

## **INTRODUCTION**

Range — what do you think of when you hear that word — range wars, land under starry skies above, cowboys living a hard, yet free life, buffalo, Plains Indians? Do you see cows or sheep grazing, moonlit coyotes howling from the hilltops? Do you smell the biting dryness or feel the green of spring? Do you hear the rattle of basque shepherders' wagons bouncing along, or taste strong campfire coffee?

Rangelands are important for more than the feelings we have experienced either directly or vicariously. Rangelands make up more than 40% of the world's land use. It is, geographically, an extensive area of relatively level, rolling, broken or mountainous land, usually not adapted to cultivation. It is covered with native grasses and other forage plants. Sometimes ranges are seeded to grow specific types of vegetation. Range may be privately or publicly owned and fenced or unfenced. It is an area of land having a distinctive combination of soil, topography, climate, and vegetation.

## **THE ACTIVITIES**

## **TIME REQUIRED**

Observe the Range Environment	25 minutes
Range Plant Inventory	25 - 30 minutes
Life Along the Line (transect survey)	60 minutes
How Healthy is this Range?	20 - 25 minutes
Better or Worse? What is the Prescription for Health?	30 minutes



Determine Range Utilization 30 - 60 minutes

Determine Food Value of Plants for Animals 20 - 30 minutes

Whose Home is this Range? 40 - 60 minutes

Map the Range (Optional) two or three 45-minute class periods (estimate)

### **COMBINING THE ACTIVITIES**

The activities in this unit are displayed singly. Depending upon the time available and the skill of the participants, you may choose to do only one activity or the entire series. For maximum learning, the activities should be experienced in the order listed in the unit, however, other suggestions are:

Suggestion 1:

Title: Range Site Exploration

Introduction: Range is an uncommon environment for many people, but one which is readily available for study. Participants use their knowledge of their home environment to learn about range.

Activity: Observe the Range Environment

Transition Statement: Let's take one aspect of the range environment, plants, and explore it further.

Activity: Conduct a Range Plant Inventory

Transition Statement: The next activity looks even closer at range plant life and introduces the principles of "transect line" and inventory.

Activity: Life Along the Line

Transition Statement: Range plants are classified into three groups which help determine the overall health of a range site.



Activity: How Healthy is this Range?

Transition Statement: The determination of a range's health can lead to wise land management.

Activity: Evaluate Range Utilization

Transition Statement: Do you think livestock are picky eaters? Well, in this next lesson, perhaps we can find out.

Activity: Determine Food Value of Plants and Animals

Transition Statement: Livestock aren't the only animals on the range. What about prairie dogs, jack rabbits, etc...

Activity: Observe and Record Evidence of Animals

Transition Statement: We can summarize in discussions or through mapping, what has been learned about this site.

Activity: Map the Range

Suggestion 2:

Title: Typical Range Plants

Introduction: People like to compare plants in a new area to plants where they live.

These activities introduce some specific range plant types.

Activity: Observe the Range Environment

Transition Statement: Let's take one aspect of the range environment--plants--and explore it further.

Activity: Conduct a Range Environment

Transition Statement: The next activity allows us to look even closer at range plant life.

Activity: How Healthy is this Range?

Transition Statement: This exploration is just a beginning of what we can learn about range plants.

Suggestion 3:

Title: Oh Give Me a Home, Where...

Introduction: Cows, sheep and buffalo are all range animals. Spiders, ants, sage hens and jack rabbits are also range animals. The activities dealing with animals are short and form a foundation for further investigation.

Activity: Observe the Range Environment

Transition Statement: Let's take another aspect of the range environment--animals-- and investigate it further.

Activity: Determine Food Value of Plants and Animals

Transition Statement: Here's another activity to expand your understanding of range animal life.

Activity: Observe and Record Evidence of Animals



## CURRICULUM RELATIONSHIPS

### Social Studies/Science

1. Read about and explore how rangelands in your state were settled. What made people settle there? When did they come? Why?
2. What Native American Indian groups lived there? Where? What Native American Indian groups live there now? Where? Compare their life and lifestyle today to 100 years ago, 150 years ago. Construct a display or write a report detailing your research.
3. How is the use of range land influenced by the environment? Consider all aspects.
4. Locate different agricultural crops or businesses on rangelands in your state. Can you determine why certain crops or livestock can be found in a specific area?
5. Map rangelands in your state. Compare them to rangelands world-wide and draw comparisons.
6. Determine how land is classified in your state and then determine how much of your state's agricultural production comes from rangelands.
7. What other uses are there for rangeland besides agriculture?

### Language Arts

1. Research literature for poetry, story, and songs about rangeland, range animals or a way of life associated with range. Then present or perform part of what you find. Be sure to explore the rich legends, mythology, and history of the Native American Indian.
2. Write your own poem, story, or song about the range.
3. Pick an aspect of the range environment, research it, and write a complete report.
4. Interview a person whose career involves some aspect of range. Tape the interview and then edit it, videotape it, or present the interview in some form.
5. Learn and tell a Native American Indian legend, tall-tale or folktale associated with range.
6. Read a novel--historical fiction, biography, or autobiography--about or by someone associated with range.

### Creative Arts

1. American painters have produced many paintings about the American West. Select one, review his or her work and share your new knowledge with your classmates in a manner decided upon with your teacher.
2. Write and film a project on the American range. Subject and script must be discussed with the teacher first.
3. Create and perform for a younger class a play or puppet show about range or an associated subject.
4. Use your own favorite form of creative talent to depict any aspect of range you wish to share.

### Math

1. Measure and mark off one acre.
2. Measure soil temperature and pH on different range sites. Graph and see if you can find a relationship.



## **OBSERVE THE RANGE ENVIRONMENT**

<b>CONCEPT</b>	Organism, Interaction, System
<b>PRINCIPLE</b>	Participants use their observation skills in a new environment to discover what they “know” about the site within a range environment.
<b>OBJECTIVE</b>	<ul style="list-style-type: none"><li>• The student will be able to observe and record his/her observations about the range environment.</li></ul>
<b>PREPARATION</b>	Select a site where the group can spread out and work individually. Site should have a variety of plant types, animal evidence, and a possible difference in range conditions within a short distance. Before selecting a site or doing Activities C and D, the facilitator should read the activities in this unit.
<b>MATERIALS USED</b>	<ul style="list-style-type: none"><li>• Copies of activity A: Observe the Range Environment</li><li>• Flip chart and markers</li><li>• Writing instruments</li></ul>
<b>PROCESSES USED</b>	<ul style="list-style-type: none"><li>• Observe</li><li>• Communicate</li><li>• Infer</li><li>• Hypothesize</li></ul>
<b>TIME</b>	25 minutes with discussion





### C. Retrieve Data

1. Gather the students for a discussion.
2. Record data on a flip-chart. You may want to pre-prepare a flip-chart. An example of a flip-chart page is shown below.

Soil	Rocks
Air	Plants
Animals	Other

- 3.. Ask: What did you notice about this area?
4. Ask: What did you notice about plants in this area?
5. Ask: What animals or animal evidence did you see?
6. Ask: What did you find out about the non-living components of this environment?
7. Ask: How are the living and non-living elements of the environment related?

#### **CLOSURE**

Share your observations by stating the word or words which summarize your impression of the area.

#### **TRANSITION**

Choose a transition specific to your next activity.

## **RANGE PLANT INVENTORY**

<b>CONCEPT</b>	Organism
<b>PRINCIPLE</b>	Range plants can be either annuals or perennials. Plants are often classified in categories such as grasses, shrubs, forbs (herbs), and grass-like plants.
<b>OBJECTIVE</b>	<ul style="list-style-type: none"><li>• The student will be able to classify plants found on site into one of four range plant groupings.</li><li>• The student will be able to classify plants found on the site as either annuals or perennials.</li></ul>
<b>PREPARATION</b>	Prepare a display board of range plants from the four broad plant groups and another board showing annuals and perennials. Make duplex copies of the plant identification sheet, laminate them, if possible, and give one to each group. Copy activity sheets and organize supplies.
<b>MATERIALS</b>	<ul style="list-style-type: none"><li>• Copies of Activity Sheet B: Range Plant Inventory and Activity B: Range Plant Inventory Identification Sheet (3)</li></ul>
<b>NEEDED</b>	<ul style="list-style-type: none"><li>• Pencils</li><li>• Pens</li><li>• Sack of loose plants</li><li>• Display board of plants</li><li>• Plant guides</li><li>• Range plant identifying sheet</li></ul>
<b>PROCESSES USED</b>	<ul style="list-style-type: none"><li>• Classify</li><li>• Infer</li><li>• Hypothesize</li><li>• Communicate</li><li>• Observe</li></ul>
<b>TIME</b>	25 to 30 minutes



**DOING THE ACTIVITY** (outdoors)

A. Set the Stage

Range plants are divided into four broad groups. Today we will identify plants in these groups in order to complete a range analysis. We will also determine whether a plant is an annual or perennial. Knowledge of plant groups helps us understand what is happening on rangelands.

B. Procedure

1. Hand out Activity B: Range Plant Inventory sheets.
2. Work in pairs and study the two plants displayed. Then classify into the appropriate group. the plants you have been given.

**ACTIVITY B: Range Plant Inventory** pairs

Describe or name in the appropriate column below the plants found on your study area. Classify the annuals and perennials. Use the Range Plant Identification chart as necessary.

	Grasses	Grasslike	Forbs	Shrubs
perennial				
annual				

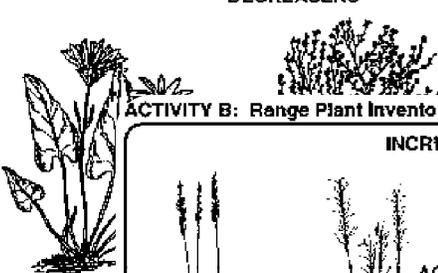
Investigating Your Environment Range 



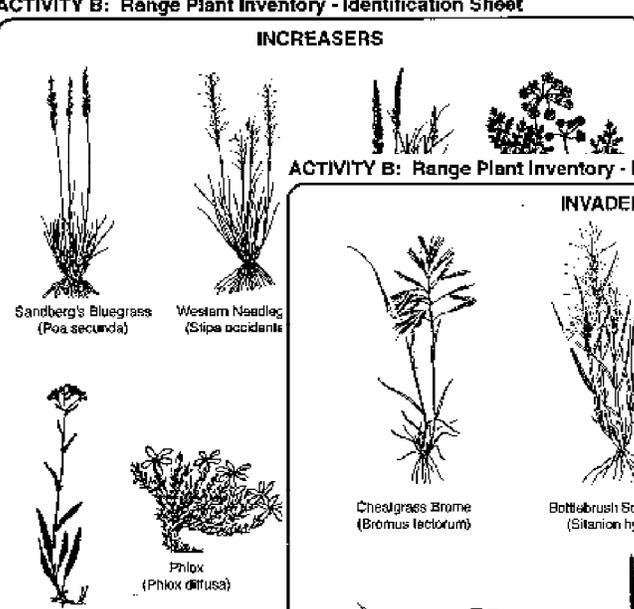
3. Distribute plants to groups as they study the displays. (Same as #2)
4. About 10 minutes into the activity, ask; What characteristics have helped you classify your plants thus far? Partners should answer the question for themselves.
5. Hand out Activity Sheet B: Range Plant Inventory and explain to students they need to get an idea of the plant types in this area. Use the information you have just learned. Describe or name the plants you have found here. Record your observations on Activity B. Allow 10 minutes.

**ACTIVITY B: Range Plant Inventory - Identification Sheet**

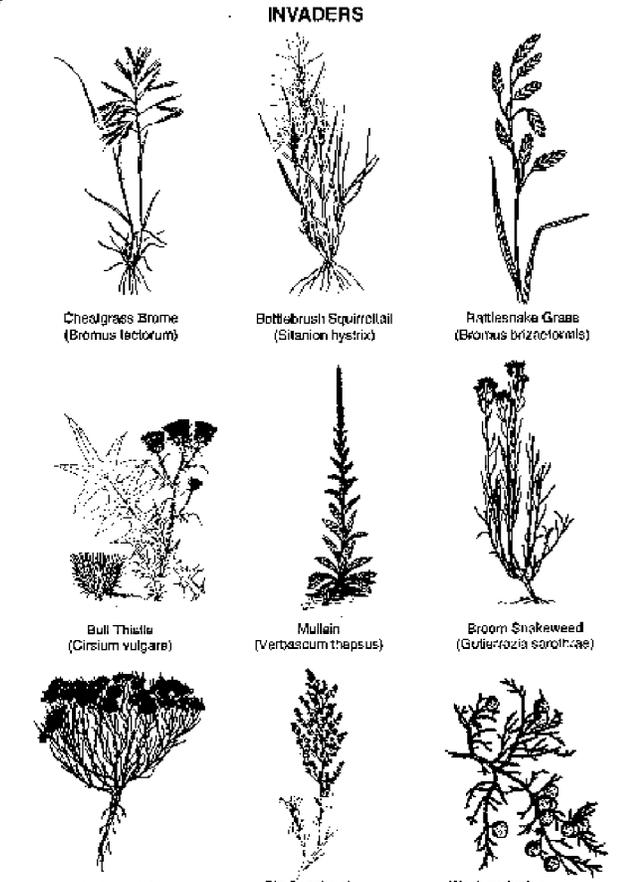
**DECREASERS**



**INCREASERS**



**INVADERS**





Bluebunch Wheat  
(*Agropyron spic*)



Idaho Fescue  
(*Festuca idaho*)



Sandberg's Bluegrass  
(*Poa secunda*)



Western Needlegrass  
(*Stipa occident*)



Cheatgrass Bromes  
(*Bromus tectorum*)



Bottlebrush Squirrolltail  
(*Sitanion hystrix*)



Phlox  
(*Phlox diffusa*)



Western Yarrow  
(*Achillea millefolium*)



Bull Thistle  
(*Cirsium vulgare*)



Mullain  
(*Verbascum thapsus*)



Broom Snakeweed  
(*Gutierrezia sarothrae*)



Rubber Rabbitbrush  
(*Chrysothamnus nauseosus*)



Big Sagebrush  
(*Artemisia tridentata*)



Western Juniper  
(*Juniperus occidentalis*)



Bittercherry  
(*Prunus emarginata*)



Snowbrush  
(*Ceanothus velut*)

### C. Retrieve Data

Guide a group discussion with questions such as:

1. What did you find?
2. Which plant group had the most plants in it?
3. Where did you find the different plants growing (separately, in clumps, mixed)?
4. What other observations did you make about the plants growing on this site?

**CLOSURE**            End the discussion by asking, “What can we say about plants that grow on the range?”

**TRANSITION**        In the next activity, we will investigate range plant life more extensively.



## **LIFE ALONG THE LINE (A TRANSECT SURVEY)**

<b>CONCEPT</b>	Change, Evolution, Interaction, Organism, Population, System
<b>PRINCIPLE</b>	A transect line is a cross-section of an area previously unknown to the observer. Careful study of a transect renders a wealth of information upon which the scientist can act. Transects are used in many fields of science, not just range science.
<b>OBJECTIVES</b>	<ul style="list-style-type: none"><li>• The student will be able to count and record the number and types of plants growing on a portion of an area.</li><li>• The student will be able to compute the percentage of vegetative cover along a given transect and hypothesize as to why the growth is as it is.</li></ul>
<b>PREPARATION</b>	Survey the area carefully and predetermine several areas which would hold a 100' transect line. You may need to establish the lines yourself if working with younger students. Make sure the one-foot intervals are marked. Make duplex copies of activity sheet C back to back.
<b>MATERIALS NEEDED</b>	<ul style="list-style-type: none"><li>• 100' tape or strings</li><li>• Stakes to tie down the transect lines</li><li>• Copies of Activity Sheet C: Transect Survey (2 pages)</li></ul>
<b>PROCESSES USED</b>	<ul style="list-style-type: none"><li>• Classify</li><li>• Communicate</li><li>• Observe</li><li>• Measure</li><li>• Hypothesize</li><li>• Infer</li><li>• Use numbers</li><li>• Interpret data</li></ul>
<b>TIME</b>	60 minutes. Can break into shorter sessions by laying out the line one day and conducting the survey the second day





## **HOW HEALTHY IS THIS RANGE?**

<b>CONCEPT</b>	Change, Cycle, Cause/Effect, Organism
<b>PRINCIPLE</b>	All the data gathered thus far will help us determine the health of this range. By knowing the health of the area, range managers can better prescribe management practices.
<b>OBJECTIVE</b>	<ul style="list-style-type: none"><li>• The student will be able to use his/her knowledge gathered so far to infer the healthiness of the range.</li><li>• The student will be able to explain how plants can be indicators of healthy rangeland and predict how this knowledge might be of help in another field.</li></ul>
<b>PREPARATION</b>	Print Activity Sheet D, back-to-back
<b>MATERIALS NEEDED</b>	<ul style="list-style-type: none"><li>• Completed copy of Activity Sheet C for each student</li><li>• Copies of Activity Sheet D: Infer Range Health or Condition (2 pages)</li></ul>
<b>PROCESSES USED</b>	<ul style="list-style-type: none"><li>• Observe</li><li>• Infer</li><li>• Classify</li><li>• Communicate</li><li>• Hypothesize</li><li>• Interpret data</li></ul>
<b>TIME</b>	20-25 minutes



**DOING THE ACTIVITY** (indoors or outdoors)

A. Set Stage

The type, number, and condition of certain plants, serve as indicators of the health or condition of the range and its ability to produce food or forage. We will use one approach to determine the health of our range. We call it the "traffic signal" method.

B. Procedure

1. Distribute Activity Sheet D to pairs. Allow 15 minutes.
2. Based on data gathered in the previous Activity C and using the information in Activity D, determine the range condition class for this range.
3. Apply the meaning of traffic signals to range plants to make this determination easier: Green group plants, Yellow group plants, and Red group plants.

15 min

**ACTIVITY D: Infer Range Health or Condition** **Inferred Range Health Or Condition (Continued)**

Use the data gathered in Activity C and the information below to class of this range.

**TECHNICIANS' GUIDE TO RANGE CONDITION**

Green-Group Plants	Yellow-Group Plants
<p><b>DECREASERS:</b> Plants that disappear when range is abused. Percentage figures indicate approximate amount found in climax for the site but count all found on site as climax.</p> <p>50% Sandbunch wheatgrass 5 Idaho fescue 1 Giant wild rye 5% Bitterbush</p>	<p><b>INCREASESERS:</b> Plants that increase when range is abused. Percentage figures indicate approximate amount found in climax for the site, so count no more than amount shown toward climax.</p> <p>15% Sandberg bluegrass 5 Western needlegrass 2 Prairie junegrass</p> <p>10% Max. In aggregate 1 Biscuitroot 2 Yarrow 2 Phlox 1 Buckwheat 1 Silver lupine 1 Serviceberry 1 Arrowleaf balsamroot 1 Bitter cherry 1 Snowbrush 1 Showy aster 1 Peary everlasting</p>
<p>Condition:    Excellent    Good-to-Fair    Poor</p> <p>Our area is in the green, yellow, red group plant condition—(circle plants found there)</p> <p>_____</p> <p>_____</p> <p>This would mean that the condition of the range is excellent. go</p> <p>_____</p> <p>_____</p> <p>_____</p>	

**The Green Group**—Plants in this group are the most desirable; the ones that livestock like best. When you see the green-group plants in abundance on the range, you know your grazing program is going well. The green-group plants consist of those which are plentiful, in excellent condition on native range, and are the first to decrease if range conditions is forced down to "good," "fair," and finally to "poor" range. Range in the poorest condition has very few green-group plants on it.

**The Yellow Group**—These are also native plants, but they are less attractive to livestock. They escape grazing because they are short or because they are less tasty to livestock. Yellow-group plants are the ones to watch with "caution." They replace the green-group plants which have become smaller and weaker.

The range manager uses caution when he sees the number of yellow-group plants increasing on his range. He is safe if they are being replaced by green-group plants. That means the range is improving.

If heavy grazing continues, the yellow-group plants begin to weaken and die out. Their place is taken by the red-group plants.

**The Red Group**—These plants really do not need any explanation. They simply mean "danger" to the range, so far as production is concerned. These plants are usually annuals or unpalatable species which have come in from other areas and occupy the range as invaders.

Red-group plants seldom, if ever, are as effective in controlling soil erosion and conserving water resources as the native plants which are more abundant when the range is in good or excellent condition. Soil and water losses cause nature's plant and soil development process to go in reverse. The range becomes less healthy and less productive.



### C. Retrieve Data

In a discussion of the group findings, look for similarities and differences. If you are all in the same area, each group should come up with about the same classification. Ask questions such as:

1. What color group did you put your range in and why?
2. What condition does your site appear to be in?

**CLOSURE**                Review findings with class and write a group statement about the range's health.

**TRANSITION**            We have gathered information about the health of our range. In the next activity, we will predict future health trends.

## **BETTER OR WORSE? WHAT IS THE PRESCRIPTION FOR HEALTH?**

<b>CONCEPT</b>	Change, Cause/Effect, Organism, Evolution
<b>PRINCIPLE</b>	Determining what is happening on a piece of land requires many steps. This activity lets you continue putting the pieces together to predict the direction of the health of the range.
<b>OBJECTIVE</b>	<ul style="list-style-type: none"><li>• The student will be able to use information gathered to determine in which direction the health of the range is heading.</li></ul>
<b>PREPARATION</b>	Duplex copy Activity E back-to-back for each student.
<b>MATERIALS NEEDED</b>	<ul style="list-style-type: none"><li>• Previous data sheets C and D</li><li>• Activity sheet E: Range Health and Condition</li><li>• Pencils</li></ul>
<b>PROCESSES USED</b>	<ul style="list-style-type: none"><li>• Observe</li><li>• Infer</li><li>• Predict</li><li>• Communicate</li><li>• Hypothesize</li><li>• Interpret data</li></ul>
<b>TIME</b>	30 minutes



**DOING THE ACTIVITY** (indoors or outdoors)

A. Set the stage

In this activity, we will record and interpret data to predict the direction of the health of the range..

B. Procedure

1. Distribute Activity Sheet E, allowing about 15 minutes.
2. Work in groups and compile the information you have gathered. Use the Activity Sheet E to help you organize your information.

15 in. groups

**ACTIVITY E: Range Health and Condition Information**

Observers \_\_\_\_\_ Date \_\_\_\_\_

\_\_\_\_\_ Location \_\_\_\_\_

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**ACTIVITY E: Range Trend Indicators\***

Plants	%
bluebunch wheatgrass	
Idaho fescue	
Sandberg bluegrass	
Cheatgrass	
Other	
<b>Forbs</b>	
Yarrow	
Phlox	
Balsam	
Carrot	
Other	
Shrubs and trees	
Total Usable Plants	

Condition Indicators (From Activity D)	Condition class based on vegetation
Excellent	_____
Good to Fair	_____
Poor	_____

**Indicators of Upward Vegetation Trend**

1. Desirable and intermediate forage plants becoming more abundant.
2. Desirable and intermediate forage plants invading bare ground or stands of undesirable plants. A variety of all age classes of better forage plants must be present.
3. Establishment of perennial plants on erosion pavement.
4. Several years of vigorous growth on browse.
5. Decreaser plants increasing and vigorous. Grasses with long green leaves, and numerous healthy seed stalks.
6. A well dispersed accumulation of litter.

**Indicators of Upward Soil Trend**

1. Gullies approaching the angle of repose and healing.
2. Gullies stabilizing by the growth of perennial vegetation on both sides and bottom.
3. Soil remnants having sloping sides or sides covered with mosses, lichens, or higher plants.
4. Terraces characterized by sloping sides which are being covered with vegetation. Tops of terraces should be occupied by perennial plants.

**Indicators of Downward Vegetation Trend**

1. Desirable and intermediate species decreasing in vigor.
2. Lack of young plants from desirables and intermediate species.
3. Invasion by undesirable species.
4. Hedged and highlined shrubs. Dead branches generally indicating that shrubs are dying back.
5. Litter scarce and poorly dispersed.

**Indicators of Downward Soil Trend**

1. Rill mark, small active gullies that indicate shrubs are dying back.
2. Active gullies. Established gullies are raw and actively cutting. This type of gully may vary from a few inches to several feet in depth.
3. Alluvial deposits. Soil material transported and laid down by running water.
4. Soil remnants. Original topsoil held in place by vegetation or plant roots.
5. Active terraces. Terraces usually caused by hooves of animals. They are "stair step-like" in appearance on slopes.
6. Exposed plant crowns or roots (pedestalled plants).
7. Wind-scoured depressions between plants.
8. Wind deposits.

\* Forest Service Range Environmental Analysis Handbook



### C. Retrieve Data

1. Discuss the results. You may want to graph the results and discuss the trend or direction in which this range is going.
2. Ask: What did you find is the trend of this range?
3. Ask: What could account for your findings?
4. Ask: Which things are influencing the trend the most?
5. Ask: How might this area look in 10 years?

**CLOSURE** Participants share answers to the question; What have we found out about changes on this range?

**TRANSITION** We have just finished determining the health of the range. Let's look at the degree to which it is being used by livestock.

## **DETERMINE RANGE UTILIZATION**

<b>CONCEPT</b>	Cause/Effect, Change, Equilibrium, Interaction, Population.
<b>PRINCIPLE</b>	Rangelands are used for livestock grazing. This activity shows a student how to look at this use of range.
<b>OBJECTIVE</b>	<ul style="list-style-type: none"><li>• The student will be able to determine how much use an area of range receives from livestock grazing.</li></ul>
<b>PREPARATION</b>	Copy Activity Sheet F
<b>MATERIALS NEEDED</b>	<ul style="list-style-type: none"><li>• Activity sheet F: Evaluate Range Utilization</li><li>• String</li><li>• Sharp knife</li></ul>
<b>PROCESSES USED</b>	<ul style="list-style-type: none"><li>• Communicate</li><li>• Define operationally</li><li>• Infer</li><li>• Interpret data</li><li>• Measure</li><li>• Observe</li><li>• Classify</li><li>• Use numbers</li></ul>
<b>TIME</b>	30 minutes to 60 minutes depending upon number of plants measured.



## DOING THE ACTIVITY (outdoors)

### A. Set the Stage

1. Rangelands are often used for livestock grazing. In this activity, we will look at a method to measure how much grass can be used.
2. Utilization is the amount of the current year's plant growth that is removed by grazing livestock. Heavy utilization may occur on a range in excellent or in poor condition. Heavy utilization over a period of years causes regression and weakens range health.
3. Livestock do not use all species of range plants to the same degree. They eat more of the better-tasting plants. Each grass, forb, and shrub can be grazed a certain amount without hurting its ability to grow year after year. We will consider three categories of range use.

### B. Procedure

1. Arrange students into groups and distribute Activity Sheet F.
2. Go over the instructions and model the procedure.
3. Allow 30 to 45 minutes to complete the activity.

#### ACTIVITY F: Evaluate Range Utilization

30 min.  
groups

For some grasses, the proper use is considered removal of about one-half of the growth made in the present year. While proper use must be considered in the light of the above-named factors, "taking half and leaving half" can sometimes be used as a "rule of thumb."

To determine the amount of stubble left when one-half the growth is removed, follow these steps:

1. Wrap an average-sized, mature, ungrazed plant with string to hold it together when cut.
2. Cut off plant at crown (ground level).
3. Adjust the wrapped plant across a knife blade to make it balance. Measure with ruler from bottom of plant to point of balance. This gives height, indicating 50 percent use for that particular species of grass. Desirable approximate stubble heights for some native grasses are:

Grass	Inches stubble left
Bluebunch wheatgrass	4-8
Idaho fescue	2-4
Big bluegrass	3-5

4. Repeat this for 10 average plants of a species to get an average.
5. Select 100 plants randomly, measure their heights (whether grazed or not), and average the measurements. If the average grazed height is more than the standard shown above, the range is not fully used. If it is less, the range is overused.

Grass	Inches stubble left	Utilization rate heavy-moderate-light

#### Definition of Utilization Rate

**Light use:** Only choice plants are grazed. Only a small amount of the less-desirable forage plants are consumed, thereby wasting much valuable forage. Ungrazed plants and heavy litter build-up may result in serious fire hazard. Also, excessive amounts of unused plant material may contribute to poor utilization of forage by the grazing livestock because usually they will not eat last year's old stems and leaves.

**Moderate use:** The most economically important forage plants have been fully grazed on the most popular parts of the management unit. Factors to be considered when determining proper use are: (1) species of grasses being grazed; (2) season of year the grass is grazed; (3) amount of growth made in the present year; and (4) amount of soil moisture this year.

**Heavy use:** The range has a "clipped" or mowed appearance. Over half of the green and the yellow forage plants are grazed. This leads eventually to a decrease in forage production and range condition. Heavy use is directly harmful to plants and soil and indirectly to animals. Grasses are grazed short. As a result, the best "food factories" are inefficient, roots are decreased in size and length, and plants die during the dry summer season or a severe drought. Heavy use results in unprofitable returns and reduces the value of the land for sale. The land may be ruined for many years by speeded-up water and wind erosion and by trampling. Grasses that are grazed short require three to five weeks of top growth before root growth begins.

Investigating Your Environment  
Range



### C. Retrieve Data

Conduct a discussion asking the following questions:

1. What utilization rate did you find?
2. What different rates did you find among the different grasses?
3. What could account for the different rates?
4. Of what, if any, value are the stubble and plant litter remains on a properly utilized range?

**CLOSURE**                      What have we discovered about livestock's use of plants (grasses) ?

**TRANSITION**                We have looked at how much use our range receives from livestock. Let's investigate the food value of range plants.

## **DETERMINE FOOD VALUE OF PLANTS FOR ANIMALS**

<b>CONCEPT</b>	Cause/Effect, Change
<b>PRINCIPLE</b>	Plants are usually eaten by animals. In this activity, you will explore the food value of different types of range plants.
<b>OBJECTIVE</b>	<ul style="list-style-type: none"><li>• The student will be able to determine the value of certain food plants for grazing animals.</li></ul>
<b>PREPARATION</b>	Copy worksheets for each student
<b>MATERIALS NEEDED</b>	<ul style="list-style-type: none"><li>• Activity sheet G: Food Plant Values for Animals</li></ul>
<b>PROCESSES USED</b>	<ul style="list-style-type: none"><li>• Communicate</li><li>• Infer</li><li>• Interpret data</li><li>• Observe</li></ul>
<b>TIME</b>	20 to 30 minutes



**DOING THE ACTIVITY** (indoors or outdoors)

A. Set Stage

Plants have different food values for different animals.

B. Procedure

1. Hand out Activity Sheet G and have students get into pairs.
2. Students look at the plant value chart and the plants of the area before completing the chart on the bottom of the activity sheet.
3. Allow 15 minutes.

15 min.  
Pairs

**ACTIVITY G: Food Plant Values for Animals**

Use the range plant identification sheets and the chart below to complete the chart at the bottom of the page.

**PLANT VALUE CHART**

Value: X - Poor XX - Fair XXX - Good	Check plants on area	Small Mammals	Medium Mammals (Example Rabbit)	Hoofed Browsers (Example Deer)	Songbirds (Example Sparrow)	Game birds (Example Quail)	Cattle	Watershed Value
<b>Grasses:</b>								
	clovergrass	X	X	XX	X	XXX	XX	X
	orchardgrass	X	X	XX	X	XXX	XX	XX
	quailgrass	X	X	XX	X	XXX	XX	XX
<b>Herbs:</b>								
	butternut	X	X		X	X	X	X
	lettuce		XX		X	XXX	X	X
	mustard	X			X	X	X	X
	peppergrass	X			X	X	X	X
	pigweed	X	X		X	X	X	X
	Russian thistle	X	X	X	X	X	X	X
<b>Shrubs:</b>								
	rabbit brush			X				XX
	sagebrush		X	XXX			XX	XX

Based on the plants found in the area and the plant value chart above check the values of the plants for the animals listed.

**Value of plants on area for food for animals**

Animal	poor	fair	good
Small mammals (Mice)			
Medium mammals (Rabbits)			
Hoofed browser (Deer)			
Song birds			
Game birds (Quail)			
Cattle			

Investigating Your Environment  
Range 

C. Retrieve Data

Discuss findings:

1. What did you find?
2. Which animals would find the most food value here?
3. What might account for the different foods?

**CLOSURE**

What can we say about food values here?

**TRANSITION**

This activity looked at how different animals inhabit this area. Let's go to the next activity for a more in-depth look.



## **WHOSE HOME IS THIS RANGE?**

<b>CONCEPT</b>	Equilibrium, Interaction, Organism, Population
<b>PRINCIPLE</b>	We seldom see wild animals. Instead, we catch hints of their existence: a tuft of fur on a branch, a footprint in wet sand, a smell or a sound. In this activity the student becomes a close observer of animals.
<b>OBJECTIVE</b>	<ul style="list-style-type: none"><li>• The student will gather information about animals that live in the area and estimate the use the area receives.</li></ul>
<b>PREPARATION</b>	Make wire hoops ahead of time. Copy Activity Sheet H and I. Make sure the site contains animal burrows.
<b>MATERIALS NEEDED</b>	<ul style="list-style-type: none"><li>• Five 40" diameter wire hoops per group</li><li>• Pencils</li><li>• Screen box</li><li>• Activity Sheets H: Animal Evidence Survey and I: Investigate An Animal Burrow, for each student</li><li>• 12" rulers</li><li>• Knife</li></ul>
<b>PROCESSES USED</b>	<ul style="list-style-type: none"><li>• Classify</li><li>• Communicate</li><li>• Infer</li><li>• Hypothesize</li><li>• Question</li><li>• Observe</li><li>• Measure</li><li>• Use numbers</li></ul>
<b>TIME</b>	40 to 60 minutes





2. Distribute wire hoops. Model and verbally explain the hoop tossing procedure as well as how to record data.
3. Allow about 20 minutes to complete the activity, including calculations.
4. Group back together, explain Activity I. Make sure they know the instructions are on the activity card.
5. Allow 20 or so minutes to finish Activity I.

### C. Retrieve Data

1. Conduct a discussion, record data, if and where you think appropriate.
2. Questions for Activity H: Animal Evidence Survey
  - a. What did you find?
  - b. What animals did you find the most evidence of? the least?
  - c. What might account for the differences you found?
  - d. How might the evidence be different if this were during another time of the year?
3. Questions for Activity I: Burrow Investigation.
  - a. How would you describe your burrow?
  - b. What can you say about the habitats of the animals that lived there?
  - c. How does the animal and burrow affect the area?

### **CLOSURE**

How can we summarize our discussions and investigations?  
Go back over all that you have done to form a conclusive picture. How would you summarize the processes we used?



## **MAP THE RANGE (OPTIONAL)**

<b>CONCEPT</b>	System, Change, Interaction, Population
<b>PRINCIPLE</b>	Range sites are most easily recognizable on the basis of their vegetative and soil characteristics. On all but the most severely depleted ranges, sites are most easily recognized by similar plant communities which cover them. Each range site is thought of as a separate part of the range for management purposes. Since each range site grows different plant combinations, each site should be judged separately.
<b>OBJECTIVE</b>	<ul style="list-style-type: none"><li>• The student will use skills learned in the “Measuring the Environment” lesson to construct a map of the area studied.</li></ul>
<b>PREPARATION</b>	Gather materials used in measuring lesson plans so students know what is needed. Review skills used in measuring lesson so you can help students. Establish minimum criteria for a finished product.
<b>MATERIALS NEEDED</b>	<ul style="list-style-type: none"><li>• Compass</li><li>• Instant mappers</li><li>• Cardboard box</li><li>• Plane tables</li><li>• Pencils</li><li>• Paper</li><li>• Tape measures</li></ul>
<b>PROCESSES USED</b>	<ul style="list-style-type: none"><li>• Classify</li><li>• Communicate</li><li>• Formulate model</li><li>• Interpret data</li><li>• Measure</li><li>• Observe</li><li>• Use numbers</li><li>• Use time-space relationships</li><li>• Scale</li></ul>
<b>TIME</b>	Two to three 45-minute class periods (estimate)



**DOING THE ACTIVITY** (outdoors, on site)

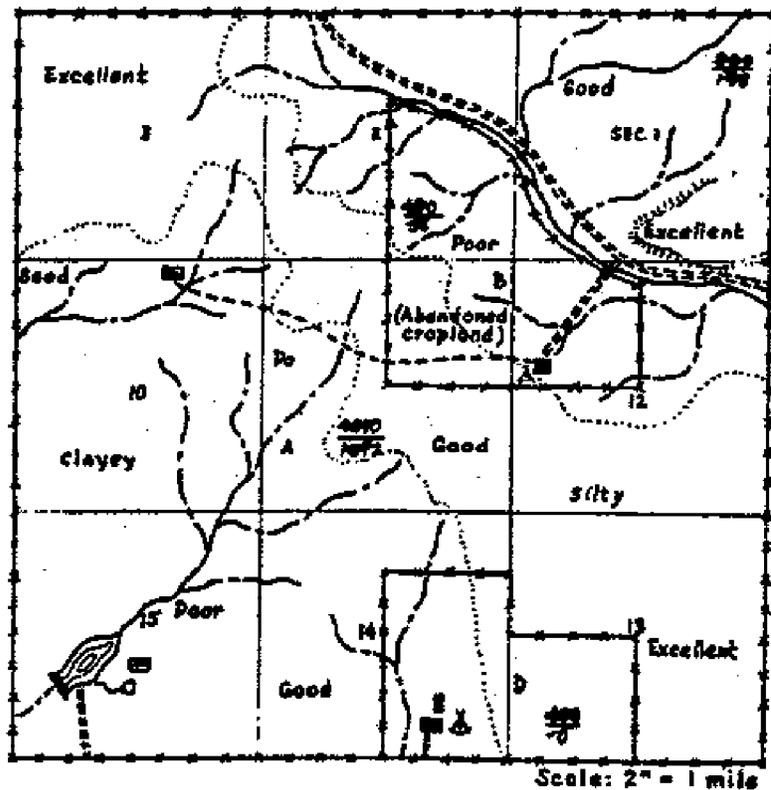
**A. Set Stage**

Range sites are most easily recognizable on the basis of their vegetative and soil characteristics. On all but the most severely depleted ranges, sites are most easily recognized by similar plant communities which cover them. Each range site is thought of as a separate part of the range for management purposes. Since each range site grows different plant combinations, each site should be judged separately.

We will map out range site using knowledge and skills learned in a previous investigation.

**B. Procedure**

Use the skills learned in the Measuring the Environment lesson plan, construct a map of your area, such as the sample below. Work in groups of 4. Allow two to three 45-minute periods.



- |                           |  |
|---------------------------|--|
| ■ Building                | — Public road                                    |
| ▣ Salt trough             | --- Private road                                 |
| ⊙ Windmill                | --- Trail  |
| ○ Natural spring          | — Permanent stream                               |
| ○ Spring developed        | --- Intermittent stream                          |
| --- Fence                 | ⊘ Cliffs   |
| D Pasture or field number | ⊙ Stack water or reservoir                       |
| Do Poisonous plants       | Excellent, good, fair, or poor = Range condition |
|                           | --- Site boundary                                |



### C. Retrieve Data

In the discussion of each map, find out:

1. How did you map your area?
2. How do the maps you made differ?
3. What could account for the differences?
4. How could your map be helpful in planning for the future of the area?

### **CLOSURE**

What can we say about rangelands from our investigations?

## ACTIVITY A: Observe the Range Environment

15 min.  
individuals

As you investigate the study area, observe and record your observations.

### **Soil**

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### **Rocks**

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### **Air**

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### **Plants**

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### **Animals**

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## ACTIVITY B: Range Plant Inventory

pairs

Describe or name in the appropriate column below the plants found on your study area. Classify the annuals and perennials. Use the Range Plant Identification chart as necessary.

	Grasses	Grasslike	Forbs	Shrubs
perennial				
annual				

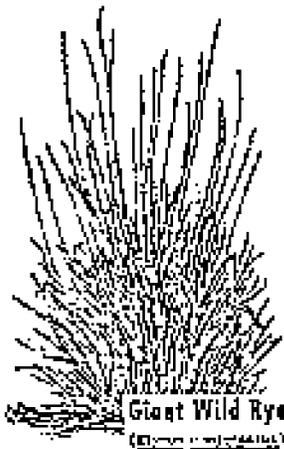


# ACTIVITY B: Range Plant Inventory Identification Sheet

IMPORTANT RANGE PLANT GROUPS					
	GRASSES	QUADRUPE Sedges   Rushes		FORBS	SHRUBS (Green)
STEMS	 Jointed Nodes or Noddy	 Solid Not Jointed	 Solid	 Scattered nodes Solid	 Woody Solid
LEAVES	 Blade Leaf sheath Leaf sheath Blade			 Widely and evenly netlike	
ROOTS	 Fibrous at base of stem Fibrous at base of stem	 Fibrous at base of stem Fibrous at base of stem	 Fibrous at base of stem Fibrous at base of stem	 Taproot Many	 Taproot Many
FLOWERS	 Many	 Many Long or compound	 Many	 Many	 Many
FRUIT	 Many	 Many	 Many	 Many	 Many

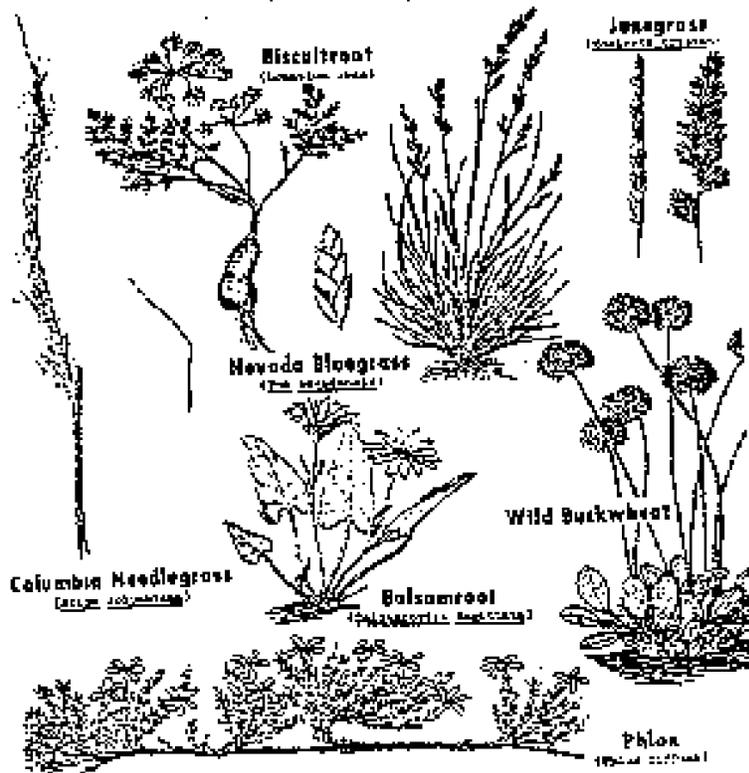
Definitions:  
 litter—plant debris on ground surface.  
 annual grass—lives for a single year and depends on seeds for reproduction.  
 perennial grass—lasts from year to year from the same root base.  
 forb—wildflowers and "weeds"  
 shrub—persistent woody plant smaller than a tree.

Examples of Green Group plants (decreasers)

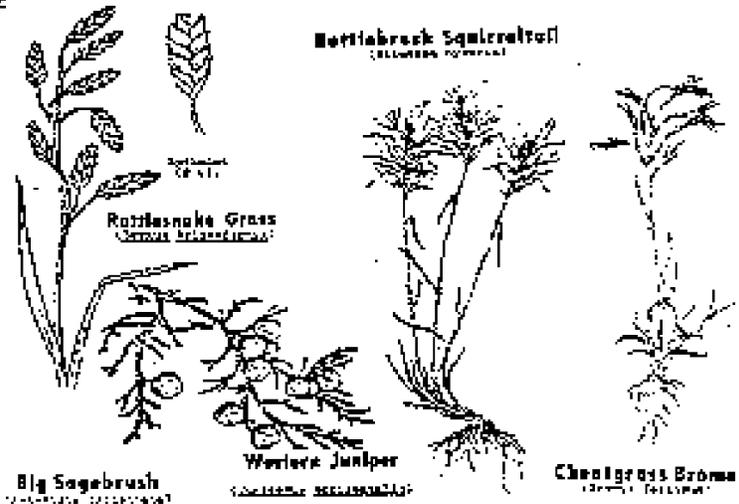


Range Plants

Samples of the Yellow Group Plants  
(Increasers)



Samples of the Yellow Group Plants  
(Invaders)



White Sage or Silver Sage (Artemisia cana) Grows on flats too wet in spring for big sage. Fairly good winter feed (1/8 x).

Dark Sage or Little Sage (Artemisia arbuscula) Low, bushy plant on thin rocky soil in desert-like places. Excellent forage (1/8 x).

Stiff Sage (Artemisia rigida) Found in rocky scrub lands along Columbia River. Silvery color, leaves divided clear to base (1/8 x).



# ACTIVITY B: Range Plant Inventory - Identification Sheet

## INCREASERS



Sandberg's Bluegrass  
(*Poa secunda*)



Western Needlegrass  
(*Stipa occidentalis*)



Prairie Junegrass  
(*Koeleria cristata*)



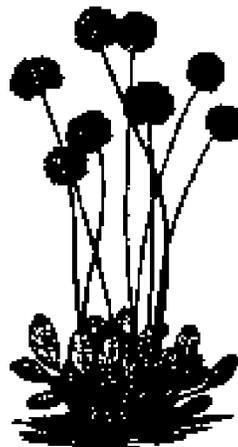
Biscuitroot  
(*Lomatium couis*)



Western Yarrow  
(*Achillea millefolium*)



Phlox  
(*Phlox diffusa*)



Wild Buckwheat  
(*Eriogonum ovalifolium*)



Silvery Lupine  
(*Lupinus argenteus*)



Bittercherry  
(*Prunus emarginata*)



Snowbrush  
(*Caeanthus velutinus*)



Showy Aster  
(*Aster conspicuus*)



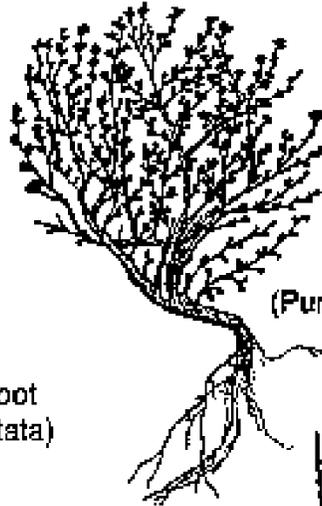
Pearly Everlasting  
(*Anaphalis margaritacea*)

**ACTIVITY B: Range Plant Inventory - Identification Sheet**

**DECREASERS**

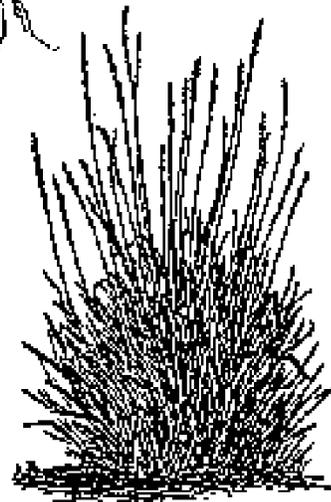


Arrowleaf Balsamroot  
(*Balsamorhiza sagittata*)

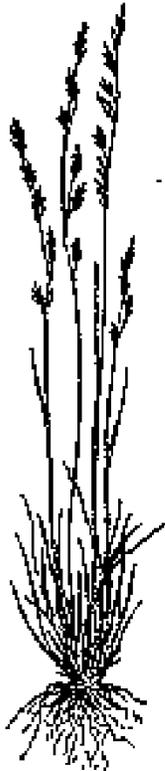


Bitterbrush  
(*Purshia tridentata*)

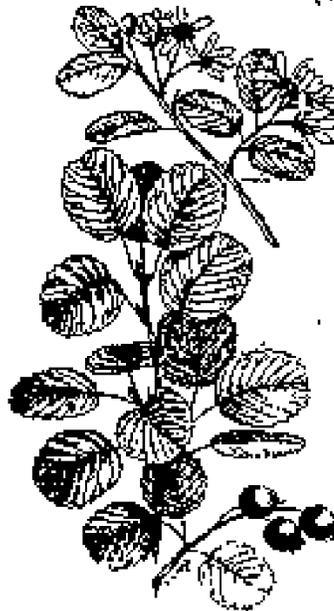
Bluebunch Wheatgrass  
(*Agropyron spicatum*)



Giant Wild Rye  
(*Elymus condensatus*)



Idaho Fescue  
(*Festuca idahoensis*)



Saskatoon Serviceberry  
(*Amelanchier alnifolia*)



## ACTIVITY B: Range Plant Inventory - Identification Sheet

### INVADERS



Cheatgrass Brome  
(*Bromus tectorum*)



Bottlebrush Squirreltail  
(*Sitanion hystrix*)



Rattlesnake Grass  
(*Bromus brizaeformis*)



Bull Thistle  
(*Cirsium vulgare*)



Mullein  
(*Verbascum thapsus*)



Broom Snakeweed  
(*Gutierrezia sarothrae*)



Rubber Rabbitbrush  
(*Chrysothamnus nauseosus*)



Big Sagebrush  
(*Artemisia tridentata*)



Western Juniper  
(*Juniperus occidentalis*)

### ACTIVITY C: Transect Survey (continued)

#### Transect Survey (Continued)

Summarize your data below:

Item	Record the total # of ✓s from chart for each item below.
Rock	
Bare soil	
Litter	
Annual grass	
Perennial grass	
Forb	
Shrub	
Trees	
Animal sign	

#### Totals

(The # of ✓s for each item is equal to the percentage of the total for that item.)

Which column had the greatest percentage coverage \_\_\_\_\_, the least \_\_\_\_\_.

Which plants if any tend to be associated with certain areas, such as bare places, rocks, protective shrubs, etc.? \_\_\_\_\_

What reasons might account for this? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



# ACTIVITY C: Transect Survey

45 m In.  
groups

Working in groups, stretch a 100 foot tape along the ground where you want to inventory the types of plants of your area. Record what you find at each foot along the transect by putting a check (✓) in the appropriate column.

Sample Every Foot	Left Side										Right Side										
	Rock	Bare Soil	Litter	Annual Grass	Per. Grass	Forb	Shrub	Tree	Animal Sign	Other	Rock	Bare Soil	Litter	Annual Grass	Per. Grass	Forb	Shrub	Tree	Animal Sign	Other	
1																					
2																					
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# ACTIVITY D: Infer Range Health or Condition

15 min.  
pairs

Use the data gathered in Activity C and the information below to determine the range condition class of this range.

## TECHNICIANS' GUIDE TO RANGE CONDITION CLASSES

Green-Group Plants	Yellow-Group Plants	Red-Group Plants
<p><b>DECREASERS:</b> Plants that disappear when range is abused. Percentage figures indicate approximate amount found in climax for the site but count all found on site as climax.</p> <p>60% Bluebunch wheatgrass 5 Idaho fescue T Giant wild rye 5% Bitterbush</p>	<p><b>INCREASERS:</b> Plants that increase when range is abused. Percentage figures indicate approximate amount found in climax for the site, so count no more than amount shown toward climax.</p> <p>15% Sandberg bluegrass 5 Western needlegrass 2 Prairie junegrass</p> <p>10% Max. in aggregate 1 Biscuitroot 2 Yarrow 2 Phlox 1 Buckwheat 1 Silver lupine 1 Serviceberry 1 Arrowleaf balsamroot 1 Bitter cherry 1 Snowbrush 1 Showy aster 1 Pearly everlasting</p>	<p><b>INVADERS:</b> Plants that invade when range is abused. These did not occur in climax, so none of these are counted toward climax.</p> <p>Cheatgrass Brome Squirreltail Rattlesnake grass</p> <p>Bull thistle Mullein Broom snakewood</p> <p>Rubber rabbitbrush Big sagebrush Western Juniper</p>

**Condition:**      Excellent      Good-to-Fair      Poor

Our area is in the green, yellow, red group plant condition—(circle one) because of the following plants found there \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

This would mean that the condition of the range is excellent, good to fair, poor, because

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



## Inferring Range Health Or Condition (Continued)

**The Green Group**—Plants in this group are the most desirable; the ones that live-stock like best. When you see the green-group plants in abundance on the range, you know your grazing program is going well. The green-group plants consist of those which are plentiful, in excellent condition on native range, and are the first to decrease if range conditions is forced down to "good," "fair," and finally to "poor" range. Range in the poorest condition has very few green-group plants on it.

**The Yellow Group**—These are also native plants, but they are less attractive to livestock. They escape grazing because they are short or because they are less tasty to livestock. Yellow-group plants are the ones to watch with "caution." They replace the green-group plants which have become smaller and weaker.

The range manager uses caution when he sees the number of yellow-group plants increasing on his range. He is safe if they are being replaced by green-group plants. That means the range is improving.

If heavy grazing continues, the yellow-group plants begin to weaken and die out. Their place is taken by the red-group plants.

**The Red Group**—These plants really do not need any explanation. They simply mean "danger" to the range, so far as production is concerned. These plants are usually annuals or unpalatable species which have come in from other areas and occupy the range as invaders.

Red-group plants seldom, if ever, are as effective in controlling soil erosion and conserving water resources as the native plants which are more abundant when the range is in good or excellent condition. Soil and water losses cause nature's plant and soil development process to go in reverse. The range becomes less healthy and less productive.





**ACTIVITY F: Evaluate Range Utilization**

For some grasses, the proper use is considered removal of about one-half of the growth made in the present year. While proper use must be considered in the light of the above-named factors, "taking half and leaving half" can sometimes be used as a "rule of thumb."

To determine the amount of stubble left when one-half the growth is removed, follow these steps:

1. Wrap an average-sized, mature, ungrazed plant with string to hold it together when cut.
2. Cut off plant at crown (ground level).
3. Adjust the wrapped plant across a knife blade to make it balance. Measure with ruler from bottom of plant to point of balance. This gives height, indicating 50 percent use for that particular species of grass. Desirable approximate stubble heights for some native grasses are:

Grass	Inches stubble left
Bluebunch wheatgrass	4-8
Idaho fescue	2-4
Big bluegrass	3-5

4. Repeat this for 10 average plants of a species to get an average.
5. Select 100 plants randomly, measure their heights (whether grazed or not), and average the measurements. If the average grazed height is more than the standard shown above, the range is not fully used. If it is less, the range is overused.

Grass	Inches stubble left	Utilization rate heavy-moderate-light

**Definition of Utilization Rate**

**Light use:** Only choice plants are grazed. Only a small amount of the less desirable forage plants are consumed, thereby wasting much valuable forage. Ungrazed plants and heavy litter build-up may result in serious fire hazard. Also, excessive amounts of unused plant material may contribute to poor utilization of forage by the grazing livestock because usually they will not eat last year's old stems and leaves.

**Moderate use:** The most economically important forage plants have been fully grazed on the most popular parts of the management unit. Factors to be considered when determining proper use are: (1) species of grasses being grazed; (2) season of year the grass is grazed; (3) amount of growth made in the present year; and (4) amount of soil moisture this year.

**Heavy use:** The range has a "clipped" or mowed appearance. Over half of the green and the yellow forage plants are grazed. This leads eventually to a decrease in forage production and range condition. Heavy use is directly harmful to plants and soil and indirectly to animals. Grasses are grazed short. As a result, the leaf "food factories" are inefficient, roots are decreased in size and length, and plants die during the dry summer season or a severe drought. Heavy use results in unprofitable returns and reduces the value of the land for sale. The land may be ruined for many years by speeded-up water and wind erosion and by trampling. Grasses that are grazed short require three to five weeks of top growth before root growth begins.



# ACTIVITY G: Food Plant Values for Animals

15 min.  
pairs

Use the range plant identification sheets and the chart below to complete the chart at the bottom of the page.

**PLANT VALUE CHART**

Value: X - Poor XX - Fair XXX - Good	Check plants on area	Small Mammals	Medium Mammals (example Rabbit)	Hoofed Browsers (Example Deer)	Songbird (Example Sparrow)	Upland Game birds (Example Quail)	Cattle	Watershed Value
<b>Grasses:</b>								
	chestgrass	X	X	XX	X	XXX	XX	X
	crested wheatgrass	X	X	XX	X	X	XXX	XXX
	squirreltail	X		X	X	X	XXX	XXX
<b>Forbs:</b>								
	bull thistle	X	X		X	X	X	X
	lettuce		XX		X	XXX		X
	mustard	X			X	X		X
	pepper grass	X			X			X
	pigweed	X	X		X	X		X
	Russian thistle	X	X	X	X	X	X	X
<b>Shrubs:</b>								
	rabbit brush			X				XX
	sagebrush		X	XXX			XX	XX

Based on the plants found in the area and the plant value chart above check the values of the plants for the animals listed.

## Value of plants on area for food for animals

Animal	poor	fair	good
Small mammals (Mice)			
Medium mammals (Rabbits)			
Hoofed browser (Deer)			
Song birds			
Game birds (Quail)			
Cattle			



## ACTIVITY H: Animal Evidence Survey

15 min.  
pairs

Observe and record evidences of animals.

Make a wire hoop 40" diameter. Five hoops equals about 1/1000 of an acre. Take 5 samples by throwing your hoop out in 5 different places. Record the evidences of animals found within each hoop area below.

(Multiply total animal signs by 1,000 to get number per acre).

Numbers of individual signs (such as rabbit pellets) may be convenient to work with. For small social insects such as an ant, record number of anthills, active or inactive.

Type of Sign	Animal that made it	Number of signs/hoop					5-hoop total	Multiply by 1,000	Approx. #/acre
		1	2	3	4	5			
EXAMPLE: Web	Spider	2	0	4	3	0	9	1,000	9,000
EXAMPLE: Tracks	Horse	4	0	0	0	0	4	1,000	4,000

1. What other types of animal evidence do you observe in your plot?

2. What certain types of signs are most often associated with particular kinds of plants?

3. From the evidence found, are small (jackrabbit size or less) or large animals found in greater numbers of your area? Why?



