



Washington
Department of
**FISH and
WILDLIFE**

Hooves and Herds

6-8 grade

Themes: Rut (breeding) in ungulates (hoofed mammals)

Location:

The lesson can be taught in the classroom or a hybrid of in the classroom and on [WDFW public lands](#). We encourage teachers and parents to take students in the field so they can look for signs of rut in ungulates (hoofed animals) and experience the ecosystems where ungulates call home.

If your group size is over 30 people, you must apply for a group permit. To do this, [please e-mail or call your WDFW regional customer service representative](#).

Check out other [WDFW public lands rules](#) and [parking information](#).

Remote learning modification: Lesson can be taught over Zoom or Google Classrooms.

Standards:

NGSS

MS-LS1-4

Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively.

MS-LS4-4

Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment.

CCSS

RST.6-8.4

Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 texts and topics.

RST.6-8.10

By the end of grade 8, read and comprehend science/technical texts in the grades 6-8 text complexity band independently and proficiently.

RST.6-8.9

Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.

Modifications, Adaptations:

For COVID-19 distance learning, or other remote learning modification, look for **Remote learning modifications** throughout the lesson plan.

Materials:

WDFW PowerPoints: Introduction to Ungulates in Washington, Rut in Washington Ungulates, Ungulate comparison sheet, WDFW career profile

Vocabulary:

Biological fitness: How successful an individual is at reproducing relative to others in the population.

Bovid: An ungulate with permanent keratin horns. All males have horns and, in many species, females also have horns. Examples are cows, sheep, and goats.

Cervid: An ungulate with antlers that fall off and regrow every year. Antlers are almost exclusively found on males (exception is caribou). Examples include deer, elk, and moose.

Harem: A group of breeding females associated with one breeding male.

Herd: A large group of animals, especially hoofed mammals, that live, feed, or migrate.

Mammal: Animals that are warm blooded, females have mammary glands that produce milk for feeding their young, three bones in the middle ear, fur or hair (in at least one stage of their life), and most give live birth.

Ruminant: Mammals who have a four-chambered stomach that uses microbes to break down cellulose from plants to acquire nutrients.

Rut: Mating season in some animals when males have increased testosterone, exaggerated sexual dimorphisms, and increased aggression and interest in females.

Sexual dimorphism: Distinct difference in size or appearance between the male and female sexes of an animal. For example, male deer are larger and have antlers.

Ungulate: Mostly large mammals with hooves, including odd-toed ungulates (horses, rhinoceroses) and even-toed ungulates (deer, sheep, camels).

Velvet: Fuzzy covering of a growing antler. It supplies oxygen and nutrients to the growing bone. When bone growth is complete, the velvet dries up and falls off.

Objectives:

Students will...

1. Identify and classify the different types of ungulates in Washington.
2. Explain why some genetic variations make an individual more likely to reproduce.
3. Describe what rut is, why it is important for the species, and why it may be important for humans.
4. List behaviors of ungulates in rut and explain how these behaviors lead to increased probability of reproduction.
5. Summarize empirical evidence to answer a self-generated question about ungulates in Washington.



Procedure:

1. Introduction to ungulates of Washington:

Show WDFW pictures of a mountain goat and an elk. Introduce the two species as “ungulates.” Have students study the pictures. With a neighbor, have them write down ways in which the two animals look similar and different. Give students about three minutes and then have a couple of groups share their similarities/differences.

Remote learning modifications: Break students up into Zoom/Google breakout rooms and have them discuss before coming back as a class.

Open the Ungulates in Washington PowerPoint and review with students. **Make sure presenter notes are turned on.** Students should write down notes to help them remember the information. This PowerPoint will introduce:

- What is an ungulate?
- What is a ruminant?
- What species of ungulates live in Washington?
- What are bovids?
- What are cervids?
- What’s the difference between antlers and horns?

After the PowerPoint, have students pair with a partner and quiz each other [using these flash cards](#). Students must hit the spacebar to begin. They can also quiz themselves using the “Memorize” tab on this [flash card web-app](#).

2. Biological Fitness

Open the PowerPoint, Rut in Ungulates. **Make sure presenter notes are on.** Students should write down notes to help them remember the information. This PowerPoint will introduce:

- Rut in ungulates
- Sexual dimorphism in ungulates
- Biological fitness
- Antler and horn growth
- Breeding cycles of Washington ungulates

Using their notes, the PowerPoint slides, and other WDFW resources, students should write a two-page, double-spaced technical paper summarizing what genetic variations in ungulates makes individuals more likely to reproduce. Students may use outside resources but must cite outside information accordingly. Students should use terms learned in the PowerPoint such as biological fitness, sexual dimorphism, bovid, cervid, etc. They should consider the following questions:

- Why do some genetic variations make a male individual appear more biologically fit to a female?
- What could be some risks of being the most biologically fit male?
 - i.e., higher mortality in dominant bull elk trying to defend harem from competitors.
- Are there benefits to being a less biologically fit male? Explain.

3. The Rut

As a class, listen to the short podcast “[The Ungulate Mating Calendar Demands Tight Timing](#)”.

Distribute the sheet, Breeding in Washington Ungulates and assign students to small groups. Have them choose three ways they think the behaviors that males display in rut (breeding season) make them more successful reproducers.

Ask them to consider if any of the behaviors displayed in rut have an impact on humans—why or why not? Students will brainstorm for five minutes and then will share answers as a class. You can write answers on a whiteboard.

Remote learning modifications: Use breakout rooms to have students discuss. Use a [virtual whiteboard such a Google Jamboard](#) to share ideas.

After the class has shared ideas, use [this 15 question game to briefly assess student learning](#) thus far. After clicking the link, you will follow the “Play as Guest” button in the upper right-hand corner. Choose the settings that are most appropriate for your class and begin the game. Students will go to [www.kahoot.it](#) and then enter the game pin to begin. Once everyone has logged in to the game, you can begin.

4. Final Project

For their final project in this lesson, students will come up with a question regarding ungulates in rut in Washington. Students will create a five to 10-slide presentation which answers their question. Examples could include:

- Is the largest male always the most likely to breed?
- What ecosystem/environmental factors play into rut in [choose a species]?
- What behaviors are more likely to lead to reproduction in [choose a species]?

You should review and approve questions before letting students begin their research. Most of their sources must come from scientific studies. Please show them how to use your school/district library for searching tools and resources. Students are also encouraged to use video, audio, or other multimedia in their presentations. Sources should come from a credible source and not “viral video.net”, for example. When doing the project students should consider:

- How much information is available on the subject? Ideas with little information will be harder to explain as they will have little to no evidence to answer their question and support their claim.
- Do they need to introduce new terms to their classmates in their presentation?
- What sources (print, video, audio, etc.) is going to be the best for:
 - answering the question;
 - gathering evidence;
 - understanding the topic;
 - helping the audience visualize the ideas; and
 - showcasing a fact, figure, or idea.

Give students between one and two weeks to complete their presentations. Try and schedule a check-in if possible. After student presentations are complete, have students sign-up to present to the class in five-minute time slots.



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Additional Resources :

You can use the following resources to build onto this lesson, or share these resources with students for their research project.

More information:

- [Vertebrate skulls-Museum of Cultural and Natural History](#)
- [Elk in Olympic National Park-National Park Service](#)
- [Hoofed mammals-Oregon Department of Fish and Wildlife](#)

Species profiles:

- [Elk profile-WDFW](#)
- [Pronghorn profile-WDFW](#)
- [Bighorn sheep profile-WDFW](#)
- [Moose profile-WDFW](#)
- [Mountain goat profile-WDFW](#)

Videos:

- [The Yearly Elk Brawl-National Geographic](#)
- [Rocky Mountain Bugling Elk-National Geographic](#)
- [Moose Fight in a Quiet Alaska Suburb-National Geographic](#)
- [Moose Loses an Antler-National Geographic](#)
- [Rutting Bull Moose Lose Their Velvet-Wildlife Photography](#)
- [Big Horn Bash-National Geographic](#)
- [Tule Elk Bugling-United States Fish and Wildlife Service](#)