

# Bighorn: Components of a Habitat

Adapted from Project Wild

## Objectives:

Students will be able to describe the components of habitat (food, shelter, water, space), describe the importance of good habitat for bighorn, define “limiting factors” and give examples, and recognize that wildlife populations have fluctuations and these are natural as ecological systems undergo constant change.

**Grade level:** 3-12

**Duration:** 30-45 minutes

**Group Size:** 15 or larger

**Setting:** large area for running

## NGSS Connections:

\*See detailed standards at end of lesson

3-LS4-3      MS-LS2-2

3-LS4-4      HS-LS2-2

MS-LS2-4      HS-LS2-6

MS-LS2-1

## Method:

Students become bighorn sheep and different components of habitat (food, shelter, water) in a highly evolving physical activity.

## Materials:

- An area large enough to run
- Large chart paper
- Writing materials
- LAST CHANCE RANGE DATA of sheep herd in Nevada (found on PowerPoint and at end of lesson)

## Background:

There are many different factors that affect the ability of wildlife to successfully reproduce and maintain a

constant population over time. For bighorn, disease, predator/prey relationships, weather conditions throughout the year (e.g., drought, freezing temperatures, heavy snow), habitat destruction or improvement, and human recreational activities (e.g., cross-country skiing in bighorn winter habitat) are among these factors.

The most fundamental of life's necessities for any animal are food, water, shelter, and space. Without these, animals cannot survive.

This lesson will help students understand that:

- Good habitat is the key to bighorn sheep survival
- Bighorn population will continue to increase in size until some limiting factors are enacted
- Limiting factors lead to fluctuations in bighorn populations
- Nature is constantly changing and never in “balance”

Bighorn populations, as with all wildlife, are not static, but instead are ever changing. They constantly fluctuate in response to a variety of stimulating and limiting factors. These limiting factors may apply to a single species, or to many different species living in the same ecosystem. Natural limiting factors, or those executed to help wildlife management, tend to maintain populations of species at levels within predictable ranges. This kind of “balance in nature” is not static, but is more like a teeter-totter than a balance. Some species fluctuate or cycle annually. Quail, for example, may start with a population of 100 pairs in early spring, reproduce to 1200 birds by late spring, and then gradually decline to 100 pairs again by

mid-winter. This cycle appears to be almost totally controlled by the habitat components of food, water, shelter, and space, which are also limiting factors. Habitat components are the most fundamental and thereby the most critical of limiting factors in most natural settings.

This activity is intended to be a simple but powerful way for students to grasp some BASIC concepts: that everything in natural systems is interrelated: that populations of organisms are continuously affected by elements of their environment; and that populations of bighorn (and all animals) do not stay at the same number of sheep year after year, but are continually changing in a process of maintaining dynamic equilibrium in natural systems.

### Procedures:

1) Ask students what they know about what an animal needs to survive, leading them towards the essential components of food, shelter, water, and space. This activity emphasizes three of those components (food, water and shelter), but students should understand that space is also an important component. Review, or teach, that all 4 components have to be present and in a suitable arrangement or the animals will die.

2) Have two parallel lines on the ground about 15 meters apart. Put students into four groups, perhaps having them count off in four's. Have the one's go line up behind one line; all the two's, three's and four's go together and line up behind the other.

3) The one's will be the bighorn sheep. All sheep need good habitat in order to survive. Ask the students what the essential components of habitat are again: **food, water, shelter, and space in a suitable arrangement.** For this activity, tell the students that all the bighorn have enough space in which to live so that

component will not be a part of this activity. The bighorn (one's) need to find food, water, and shelter if they are to survive. Teach the following actions to students. If a sheep is looking for:

- **food**, it should clamp its hands over its stomach.
- **water**, it puts its hands over its mouth.
- **shelter**, it holds its hands together over its head.

During each round, a bighorn chooses to look for any of these three components, but the bighorn cannot change what it is looking for when it sees what happens to be available. It can change what it is looking for in the next round.

4) The two's, three's, and four's are the food, water, and shelter- components of habitat. Each student in this group chooses what it will be at the beginning of each round. The students depict which component they are in the same way the bighorns do; that is, hands on stomach for food, etc.

5) The game starts with all players lined up on their respective lines (bighorn on one side and habitat components on the other side)- and **with their backs to the students on the other side.**

6) The teacher begins the first round by asking all the students to make their signs- each bighorn deciding what it is looking for, and each habitat component deciding what it is. Give the students a few seconds to get their hands in place (over stomach, over mouth, or over head).

7) When you can see that the students are ready, count: "One...two...three." At the count of three, each bighorn and habitat component turn to face each other, continuing to hold their signs.

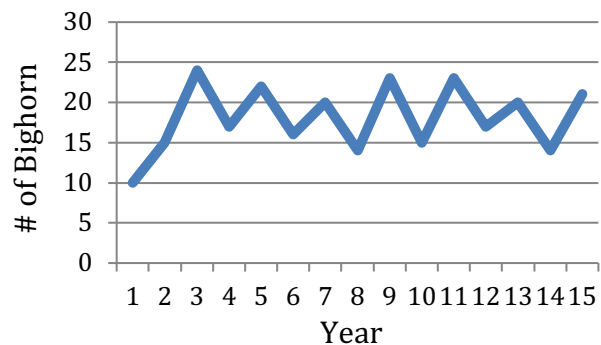
8) When a bighorn see the habitat component they need (same sign they are holding up), they are to run to it. Each bighorn **MUST** hold the sign of what it is

looking for until getting to the habitat component person with the same sign. Each bighorn that reaches its necessary habitat components takes the “food”, “water”, or “shelter” back to the bighorn side of the line. This is to represent the bighorn successfully meeting its needs, and successfully reproducing as a result. Any bighorn that fails to find its food, water, or shelter dies and becomes part of the habitat. That is, in the next round, the bighorn that died is a habitat component and so is available as food, water, or shelter to the bighorn still alive. NOTE: When more than one bighorn reaches a habitat component, the student who gets there first survives. Habitat components stay in place on their line (they don’t run or move) until a bighorn reaches them. If no bighorn needs a particular habitat component during a round, the habitat component just stays where it is. During the next round, however, can change which component it is.

9) You as the teacher keep track of how many bighorn there are at the beginning of the game, and at the end of each round. Continue the game for about 15 rounds. Keep the pace brisk.

10) At the end of the 15 rounds, which represent 15 years, gather the students to discuss the activity. Encourage them to talk about what they experienced and saw. For example, they saw a small herd of sheep (7 students in a class of 28), begin by finding more than enough of its habitat needs. The population of bighorn expanded over two to three rounds (years) of the game, until habitat was depleted and there was not sufficient food, water, and shelter for all the members of the herd. At that point, bighorn starved or died of thirst, or lack of appropriate shelter. Such things happen in nature as well.

11) Using chart paper or whiteboard, post the data recorded during the game and create line graph with it.



The students will see this visual reminder of what they experienced during the game: the bighorn population fluctuated over a period of years. This is a natural process, as long as the factors which limit the population do not become excessive, to the point where the animals cannot successfully reproduce. The wildlife populations will tend to peak, decline, and rebuild, peak, decline, and rebuild- as long as there is good habitat and sufficient numbers of animals to successfully reproduce.

12) Show the LAST CHANCE RANGE DATA of an actual desert bighorn sheep herd that lives in southern Nevada, west of Las Vegas near the California border. Twenty-four bighorn were reintroduced in 1988, followed by another transplant of 25 in 1989. This, along with new lambs being born, start the population of 64 at in 1989. Allow students to see how the population from 1989 to about 1998 grew until it reached its carrying capacity. At which point, it began to peak and decline over and over until the most recent count in 2016. Older students could graph data.

13) In discussion, ask students to summarize some of the things they have learned. What do animals need to survive? What are some of the limiting factors that affect their survival? Are wildlife

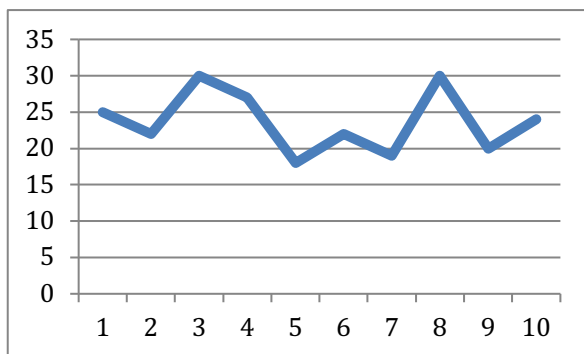
populations static, or do they tend to fluctuate, as part of an overall “balance of nature”? Is nature ever really “balanced”, or are ecological systems involved in a process of constant change?

**Evaluation:**

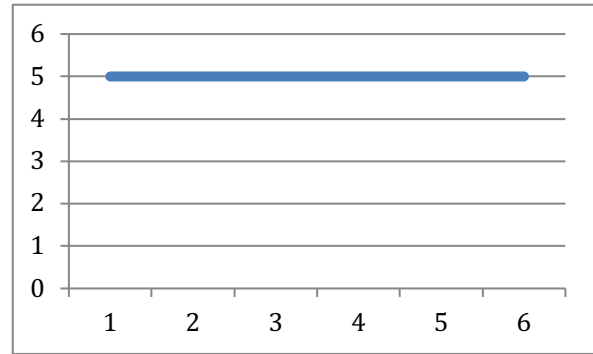
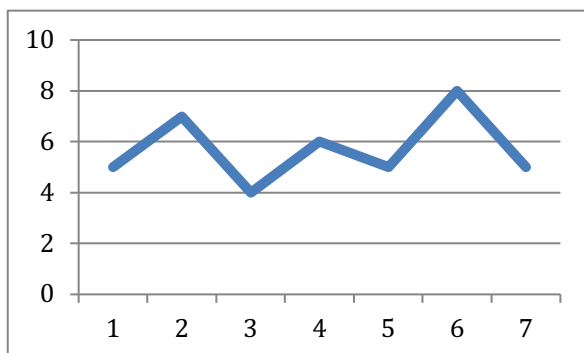
Name three essential components of habitat. Define “limiting factors”. Give three examples.

Examine graphs drawn by teacher on the board. What factors may have caused the following population changes:

- between the years 1 and 2?
- between the years 3 and 4?
- between the years 5 and 6?
- between the years 7 and 8?



Which of the following graphs represents the more typically balanced population? (Answer: first graph)



**Next Generation Science Standards (NGSS) Detailed Connection Ideas:**

3-LS4-3 Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.

3-LS4-4 Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.

MS-LS2-1 Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.

MS-LS2-2 Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.

MS-LS2-4 Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.

HS-LS2-2 Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.

HS-LS2-6 Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.



## LAST CHANCE RANGE DATA

The Last Chance Range is located west of Las Vegas, Nevada. Sheep were reintroduced (moved to) to this range in 1989, with a starting population of 64.



## Population Data of Last Chance Range: Desert Bighorns

<u>Year</u>	<u>Herd Population</u>	<u>Year</u>	<u>Herd Population</u>
1989	64	2003	137
1990	70	2004	149
1991	85	2005	161
1992	107	2006	182
1993	136	2007	168
1994	147	2008	160
1995	148	2009	162
1996	167	2010	168
1997	179	2011	166
1998	180	2012	179
1999	183	2013	178
2000	166	2014	176
2001	156	2015	181
2002	141	2016	174

### Last Chance Range, Unit 261

