



LESSON ELEVEN:

Ecological Sites of Nebraska



Ecological Site

A distinctive kind of land with specific soil and physical characteristics that differ from other kinds of land in its ability to produce a distinctive kind and amount of vegetation and its ability to respond similarly to management actions and natural disturbances.

An identifiable unit of rangeland that allows range managers the ability to predict potential vegetative production for allocating forages to livestock and wildlife.

See Lesson 10 for general information about ecological sites.

Source: [Natural Resources Conservation Service](#)



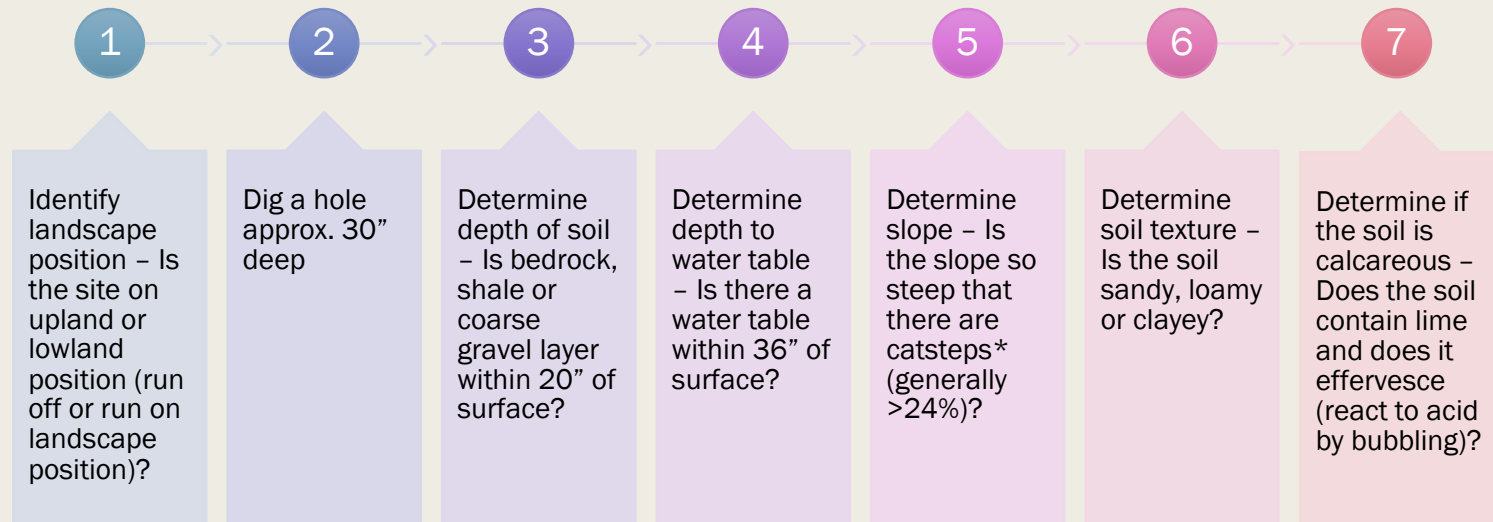
12 Common Ecological Sites of Nebraska

- Choppy Sands
- Clayey
- Limy Upland
- Loamy Upland
- Loamy Overflow
- Loess Breaks
- Saline Subirrigated
- Sands
- Sandy
- Shallow
- Subirrigated
- Wetland

Photo: Range Judging Near Hyannis



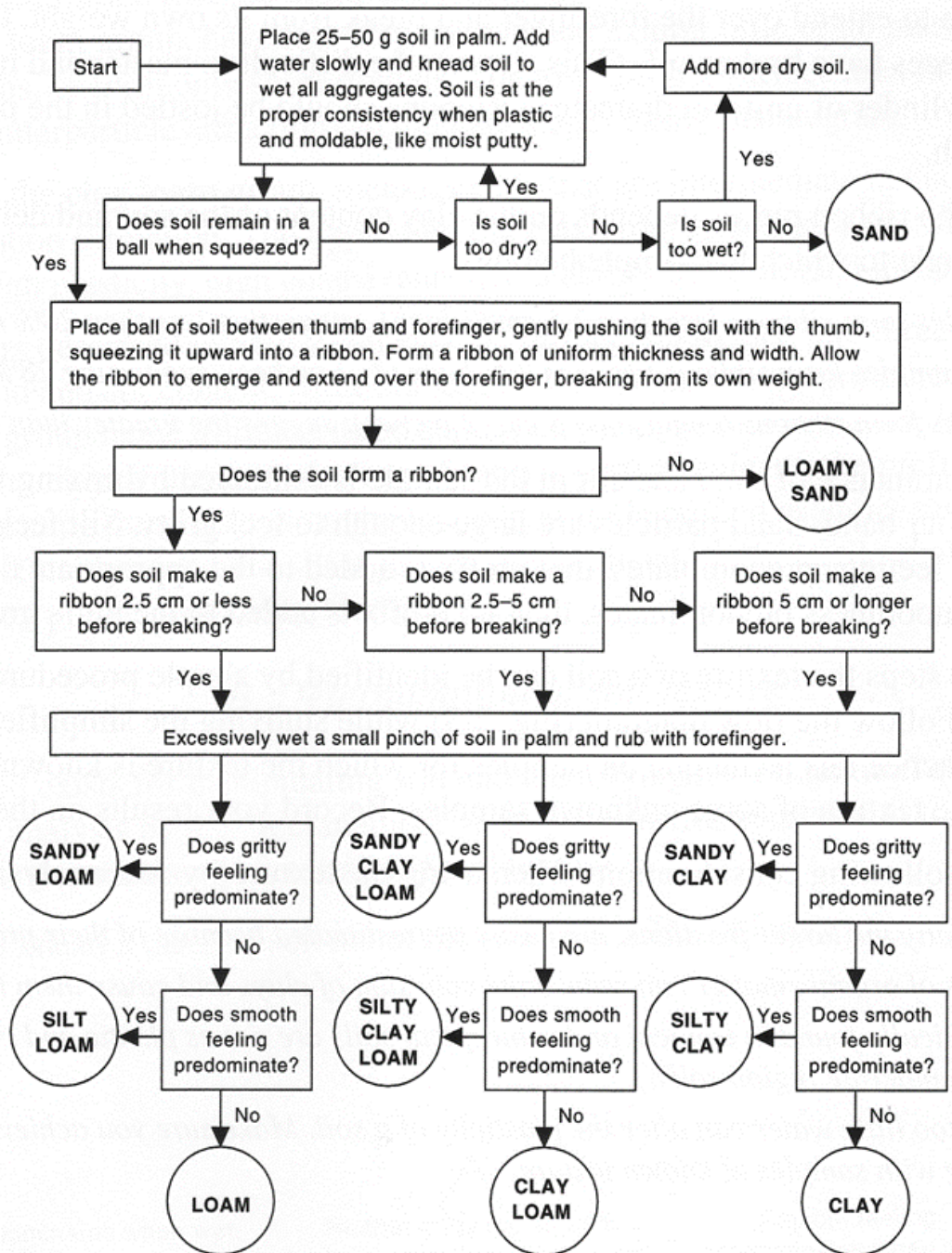
Steps in Ecological Site Identification



* Catsteps are small terrace-like formations or ridges created on steep hillsides by the slumping of the soil. The soil is so steep that the soil can not hold its form.

HOW TO DETERMINE SOIL TEXTURE

Procedure for Analyzing Soil Texture by Feel.



Ecological Sites: Upland Landscape, Deep, Sandy Soils

Ecological Sites

- *Choppy Sands*
- *Sands*
- *Sandy (can also be located on run-on positions)*



Choppy Sands Ecological Site


- 
- Occurs on steep uplands with slopes greater than 20 percent
 - Sandy soil texture, well drained
 - Wind erosion and “blowouts” are common if vegetation is lacking
 - “Catsteps” are characteristic of this site
 - Dark color from organic buildup in the surface is less than 3 inches to absent
 - Primary use: Grazing

Photo Source: Jeff Nichols, NRCS

Choppy Sands Ecological Site

- Reduced Vegetative Cover
- Little or no dark surface layer



Choppy Sands Ecological Site

A photograph of a sandy dune covered in sparse, green and brown grasses under a clear blue sky. The dune is covered in a mix of tall, thin grasses and shorter, clumpy vegetation. The sand is light-colored and visible between the plants. The sky is a clear, bright blue.

Common Plants

Little Bluestem

Prairie Sandreed

Hairy Grama

Blowout Grass

Sandhill Muhly

Small Soapweed

Lemon Scurfpea

Choppy Sands Ecological Site

Blowouts are common in Choppy Sands Ecological Sites



The predominant grass in this blowout is blowout grass

Sands Ecological Site



- Most widespread ecological site in the Sandhills
- Occurs on gently sloping to rolling uplands, but may be found on bottomlands or stream terraces
- Sandy texture soils, deep, well drained
- Dark color accumulation of less than 6 inches at the surface
- Subject to severe wind erosion if vegetation is absent
- Primary use: Grazing

Sands Ecological Site



Less
than 6
inches of
dark
layer at
surface

Photo Credit: Jeff Nichols

Sands Ecological Site



Common Plants

Sand Bluestem
Little Bluestem
Prairie Sandreed
Switchgrass
Needleandthread
Porcupine Grass (eastern sandhills)
Sand Lovegrass
Indiangrass
Sedges
Small Soapweed
Leadplant
Sand sagebrush (SW NE & western sandhills)

Sands Ecological Site




After disturbances such as drought, wildfire, or heavy grazing annual forbs, such as the sunflower and annual buckwheat in the photo, increase due to the amount of bare ground present. Annual forbs will decrease and native grasses will increase after the site recovers from the disturbance.

Sandy Ecological Site

- Occurs on nearly level to steep uplands.
- In Sandhills occurs in dry, flat valleys between rolling dunes.
- Organic accumulation (dark layer) at the surface is 6" or greater
- Soils have a fine sandy loam to fine sand surface and subsurface.
- Common land uses: grazing, haying, irrigated cropland



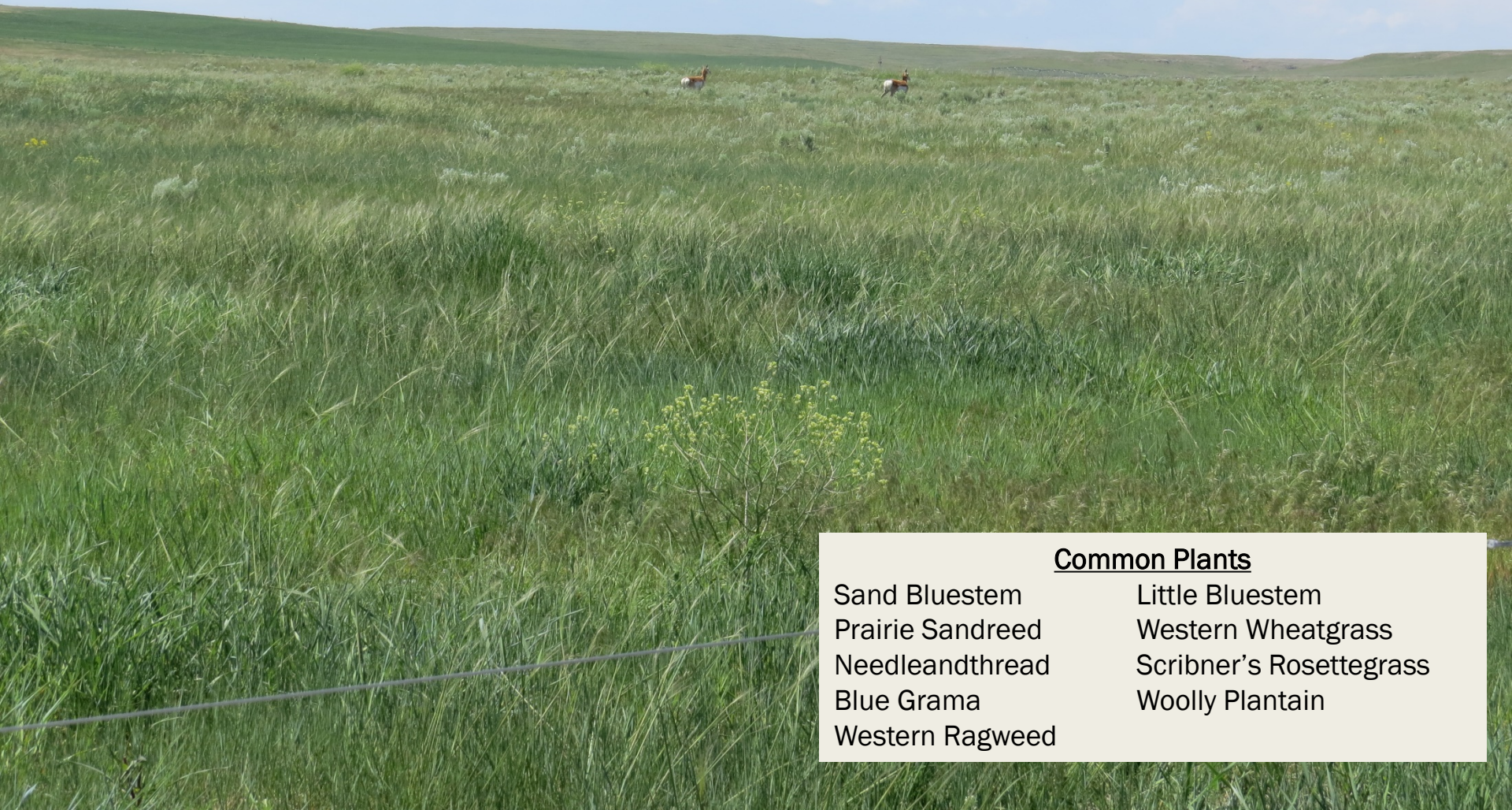
Sandy Ecological Site

A photograph of a sandy ecological site. A shovel is stuck vertically in the sand on the left side. The sand is light brown and contains many small, dry twigs and roots. A text box on the right side of the image contains the text "Organic layer greater than 6 inches at surface".

Organic layer greater
than 6 inches at
surface

Photo Source: Jeff
Nichols, NRCS

Sandy Ecological Site



Common Plants

Sand Bluestem

Prairie Sandreed

Needleandthread

Blue Grama

Western Ragweed

Little Bluestem

Western Wheatgrass

Scribner's Rosettegrass

Woolly Plantain

Sandy Ecological Site



Ecological Sites: Upland Landscape, Deep Loamy or Clayey Soils

Ecological Sites

- *Clayey*
- *Loamy Upland*
- *Limy Upland*
- *Loess Breaks*

Loess Breaks Ecological Site



- Occurs on steep to very steep uplands >24% slopes
- Are located on canyons or hillsides associated with major drainageways.
- Deep soils with a silt loam surface layer
- Contains land slips or cat steps
- Sub-soils are limy (calcareous) and effervesce with acid
- Occurs in association with loamy upland, limy upland, shallow, and loamy overflow sites
- Primary Land Use: Grazing

Loess Breaks Ecological Site



Reaction to acid
applied to
subsoil

Photo Source: Jeff Nichols, NRCS

Loess Breaks Ecological Site



Common Plants
Little Bluestem
Sideoats Grama
Needleandthread
Threadleaf Sedge
Plains Muhly
Variety of forbs

Loess Breaks Ecological Site



Catsteps

Eastern red cedar encroachment is common on loess breaks sites.

Photo Source: Jeff Nichols, NRCS

Clayey Ecological Site



- Occurs on nearly level to strongly sloping uplands
- Soil texture ranges from a silt loam to a clay loam in the surface with a silty clay or clay subsoil
- Water movement in the soil is restricted by clay
- Site occurs primarily in Northern and Northwest Nebraska
- Primary land use: Grazing
- Photo Source: Jeff Nichols, NRCS

Clayey Ecological Site

Soils are sticky when wet and very hard when dry.

Photo Source: Jeff Nichols, NRCS

Clayey Ecological Site

Clayey site in foreground with badlands in background

Common plants include:

- Western wheatgrass
- Green Needlegrass
- Buffalograss
- Blue Grama
- Needleandthread
- Sedges
- Prickly pear cactus
- Variety of forbs



Clayey Ecological Site

Clayey site close-up showing cracks which are common when clayey soils are dry.



Photo Source, Jeff Nichols, NRCS

Limy Upland Ecological Site



- Occurs on nearly level to steep uplands, foot slopes and stream terraces
- Soils may be fine sandy loams to clay loams and have an abundance of lime in the surface layer, so they will show a reaction when acid is applied to the soil surface
- The gently sloping areas on the photo are limy upland sites. Shallow sites are found on the steeper areas in this MLRA and mixed among the limy upland sites. In this photo, the eastern red cedar trees are on shallow sites. The short grass areas in center of photo are limy upland sites.
- Primary Land Use: Grazing and Cropland

Limy Upland Ecological Site



Will react to
acid applied to
soil surface

Photo Source: Jeff Nichols, NRCS

Limy Upland Ecological Site

(limy upland site in foreground; shallow in the background)

Li

Common Plants:
Little Bluestem
Sideoats Grama
Western Wheatgrass
Needleandthread
Plains Muhly
Threadleaf Sedge



Limy Upland Ecological Site

Limy upland Sites are on the less steep slopes and loess breaks occurs on the canyon coming through the right center of the photo.



Loamy Upland Ecological Site



- Occurs on nearly level to steep uplands and stream terraces
 - Soils are deep to very deep and soil textures range from very fine sandy loam to clay loam
 - Most common range site outside of the Sandhills
 - Many loamy upland sites are farmed or have become invaded by smooth brome and/or eastern red cedar.
 - Common land uses: Cropland, Grazing, Haying
- Photo Source: Jeff Nichols, NRCS

Loamy Upland Ecological Site

Common Plants

- Blue Grama
- Needleandthread
- Buffalograss
- Western Wheatgrass
- Plains muhly
- Little Bluestem
- Annual Bromes
- Big Bluestem (≥ 20 " precipitation)

Foreground: Loamy Upland, Canyon in background: Loess Breaks

Loamy Upland Ecological Site

A photograph of a grassy field with a dense line of evergreen trees in the background under a clear blue sky. The field is filled with tall, green and yellowish grasses, some of which appear to be smooth brome grass. The trees are dark green and form a thick line across the horizon.

In eastern and central Nebraska, Loamy Upland sites are often invaded by smooth brome grass

Loamy Upland Ecological Site



Loamy Upland Ecological Site



This site occurs some of our most productive soils and is frequently cropped. Most loamy upland sites remaining as rangeland are small areas that are too small or remote to farm.

Shallow Ecological Site

- Occurs on nearly level to steep uplands
- Soils are less than 20 inches deep over shale, mixed sand and gravel, limestone, siltstone or caliche
- Common land uses: Grazing

Shallow Ecological Site

This example of a shallow site is < 20" over limestone
Photo credit: Kristin Dickinson.



Shallow Ecological Site

Common Plants

Little Bluestem

Blue Gama

Plains Muhly

Sideoats Grama

Needleandthread

Hairy Grama

Western Wheatgrass

Big Bluestem >20" Precip.

Wide Variety of Forbs

Photo Credit: Kristin Dickinson

Shallow Ecological Site



Sites that are very shallow will have large amounts of fringed sagewort and cacti, and will usually have more forbs than grass. Those sites also contain a large amount of annual grasses such as six-weeks fescue and annual brome grasses.

Ecological Sites: Lowland or Run on Landscape, All Soil Types

Ecological Sites

- *Loamy Overflow*
- *Saline Subirrigated*
- *Subirrigated*
- *Wetland*



Loamy Overflow Ecological Site

- Occurs on bottomlands that receive additional water from periodic overflows or run-in from higher elevations
- Water table is more than 60 inches below the soil surface
- Soils range from silty clay loam to silt loam
- Common land uses: Cropping, Grazing, Haying



Loamy Overflow Site is outlined in black

Loamy Overflow Ecological Site



Common Plants

Big Bluestem
Western Wheatgrass
Indiangrass
Kentucky Bluegrass
Green Muhly
Buffalograss
Skunkbush Sumac
Western Snowberry
Ironweed
Western Ragweed
Annual Bromes

Loamy Overflow Ecological Site

The loamy overflow site is in the bottom to middle of the photo on the level area of the landscape.
The adjacent hills are limy upland sites.



Saline Subirrigated Ecological Site

- Occurs on nearly level bottomlands, upland basins and stream terraces
- Water table is between 10-60" of the surface during the majority of the growing season.
- Soils are strongly saline and/or alkaline near the surface, and there is often a whitish-gray deposit on the surface.
- Common land uses: Grazing, Haying



Saline Subirrigated Ecological Site



Photo: On extremely saline sites, there is very little vegetation and what vegetation is present is clumped and cushion-like. Saltwort is common on saline subirrigated sites like this one in Lancaster County, NE.




Saline Subirrigated Ecological Site

- Common plants vary with the degree of salinity and alkalinity of the soils. Soils with very high levels of salinity grow only very salt tolerant species such as saltwort, sea blight, and inland saltgrass.
- Moderately saline sites grow switchgrass, alkali sacaton, alkali cordgrass, foxtail barley and sedges. Prairie gentian can be found on this site.
- Arrowgrass can be common on this site.

Photo: Prairie gentian on a saline subirrigated site in Garden County, NE

Subirrigated Ecological Site

- 
- Occurs on nearly level bottomlands, upland basins, stream terraces and foot slopes
 - Water table is between 10 to 60 inches from surface.
 - Surface layer is high in organic matter
 - Common land uses: Grazing, Haying
 - Photo Credit: Jeff Nichols, NRCS

Subirrigated Ecological Site



High organic layer at surface indicated by dark color at the surface.

During dry periods look for gray colored or rust colored spots in the soil profile. These indicate that the soil has a high water table during wetter times of the

Subirrigated Ecological Site



Common Plants:

Big Bluestem

Indiangrass

Switchgrass

Prairie Cordgrass

Sedges

Sites may have been interseeded with red clover
and other pasture legumes and grasses

Wetland Ecological Site



- Occur on nearly level ground or depressions
- High water table within three feet of the surface
- Water table may be above the soil surface early in the growing season
- Soils can be limy at the surface
- Common land uses: Haying, Grazing after haying, Wildlife Habitat

Wetland Ecological Site

Reaction to acid. Some wetlands are limy at the surface

Water Table within 3 feet of the soil surface

Photo Credit: Jeff Nichols



Wetland Ecological Site



Plant community is highly variable and is related to the length of ponding. Wetlands with longer or more frequent ponding have more annual plants. If water is below the surface most of the year, common plants include:

- Sedges
- Rushes
- Prairie Cordgrass
- Canada thistle

Wetland Ecological Site

A wide-angle photograph of a wetland site. The foreground and middle ground are dominated by dense, tall grasses that are mostly brown and dry, with some green blades still visible. In the background, a line of residential houses is visible, surrounded by lush green trees. The sky is bright blue with scattered white clouds. The overall scene suggests a natural area that has been partially encroached upon by human development.

Wetland Sites often become invaded with Reed Canarygrass.

Ecological Site Key Part I

I. Upland or “Run-off” Landscape Position

- A. Soils are 0-20” deep over rock, shale or coarse gravel; any soil texture
.....**Shallow**
- B. Soils are > 20” deep
 - A. Soil textures are silt loams on very steep, rough broken slopes.....**Loess Breaks**
 - B. Soil textures are loams, silt loams or silty clay loams and are calcareous (limy) in the surface soil.....**Limy Upland**
 - C. Soil textures are loams, silt loams and silts on nearly level to steep slopes.....**Loamy Upland**
 - D. Soil textures are clay loams, silty clay loams, or clay textures on nearly level to steep slopes.....**Clayey**
 - E. Soil textures are sand, fine sand, fine sandy loam or loamy sand
 - a) Sands on steep, irregular slopes; catsteps are common.....**Choppy Sands**
 - b) Sands and loamy sands on nearly level to rolling slopes with dark layer at soil surface <6”.....**Sands**
 - c) Fine sandy loams to loamy sands on nearly level to gently rolling slopes with dark layer at soil surface >6”.....**Sandy**

Ecological Site Key part II

II. Run-on Landscape position (receives additional water from stream flow or runoff from uplands).

A. *Water table at 60" from surface or less all or part of the growing season*

A. Water table is within 36" of the soil surface. Site is poorly drained. Ponding may occur during part of the growing season.....*Wetland*

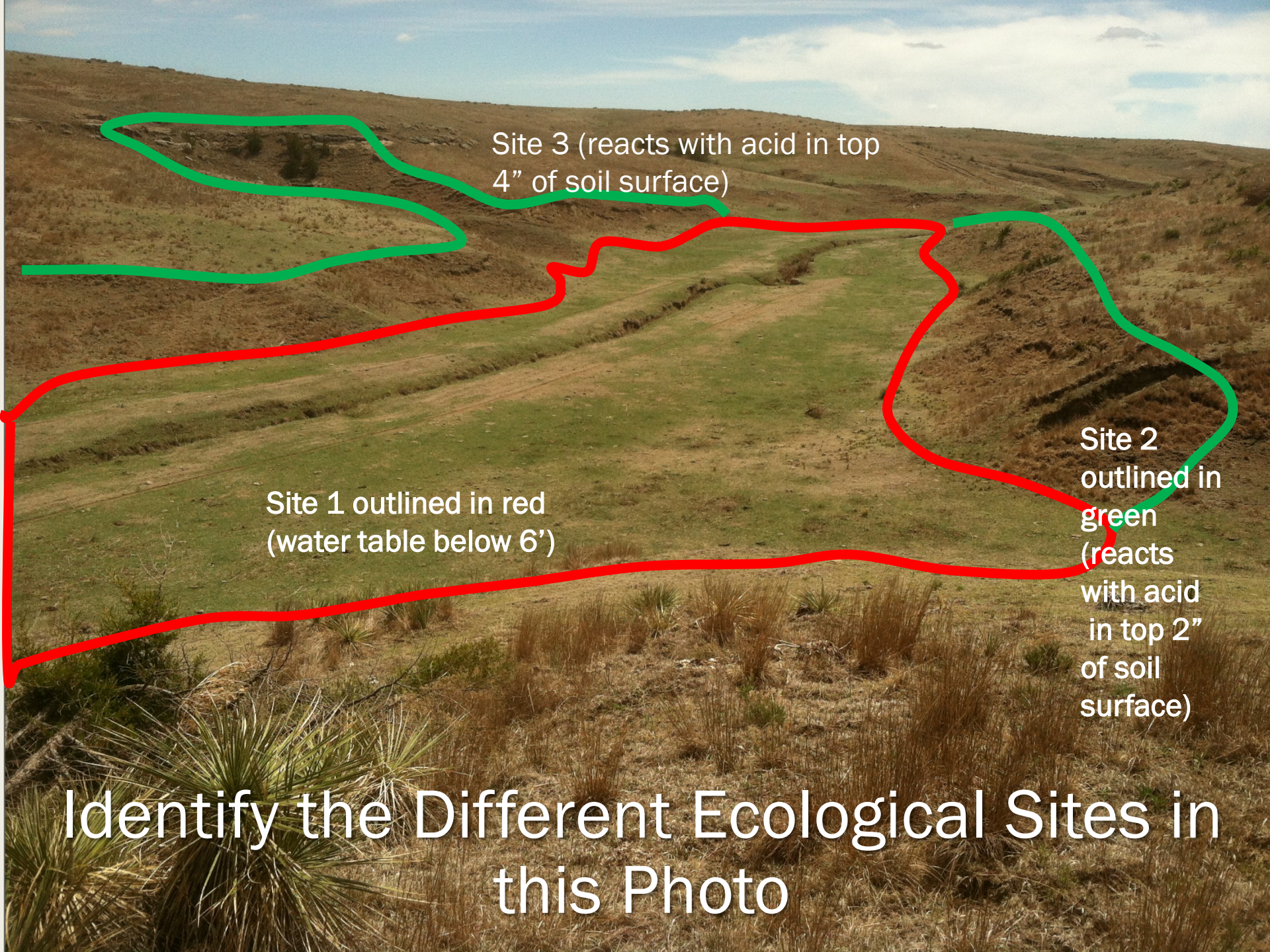
B. Water table is 10-60" of the soil surface during a much of the growing season

a) Salts or alkali accumulate near or at the soil surface.....*Saline Subirrigated*

b) Salts or alkali do not accumulate near or at the soil surface.....*Subirrigated*

B. *Water table deeper than 60" from surface*

A. Soils loams, silt loams, silts or silty clay loams. Site receives additional water from stream overflow or run-in....*Loamy Overflow*



Site 3 (reacts with acid in top 4" of soil surface)

Site 1 outlined in red
(water table below 6')

Site 2
outlined in green
(reacts with acid in top 2" of soil surface)

Identify the Different Ecological Sites in this Photo

Site Answers



Limy Upland
Upland Landscape position
Calcareous near surface

Loamy Overflow
Run In Landscape
Position
Does not have high
water table

Loess Breaks
Very Steep
Has Catsteps
Calcareous
(usually)

ECOLOGICAL SITES

ACTIVITIES

- Obtain several soil samples. Using the soil texture key in this lesson, identify the soil texture for each sample.
- Study the differences in ecological sites and learn the key concepts for each site. Go to the field and identify the ecological sites present.

REFERENCES

- [Range Judging Handbook and Contest Guide for Nebraska](#)



Loamy Upland Site – Frontier County

END OF LESSON ELEVEN