

RRO RANGELAND OUTREACH ACTIVITIES MANUAL



University of Idaho
Extension



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RANGELAND OUTREACH ACTIVITIES MANUAL

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ABOUT 4-H

4-H is one of the largest youth development organizations in the United States. 4-H is found in almost every county across the nation and enjoys a partnership between the U.S. Department of Agriculture (USDA), the state land-grant universities (e.g., University of Idaho), and local county governments.

4-H is about youth and adults working together as partners in designing and implementing club and individual plans for activities and events. Positive youth development is the primary goal of 4-H. The project area serves as the vehicle for members to learn and master project-specific skills while developing basic life skills. All projects support the ultimate goal for the 4-H member to develop the positive personal assets they need to live successfully in a diverse and changing world.

Participation in 4-H has shown many positive outcomes for youth. Specifically, 4-H participants have higher participation in civic contribution, higher grades, increased healthy habits, and higher participation in science than other youth.

WHAT IS ROAM?

The Rangeland Outreach Activities Manual (ROAM): 4-H Skill-a-thon Study Guide was created to guide new 4-H rangeland volunteers through the process of coaching a 4-H team to compete in the Idaho 4-H Rangeland Skill-a-thon. It also provides a guideline for seasoned volunteers to try a new project area. This curriculum includes vocabulary lists, activities, reference materials, and optional activities to further learning.



STARTING A TEAM

1. Recruit a team of 3–4 youth to create a junior or senior team and a 4-H certified volunteer to serve as the team coach.

a. Team classifications if preparing for Idaho 4-H Rangeland Skill-a-thon.

i. Junior Teams: ages 8–13; Senior Teams: ages 14–18; Mixed-age Teams are allowed and will compete as a senior team, but will be ineligible to compete at Wildlife Habitat Education Program (WHEP) (age as of January 1 of the current 4-H year).

ii. The top senior team at this contest will be invited to represent Idaho at the national WHEP (WHEP.org) competition. Mixed-age teams are not eligible to participate in the national contest.

b. Have each team member sign up on the University of Idaho Marketplace by the deadline.

2. Enroll your team with your local Extension office. Each youth will need to enroll on www.4honline.com. Each adult volunteer coach will need to be a certified 4-H volunteer. Contact your county Extension office for further information on the certification or recertification process.

3. Further contest information can be found at: <https://www.uidaho.edu/extension/4h/programs/contests>.





MEETING
01

ORIENTATION

Welcome to the Rangeland Outreach Activities Manual! Your leader will guide you through seven meetings to develop your skills and deepen your knowledge about rangeland ecology and management. This manual will also walk you through the Idaho 4-H Rangeland Skill-a-thon requirements.

This first meeting gives you the opportunity to learn about fellow 4-H members and to get an overview of what to expect from this program. In the next six meetings, you will learn about the skills that are necessary for a career in rangeland science and management. Interested in becoming a livestock manager or soil scientist? You'll learn about that and other related topics, like rangeland ecology in the northwestern United States.

ACTIVITY OVERVIEW

01

PASS THE BALL

02

**ICE CREAM PLANTS AND
SKULL OBSERVATION**

03

**RANGELAND SKILL-A-THON
ORAL PRESENTATION
& 3-D DIORAMA**

**RANGELAND SKILL-A-THON
WRITTEN MANAGEMENT
PLAN, ORAL PRESENTATION
& 3-D DIORAMA (*SENIORS*)**

VOCABULARY

(Definitions on page 50)

CARNIVORE

ECOSYSTEM

FORB-FLOWERS

HERBIVORE

LIVESTOCK

RANGE

RANGELAND

RUSH

SEDGE

SHRUB

WILDLIFE



ACTIVITY 1: PASS THE BALL

During this activity, you will get to know your teammates better!

Supplies

- Soft foam ball

Do

1. Pass the soft foam ball among yourselves.
2. When you receive the ball, share your name, where you live, and either something you think is interesting about yourself or something you like.
3. Once everyone has shared about themselves, keep passing the ball and share something you know about rangeland or the animals or plant species that are found in rangeland.

Reflect

- What is something you learned about your teammates?
- What are some of your teammates' strengths?

Apply

- How might you structure your team to utilize everyone's strengths?

ACTIVITY 2: ICE CREAM PLANTS AND SKULL OBSERVATION

Recreationists, ranchers, hunters, livestock, and wildlife use public rangelands in Idaho for all different reasons. During this activity you will learn about grazing management practices and the differences between carnivores and herbivores.

Supplies

- Copies of the Teeth handout and the Ice Cream Plant handout from the Ice Cream Plants & Skull Observation lesson found at: https://idrange.org/wp-content/uploads/2017/06/IceCreamPlants_SkullObsvervation.pdf
- Pens, pencils, paper
- Animal skulls

Do

1. Conduct the Ice Cream Plants & Skull Observation lesson
2. Have the youth draw a picture of predator or prey and explain why it is predator or prey
3. Have the youth make a list of words they were able to define

Reflect

- What types of grazing plants are utilized on rangeland and why?
- How can wildlife and livestock coexist on rangeland?

Apply

- How can you use your new knowledge to educate others about the importance of rangelands?
- How might you use your introductory knowledge about range in evaluating other ecosystems?

Resources

- Idaho Rangeland Resources Commission <https://idrange.org/>



ACTIVITY 3: PRESENT, PLAN, AND CREATE

Rangeland Skill-a-thon Prep Work Junior Team Oral Presentation/Senior Team Written Management Plan and Oral Presentation Scenario and 3-D Diorama

Each year, the Idaho 4-H Rangeland Skill-a-thon committee will create and send a scenario for all participants to review. All of the guidelines that come with the scenario must be followed and can be found in the contest rules. Follow this link to find rules and further information on the state contest: <https://www.uidaho.edu/extension/4h/programs/contests>

Senior and Junior teams will develop and present an oral presentation with a 3-D diorama at the Skill-a-thon.

Your coach will provide a copy of the scenario for each participant. Using the shipping box that was mailed by the Skill-a-thon planning team, all teams will create the 3-D diorama to show the scenario and present their solution. Props and figures are encouraged. Below is an example of a team's 3-D diorama from a previous competition.



HOMework

1. Sign up on 4honline.com before the next team meeting.
2. Read the scenario for the Skill-a-thon.
3. Study the vocabulary list (can be found on the state contest website: <https://www.uidaho.edu/extension/4h/programs/contests>)



MEETING 02



SOIL

Soil evaluation helps determine whether rangeland is healthy, at risk, or unhealthy. To make an evaluation, you must first identify a soil's composition. Sometimes you can identify soil composition by simply rubbing the granules between your fingers. Knowing the soil composition is important because it gives insight into how the soil might influence the environment:

"The texture, structure, and porosity of soil determines how much rain is captured and how much runs off during a storm. Soils are storehouses of water and nutrients for plants to draw on when they need them." – *Rangeland Health*, 1994, pg. 97¹

Not only is this helpful to know, but soil and land evaluations play a major role in many professions! Soil scientists, geologists, and crop scientists all have careers that focus on determining soil health.

ACTIVITY OVERVIEW

01

TEXTURE COMPARISON

02

**RIBBON TESTING
FOR TEXTURE**

03

**WHAT IS SOIL
MADE OF?**

VOCABULARY

(Definitions on page 50)

CLAY

ELUVIATION

SAND

SILT

SOIL HORIZONS

ACTIVITY 1: TEXTURE COMPARISON

This activity is an introduction to soil textures.

Supplies

- 3 one-gallon, clear tubs
- BBs, marbles, and tennis balls (enough for one tub of each)

Do

1. Fill each tub with one material—you will end up with one tub of BBs, one tub of marbles, and one tub of tennis balls.
2. Pass the tubs around to your team members.
3. Make observations by recording the similarities and differences between the tubs of materials.

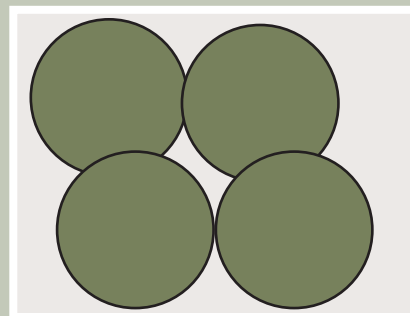
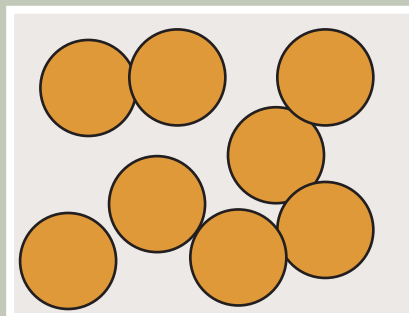
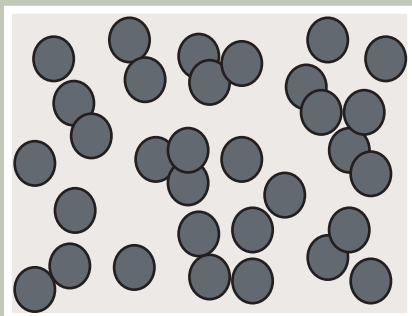


Photo courtesy of USDA NRCS

Reflect

- What similarities and/or differences did you observe? How might these differences affect the soil?

Apply

- What types of soil might be represented by the BBs, marbles, or tennis balls?

ALTERNATIVE ACTIVITY: TEXTURE COMPARISON

This is an alternate activity to introduce students to soil textures.

Supplies

- Space large enough for students to form the various soil types

Do

1. Assign one student to be a water droplet. Everyone else will be a soil particle.
2. Have soil particle students create a 'soil profile' by arranging in rows and columns. The number of rows and columns will depend on the number of students available.
3. First form a sandy profile. Soil particle students hold their arms straight out and stand so you are barely touching fingertips. Then have students put hands down at their sides and remain immobile.
4. Ask the water droplet student to move through the soil. How easy was it?
5. Next form a silty profile. Soil particle students will put their hands on their hips and move closer together so elbows are barely touching. As before, ask students to put arms down and remain immobile.
6. Ask the water droplet to move through the soil. How easy was it?
7. Now form a clay soil profile. Students will put their arms to their side and move closer together so shoulders are touching.
8. Ask the water droplet if they could move through the clay soil very easily. For safety, don't let the water droplet move through soil.



Reflect

- Discuss the benefits and drawbacks of each soil type.

ACTIVITY 2: RIBBON TESTING FOR TEXTURE

An important part of learning about soil is understanding textures. In this activity you will learn more about the ribbon test flowchart and how to identify unknown textures.

There are 2 main factors that determine soil texture, weathering (time) and classification (segregation) forces. Weathering occurs as mineral rock is broken down by wind, water, temperature etc. into smaller and smaller particles. Generally, the older a soil, the finer its texture will be simply because more forces have acted on it.

Classification of particles occurs as weathering segregates soil particles, naturally creating soils of a dominant texture. A classic example of this is water. Streams and rivers carry fine clay and silt particles in suspension until they enter a pond or lake. The fine particles then settle out, eventually creating clay and silt-laden soils.

How might wind affect soil particles?

Supplies

- Clay soil
- Silt soil
- Sand soil
- Squeeze bottle filled with water
- "Ribbon Test" flowchart

Do

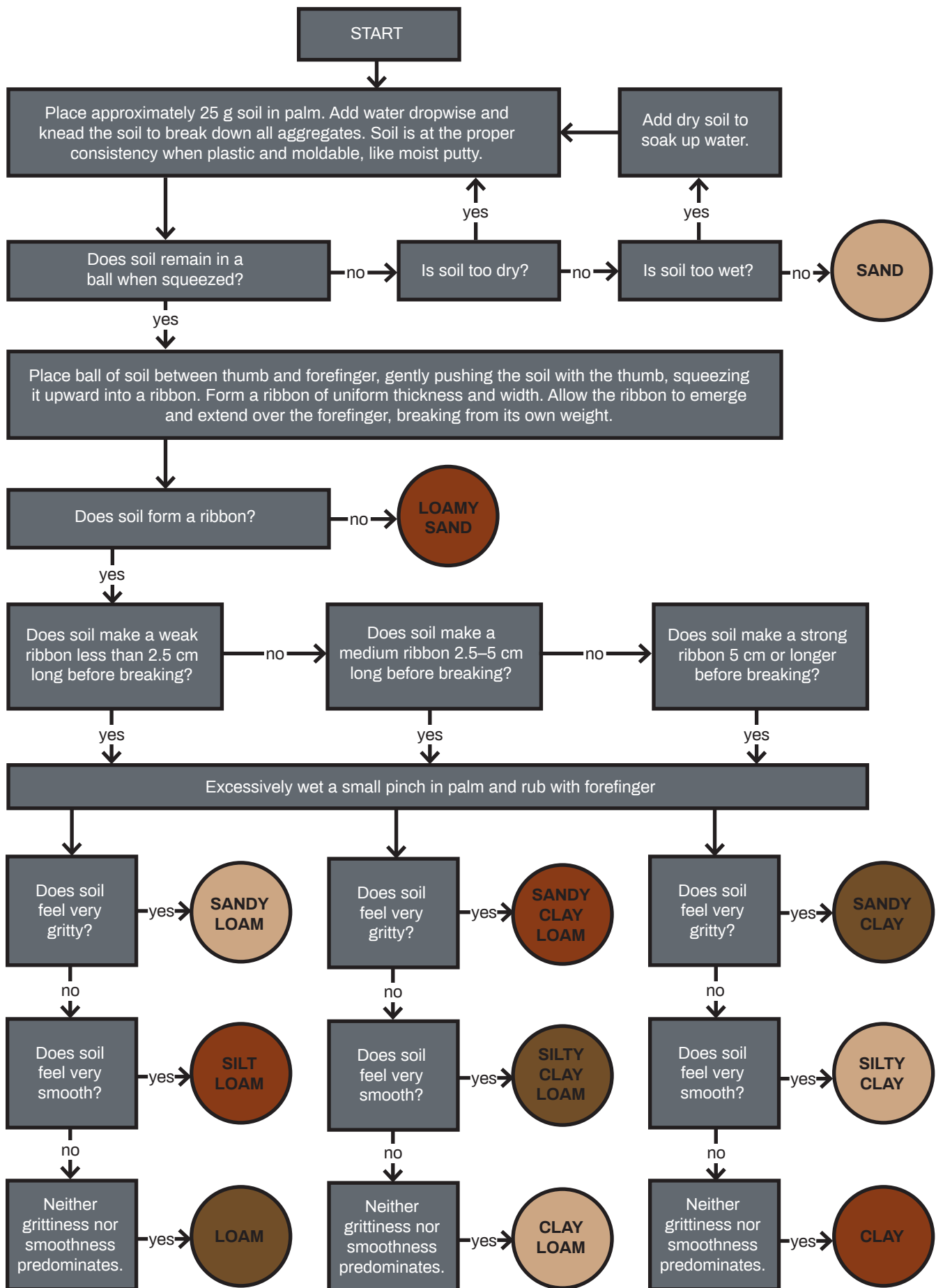
1. Have a volunteer from the group stir or knead the clay sample to get it ready for the rest of the group later.
2. Get out your flowchart.
3. Watch the coach demonstrate how to use the flowchart with a clay sample.
4. In your group, follow the flowchart and try out your new knowledge using silt and sand.

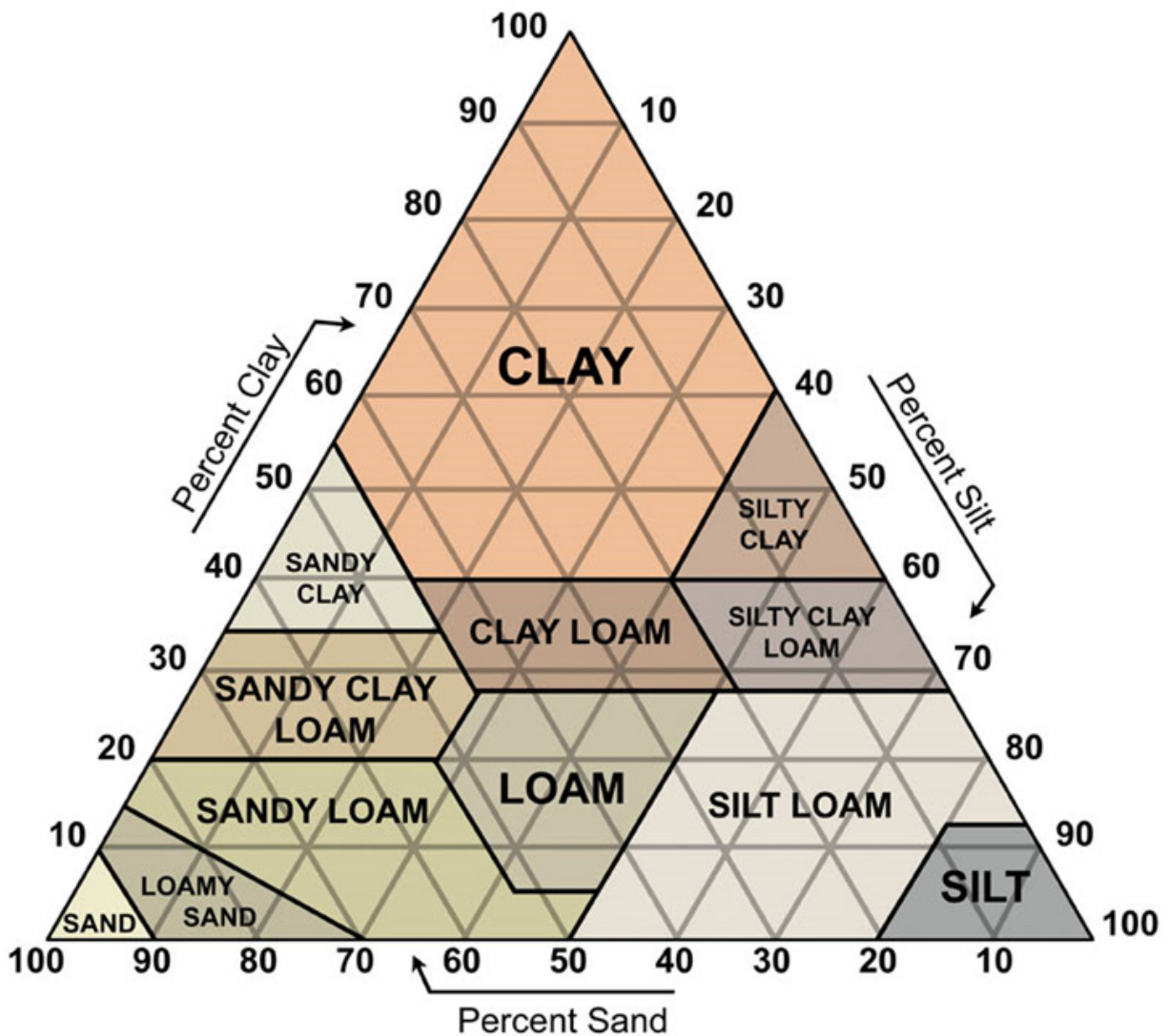
Reflect

- What similarities and/or differences did you observe?
- With your new understanding of soil textures, hypothesize how soil texture might affect plant growth.

Apply

- When building, what type of soil is best to use?





The soil textural triangle, above, identifies a soil sample's classification, based on the percentage of each type of particle in a sample. To use it, first estimate what percentage of each soil particle makes up your sample. Let's say you have a sample that is 50 percent clay, 20 percent silt, and 30 percent sand. Find the 50 on the clay axis and highlight its line with your pencil. Now, do the same for the 20 percent value on the silt axis and again for the sand. The point where all three of your lines meet determines the soil's classification. So, in this example, our soil is a clay.

Now, try this one:

A soil that is 10% clay, 30% silt, and 60% sand is called a _____.



Photo by Nilfanion CC BY-SA 3.0

ACTIVITY 3: WHAT IS SOIL MADE OF?

Soil is made up of distinct layers, called horizons. Each layer can be identified and classified by its particulate structure.

What is soil made of?

45% Minerals (from rocks)

25% Air
(lets gases get in and out of soil)

25% Water
(keeps reactions going and helps plants and organisms grow)

5% Organic matter
(material derived from plants, animals and other organisms)

Percentages change according to soil condition and quality.

Discuss how having a higher or lower percentage of each component would impact the soil.

SOIL HORIZONS



A HORIZON
Topsoil

B HORIZON
Subsoil

C HORIZON
Weathered Parent Material

R HORIZON
Bedrock

Supplies

- Sample of soil
- Peat moss or potting soil (high organic)
- Two disposable cups with 5 holes punched in the bottom
- Two 1-cup measuring cups

Do

1. Fill a disposable cup with 1 cup of soil.
2. While holding the soil-filled cup over measuring cup #1, use measuring cup #2 to pour 1 cup of water into the soil.
3. As soon as water stops dripping heavily from the bottom of the disposable cup, record the amount of water in measuring cup #1 and calculate how much water the soil absorbed.
4. Repeat the experiment after mixing some peat moss or potting soil with the sampled soil to simulate higher organic matter.
5. Record your observations.

Reflect

- During these activities, what did you discover about soils? Share your results from each activity with the group.
- How does bedrock depth affect root growth?
- Does the bedrock depth change what plants can grow in the soil?

Apply

- How might rangeland soil be different from soil in a garden, desert, or rainforest? Why?

Rangeland Skill-a-thon Prep

Read the scenario provided to you for the Skill-a-thon. What aspects of the scenario mention soil directly? What aspects might be affected indirectly? Brainstorm how you might use the insights from today's meeting to address these aspects. Have someone in your group write down the ideas!

HOMework

1. Begin connecting names of plants to their pictures.
2. Begin connecting names of animals to their pictures.



MEETING
03

WATERSHEDS

Today we will discuss the water cycle, water filtration, and water-quality standards for fish. Water is an important resource for any ecosystem. Each ecosystem has different levels of demand for water. A rainforest can receive 60–160 inches of rain each year! Alternatively, the Sahara Desert receives less than 5 inches annually!

There are five different rangeland types in Idaho. They include Pacific bunchgrass, Salt Desert shrublands, juniper woodlands, sagebrush grasslands, and coniferous forest and mountain meadows (Idaho Rangeland Resource Commission)². Precipitation in rangeland is usually between 10 and 30 inches per year—quite a bit less than a rainforest.

The Earth's surface is covered by, roughly, 71 percent water, yet less than one percent of that water is fit for human consumption. Needless to say, using water wisely is important.

ACTIVITY OVERVIEW

01

WATER CYCLE

02

MAKE IT RAIN!

03

WATER FILTERING

VOCABULARY

(Definitions on page 50)

AQUIFER

CONIFEROUS

EVAPORATION

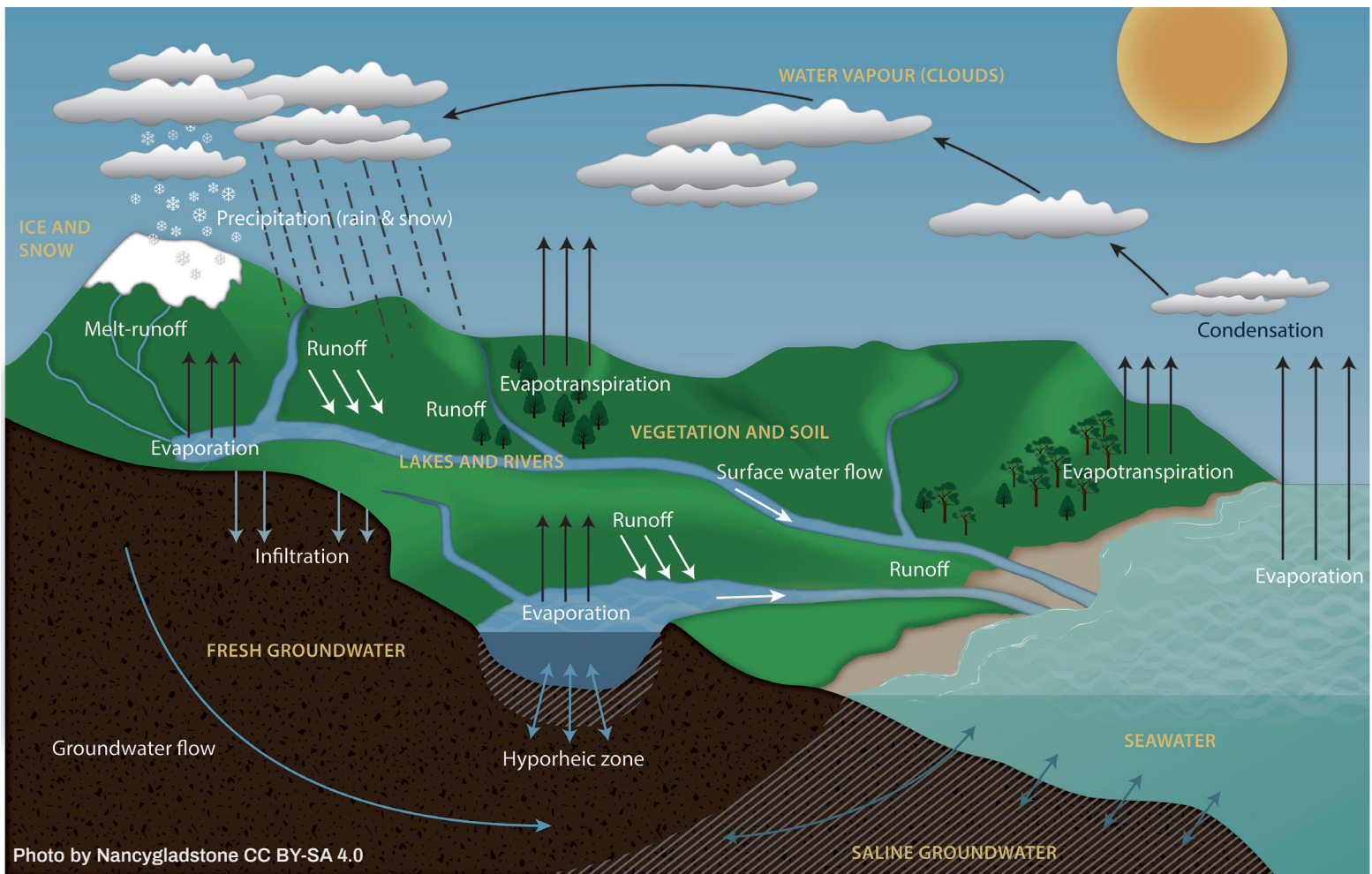
FILTRATION

PRECIPITATION

WATERSHED

ACTIVITY 1: WATER CYCLE

This activity will help us delve deeper into how the water cycle plays an important role in everyday life.



The water cycle involves the pathways and processes by which water moves in a watershed. Inflow of water equals water outflow/storage within a watershed.

There are multiple forms of precipitation, including rain, snow, and hail. Once precipitation returns to the Earth's surface, the water cycle continues.

Supplies

- Coffee mug or cup of equal size
- Mixing bowl
- Saran wrap
- Rubber band

Do

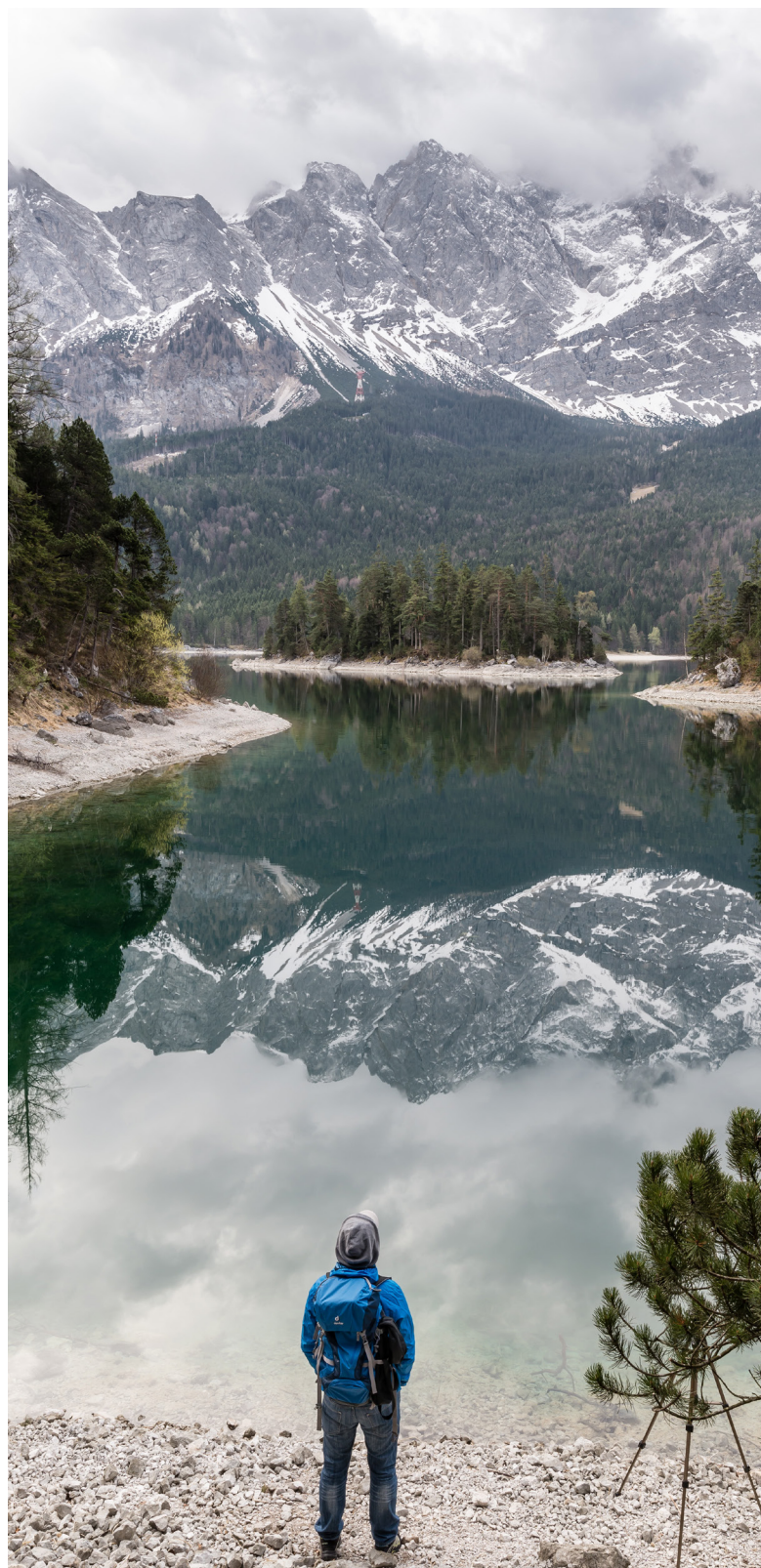
1. Place the coffee mug (or cup of equal size) into the mixing bowl.
2. Pour water into the mixing bowl until water reaches two-thirds of the way up the coffee mug.
3. Next, place the Saran wrap on top of the bowl and seal it.
4. Place the rubber band around the bowl to hold the Saran wrap firmly in place.
5. Now place the bowl in direct sunlight for the entire observation time.
6. In your group, make observations at twenty-minute intervals for a two-hour period of time.

Reflect

- What purpose does the sun have in the water cycle?
- Can you name the different stages of the water cycle without looking at the diagram?

Apply

- How might you use your knowledge to educate people on the water cycle and its importance?





ACTIVITY 2: MAKE IT RAIN!

During this activity, you will demonstrate what happens in clouds during that stage of the water cycle.

Supplies

- 3 Tbsp of water
- Small glass (6 ounces)
- Medium glass (12 ounces)
- Blue food coloring
- Shaving cream
- Eye dropper or straw

Do

1. Place the water into a small glass and add 10 drops of blue food coloring.
2. Partially fill a medium glass with water, leaving 1–3 inches at the top of the glass.
3. Add shaving cream in the space left at the top of the medium glass.
4. Drip the blue-colored water into the medium glass that has the shaving cream, adding it drop by drop with an eye dropper or using a straw. (Dip a straw into the colored water, then hold a finger over the top end of the straw to seal it, and lift it out of the water. Hold the straw over the shaving cream and lift your finger slightly to allow the fluid to drip.)
5. Make observations with your group.

Reflect

- Using your observations, explain how precipitation works.

Apply

- How has precipitation affected where you live?

ACTIVITY 3: WATER FILTERING

This activity involves the science of soil and demonstrates how soil plays a role in creating drinkable water.

Supplies

- Flowerpot (with a hole in the bottom) - big enough to hold 6 cups of material
- Large, clear container
- Blotting paper (if you can't find blotter paper, a large paper towel folded in half twice will work)
- 1 cup of Sand
- 1 cup of Gravel
- 1 cup of Soil (dirt)
- 1 cup of Water
- 1 cup of Plant material (grass, weeds, flowers, etc.)

Do

1. Place the flowerpot in the container.
2. Place blotting paper at the bottom of the flowerpot. Be sure to cover the hole. Place the sand in the pot first, then the gravel.
3. Mix the water with dirt and plant material and then pour into the flowerpot.
4. Observe in your group what happens to the water.

Reflect

- During these activities what did you discover about the water cycle? Share your results from each activity with the group.
- Why is water important to rangelands?
- Why would layering the water filter with large particles on top with smaller ones at the bottom filter the water better?
- Why is it important to have clean water?

Apply

- Lake reservoirs and canal systems in the West lose a lot of water due to evaporation. Why is this a concern?
- Why might short, severe rainstorms be more detrimental than long, gentler ones?



Rangeland Skill-a-thon Prep

Read the scenario prompt provided to you for the Skill-a-thon. What aspects of the scenario mention water directly? What aspects might be affected indirectly? Brainstorm how you might use the insights from today's meeting to address these aspects. Have someone in your group write down the ideas!

HOMEWORK

1. Begin reading the Plant Identification Guide.
2. Begin identifying the animals.



MEETING 04

PLANTS

In this meeting, we will begin exploring the plants of Idaho. We will cover plant biology: plant types, parts, growth, life and lifespan, and desirability.

Plants are an important source of energy for certain animals. Some animals, called herbivores, rely solely on plants to feed themselves. Other animals, known as omnivores, only derive a portion of their energy from plants. (We will discuss the relationship between organisms and their energy levels in greater detail next week.)

Plants are, by far, one of the largest kingdoms. Plants that are either genetically similar or similar in appearance are put into groups to distinguish them, called families. There is an abundance of families in the plantae (**plan**-tay-ē) kingdom, 460 of them, in fact! One family of plants has over 23,600 different accepted (ones that botanists can agree on) species. Talk about a family reunion!

ACTIVITY OVERVIEW

01

PLANT PARTS

02

PLANT IDENTIFICATION

03

PLANT PHOTOS

VOCABULARY

(Definitions on page 50)

CARNIVORE

DETRITIVORE

FORB

GRASS

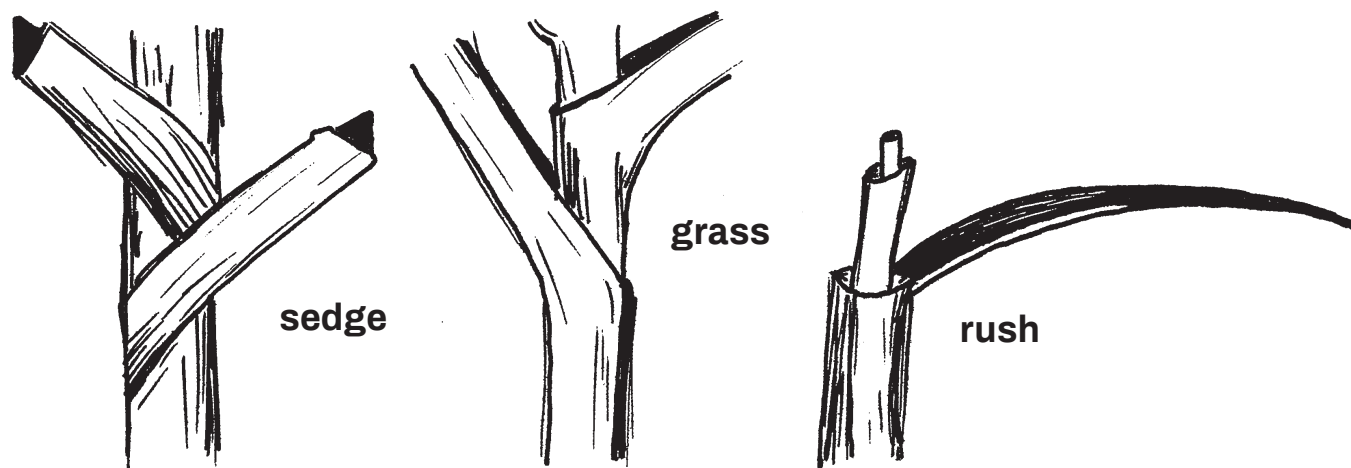
HERBIVORE

OMNIVORE

WOODY PLANT

ACTIVITY 1: PLANT PARTS

This activity will help us know and understand the different parts of plants.



Adapted from Image from: <http://thefineprintmag.org/urban-homesteading-edibles/>

We will begin with the family of grasses, Poaceae (pō-ay-sē-ē). Poaceae is derived from the Greek word "Pōa," which means fodder or hay. Since this puts all grasses under one family name, they are broken down into "tribes." There are a few plant families that need to have tribes to group similar species. Each tribe has something special about it to distinguish it from other tribes.

Forbes and woody plants also grow in rangelands, but unlike grasses, not all forbs or woody plants are in the same family. They are grouped into their own families, based on similarities of genetics and appearance.

Supplies

- Printer paper (6 pieces per participant)
- Crayons
- Plant part list

Do

1. Tear one sheet half way 3 times, making 4 rows.
2. Draw a grass inflorescence in the first.
3. Draw a node and internode in the second.
4. Draw leaf parts in the third.
5. Draw roots with rhizomes and stolon in the fourth.
6. Now connect all the parts with a stem.
7. After this has been completed, change the picture being drawn for forbs and woody plants.

Reflect

- How are plants different and how are they similar?

Apply

- Why does cheatgrass (*Bromus tectorum*) stick to your socks when it dries out?



ACTIVITY 2: PLANT IDENTIFICATION

This activity provides a detailed look at the plants that need to be identified at the event. It will help you to understand the key features of each plant.

Supplies

- Flashcard sheet
- Plant list, see current Skill-a-thon contest guidelines
- Plant Guides
- 8.5" x 11" plant printouts
- Idaho Rangeland Plant Classification Guide

Do

Review the guide and practice identifying the plants with your teammates

Reflect

- Why does it matter that grasses are separate from rushes and sedges?

Apply

- What is the difference between annual and perennial plants?
- Is one type better than the other? Why?



ACTIVITY 3: PLANT PHOTOS

Collecting and Identifying Range Plants

Supplies

- Utilize Grasses, Forbs, and Shrubs handout to determine the differences in the plants you find
- Camera or phone camera
- List of plants and pictures

Do

With your coach, visit a piece of rangeland that you have permission to access and gather pictures you take of plant specimens with your teammates. Use the handout to determine what type of plant you have. To go further, use your plant identification cards to determine what species of plant you have captured in your photo.

Reflect

- Connect some of the root words of the names of different plants' family/tribe.
- Sunflowers are in the family Asteraceae. What might "Aster" mean?
- Tridentata, such as *Artemesia tridentata*, reveals a characteristic about the species' leaves. What do the roots of the word *tridentata*, "tri" and "dent," mean? What do you notice about the leaves?

Apply

- How does Russian thistle (*Salsola iberica*) spread its seed? What kind of life span does this plant have?
- What invasive species on rangelands should we be concerned about?



HOMework

1. What are the different parts of a flower?
2. Which plants are named after a famous botanist?
3. What is the difference between a stolon and rhizome?
4. Start looking at animals for the next meeting.

Rangeland Skill-a-thon Prep

Read the scenario prompt provided to you for the Skill-a-thon. What aspects of the scenario mention plants directly? What aspects might be affected indirectly? Brainstorm how you might use the insights from today's meeting to address these aspects. Have someone in your group write down the ideas!

MEETING 05



ANIMALS

At this meeting, we introduce animals. You will learn how to identify and learn more about the animals found in rangeland.

Remember, native species are not the only animals found on rangeland. Livestock, such as cows, sheep, and goats, also use the range for parts of the year. How might this affect management? Do you think native species and livestock have any interaction or effect on one another?



ACTIVITY OVERVIEW

01

NAME GAME

02

WHO LIVES WHERE?

03

ENERGIZING LEVELS

VOCABULARY

(Definitions on page 50)

COVER

DECOMPOSERS

HABITAT

LIVESTOCK

PRIMARY CONSUMERS

PRIMARY PRODUCERS

RIPARIAN

SECONDARY CONSUMERS

TERTIARY CONSUMERS

TROPHIC LEVEL

ACTIVITY 1: NAME GAME

The objective of this activity is to have your teammate guess all the animals correctly.

Supplies

- one packet of flash cards per participant

Do

1. Get in a group of four.
2. Have one teammate hold one of the flash cards to their head with the picture facing out (don't let them see the picture).
3. The remaining group describes the animal without mimicking the sound it makes, while the teammate holding the card tries to identify the animal on the flash card.
4. Once someone misses three times, they pass the stack of flash cards to the next person to the right.
5. The next person will need to shuffle the deck before they begin another round.

Name Game Further

Here's a challenge for our senior teams! For the animals on the flashcards:

- Can you name them using their scientific names?
- Can you guess their trophic "energizing level?"
- Can you identify what eats them and what they eat?
- Can you give a fact about them?



Reflect

- What were some of the attributes that you found to be the most helpful in identifying animals?

Apply

- What animals were unknown or unfamiliar to you?
- What things would you like to learn about these animals?

ACTIVITY 2: WHO LIVES WHERE?

All animals have one thing in common:
There is a specific ecosystem each
species calls its "home."

Supplies

- Animal list
- Animal flash cards
- Crayons

Do

1. Using the animal flash cards, work with your teammates to place the animals in the following "cover" categories:
 - Timber
 - Brush
 - Open
 - Riparian for fish species (region that has water in it)

Reflect

- Why would some animals prefer timber as their main cover?

Apply

- Can you think of other "cover" categories that some animals might fit under?



ACTIVITY 3: ENERGIZING LEVELS

Every ecosystem needs to have a balance between plants and carnivores. This balance changes constantly. For example, if certain animal populations decrease, the predator population goes down; if the animal population resurges and rises, the predator population rises.

The energy levels in an ecosystem are interdependent too. Energy levels are related to food chains or webs. Each food web has multiple trophic levels, the first being plant life, the second the herbivore, the third the predators, and the fourth the large predator.

Understanding the transfer of energy between organisms, particularly those that occupy different trophic levels, is essential to understanding range ecology. This will help synthesize the subject matter learned during previous meetings, leading to a more cohesive understanding of their relationships.

"Just as a deer herd lives in mortal fear of wolves, so does a mountain live in mortal fear of deer. And perhaps with better cause, for while a buck pulled down by wolves can be replaced in two or three years, a range pulled down by too many deer [herbivores] may fail of replacement in as many decades" – Aldo Leopold - from "Thinking Like a Mountain," *A Sand County Almanac*

Every ecosystem has an energy budget, the maximum number animals that the environment can support. Any healthy environment will be in a state of long-term equilibrium. Year to year environmental factors

will be more advantageous for one species or another, or for one class or another. Can you think of what animals might benefit from a drought? Can you think of what animals might benefit from an above-average snow year in the winter?

Energy comes from the sun and is captured by plants. Plants then stores the energy as sugar. This is the first trophic level, primary producer or simple the producers. Can you name a few producers?

Plants are then eaten by herbivores whose energy is stored by animals as fat. This is the second trophic level, known as primary consumers. Can you name a few herbivores?

The term omnivore means plant- and meat-eating creatures. This class of animals, along with smaller carnivores, make up the third trophic level, secondary consumers. Can you name an omnivore or small carnivore?

Apex predators are the furthest away from the sun's energy. They make up the fourth trophic level, tertiary consumers. North America has four species of apex predators. The species are brown bear (*Ursus arctos*), polar bear (*Ursus maritimus*), grey wolf (*Canis lupus*) and mountain lion (*Puma concolor*).

Each time energy is transferred between trophic levels some heat is lost. When any plant or animal dies, if it is not eaten by somebody, the energy is used by decomposers. This is true for the smallest field mouse to the largest brown bear.

Supplies

- Blank pyramid
- Crayons

Do

- Divide the pyramid into five levels.
- Starting at the bottom, label the levels: primary producers, primary consumers, secondary consumers, tertiary consumers, and decomposers.
- Draw pictures of what organism occupies each level of the pyramid.
- The pictures will include five plants, four primary consumers, three secondary consumers, and two tertiary consumers.
- Next, draw arrows up from the bottom of the pyramid to the top, with the words alongside saying "energy goes down."

Reflect

- Why would energy in a food chain go down as you rise higher in the chain?
- Should decomposers be at the top of the pyramid or at the bottom? Why?

Apply

- Make a food chain with the tertiary consumer as a red-tailed hawk.
- Make a food chain with the primary producer as Idaho fescue.
- What are some examples where top consumers have been eliminated; how has this affected the ecosystem?
- The sand hills of Nebraska are an example where grass cover has been lost. What does this mean for rangeland productivity? Can you think of other places where plant cover has been lost?



HOMework

1. Review the plant list.
2. Review the group presentation.

Rangeland Skill-a-thon Prep

Read the scenario prompt provided to you for the Skill-a-thon. What aspects of the scenario mention animals directly? What aspects might be affected indirectly? Brainstorm how you might use the insights from today's meeting to address these aspects. Have someone in your group write down the ideas!



MEETING
06

FIRE

Fire is normal and sometimes healthy for ecosystems, including rangelands. Among other benefits, ash from fire puts back certain nutrients into the soil, such as carbon, and burning can keep the spread of certain species in check and open the canopy to allow new growth. In fact, many plants have seeds that cannot germinate unless they come in contact with the extreme heat of fire! These include the California buckeye, shortleaf pine, jack pine, and lodgepole pine.

Native American tribes often used controlled burns to promote desirable plant species and to direct game (examples: steering deer and elk into the remaining, unburned areas; game birds favored the tender shoots of new plants in recently burned areas). It could be argued that this was one of the first forms of range management.

ACTIVITY OVERVIEW

01

HUGE FIRES IMPACT RANCHERS

VOCABULARY

(Definitions on page 50)

FIRE CYCLE

MOONSCAPE FIRES

MOSAIC FIRES



Photo left by Kari Greer/U.S. Forest Service

ACTIVITY 1: HUGE FIRES IMPACT RANCHERS

This lesson is filled with videos about fire: the good and the bad.



Photo by Kari Greer/U.S. Forest Service

Sometimes fire can do more harm than good. Burn patterns are one indicator. “Mosaic fires” create patchy patterns of burned and unburned land. (Think of a mosaic, with little pieces of colored glass here and there, broken up by other little pieces of different colors.) In this kind of pattern, only small areas have burned. They are intermixed with remaining unburned areas, which provide stability and an established plant community. This is when fires do good. In contrast, a “moonscape fire” burns everything (think of the barren appearance of the surface of the moon), sometimes for many hundreds of acres. This can devastate an ecosystem. It’s pretty hard to reestablish a plant community when there are no mature plants to supply seeds for miles and miles around!

Invasive plant species add yet another hiccup to fire recovery. As you may recall from your plants lesson a few weeks ago, many of these species are annuals (remember what that means?) and die off quickly, making it easy for them to burn again and speeding up the fire cycle (the amount of time between burns for an ecosystem), sometimes reducing it from hundreds of years to two or three years.

Supplies

- Video: Huge Fires Impact Ranchers
- Internet connection: <https://idrange.org/range-stories/southwest-idaho/huge-fires-impact-ranchers-coping-with-large-scale-fires/>
- Worksheet "Listening comprehension: Huge fires impact ranchers"

Do

Watch the video and fill out the worksheet, then discuss the answers with your teammates

Reflect

- What can you do to help prevent rangeland fires?
- What are the pros and cons to wildland fires?
- What are some ways that fire has impacted rangeland?

Apply

- Walk around your house and yard and look for fire hazards.
- What plants benefit from fire? Which ones are harmed?
- Do "let it burn" policies make sense when rainfall and snowfall have been minimal?
- How does fire affect your life?

HOMEWORK

1. Watch more of life-on-the-range videos at: <http://www.lifeontherange.org>.
2. Keep studying your plants and animals.
3. Continue to work on the team's oral presentation script, 3-D Diorama, and the written management plan (senior teams).

Rangeland Skill-a-thon Prep

Read the scenario prompt provided to you for the Skill-a-thon. What aspects of the scenario mention fire directly? What aspects might be affected indirectly? Brainstorm how you might use the insights from today's meeting to address these aspects. Have someone in your group write down the ideas!





MEETING 07

PRACTICE



We are down to the wire—it's almost time for the Rangeland Skill-a-thon! Are you excited? Do you feel prepared? Now is the time to pull together all of your knowledge and hard work and make the final push!

ACTIVITY OVERVIEW

01 DIORAMA BUILDING AND PREPPING ORAL PRESENTATIONS

VOCABULARY

Review the vocabulary words from each meeting at the end of this guide in Appendix A.

ACTIVITY 1: PRACTICE MAKES PERFECT

Let's finalize your diorama, oral presentations, and written management plans.

Supplies

- 3-D diorama box
- Craft supplies
- Small plastic figurines
- Notes for each member's portion of the oral presentation
- Packing list

Do

1. Finalize your 3-D diorama box.
2. Finalize your oral presentation.
3. Finalize your written management plan (seniors).

Reflect

- What should I do when my team members are talking?
- What is my role during the oral presentation; what am I conveying?
- What is great about our project? What could be great? What do we need to do to make it great?
- What area/studying needs my attention most between now and the competition?

Apply

- Deliver your presentation in front of a group. Ask your audience for constructive feedback. Afterward, discuss the feedback with your team.



Rangeland Skill-a-thon Prep

Remember all those preparation pauses you and your team completed after every meeting? If you haven't already, now is the time to pull them out! Use them to synergize your ideas into a cohesive management plan, adding detail and insight that you may have since forgotten.

HOMework

1. Practice. Practice. Practice!
2. Look at the packing list that was sent with the Rangeland Skill-a-thon packet and start packing your bag.



VOCABULARY

Here is a list of relevant vocabulary words from the seven meetings. A presentation that uses appropriate terminology will sound polished, professional, and will add to your own credibility, so consider using these terms when appropriate. Space has been provided for you to add your own vocabulary as well, so if you notice useful words during your meetings (or could expand on definitions of given words), take the time to add them below.

aquifer: any geological formation containing or conducting groundwater, especially one that supplies the water for wells, springs, etc. An underground layer of sand, gravel, or porous rock that collects water and holds it like a sponge.

carnivore: an animal that eats meat exclusively

clay: smallest soil particle; can form a waterproof barrier on the surface of the soil

coniferous: cone-bearing plants

cover: plants and other biotic parts of the environment and physical topography that provide concealment from prey or predators and shelter from the environment

decomposers: any creatures, including fungi, bacteria, worms, etc. that will break down all dead material

detritivore: an animal that eats decaying material such as carrion or decomposing plant matter or fungal matter, exclusively

domestic: any of various animals (such as horse or sheep) domesticated so as to live and breed in a tame condition

ecosystem: a biological community of interacting organisms and their physical environment

eluviation: the transport of soil material usually by water from the upper soil layers to the lower soil layers

evaporation: water vapor rising into the atmosphere, due to heat or wind

filtration: separating solids from liquids through the passing of a medium, such as soil

fire cycle: the time between plant growth, maturity, and burning in an ecosystem

forb: a nonwoody flowering plant that is not a grass

forb-flowers: a flowering plant that is not a grass, sedge, or rush

grass: a plant characterized by having narrow blade-like leaves joined at the stems

habitat: where an organism lives; components of habitat include space, food, water, and shelter

herbivore: an animal that eats plant material or fungal material exclusively

livestock: animals kept for production of meat, wool, etc.

moonscape fires: a type of fire that has burned everything (think of the barren appearance of the moon surface), sometimes for many hundreds of acres

mosaic fires: Patchy pattern of fires that opens up small, intermittent areas between unburned, established areas. Mosaic fires open up land in certain spots (think of a mosaic, with little pieces of colored glass here and there, broken up by other little pieces of different colors).

omnivore: an animal that eats any combination of plant matter, fungal matter, meat, or decomposing material

precipitation: water vapor falling, by gravity, in the form of rain, snow, hail, etc.

predator: an animal that hunts and catches other animals for food

prey: an animal that is hunted and killed by another for food

primary consumers: herbivorous animals; consumes plant material; energy in sugars is stored as fats. Example: bighorn sheep, domestic cattle, field mice, and grasshoppers

primary producers: all plant life; takes energy from the sun and stores the energy as simple and complex sugars

range: an open region over which animals (such as livestock) may roam and feed

rangeland: land used or suitable for range

riparian: the area where terrestrial and aquatic ecosystems interface; includes marshes and bogs. There may not be a clear delineation between terrestrial and aquatic.

rush: various grass like wetland plants having stiff, hollow, or pithy stems

sand: largest soil particle; provides excellent drainage

secondary consumers: small carnivores and omnivores that prey on herbivores such as rodents and insects

sedge: a plant like grass that grows on or near wet ground

shrub: a woody plant or bush, smaller than a tree, usually having multiple permanent stems branching from or near the ground

APPENDIX A

silt: second-smallest soil particle

soil horizons: layers of sediment, parallel with the soil surface, that each have different characteristics

tertiary consumers: large carnivores that prey on primary and secondary consumers; include large birds of prey, wolves, bears, etc.

trophic level: a level at which energy is stored in the environment. Example: Plants store sunlight, then are eaten by herbivores, and some of the energy is lost as body heat. Most is used to maintain life, and some is stored as fat.

watershed: a land area that channels rainfall and snowmelt to creeks, streams, and rivers, and eventually to outflow points such as reservoirs, bays, and the ocean

wild: any animal living in a natural, undomesticated, or untamed state

wildlife: undomesticated animals living in the wild, including those hunted for food, sport, or profit

woody plant: a plant that has wood-like stems above the ground

¹ Idaho Rangeland Resource Commission, *FAQ*. (n.d.). Retrieved April 29, 2021, from <https://idrange.org/education-2/faqs>.

² National Research Council. 1994. *Rangeland Health: New Methods to Classify, Inventory, and Monitor Rangelands*. Washington, DC: The National Academies Press. <https://doi.org/10.17226/2212>.

PHOTOS & DIAGRAMS

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