Oh Bighorn Sheep!

Grades: 6-12

Estimated Time: 30 minutes

Standards Met:

- 6-8 grade:
  - *Science N.8.A.1* Students know how to identify and critically evaluate information in data, tables, and graphs.
  - *Science L.8.C* Students understand how living and non-living components of ecosystems interact.
  - *Science L.8.C.3* Students will evaluate how changes in environments can be beneficial or harmful.
  - *Science L.8.C.4* Students know inter-related factors affect the number and type of organisms an ecosystem can support.
- 9-12 grade:
  - *Science N.12.A.1* Students know tables, charts, illustrations and graphs can be used in making arguments and claims in oral and written presentations.
  - *Science N.12.A.5* Students know models and modeling can be used to identify and predict cause-effect relationships.
  - *Science L.12.C* Students understand that ecosystems display patterns of organization, change, and stability as a result of the interactions and interdependencies among the living and non-living components of the Earth.
  - *Science L.12.C.1* Students know relationships of organisms and their physical environment.
  - *Science L.12.D.6* Students know the concepts of natural and artificial selection.

Objective:
Demonstrate various impacts on ecosystems and population
Demonstrate carrying capacity

Procedure:
Mark two parallel lines about 10 to 20 yards apart with either rope or student's backpacks.

Have students count off in fours. Have all the ones become bighorn sheep and stand behind one line, and the rest become resources and stand behind the other line.

Go over what all living things need to survive (food, water, shelter, and space). Explain that we will be assuming there is enough space, but the bighorn sheep need to find food, water, and shelter to survive. When they are looking for food, they should clamp their hands on their stomach like they are hungry. When they are looking for water, they should clamp their hands over their mouth. When they are looking for shelter, they should hold their hands together over their heads to make a little house. They can choose either food, water, or shelter at the beginning of each round, but they cannot change their decision in the middle of the round.

The other students are the resources that the bighorn sheep need, and likewise get to pick whether they are food, water, or shelter at the beginning of each round. They show which resource they are by using the same hand motions as the bighorn sheep and also cannot change what they are in the middle of the round.

Have the students line up along their respective lines, with their backs to the other group. Ask them to pick what resource they are or are looking for. Once everyone has their hands in place, tell them that on the count of three, they can turn around, keeping their hands in the symbol they picked. The bighorn sheep need to find a resource on the opposite side that matched the resource they need. When they find one, they will walk to it briskly, keeping their hands in the same position until they reach the resource.

Materials Needed:

- Large piece of paper and marker
- Paper and writing utensil for each student (optional)
- Two long pieces of rope (optional)
- Soft throwable (i.e. nerf ball or paper and tape ball; optional)

Sources:
Adapted from Project Wild activity *Oh Deer!*. Council for Environmental Education, 1984.

Submitted by Anica Mercado

Note: *Normally this is done as a running activity, however, due to the rocky terrain and vegetation at Red Rock Canyon NCA, running is not recommended. You can address this by stating that while it is important that bighorn sheep find the resources they need to survive, they also have to be aware of their surroundings and be cautious of other threats to their survival, such as predators. Any students caught running have become unaware of their surroundings and are "hit by a semi-truck" on the road and dies, becoming a resource the next round.*

When a bighorn sheep matches with the resource they were looking for, they bring the resource back with them as a new bighorn sheep. This represents the sheep's success in finding the resources it needs to survive and subsequently reproduce. If a bighorn sheep did not find the resource it was looking for, it dies and becomes a resource for the next round. If more than one bighorn sheep goes for the same resource, the first sheep there gets the resource and the other dies. If they arrive at the same time, they can play rock, paper, scissors with the winner getting the resource and the other dying. Any resource not taken by a bighorn sheep remains a resource for the next round.

Start another round, with all the new bighorn sheep joining the successful bighorn sheep and all the unsuccessful ones joining the resources, in the same manner, keeping track of the number of sheep from the start of the activity and at the beginning each round.

After several rounds, you can start introducing other circumstances to demonstrate the difference of other forces on the bighorn sheep population. For example, you can secretly tell all the resources to be shelter, symbolizing a drought where there is no food or water, or have none of them be shelter to symbolize a new housing development being built. Another option is to add a hunter, who stands on the sideline throwing the soft throwable (below the waist) at the bighorn sheep; if they are hit, they have been hunted and died that round. Make sure to note when you add in these variables for later discussion.

This activity should consist of twelve to fifteen rounds. At the end of the activity, graph as a class (or have students individually graph) the bighorn sheep population, with years on the x-axis and number of bighorn sheep on the y-axis, with each round played equaling one year. Note the pattern of increases and decreases in population, and discuss as a class the causes behind it. If you added other variables, such as drought or hunters, discuss the impact these factors had on the bighorn sheep population. You can also use any students that died as a result of running/being hit by a semi-truck as another factor of human influence on populations. For older students, have them compare the data on the graph and discuss how they might be useful if they were presenting the information, for example against a proposition for a housing development. Older students can also discuss the differences between natural and artificial selection and how it relates to this activity. Students can also predict the outcome of the sheep population with other potential circumstances.

Suggested Locations:
Large open area

Pine Creek Trail: 3 or 8	**Red Spring Boardwalk:** 4
Fire Ecology Loop: 4	**Moenkopi Loop:** 3