Ecological Site Description (ESD)

- Standardized method for defining, delineating, and describing grasslands.
- Distinctive kinds of land with specific physical characteristics.
- Recognized and described based on its unique characteristics and ability to produce and support a characteristic plant community.
- ESD contains more information – soil, physical, climate, and hydrologic features, plant communities and dynamics, production estimates, growth curves, animal communities, and interpretation for management.
Bluestem/prairie sandreed/switchgrass/needlegrass (1700 to 2200 lb/ac)

Prairie sandreed/needlegrass/dropseed/ragweed (1200 to 1600 lb/ac)

Grama/sedge/dropseed/ragweed (400 to 800 lb/ac)

Eastern redcedar

MLRA 65 Nebraska Sandhills (17-22” precipitation)

Disturbance (animal, man, fire)

Long-term PG

(PG = proper grazing) (HG = heavy grazing)
<table>
<thead>
<tr>
<th>Yield (tons/ac)</th>
<th>June 20</th>
<th>October regrowth</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fertilized</td>
<td>2.12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control – no fertilizer</td>
<td>1.37</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>July</td>
<td></td>
</tr>
<tr>
<td>Fertilized</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control – no fertilizer</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hay Quality (%)</th>
<th>June 20</th>
<th>October regrowth</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CP</td>
<td>ADF</td>
<td>TDN</td>
</tr>
<tr>
<td>Fertilized</td>
<td>8.9</td>
<td>33.8</td>
<td>64.0</td>
</tr>
<tr>
<td>Control – no fertilizer</td>
<td>9.3</td>
<td>34.1</td>
<td>63.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>July</td>
<td>CP</td>
</tr>
</tbody>
</table>
### GSL Precipitation (inches)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Oct. – Mar.</td>
<td>3.36</td>
<td>5.52</td>
<td>6.04</td>
<td>6.04</td>
</tr>
<tr>
<td>April</td>
<td>2.14</td>
<td>2.45</td>
<td>2.05</td>
<td>8.09</td>
</tr>
<tr>
<td>May</td>
<td>3.04</td>
<td>6.67</td>
<td>6.28</td>
<td>14.37</td>
</tr>
<tr>
<td>June</td>
<td>3.66</td>
<td>4.15</td>
<td>2.86</td>
<td>17.23</td>
</tr>
<tr>
<td>July</td>
<td>2.95</td>
<td>4.51</td>
<td></td>
<td></td>
</tr>
<tr>
<td>August</td>
<td>2.15</td>
<td>0.50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>September</td>
<td>1.76</td>
<td>2.24</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>19.06</td>
<td>26.04</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### June 2019
- 8 days with more than 0.10”
- Longest period without rain: 7 days
Percent of Normal Precipitation (%)
4/1/2019 – 7/3/2019

Generated 7/4/2019 at HPRCC using provisional data.
NOAA Regional Climate Centers
U.S. Drought Monitor
High Plains

July 2, 2019
(Released Wednesday, Jul. 3, 2019)
Valid 8 a.m. EDT

Intensity:
- None
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author:
Richard Tinker
CPC/NOAA/NWS/NCEP

droughtmonitor.unl.edu
Grass-Cast: An *Experimental* Grassland Productivity Forecast (look for it online in Spring & Summer!)

For livestock producers, Extension, NRCS, and other rangeland managers—a new forecast of your area’s peak standing grassland biomass, for the whole growing season, across the Great Plains.

**How does it work?**

Grass-Cast uses well-known relationships between historical weather and grassland production. It combines current weather data and seasonal climate outlooks (from NOAA Climate Prediction Center) with a well-trusted grassland model (*DayCent*) to predict total biomass (lbs/acre) for individual counties, compared to their 38-year average.

Grass-Cast is an *optional* tool that managers can use to form a more-educated guess about the upcoming growing season. It can help inform the design of proactive drought management plans, trigger dates, stocking dates, and grazing rotations.

For more info visit [http://grasscast.agsci.colostate.edu/](http://grasscast.agsci.colostate.edu/)
Percent Change in 2019 Predicted ANPP compared to 1981-2018 mean ANPP Assuming Normal June-August Precipitation (%)

Maps made on June 25, 2019

If near normal Jun-Aug precip

Forecast date: June 25, 2019
Percent Change in 2019 Predicted ANPP compared to 1981-2018 mean ANPP Assuming Below Normal June-August Precipitation (%)

If **below** normal Jun-Aug precip

Forecast date: June 25, 2019
Balancing Forage Supply and Demand

Jerry D. Volesky
Range / Forage Specialist
West Central Res. & Ext. Center
402 West State Farm Rd
North Platte, NE  69101
(308) 696-6710
Jerry.volesky@unl.edu

Ranch Practicum - 2019
Grazing Resources

- Native rangeland
- Mixed native and introduced pastureland
- Seeded introduced/improved pasture
- Irrigated perennial or annual pasture
- Dryland annual pasture
Northern Nebraska Cash Rental Rates for Pasture (1986 - 2019)

Cow-calf pair

T. Jansen, et al. UNL Ag Economics
Value of 1 lb of pasture forage: $0.08 to $0.10
Proportion of total standing crop commonly allocated to different functions to maintain healthy rangeland under continuous grazing.

Harvest efficiency = 25%
Balancing Forage Supply and Demand

- Spatially – optimum use across management units
- Temporally – optimum use over time
Animal-Land Relationship

- **Grazing capacity** – total number of animals which may be sustained on a given area based on total forage available.

- **Stocking rate** – animal unit demand per unit area over a period of time (e.g., AUM/acre). It is a management decision.
Stocking rate could be expressed by which of the following?

1. AUM/acre
2. Cows/section/month
3. Acres/pair/5 months
4. All the above
5. None of the above
Stocking Rate Decisions

- Enable ranch to survive financially.
- Give satisfactory animal performance.
- Allow for future growth of the forage plants.
Methods of Determining Forage Supply

- Table values – based on ecological or range site and species composition
- Pasture yields
- Visual estimates
- Clip samples
- Records – observations - experience
<table>
<thead>
<tr>
<th>Vegetative Zone II</th>
<th>Range condition – Stocking rate</th>
<th>Fair to Excellent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AUM/acre</td>
<td>Acres/AU/5 month</td>
</tr>
<tr>
<td>Silty overflow, sandy lowland, silty lowland</td>
<td>0.45 to 0.90</td>
<td>6 to 12</td>
</tr>
<tr>
<td>Sandy, sands, silty</td>
<td>0.35 to 0.70</td>
<td>7 to 14</td>
</tr>
<tr>
<td>Clayey, choppy sands, limy upland</td>
<td>0.30 to 0.60</td>
<td>8 to 17</td>
</tr>
<tr>
<td>Shallow clay, shallow limy</td>
<td>0.25 to 0.50</td>
<td>10 to 20</td>
</tr>
<tr>
<td>Shallow to gravel, thin loess</td>
<td>0.20 to 0.40</td>
<td>12 to 25</td>
</tr>
</tbody>
</table>
UNL-Barta Brothers Ranch: Herbage Production
1999 - 2017

Herbage Production (lb/acre)

1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017

Herbage Production (lb/acre)
0
500
1000
1500
2000
2500
Production
Average (1815 lb/ac)
Vegetative Zones

Average Annual Precipitation

Legend (in inches)
- Under 16
- 16 to 18
- 18 to 20
- 20 to 22
- 22 to 24
- 24 to 26
- 26 to 28
- 28 to 30
- 30 to 32
- 32 to 34
- Above 34

This is a map of annual precipitation averaged over the period 1981-1990. Station observations were collected from the NOAA Cooperative and USDA-NRCS SRTP networks plus other state and local networks. The PRISM modeling system was used to create the gridded estimates from which this map was made. The size of each grid point is approximately 4 x 4 km. Support was provided by the NECS Water and Climate Center.

Copyright 2004 by Spatial Climate Analysis Service, Oregon State University.
Animal Unit (AU)

- Standard animal (1,000 lb. animal) that consumes a standard amount of forage (26 lbs of air-dry forage).
- The animal unit concept allows for expressing forage supply and demand using a common unit of measure.
Animal Unit Month (AUM)

- Amount of forage (780 lbs of air-dry forage) required to sustain the standard animal for one month.
- 1.5 AUM/acre = 1,170 lbs of air-dry forage.
- 0.6 AUM/acre = 470 lbs of air-dry forage.
- Can be expressed as amount of forage available or amount of animal demand.
- Animal unit day (AUD) or year (AUY).
Animal Unit Equivalent (AUE)

- A numerical figure expressing the quantitative forage demand of a particular kind and class of animal relative to an animal unit.
- AUE - 0.1 AU for every 100 lbs of live weight.
Animal Unit Equivalent

- A weaned calf weighing 500 lbs will consume about 390 lbs of air-dry forage/month; therefore, it is equivalent to 0.5 AU.
- AUE of a cow-calf pair is the sum of the average cow weight and the average calf weight and divided by 1,000 lbs. 
  (Option: calf not included until > 3 months age)
Animal Unit Equivalent

<table>
<thead>
<tr>
<th>Class of Cattle</th>
<th>Approximate AUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cows (1000 lb)</td>
<td>1</td>
</tr>
<tr>
<td>Cow-calf pairs</td>
<td>1.3 to 1.6</td>
</tr>
<tr>
<td>Replacement heifer (&gt; 24 mo.)</td>
<td>0.9</td>
</tr>
<tr>
<td>Calves (weaned) (&lt; 12 mo.)</td>
<td>0.5</td>
</tr>
<tr>
<td>Yearling (12 - 17 months)</td>
<td>0.7</td>
</tr>
<tr>
<td>Yearling (18 - 24 months)</td>
<td>0.8</td>
</tr>
<tr>
<td>Bulls</td>
<td>1.5 to 2.0</td>
</tr>
</tbody>
</table>

* For all classes, the preferred method of calculating AUE is: Avg. weight ÷ 1000
### Grazing Stocking Rates and Carrying Capacity

1 AU (animal unit) = 1000 lb of animal
1AUD (animal unit day) = 26 lb forage (daily intake)
1 AUM = 780 lb of forage intake (26 lb per day X 30 days)
AUE (animal unit equivalent)

<table>
<thead>
<tr>
<th>Class of Cattle</th>
<th>Approximate AUE</th>
<th>* For all classes, the preferred method of calculating AUE is: Avg. weight ÷ 1000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cows (1000 lb)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Cow-calf pairs</td>
<td>1.3 to 1.6</td>
<td></td>
</tr>
<tr>
<td>Replacement heifer (&gt; 24 months)</td>
<td>0.9</td>
<td></td>
</tr>
<tr>
<td>Calves (weaned) (&lt; 12 months)</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>Yearling (12 - 17 months)</td>
<td>0.7</td>
<td></td>
</tr>
<tr>
<td>Yearling (18 - 24 months)</td>
<td>0.8</td>
<td></td>
</tr>
<tr>
<td>Bulls</td>
<td>1.5 to 2.0</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Forage production</th>
<th>Nebraska example</th>
<th>AUM/acre</th>
<th>AUD/acre</th>
<th>Cow-calf (1.5 AUE) pairs/acre for 1 month</th>
<th>Cow-calf (1.5 AUE) pairs/acre for 5 months</th>
<th>Acres/AU for 1 month</th>
<th>Acres/AU for 5 months</th>
<th>Acres/cow-calf (1.5 AUE) pair for 5 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>Panhandle native</td>
<td>0.30</td>
<td>9</td>
<td>0.20</td>
<td>0.04</td>
<td>3.3</td>
<td>16.7</td>
<td>25.0</td>
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<tr>
<td></td>
<td>Southwest native</td>
<td>0.40</td>
<td>12</td>
<td>0.27</td>
<td>0.05</td>
<td>2.5</td>
<td>12.5</td>
<td>18.8</td>
</tr>
<tr>
<td></td>
<td>Western Sandhills</td>
<td>0.50</td>
<td>15</td>
<td>0.33</td>
<td>0.07</td>
<td>2.0</td>
<td>10.0</td>
<td>15.0</td>
</tr>
<tr>
<td></td>
<td>Central Sandhills</td>
<td>0.60</td>
<td>18</td>
<td>0.40</td>
<td>0.08</td>
<td>1.7</td>
<td>8.3</td>
<td>12.5</td>
</tr>
<tr>
<td></td>
<td>Eastern Sandhills</td>
<td>0.70</td>
<td>21</td>
<td>0.47</td>
<td>0.09</td>
<td>1.4</td>
<td>7.1</td>
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<tr>
<td></td>
<td>Seeded cool-</td>
<td>0.80</td>
<td>24</td>
<td>0.53</td>
<td>0.11</td>
<td>1.3</td>
<td>6.3</td>
<td>9.4</td>
</tr>
<tr>
<td></td>
<td>season pasture</td>
<td>0.90</td>
<td>27</td>
<td>0.60</td>
<td>0.12</td>
<td>1.1</td>
<td>5.6</td>
<td>8.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.00</td>
<td>30</td>
<td>0.67</td>
<td>0.13</td>
<td>1.0</td>
<td>5.0</td>
<td>7.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.50</td>
<td>45</td>
<td>1.00</td>
<td>0.20</td>
<td>0.7</td>
<td>3.3</td>
<td>5.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.00</td>
<td>60</td>
<td>1.33</td>
<td>0.27</td>
<td>0.5</td>
<td>2.5</td>
<td>3.8</td>
</tr>
<tr>
<td></td>
<td>Graze-out oats, rye, triticate, or sorghum-sudan.</td>
<td>2.50</td>
<td>75</td>
<td>1.67</td>
<td>0.33</td>
<td>0.4</td>
<td>2.0</td>
<td>3.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.00</td>
<td>90</td>
<td>2.00</td>
<td>0.40</td>
<td>0.3</td>
<td>1.7</td>
<td>2.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.00</td>
<td>120</td>
<td>2.67</td>
<td>0.53</td>
<td>0.3</td>
<td>1.25</td>
<td>1.88</td>
</tr>
<tr>
<td>Low</td>
<td>Low input</td>
<td>5.00</td>
<td>150</td>
<td>--</td>
<td>0.67</td>
<td>--</td>
<td>1.00</td>
<td>1.50</td>
</tr>
<tr>
<td></td>
<td>irrigated pasture</td>
<td>6.00</td>
<td>180</td>
<td>0.80</td>
<td>--</td>
<td>0.83</td>
<td>--</td>
<td>1.25</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7.00</td>
<td>210</td>
<td>0.93</td>
<td>--</td>
<td>0.71</td>
<td>--</td>
<td>1.07</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8.00</td>
<td>240</td>
<td>1.07</td>
<td>--</td>
<td>0.63</td>
<td>--</td>
<td>0.94</td>
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<tr>
<td></td>
<td></td>
<td>9.00</td>
<td>270</td>
<td>1.20</td>
<td>--</td>
<td>0.56</td>
<td>--</td>
<td>0.83</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10.00</td>
<td>300</td>
<td>1.33</td>
<td>--</td>
<td>0.50</td>
<td>--</td>
<td>0.75</td>
</tr>
<tr>
<td></td>
<td>High input</td>
<td>11.00</td>
<td>330</td>
<td>1.47</td>
<td>--</td>
<td>0.45</td>
<td>--</td>
<td>0.68</td>
</tr>
<tr>
<td></td>
<td>irrigated pasture</td>
<td>12.00</td>
<td>360</td>
<td>1.60</td>
<td>--</td>
<td>0.42</td>
<td>--</td>
<td>0.63</td>
</tr>
</tbody>
</table>
Pasture size: 640 acres
Recommended SR: 0.7 AUM/acre

- Forage supply:
  640 acres x 0.7 AUM/acre = 448 AUMs

- Forage demand:
  1.2 AU/cow + 0.3 AU/calf = 1.5 AU/pair
  1.5 AU x 6 months = 9 AUMs/pair

- Number of pairs:
  448 AUMs/9 AUMs = 50 pairs

- How long for 70 pairs? (70 pairs x 1.5 AU = 105 AU)
  448 AUM / 105 AU) = 4.3 months
Pasture size: 640 acres
Recommended SR: 21 AUD/acre

- Forage supply:
  640 acres x 21 AUD/acre = 13,440 AUDs

- Forage demand:
  1.2 AU/cow + 0.3 AU/calf = 1.5 AU/pair
  1.5 AU x 180 days = 270 AUDs/pair

- Number of pairs:
  13,440 AUDs/270 AUDs = 50 pairs

- How long for 70 pairs? (70 pairs x 1.5 AU = 105 AU)
  13,440 AUD / 105 AU) = 128 days
Importance of Animal Unit Concept

- To present forage supply and demand in a common unit of measure.
- As a means of estimating forage removal.
- To allow a switch from one kind or class of animal to another.
Grazing Records: an essential component of any range or pastureland management program

- Planning next year’s grazing (stocking rates, timing, rotation sequence, etc.)
- Grazing lease arrangements
- Participation in NRCS programs
- Drought / insurance disaster relief
# Forage Supply

<table>
<thead>
<tr>
<th>Pasture</th>
<th>Site</th>
<th>Acres</th>
<th>Stocking Rate</th>
<th>AUM's</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>AUM/ac</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Silty</td>
<td>250</td>
<td>0.50</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Limy Upland</td>
<td>50</td>
<td>0.40</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Silty</td>
<td>150</td>
<td>0.40</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sand</td>
<td>150</td>
<td>0.30</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Sandy</td>
<td>300</td>
<td>0.50</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Silty</td>
<td>100</td>
<td>0.50</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sandy</td>
<td>200</td>
<td>0.40</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Silty</td>
<td>400</td>
<td>0.60</td>
<td></td>
</tr>
</tbody>
</table>

**Total available AUM**

One Animal Unit Month (AUM) of forage = 780 lb air dried

One Animal Unit Day (AUD) of forage = 26 lb air dried

One Animal Unit (AU) of beef = 1,000 lb of beef animal

**Bonus:** How long could 80 cow-calf pairs (1.5 AUE each) graze Pasture 5 to reach the point where they removed 0.60 AUM/acre from that pasture?

80 cow-calf pairs × 1.5 AUE = _______ AU

AUM in Pasture 5: __________________ = _______ AUM

Length of time: __________________ = _______ months
Homework

Forage Demand

100 pairs
4 bulls (Jun 1 – Aug 15) 2000 lb
1200 lb cows (@ BCS 5.0-5.5)
Calves 3 months on July 1, 2008
Grazing season May 1 – Oct 31

<table>
<thead>
<tr>
<th>Animal Weights and AUE Values</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cow</strong></td>
<td>1200</td>
<td>1200</td>
<td>1200</td>
<td>1200</td>
<td>1200</td>
<td>1200</td>
</tr>
<tr>
<td><strong>Calf</strong></td>
<td></td>
<td></td>
<td>300</td>
<td>370</td>
<td>440</td>
<td>510</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1200</td>
<td>1200</td>
<td>1500</td>
<td>1570</td>
<td>1640</td>
<td>1710</td>
</tr>
<tr>
<td><strong>AUE</strong></td>
<td></td>
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Average Animal Unit Equivalent (AUE) per pair = _______ AUE
Animal Unit Equivalent per bull = _______ AUE

How much forage do you need?

(100 pairs) × ( _______ AU/pair) × (6 mo) = _______ AUM

(4 bulls) × ( _______ AU/bull) × (2.5 mo) = _______ AUM
Total = _______ AUM

**Bonus:** How many acres of pasture (carrying capacity = 0.60 AUM/acre) would be needed to support this herd?
Sandhills Defoliation Response Index System

- Decision support tool designed to optimize grassland production and use.
- Assist grassland manager with decisions about grazing land use in a variable environment.
- Ranks the suitability of pastures for future grazing based on the season of defoliation, recent precipitation regime, and residual herbage (hydrologic condition).
### Sandhills Defoliation Response Index System (SanDRIS)

Patrick E. Reece¹, Walter H. Schachler², and Jerry D. Volesky³  
University of Nebraska-Lincoln  
2007 Edition

#### Season of Defoliation (Grazing, Hail, Fire, & Grasshoppers) Index

- **March-April:** sedge green-up and grow  
  +2  
- **May:** cool-season grasses green-up  
  +1  
- **June:** early growth of warm-season tall grasses  
  -1  
- **July:** rapid growth of warm-season tall grasses  
  -2  
- **Multiple events** during June-August  
  -3  
- **August:** warm-season tall grasses have flowered  
  0  
- **September:** nearly full growing-season deferment  
  +2  
- **October-February:** dormant season  
  +4

#### Precipitation Regime (October through September) Index

- **Well above average:** 5-6 feet of moist soil by April 30 and abundant precipitation during May-July  
  +2  
- **Near average:** 3-4 feet of moist soil by April 30 and abundant precipitation during June-July  
  0  
- **Drought:** little or no dormant-season precipitation during October-April and/or well below average precipitation during June-July  
  -2

#### End-of-Season Residual Herbage (Hydrologic Condition) Index

- **Excellent:** residual herbage of palatable species is common, standing herbage (>1500 lb/acre) and litter are abundant throughout  
  +2  
- **Adequate:** standing herbage (700-900 lb/acre) and litter uniformly distributed  
  0  
- **Poor:** standing herbage absent, litter uncommon, characteristic of fire or severe overgrazing  
  -2
Questions