation. Using graph paper and points on the x and y axes, slope is given a value which can be translated into a percentage. For example, if the run is equal to 4, and the rise is equal to 3, the slope is  $\frac{3}{4}$  or 75%, which is quite steep. If the run is equal to 4, and the rise is equal to 1, the slope is  $\frac{1}{4}$  or 25%.

In range science, gently sloping sites measure 0 to 6% slope, and steeply sloping sites measure 6% or more.

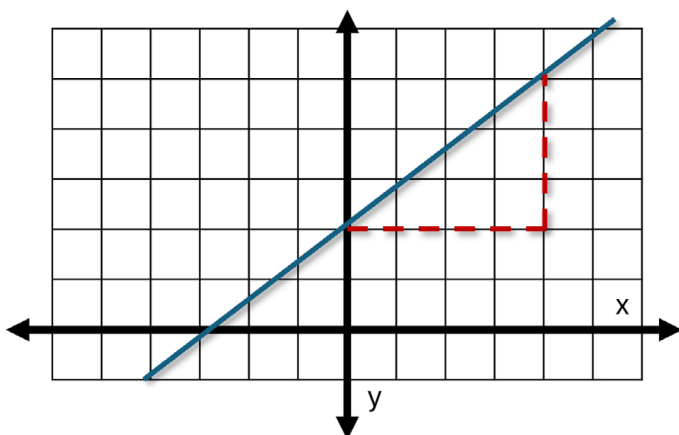


Figure 8. A depiction of how slope can be determined.

## Identifying Plants!

### Why do we need to identify plants?

Many people are interested in learning plant characteristics and plant names. Here are some of the more common reasons:

- To satisfy a general curiosity – usually the first question that comes to mind when we see a new or strange plant is, “Now, what is the plant called?”
- To be able to talk or write about the plant – it simply makes life more interesting and fun when we can talk to others about plants that are important to us in our daily lives
- To be able to look up information about plants – many books are packed with facts about plants. Books can tell us lots of interesting facts about plants.

Once we have answered the question, “what is the name of that plant?” then we have the information necessary to ask, “What is it used for, what are its characteristics?”

### Scientific and Common Names

Each plant has two names: its **scientific name** and its **common name**. The scientific name always has two parts. The first part tells what genus the plant belongs to, and the second part tells what species it is. Each plant can have only one scientific name and is the same throughout the world. The scientific name for breadroot scurfpea is *Psoralea esculenta*. *Psoralea* tells what genus the plant belongs to and *esculenta* tells what species it is.

On the other hand, plants are often given more than one common name. Breadroot scurfpea is also called Indian breadroot, prairie turnip, or tipsin. All four common names are acceptable but can lead to confusion because there are similar plants with similar names. That is where scientific names become important! The scientific name applies to only one plant species.

### Kinds of range plants

There are several hundred different plants in South Dakota’s rangelands. Each is a different species. If you can learn to recognize the most common range plants, you also can learn how each plant relates to wildlife habitat, livestock forage, or human use.

Because there are so many different kinds of range plants, it helps to group them based on appearance and growth habits. The four main groups of range plants are

**grasses, grass-likes** (sedges and rushes), **forbs**, and **shrubs**. **Succulents** are sometimes placed with forbs, as we have done with the prickly pear. The diagram on the following page will help you to compare the different groups of range plants. Knowing the groups will help you identify plants that you don't know.

**Grasses**

Grasses have jointed stems. Stems are often hollow between joints. The leaves are in two rows on the stem. Examples are western wheatgrass, annual brome, blue grama, and little bluestem.

**Sedges**

Sedges look like grasses, but stems are solid (not hollow). Sedges have triangular stems. Stems do not have joints (nodes). All sedges are put together, and are simply called 'sedges'.

**Forbs**

Many forbs have showy flowers. They are often called weeds, but most forbs are not weeds. If a plant is not a weed it is a desirable plant. Perennial forbs die back to the ground each year. We have included the succulent prickly pear, in this group. Examples are goldenrods, prairie clover, sweet clover, and leafy spurge.

**Shrubs**

Shrubs have woody stems. These stems can live for several years even though most shrub leaves fall off each winter. Shrubs normally have many stems. Examples are: western snowberry, chokecherry, and leadplant.


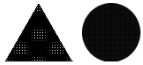
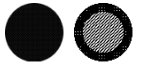


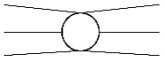

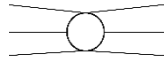










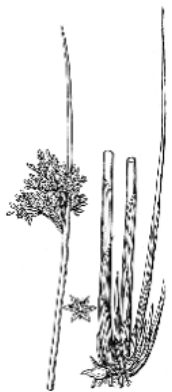


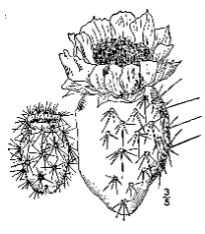
	Grasses	Grass-likes		Forbs	Shrubs	Succulents
Stems	 hollow or pithy, jointed	 solid, not jointed		 solid or pithy	 solid, with growth rings	 fleshy
Leaves	 leaves on two sides	 leaves on three sides	 leaves on two sides	 veins are Pinnate (net-like)		 small, seldom present
Flowers	 floret	 male and female flowers	 small flowers	 showy or small	 showy or small	 showy
Examples	 blue grama	 sedge	 rush	 scarlet globemallow	 skunkbrush	 prickly pear

Table 1. Comparing Plant Groups

## Parts of Plants

You have probably found plants you couldn't name. You can use a plant identification key to find out the names of the ones you don't know. However, before you can use a key, you need to know the parts of a plant.

Like your body, a plant is made up of many different parts. Each part with a different job or function.

The underground parts of plants are very important. The root both takes up nutrients and water from the soil and anchors the plant firmly in place. Some plants also have rhizomes. These are special underground stems used to establish new plants nearby. Perennial plants store food in their underground parts (the crown, roots and rhizomes) to help them live through the winter and start growth again in the spring.

A stem performs several functions. Tiny tubes inside the stem carry food and water between the roots and the leaves. Stems also provide a structure for leaves to grow from. Plants get most of their height from their stems, which is important because the tallest plants capture the most sunlight.

Leaves capture the sunlight, which is the energy plants use as fuel. Plants use sunlight to make sugar and other foods from water, soil nutrients (such as nitrogen), and a gas in the air called carbon dioxide. This process is known as **photosynthesis**.

Much of the food made by the grass plant is used to produce the **flower**, or seedhead. Mature seeds fall from the grass flower and grow into new plants.

The main plant parts – stems, leaves, and flowers – are made up of smaller parts. Different species of plants have different combinations of these smaller parts. The shape and appearance of the parts are important clues in identifying all plants.

## Focusing on Grass

### The Blade

All grass leaves have a blade. It's the long, thin part we call the leaf. Leaf blades are usually long and narrow, or linear. They can vary in size and shape. Some leaf blades (Figure 9) are constricted at the base, twisted near the center and/or tapering to a sharp point. In other grasses, the blades may taper (Figure 11) to a sharp point throughout their entire length or they may be nearly parallel and then taper to a point or appear boat shaped. Leaf blades are often quite flat, but they may also be v-shaped, folded or rounded. If the blade is

tightly folded, it may also appear solid or cylindrical. This is referred to as being bristle-like (Figure 10).

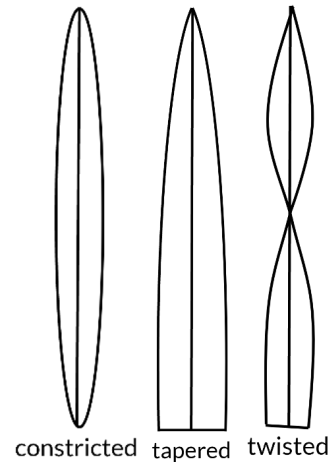


Figure 9. Types of leaf blades

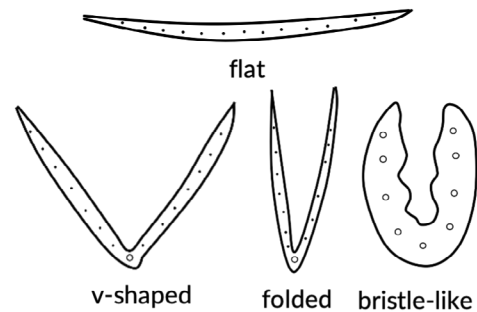


Figure 10. Examples of how leaf blades lay or are folded.

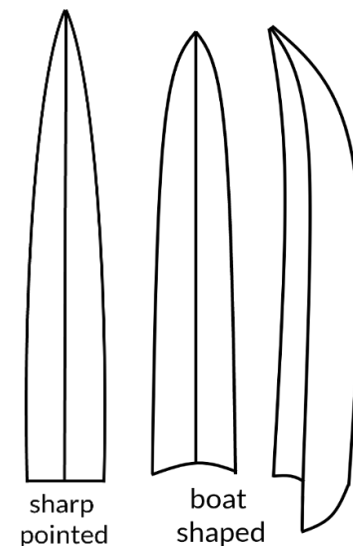


Figure 11. Examples of how leaves taper.

Rounded leaf blades may be u-shaped or rolled with one edge overlapping the other (convolute), or rolled with each edge curled inwards towards the blade's center or midrib (involute) (Figure 12).

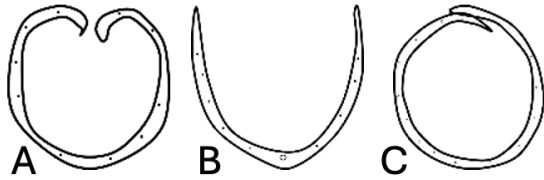


Figure 12. Depictions of how leaf blades overlap. A. Involute. B. U-shaped. C. Convolute.

The leaf's surface may feel smooth or rough. Veins on the blade may stick out, giving the appearance of ridges – like with western wheatgrass. The blade underside may also show a very prominent central vein which is referred to as keeled (like a boat) – like prairie sandreed. Sometimes leaf blades and sheaths may be covered with very short hairs (pubescent) on one or both sides such as with annual bromes, or sparsely covered with long, soft hair (villose) (Figure 13).

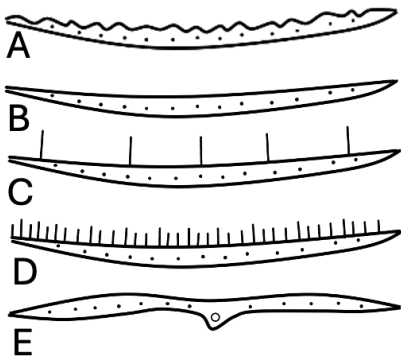


Figure 13. Leaf surface drawings. A. Rat, ridged above. B. Flat. C. Villose. D. Pubescent. E. Flat, keeled below.

The edges of the leaf blades may be smooth, fringed with hair, fringed with glandular hair or they may be saw-toothed (serrate)

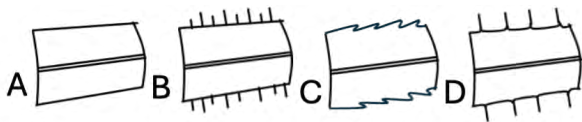


Figure 14. Leaf blade edges. A. Smooth. B. Hairy. C. Saw-tooth. D. Glandular hairy.

## The Sheath

The leaf also has a sheath, which wraps around the stem, like an overcoat. The blade is attached to the top of the sheath. Nutrients and plant food move between the stem and the leaves through the base of the sheath. The leaf sheath is sometimes tinged with pink or purple near the base. The sheath takes on the shape of the grass stem, so it may be rounded, compressed or flattened. The sheath might be keeled if it has a prominent vein on the backside. When viewed from the front, there are three main types, split with no edges overlapping, split with overlap, and not split with a notch near the top (Figure 15).

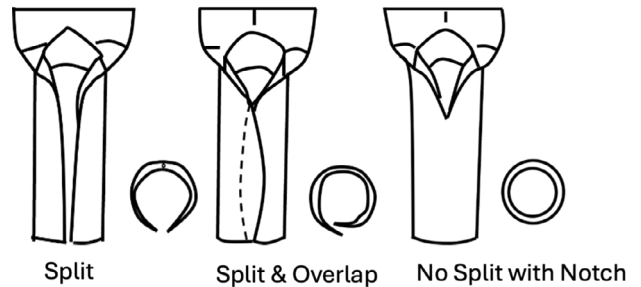


Figure 15. Types of leaf sheaths.

## The Ligule

A small flap, the ligule, (Figure 16) is sometimes found between the blade and the stem, where the back of a shirt collar would stick up. Not all grasses have ligules. A membranous ligule will be quite thin, whitish in color, nearly see-through or solid. The length of the ligule varies between different grasses, and can be variable between different plants of the same species. Some of the different shapes of ligules are shown in Figure 17, and some of the different edges are shown in Figure 18.

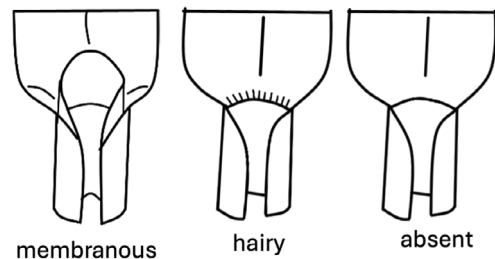


Figure 16. Example of ligule types.

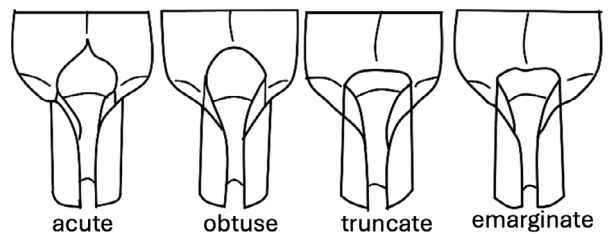


Figure 17. Shapes of ligules.

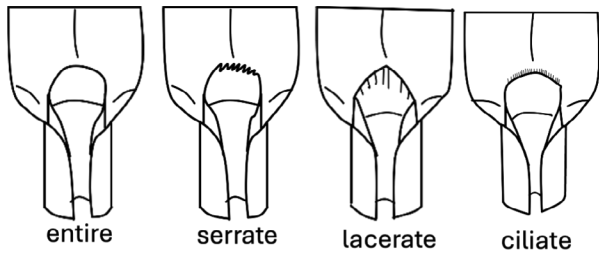


Figure 18. Types of edges of ligules.

### The Collar

The **collar** of a grass leaf is actually the very top part of the sheath (Figure 19). It is usually a distinct yellowish band, but sometimes it is tinged with red. Just like a collar on a shirt, the grass collar can be described as broad or narrow. If the collar extends across the entire sheath, it is continuous. If it is interrupted by the midrib of the leaf, it is a divided collar. Sometimes collars seem to run across the sheath at an angle. These are known as oblique. Most collars are smooth, but a few grasses have hairy collars (pubescent), and some have long hairs on the edge. These are described as ciliate.

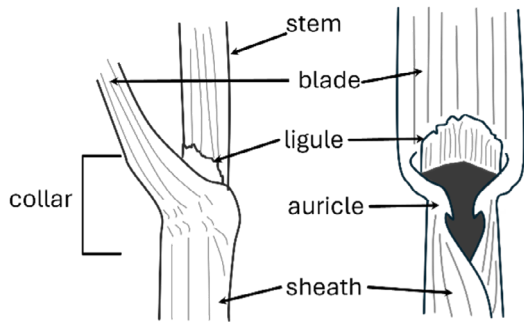


Figure 19. Different views of various grass characteristics.

### The Auricles

Some grasses have two more flaps – like shirt lapels – called **auricles** (Figure 20). A hand lens or magnifying glass may help you see these smaller parts when you examine grasses. If auricles are present, they tend to clasp the stem. Auricles can be very fragile; they may wither or fall off plants that are mature or have dried out. Auricles are described as claw-like, rounded or rudimentary, which are usually quite poorly developed.

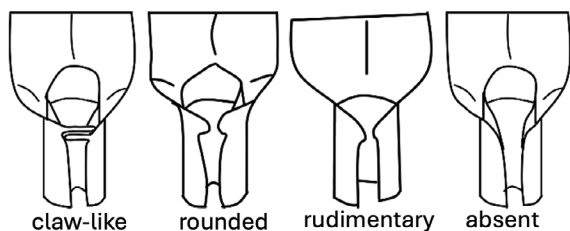


Figure 20. Types of auricles.

### The Stem

The grass stem consists of two main parts: **node** and **internodes**. The nodes are hard, solid knots or bumps, while the internodes are the long, hollow lengths between the nodes. Nodes are sometimes a different color from the rest of the stem and can be hairy or smooth. Internodes can be short or long, depending on the age or type of grass.

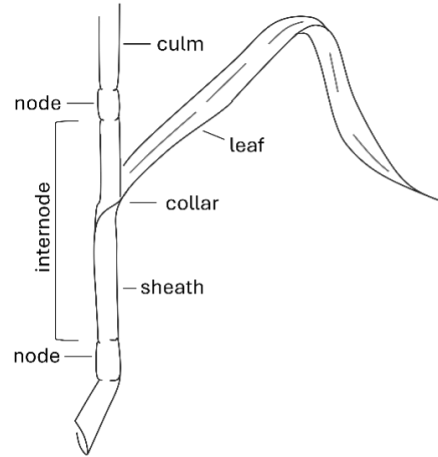


Figure 21. Drawing of the various parts of the stem.

### The Seedheads and Flowers

The final step in the grass growth cycle is the development of the seedhead or flower. Individual grasses develop different looking seedheads (Figure 22). There are two main seedhead types, the spike and the panicle. A third type, which is quite rare, is called a raceme. A spike is an unbranched seedhead in which the individual units, or spikelets, are attached directly to a central axis. The raceme seedhead has spikelets attached to tiny stems (pedicels) attached directly to the central axis. Examples of spike-type seedheads include those of western wheatgrass, blue grama, or buffalograss. Examples of panicle-type seedheads include switchgrass, smooth brome, or Kentucky bluegrass.

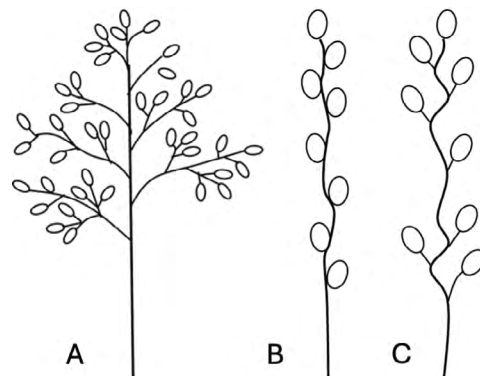


Figure 22. Different seedhead types. A. Panicle. B. Spike. C. Raceme.

The basic units of a grass seedhead is called a **spikelet** (Figure 23). A seedhead is usually made up of many spikelets attached to a central axis called the **rachis**. A spikelet has two small leaf-like appendages at its base called **glumes**. Above the glumes there may be one or more flowers or florets, which produce the seeds. The florets are attached to a central axis of the spikelet called the **rachilla**.

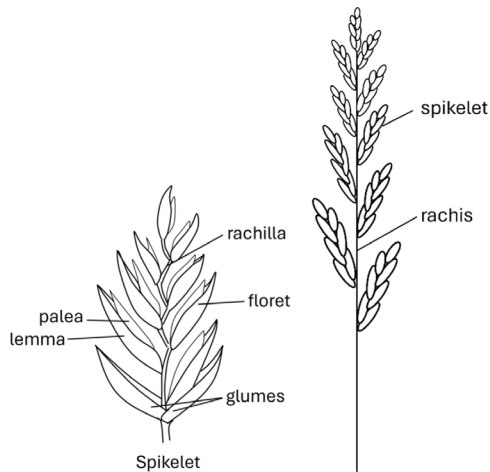


Figure 23. Spikelet and seedhead.

Seedheads usually contain several spikelets, and each spikelet contains one or more florets. The spikelets developing near the base of the seedhead usually contain more florets than those at the top. The actual number of florets per spikelet is determined genetically. However, the number of florets may also be affected by temperature, soil moisture, soil fertility, and even day length.

The grass flower is not very colorful or showy because grass does not need insects to assist them in pollination. Instead, grass depends upon the wind to achieve cross-pollination. Though very small, a grass floret contains the same essential parts as a showy flower. To contrast, in forb flowers, the **palea** and **lemma** are two modified leaves called **bracts**. The stamen is made up of the **anther**, which produces the **pollen**, and the **filament**, a slender stock topped with the anther. The **pistil** has three parts; the **ovary**, which is located at the bottom of the floret and enlarges to become the seed. The **style** is a slender stalk arising from the ovary, through which the pollen tube extends and fertilization occurs. The **stigma** is the upper portion of the style where the pollen attaches.

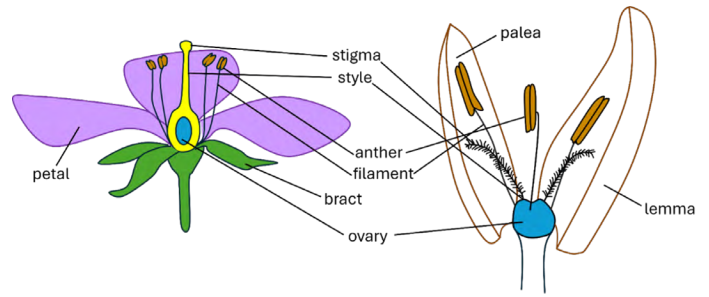


Figure 24. Comparison of grass's flower parts compare to a forb's flowering parts (not to scale).

## Focusing on Forbs, Shrubs and Trees

The flower is the structure most commonly used in classifying and identifying forbs and shrubs. A simple flower has the parts shown above in Figure 24. Other types of flowers include composite and legume type.

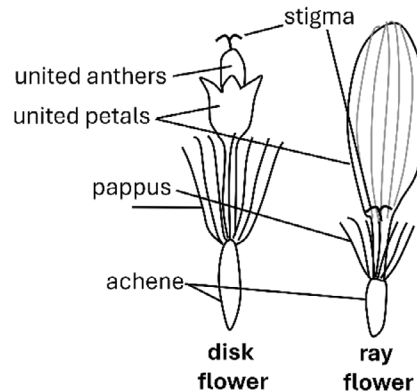


Figure 25. Drawings of ray and disk flowers and their parts.

Composite flowers are unique in that they have ray flowers and disk flowers within the same flowering structure. The disk flowers typically fill the center. Disk flowers have modified petals that are united (also called corollas), and may have a hairy appendage attached called a pappus to help with seed dispersal. Ray flowers typically surround the disk flowers. Ray flowers are attached to the typical looking petal, and may also have a pappus. Each type of 'flower' has the parts needed to fulfill pollination to create a seed. Plants with composite flower-types include sunflowers, purple coneflower, heath aster, or daisies.

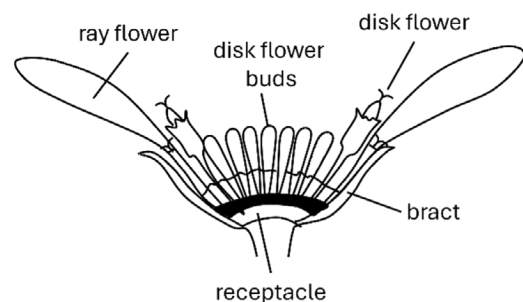


Figure 26. Drawing of a composite flower and its parts.

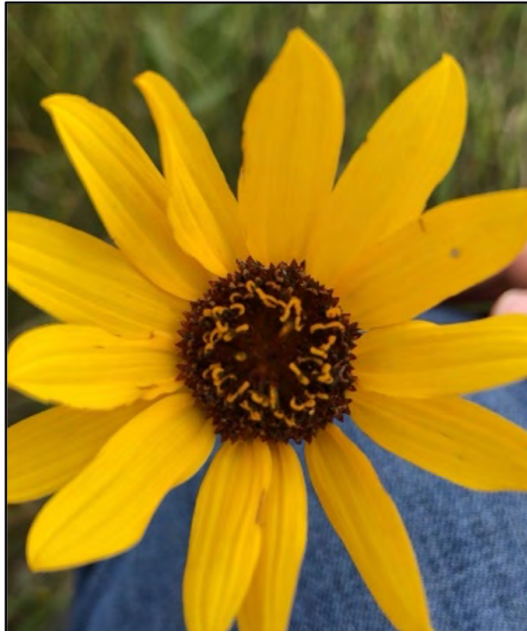


Figure 27. Photo of a sunflower. The center brown are the disk flowers and the outside yellow are the ray flowers.

Legume flowers are unique flowers that have modified petals that are not symmetrical like simple or composite flowers. The petals are modified into standard petals, the keel and wing petals. Some legumes also have a spur. Plants with legume-type flowers include crazyweed, alfalfa, sweetclover, and leadplant.

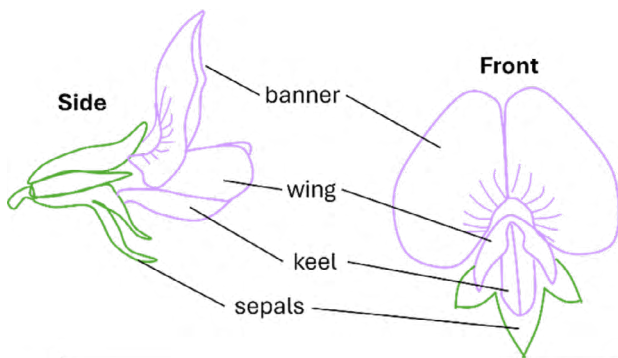


Figure 28. Drawings of a legume flower and their parts.

Other plant parts that are useful in identifying forbs and shrubs include special stem types, rooting types, and leaf types. Leaves can also be arranged differently on the stem, which can help you tell the difference between plants as well.

Root types include **fibrous, tap**, or modified tap roots (**tubers**) (Figure 29). Fibrous roots typically belong to grasses, while taproots can be found on forbs. Modified taproots, like tubers, are found on certain forb species. One example of a forb with a modified tap root is breadroot scurfpea!

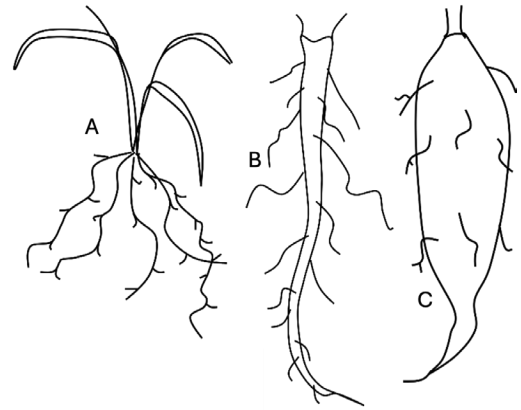


Figure 29. Types of roots: A. Fibrous; B. Taproot; C. Modified tap (tubers).

Stems can also take different forms. Stems typically grow out of the ground, but they can also grow below ground, or along the surface of the ground. When they take these forms, they have different names. Underground stems are usually called rhizomes (Figure 30). As they grow, they will put up new growth and leaves at different points along the stem. Plants with rhizomes include western wheatgrass, big bluestem, and some types of goldenrods. Stolons are another type of modified stem (Figure 31). These grow above ground as runners. They put down roots at the nodes and grow new leaves as they grow across the soil surface. Plants with stolons include strawberries and buffalograss.



Figure 30. Below ground stem structures, also know as rhizomes.



Figure 31. Above ground stem structures, also known as stolons.

Leaf shape and type can be indicators of different types of plants. Leaves can be simple with different types of leaf margins (Figure 33), or compound with smaller leaflets attached to a main stem (Figure 32). Compound leaves can be arranged in different ways including palmately (around on central axis point) or pinnately (around a central axis).

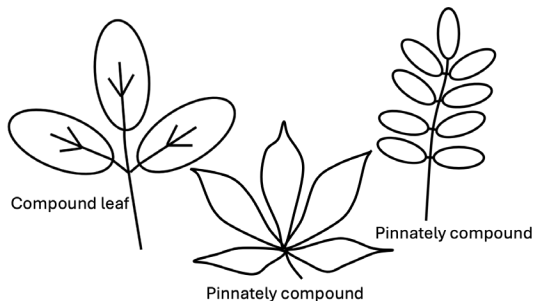


Figure 32. Compound leaf types.

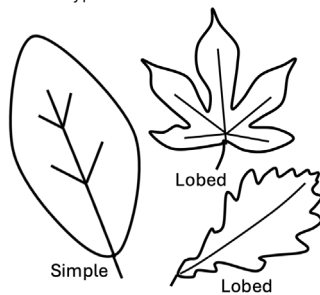


Figure 33. Simple leaf types.

## Other Interesting Plant Characteristics

### Life Span

Plants live from a few days to hundreds of years. Many range plants can live for a very long time. The length of time a plant lives is called its life span.

3 years or more: **Perennials** live a few to many years. They typically overwinter and withstand droughts by living on stored materials in roots, crowns or stems. Examples are: big bluestem, pasqueflower, yucca.

2 years: **Biennials** complete their life cycle in two years and die. Seed is produced the second year. Examples are sweetclover, common mullein.

1 year: **Annual** plants live for less than one year. Sometimes an annual's life cycle only takes a few weeks from the time a seed germinates until its plant produces seed and dies. Some annuals start to grow in the fall, completing their final growth the next year. Examples of annual plants are annual brome, annual sunflower, garden plants, and others.

### Season of Growth

Plants begin growth in the spring when the soil warms up. Some plants begin growth early when soil temperatures are still quite cool. **Cool-season** plants

make their principal growth in the spring, and some in the fall if moisture is available. **Warm-season** plants begin growth in late spring when the soil is warmer and make their principal growth in the summer. A native pasture has both cool-season and warm-season plants and provides excellent grazing throughout the year, if grazed properly.

### Origin

Some plants are **native** to a continent; they are natural components of rangelands. Others are **introduced** from other continents and are now a part of nearly every range plant community. Many, although not all, are troublesome or weedy, competing badly with native plant species.

### Poisonous

Some range plants are poisonous if eaten by grazing animals. Others are poisonous when eaten by humans. Remember, never eat a plant unless your parent or teacher tells you that it is all right!

### Medicinal Value

Many range plants have historically been used to treat all sorts of human ailments. North American Indigenous peoples and European settlers made good use of range plants for many herbal medicines. Today, interest is growing in herbal medicines produced from range plants. The use of range plants for this field is expanding.

### Edible for Humans

Many range plants have been used for human food. You may be familiar with chokecherry jelly. Many Great Plains tribes and settlers once relied heavily on many range plants for part of their diet.

### Other Human Uses

An amazingly large number of range plants have been used by humans. These uses range from hair brushes to dyes, and toilet paper to smoking. Although most uses are historical, many range plants are still used today.

### Noxious Weeds

South Dakota has eight plants which are so troublesome that they are called noxious weeds. All eight are introduced from other continents, most having been accidentally transported to North America. Here they flourish, principally because of the lack of insects or disease which keep them under control in their native continent. Other weeds are troublesome in certain counties. They are called locally noxious weeds.

## Identifying Ecological Sites

Now that you have learned how to identify plants, know some of the main plants that occur, and you have a basic understanding of soils, it is time to put all of it together and learn to identify Ecological sites.

### What are Ecological Sites?

It is not difficult to recognize that some parts of any landscape are different from other parts in kinds and amounts of vegetation.

As nature would have it, there is a relationship. In fact, in most cases, there is a close link between the specific soils on the landscape and the specific plants that grow there. To understand this variation across the landscape, we classify these different parts into units called ecological sites.

An ecological site is defined as a distinctive kind of land with specific physical characteristics. It differs from other kinds of land in its ability to produce a distinctive kind and amount of vegetation. Landscapes are divided into ecological sites so we can evaluate them similarly. Some of the criteria used to separate ecological sites are position on the landscape, soils, and differences in kind or proportion of plant species (Figure 35).

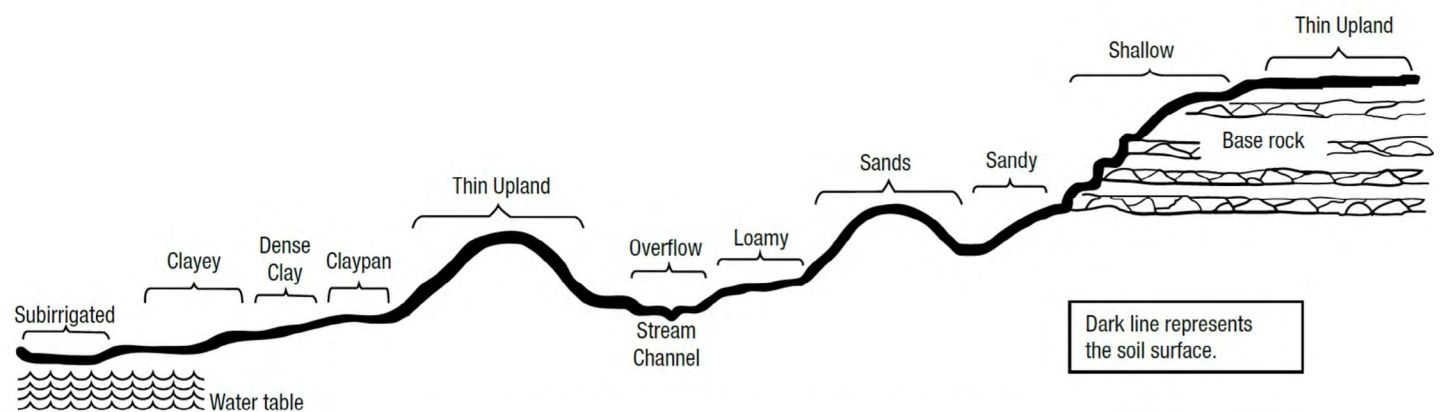


Figure 35. Ecological sites as they appear on the landscape.

An 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. In South Dakota the most important of these factors are climate and soil. The United States has been divided into broad geographic areas characterized largely by patterns of climate, soils, and vegetation. They are called Major Land Resource Areas (MLRAs) (Figure 36).

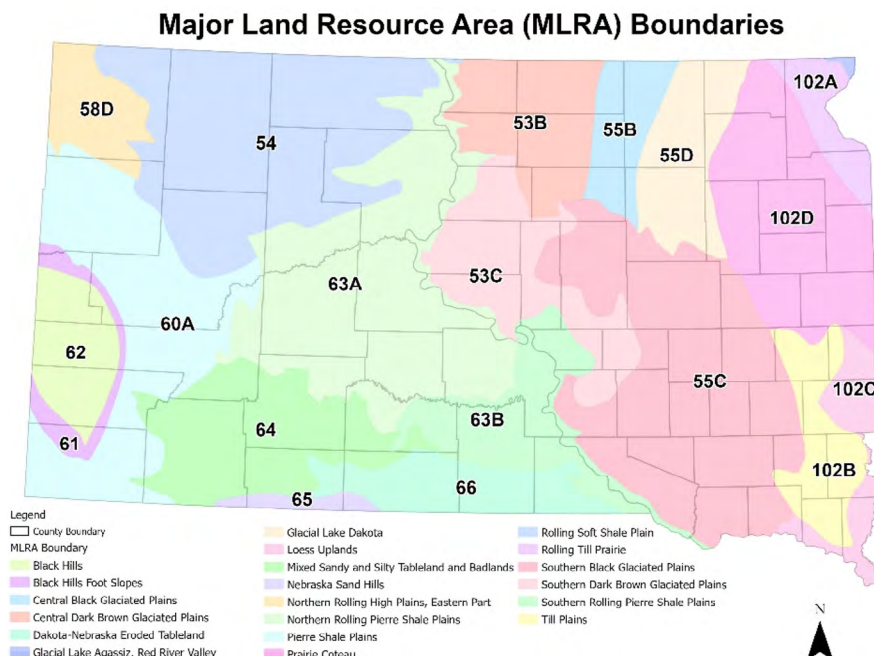


Figure 36. Major Land Resources Areas (MLRAs) in South Dakota.

Within MLRAs, soils that have similar combinations of plant species are grouped together. These groups are called ecological sites and are given names such as Loamy or Clayey. In South Dakota there are over 40 different names given to ecological sites. These ecological sites vary in extent and distribution.

Only 10 broad ecological site names are described in this manual. These 10 make up over 90% of the rangeland in South Dakota. Their relative positions on the landscape are shown in Figure XX. Examples of these ecological sites can be found in most MLRAs.

The MLRA is necessary to identify the ecological site and correctly calculate similarity index of the site. An example of a specific ecological site name would be Loamy, MLRA 60A (or MLRA 60A Loamy). An example Similarity Index worksheet can be found later in this manual. The 10 broad ecological sites that will be used in range judging in South Dakota are briefly described below:

- Subirrigated
- Overflow
- Sands
- Sandy
- Loamy
- Clayey
- Dense clay
- Thin upland
- Shallow
- Claypan

## Brief Ecological Site Descriptions

### Subirrigated

This site occurs on level or nearly level bottomland. Soils have a beneficial water table that is within 3 to 5 feet of the surface during most of the growing season. The water table may reach the surface during the spring but only for a very short period. Soils have textures that vary from loamy sand to silty clay. These soils are not saline. They are well-enough aerated to grow big bluestem or corn and alfalfa. Potential natural plant cover consists chiefly of big bluestem, prairie cordgrass, and other tall grasses such as Indiangrass and switchgrass. Because of the beneficial water table, tall grasses are predominant on this site even in the drier climatic areas. Other grasses that occur are little bluestem, Canada wildrye, and green muhly. Prairie cordgrass may occur on inclusions that have a higher water table. Sedges

occur in the understory. Forbs that often occur are Missouri goldenrod, Maximilian sunflower, American licorice, and showy milkweed. The subirrigated site is often used as native hayland. It is noted for its high production of excellent quality bluestem hay.

### Overflow

This site occurs on nearly level to gently sloping lands which receive stream water overflow or run-in from higher lands. Soils are deep and well aerated, and the texture in topsoil and subsoil varies from sandy loam to clay. Available water capacity is high. General fertility level and organic content are high. The water table is generally 5 feet or more below the surface. Potential plant cover is an excellent stand of tall grasses. Big bluestem is the major dominant grass except in the driest parts of the state. Western wheatgrass is more common in the western part of the state, especially on heavy clay soils. Other grasses that occur are prairie cordgrass, green needlegrass, switchgrass, slender wheatgrass, and sideoats grama, with an understory of sedges in the wetter areas and blue grama and buffalograss in drier areas. Wild rose and western snowberry may occur throughout the site. Scattered stands of shrubs (such as chokecherry and buffaloberry) and trees (such as green ash and cottonwood) may occur adjacent to streams. These natural stands of trees and shrubs provide valuable but very limited cover and food for both wildlife and livestock.

### Sands

This site occurs on nearly level to hummocky or hilly uplands. Soils are deep, loose, excessively drained loamy fine sands or sand. Precipitation does not run off except in extreme cases; this causes this site to have more tall grasses than other upland sites in the drier climatic areas. In eastern South Dakota this site and finer textured upland soils produce about equal amounts of vegetation. The potential natural plant cover consists of sand bluestem, little bluestem, prairie sandreed, and switchgrass. Grasses such as needle and thread, sand dropseed, and blue or hairy grama occur in lesser amounts. Shrubs such as leadplant, wild rose, and sandcherry may occur throughout. Yucca is more common on the steeper, less stable inclusions. Proper grazing use and management are essential to maintain a suitable soil cover that will prevent wind erosion and the formation of blowouts.

### Sandy

This site occurs on nearly level to rolling upland. Soils are deep and well drained with a sandy loam or fine

sandy loam surface texture that grades into sandy loam to sand in the subsoil. Water intake rate is moderate to rapid, and available water capacity is moderately high. The potential natural plant cover consists chiefly of prairie sandreed, little bluestem, sand or big bluestem, and the cool-season grass needleandthread. Other plants are sideoats grama, blue grama, and threadleaf sedge. Common forbs are the sageworts, heath aster, and legumes such as prairie clover. Shrubs such as leadplant and wild rose may occur throughout, but sand sagebrush occurs only in the southwestern part of the state. With continued season-long overuse the bluestems and prairie sandreed are replaced by needleandthread, sideoats grama, blue grama, Kentucky bluegrass, and sedges.

### **Loamy**

This site occurs on nearly level to rolling upland. Soils are deep or moderately well drained with a moderate or high available water capacity and favorable soil-water plant relationships. The potential natural plant cover consists of tall and mid grasses characteristic of the true prairie in the eastern climatic area. This grades to fewer tall grasses and more mid and short grasses characteristic of the mixed prairie in the western part of the state. Big and little bluestem predominate in eastern SD. Western wheatgrass and green needlegrass are the predominant species in western SD; needleandthread is characteristic although not always abundant. Understory species are principally sedges in the eastern area and blue grama, buffalograss, and sedges in the western area. Forbs occur in small amounts but on overused ranges weedy species such as curlycup gumweed may be abundant. On rangeland in high ecological status, shrubs like leadplant and wild rose occur on this site in all climatic areas.

### **Clayey**

This site occurs on nearly level to rolling upland. Soils are deep and have silt loam to clay surfaces and silty clay to clay subsoils. If dense restrictive clay horizons occur, they are at depths of more than 14 inches. Runoff is medium or slow, and permeability is moderately slow or slow. Potential natural plant cover is a mixture of tall and mid grasses characteristic of the northern true prairie in the east and mixed prairie in the west. In eastern SD, about equal amounts of the warm season grasses (big and little bluestem) and the cool season grasses (porcupine grass, green needlegrass, and western wheatgrass) occur. In western SD the principal grasses are western wheatgrass and green needlegrass. Understory plants consist of the grammas, and sedges in

the east and blue grama, buffalograss, and sedges in the west. Forbs and shrubs are found in the understory.

### **Dense Clay**

This site occurs on nearly level to gently rolling uplands. It occurs principally in the western and west-central climatic areas. Soils are moderately deep to deep and have a nearly structureless clay surface underlain at 14 inches or less by a dense clay. Runoff is rapid. Permeability is very slow. The potential natural plant cover is chiefly a mixture of western wheatgrass (thick spike wheatgrass may occur in the western area) and green needlegrass. This site does not have an understory of short grasses. Forbs such as American vetch, wild parsley, and wild onion are common. Woody plants are not common, but some saltbush, sagebrush, and prickly pear may occur in the western area. This site, when it is overgrazed, is nearly bare during very dry years. The erosion hazard from wind and water is high.

### **Thin Upland**

This site occurs mostly on steep uplands. Soils are weakly (thinly) developed with a calcareous surface layer. Surface textures range from fine sandy loam to clay loam. The unweathered parent material is calcareous and lacks a root restrictive layer. If bedrock exists, it is deeper than 20 inches. Surface runoff is medium or rapid, and permeability is moderate or moderately rapid. This results in less vegetative production, less organic matter in the surface, and eventually a thinly developed soil. The potential natural plant cover consists of the tall and mid grasses characteristic of the true prairie in eastern SD. This grades to a mixture of mid and short grasses in western SD. In the east, the bluestems, prairie dropseed, and porcupine grass are the principal species. In the west, needleandthread, bluestems, and blue grama are major grasses. Sedges occur in the understory; and in the west, threadleaf sedge becomes abundant with overuse. Forbs and shrubs are found in the understory.

### **Shallow**

This site occurs on gently sloping to steeply sloping uplands. The soils are shallow, less than 20 inches to bedrock. Bedrock may be solid and rock-like or it may be unconsolidated as in the case of strongly compacted shale. If solid, moisture penetration is inhibited; if unconsolidated, the bedrock material greatly reduces the available water capacity. Both greatly restrict root penetration to less than 20 inches. Runoff is moderate or rapid and permeability is moderate to slow. The potential natural plant cover is chiefly a mixture of

bluestems, sideoats grama, and needleandthread with some western wheatgrass and green needlegrass. Understory plants are blue and hairy gramas, and sedges. Forbs such as purple coneflower and dotted gayfeather are quite typical. Shrubs such as leadplant and wild rose are common.

### **Claypan**

This site occurs on nearly level to gently sloping uplands and occasionally on nearly level bottomlands. Soils may have a fine sandy loam to clay loam surface. The identifying site characteristic is that the texture changes abruptly, between depths of 4 to 8 inches, to an extremely hard clayey horizon. This hard clay has a round topped columnar commonly referred to as “biscuit tops”. Salt accumulations can usually be seen in the lower part of the clay layer. Runoff is slow or medium and permeability is very slow or slow. The potential natural plant cover is chiefly a mixture of mid and short grasses. Western wheatgrass is the dominant grass. Farther east, some tall decreaser grasses may occur. Blue grama is the principal understory plant in the east while blue grama and buffalograss fill this niche in the west. Common shrubs may include sagebrush (in the west) and cactus.

### **How to Identify Ecological Sites**

When you walk out to an area that you want to identify as a particular ecological site, keep your eyes open and observe your surroundings. Ask yourself some questions:

- Have I walked to one of the lowest (or highest) places on the landscape, or is this just a rise (or a low spot) on a gently rolling landscape?
- What plants have I seen as I have been walking to the site, and what plants do I see around me?

When you arrive at the location you want to identify, one of the first questions you’ll want to ask yourself is:

- Am I on a runoff, a run-in, or more normal landscape position?

Refer to the “Ecological Sites Key” following this section. When you decide which landscape position you are on, read through the entire Key to be sure there isn’t another option, then you will want to examine the soil pit to narrow down which Ecological site you will select.

At this point, ask yourself some more questions.

- Is this a shallow (less than 20 inches deep) soil (you can either see how deep the pit is, or also look at

the roots to see if they seem to turn sideways at a certain depth)?

- What is the texture of the soil surface (take your sample from the pit itself, within the first couple inches of the top)?
- Do you see any water standing in the pit?
- Do you see any evidence of salts or calcium deposits in the soil profile (you may want to perform the acid test to see if it bubbles)?
- Do you see any evidence of a restrictive layer several inches down (it may look like columns of soil with biscuit tops on the columns)?
- Are there cracks in the soil at the surface and lower (usually will be associated with very high clay content)?

You may not need to ask yourself all of these questions, but you may use some of these questions at various sites you will see across the state.

Once you think you have figured out what Ecological Site is based on the soil, don’t stop yet! You will also want to look at the dominant plants that exist in the area. Then ask yourself:

- Are the plants that dominate here typical for the ecological site that I think it is?

If you don’t know what plants to expect, you can refer to Table 2 below and look at the column labeled Indicator Plants. These are the plants that normally dominate the various Ecological Sites when they are in good condition. If one or more of these plants are missing, it may not mean you have identified the wrong Ecological site, it may just mean that the area you are looking at is not in very good condition or recent weather patterns (within the last few years) are unusually dry or wet for the area. In this same table, you may also want to check the other columns (Landscape Position, Surface Soil Texture, and Slope), and see if they seem to match what you are seeing.

If the landscape position (runoff, run-in, or normal), soil characteristics, and plants seem to match the Ecological Site you have selected, then you are probably done. If you find that the instructors have identified a different ecological site than what you thought it was, be sure to ask them why they selected the Ecological Site that they did.

Five Soil Texture Groups

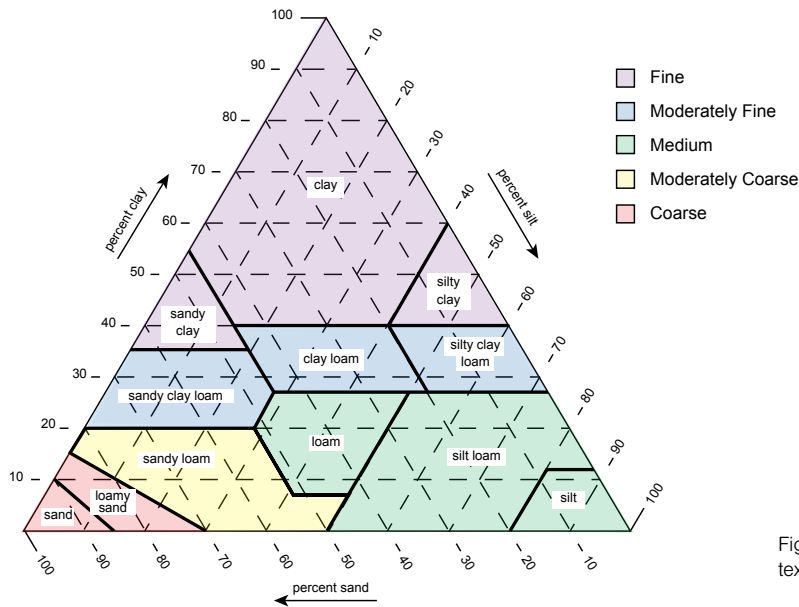


Figure 37. The Soil Texture Triangle can help you in determining the soil texture of the ecological site you are trying to identify.

Ecological Site Name	Landscape Position	Surface Soil Texture	Slope	Indicator Plants
<b>Shallow</b>	Upland	Various	Gentle to steeply sloping (6 - 9% or greater)	Sideoats grama, needleandthread, little bluestem, purple coneflower, blue grama, leadplant, gayfeather, yucca
<b>Thin Upland</b>	Upland	Fine sandy loam to clay loam (limy)	Mostly steep (6 - 9% or greater)	Purple coneflower, little bluestem, needleandthread, blue grama
<b>Claypan</b>	Upland (sometimes bottom land)	Fine sandy loam to clay loam surface, hard clayey subsoil at 4 to 8 inches	Nearly level to gently sloping (1 - 6%)	Western wheatgrass (sparse)
<b>Clayey</b>	Upland	Silt loam to clay	Nearly level to gently rolling (1 - 6%)	Western wheatgrass, green needlegrass, big bluestem, little bluestem, blue grama, buffalograss
<b>Dense Clay</b>	Upland	Clay	Nearly level to rolling (1 - 6%)	Western wheatgrass, blue grama
<b>Loamy</b>	Upland	sandy loam to clay loam	Nearly level to rolling (1 - 6%)	Western wheatgrass, big bluestem, little bluestem, green needlegrass, leadplant, wild rose
<b>Sandy</b>	Upland	Fine sandy loam to sandy loam	Nearly level to rolling (1 - 6%)	Prairie sandreed, sand dropseed, sand or big bluestem, needleandthread, little bluestem, leadplant
<b>Sands</b>	Upland	Loamy fine sand to sand	Nearly level to rolling (1 - 6%)	Prairie sandreed, sand bluestem, sand dropseed, needleandthread, little bluestem, switchgrass, yucca, leadplant
<b>Subirrigated</b>	Bottom land	Loamy sand to silty clay	Level or nearly level	Prairie cordgrass, switchgrass, big bluestem, Indiangrass, Canada wildrye
<b>Overflow</b>	Bottom land	Sandy loam to clay	Level to gentle slope	Big bluestem, western wheatgrass, green needlegrass

Table 2. Comparing Ecological Sites

# Ecological Sites Key

By: Kent Cooley, Area Resource Soil Scientists, NRCS

**First! Determine Your Landscape Position:**  
Run-Off, Run-In, or Normal?



## Run-Off Landscape Position (Upland)

**Dig a hole to a depth of 20 inches minimum or to the restrictive layer.**

Is there a root restricting layer (bedrock, shale, gravel) within 20 inches of the soil surface?  
Yes → Shallow  
No

Is the soil weakly developed, have a thin topsoil, and effervesce "fizz" at or near (within 6 in) of the surface? (Slopes tend to be greater than 6%)  
Yes → Thin Upland  
No

See "Normal Landscape Positions"

## Run-In Landscape Positions (Bottomlands, Drainageways, etc.)

**Determine the soil characteristics to a depth of 60 inches.**

Is there an apparent water table within 3 to 5 feet of the surface during most of the growing season? (If present, will be given).  
Yes → Subirrigated  
No

Does water flow into and through the site?  
Yes → Overflow  
No

See "Normal Landscape Positions"

## Normal Landscape Position (Upland)

**Dig a hole to a depth of 20 inches minimum or to the restrictive layer.**

Is there a claypan within 8 inches of the surface with columnar structure?  
Yes → Claypan  
No

**What is the surface soil texture?**

Clay, Silty Clay surface with a dense clay (>60% clay) subsoil (ribbon >3 inches long, usually wraps around hand)  
Yes → Dense Clay  
No

Clay, Silty Clay (40% to 60% clay) (ribbons 2-3 inches long)  
Yes → Clayey  
No

Loam, silt loam, silty clay loam, clay loam, sandy clay loam, very fine sandy loam (ribbons 0.5 to 2 inches long)  
Yes → Loamy  
No

Sandy loam, fine sandy loam, loamy very fine sand (forms a ball and ribbons up to 0.5 inch)  
Yes → Sandy  
No

Sand, loamy fine sand, loamy sand (does not form a ball)  
Yes → Sands  
No

## Determining Similarity Index

Once you have determined the ecological site, now is your opportunity to evaluate the plants in that ecological site. One way to evaluate the plants is through a process called Similarity Index.

Similarity Index (SI) is an expression of the kinds and proportions of vegetation present in relation to the native vegetation that the site is capable of producing (see Figure 38). This plant community is known as the reference plant community and will have an SI of 100. Similarity Index is a yardstick for measuring the departure of the present plant community from the reference plant community. In South Dakota the greatest species diversity and productivity generally occur at the upper (SI closer to 100) versus the lower (SI closer to 0) levels of plant succession. The soil, water, plant, animal, and air resources on an ecological site with an SI approaching 100 will be well protected, and the ecological processes which sustain the site will be functioning at high levels (excellent rangeland health). In a way, we are giving the current plant community a grade, based on how similar it is to the reference (historical) plant community.

Loamy Ecological Site			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
western wheatgrass	50	18	18
needlegrasses	35	36	35
sideoats grama	15	5	5
big bluestem	5	8	5
other native tall grasses	5	-	-
invader tall grasses	0	4	-
<b>Short Height</b>			
blue grama	10	5	5
buffalograss	5	-	-
sedges	5	-	-
other native short grasses	5	-	-
invader short grasses	0	3	-
<b>Forbs:</b>			
native forbs	10	10	10
invader forbs	0	-	-
<b>Shrubs:</b>			
native shrubs	5	11	5
invader shrubs	0	-	-
<b>Trees:</b>			
native trees	0	-	-
invader trees	0	-	-
<b>TOTAL OBSERVED COMPOSITION</b>		100%	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			83

Figure 38. Example of a Similarity Index calculation sheet.

The desired plant community is the SI that meets the land manager's objectives or goals. It may not necessarily be an SI at or near 100. For example, the land manager may want parts of the management unit to have an SI of 30% to 40% (lower successional level) to provide winter food and cover (increased shrub component) for prairie grouse. Other parts of the management unit may need to be managed to obtain an SI of 80 to 90 (higher successional level) for prairie grouse nesting cover and forage for cattle.

Changes in SI are influenced primarily by grazing intensity and season of grazing use. Overuse by livestock or wildlife for extended periods of time results in many desirable plants losing vigor. Eventually overuse will substantially reduce or remove desirable plants from the plant community. Plants that are less productive and less desirable for the intended use may replace desirable species. Other factors that may influence SI are climatic cycles, fire, insects, exotic plants, non-use by grazing animals, and kind of grazing animal.

SI is calculated by estimating the percent species composition by weight of individual species and comparing these estimates to the reference plant community guides for the site. SI is generally best calculated at the end of the growing season to best reflect the species composition of all species present.

As judging is often done at times prior to or after the end of the growing season, contestants must be able to visualize what the plants would look like when they have reached their peak growth. The observed plant composition is the estimate of how much weight each species contributes to the total composition.

The exception to this is with woody plants. For contest purposes, the contribution of woody plants (shrubs and trees) will be evaluated as percent canopy cover and expressed as percent composition (see Figure 39). For woody species, only consider current year's growth.

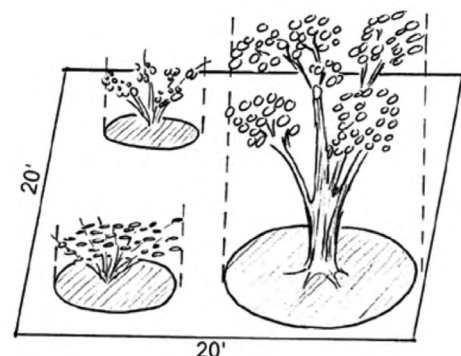


Figure 40. Visual example of tree and shrub composition estimated from canopy cover. Combined composition is measured at 20%. Note: An area of 10'x10' = 4% of a site measuring 50'x50'.

## Where do I start with Similarity Index?

Similarity Index is one way to determine what kinds and types of plants make up the site that is being evaluated. Plant identification is very important for this. By knowing your plants, you are able distinguish between different types of grasses, forbs, shrubs, and trees.

The best way to evaluate a site is by first walking around and through the enter site to determine what kinds and types of plants are present. Make a mental list of plants that you can recognize, or write them down. Also keep track of how much of each plant type is present. Is there a lot or a little?

Next, start filling in your Similarity Index worksheet for the ecological site you think the site is on. If you determine that the site is loamy, make sure to fill your data in that area. The first part you will fill in is the “Percent Observed Column” of the box. Make sure that your total observed percentages equals 100.

After filling in the Percent Observed column, next you will fill out the Percent Allowed column. To fill out this column, compare the Composition Maximums to the Percent Observed. Place the smaller of the two numbers in the Percent Allowed column. For example, in Figure 40, for western wheatgrass, the maximum was 50, but they only observed 18. Since 18 is the smaller number of the two, place 18 in the Percent Allowed column. Continue this for all species observed and add up all the numbers in that column to get a total. This is your Similarity Index number. The higher the similarity index, the closer you are to the reference. The lower the number, the farther you are from the reference. This could be due to too many introduced species present, or it could also mean that you might have chosen the wrong ecological site to compare things to.

Loamy Ecological Site			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<i>Tall and Mid Height</i>			
western wheatgrass	50	18	18
needlegrasses	35	36	35
sideoats grama	15	5	5
big bluestem	5	8	5
other native tall grasses	5	-	-
invader tall grasses	0	4	-
<i>Short Height</i>			
blue grama	10	5	5
buffalograss	5	-	-
sedges	5	-	-
other native short grasses	5	-	-
invader short grasses	0	3	-
<b>Forbs:</b>			
native forbs	10	10	10
invader forbs	0	-	-
<b>Shrubs:</b>			
native shrubs	5	11	5
invader shrubs	0	-	-
<b>Trees:</b>			
native trees	0	-	-
invader trees	0	-	-
<b>TOTAL OBSERVED COMPOSITION</b>		100%	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			83

Figure 40. When filling in this form, make sure you start with the percent observed column. Make sure all amounts add up to 100.

## An Introduction to Beef Cattle Carrying Capacity Evaluation

Beef cattle graze or browse on many different kinds of plants (herbaceous and woody). Plant selection is dependent on animal preference, availability, and palatability of the plant. Allowing beef cattle to graze in native plant communities, rangeland, or grazeable forest is compatible with natural resources stewardship provided the grazing is done in a proper manner.

Proper grazing management includes maintaining the appropriate number of cattle at or below the **carrying capacity** of the pasture. The carrying capacity of a pasture is the maximum stocking rate possible without causing permanent or long-term damage to the vegetation or related range resources. **Stocking rate** is the number of beef cattle utilizing a unit of land for a specific period of time.

The amount of forage available for grazing that is produced on an acre of land is expressed as **animal unit months** (AUMs) per acre. To determine AUMs per acre, first determine the ecological site and the Similarity Index of the ecological site. The carrying capacity, expressed as AUMs per acre, can be selected from the appropriate livestock carrying capacity table. An animal unit (AU) is one mature cow of approximately 1000 pounds with a calf up to weaning, usually at 6 months of age.

Many introduced plants (those that did not evolve with the native ecosystems) that are desirable cattle forage will count toward the beef cattle carrying capacity evaluation but not toward Similarity Index. Example species are smooth brome and crested wheatgrass. These are primary species for cultivated pastures. However, in rangeland these and other introduced plant species threaten the integrity of native plant ecosystems and are not counted toward the SI.

In the following Detailed Contest Example, we will go over a management scenario where we will consider the number and type of animals and duration of grazing to determine the stocking rate. Then we will determine the amount of forage available, to help determine if we are at, above, or below the carrying capacity.

## A Detailed Contest Example

At the beginning of the contest, a management scenario will be given by the station monitor or will be posted. (As Wranglers, the only parts of the contest that need to be completed are **Part I. Ecological Sites** and **Part II. Similarity Index**. The rest of this example is for your information only.)

**Management Scenario:** A rancher in Lyman County has 100 cow/calf pairs and 4 bulls that he wants to graze in his 1,440 acre pasture for 8 months. Water is 3/4 mile away. Cropland is 1/2 mile away. Annual Production was measured at 2,350 lbs/acre. The primary objective of the ranch is to raise cattle, with prairie grouse as a secondary objective. The manager's goal is to have a beef cattle habitat rating value of 30, and a prairie grouse habitat rating value of 25.

### Part I: Determine Ecological Site

The contestant notices that the site is in an upland location, not subject to flooding. The slope is less than 5%, and the soil pit is greater than 20 inches deep and has loamy textured soil (ribbons about 1.5 inches).

The contestant determines the site is Loamy and makes the appropriate mark on the Scorecard, Station 1, Part I.

### Part II: Determine Similarity Index

The MLRA 63A SI worksheets have been pre-selected from the South Dakota Major Land Resource Area Map for calculating Similarity Index (SI). Lyman County is in this Resource Area. The contestant determines the similarity index to 83%. Based on their calculations, the contestant checks the "76%-100% of Potential" category on the Scorecard and enters the amount on the Beef Cattle Carrying Capacity Appraisal Form in Part III. Section D.

The similarity index (SI) that occurs on an ecological site is determined by comparing the kinds and proportions of vegetation presently on the site with the native vegetation that the site is capable of producing in a relatively undisturbed condition. See example calculation: Similarity Index above (Figure 38).

For range judging, it is necessary to select the SI worksheets from the back of the manual for the Major Land Resource Area where the contest is held. Use the Major Land Resource Area map (Figure 36) to determine which SI worksheets to use. In this example, use the MLRA 63A Similarity Index worksheets.

The contestant will have already determined that the ecological site for Station 1 is Loamy and uses the loamy ecological site worksheet for calculating SI. The SI is determined by calculating the composition of the species at the judging station. It is entered in the "Percent Observed" column. Composition is by weight of species when they reach their peak growths. Contestants must visualize what plants will look like when they are fully grown and not grazed. For contest purposes, the composition contribution of shrubs and trees will be evaluated as percent canopy cover and expressed as percent composition. "Total Observed

Composition" must total 100%. The "Percent Allowed" is determined by comparing "Percent Observed" to "Composition Maximums." For each species, the smaller value is entered in the "Percent Allowed" column, as in this example:

Dominant Plants	Composition maximums	Percent observed	Percent allowed toward SI
Needlegrass	30	33	30
Sideoats grama	10	5	5

**NOTE: The following is for instructional purposes only. The Wrangler Division does not need to determine beef cattle carrying capacity during the contest.**

### Part III: Beef Cattle Carrying Capacity

Use the Beef Cattle Carrying Capacity Appraisal Form for your calculations.

#### Section A: Animal Units

*Step 1.* The information for number and type (cow/calf, yearling, or bull) of livestock will be given to you at the judging station. The example site is in MLRA 63A, and the producer wants to graze 100 cow/calf pairs and 4 bulls. Enter the number of beef cattle for each type on the beef cattle carrying capacity appraisal form in the appropriate space (in this example Station 1).

*Step 2.* Multiply the number of cattle in column one by the Animal Unit Conversion Factor in the second column. Enter the answer in column three, Animal Units (AU) to Graze. You will note that a 1000-pound cow with a calf is one animal unit; therefore, the conversion factor is 1.0. Yearling beef cattle weigh less than 1000 pounds and consume less forage; therefore, the conversion factor is 0.6. A bull weighs more than the 1000-pound cow and consumes more forage, thus has a conversion factor of 1.2.

*Step 3.* Add the Animal Units to Graze and enter your answer (104.8) on the bottom line, labeled Total Animal Units.

A. Animal Units • What is the daily forage requirement of animals adjusted to the same base?

Animal Units	Number of Cattle		X	Animal Unit Conversion Factor	=	Animal Units (AU) to Graze	
	STA 1	STA 2				STA 1	STA 2
Cow/calf pairs	100		X	1.0	=	100	
Yearlings			X	0.6	=		
Bulls	4		X	1.2	=	4.8	
Total Animal Units (AU)							104.8

#### Section B: Animal Unit Months (AUMs)

*Step 1.* Enter your answer for Total Animal Units from Section A. 0.6 1.2 Total Animal Units (AU) = = = STA 1 100 4.8 104.8 STA 2

*Step 2.* The producer wants to graze 8 months. This information will be given for the station. Enter the 8 under the Months to Graze.

*Step 3.* Multiply column one, Total Animal Units, by the second column, Months to Graze, and enter the answer in the third column, Total Required Animal Unit Months (AUM) Capacity. In this example the total required capacity is 838.4 AUMs.

B. Animal Unit Months • How much forage is required for a specified amount of time?

Station Number	Total Animal Units	X	Months to Graze	=	Total Required Animal Unit Months (AUM Capacity)
STA 1	104.8	X	8	=	838.4
STA 2		X		=	

### Section C: Ecological Site

Enter the Ecological Site name.

C. Ecological Site • What is the ecological site? Use the ecological site determined earlier for this station or determine now.

**STA 1** • Ecological Site Name \_\_\_\_\_

**STA 2** • Ecological Site Name \_\_\_\_\_

### Section D: Similarity Index (SI)

Check "76-100%" Similarity Index. You previously calculated the SI at 83%.

D. Similarity Index (SI) • What is the SI for this site? Use SI calculated for the site, or it may be given. Enter below.

Station Number	76-100%	51-75%	26-50%	0-25%
STA 1	83%			
STA 2				

### Section E: Carrying Capacity Calculation

This section is used to calculate the carrying capacity for the range judging station.

*Step 1.* Select the correct available AUMs/acre value for the Ecological Site from the Livestock Carrying Capacity table. The carrying capacity tables are specific for each Major Land Resource Area in South Dakota. For contests, the correct Livestock Carrying Capacity table will be provided with the SI worksheets for each MLRA.

*Step 2.* To use the Carrying Capacity table below, select the Loamy Ecological Site in the left hand column. Select the correct Similarity Index. In this example select 76-100%. Read the figure in the box below 76-100% and to the right of the Loamy Ecological Site. The Available Animal Unit Months Per Acre (AUMs/Acre) would be 0.65 AUMs/Acre.

Part III LIVESTOCK CARRYING CAPACITY TABLE FOR NORTHERN ROLLING PIERRE SHALE PLAINS, MLRA 63A, SOUTH DAKOTA				
SIMILARITY INDEX (%)				
	76-100	51-75	26-50	0-25
<b>Ecological Site:</b>	<b>Carrying Capacity Expressed As Animal Unit Months Per Acre (AUM's/Ac):</b>			
Subirrigated	1.3	1.0	0.8	0.6
Overflow	0.9	0.7	0.6	0.45
Loamy, Clayey, Sandy, Sands	0.65	0.5	0.4	0.3
Dense Clay, Thin Upland, Shallow, Claypan	0.47	0.4	0.3	0.2

Rev. 5/30/08

**NOTE:** Use higher AUM/Ac value when site contains large quantities of any (alone or in combination) of these invader plants that are desirable forage: crested wheatgrass, intermediate wheatgrass, quackgrass, smooth bromegrass, bluegrass, alfalfa, and/or sweetclover.

Composition of  
Listed Plants  
21% - 40%  
41% - 60%  
61% or greater

AUM/Ac  
Change  
next higher rate  
2nd higher rate  
3rd higher rate

**NOTE:** Use a higher AUM/Acre value when the site contains large quantities of any (alone or in combination) of these invader plants that are desirable forage: crested wheatgrass, intermediate wheatgrass, quackgrass, smooth bromegrass, alfalfa, and/or sweetclover.

*Step 3.* In this example, invader plants exist on the site, but they are less than 21%, so enter the 0.6 AUM/Acre and the acres given for the pasture size, 1440 acres. Multiply the AUMs/Acre times the Acres and enter your answer (936 AUMs) under Total Available AUMs Capacity. This is the total forage available for livestock grazing in the example.

E. Carrying Capacity Calculation • What is the specific beef cattle carrying capacity for this Ecological Site with its Similarity Index?

From the Carrying Capacity Table, Part III, select the correct Available AUM/Acre for Ecological Site and its SI.

Station Number	Available AUM/Ac	X	Acres (given)	=	Total Available AUM's Capacity
STA 1	0.65	X	1440	=	936
STA 2		X		=	

### Section F: Forage Balance

In this section you will determine whether there is enough forage in the pasture.

*Step 1.* Enter the Total Required AUM Capacity from Section B, 838.4 AUMs required, in the space provided.

*Step 2.* Enter the Total Available AUM Capacity, 936 AUMs available, from Section E in the space provided.

*Step 3.* The AUMs available is greater than the AUMs required. Check on the Appraisal form that the capacity is larger than needed.

*Step 4.* Also enter this response on your Rangeland Judging Scorecard, Part III, by checking the box following The Capacity is Larger Than Needed.

F. Forage Balance • Does the unit have enough forage to meet the livestock demand?

Animal Unit Months	STA 1	STA 2
Enter Total Required AUM Capacity (B)	838.4	
Enter Total Available AUM Capacity (E)	936	
	Check one	Check one
If (B) is larger, the capacity is too small		
If (B) = (E) the capacity is exactly right		
If (E) is larger, the capacity is larger than needed	X	

**Remember:** You are only scored on the responses you record on the Rangeland Judging Scorecard. The Beef Cattle Carrying Capacity Appraisal form is only used to arrive at the correct answer and is not turned in for scoring.

**Part IV Beef Cattle Habitat Inventory, Part V Prairie Grouse Habitat Inventory, and Part VI Needed Management Scenarios** are covered in the [Judging South Dakota Rangeland for Livestock and Wildlife Values](#) manual for Scouts and Go-getters.

**Example Scorecard:**

**SOUTH DAKOTA RANGELAND JUDGING SCORECARD**

**Resource Inventory, Present Conditions**

Part I	Ecological Sites	Station No.	
		1	2
15 pts.	Subirrigated		
	Overflow		
	Sands		
	Sandy		
	Loamy		
	Clayey		
	Dense Clay		
	Thin Upland		
	Shallow		
	Claypan		

Part II	Similarity Index	Station No.	
		1	2
10 pts	76-100% Potential		
	51-75% potential		
	26-50% potential		
	0-25% potential		

Part III	Beef Cattle Carrying Capacity	Station No.	
		1	2
10 pts	Capacity is Too Small		
	Capacity is Exactly Right		
	Capacity is Larger Than Needed		

Part IV	Beef Cattle Habitat Inventory	Station No.	
		1	2
10 pts	Excellent Value (31-40)		
	Good Value (21-30)		
	Fair Value (11-20)		
	Poor value (<11)		
<b>Beef Cattle Limiting Factors</b>			
3 pts each	Forage Factor is Limiting		
	Distribution Factor is Limiting		
	Rangeland Health Factor is Limiting		

Part V	Prairie Grouse Habitat Inventory	Station No.	
		1	2
10 pts	Excellent Value (31-40)		
	Good Value (21-30)		
	Fair Value (11-20)		
	Poor value (<11)		
<b>Prairie Grouse Limiting Factors</b>			
3 pts each	Winter Components Are Limiting		
	Nesting Cover is Limiting		
	Brood Food is Limiting		
	Brood Habitat is Limiting		
	Invasive Species		

Contestant Name \_\_\_\_\_

Contestant Number \_\_\_\_\_

County or School \_\_\_\_\_

Team Number or Name \_\_\_\_\_

Score: Station 1 \_\_\_\_\_/118

Station 2 \_\_\_\_\_/118

Total: \_\_\_\_\_/236

Part VI	Needed Management Practices	Station No.	
		1	2
3 pts each	1. Apply Invader Plant Control for Integrity of the Site		
	2. Continue Present Management for Beef		
	3. Apply Woody Plant Control for Beef Cattle		
	4. Develop Water for Beef Cattle		
	5. Begin a Planned Grazing System		
	6. Change Livestock Numbers or Duration of Grazing Period		
	7. Change the Kind of Grazing/ Browsing Animal		
	8. Continue Present Management for Prairie Grouse		
	9. Improve Winter Food or Cover for Prairie Grouse		
	10. Improve Nesting Cover Quality for Prairie Grouse		
	11. Improve Nesting Cover Height for Prairie Grouse		
	12. Improve Brood Food for Prairie Grouse Chicks		
	13. Improve Brood Habitat		

## Wrangler Judging Contest Details

Judging contests are held after participants have had the opportunity to study and learn principles and practices that apply to rangeland management. Generally, three judging stations are set up. Two will be for ecological site evaluation and one will be range plant identification. The estimated time to judge each station is 30 minutes.

The two ecological site evaluation stations should represent a single ecological site in a specific similarity index, both of which will be determined by the participant. Stations are square or rectangular, with border flags marking the area to judge (Figure 41). In the judged area, a path is marked so the site can be viewed more easily. Outside the judged area, a soil pit is dug to assist in determining the ecological site.

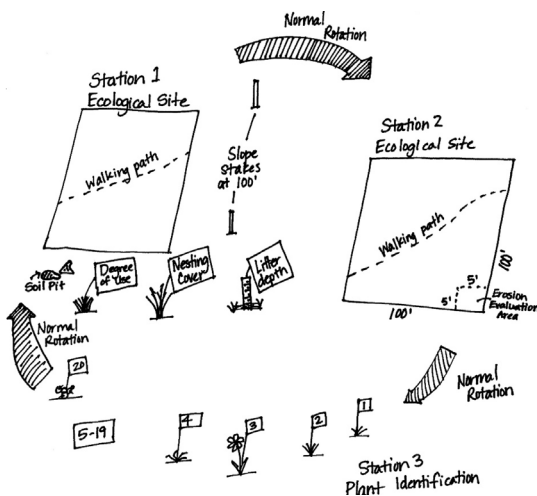


Figure 41. Schematic of how the contest flows.

At the plant identification station, 20 plants are numbered. These plants are to be identified by the participants.

### Contest Components

#### Stations 1 & 2

- Determine ecological site
- Determine similarity index

#### Station 3

- Identify 20 plants and their key characteristics (name, life span, growth season, origin).

### Contest Setup

The contest committee must carefully evaluate each ecological site location before deciding on the management scenario and numerical habitat ratings.

Ecological site evaluation stations should be about 50 x 50 feet but may be smaller if necessary.

The statewide plant list consists of 105 entries. It is acceptable to create a more localized list eliminating species that do not occur in the contest area. If this is the case, the required species list might have 70-80 entries and should be widely circulated among contestants prior to the contest.

For Stations 1 and 2:

- Mark the boundary with wire flags or ribbon.
- Mark a path through the middle of the site to assure participants can fully evaluate vegetative components.
- To assist in ecological site determination, dig a soil pit outside the site boundary to a depth greater than 20 inches or to the restrictive layer.
- Set 3-foot stakes at 50 or 100 feet to determine slope. Make sure stakes being used are the same height.

For Station 3 plant identification, use wire flags numbered 1 through 20.

Contest Materials and Conduct Each contestant should bring a clipboard and pencil. A gallon-size plastic bag should be included if rainy weather is expected. No other student-provided aids are permitted. No calculators or cellphone use is allowed.

Wrangler contestants will be given:

- A scorecard
- Local guides for calculating similarity index

These worksheets and scorecard will be the same as those in this judging manual.

A minimum of 30 minutes will be allowed for judging each station. Scorecards will be turned in at each station. Contest appraisal forms are not to be turned in for scoring.

Contestants normally divide into three equal groups, start at different stations, and rotate clockwise (See Figure 1).

### Wrangler Scoring

A sample judging scorecard is at the back of this manual. The total possible score for each ecological site (stations 1 and 2) is 25 points (50 combined). For plant identification, 280 points are possible (14 points for each plant). 8 points for correct plant identification and 2 points each for the correct life span, growth season, and origin characteristic. If a plant is incorrectly identified, no points are awarded for the marked characteristics.

## GLOSSARY OF TERMS

**Animal Unit (AU)** — one mature cow of approximately 1000 pounds with a calf up to weaning, usually at 6 months of age.

**Animal Unit Month (AUM)** — the amount of forage required by one animal unit for one month (forage demand)

**Annual Plant** — a plant that completes its life cycle in one year

**Anther** — the part of the stamen that contains the pollen

**Auricle** — an appendage or extension of the leaf collar

**Axil** — the angle between the leaf and the stem node

**Biennial Plant** — Life cycle completed in two years.

**Blade** — the portion of the leaf above the sheath

**Bract** — the modified leaves of the seedhead or inflorescence .

**Bunchgrass** — grass with a characteristic growth habit, forming a bunch or tuft, as in crested wheatgrass

**Carrying Capacity** — the maximum stocking rate possible without causing long-term damage to the vegetation or related range resources

**Ciliate** — fringed with fine hair

**Clasping** — said of clawlike auricles which partly or completely surround the stem

**Collar** — a band on the underside of the leaf at the junction of the blade and sheath

**Common Name** — The locally accepted terminology for a specific plant of a certain region

**Compressed** — flattened

**Constricted** — a collar narrowed at its midpoint or a leaf blade at its base

**Convolute** — a leaf rolled lengthwise with one margin overlapping the other as it emerges

**Cool Season Plant** — plant that makes most of its growth and flowers during spring and early summer and then slows growth or becomes dormant during the hot part of summer, and may resume growth in the fall with the advent of cool temperatures

**Corolla** — the petals of the flower

**Cross Pollination** — the transfer of pollen from the stamens of one plant to the stigma of the flower of another plant

**Crown** — the place where the root and shoot joins, somewhere near the soil surface. Crowns are where new shoots or stems arise

**Desirable** — provides positive functions and values throughout most of its life cycle

**Disk Flowers** — the tubular flowers as opposed to the ray flowers

**Ecological Site** — a distinctive kind of land with specific physical characteristics. It differs from other kinds of land in its ability to produce a distinctive kind and amount of vegetation.

**Ecosystem** — The basic functional unit in ecology, it includes both organisms (biotic community) and abiotic environment, each influencing the properties of the other. Both are necessary for maintenance of life as we have it on the earth.

**Entire** — the margins of a blade or ligule being smooth and continuous

**Fauna** — animal life of a specified area

**Fibrous** — type of root with many roots extending downward

**Filament** — the stalk of the stamen

**Flora** — plant life of a specified area

**Floret** — an individual flowering unit of the spikelet including the lemma and palea

**Flower** — the part of the plant that completes pollination, sometimes showy or unnoticeable

**Forb** — a herbaceous plant that has broad leaves. Flowers are usually large, colored, and showy

**Glumes** — empty bracts at the base of a grass spikelet, most commonly two

**Graminoid** — A grasslike herbaceous plant that resembles grass but generally has solid stems without elongated internodes. Leaf veins are parallel, but the leaves are three-ranked. Stems are often triangular, and the flowers are small and inconspicuous.

**Grass** — A herbaceous plant that has both hollow and solid stems with nodes. Leaves are two-ranked and have parallel veins, which are typical of monocots. Flowers are small and inconspicuous.

**Grass-like** — see Graminoid

**Inflorescence** — the flowering part of the plant

**Internode** — the part of the plant between two nodes

**Introduced Plant** — not a part of the original fauna or flora of the area in question, generally from a different continent. Some introduced plants are grown for pasture or hayland.

**Invasive Plant** — a plant species that was absent in undisturbed portions of the original vegetation of a specific range site but which will invade and increase following disturbance or continued heavy grazing. Some invader plants can enter a site that has not been disturbed. Synonym: invader

**Land Stewardship** — Taking care of the land including all of its components; soil, plants, animals, water and air.

**Landscape** — An expanse of land that can be viewed from one vantage point.

**Lemma** — the first modified leaf of a floret

**Ligule** — an appendage of the leaf projecting from the inner surface at the junction of the blade and sheath

**Membranous** — describes a ligule that is thin and pliable

**Native Plant** — plant that is part of the original fauna or flora of an area, generally meaning from the same continent

**Node** — a joint in the stem. The point on a stem where leaves or buds are attached.

**Ovary** — the swollen basal portion of the pistil in which seed is formed

**Palea** — the inner modified leaf of a floret

**Panicle** — a seedhead or inflorescence in which the individual structural units (spikelets) are attached directly to the branches of the central axis (rachis)

**Pedicel** — the stalk of a spikelet

**Perennial Plant** — a plant that lives for more than one year.

**Photosynthesis** — the process that plants use to turn water, sunlight and carbon dioxide into sugars

**Pistil** — the seed-bearing organ of the flower. Consists of the stigma, style, and ovary

**Plant Community** — a group of plants occupying the same area of a landscape

**Pollen** — tiny, male reproductive cells formed in the stamens and typically necessary for seed production

**Pollination** — the transfer of pollen from the stamens to the stigma

**Prescribed Grazing** — Animals grazing under a prescribed stocking rate, density (for rotational grazing) and time interval.

**Pubescent** — a plant part having soft, fine hair

**Rangeland** — land supporting native vegetation suitable for grazing, including native grasslands, woodlands, and shrublands

**Raceme**— a seedhead or inflorescence in which the individual structural units (spikelets) are borne on pedicels attached directly to the central axis or rachis

**Rachilla** — the central axis of a spikelet

**Rachis** — the central axis of a spike, raceme, or panicle

**Ray Flowers** — one of the marginal flowers surrounding the tubular flowers in the flowerhead of a composite flower

**Rhizome** — creeping underground stem, which can produce shoots and roots at the nodes, giving rise to new plants

**Root** — the part of the plant that anchors it in the ground, takes up nutrients and water, and facilitates communication with the underground environment

**Rudimentary** — an imperfectly developed plant part

**Ruminant** — a mammal with a compartmentalized stomach (more than one compartment) such as bison or cattle.

**Scientific Name** — a name used by scientists, especially the taxonomic name of an organism that consists of a genus name and specific epithet

**Serrate** — leaf blades or ligules having sharp teeth on the margins

**Sheath** — the lower part of the grass leaf that surrounds the stem

**Shrub** — a woody plant with secondary growth originating from aerial stems which live throughout the year, although they may be dormant part of the time. Leaves are often broad and net veined. Flowers are often showy.

**Similarity Index** — an expression of the kinds and proportions of vegetation present in relation to the native vegetation the site is capable of producing (or reference state).

**Spike** — an unbranched seedhead in which the individual structural units (spikelets) are attached directly to a central axis (rachis)

**Spikelet** — the unit of the inflorescence of grasses, consisting of two glumes and one or more florets

**Stamen** — the male part of the flower consisting of the anther and filament which contain the pollen

**Stocking Rate** — the number of livestock utilizing a unit of land for a specific period of time

**Stolon** — horizontal stem that grows along the soil surface with roots at the nodes and produces new plants, as in buffalograss and strawberries.

**Style** — the narrow extension of the pistil between the ovary and the stigma

**Succulent** — a type of plant that has thick leaves and stems that store a lot of water.

**Tall-grass** — generally, plants more than three feet tall at maturity.

**Taproot** — type of root with one main root extending down and small lateral roots

**Tuber** — type of root that is fleshy, rounded, or thick, may have buds from which new plants can grow.

**Undesirable** — may provide short-term functions and values, but overall not a plant suited for the intended purpose.

**Warm Season Plant** — plant which makes most or all of its growth during the late spring and summer, flowering in the summer or autumn.

## Plant Characteristics and Resource Rating Guide

No.	Common Name	Scientific Name	ID Notes	Lifespan	Seasonality	Origin/Traits	Grouse Food	Grouse Cover	Cattle Food
<b>GRASSES and GRASSLIKES (TALL)</b>									
1	big or sand bluestem	<i>Andropogon spp.</i>		P	W	N	U	D	D
2	Canada wildrye	<i>Elymus canadensis</i>		P	C	N	U	D	D
3	crested wheatgrass	<i>Agropyron cristatum</i>		P	C	IN/IV	U	D	D
4	green needlegrass	<i>Nassella viridula</i>		P	C	N	D	D	D
5	green or yellow foxtail	<i>Setaria spp.</i>		A	W	IN/IV	D	D	U
6	Indiangrass	<i>Sorghastrum nutans</i>		P	W	N	U	D	D
7	intermediate or tall wheatgrass	<i>Thinopyrum spp.</i>		P	C	IN/IV	U	D	D
8	little bluestem	<i>Schizachyrium scoparium</i>		P	W	N	U	D	D
9	needleandthread	<i>Hesperostipa comata</i>		P	C	N	D	D	D
10	plains muhly	<i>Muhlenbergia cuspidata</i>		P	W	N	U	D	D
11	porcupinegrass	<i>Hesperostipa spartea</i>		P	C	N	D	D	D
12	prairie cordgrass	<i>Spartina pectinata</i>		P	W	N	U	D	D
13	prairie dropseed	<i>Sporobolus heterolepis</i>		P	W	N	D	D	D
14	prairie junegrass	<i>Koeleria macrantha</i>		P	C	N	U	D	D
15	prairie sandreed	<i>Calamovilfa longifolia</i>		P	W	N	U	D	D
16	quackgrass	<i>Elymus repens</i>		P	C	IN/IV	U	D	D
17	reed canarygrass	<i>Phalaris arundinacea</i>		P	C	N	U	D	D
18	sand or tall dropseed	<i>Sporobolus spp.</i>		P	W	N	U	D	U
19	sideoats grama	<i>Bouteloua curtipendula</i>		P	W	N	D	D	D
20	smooth brome	<i>Bromus inermis</i>		P	C	IN/IV	U	D	D
21	switchgrass	<i>Panicum virgatum</i>		P	W	N	D	D	D
22	threeawan	<i>Aristida spp.</i>		P	W	N	U	D	U
23	western wheatgrass	<i>Pasopyrum smithii</i>	State Grass	P	C	N	U	D	D
<b>GRASSES and GRASSLIKES (SHORT)</b>									
24	annual brome	<i>Bromus spp.</i>		A	C	IN/IV	U	U	U
25	blue or hairy grama	<i>Bouteloua spp.</i>		P	W	N	D	U	D
26	bluegrass	<i>Poa spp.</i>		P	C	IN/IV	U	U	D
27	buffalograss	<i>Bouteloua dactyloides</i>		P	W	N	U	U	D
28	foxtail barley	<i>Hordeum jubatum</i>		P	C	N	U	U	U
29	inland saltgrass	<i>Distichlis spicata</i>		P	W	N	U	U	U
30	Scribner's panicgrass	<i>Dichanthelium spp.</i>		P	C	N	D	U	D
31	sedge	<i>Carex spp.</i>		P	C	N	D	U	D
32	witchgrass	<i>Panicum capillare</i>		A	W	N	D	U	U
<b>FORBS</b>									
33	absinth wormwood	<i>Artemisia absinthium</i>		P	W	IN/IV	U	D	U
34	alfalfa	<i>Medicago sativa</i>	Legume	P	C	IN/IV	D	D	D
35	American licorice	<i>Glycyrrhiza lepidota</i>	Legume	P	W	N	D	D	D
36	American vetch	<i>Vicia americana</i>	Legume	P	C	N	D	U	D
37	annual sunflower	<i>Helianthus annuus</i>		A	W	N	D	D	D
38	breadroot scurfpea	<i>Psoralea esculenta</i>	Legume	P	C	N	D	U	U
39	Canada thistle	<i>Cirsium arvense</i>		P	W	IN/IV	U	D	U
P = Perennial; A = Annual; B = Biennial C = Cool Season; W = Warm Season N = Native; IN = Introduced; IV = Invader D = Desirable; U = Undesirable									

No.	Common Name	Scientific Name	ID Notes	Lifespan	Seasonality	Origin/Traits	Grouse Food	Grouse Cover	Cattle Food
40	clover	<i>Trifolium spp.</i>	Legume	P	C	IN/IV	D	U	D
41	cocklebur	<i>Xanthium strumarium</i>		A	W	N	U	D	U
42	common mullein	<i>Verbascum thapsus</i>		B	W	IN/IV	U	D	U
43	common yarrow	<i>Achillea millefolium</i>		P	C	N	D	U	U
44	crazyweed	<i>Oxytropis spp.</i>	Legume	P	C	N	D	U	U
45	curlycup gumweed	<i>Grindelia squarrosa</i>		B	W	N	D	D	U
46	daisy fleabane	<i>Erigeron strigosus</i>		B	C	N	D	D	U
47	deathcamas	<i>Zigadenus spp.</i>		P	C	N	U	U	U
48	deervetch	<i>Lotus unifoliatus</i>	Legume	A	W	N	D	D	U
49	false boneset	<i>Brickellia eupatorioides</i>		P	W	N	D	D	D
50	false gromwell	<i>Onosmodium bejariense</i>		P	W	N	D	D	U
51	field bindweed	<i>Convolvulus arvensis</i>		P	W	IN/IV	D	U	D
52	field pennycress	<i>Thlaspi arvense</i>		A	C	IN/IV	U	D	U
53	gayfeather	<i>Liatis spp.</i>		P	W	N	D	D	D
54	goldenrod	<i>Solidago spp.</i>		P	W	N	D	D	U
55	hairy goldenaster	<i>Heterotheca villosa</i>		P	W	N	D	U	U
56	heath aster	<i>Symphyotrichum ericoides</i>		P	W	N	D	D	U
57	horsetweed	<i>Conyza canadensis</i>		A	W	N	U	U	U
58	leafy spurge	<i>Euphorbia esula</i>		P	C	IN/IV	D	D	U
59	Maximillian sunflower	<i>Helianthus maximilliani</i>		P	W	N	D	D	D
60	milkvetch	<i>Astragalus spp.</i>	Legume	P	C	N	D	U	D
61	milkweed	<i>Asclepias spp.</i>		P	W	N	U	U	U
62	pasqueflower	<i>Anemone patens</i>	State Flower	P	C	N	D	U	U
63	penstemon	<i>Penstemon spp.</i>		P	W	N	D	U	D
64	phlox	<i>Phlox spp.</i>		P	C	N	U	U	U
65	poison hemlock	<i>Conium maculatum</i>		P	W	IN/IV	U	D	U
66	prairie clover	<i>Dalea purpurea</i>	Legume	P	W	N	D	D	D
67	prairie coneflower	<i>Ratibida columnifera</i>		P	W	N	D	D	D
68	prickly pear	<i>Opuntia spp.</i>		P	W	N	U	U	U
69	purple coneflower	<i>Echinacea purpurea</i>		P	W	N	D	D	D
70	ragwort	<i>Senecio spp.</i>		P	C	N	U	U	U
71	rush skeletonplant	<i>Chondrilla juncea</i>		P	W	N	U	U	U
72	sagewort	<i>Artemisia spp.</i>		P	W	N	D	D	U
73	salsify	<i>Tragopogon dubius</i>		B	W	IN/IV	D	U	D
74	scarlet gaura	<i>Gaura coccinea</i>		P	W	N	U	U	U
75	scarlet globemallow	<i>Sphaeralcea coccinea</i>		P	W	N	D	U	U
76	scurfpea	<i>Psoraleidum spp.</i>	Legume	P	W	N	D	D	U
77	sensitive briar	<i>Mimosa nuttallii</i>	Legume	P	W	N	D	D	D
78	spiderwort	<i>Tradescantia spp.</i>		P	C	N	D	U	D
79	stiff sunflower	<i>Helianthus pauciflorus</i>		P	W	N	D	U	D
80	sweetclover	<i>Melilotus officinalis</i>		B	C	IN/IV	D	D	D
81	wavyleaf thistle	<i>Cirsium undulatum</i>		P	W	N	U	U	U
82	western ragweed	<i>Ambrosia psilostachya</i>		P	W	N	D	D	U

P = Perennial; A = Annual; B = Biennial  
C= Cool Season; W = Warm Season  
N = Native; IN = Introduced; IV= Invader  
D = Desirable; U = Undesirable

No.	Common Name	Scientific Name	ID Notes	Lifespan	Seasonality	Origin/Traits	Grouse Food	Grouse Cover	Cattle Food
83	western wallflower	<i>Erysimum asperum</i>		B	C	N	U	U	U
84	wild onion	<i>Allium ascalonicum</i>		P	C	N	D	U	D
85	woolly verbena	<i>Verbena stricta</i>		P	W	N	D	D	U
86	yellow evening primrose	<i>Calylophus serrulatus</i>		P	W	N	U	D	U
87	yucca	<i>Yucca glauca</i>		P	C	N	U	D	D
<b>SHRUBS</b>									
88	broom snakeweed	<i>Gutierrezia sarothrae</i>		P	W	N	U	D	U
89	chokecherry	<i>Prunus virginiana</i>		P	W	N	D	D	U
90	leadplant	<i>Amorpha canescens</i>	Legume	P	W	N	D	D	D
91	poison ivy	<i>Toxicodendron radicans</i>		P	W	N	U	D	D
92	rubber rabbitbrush	<i>Ericameria nauseosa</i>		P	W	N	U	D	U
93	sagebrush	<i>Artemisia spp.</i>		P	W	N	D	D	U
94	saltbush	<i>Atriplex spp.</i>		P	W	N	D	D	D
95	sandcherry	<i>Prunus pumila</i>		P	W	N	D	D	U
96	silver buffaloberry	<i>Shepherdia argentea</i>		P	W	N	D	D	U
97	skunkbrush	<i>Rhus aromatica</i>		P	W	N	D	D	U
98	smooth sumac	<i>Rhus glabra</i>		P	W	N	D	D	D
99	western snowberry	<i>Symphor. occidentalis</i>		P	W	N	D	D	U
100	wild plum	<i>Prunus americana</i>		P	W	N	D	D	U
101	wild rose	<i>Rosa spp.</i>		P	W	N	D	D	D
102	willow	<i>Salix spp.</i>		P	W	N	D	D	D
<b>TREES</b>									
103	American elm	<i>Ulmus americana</i>		P	W	N	D	D	D
104	Black Hills spruce	<i>Picea glauca var. densata</i>	State Tree	P	W	N	D	D	U
105	bur oak	<i>Quercus macrocarpa</i>		P	W	N	D	D	D
106	green ash	<i>Fraxinus pennsylvanica</i>		P	W	N	D	D	U
107	juniper or cedar	<i>Juniperus spp.</i>		P	W	N/IV	D	D	U
108	plains cottonwood	<i>Populus deltoides</i>		P	W	N	D	D	U
109	Ponderosa pine	<i>Pinus ponderosa</i>		P	W	N/IV	D	D	U
110	Russian olive	<i>Elaeagnus angustifolia</i>		P	W	IN/IV	D	D	U
111	saltcedar	<i>Tamarix spp.</i>		P	W	IN/IV	U	U	U
P = Perennial; A = Annual; B = Biennial C = Cool Season; W = Warm Season N = Native; IN = Introduced; IV = Invader D = Desirable; U = Undesirable									

**Grasses - Tall and Mid**

**Big or Sand Bluestem**



Hitchcock, A.S. (rev. A. Chase). 1950

**Canada Wildrye**



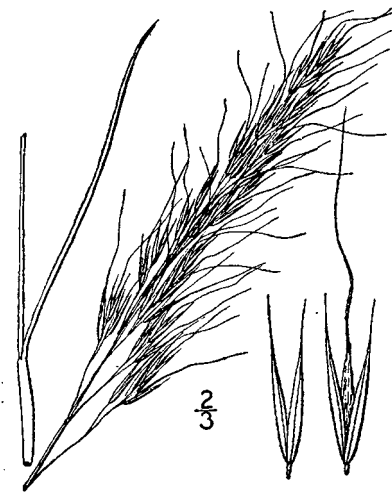
Hitchcock, A.S. (rev. A. Chase). 1950

**Crested Wheatgrass**



Jeanne M. Janisch

**Green Needlegrass**



Britton, N. L., and A. Brown, 1913



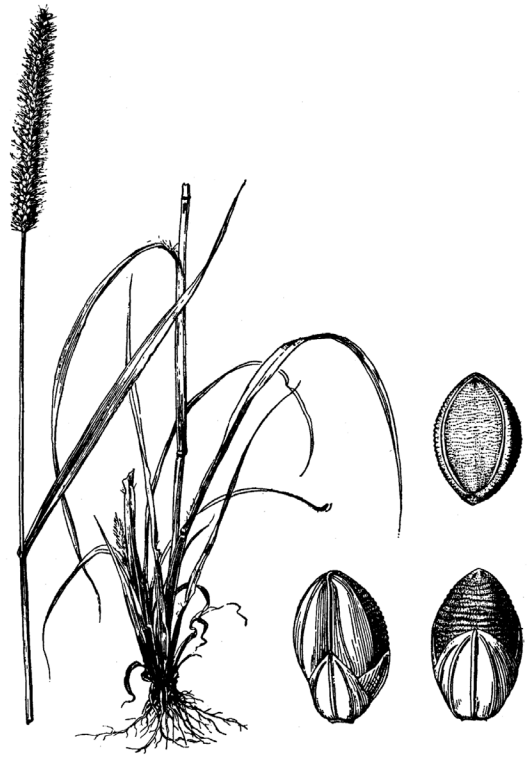
Hitchcock, A.S. (rev. A. Chase). 1950

## Green Foxtail



Hitchcock, A.S. (rev. A. Chase). 1950

## Yellow Foxtail



Hitchcock, A.S. (rev. A. Chase). 1950

## Indiangrass



Hitchcock, A.S. (rev. A. Chase). 1950

## Little Bluestem



Hitchcock, A.S. (rev. A. Chase). 1950

### Needleandthread



Britton, N.L., and A. Brown, 1913

### Plains Muhly



Hitchcock, A.S. (rev. A. Chase). 1950

### Porcupinegrass



Hitchcock, A.S. (rev. A. Chase). 1950

### Prairie Cordgrass



Hitchcock, A.S. (rev. A. Chase). 1950

**Prairie Dropseed**



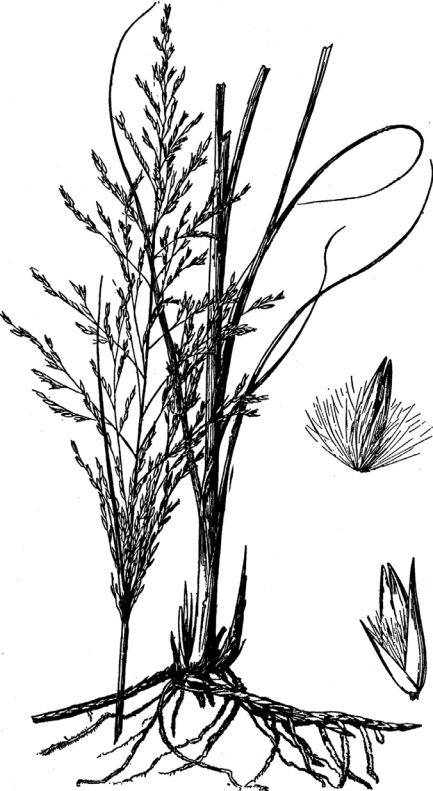
Hitchcock, A.S. (rev. A. Chase). 1950

**Prairie Junegrass**



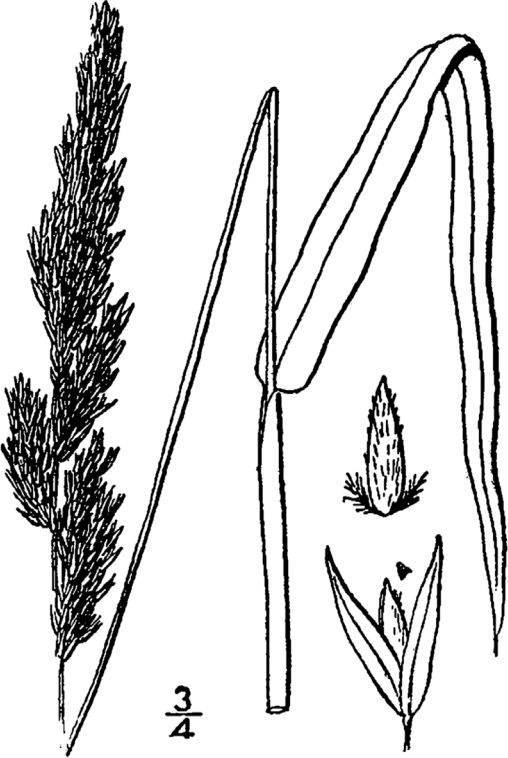
Hitchcock, A.S. (rev. A. Chase). 1950

**Prairie Sandreed**



Hitchcock, A.S. (rev. A. Chase). 1950

**Reed Canarygrass**



Britton, N.L., and A. Brown, 1913

**Sand Dropseed**



Hitchcock, A.S. (rev. A. Chase). 1950

**Tall Dropseed**



Hitchcock, A.S. (rev. A. Chase). 1950

**Sideoats Grama**



Hitchcock, A.S. (rev. A. Chase). 1950

**Smooth Brome**



Hitchcock, A.S. (rev. A. Chase). 1950

## Switchgrass



Hitchcock, A.S. (rev. A. Chase). 1950

## Threawn



Hitchcock, A.S. (rev. A. Chase). 1950

## Western Wheatgrass



Britton, N.L., and A. Brown, 1913

Grasses - Short

**Annual Brome**



Britton, N.L., and A. Brown, 1913

**Blue Grama**



Hitchcock, A.S. (rev. A. Chase). 1950

**Hairy Grama**



Britton, N.L., and A. Brown, 1913

**Bluegrass**



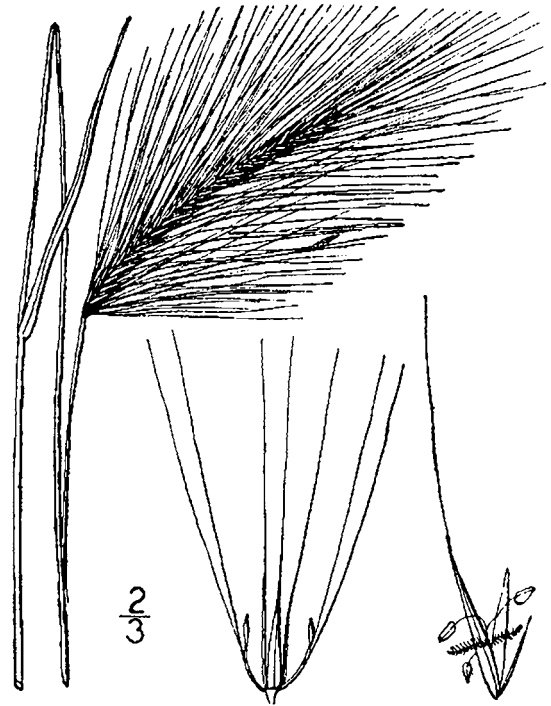
Hitchcock, A.S. (rev. A. Chase). 1950

### Buffalograss



Hitchcock, A.S. (rev. A. Chase). 1950

### Foxtail Barley



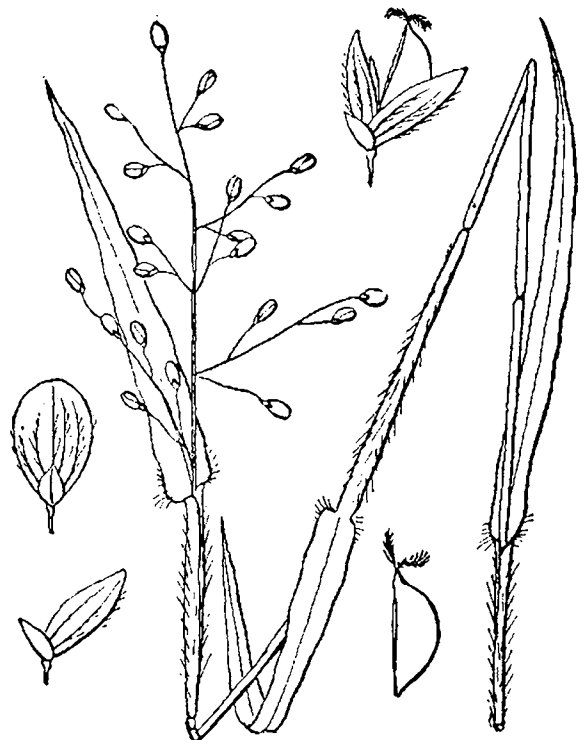
Britton, N.L., and A. Brown, 1913

### Inland Saltgrass



Hitchcock, A.S. (rev. A. Chase). 1950

### Scibner's Panicgrass



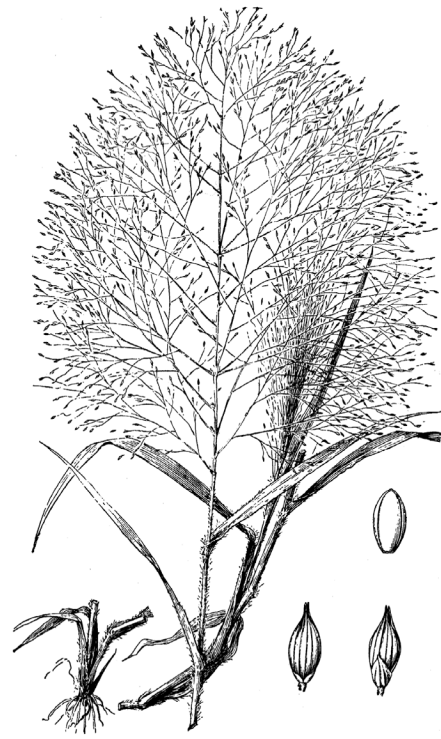
Britton, N.L., and A. Brown, 1913

## Sedge



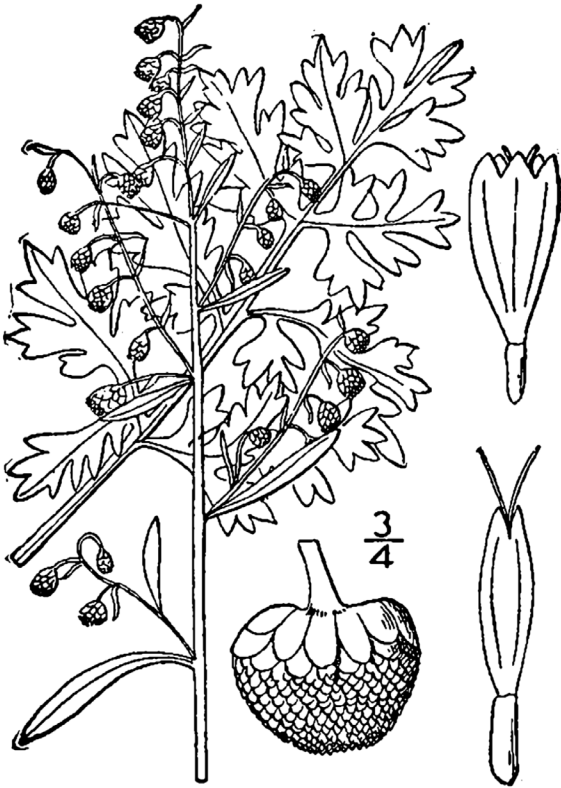
Hermann, 1970

## Witchgrass



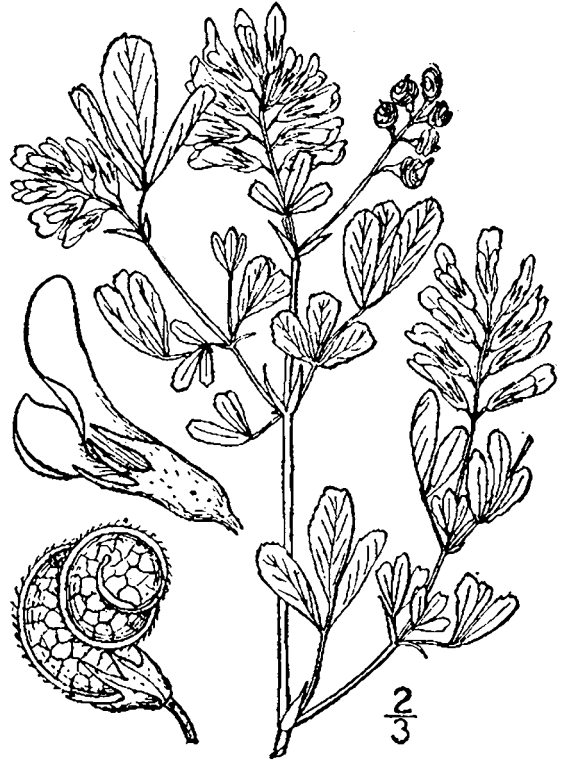
Hitchcock, A.S. (rev. A. Chase). 1950

**Absinth Wormwood**



Britton, N.L., and A. Brown, 1913

**Alfalfa**



Britton, N.L., and A. Brown, 1913

**American Licorice**



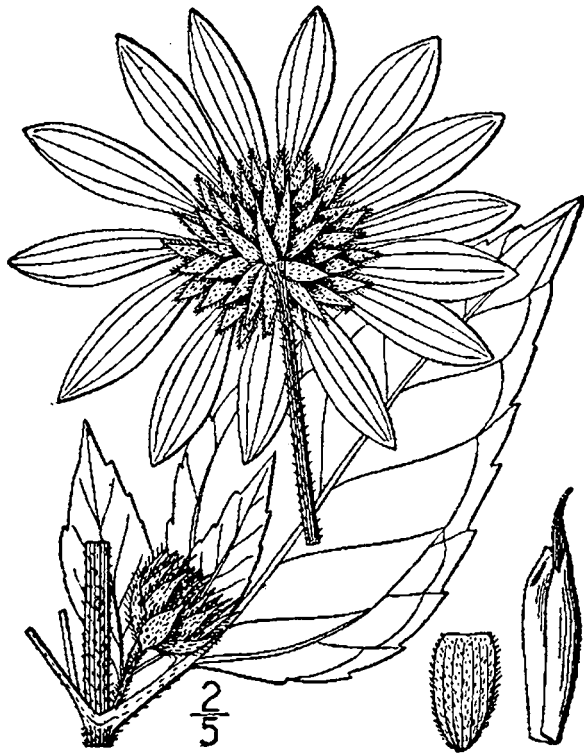
Britton, N.L., and A. Brown, 1913

**American Vetch**



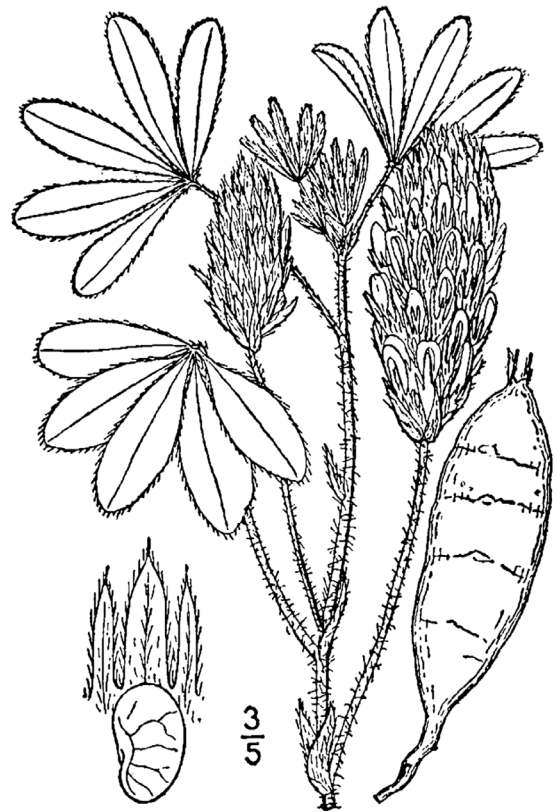
Britton, N.L., and A. Brown, 1913

### Annual Sunflower



Britton, N.L., and A. Brown, 1913

### Breadroot Scurfpea



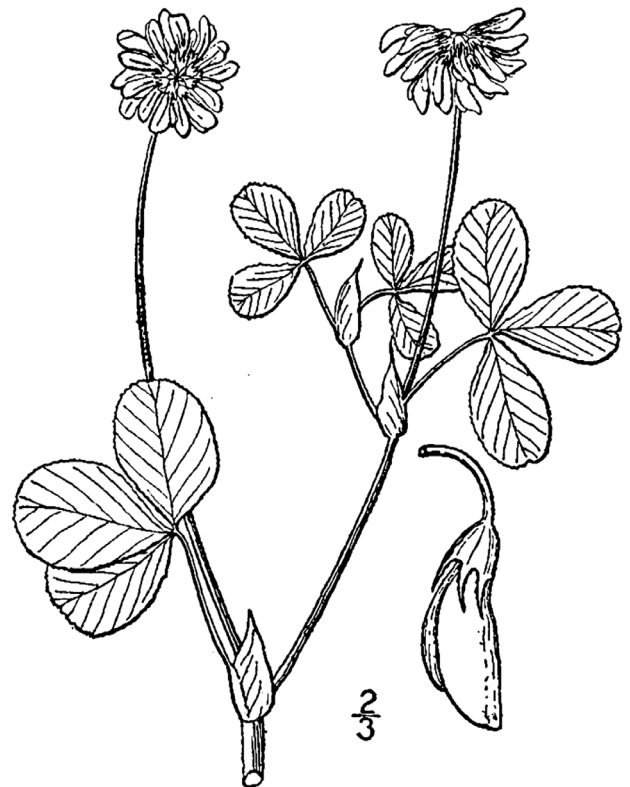
Britton, N.L., and A. Brown, 1913

### Canada Thistle



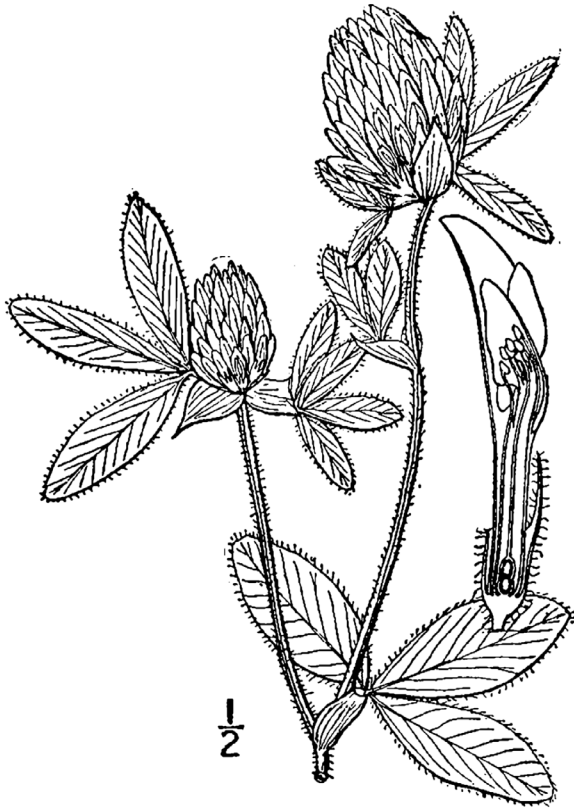
Britton, N.L., and A. Brown, 1913

### Clover (alsike)



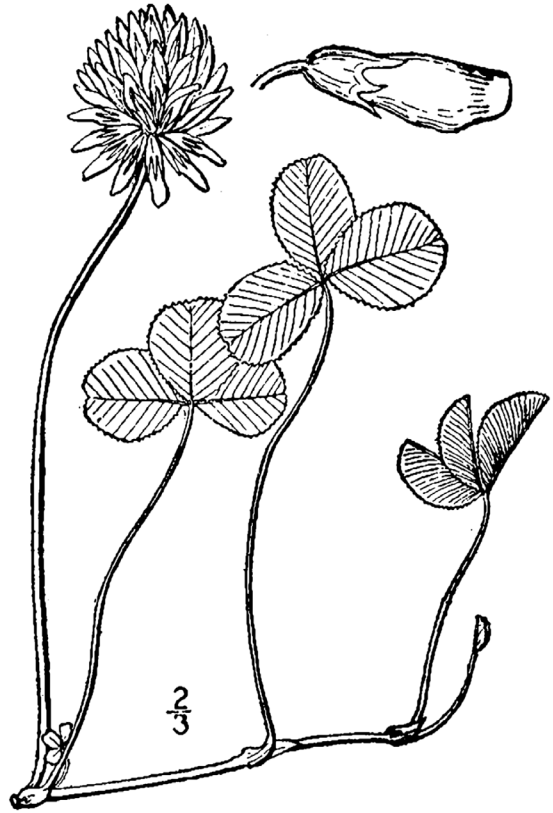
Britton, N.L., and A. Brown, 1913

**Clover (red)**



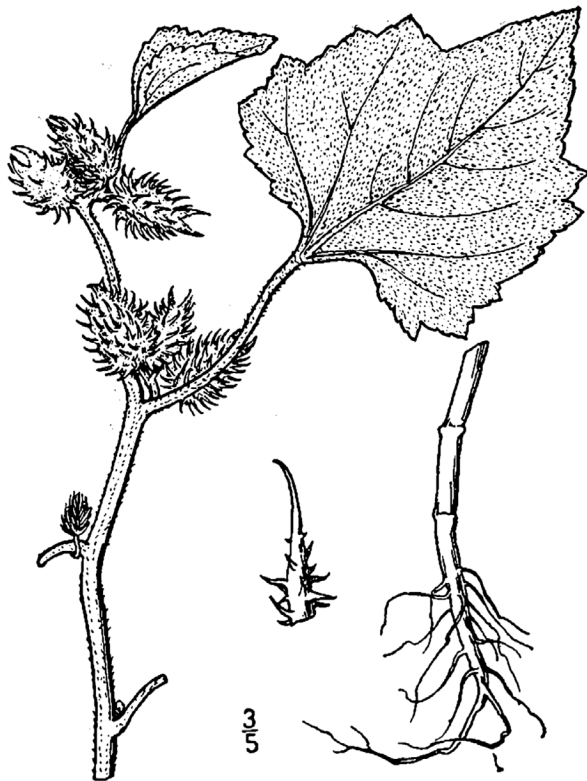
Britton, N.L., and A. Brown, 1913

**Clover (white)**



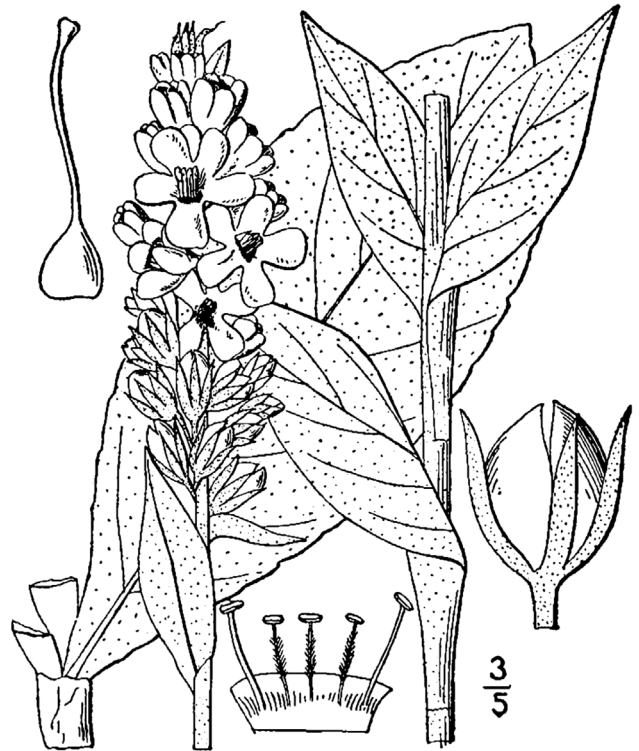
Britton, N.L., and A. Brown, 1913

**Cocklebur**



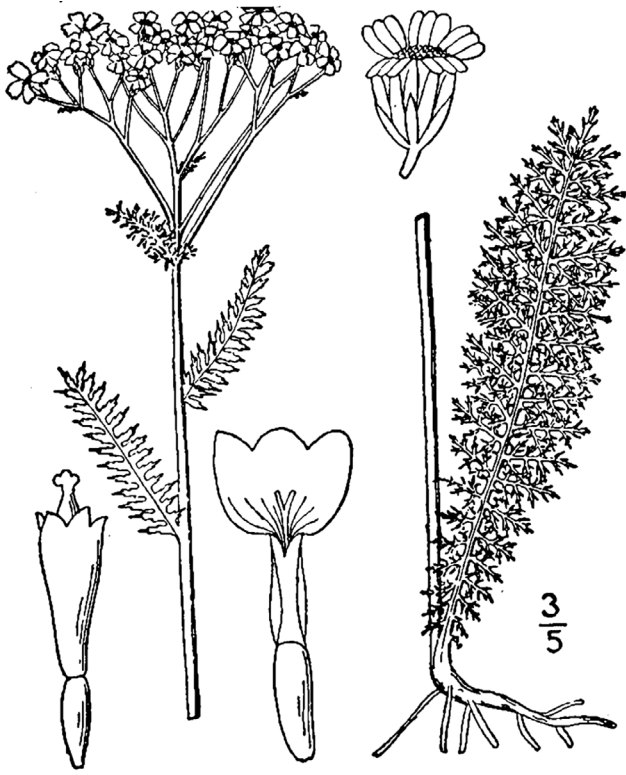
Britton, N.L., and A. Brown, 1913

**Common Mullein**



Britton, N.L., and A. Brown, 1913

### Common Yarrow



Britton, N.L., and A. Brown, 1913

### Crazyweed



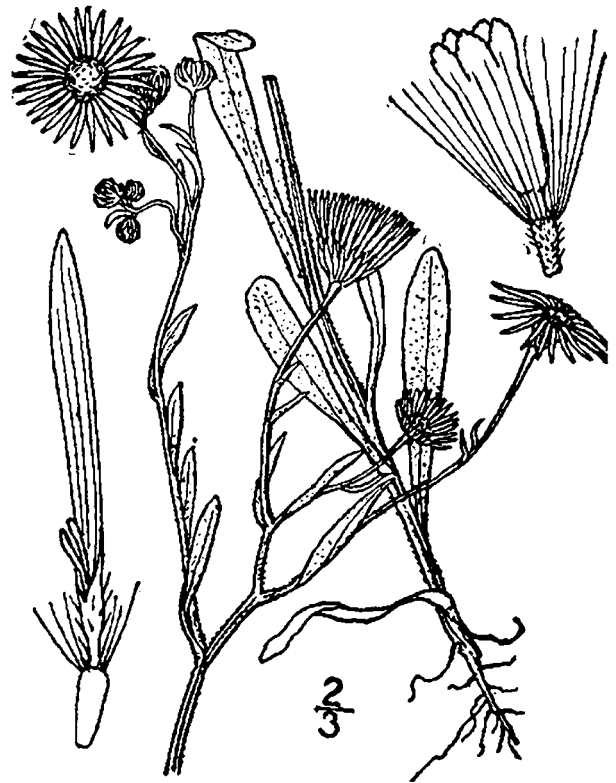
Britton, N.L., and A. Brown, 1913

### Curlycup Gumweed



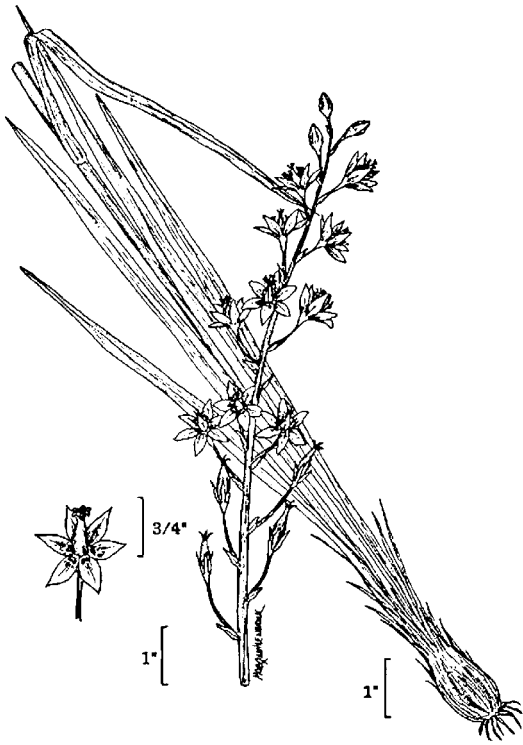
Britton, N.L., and A. Brown, 1913

### Daisy Fleabane



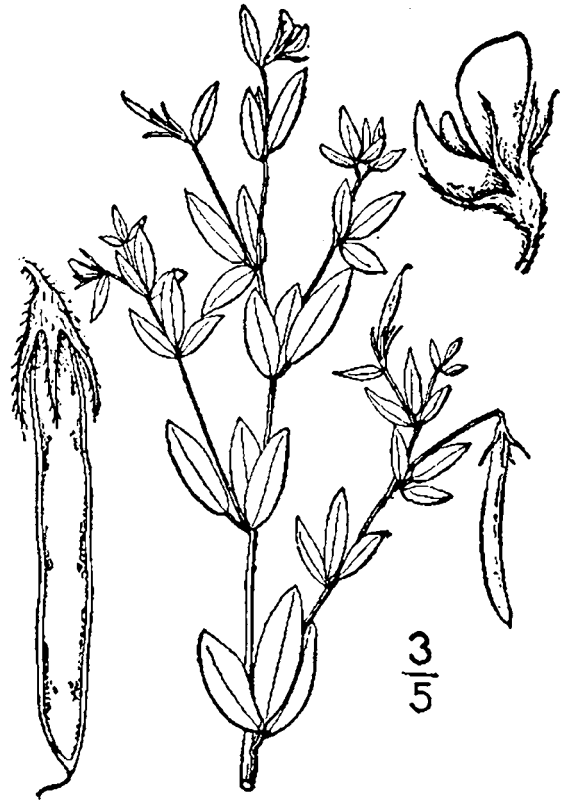
Britton, N.L., and A. Brown, 1913

### Deathcamas



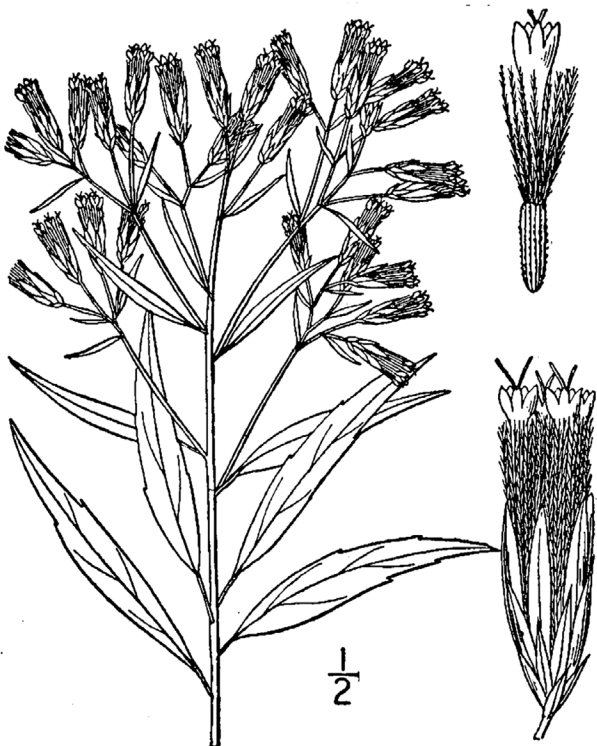
USDA NRCS Wetland Team

### Deervetch



Britton, N.L., and A. Brown, 1913

### False Boneset



Britton, N.L., and A. Brown, 1913

### False Gromwell



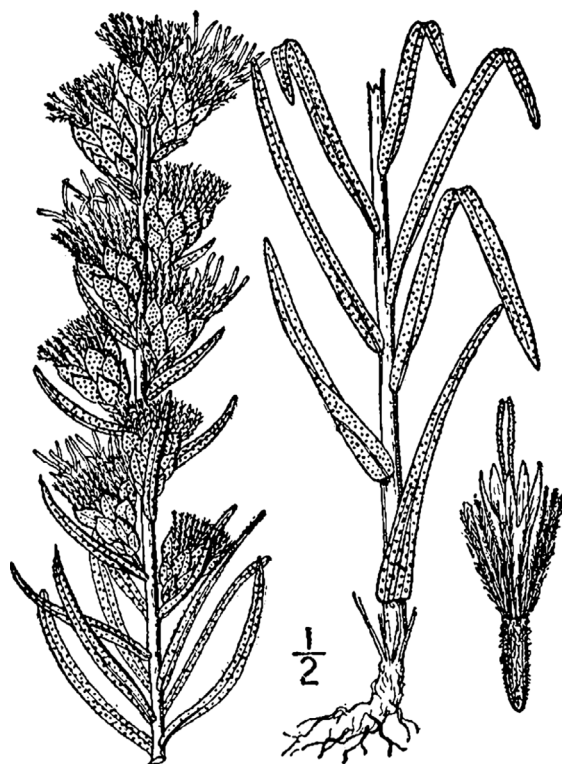
Britton, N.L., and A. Brown, 1913

### Field Bindweed



Britton, N.L., and A. Brown, 1913

### Gayfeather



Britton, N.L., and A. Brown, 1913

### Goldenrod



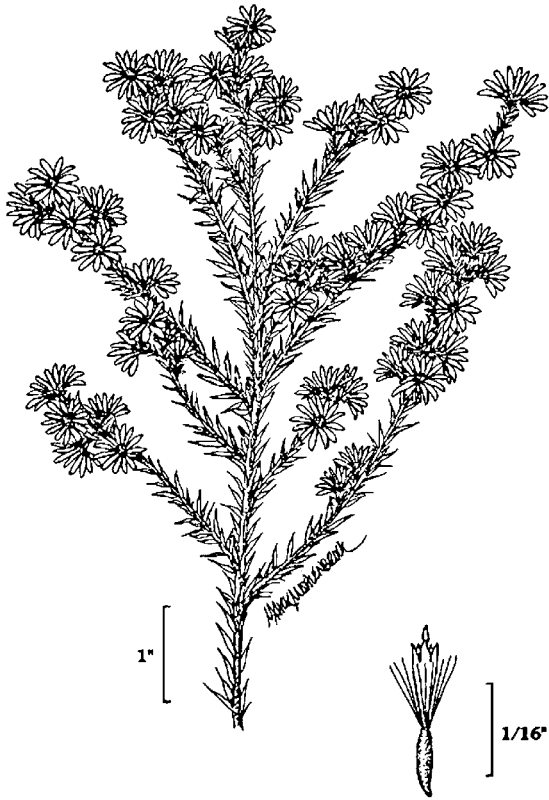
Britton, N.L., and A. Brown, 1913

### Hairy Goldaster



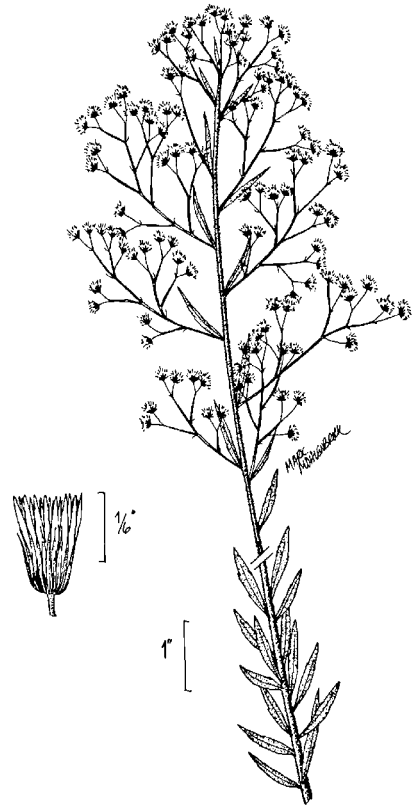
Britton, N.L., and A. Brown, 1913

**Heath Aster**



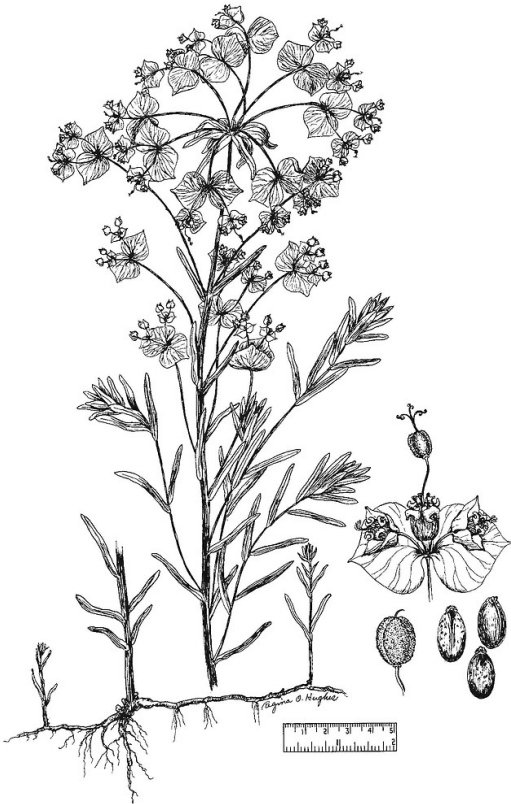
NRCS National Wetland Team

**Horseweed**



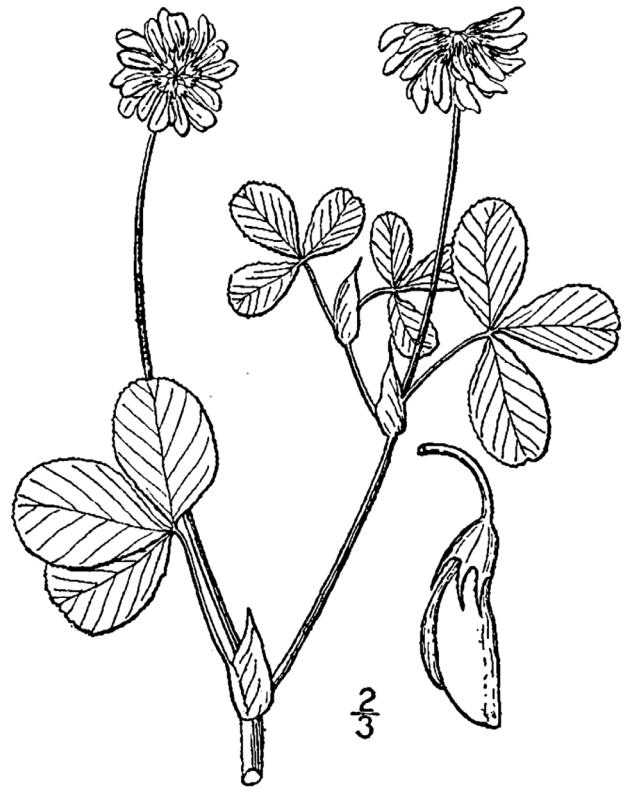
NRCS National Wetland Team

**Leafy Spurge**



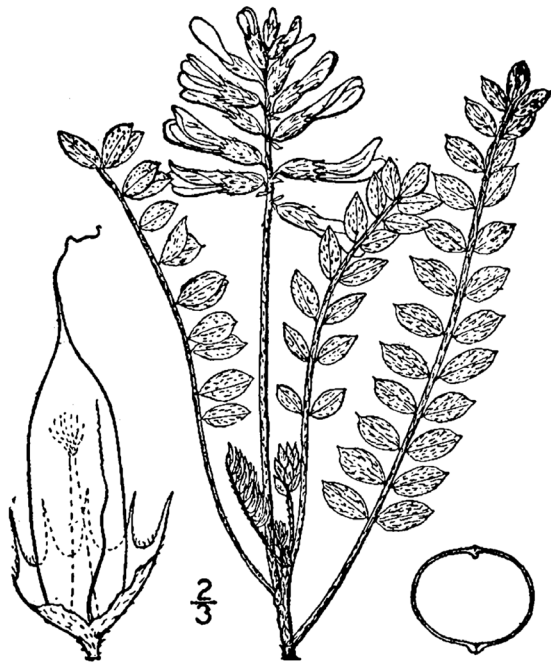
Regina O. Hughes

**Clover (alsike)**



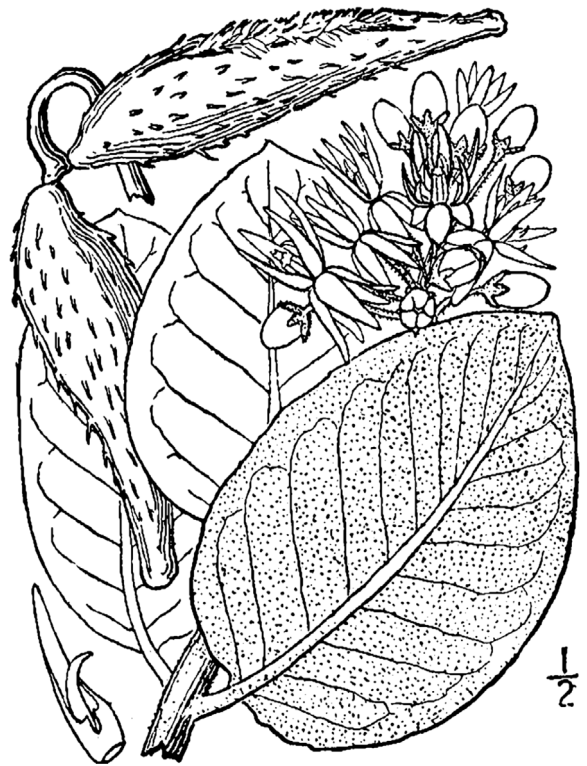
Britton, N.L., and A. Brown, 1913

### Milkvetch



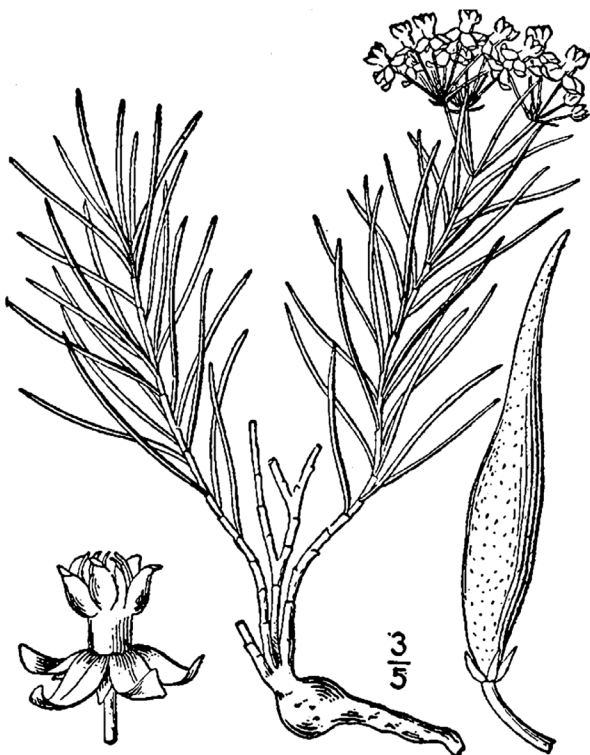
Britton, N.L., and A. Brown, 1913

### Milkweed (showy or common)



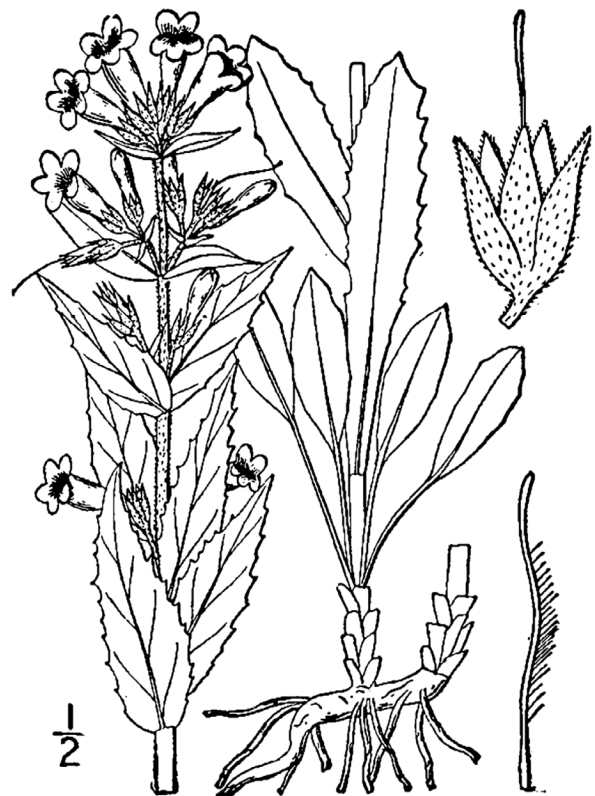
Britton, N.L., and A. Brown, 1913

### Milkweed (plains)



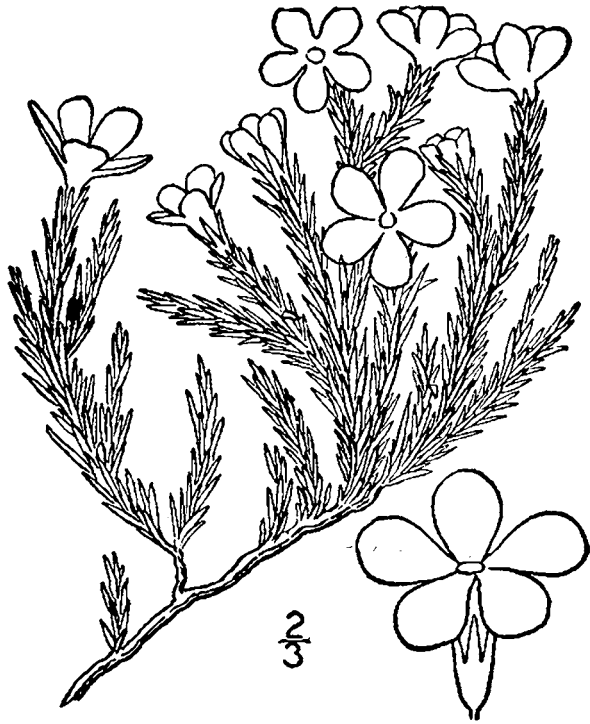
Britton, N.L., and A. Brown, 1913

### Penstemon



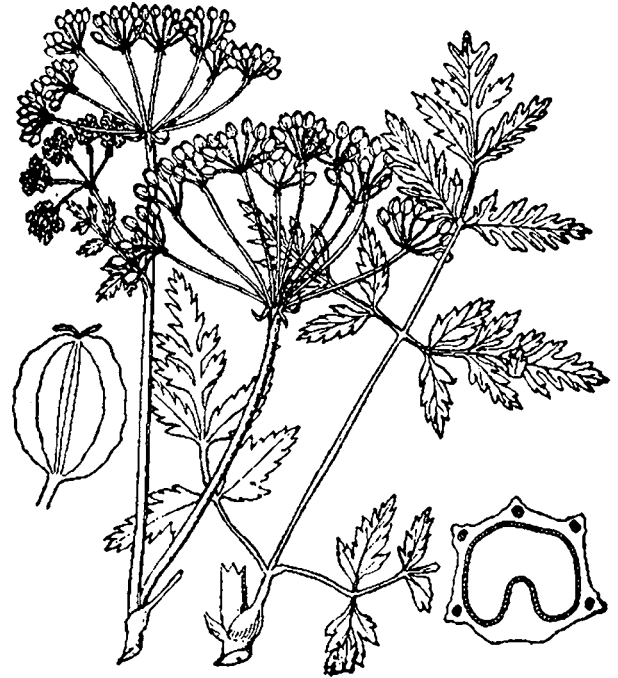
Britton, N.L., and A. Brown, 1913

### Phlox



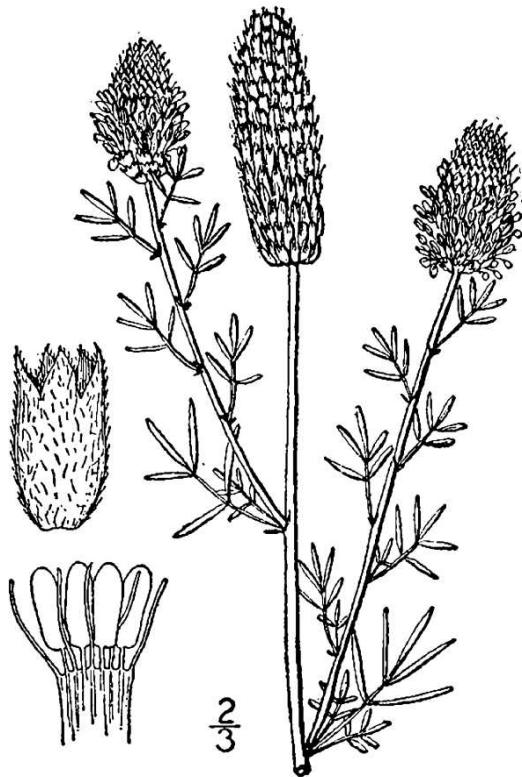
Britton, N.L., and A. Brown, 1913

### Poison Hemlock



Britton, N.L., and A. Brown, 1913

### Prairie Clover



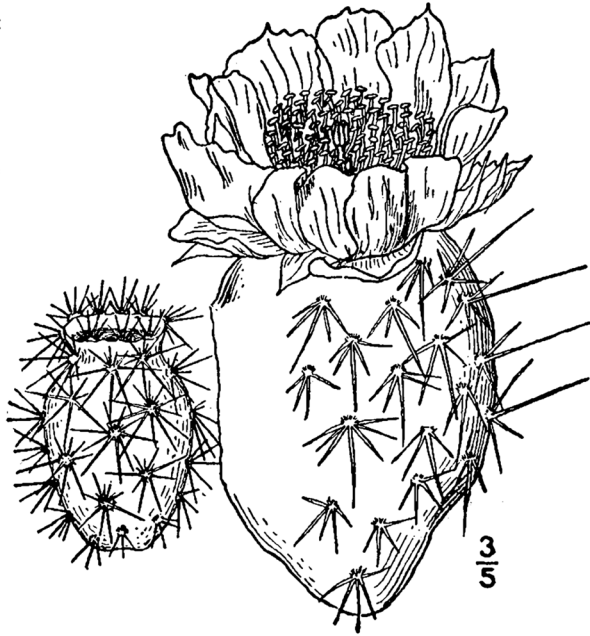
Britton, N.L., and A. Brown, 1913

### Prairie Coneflower



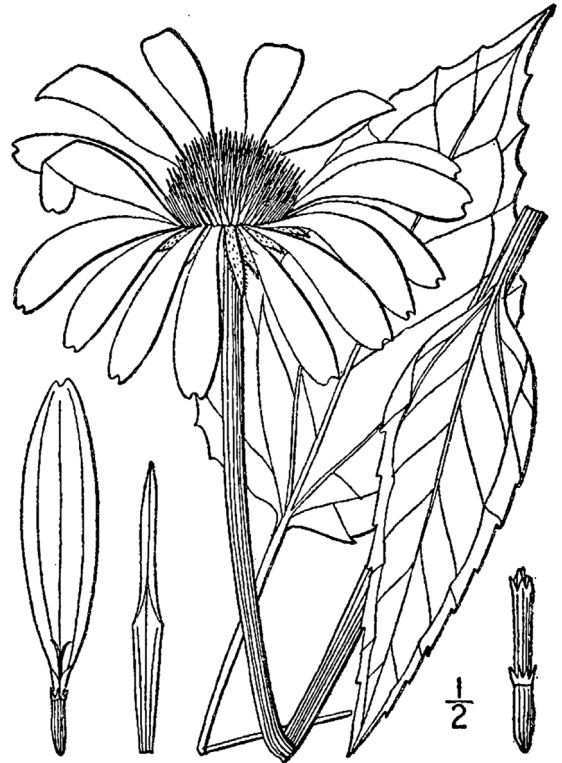
Britton, N.L., and A. Brown, 1913

### Prickly Pear



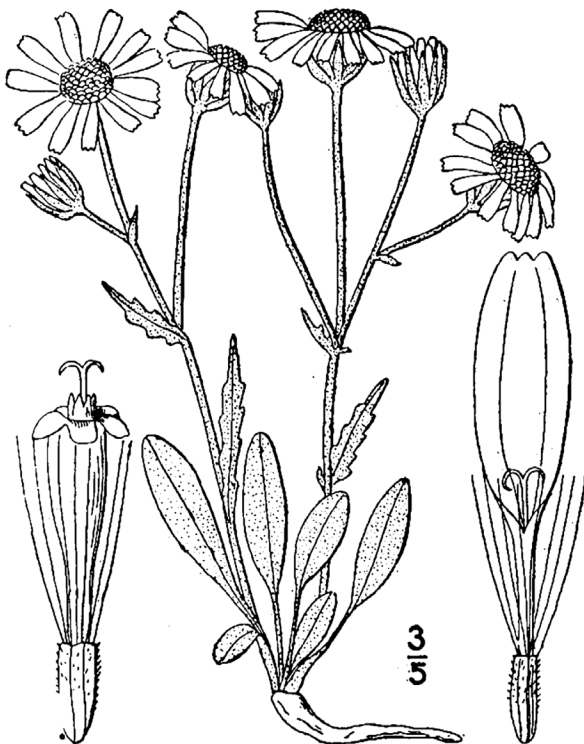
Britton, N.L., and A. Brown, 1913

### Purple Coneflower



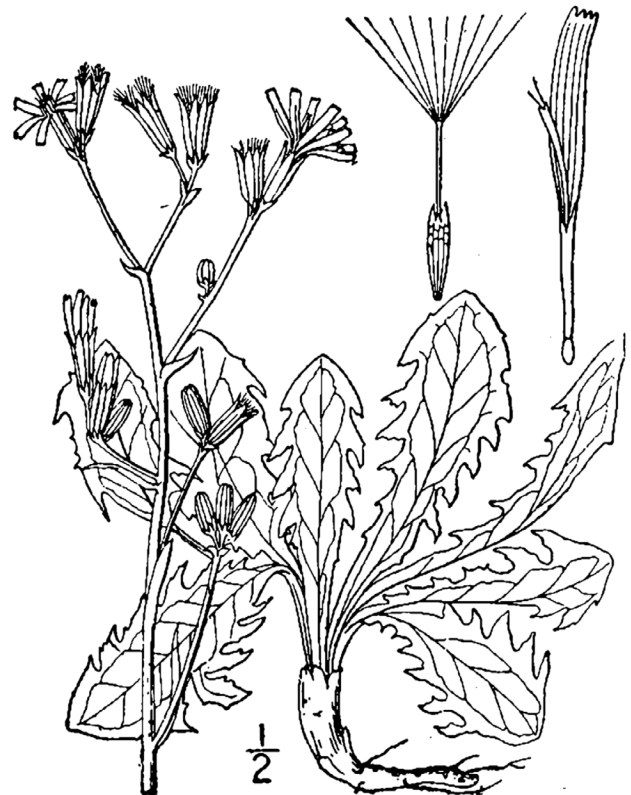
Britton, N.L., and A. Brown, 1913

### Ragwort



Britton, N.L., and A. Brown, 1913

### Rush Skeletonplant



Britton, N.L., and A. Brown, 1913

### Sagewort (cudweed)



Britton, N.L., and A. Brown, 1913

### Sagewort (fringed)



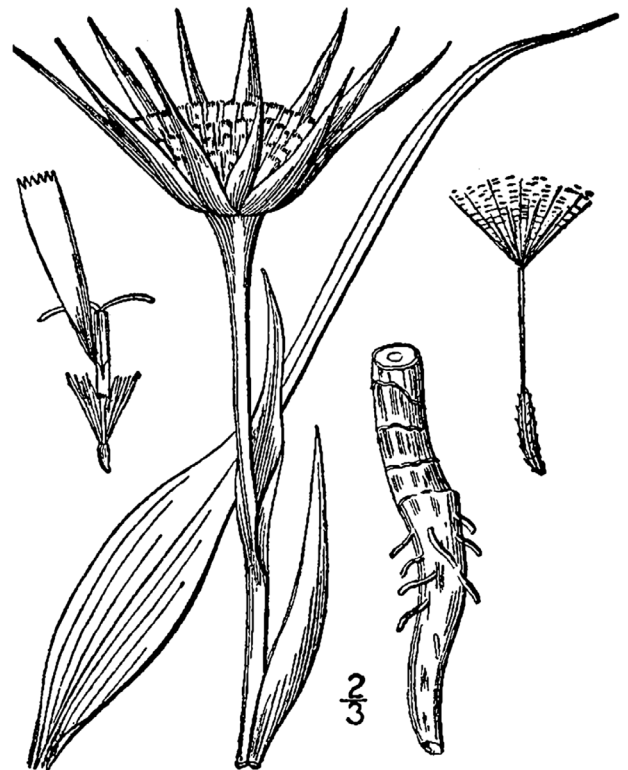
Britton, N.L., and A. Brown, 1913

### Sagewort (green)



Britton, N.L., and A. Brown, 1913

### Salsify



Britton, N.L., and A. Brown, 1913

**Scarlet Gaura**



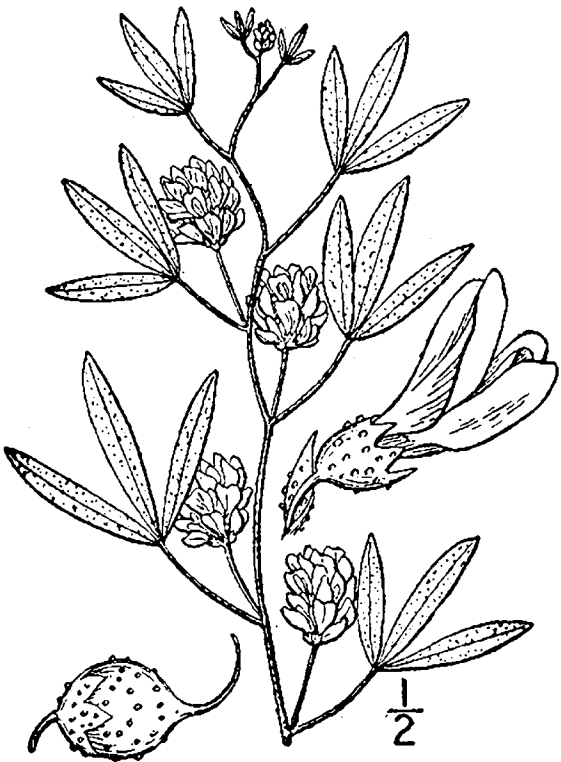
Britton, N.L., and A. Brown, 1913

**Scarlet Globemallow**



Britton, N.L., and A. Brown, 1913

**Scurfpea (lemon)**



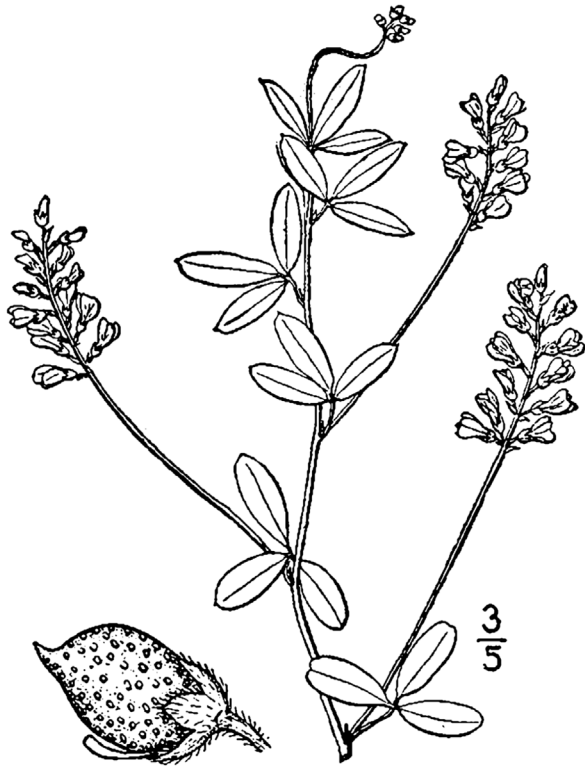
Britton, N.L., and A. Brown, 1913

**Scurfpea (sliver)**



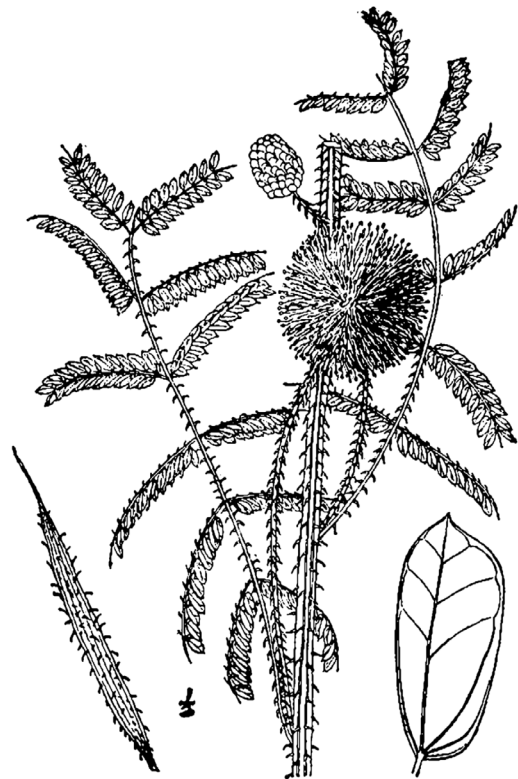
Britton, N.L., and A. Brown, 1913

### Scurfpea (slimflower)



Britton, N.L., and A. Brown, 1913

### Sensitive Briar



Britton, N.L., and A. Brown, 1913

### Spiderwort



Britton, N.L., and A. Brown, 1913

### Stiff Sunflower



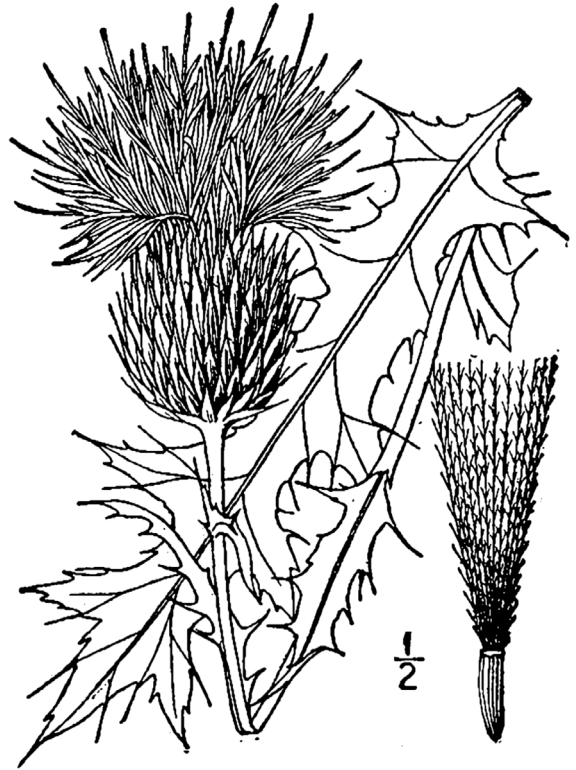
Britton, N.L., and A. Brown, 1913

**Sweetclover**



Britton, N.L., and A. Brown, 1913

**Wavyleaf Thistle**



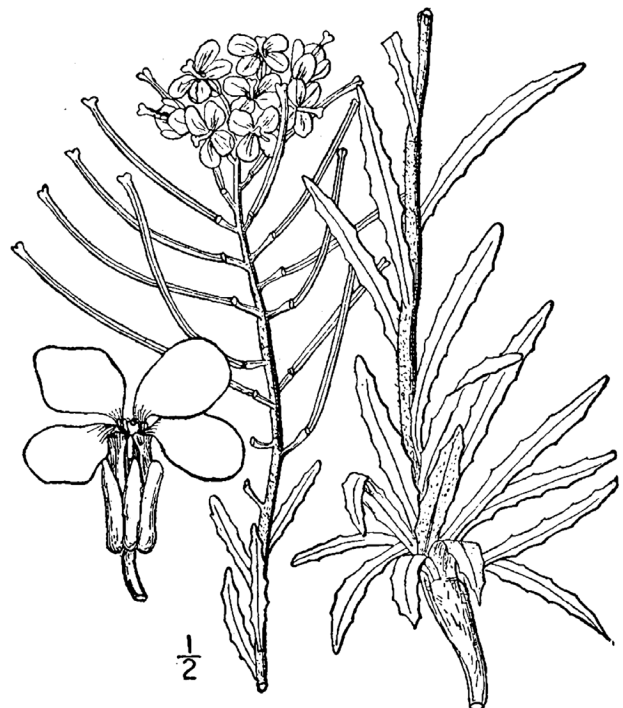
Britton, N.L., and A. Brown, 1913

**Western Ragweed**



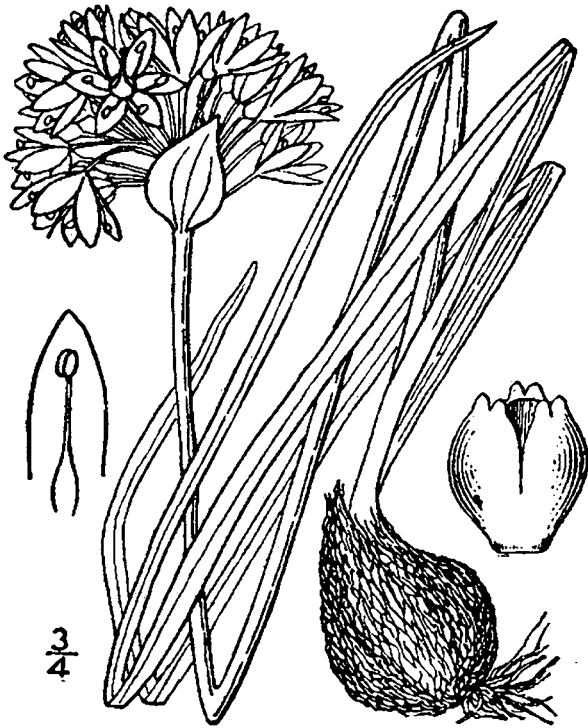
Britton, N.L., and A. Brown, 1913

**Western Wallflower**



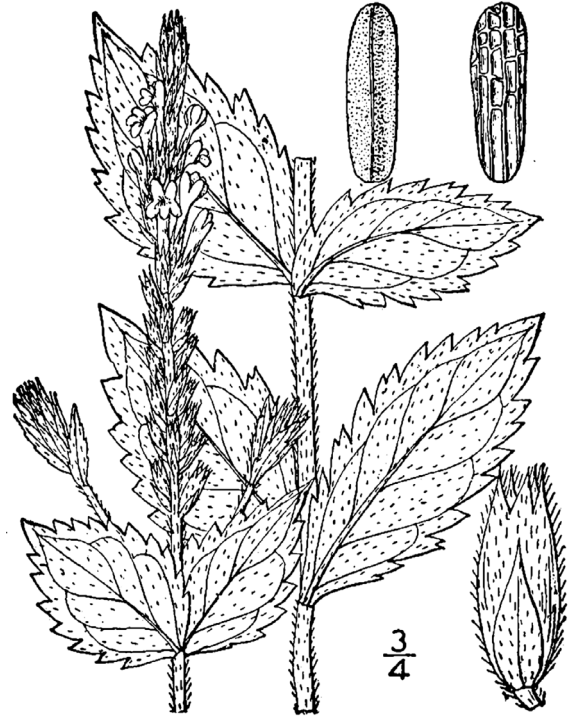
Britton, N.L., and A. Brown, 1913

### Wild Onion



Britton, N.L., and A. Brown, 1913

### Woolly Verbena



Britton, N.L., and A. Brown, 1913

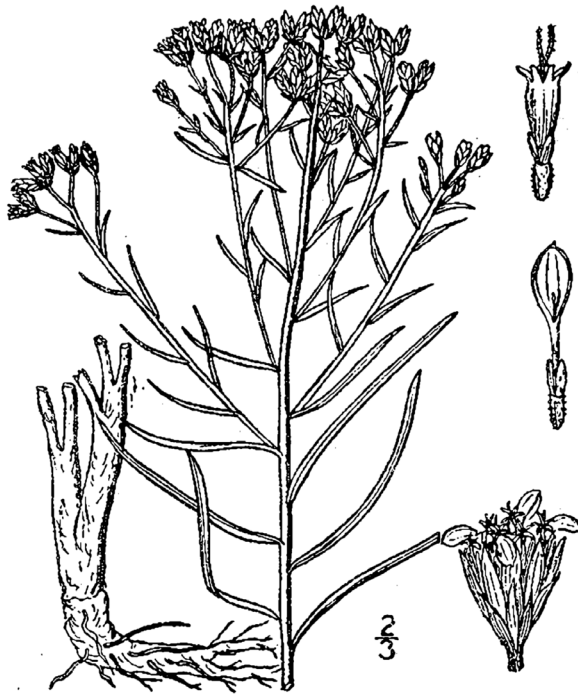
### Yucca



Britton, N.L., and A. Brown, 1913

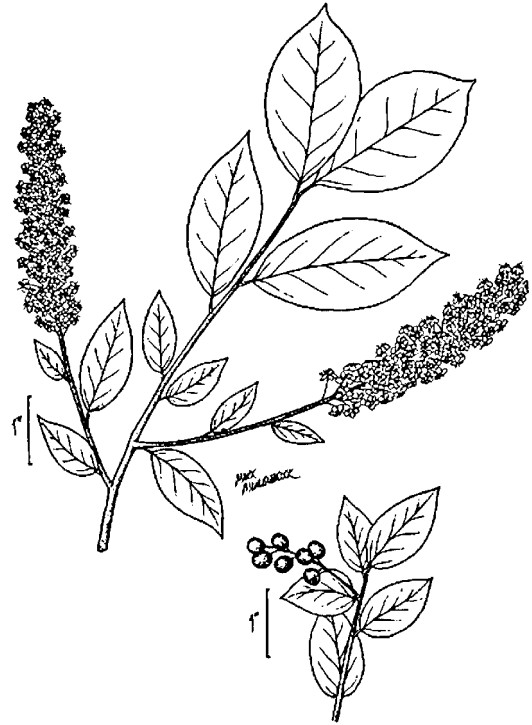
**Shrubs**

**Broom Snakeweed**



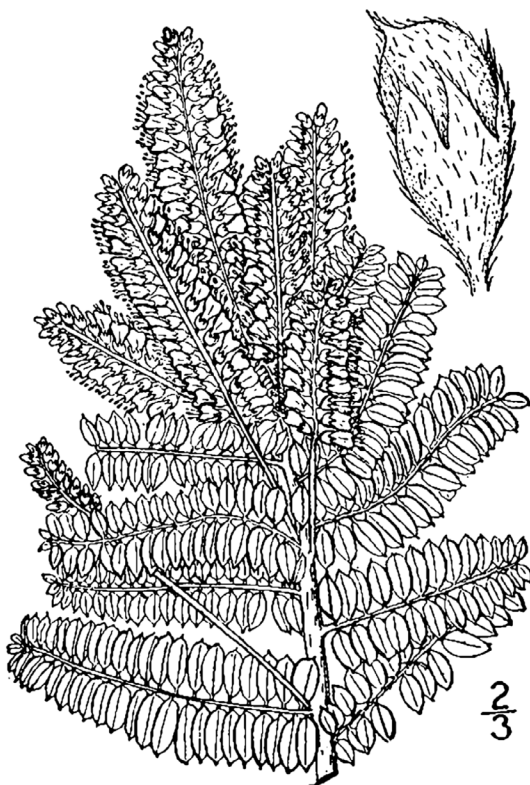
Britton, N.L., and A. Brown, 1913

**Chokecherry**



NRCS National Wetland Team

**Leadplant**



Britton, N.L., and A. Brown, 1913

**Poison Ivy**



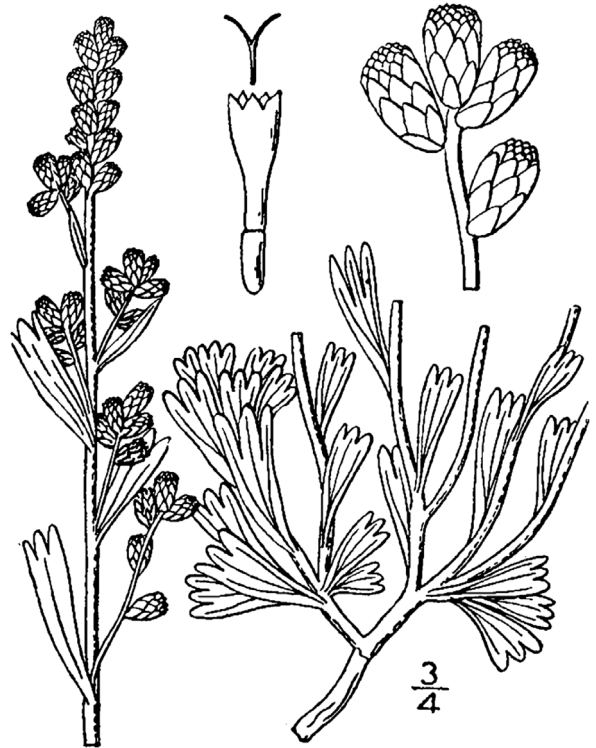
Britton, N.L., and A. Brown, 1913

**Rubber Rabbitbrush**



Britton, N.L., and A. Brown, 1913

**Sagebrush (big)**



Britton, N.L., and A. Brown, 1913

**Sagebrush (sliver)**



Britton, N.L., and A. Brown, 1913

**Saltbrush**



Britton, N.L., and A. Brown, 1913

### Sandcherry



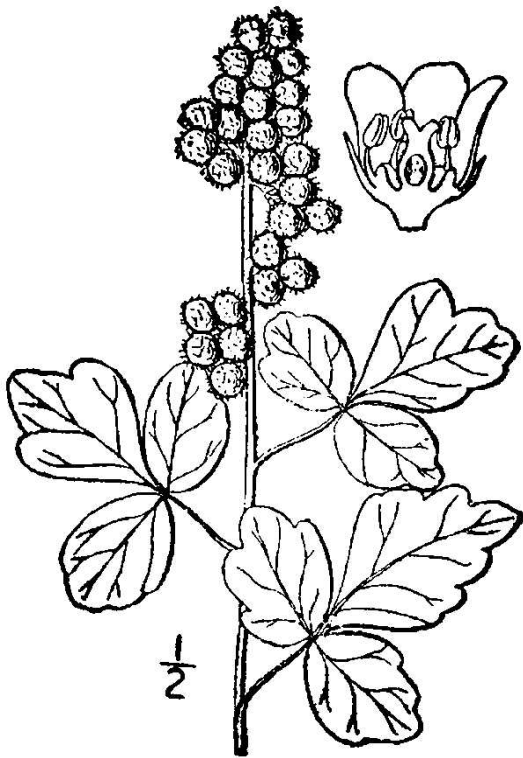
Britton, N.L., and A. Brown, 1913

### Sliver Buffaloberry



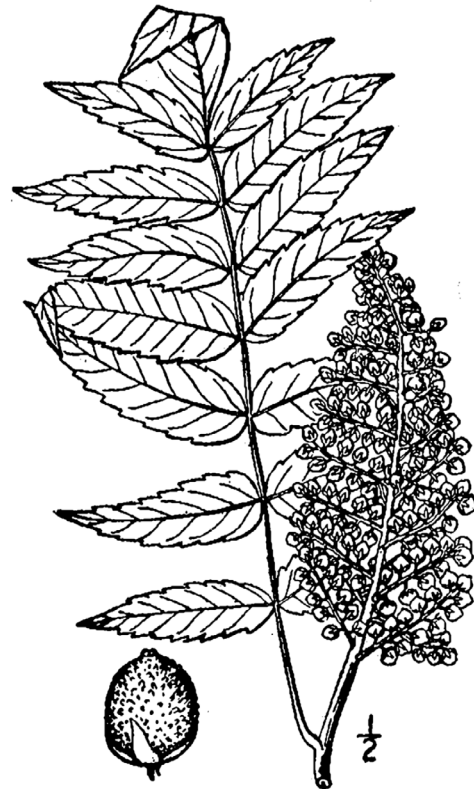
Britton, N.L., and A. Brown, 1913

### Skunkbrush



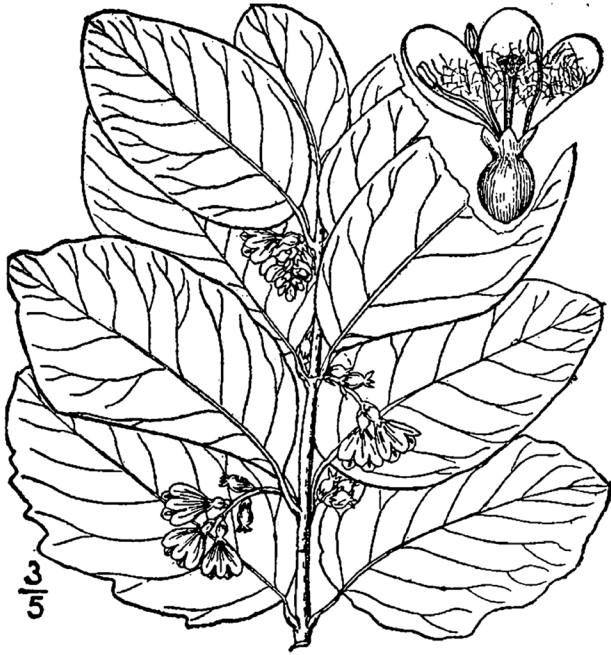
Britton, N.L., and A. Brown, 1913

### Smooth Sumac



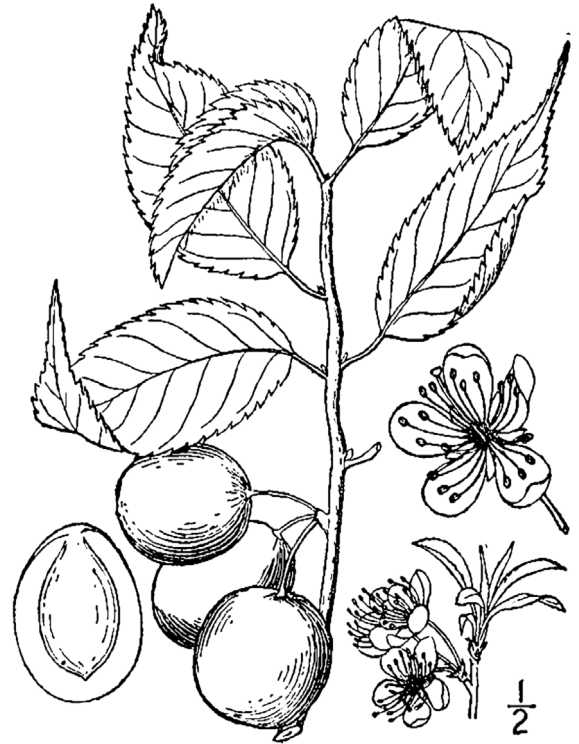
Britton, N.L., and A. Brown, 1913

### Western Snowberry



Britton, N.L., and A. Brown, 1913

### Wild Plum



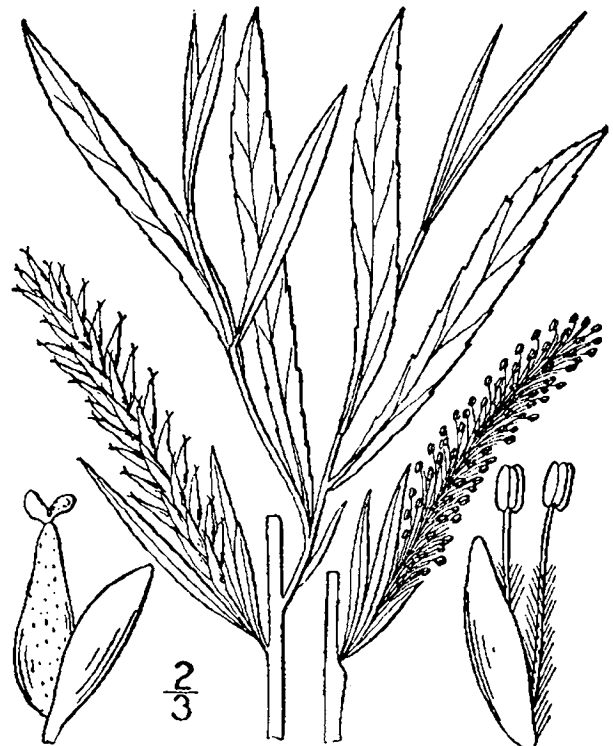
Britton, N.L., and A. Brown, 1913

### Wild Rose



Britton, N.L., and A. Brown, 1913

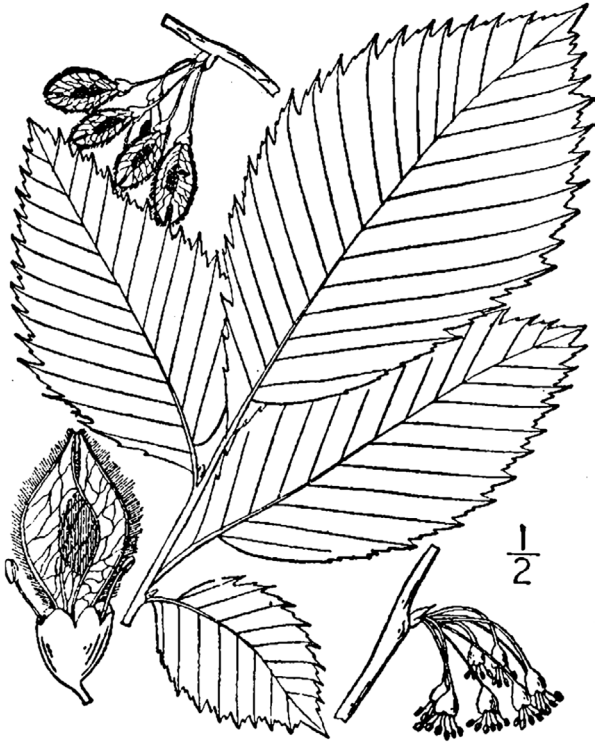
### Willow



Britton, N.L., and A. Brown, 1913

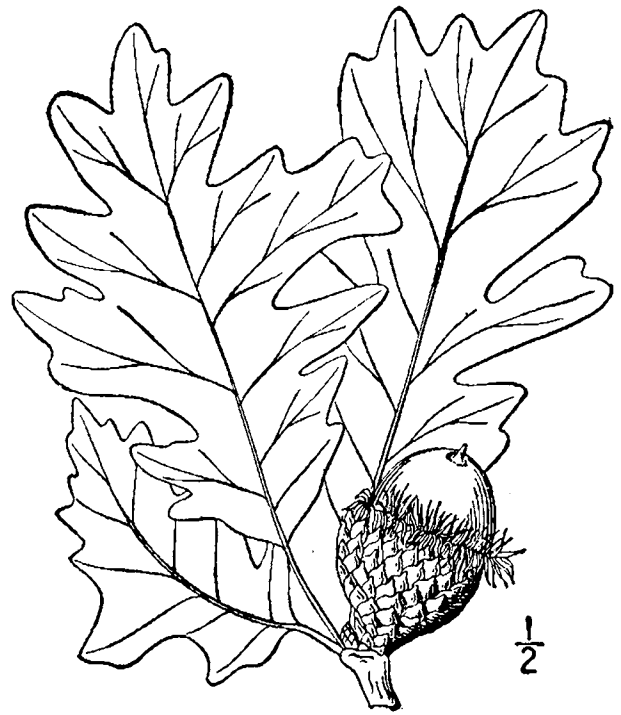
Trees

**American Elm**



Britton, N.L., and A. Brown, 1913

**Bur Oak**



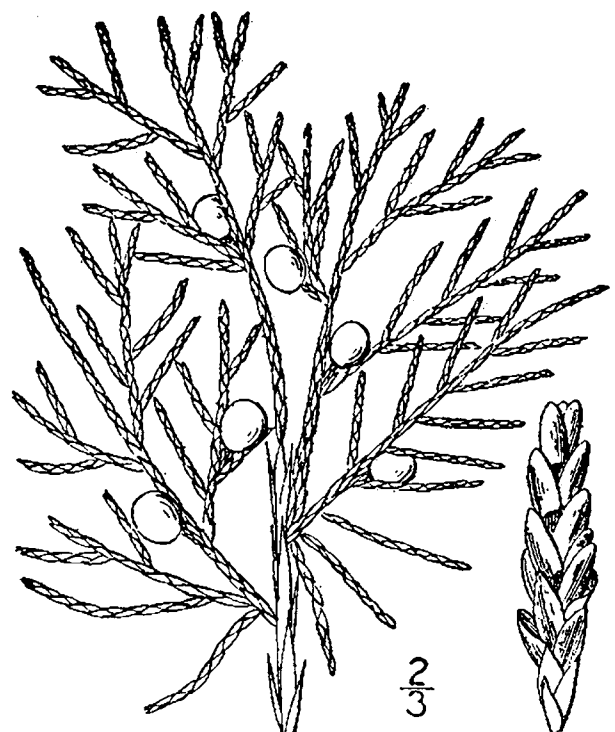
Britton, N.L., and A. Brown, 1913

**Green Ash**



Britton, N.L., and A. Brown, 1913

**Juniper or Cedar**



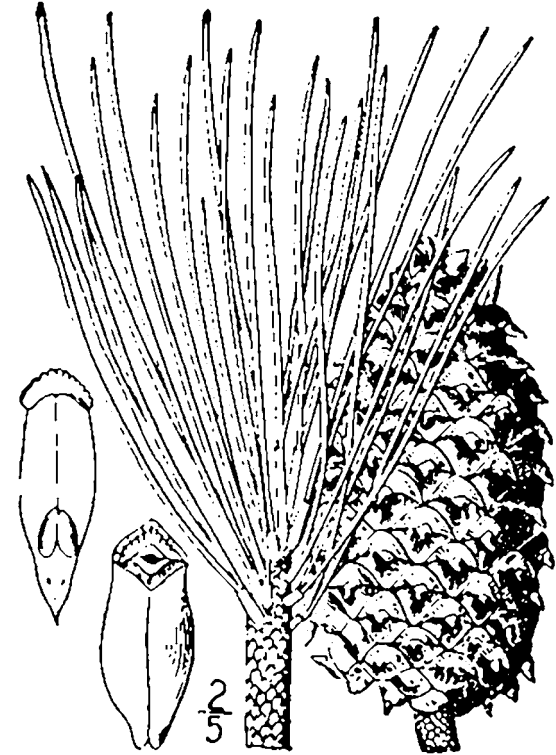
Britton, N.L., and A. Brown, 1913

**Plains Cottonwood**



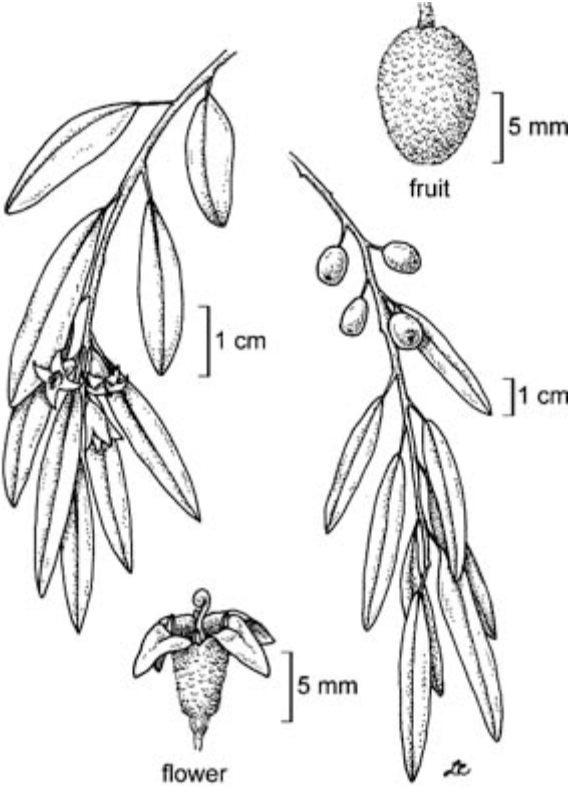
Britton, N.L., and A. Brown, 1913

**Ponderosa Pine**



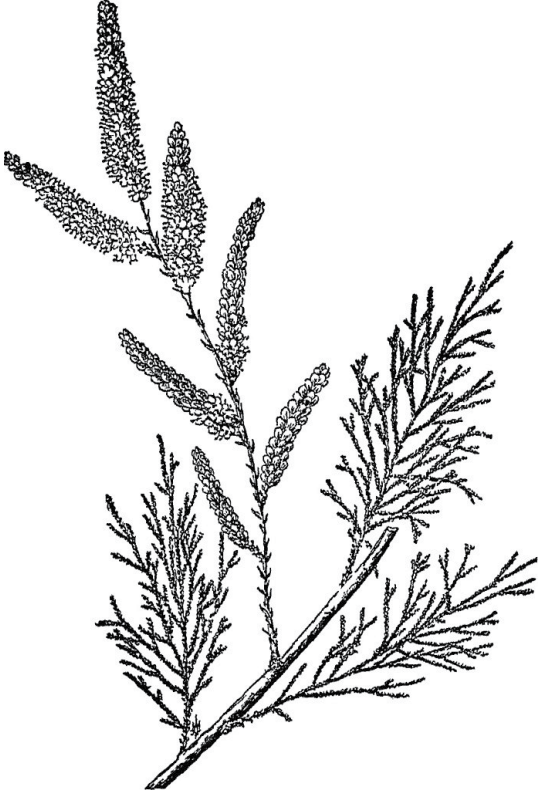
Britton, N.L., and A. Brown, 1913

**Russian Olive**



University of California

**Saltcedar**



Femow, B.E., 1910

# Management Scenario

Station # \_\_\_\_\_

\_\_\_\_\_ cow/calf pairs

\_\_\_\_\_ yearlings

\_\_\_\_\_ bulls

\_\_\_\_\_ months of grazing

\_\_\_\_\_ acres of pasture

\_\_\_\_\_ lbs/ac Annual Production

\_\_\_\_\_ miles to nearest water

\_\_\_\_\_ miles to nearest cropland

\_\_\_\_\_ litter depth

BEEF GOAL \_\_\_\_\_

GROUSE GOAL \_\_\_\_\_

Slope stakes are \_\_\_\_\_ feet apart





## SOUTH DAKOTA RANGELAND JUDGING SCORECARD

### Resource Inventory, Present Conditions

Part I	Ecological Sites	Station No.	
		1	2
15 pts.	Subirrigated		
	Overflow		
	Sands		
	Sandy		
	Loamy		
	Clayey		
	Dense Clay		
	Thin Upland		
	Shallow		
	Claypan		

Part II	Similarity Index	Station No.	
		1	2
10 pts	76-100% Potential		
	51-75% potential		
	26-50% potential		
	0-25% potential		

Part III	Beef Cattle Carrying Capacity	Station No.	
		1	2
10 pts	Capacity is Too Small		
	Capacity is Exactly Right		
	Capacity is Larger Than Needed		

Part IV	Beef Cattle Habitat Inventory	Station No.	
		1	2
10 pts	Excellent Value (31-40)		
	Good Value (21-30)		
	Fair Value (11-20)		
	Poor value (<11)		
<b>Beef Cattle Limiting Factors</b>			
3 pts each	Forage Factor is Limiting		
	Distribution Factor is Limiting		
	Rangeland Health Factor is Limiting		

Part V	Prairie Grouse Habitat Inventory	Station No.	
		1	2
10 pts	Excellent Value (31-40)		
	Good Value (21-30)		
	Fair Value (11-20)		
	Poor value (<11)		
<b>Prairie Grouse Limiting Factors</b>			
3 pts each	Winter Components Are Limiting		
	Nesting Cover is Limiting		
	Brood Food is Limiting		
	Brood Habitat is Limiting		
	Invasive Species		

Contestant Name \_\_\_\_\_

Contestant Number \_\_\_\_\_

County or School \_\_\_\_\_

Team Number or Name \_\_\_\_\_

Score: Station 1 \_\_\_\_\_/118

Station 2 \_\_\_\_\_/118

Total: \_\_\_\_\_/236

Part VI	Needed Management Practices	Station No.	
		1	2
3 pts each	1. Apply Invader Plant Control for Integrity of the Site		
	2. Continue Present Management for Beef		
	3. Apply Woody Plant Control for Beef Cattle		
	4. Develop Water for Beef Cattle		
	5. Begin a Planned Grazing System		
	6. Change Livestock Numbers or Duration of Grazing Period		
	7. Change the Kind of Grazing/ Browsing Animal		
	8. Continue Present Management for Prairie Grouse		
	9. Improve Winter Food or Cover for Prairie Grouse		
	10. Improve Nesting Cover Quality for Prairie Grouse		
	11. Improve Nesting Cover Height for Prairie Grouse		
	12. Improve Brood Food for Prairie Grouse Chicks		
	13. Improve Brood Habitat		

## SOUTH DAKOTA RANGELAND JUDGING SCORECARD

### Resource Inventory, Present Conditions

Part I	Ecological Sites	Station No. 1
15 pts.	Subirrigated	
	Overflow	
	Sands	
	Sandy	
	Loamy	
	Clayey	
	Dense Clay	
	Thin Upland	
	Shallow	
	Claypan	

Part II	Similarity Index	Station No. 1
10 pts	76-100% Potential	
	51-75% potential	
	26-50% potential	
	0-25% potential	

Part III	Beef Cattle Carrying Capacity	Station No. 1
10 pts	Capacity is Too Small	
	Capacity is Exactly Right	
	Capacity is Larger Than Needed	

Part IV	Beef Cattle Habitat Inventory	Station No. 1
10 pts	Excellent Value (31-40)	
	Good Value (21-30)	
	Fair Value (11-20)	
	Poor value (<11)	
<b>Beef Cattle Limiting Factors</b>		
3 pts each	Forage Factor is Limiting	
	Distribution Factor is Limiting	
	Rangeland Health Factor is Limiting	

Part V	Prairie Grouse Habitat Inventory	Station No. 1
10 pts	Excellent Value (31-40)	
	Good Value (21-30)	
	Fair Value (11-20)	
	Poor value (<11)	
<b>Prairie Grouse Limiting Factors</b>		
3 pts each	Winter Components Are Limiting	
	Nesting Cover is Limiting	
	Brood Food is Limiting	
	Brood Habitat is Limiting	
	Invasive Species	

Contestant Name \_\_\_\_\_

Contestant Number \_\_\_\_\_

County or School \_\_\_\_\_

Team Number or Name \_\_\_\_\_

Score: Station 1 \_\_\_\_\_/118

Total: \_\_\_\_\_/118

Part VI	Needed Management Practices	Station No. 1
3 pts each	1. Apply Invader Plant Control for Integrity of the Site	
	2. Continue Present Management for Beef	
	3. Apply Woody Plant Control for Beef Cattle	
	4. Develop Water for Beef Cattle	
	5. Begin a Planned Grazing System	
	6. Change Livestock Numbers or Duration of Grazing Period	
	7. Change the Kind of Grazing/Browsing Animal	
	8. Continue Present Management for Prairie Grouse	
	9. Improve Winter Food or Cover for Prairie Grouse	
	10. Improve Nesting Cover Quality for Prairie Grouse	
	11. Improve Nesting Cover Height for Prairie Grouse	
	12. Improve Brood Food for Prairie Grouse Chicks	
	13. Improve Brood Habitat	

\_\_\_\_\_/79

\_\_\_\_\_/39

## SOUTH DAKOTA RANGELAND JUDGING SCORECARD

### Resource Inventory, Present Conditions

Part I	Ecological Sites	Station No. 2
15 pts.	Subirrigated	
	Overflow	
	Sands	
	Sandy	
	Loamy	
	Clayey	
	Dense Clay	
	Thin Upland	
	Shallow	
	Claypan	

Part II	Similarity Index	Station No. 2
10 pts	76-100% Potential	
	51-75% potential	
	26-50% potential	
	0-25% potential	

Part III	Beef Cattle Carrying Capacity	Station No. 2
10 pts	Capacity is Too Small	
	Capacity is Exactly Right	
	Capacity is Larger Than Needed	

Part IV	Beef Cattle Habitat Inventory	Station No. 2
10 pts	Excellent Value (31-40)	
	Good Value (21-30)	
	Fair Value (11-20)	
	Poor value (<11)	
<b>Beef Cattle Limiting Factors</b>		
3 pts each	Forage Factor is Limiting	
	Distribution Factor is Limiting	
	Rangeland Health Factor is Limiting	

Part V	Prairie Grouse Habitat Inventory	Station No. 2
10 pts	Excellent Value (31-40)	
	Good Value (21-30)	
	Fair Value (11-20)	
	Poor value (<11)	
<b>Prairie Grouse Limiting Factors</b>		
3 pts each	Winter Components Are Limiting	
	Nesting Cover is Limiting	
	Brood Food is Limiting	
	Brood Habitat is Limiting	
	Invasive Species	

Contestant Name \_\_\_\_\_

Contestant Number \_\_\_\_\_

County or School \_\_\_\_\_

Team Number or Name \_\_\_\_\_

Score: Station 2 \_\_\_\_\_/118

Total: \_\_\_\_\_/118

Part VI	Needed Management Practices	Station No. 2
3 pts each	1. Apply Invader Plant Control for Integrity of the Site	
	2. Continue Present Management for Beef	
	3. Apply Woody Plant Control for Beef Cattle	
	4. Develop Water for Beef Cattle	
	5. Begin a Planned Grazing System	
	6. Change Livestock Numbers or Duration of Grazing Period	
	7. Change the Kind of Grazing/Browsing Animal	
	8. Continue Present Management for Prairie Grouse	
	9. Improve Winter Food or Cover for Prairie Grouse	
	10. Improve Nesting Cover Quality for Prairie Grouse	
	11. Improve Nesting Cover Height for Prairie Grouse	
	12. Improve Brood Food for Prairie Grouse Chicks	
	13. Improve Brood Habitat	

\_\_\_\_\_/79

\_\_\_\_\_/39

Contestant Name \_\_\_\_\_ Contestant Number \_\_\_\_\_ School/County \_\_\_\_\_

Score: \_\_\_\_\_/400

**Grasses and Grasslike (Mid and Tall)**

1. big or sand bluestem
2. Canada wildrye
3. crested wheatgrass
4. green needlegrass
5. green or yellow foxtail
6. Indiangrass
7. little bluestem
8. needleandthread
9. plains muhly
10. porcupinegrass
11. prairie cordgrass
12. prairie dropseed
13. prairie junegrass
14. prairie sandreed
15. reed canarygrass
16. quackgrass
17. reed canarygrass
18. sand or tall dropseed
19. sideoats grama
20. smooth brome
21. switchgrass
22. threeawan
23. western wheatgrass

**Grasses and Grasslikes (short)**

24. annual brome
25. blue or hairy grama
26. bluegrass
27. buffalograss
28. foxtail barley
29. inland saltgrass
30. scribner's panicgrass
31. sedge
32. witchgrass

**Forbs**

33. absinth wormwood
34. alfalfa
35. American licorice
36. American vetch
37. annual sunflower
38. breadroot scurfpea
39. Canada thistle
40. clover
41. cocklebur
42. common mullein
43. common yarrow
44. crazyweed
45. curlycup gumweed
46. daisy fleabane
47. deathcamus
48. deervetch
49. false boneset
50. false gromwell
51. field bindweed
52. field pennycress
53. gayfeather
54. goldenrod

55. hairy goldaster
56. heath aster
57. horseweed
58. leafy spurge
59. Maximilian sunflower
60. milkvetch
61. milkweed
62. pasqueflower
63. penstemon
64. phlox
65. poison hemlock
66. prairie clover
67. prairie coneflower
68. prickly pear
69. purple coneflower
70. ragwort
71. rush skeletonplant
72. sagewort
73. salsify
74. scarlet gaura
75. scarlet globemallow
76. scurfpea
77. sensitive briar
78. spiderwort
79. stiff sunflower
80. sweetclover
81. wavyleaf thistle
82. western ragweed
83. western wallflower
84. wild onion
85. woolly verbena
86. yellow evening primrose
87. yucca

**Shrubs**

88. broom snakeweed
89. chokecherry
90. leadplant
91. poison ivy
92. rubber rabbitbrush
93. sagebrush
94. saltbush
95. sandcherry
96. silver buffaloberry
97. skunkbrush
98. smooth sumac
99. western snowberry
100. wild plum
101. wild rose
102. willow

**Trees**

103. American elm
104. Black Hills spruce
105. bur oak
106. green ash
107. juniper or cedar
108. plains cottonwood
109. ponderosa pine
110. Russian olive
111. saltcedar

Flag #	Plant #	PLANT CHARACTERISTICS								Prairie Grouse		Cattle		
		Life Span			Growth Season		Origin			Food		Food		
		Perennial	Biennial	Annual	Cool Season	Warm Season	Native	Introduced	Invader	De	Un	De	Un	
1														
2														
3														
4														
5														
6														
7														
8														
9														
10														
11														
12														
13														
14														
15														
16														
17														
18														
19														
20														

ECOLOGICAL and RESOURCE RATING: Desirable = De; Undesirable = Un

SDSU Extension is an equal opportunity provider and employer in accordance with the nondiscrimination policies of South Dakota State University, the South Dakota Board of Regents and the United States Department of Agriculture.

Learn more at [extension.sdstate.edu](http://extension.sdstate.edu).

© 2026, South Dakota Board of Regents

**Part I & II MLRA 53B - CENTRAL DARK BROWN GLACIATED PLAINS (Page 1)**

<b>Subirrigated Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
big bluestem	45		
switchgrass	20		
Indiangrass	15		
little bluestem	10		
needlegrasses	10		
western/slender wheatgrass	10		
prairie cordgrass	5		
other native grasses/sedges	5		
invader tall grasses	0		
<b>Short Height</b>			
sedges	5		
rushes & other grass-likes	5		
other native short grasses	0		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	10		
invader shrubs	0		
<b>Trees:</b>			
native trees	5		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Overflow Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
big bluestem	30		
needlegrasses	15		
western wheatgrass	10		
switchgrass	10		
sideoats grama	5		
Indiangrass	5		
other native grasses/sedges	10		
invader tall grasses	0		
<b>Short Height</b>			
blue grama	5		
sedges	5		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	10		
invader shrubs	0		
<b>Trees:</b>			
native trees	5		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Sandy Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
prairie sandreed	20		
needlegrasses	20		
big or sand bluestem	10		
western wheatgrass	10		
little bluestem	5		
sideoats grama	5		
other native tall grasses	5		
invader tall grasses	0		
<b>Short Height</b>			
blue or hairy grama	10		
sedges	7		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Loamy Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
needlegrasses	30		
western/slender wheatgrass	20		
big bluestem	10		
sideoats grama	10		
little bluestem	5		
other native tall grasses	10		
invader tall grasses	0		
<b>Short Height</b>			
blue grama	10		
sedges	5		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

Rev. 5/30/08

**Part I & II MLRA 53B - CENTRAL DARK BROWN GLACIATED PLAINS (Page 2)**

<b>Clayey Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
western wheatgrass	35		
needlegrasses	25		
sideoats grama	5		
big bluestem	5		
plains muhly	5		
other native tall grasses	10		
invader tall grasses	0		
<b>Short Height</b>			
blue grama	10		
buffalograss	5		
native short grasses/sedges	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	5		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Thin Upland Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
little bluestem	30		
needlegrasses	20		
sideoats grama	10		
plains muhly	10		
western wheatgrass	5		
other native tall grasses	15		
invader tall grasses	0		
<b>Short Height</b>			
blue or hairy grama	5		
sedges	8		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Shallow Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
needlegrasses	20		
sideoats grama	15		
little bluestem	15		
big bluestem	15		
prairie sandreed	10		
western wheatgrass	10		
plains muhly	8		
other native tall grasses	5		
invader tall grasses	0		
<b>Short Height</b>			
blue or hairy grama	10		
sedges	8		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Claypan Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
western wheatgrass	30		
needlegrasses	18		
other native tall grasses	5		
invader tall grasses	0		
<b>Short Height</b>			
blue grama	15		
buffalograss	5		
native short grasses/sedges	15		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

Rev. 5/30/08

Sands Ecological Site			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses and Grasslike:</b>			
<b>Tall and Mid Height</b>			
prairie sandreed	30		
sand bluestem	15		
needlegrasses	15		
little bluestem	10		
western wheatgrass	5		
switchgrass	5		
other native tall grasses	5		
invader tall grasses	0		
<b>Short Height</b>			
blue grama	5		
native short grasses/sedge	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	15		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	8		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

Part III CARRYING CAPACITY TABLE	BROWN GLACIATED PLAINS, MLRA 53B, SOUTH DAKOTA				LIVESTOCK FOR CENTRAL DARK
	SIMILARITY INDEX (%)				
	76-100	51-75	26-50	0-25	
<b>Ecological Site:</b>	<b>Carrying Capacity Expressed As Animal Unit Months Per Acre (AUM's/Ac):</b>				
Subirrigated	1.4	1.2	0.9	0.7	
Overflow	1.0	0.8	0.6	0.45	
Loamy, Clayey, Sandy, Sands	0.65	0.5	0.4	0.3	
Thin Upland, Shallow, Claypan	0.5	0.4	0.3	0.2	

Rev. 5/30/08

**NOTE:** Use higher AUM/Ac value when site contains large quantities of any (alone or in combination) of these invader plants that are desirable forage: crested wheatgrass, intermediate wheatgrass, quackgrass, smooth bromegrass, bluegrass, alfalfa, and/or sweetclover.

Composition of Listed Plants
21% - 40%
41% - 60%
61% or greater

AUM/Ac Change
next higher rate
2nd higher rate
3rd higher rate

<b>Part IV RANGELAND HEALTH REFERENCE VALUES TABLE FOR CENTRAL DARK BROWN GLACIATED PLAINS, MLRA 53B, SOUTH DAKOTA</b>			
	Average Annual Production (lbs/acre)	Bareground %	Litter Depth
<b>Ecological Site:</b>	<b>Reference Values</b>		
Subirrigated	5,000	< 5%	0.5 - 1.0 inches
Overflow	3,500	< 5%	0.25 - 0.75 inches
Loamy, Clayey, Sandy, Sands	2,400	< 5%	0.25 - 0.5 inches
Thin Upland, Shallow, Claypan	1,700	< 10%	0.25 inches

Rev. 12/28/2021

The above are values for each ecological site grouping for the Reference State (when similarity index is greater than 76%). These values represent the range of variability acceptable to promote rangeland and soil health. Current site conditions should be compared to these reference values in order to determine if management is needed to improve the resource value ratings.

**Part I & II MLRA 53C - SOUTHERN DARK BROWN GLACIATED PLAINS (Page 1)**

<b>Subirrigated Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
big bluestem	45		
switchgrass	20		
Indiangrass	20		
needlegrasses	10		
little bluestem	10		
western/slender wheatgrass	10		
prairie cordgrass	5		
other native grasses/sedges	15		
invader tall grasses	0		
<b>Short Height</b>			
sedges	15		
rushes & other grass-likes	10		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

Rev. 12/28/21

<b>Overflow Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
big bluestem	45		
green needlegrass	25		
western wheatgrass	15		
switchgrass	15		
porcupine grass	10		
little bluestem	10		
other native grasses/sedges	15		
invader tall grasses	0		
<b>Short Height</b>			
sedges	10		
rushes and other grass-likes	5		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	10		
invader shrubs	0		
<b>Trees:</b>			
native trees	5		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

Rev. 12/28/21

<b>Sandy Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
big or sand bluestem	25		
prairie sandreed	25		
little bluestem	20		
needlegrasses	20		
western wheatgrass	10		
sideoats grama	10		
other native tall grasses	15		
invader tall grasses	0		
<b>Short Height</b>			
blue or hairy grama	10		
sedges	5		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

Rev. 12/28/2021

<b>Loamy Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
needlegrasses	30		
western wheatgrass	30		
big bluestem	20		
little bluestem	15		
sideoats grama	15		
other native tall grasses	15		
invader tall grasses	0		
<b>Short Height</b>			
blue grama	5		
buffalograss	5		
sedges	5		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

Rev. 12/28/21

**Part I & II MLRA 53C - SOUTHERN DARK BROWN GLACIATED PLAINS (Page 2)**

<b>Clayey Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<i>Tall and Mid Height</i>			
western wheatgrass	40		
needlegrasses	30		
big bluestem	20		
sideoats grama	15		
little bluestem	10		
other native tall grasses	10		
invader tall grasses	0		
<i>Short Height</i>			
blue grama	10		
buffalograss	5		
native grasses/sedges	10		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

Rev. 12/28/21

<b>Shallow Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<i>Tall and Mid Height</i>			
needlegrasses	25		
sideoats grama	15		
western wheatgrass	15		
little bluestem	15		
big bluestem	5		
prairie sandreed	5		
plains muhly	5		
other native tall grasses	5		
invader tall grasses	0		
<i>Short Height</i>			
blue or hairy grama	10		
sedges	10		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

Added 12/30/2025

<b>Thin Upland Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<i>Tall and Mid Height</i>			
little bluestem	35		
needlegrasses	20		
sideoats grama	20		
big bluestem	20		
western wheatgrass	10		
other native tall grasses	20		
invader tall grasses	0		
<i>Short Height</i>			
blue or hairy grama	10		
buffalograss	5		
sedges	5		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

Rev. 12/28/2021

<b>Dense Clay Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<i>Tall and Mid Height</i>			
western wheatgrass	60		
green needlegrass	35		
sideoats grama	10		
other native tall grasses	10		
invader tall grasses	0		
<i>Short Height</i>			
blue grama	10		
buffalograss	5		
other native grasses/sedges	10		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

Rev. 12/28/21

**Part I & II MLRA 53C - SOUTHERN DARK BROWN GLACIATED PLAINS (Page 3)**

<b>Claypan Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
western wheatgrass	40		
green needlegrass	30		
needleandthread	10		
prairie sandreed	10		
other native tall grasses	10		
invader tall grasses	0		
<b>Short Height</b>			
blue grama	15		
buffalograss	5		
sedges	10		
native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	10		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

Rev. 12/28/2021

<b>Sands Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
sand or big bluestem	30		
prairie sandreed	30		
little bluestem	20		
switchgrass	20		
needlegrasses	15		
sand dropseed	5		
other native tall grasses	15		
invader tall grasses	0		
<b>Short Height</b>			
blue or hairy grama	10		
sedges	5		
native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

Rev. 12/28/21

<b>Part III CARRYING CAPACITY TABLE</b>	<b>DARK BROWN GLACIATED PLAINS, MLRA 53C, SOUTH DAKOTA</b>	<b>LIVESTOCK FOR SOUTHERN</b>
---	--	-----------------------------------

Ecological Site:	SIMILARITY INDEX (%)			
	76-100	51-75	26-50	0-25
	<b>Carrying Capacity Expressed As Animal Unit Months Per Acre (AUM's/Ac):</b>			
Subirrigated	1.4	1.2	0.9	0.7
Overflow	1.0	0.8	0.6	0.5
Loamy, Clayey, Sandy, Sands	0.75	0.5	0.4	0.3
Dense Clay, Shallow, Thin Upland, Claypan	0.5	0.4	0.3	0.2

Rev. 12/30/25

**NOTE:** Use higher AUM/Ac value when site contains large quantities of any (alone or in combination) of these invader plants that are desirable forage: crested wheatgrass, intermediate wheatgrass, quackgrass, smooth bromegrass, bluegrass, alfalfa, and/or sweetclover.

Composition of  
Listed Plants  
21% - 40%  
41% - 60%  
61% or greater

AUM/Ac  
Change  
next higher rate  
2nd higher rate  
3rd higher rate

**Part IV  
RANGELAND HEALTH REFERENCE VALUES TABLE  
FOR SOUTHERN DARK BROWN GLACIATED PLAINS, MLRA 53C, SOUTH DAKOTA**

	<b>Average Annual Production (lbs/acre)</b>	<b>Bareground %</b>	<b>Litter Depth</b>
<b>Ecological Site:</b>	<b>Reference Values</b>		
Subirrigated	5,100	< 5%	0.5 - 1.0 inches
Overflow	3,500	< 5%	0.5 - 1.0 inches
Loamy, Clayey, Sandy, Sands	2,600	< 5%	0.25 - 0.5 inches
Dense Clay, Shallow, Thin Upland, Claypan	1,900	< 15%	0.25 - 0.5 inches

Rev. 12/30/2025

The above are values for each ecological site grouping for the Reference State (when similarity index is greater than 76%). These values represent the range of variability acceptable to promote rangeland and soil health. Current site conditions should be compared to these reference values in order to determine if management is needed to improve the resource value ratings.

**Part I & II MLRA 54 - ROLLING SOFT SHALE PLAIN (Page 1)**

<b>Subirrigated Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
big bluestem	45		
switchgrass	15		
needlegrasses	10		
prairie cordgrass	5		
little bluestem	5		
Indiangrass	5		
western wheatgrass	5		
other native grasses/sedges	10		
invader tall grasses	0		
<b>Short Height</b>			
sedges	5		
rushes & other grass-likes	5		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	10		
invader shrubs	0		
<b>Trees:</b>			
native trees	10		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Overflow Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
big bluestem	30		
needlegrasses	25		
western wheatgrass	15		
switchgrass	10		
sideoats grama	5		
Canada wildrye	5		
other native grasses/sedges	10		
invader tall grasses	0		
<b>Short Height</b>			
blue grama	5		
sedges	5		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	5		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Sandy Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
prairie sandreed	25		
big or sand bluestem	20		
needlegrasses	10		
little bluestem	5		
western wheatgrass	5		
other native tall grasses	10		
invader tall grasses	0		
<b>Short Height</b>			
blue or hairy grama	10		
sedges	10		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Loamy Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
western wheatgrass	30		
needlegrasses	30		
sideoats grama	5		
big bluestem	5		
other native tall grasses	10		
invader tall grasses	0		
<b>Short Height</b>			
blue grama	10		
sedges	5		
other native short grasses	10		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

Rev. 5/30/08

**Part I & II MLRA 54 - ROLLING SOFT SHALE PLAIN (Page 2)**

<b>Clayey Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<i>Tall and Mid Height</i>			
western wheatgrass	40		
needlegrasses	35		
sideoats grama	5		
big bluestem	5		
other native tall grasses	10		
invader tall grasses	0		
<i>Short Height</i>			
blue grama	10		
buffalograss	5		
native grasses/sedges	10		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	5		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Thin Upland Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<i>Tall and Mid Height</i>			
needlegrasses	25		
little bluestem	25		
western wheatgrass	15		
sideoats grama	15		
plains muhly	10		
other native tall grasses	10		
invader tall grasses	0		
<i>Short Height</i>			
blue grama	5		
sedges	5		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

Rev. 10/25/2022

<b>Shallow Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<i>Tall and Mid Height</i>			
needlegrasses	20		
little bluestem	20		
western wheatgrass	15		
plains muhly	15		
sideoats grama	10		
other native tall grasses	15		
invader tall grasses	0		
<i>Short Height</i>			
blue or hairy grama	5		
sedges	7		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Claypan Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<i>Tall and Mid Height</i>			
western wheatgrass	30		
needleandthread	15		
green needlegrass	10		
other native tall grasses	5		
invader tall grasses	0		
<i>Short Height</i>			
blue grama	15		
buffalograss	5		
native grasses/sedges	15		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

Rev. 5/30/08

**Part I & II MLRA 54 - ROLLING SOFT SHALE PLAIN (Page 3)**

<b>Sands Ecological Site</b>			
<b>Dominant Plants</b>	<b>Composition Maximums</b>	<b>Percent Observed</b>	<b>Percent Allowed</b>
<b>Grasses and Grasslike:</b>			
<b>Tall and Mid Height</b>			
big or sand bluestem	20		
prairie sandreed	20		
needlegrasses	15		
little bluestem	10		
other native tall grasses	10		
invader tall grasses	0		
<b>Short Height</b>			
blue grama	5		
native grasses/sedges	10		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Part III CARRYING CAPACITY TABLE</b>	<b>SHALE PLAIN, MLRA 54, SOUTH DAKOTA</b>				<b>LIVESTOCK FOR ROLLING SOFT</b>
	<b>SIMILARITY INDEX (%)</b>				
	76-100	51-75	26-50	0-25	
<b>Ecological Site:</b>	<b>Carrying Capacity Expressed As Animal Unit Months Per Acre (AUM's/Ac):</b>				
Subirrigated	1.1	0.9	0.7	0.5	
Overflow	0.9	0.75	0.6	0.4	
Loamy, Clayey, Sandy, Sands	0.6	0.5	0.4	0.3	
Thin Upland, Shallow, Claypan	0.4	0.37	0.27	0.19	

Rev. 12/29/21

**NOTE:** Use higher AUM/Ac value when site contains large quantities of any (alone or in combination) of these invader plants that are desirable forage: crested wheatgrass, intermediate wheatgrass, quackgrass, smooth bromegrass, bluegrass, alfalfa, and/or sweetclover.

Composition of Listed Plants
21% - 40%
41% - 60%
61% or greater

AUM/Ac Change
next higher rate
2nd higher rate
3rd higher rate

**Part IV  
RANGELAND HEALTH REFERENCE VALUES TABLE  
FOR ROLLING SOFT SHALE PLAIN, MLRA 54, SOUTH DAKOTA**

	<b>Average Annual Production (lbs/acre)</b>	<b>Bareground %</b>	<b>Litter Depth</b>
<b>Ecological Site:</b>	<b>Reference Values</b>		
Subirrigated	4,000	< 5%	0.5 - 1.0 inches
Overflow	3,200	< 5%	0.5 - 1.0 inches
Loamy, Clayey, Sandy, Sands	2,200	< 10%	0.25 - 0.5 inches
Thin Upland, Shallow, Claypan	1,500	< 15%	0.25 - 0.5 inches

Rev. 12/28/2021

The above are values for each ecological site grouping for the Reference State (when similarity index is greater than 76%). These values represent the range of variability acceptable to promote rangeland and soil health. Current site conditions should be compared to these reference values in order to determine if management is needed to improve the resource value ratings.

Subirrigated Ecological Site			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<i>Tall and Mid Height</i>			
big bluestem	40		
switchgrass	20		
Indiangrass	10		
western/slender wheatgrass	10		
northern reedgrass	10		
prairie cordgrass	5		
other native grasses/sedges	10		
invader tall grasses	0		
<i>Short Height</i>			
sedges	10		
rushes & other grass-likes	5		
other native short grasses	0		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	5		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		100%	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

Overflow Ecological Site			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<i>Tall and Mid Height</i>			
big bluestem	30		
needlegrasses	20		
switchgrass	10		
Indiangrass	10		
western/slender wheatgrass	10		
little bluestem	5		
other native grasses/sedges	10		
invader tall grasses	0		
<i>Short Height</i>			
sedges	5		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	10		
invader shrubs	0		
<b>Trees:</b>			
native trees	5		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		100%	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

Rev. 5/30/08

Sandy Ecological Site			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<i>Tall and Mid Height</i>			
prairie sandreed	25		
needlegrasses	20		
big or sand bluestem	20		
little bluestem	10		
sideoats grama	10		
western/slender wheatgrass	5		
other native tall grasses	10		
invader tall grasses	0		
<i>Short Height</i>			
blue or hairy grama	5		
sedges	10		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		100%	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

Rev. 12/28/21

Loamy Ecological Site			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<i>Tall and Mid Height</i>			
needlegrasses	30		
western/slender wheatgrass	20		
big bluestem	20		
sideoats grama	5		
little bluestem	5		
other native tall grasses	10		
invader tall grasses	0		
<i>Short Height</i>			
blue grama	5		
sedges	5		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		100%	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

Clayey Ecological Site			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<i>Tall and Mid Height</i>			
needlegrasses	40		
western wheatgrass	20		
slender wheatgrass	10		
big bluestem	10		
sideoats grama	10		
other native tall grasses	10		
invader tall grasses	0		
<i>Short Height</i>			
blue grama	5		
buffalograss	5		
native grasses/sedges	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		100%	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

Thin Upland Ecological Site			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<i>Tall and Mid Height</i>			
little bluestem	25		
needlegrasses	25		
big bluestem	10		
sideoats grama	10		
western wheatgrass	5		
other native tall grasses	15		
invader tall grasses	0		
<i>Short Height</i>			
blue or hairy grama	5		
sedges	5		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		100%	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

Shallow Ecological Site			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<i>Tall and Mid Height</i>			
needlegrasses	20		
sideoats grama	15		
little bluestem	15		
big bluestem	15		
prairie sandreed	10		
western wheatgrass	10		
plains muhly	5		
other native tall grasses	5		
invader tall grasses	0		
<i>Short Height</i>			
blue or hairy grama	10		
sedges	8		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		100%	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

Claypan Ecological Site			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<i>Tall and Mid Height</i>			
western wheatgrass	30		
needlegrasses	30		
other native tall grasses	5		
invader tall grasses	0		
<i>Short Height</i>			
blue grama	15		
buffalograss	5		
native grasses/sedges	15		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		100%	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

Rev. 5/30/08

Rev. 12/28/21

Sands Ecological Site			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses and Grasslike:</b>			
<i>Tall and Mid Height</i>			
needlegrasses	30		
prairie sandreed	25		
big or sand bluestem	15		
little bluestem	5		
western wheatgrass	5		
switchgrass	5		
other native tall grasses	10		
invader tall grasses	0		
<i>Short Height</i>			
blue grama	5		
native grasses/sedge	10		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

Part III CARRYING CAPACITY TABLE	LIVESTOCK FOR CENTRAL BLACK GLACIATED PLAINS, MLRA 55B & GLACIAL LAKE DAKOTA, MLRA 55D, SOUTH DAKOTA			
	SIMILARITY INDEX (%)			
	76-100	51-75	26-50	0-25
<b>Ecological Site:</b>	<b>Carrying Capacity Expressed As Animal Unit Months Per Acre (AUM's/Ac):</b>			
Subirrigated	1.3	1.2	0.9	0.7
Overflow	1.0	0.8	0.6	0.5
Loamy, Clayey, Sandy, Sands	0.7	0.5	0.4	0.3
Thin Upland, Shallow, Claypan	0.5	0.4	0.3	0.2

Rev. 12/28/21

**NOTE:** Use higher AUM/Ac value when site contains large quantities of any (alone or in combination) of these invader plants that are desirable forage: crested wheatgrass, intermediate wheatgrass, quackgrass, smooth bromegrass, bluegrass, alfalfa, and/or sweetclover.

Composition of Listed Plants
21% - 40%
41% - 60%
61% or greater

AUM/Ac Change
next higher rate
2nd higher rate
3rd higher rate

<b>Part IV RANGELAND HEALTH REFERENCE VALUES TABLE FOR CENTRAL BLACK GLACIATED PLAINS, MLRA 55B &amp; GLACIAL LAKE DAKOTA, MLRA 55D, SOUTH DAKOTA</b>			
	<b>Average Annual Production (lbs/acre)</b>	<b>Bareground %</b>	<b>Litter Depth</b>
<b>Ecological Site:</b>	<b>Reference Values</b>		
Subirrigated	4,700	< 5%	0.5 - 1.0 inches
Overflow	3,800	< 5%	0.25 - 0.5 inches
Loamy, Clayey, Sandy, Sands	2,600	< 5%	0.25 - 0.5 inches
Thin Upland, Shallow, Claypan	2,000	< 10%	0.25 - 0.5 inches

Rev. 12/28/2021

The above are values for each ecological site grouping for the Reference State (when similarity index is greater than 76%). These values represent the range of variability acceptable to promote rangeland and soil health. Current site conditions should be compared to these reference values in order to determine if management is needed to improve the resource value ratings.

**Part I & II MLRA 55C - SOUTHERN BLACK GLACIATED PLAINS (Page 1)**

<b>Subirrigated Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
big bluestem	40		
switchgrass	20		
Indiangrass	10		
slender wheatgrass	10		
northern reedgrass	10		
prairie cordgrass	5		
other native grasses/sedges	10		
invader tall grasses	0		
<b>Short Height</b>			
sedges	10		
rushes & other grass-likes	5		
other native short grasses	0		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	5		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Overflow Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
big bluestem	40		
needlegrasses	20		
switchgrass	15		
western/slender wheatgrass	15		
Indiangrass	10		
little bluestem	10		
other native grasses/sedges	10		
invader tall grasses	0		
<b>Short Height</b>			
sedges	10		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	10		
invader shrubs	0		
<b>Trees:</b>			
native trees	5		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Sandy Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
prairie sandreed	20		
needlegrasses	20		
big or sand bluestem	15		
little bluestem	10		
sideoats grama	10		
western/slender wheatgrass	5		
other native tall grasses	10		
invader tall grasses	0		
<b>Short Height</b>			
blue or hairy grama	5		
sedges	10		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Loamy Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
needlegrasses	30		
western/slender wheatgrass	20		
big bluestem	20		
sideoats grama	5		
little bluestem	5		
other native tall grasses	10		
invader tall grasses	0		
<b>Short Height</b>			
blue grama	5		
sedges	5		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

Rev. 12/28/21

**Part I & II MLRA 55C - SOUTHERN BLACK GLACIATED PLAINS (Page 2)**

<b>Clayey Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<i>Tall and Mid Height</i>			
western wheatgrass	35		
needlegrasses	30		
slender wheatgrass	10		
big bluestem	15		
sideoats grama	10		
other native tall grasses	15		
invader tall grasses	0		
<i>Short Height</i>			
blue grama	5		
buffalograss	5		
other native grasses/sedges	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

Rev. 12/28/21

<b>Shallow Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<i>Tall and Mid Height</i>			
needlegrasses	25		
western/slender wheatgrass	20		
sideoats grama	15		
little bluestem	15		
big bluestem	10		
other native tall grasses	10		
invader tall grasses	0		
<i>Short Height</i>			
blue grama	10		
sedges	10		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

Added 12/30/25

<b>Thin Upland Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<i>Tall and Mid Height</i>			
little bluestem	25		
needlegrasses	25		
big bluestem	10		
sideoats grama	10		
western wheatgrass	5		
other native tall grasses	15		
invader tall grasses	0		
<i>Short Height</i>			
blue or hairy grama	5		
sedges	5		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Dense Clay Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<i>Tall and Mid Height</i>			
western wheatgrass	65		
green needlegrass	35		
other native tall grasses	5		
invader tall grasses	0		
<i>Short Height</i>			
buffalograss	5		
blue grama	5		
native grasses/sedges	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

**Part I & II MLRA 55C - SOUTHERN BLACK GLACIATED PLAINS (Page 3)**

<b>Claypan Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
western wheatgrass	30		
green needlegress	30		
needleandthread	10		
little bluestem	10		
prairie sandreed	5		
other native tall grasses	10		
invader tall grasses	0		
<b>Short Height</b>			
blue grama	15		
buffalograss	10		
sedges	10		
native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

Rev. 12/28/2021

<b>Sands Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
sand or big bluestem	40		
prairie sandreed	30		
little bluestem	20		
needlegrasses	15		
switchgrass	15		
sand dropseed	5		
other native tall grasses	10		
invader tall grasses	0		
<b>Short Height</b>			
blue or hairy grama	10		
sedges	5		
native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

Rev. 12/28/21

**Part III  
LIVESTOCK CARRYING CAPACITY TABLE  
FOR SOUTHERN BLACK GLACIATED PLAINS, MLRA 55C, SOUTH DAKOTA**

<b>SIMILARITY INDEX (%)</b>				
	76-100	51-75	26-50	0-25
<b>Ecological Site:</b>	<b>Carrying Capacity Expressed As Animal Unit Months Per Acre (AUM's/Ac):</b>			
Subirrigated	1.4	1.2	0.9	0.7
Overflow	1.00	0.8	0.6	0.45
Loamy, Clayey, Sandy, Sands	0.5	0.5	0.4	0.3
Dense Clay, Shallow Thin Upland, Claypan	0.5	0.4	0.3	0.2

Rev. 12/30/25

**NOTE:** Use higher AUM/Ac value when site contains large quantities of any (alone or in combination) of these invader plants that are desirable forage: crested wheatgrass, intermediate wheatgrass, quackgrass, smooth bromegrass, bluegrass, alfalfa, and/or sweetclover.

Composition of Listed Plants
21% - 40%
41% - 60%
61% or greater

AUM/Ac Change
next higher rate
2nd higher rate
3rd higher rate

**Part IV  
RANGELAND HEALTH REFERENCE VALUES TABLE  
FOR SOUTHERN BLACK GLACIATED PLAINS, MLRA 55C, SOUTH DAKOTA**

	<b>Average Annual Production (lbs/acre)</b>	<b>Bareground %</b>	<b>Litter Depth</b>
<b>Ecological Site:</b>	<b>Reference Values</b>		
Subirrigated	5,100	< 5%	0.5 - 1.0 inches
Overflow	3,600	< 5%	0.5 - 1.0 inches
Loamy, Clayey, Sandy, Sands	3,000	< 5%	0.25 - 0.5 inches
Dense Clay, Shallow, Thin Upland, Claypan	2,200	< 15%	0.25 - 0.5 inches

Rev. 12/30/2025

The above are values for each ecological site grouping for the Reference State (when similarity index is greater than 76%). These values represent the range of variability acceptable to promote rangeland and soil health. Current site conditions should be compared to these reference values in order to determine if management is needed to improve the resource value ratings.

**Part I & II MLRA 58D - NORTHERN ROLLING HIGH PLAINS (Page 1)**

<b>Subirrigated Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
big bluestem & switchgrass	55		
prairie cordgrass	20		
western wheatgrass	10		
slender wheatgrass	10		
other native grasses/sedges	15		
invader tall grasses	0		
<b>Short Height</b>			
sedges	10		
rushes & other grass-likes	5		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	10		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Overflow Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
big bluestem	35		
western wheatgrass	30		
needlegrasses	25		
switchgrass	5		
prairie sandreed	5		
slender wheatgrass	5		
other native grasses/sedges	10		
invader tall grasses	0		
<b>Short Height</b>			
sedges	5		
blue grama	5		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	12		
invader shrubs	0		
<b>Trees:</b>			
native trees	5		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

Rev. 5/30/08

<b>Sandy Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
prairie sandreed	30		
needlegrasses	25		
big bluestem or sand bluestem	10		
little bluestem	15		
western wheatgrass	10		
other native tall grasses	10		
invader tall grasses	0		
<b>Short Height</b>			
blue grama	5		
sedges	15		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	10		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

Rev. 12/28/2021

<b>Loamy Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
western wheatgrass	35		
green needlegrass	25		
needleandthread	15		
big bluestem	10		
other native tall grasses	15		
invader tall grasses	0		
<b>Short Height</b>			
blue grama	10		
buffalograss	5		
sedges	8		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	10		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

**Part I & II MLRA 58D - NORTHERN ROLLING HIGH PLAINS (Page 2)**

<b>Clayey Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<i>Tall and Mid Height</i>			
western wheatgrass	45		
green needlegrass	25		
sideoats grama	10		
big bluestem	10		
plains muhly	10		
other native tall grasses	10		
invader tall grasses	0		
<i>Short Height</i>			
blue grama and buffalograss	10		
sedges	5		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	10		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Thin Upland Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<i>Tall and Mid Height</i>			
needlegrasses	25		
western wheatgrass	20		
little bluestem	20		
sideoats grama	10		
big bluestem	10		
other native tall grasses	15		
invader tall grasses	0		
<i>Short Height</i>			
blue or hairy grama	10		
buffalograss	5		
sedges	10		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	10		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

Rev. 10/25/2022

<b>Shallow Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<i>Tall and Mid Height</i>			
western wheatgrass	25		
needlegrasses	20		
little bluestem	20		
plains muhly	8		
big bluestem	5		
other native tall grasses	10		
invader tall grasses	0		
<i>Short Height</i>			
blue grama	10		
sedges	15		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	15		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	15		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

Rev. 10/25/22

<b>Sands Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<i>Tall and Mid Height</i>			
prairie sandreed	35		
needleandthread	25		
sand bluestem	15		
little bluestem	8		
western wheatgrass	3		
other native tall grasses	5		
invader tall grasses	0		
<i>Short Height</i>			
blue or hairy grama	5		
sedges	5		
native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	15		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	10		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

Claypan Ecological Site			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses and Grasslike:</b>			
<b>Tall and Mid Height</b>			
western wheatgrass	35		
needlegrasses	15		
sand dropseed	5		
other native tall grasses	15		
invader tall grasses	0		
<b>Short Height</b>			
blue grama	15		
buffalograss	10		
sedges	10		
other native short grasses	10		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	15		
invader shrubs	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

Part III CARRYING CAPACITY TABLE	ROLLING HIGH PLAINS, MLRA 58D, SOUTH DAKOTA				LIVESTOCK FOR NORTHERN
	SIMILARITY INDEX (%)				
	76-100	51-75	26-50	0-25	
<b>Ecological Site:</b>	<b>Carrying Capacity Expressed As Animal Unit Months Per Acre (AUM's/Ac):</b>				
Subirrigated	1.2	0.9	0.7	0.4	
Overflow	0.8	0.5	0.4	0.3	
Loamy, Clayey, Sandy, Sands	0.5	0.4	0.3	0.2	
Thin Upland, Shallow, Claypan	0.4	0.3	0.2	0.1	

Rev. 12/28/21

**NOTE:** Use higher AUM/Ac value when site contains large quantities of any (alone or in combination) of these invader plants that are desirable forage: crested wheatgrass, intermediate wheatgrass, quackgrass, smooth bromegrass, bluegrass, alfalfa, and/or sweetclover.

Composition of  
Listed Plants  
21% - 40%  
41% - 60%  
61% or greater

AUM/Ac  
Change  
next higher rate  
2nd higher rate  
3rd higher rate

**Part IV  
RANGELAND HEALTH REFERENCE VALUES TABLE  
FOR NORTHERN ROLLING HIGH PLAINS, MLRA 58D, SOUTH DAKOTA**

	<b>Average Annual Production (lbs/acre)</b>	<b>Bareground %</b>	<b>Litter Depth</b>
<b>Ecological Site:</b>	<b>Reference Values</b>		
Subirrigated	4,500	< 5%	0.5 - 1.0 inches
Overflow	2,800	< 5%	0.25 - 0.5 inches
Loamy, Clayey, Sandy, Sands	2,000	< 10%	0.25 inches
Thin Upland, Shallow, Claypan	1,500	< 15%	0.25 inches

Rev. 12/28/2021

The above are values for each ecological site grouping for the Reference State (when similarity index is greater than 76%). These values represent the range of variability acceptable to promote rangeland and soil health. Current site conditions should be compared to these reference values in order to determine if management is needed to improve the resource value ratings.

**Part I & II MLRA 60A - PIERRE SHALE PLAINS (Page 1)**

<b>Subirrigated Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
big bluestem & switchgrass	55		
prairie cordgrass	20		
western wheatgrass	10		
slender wheatgrass	10		
other native grasses/sedges	15		
invader tall grasses	0		
<b>Short Height</b>			
sedges	10		
rushes & other grass-likes	5		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	10		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Sandy Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
prairie sandreed	35		
big or sand bluestem	15		
little bluestem	15		
needleandthread	20		
western wheatgrass	5		
other native tall grasses	10		
invader tall grasses	0		
<b>Short Height</b>			
blue grama	15		
sedges	10		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Overflow Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
big bluestem	40		
western wheatgrass	30		
switchgrass	20		
green needlegrass	10		
slender wheatgrass	10		
Canada wildrye	8		
other native grasses/sedges	20		
invader tall grasses	0		
<b>Short Height</b>			
blue grama	5		
buffalograss	5		
sedges	8		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	15		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	10		
invader shrubs	0		
<b>Trees:</b>			
native trees	5		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Loamy Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
western wheatgrass	30		
needleandthread	20		
green needlegrass	15		
sideoats grama	10		
other native tall grasses	15		
invader tall grasses	0		
<b>Short Height</b>			
blue grama	10		
buffalograss	5		
sedges	10		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	10		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

Rev. 5/30/08

**Part I & II MLRA 60A - PIERRE SHALE PLAINS (Page 2)**

<b>Clayey Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<i>Tall and Mid Height</i>			
western wheatgrass	50		
green needlegrass	40		
sideoats grama	15		
big bluestem	10		
needleandthread	5		
other native tall grasses	10		
invader tall grasses	0		
<i>Short Height</i>			
blue grama	10		
buffalograss	5		
other native grasses/sedges	10		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

Rev. 12/28/2021

<b>Shallow Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<i>Tall and Mid Height</i>			
little bluestem	20		
sideoats grama	20		
needlegrasses	20		
western wheatgrass	15		
big bluestem	10		
other native tall grasses	10		
invader tall grasses	0		
<i>Short Height</i>			
blue or hairy grama	15		
buffalograss	5		
sedges	10		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	10		
invader shrubs	0		
<b>Trees:</b>			
native trees	5		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

Rev. 5/30/08

<b>Thin Upland Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<i>Tall and Mid Height</i>			
little bluestem	35		
sideoats grama	20		
western wheatgrass	15		
needlegrasses	15		
big bluestem	10		
other native tall grasses	10		
invader tall grasses	0		
<i>Short Height</i>			
blue or hairy grama	20		
buffalograss	5		
sedges	10		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	15		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	10		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Dense Clay Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<i>Tall and Mid Height</i>			
western wheatgrass	60		
green needlegrass	30		
other native tall grasses	5		
invader tall grasses	0		
<i>Short Height</i>			
buffalograss	10		
native grasses/sedges	10		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	10		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

**Part I & II MLRA 60A - PIERRE SHALE PLAINS (Page 3)**

<b>Claypan Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
western wheatgrass	40		
green needlegrass	15		
needleandthread	15		
sideoats grama	5		
prairie sandreed	5		
other native tall grasses	10		
invader tall grasses	0		
<b>Short Height</b>			
blue grama	20		
buffalograss	5		
other native grasses/sedges	10		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Sands Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
sand bluestem	40		
prairie sandreed	30		
little bluestem	20		
needlegrasses	10		
western wheatgrass	10		
other native tall grasses	10		
invader tall grasses	0		
<b>Short Height</b>			
blue or hairy grama	10		
sedges	5		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	15		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	10		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Part III CARRYING CAPACITY TABLE</b>	<b>PLAINS, MLRA 60A, SOUTH DAKOTA</b>				<b>LIVESTOCK FOR PIERRE SHALE</b>
	<b>SIMILARITY INDEX (%)</b>				
	76-100	51-75	26-50	0-25	
<b>Ecological Site:</b>	<b>Carrying Capacity Expressed As Animal Unit Months Per Acre (AUM's/Ac):</b>				
Subirrigated	1.2	0.9	0.7	0.4	
Overflow	0.8	0.5	0.4	0.3	
Loamy, Clayey, Sandy, Sands	0.5	0.4	0.3	0.2	
Dense Clay, Thin Upland, Shallow, Claypan	0.4	0.3	0.2	0.1	

Rev. 12/28/21

**NOTE:** Use higher AUM/Ac value when site contains large quantities of any (alone or in combination) of these invader plants that are desirable forage: crested wheatgrass, intermediate wheatgrass, quackgrass, smooth bromegrass, bluegrass, alfalfa, and/or sweetclover.

Composition of  
Listed Plants  
21% - 40%  
41% - 60%  
61% or greater

AUM/Ac  
Change  
next higher rate  
2nd higher rate  
3rd higher rate

**Part IV  
RANGELAND HEALTH REFERENCE VALUES TABLE  
FOR PIERRE SHALE PLAINS, MLRA 60A, SOUTH DAKOTA**

	<b>Average Annual Production (lbs/acre)</b>	<b>Bareground %</b>	<b>Litter Depth</b>
<b>Ecological Site:</b>	<b>Reference Values</b>		
Subirrigated	4,300	< 5%	0.25 - 0.75 inches
Overflow	2,800	< 5%	0.25 - 0.5 inches
Loamy, Clayey, Sandy, Sands	2,000	< 5%	0.25 inches
Dense Clay, Thin Upland, Shallow, Claypan	1,400	< 15%	0.25 inches

Rev. 12/28/2021

The above are values for each ecological site grouping for the Reference State (when similarity index is greater than 76%). These values represent the range of variability acceptable to promote rangeland and soil health. Current site conditions should be compared to these reference values in order to determine if management is needed to improve the resource value ratings.

**Part I & II MLRA 61 - BLACK HILLS FOOT SLOPES (Page 1)**

<b>Subirrigated Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
big bluestem, switchgrass, & Indiangrass	75		
prairie cordgrass	15		
sideoats grama	15		
other native grasses/sedges	15		
invader tall grasses	0		
<b>Short Height</b>			
sedges	5		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	5		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Sandy Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
big bluestem, switchgrass, & Indiangrass	30		
little bluestem	25		
prairie sandreed	40		
sideoats grama	25		
western wheatgrass	10		
other native tall grasses	5		
invader tall grasses	0		
<b>Short Height</b>			
blue grama	5		
sedges	5		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	5		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Overflow Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
big bluestem, switchgrass, & Indiangrass	45		
Canada wildrye	10		
green needlegrass	10		
little bluestem	15		
western wheatgrass	20		
other native grasses/sedges	15		
invader tall grasses	0		
<b>Short Height</b>			
blue or hairy grama	5		
sedges	5		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	5		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Loamy Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
needlegrasses	25		
western wheatgrass	25		
big bluestem	15		
sideoats grama	10		
little bluestem	10		
other native tall grasses	20		
invader tall grasses	0		
<b>Short Height</b>			
blue grama	10		
sedges	10		
other native short grasses	10		
invader short grasses	10		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	5		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

Rev. 5/30/08

**Part I & II MLRA 61 - BLACK HILLS FOOT SLOPES (Page 2)**

<b>Clayey Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
big bluestem	25		
little bluestem	35		
needlegrasses	30		
sideoats grama	10		
western wheatgrass	10		
other native tall grasses	10		
invader tall grasses	0		
<b>Short Height</b>			
native grasses/sedges	10		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	5		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Thin Upland Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
little bluestem	30		
needlegrasses	25		
sideoats grama	30		
western wheatgrass	10		
other native tall grasses	25		
invader tall grasses	0		
<b>Short Height</b>			
blue or hairy grama	15		
buffalograss	5		
sedges	20		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	5		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Shallow Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
little bluestem	30		
needleandthread	10		
big bluestem	50		
sideoats grama	35		
western wheatgrass	5		
other native tall grasses	10		
invader tall grasses	0		
<b>Short Height</b>			
blue or hairy grama	10		
sedges	5		
other native short grasses	15		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	5		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Dense Clay Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
green needlegrass	40		
western wheatgrass	80		
other native tall grasses	5		
invader tall grasses	0		
<b>Short Height</b>			
native grasses/sedges	10		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	5		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

Rev. 10/25/22

<b>Claypan Ecological Site</b>			
<b>Dominant Plants</b>	<b>Composition Maximums</b>	<b>Percent Observed</b>	<b>Percent Allowed</b>
<b>Grasses and Grasslike:</b>			
<b>Tall and Mid Height</b>			
needlegrasses	25		
prairie sandreed	10		
western wheatgrass	50		
other native tall grasses	5		
invader tall grasses	0		
<b>Short Height</b>			
blue or hairy grama	30		
buffalograss	15		
sedges	5		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	5		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	10		
invader shrubs	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Part III CARRYING CAPACITY TABLE</b>		<b>LIVESTOCK FOR FOOTHILLS OF</b>		
<b>THE BLACK HILLS, MLRA 61, SOUTH DAKOTA</b>				
<b>SIMILARITY INDEX (%)</b>				
	76-100	51-75	26-50	0-25
<b>Ecological Site:</b>	<b>Carrying Capacity Expressed As Animal Unit Months Per Acre (AUM's/Ac):</b>			
Subirrigated	1.4	1.0	0.7	0.4
Overflow	0.9	0.65	0.45	0.25
Sandy, Loamy, Clayey	0.6	0.45	0.3	0.15
Dense Clay, Thin Upland, Shallow, Claypan	0.45	0.3	0.2	0.1

Rev. 5/30/08

**NOTE:** Use higher AUM/Ac value when site contains large quantities of any (alone or in combination) of these invader plants that are desirable forage: crested wheatgrass, intermediate wheatgrass, quackgrass, smooth brome grass, bluegrass, alfalfa, and/or sweetclover.

Composition of Listed Plants
21% - 40%
41% - 60%
61% or greater

AUM/Ac Change
next higher rate
2nd higher rate
3rd higher rate

**Part IV  
RANGELAND HEALTH REFERENCE VALUES TABLE  
FOR FOOTHILLS OF THE BLACK HILLS, MLRA 61, SOUTH DAKOTA**

	<b>Average Annual Production (lbs/acre)</b>	<b>Bareground %</b>	<b>Litter Depth</b>
<b>Ecological Site:</b>	<b>Reference Values</b>		
Subirrigated	4,800	< 5%	0.25 - 0.75 inches
Overflow	3,200	< 5%	0.25 - 0.5 inches
Sandy, Loamy, Clayey	2,500	< 5%	0.5 - 1.0 inches
Dense Clay, Thin Upland, Shallow, Claypan	1,800	< 10%	0.25 - 0.5 inches

Rev. 12/28/2021

The above are values for each ecological site grouping for the Reference State (when similarity index is greater than 76%). These values represent the range of variability acceptable to promote rangeland and soil health. Current site conditions should be compared to these reference values in order to determine if management is needed to improve the resource value ratings.

**Part I & II MLRA 63A - NORTHERN ROLLING PIERRE SHALE PLAINS (Page 1)**

<b>Subirrigated Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
big bluestem	45		
switchgrass	15		
Indiangrass	15		
western wheatgrass	15		
little bluestem	10		
prairie cordgrass	8		
slender wheatgrass	8		
other native grasses/sedges	10		
invader tall grasses	0		
<b>Short Height</b>			
sedges	10		
rushes & other grass-likes	5		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	10		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		100%	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Overflow Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
big bluestem	40		
western wheatgrass	20		
needlegrasses	20		
switchgrass	10		
slender wheatgrass	10		
Canada wildrye	5		
other native grasses/sedges	15		
invader tall grasses	0		
<b>Short Height</b>			
blue grama	5		
sedges	5		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	8		
invader shrubs	0		
<b>Trees:</b>			
native trees	5		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		100%	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Sandy Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
big or sand bluestem	30		
prairie sandreed	25		
needleandthread	20		
little bluestem	15		
switchgrass	10		
sideoats grama	10		
other native tall grasses	10		
invader tall grasses	0		
<b>Short Height</b>			
blue grama	8		
sedges	7		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	10		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		100%	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Loamy Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
western wheatgrass	50		
needlegrasses	35		
sideoats grama	15		
big bluestem	5		
other native tall grasses	5		
invader tall grasses	0		
<b>Short Height</b>			
blue grama	10		
buffalograss	5		
sedges	5		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		100%	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

Rev. 5/30/08

**Part I & II MLRA 63A - NORTHERN ROLLING PIERRE SHALE PLAINS (Page 2)**

<b>Clayey Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
western wheatgrass	50		
needlegrasses	30		
sideoats grama	15		
big bluestem	10		
other native tall grasses	10		
invader tall grasses	0		
<b>Short Height</b>			
blue grama	10		
buffalograss	5		
native grasses/sedges	10		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Thin Upland Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
western wheatgrass	30		
little bluestem	25		
sideoats grama	20		
needlegrasses	20		
big bluestem	15		
other native tall grasses	5		
invader tall grasses	0		
<b>Short Height</b>			
blue or hairy grama	10		
buffalograss	10		
sedges	10		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	10		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

Rev. 10/25/2022

<b>Shallow Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
sideoats grama	25		
little bluestem	25		
western wheatgrass	20		
needlegrasses	15		
big bluestem	10		
other native tall grasses	10		
invader tall grasses	0		
<b>Short Height</b>			
blue or hairy grama	15		
buffalograss	10		
sedges	10		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	10		
invader shrubs	0		
<b>Trees:</b>			
native trees	5		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

Rev. 10/25/22

<b>Dense Clay Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
western wheatgrass	80		
green needlegrass	10		
other native tall grasses	5		
invader tall grasses	0		
<b>Short Height</b>			
buffalograss	10		
blue grama	10		
native grasses/sedges	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

**Part I & II MLRA 63A - NORTHERN ROLLING PIERRE SHALE PLAINS (Page 3)**

<b>Claypan Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
western wheatgrass	35		
green needlegrass	25		
needleandthread	10		
prairie sandreed	10		
sideoats grama	10		
other native tall grasses	10		
invader tall grasses	0		
<b>Short Height</b>			
blue grama	10		
buffalograss	5		
native grasses/sedges	15		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	15		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Sands Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
sand or big bluestem	35		
prairie sandreed	25		
little bluestem	15		
needleandthread	15		
sand dropseed	10		
other native tall grasses	10		
invader tall grasses	0		
<b>Short Height</b>			
blue or hairy grama	10		
sedges	5		
native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	10		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Part III CARRYING CAPACITY TABLE</b>			<b>LIVESTOCK FOR NORTHERN</b>	
<b>ROLLING PIERRE SHALE PLAINS, MLRA 63A, SOUTH DAKOTA</b>				
<b>SIMILARITY INDEX (%)</b>				
	76-100	51-75	26-50	0-25
<b>Ecological Site:</b>	<b>Carrying Capacity Expressed As Animal Unit Months Per Acre (AUM's/Ac):</b>			
Subirrigated	1.3	1.0	0.8	0.6
Overflow	0.9	0.7	0.6	0.45
Loamy, Clayey, Sandy, Sands	0.65	0.5	0.4	0.3
Dense Clay, Thin Upland, Shallow, Claypan	0.47	0.4	0.3	0.2

Rev. 5/30/08

**NOTE:** Use higher AUM/Ac value when site contains large quantities of any (alone or in combination) of these invader plants that are desirable forage: crested wheatgrass, intermediate wheatgrass, quackgrass, smooth bromegrass, bluegrass, alfalfa, and/or sweetclover.

Composition of  
Listed Plants

---

21% - 40%  
41% - 60%  
61% or greater

AUM/Ac  
Change

---

next higher rate  
2nd higher rate  
3rd higher rate

**Part IV  
RANGELAND HEALTH REFERENCE VALUES TABLE  
FOR NORTHERN ROLLING PIERRE SHALE PLAINS, MLRA 63A, SOUTH DAKOTA**

	<b>Average Annual Production (lbs/acre)</b>	<b>Bareground %</b>	<b>Litter Depth</b>
<b>Ecological Site:</b>	<b>Reference Values</b>		
Subirrigated	4,800	< 5%	0.25 - 0.75 inches
Overflow	3,300	< 5%	0.25 - 0.5 inches
Sandy, Loamy, Clayey	2,400	< 10%	0.25 inches
Dense Clay, Thin Upland, Shallow, Claypan	1,600	< 15%	0.25 inches

Rev. 12/28/2021

The above are values for each ecological site grouping for the Reference State (when similarity index is greater than 76%). These values represent the range of variability acceptable to promote rangeland and soil health. Current site conditions should be compared to these reference values in order to determine if management is needed to improve the resource value ratings.

**Part I & II MLRA 63B - SOUTHERN ROLLING PIERRE SHALE PLAINS (Page 1)**

<b>Subirrigated Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
big bluestem	40		
Indiangrass	20		
little bluestem	20		
switchgrass	15		
little bluestem	10		
prairie cordgrass	10		
sideoats grama	10		
other native grasses/sedges	15		
invader tall grasses	0		
<b>Short Height</b>			
sedges	5		
rushes & other grass-likes	5		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Overflow Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
big bluestem	40		
western wheatgrass	20		
needlegrasses	15		
switchgrass	10		
sideoats grama	10		
Indiangrass	5		
other native grasses/sedges	10		
invader tall grasses	0		
<b>Short Height</b>			
sedges	5		
rushes and other grass-likes	5		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	7		
invader shrubs	0		
<b>Trees:</b>			
native trees	5		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Sandy Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
big or sand bluestem	35		
prairie sandreed	25		
little bluestem	25		
switchgrass	20		
needlegrasses	15		
Indiangrass	15		
other native tall grasses	10		
invader tall grasses	0		
<b>Short Height</b>			
blue or hairy grama	10		
sedges	5		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Loamy Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
needlegrasses	35		
western wheatgrass	20		
big bluestem	15		
little bluestem	15		
sideoats grama	10		
other native tall grasses	20		
invader tall grasses	0		
<b>Short Height</b>			
blue grama	10		
buffalograss	5		
sedges	10		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	10		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

Rev. 5/30/08

**Part I & II MLRA 63B - SOUTHERN ROLLING PIERRE SHALE PLAINS (Page 2)**

<b>Clayey Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<i>Tall and Mid Height</i>			
western wheatgrass	45		
needlegrasses	25		
sideoats grama	10		
big bluestem	10		
little bluestem	10		
other native tall grasses	10		
invader tall grasses	0		
<i>Short Height</i>			
blue grama	10		
buffalograss	5		
native grasses/sedges	10		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Thin Upland Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<i>Tall and Mid Height</i>			
little bluestem	25		
western wheatgrass	25		
sideoats grama	20		
big bluestem	20		
needlegrasses	15		
other native tall grasses	10		
invader tall grasses	0		
<i>Short Height</i>			
blue or hairy grama	15		
buffalograss	5		
sedges	10		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	10		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Shallow Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<i>Tall and Mid Height</i>			
big bluestem	20		
sideoats grama	20		
little bluestem	20		
western wheatgrass	15		
needlegrasses	10		
prairie sandreed	10		
plains muhly	5		
other native tall grasses	10		
invader tall grasses	0		
<i>Short Height</i>			
blue or hairy grama	10		
sedges	10		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	10		
invader shrubs	0		
<b>Trees:</b>			
native trees	5		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Dense Clay Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<i>Tall and Mid Height</i>			
western wheatgrass	65		
green needlegrass	35		
other native tall grasses	5		
invader tall grasses	0		
<i>Short Height</i>			
buffalograss	5		
blue grama	5		
native grasses/sedges	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

Rev. 5/30/08

**Part I & II MLRA 63B - SOUTHERN ROLLING PIERRE SHALE PLAINS (Page 3)**

<b>Claypan Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
western wheatgrass	35		
green needlegrass	25		
needleandthread	10		
prairie sandreed	10		
sideoats grama	10		
other native tall grasses	10		
invader tall grasses	0		
<b>Short Height</b>			
blue grama	10		
buffalograss	5		
native grasses/sedges	15		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	15		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Sands Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
sand or big bluestem	40		
prairie sandreed	30		
little bluestem	25		
switchgrass	20		
Indiangrass	15		
needlegrasses	10		
other native tall grasses	10		
invader tall grasses	0		
<b>Short Height</b>			
blue or hairy grama	10		
sedges	5		
native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Part III CARRYING CAPACITY TABLE</b>	<b>ROLLING PIERRE SHALE PLAINS, MLRA 63B, SOUTH DAKOTA</b>				<b>LIVESTOCK FOR SOUTHERN</b>
	<b>SIMILARITY INDEX (%)</b>				
	76-100	51-75	26-50	0-25	
<b>Ecological Site:</b>	<b>Carrying Capacity Expressed As Animal Unit Months Per Acre (AUM's/Ac):</b>				
Subirrigated	1.3	1.0	0.8	0.6	
Overflow	0.9	0.7	0.6	0.45	
Loamy, Clayey, Sandy, Sands	0.75	0.6	0.45	0.3	
Dense Clay, Thin Upland, Shallow, Claypan	0.5	0.4	0.3	0.2	

Rev. 5/30/08

**NOTE:** Use higher AUM/Ac value when site contains large quantities of any (alone or in combination) of these invader plants that are desirable forage: crested wheatgrass, intermediate wheatgrass, quackgrass, smooth brome grass, bluegrass, alfalfa, and/or sweetclover.

Composition of  
Listed Plants  
21% - 40%  
41% - 60%  
61% or greater

AUM/Ac  
Change  
next higher rate  
2nd higher rate  
3rd higher rate

**Part IV  
RANGELAND HEALTH REFERENCE VALUES TABLE  
FOR SOUTHERN ROLLING PIERRE SHALE PLAINS, MLRA 63B, SOUTH DAKOTA**

	<b>Average Annual Production (lbs/acre)</b>	<b>Bareground %</b>	<b>Litter Depth</b>
<b>Ecological Site:</b>	<b>Reference Values</b>		
Subirrigated	4,800	< 5%	0.5 - 1.0 inches
Overflow	3,300	< 5%	0.5 - 1.0 inches
Sandy, Loamy, Clayey	2,800	< 5%	0.25 - 0.5 inches
Dense Clay, Thin Upland, Shallow, Claypan	1,800	< 15%	0.25 - 0.5 inches

Rev. 12/28/2021

The above are values for each ecological site grouping for the Reference State (when similarity index is greater than 76%). These values represent the range of variability acceptable to promote rangeland and soil health. Current site conditions should be compared to these reference values in order to determine if management is needed to improve the resource value ratings.

**Part I & II MLRA 64 - TABLELANDS, BADLANDS, AND PINE RIDGE (Page 1)**

<b>Subirrigated Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
big bluestem	25		
prairie cordgrass	15		
Indiangrass	15		
switchgrass	15		
little bluestem	15		
western wheatgrass	10		
slender wheatgrass	10		
other native grasses/sedges	10		
invader tall grasses	0		
<b>Short Height</b>			
sedges	10		
rushes & other grass-likes	5		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	5		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Overflow Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
big bluestem	40		
western wheatgrass	30		
switchgrass	15		
needlegrasses	10		
slender wheatgrass	5		
Canada wildrye	5		
other native grasses/sedges	10		
invader tall grasses	0		
<b>Short Height</b>			
blue grama	5		
sedges	10		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	5		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Sandy Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
big or sand bluestem	30		
prairie sandreed	30		
little bluestem	10		
needleandthread	20		
switchgrass	10		
other native tall grasses	10		
invader tall grasses	0		
<b>Short Height</b>			
blue grama	15		
sedges	5		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	10		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Loamy Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
western wheatgrass	30		
needlegrasses	25		
sideoats grama	10		
big bluestem	5		
other native tall grasses	10		
invader tall grasses	0		
<b>Short Height</b>			
blue grama	10		
buffalograss	5		
sedges	10		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	10		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

Rev. 5/30/08

**Part I & II MLRA 64 - TABLELANDS, BADLANDS, AND PINE RIDGE (Page 2)**

<b>Clayey Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
western wheatgrass	50		
needlegrasses	35		
sideoats grama	15		
big bluestem	10		
other native tall grasses	10		
invader tall grasses	0		
<b>Short Height</b>			
blue grama	10		
buffalograss	5		
native grasses/sedges	10		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	10		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Thin Upland Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
little bluestem	30		
sideoats grama	20		
western wheatgrass	15		
needlegrasses	15		
big bluestem	10		
other native tall grasses	5		
invader tall grasses	0		
<b>Short Height</b>			
blue or hairy grama	20		
buffalograss	5		
sedges	10		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	15		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	10		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Shallow Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
sideoats grama	20		
needlegrasses	20		
little bluestem	15		
western wheatgrass	15		
big bluestem	10		
other native tall grasses	15		
invader tall grasses	0		
<b>Short Height</b>			
blue or hairy grama	15		
buffalograss	5		
sedges	15		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Dense Clay Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
western wheatgrass	60		
green needlegrass	40		
other native tall grasses	5		
invader tall grasses	0		
<b>Short Height</b>			
buffalograss	10		
native grasses/sedges	10		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

Rev. 5/30/08

**Part I & II MLRA 64 - TABLELANDS, BADLANDS, AND PINE RIDGE (Page 3)**

<b>Claypan Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
western wheatgrass	40		
green needleglass	25		
needleandthread	15		
porcupine grass	10		
prairie sandreed	5		
other native tall grasses	5		
invader tall grasses	0		
<b>Short Height</b>			
blue grama	15		
buffalograss	5		
native grasses/sedges	10		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Sands Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
prairie sandreed	40		
sand bluestem	25		
little bluestem	15		
needleandthread	10		
sand dropseed	10		
other native tall grasses	10		
invader tall grasses	0		
<b>Short Height</b>			
blue or hairy grama	10		
sedges	10		
native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Part III CARRYING CAPACITY TABLE</b>	<b>BADLANDS, AND PINE RIDGE, MLRA 64, SOUTH DAKOTA</b>				<b>LIVESTOCK FOR TABLELANDS,</b>
	<b>SIMILARITY INDEX (%)</b>				
	76-100	51-75	26-50	0-25	
<b>Ecological Site:</b>	<b>Carrying Capacity Expressed As Animal Unit Months Per Acre (AUM's/Ac):</b>				
Subirrigated	1.2	0.9	0.7	0.4	
Overflow	0.8	0.6	0.4	0.3	
Loamy, Clayey, Sandy, Sands	0.54	0.43	0.34	0.25	
Dense Clay, Thin Upland, Shallow, Claypan	0.44	0.35	0.27	0.2	

Rev. 5/30/08

**NOTE:** Use higher AUM/Ac value when site contains large quantities of any (alone or in combination) of these invader plants that are desirable forage: crested wheatgrass, intermediate wheatgrass, quackgrass, smooth bromegrass, bluegrass, alfalfa, and/or sweetclover.

Composition of  
Listed Plants  
21% - 40%  
41% - 60%  
61% or greater

AUM/Ac  
Change  
next higher rate  
2nd higher rate  
3rd higher rate

**Part IV  
RANGELAND HEALTH REFERENCE VALUES TABLE  
FOR TABLELANDS, BADLANDS, AND PINE RIDGE, MLRA 64, SOUTH DAKOTA**

	<b>Average Annual Production (lbs/acre)</b>	<b>Bareground %</b>	<b>Litter Depth</b>
<b>Ecological Site:</b>	<b>Reference Values</b>		
Subirrigated	4,300	< 5%	0.5 - 1.0 inches
Overflow	2,800	< 5%	0.25 - 0.5 inches
Sandy, Loamy, Clayey	2,000	< 10%	0.25 - 0.5 inches
Dense Clay, Thin Upland, Shallow, Claypan	1,600	< 15%	0.25 inches

Rev. 12/28/2021

The above are values for each ecological site grouping for the Reference State (when similarity index is greater than 76%). These values represent the range of variability acceptable to promote rangeland and soil health. Current site conditions should be compared to these reference values in order to determine if management is needed to improve the resource value ratings.

**Part I & II MLRA 65 - NEBRASKA-SOUTH DAKOTA SAND HILLS (Page 1)**

<b>Subirrigated Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
big bluestem	50		
Indiangrass	30		
little bluestem	25		
switchgrass	15		
prairie cordgrass	15		
needlegrasses	15		
western wheatgrass	10		
other native grasses/sedges	15		
invader tall grasses	0		
<b>Short Height</b>			
sedges	10		
rushes & other grass-likes	5		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Shallow Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
little bluestem	25		
sideoats grama	25		
needlegrasses	20		
big or sand bluestem	20		
prairie sandreed	10		
western wheatgrass	10		
other native tall grasses	20		
invader tall grasses	0		
<b>Short Height</b>			
blue or hairy grama	10		
sedges	8		
other native short grasses	10		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	5		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Sandy Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
big or sand bluestem	30		
prairie sandreed	30		
needleandthread	20		
little bluestem	20		
switchgrass	10		
sideoats grama	5		
other native tall grasses	10		
invader tall grasses	0		
<b>Short Height</b>			
blue grama	15		
sedges	5		
other native short grasses	10		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Loamy Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
needlegrasses	30		
western wheatgrass	20		
big bluestem	15		
little bluestem	15		
other native tall grasses	20		
invader tall grasses	0		
<b>Short Height</b>			
blue grama	10		
buffalograss	5		
sedges	10		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	10		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

Rev. 5/30/08

Sands Ecological Site			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses and Grasslike:</b>			
<i>Tall and Mid Height</i>			
sand bluestem	40		
prairie sandreed	35		
little bluestem	25		
switchgrass	10		
Indiangrass	5		
sand lovegrass	5		
other native tall grasses	5		
invader tall grasses	0		
<i>Short Height</i>			
blue or hairy grama	10		
sedges	5		
other native short grasses	10		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

Part III CARRYING CAPACITY TABLE	SOUTH DAKOTA SAND HILLS, MLRA 65, SOUTH DAKOTA				LIVESTOCK FOR NEBRASKA-
	SIMILARITY INDEX (%)				
	76-100	51-75	26-50	0-25	
<b>Ecological Site:</b>	<b>Carrying Capacity Expressed As Animal Unit Months Per Acre (AUM's/Ac):</b>				
Subirrigated	1.3	1.1	0.9	0.7	
Loamy	0.7	0.6	0.5	0.35	
Sandy, Sands	0.65	0.5	0.4	0.3	
Shallow	0.47	0.35	0.27	0.18	

Rev. 5/30/08

**NOTE:** Use higher AUM/Ac value when site contains large quantities of any (alone or in combination) of these invader plants that are desirable forage: crested wheatgrass, intermediate wheatgrass, quackgrass, smooth brome grass, bluegrass, alfalfa, and/or sweetclover.

Composition of  
Listed Plants  
21% - 40%  
41% - 60%  
61% or greater

AUM/Ac  
Change  
next higher rate  
2nd higher rate  
3rd higher rate

**Part IV  
RANGELAND HEALTH REFERENCE VALUES TABLE  
FOR NEBRASKA-SOUTH DAKOTA SAND HILLS, MLRA 65, SOUTH DAKOTA**

	<b>Average Annual Production (lbs/acre)</b>	<b>Bareground %</b>	<b>Litter Depth</b>
<b>Ecological Site:</b>	<b>Reference Values</b>		
Subirrigated	4,600	< 5%	0.5 - 1.0 inches
Overflow	3,000	< 5%	0.25 - 0.5 inches
Sandy, Sands	2,400	< 10%	0.25 - 0.5 inches
Shallow	1,700	< 15%	0.25 inches

Rev. 12/28/2021

The above are values for each ecological site grouping for the Reference State (when similarity index is greater than 76%). These values represent the range of variability acceptable to promote rangeland and soil health. Current site conditions should be compared to these reference values in order to determine if management is needed to improve the resource value ratings.

**Part I & II MLRA 66 - DAKOTA-NEBRASKA ERODED TABLELAND (Page 1)**

<b>Subirrigated Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
big bluestem	40		
Indiangrass	20		
little bluestem	20		
switchgrass	15		
little bluestem	10		
prairie cordgrass	10		
sideoats grama	10		
other native grasses/sedges	15		
invader tall grasses	0		
<b>Short Height</b>			
sedges	5		
rushes & other grass-likes	5		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Overflow Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
big bluestem	40		
western wheatgrass	20		
needlegrasses	15		
switchgrass	10		
sideoats grama	10		
Indiangrass	5		
other native grasses/sedges	10		
invader tall grasses	0		
<b>Short Height</b>			
sedges	5		
rushes and other grass-likes	5		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	7		
invader shrubs	0		
<b>Trees:</b>			
native trees	5		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Sandy Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
big or sand bluestem	33		
prairie sandreed	28		
little bluestem	23		
needlegrasses	18		
switchgrass	15		
Indiangrass	10		
other native tall grasses	15		
invader tall grasses	0		
<b>Short Height</b>			
blue or hairy grama	10		
sedges	8		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Loamy Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
needlegrasses	30		
western wheatgrass	20		
big bluestem	15		
little bluestem	15		
sideoats grama	10		
other native tall grasses	20		
invader tall grasses	0		
<b>Short Height</b>			
blue grama	10		
buffalograss	5		
sedges	10		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	10		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

Rev. 5/30/08

**Part I & II MLRA 66 - DAKOTA-NEBRASKA ERODED TABLELAND (Page 2)**

<b>Clayey Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<i>Tall and Mid Height</i>			
western wheatgrass	45		
needlegrasses	25		
sideoats grama	10		
big bluestem	10		
little bluestem	10		
other native tall grasses	10		
invader tall grasses	0		
<i>Short Height</i>			
blue grama	10		
buffalograss	5		
native grasses/sedges	10		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Thin Upland Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<i>Tall and Mid Height</i>			
little bluestem	30		
sideoats grama	20		
needlegrasses	15		
big bluestem	15		
western wheatgrass	15		
other native tall grasses	5		
invader tall grasses	0		
<i>Short Height</i>			
blue or hairy grama	20		
buffalograss	5		
sedges	10		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	15		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	10		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Shallow Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<i>Tall and Mid Height</i>			
little bluestem	25		
sideoats grama	25		
big or sand bluestem	20		
needlegrasses	20		
western wheatgrass	10		
prairie sandreed	10		
plains muhly	10		
other native tall grasses	15		
invader tall grasses	0		
<i>Short Height</i>			
blue or hairy grama	15		
sedges	8		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	5		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Claypan Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<i>Tall and Mid Height</i>			
western wheatgrass	35		
green needlegrass	35		
needleandthread	10		
other native tall grasses	5		
invader tall grasses	0		
<i>Short Height</i>			
blue grama	20		
buffalograss	10		
native grasses/sedges	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

Rev. 5/30/08

Sands Ecological Site			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses and Grasslike:</b>			
<b>Tall and Mid Height</b>			
sand bluestem	40		
prairie sandreed	33		
little bluestem	25		
switchgrass	15		
needlegrasses	15		
Indiangrass	10		
sand lovegrass	10		
other native tall grasses	5		
invader tall grasses	0		
<b>Short Height</b>			
blue grama	10		
native grasses/sedges	10		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

Part III CARRYING CAPACITY TABLE	NEBRASKA ERODED TABLELAND, MLRA 66, SOUTH DAKOTA				LIVESTOCK FOR DAKOTA-
	SIMILARITY INDEX (%)				
	76-100	51-75	26-50	0-25	
<b>Ecological Site:</b>	<b>Carrying Capacity Expressed As Animal Unit Months Per Acre (AUM's/Ac):</b>				
Subirrigated	1.3	1.0	0.8	0.6	
Overflow	0.9	0.7	0.6	0.45	
Loamy, Clayey, Sandy, Sands	0.75	0.6	0.45	0.3	
Thin Upland, Shallow, Claypan	0.55	0.45	0.3	0.2	

Rev. 5/30/08

**NOTE:** Use higher AUM/Ac value when site contains large quantities of any (alone or in combination) of these invader plants that are desirable forage: crested wheatgrass, intermediate wheatgrass, quackgrass, smooth bromegrass, bluegrass, alfalfa, and/or sweetclover.

Composition of  
Listed Plants  
21% - 40%  
41% - 60%  
61% or greater

AUM/Ac  
Change  
next higher rate  
2nd higher rate  
3rd higher rate

**Part IV  
RANGELAND HEALTH REFERENCE VALUES TABLE  
FOR DAKOTA-NEBRASKA ERODED TABLELAND, MLRA 66, SOUTH DAKOTA**

	<b>Average Annual Production (lbs/acre)</b>	<b>Bareground %</b>	<b>Litter Depth</b>
<b>Ecological Site:</b>	<b>Reference Values</b>		
Subirrigated	4,800	< 5%	0.5 - 1.0 inches
Overflow	3,300	< 5%	0.5 - 1.0 inches
Loamy, Clayey, Sandy, Sands	2,800	< 5%	0.25 - 0.5 inches
Thin Upland, Shallow, Claypan	2,000	< 10%	0.25 - 0.5 inches

Rev. 12/28/2021

The above are values for each ecological site grouping for the Reference State (when similarity index is greater than 76%). These values represent the range of variability acceptable to promote rangeland and soil health. Current site conditions should be compared to these reference values in order to determine if management is needed to improve the resource value ratings.

**Part I & II MLRA 102A - ROLLING TILL PRAIRIE & MLRA 102D - PRAIRIE COTEAU (Page 1)**

<b>Subirrigated Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
big bluestem or Indiangrass	40		
switchgrass	25		
prairie cordgrass	10		
little bluestem	10		
porcupine grass	8		
other native grasses/sedges	10		
invader tall grasses	0		
<b>Short Height</b>			
sedges and other grass-likes	5		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	15		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	5		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Overflow Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
big bluestem	60		
porcupine grass	10		
switchgrass	10		
Canada wildrye	10		
little bluestem	10		
sideoats grama	5		
other native grasses/sedges	10		
invader tall grasses	0		
<b>Short Height</b>			
sedges	5		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	10		
invader shrubs	0		
<b>Trees:</b>			
native trees	5		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Sandy Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
big or sand bluestem	40		
little bluestem	30		
prairie sandreed	25		
needlegrasses	15		
sideoats grama	10		
other native tall grasses	10		
invader tall grasses	0		
<b>Short Height</b>			
blue or hairy grama	5		
sedges	10		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	10		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Loamy Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
big bluestem or Indiangrass	25		
little bluestem or sideoats grama	25		
needlegrasses	25		
slender/western wheatgrass	10		
other native tall grasses	15		
invader tall grasses	0		
<b>Short Height</b>			
sedges	5		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

Rev. 5/30/08

Clayey Ecological Site			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<i>Tall and Mid Height</i>			
little bluestem	35		
needlegrasses	30		
big bluestem	25		
slender/western wheatgrass	10		
sideoats grama	5		
other native tall grasses	5		
invader tall grasses	0		
<i>Short Height</i>			
blue grama	5		
native grasses/sedges	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		100%	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

Thin Upland Ecological Site			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<i>Tall and Mid Height</i>			
little bluestem	45		
needlegrasses	30		
big bluestem	20		
prairie dropseed	10		
sideoats grama	10		
other native tall grasses	10		
invader tall grasses	0		
<i>Short Height</i>			
blue or hairy grama	5		
sedges	5		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	10		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		100%	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

Shallow Ecological Site			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<i>Tall and Mid Height</i>			
big bluestem	25		
sideoats grama	15		
little bluestem	15		
needlegrasses	15		
prairie sandreed	10		
slender/western wheatgrass	5		
plains muhly	5		
other native tall grasses	10		
invader tall grasses	0		
<i>Short Height</i>			
blue or hairy grama	5		
sedges	5		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	10		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		100%	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

Claypan Ecological Site			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<i>Tall and Mid Height</i>			
western wheatgrass	45		
green needlegrass	25		
big bluestem	15		
switchgrass	10		
other native tall grasses	5		
invader tall grasses	0		
<i>Short Height</i>			
blue grama	15		
native grasses/sedges	10		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		100%	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

Sands Ecological Site			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses and Grasslike:</b>			
<i>Tall and Mid Height</i>			
sand bluestem	35		
prairie sandreed	30		
little bluestem	25		
needlegrasses	15		
switchgrass	10		
slender/western wheatgrass	5		
other native tall grasses	5		
invader tall grasses	0		
<i>Short Height</i>			
blue or hairy grama	5		
native grasses/sedge	10		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	10		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

Part III CARRYING CAPACITY TABLE		LIVESTOCK FOR ROLLING TILL		
PRAIRIE, MLRA 102A & PRAIRIE COTEAU, MLRA 102D, SOUTH DAKOTA				
SIMILARITY INDEX (%)				
	76-100	51-75	26-50	0-25
Ecological Site:	Carrying Capacity Expressed As Animal Unit Months Per Acre (AUM's/Ac):			
Subirrigated	1.5	1.3	1	0.75
Overflow	1.25	0.9	0.7	0.5
Loamy, Clayey, Sandy, Sands	0.9	0.7	0.5	0.35
Thin Upland, Shallow, Claypan	0.75	0.6	0.4	0.25

Rev. 5/30/08

**NOTE:** Use higher AUM/Ac value when site contains large quantities of any (alone or in combination) of these invader plants that are desirable forage: crested wheatgrass, intermediate wheatgrass, quackgrass, smooth bromegrass, bluegrass, alfalfa, and/or sweetclover.

Composition of  
Listed Plants  
21% - 40%  
41% - 60%  
61% or greater

AUM/Ac  
Change  
next higher rate  
2nd higher rate  
3rd higher rate

Part IV RANGELAND HEALTH REFERENCE VALUES TABLE FOR ROLLING TILL PRAIRIE, MLRA 102A & PRAIRIE COTEAU, MLRA 102D, SOUTH DAKOTA			
	Average Annual Production (lbs/acre)	Bareground %	Litter Depth
<b>Ecological Site:</b>	<b>Reference Values</b>		
Subirrigated	5,400	< 5%	0.5 - 1.0 inches
Overflow	4,500	< 5%	0.5 - 1.0 inches
Loamy, Clayey, Sandy, Sands	3,300	< 5%	0.25 - 0.5 inches
Thin Upland, Shallow, Claypan	2,600	< 10%	0.25 - 0.5 inches

Rev. 12/28/2021

The above are values for each ecological site grouping for the Reference State (when similarity index is greater than 76%). These values represent the range of variability acceptable to promote rangeland and soil health. Current site conditions should be compared to these reference values in order to determine if management is needed to improve the resource value ratings.

**Part I & II MLRA 102B - TILL PLAINS (Page 1)**

<b>Subirrigated Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
big bluestem or Indiangrass	40		
switchgrass	25		
prairie cordgrass	10		
little bluestem	10		
porcupine grass	8		
other native grasses/sedges	10		
invader tall grasses	0		
<b>Short Height</b>			
sedges and other grass-likes	5		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	15		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	5		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Sandy Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
big or sand bluestem	40		
little bluestem	30		
prairie sandreed	25		
needlegrasses	15		
sideoats grama	10		
other native tall grasses	10		
invader tall grasses	0		
<b>Short Height</b>			
blue or hairy grama	5		
sedges	10		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	10		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Overflow Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
big bluestem	60		
porcupine grass	10		
switchgrass	10		
Canada wildrye	10		
little bluestem	10		
sideoats grama	5		
other native grasses/sedges	10		
invader tall grasses	0		
<b>Short Height</b>			
sedges	5		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	10		
invader shrubs	0		
<b>Trees:</b>			
native trees	5		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Loamy Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
big bluestem or Indiangrass	25		
little bluestem or sideoats grama	25		
needlegrasses	25		
slender/western wheatgrass	10		
other native tall grasses	15		
invader tall grasses	0		
<b>Short Height</b>			
sedges	5		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

Rev. 5/30/08

**Part I & II MLRA 102B - TILL PLAINS (Page 2)**

<b>Clayey Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
little bluestem	35		
needlegrasses	30		
big bluestem	25		
slender/western wheatgrass	10		
sideoats grama	5		
other native tall grasses	5		
invader tall grasses	0		
<b>Short Height</b>			
blue grama	5		
native short grasses/sedges	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Thin Upland Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
little bluestem	45		
needlegrasses	30		
big bluestem	20		
prairie dropseed	10		
sideoats grama	10		
other native tall grasses	10		
invader tall grasses	0		
<b>Short Height</b>			
blue or hairy grama	5		
sedges	5		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	10		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Sands Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
sand bluestem	35		
prairie sandreed	30		
little bluestem	25		
needlegrasses	15		
switchgrass	10		
slender/western wheatgrass	5		
other native tall grasses	5		
invader tall grasses	0		
<b>Short Height</b>			
blue or hairy grama	5		
native short grasses/sedge	10		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	10		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

<b>Claypan Ecological Site</b>			
Dominant Plants	Composition Maximums	Percent Observed	Percent Allowed
<b>Grasses &amp; Grasslike:</b>			
<b>Tall and Mid Height</b>			
western wheatgrass	45		
green needlegrass	25		
big bluestem	15		
switchgrass	10		
other native tall grasses	5		
invader tall grasses	0		
<b>Short Height</b>			
blue grama	15		
native short grasses/sedges	10		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	10		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	5		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

Rev. 5/30/08

<b>Shallow Ecological Site</b>			
<b>Dominant Plants</b>	<b>Composition Maximums</b>	<b>Percent Observed</b>	<b>Percent Allowed</b>
<b>Grasses and Grasslike:</b>			
<b>Tall and Mid Height</b>			
needlegrasses	30		
little bluestem	20		
big bluestem	15		
sideoats grama	10		
slender/western wheatgrass	5		
plains muhly	5		
other native tall grasses	15		
invader tall grasses	0		
<b>Short Height</b>			
blue or hairy grama	10		
sedges	10		
other native short grasses	5		
invader short grasses	0		
<b>Forbs:</b>			
native forbs	15		
invader forbs	0		
<b>Shrubs:</b>			
native shrubs	10		
invader shrubs	0		
<b>Trees:</b>			
native trees	0		
invader trees	0		
<b>TOTAL OBSERVED COMPOSITION</b>		<b>100%</b>	
<b>TOTAL ALLOWED FOR SIMILARITY INDEX</b>			

Rev. 12/28/2021

<b>Part III CARRYING CAPACITY TABLE</b>		<b>LIVESTOCK FOR TILL PLAINS,</b>		
<b>MLRA 102B, SOUTH DAKOTA</b>				
<b>SIMILARITY INDEX (%)</b>				
	76-100	51-75	26-50	0-25
<b>Ecological Site:</b>	<b>Carrying Capacity Expressed As Animal Unit Months Per Acre (AUM's/Ac):</b>			
Subirrigated	1.5	1.3	1	0.75
Overflow	1.25	0.9	0.7	0.5
Loamy, Clayey, Sandy, Sands	0.9	0.7	0.5	0.35
Thin Upland, Claypan	0.75	0.6	0.4	0.25

Rev. 5/30/08

**NOTE:** Use higher AUM/Ac value when site contains large quantities of any (alone or in combination) of these invader plants that are desirable forage: crested wheatgrass, intermediate wheatgrass, quackgrass, smooth bromegrass, bluegrass, alfalfa, and/or sweetclover.

Composition of Listed Plants
21% - 40%
41% - 60%
61% or greater

AUM/Ac Change
next higher rate
2nd higher rate
3rd higher rate

Part IV RANGELAND HEALTH REFERENCE VALUES TABLE FOR TILL PLAINS, MLRA 102B, SOUTH DAKOTA			
	Average Annual Production (lbs/acre)	Bareground %	Litter Depth
<b>Ecological Site:</b>	<b>Reference Values</b>		
Subirrigated	5,600	< 5%	0.5 - 1.0 inches
Overflow	4,500	< 5%	0.5 - 1.0 inches
Loamy, Clayey, Sandy, Sands	3,300	< 5%	0.25 - 0.5 inches
Thin Upland, Shallow, Claypan	2,700	< 10%	0.25 - 0.5 inches

Rev. 12/28/2021

The above are values for each ecological site grouping for the Reference State (when similarity index is greater than 76%). These values represent the range of variability acceptable to promote rangeland and soil health. Current site conditions should be compared to these reference values in order to determine if management is needed to improve the resource value ratings.