



Mount St Helens National Volcanic Monument – Teacher’s Corner 2016
Gifford Pinchot National Forest
USDA Forest Service

Habitat Destruction & Construction

Outdoor Activity

Teacher Information:

Time Requirement:	2 Hours to 2 ½ Hours
Trail Used:	Hummocks Trail
Location:	Hummocks Trailhead
Group Size:	Not Recommended for groups larger than 30

This activity is organized to be sequential by step. This is a challenging activity that will test your students’ observational skills and deductive capabilities.

Goal:

- 1) The student will understand the factors that led to the development of specific habitats on areas affected by the May 18, 1980 landslide.

Objectives:

- 1) The student will use the scientific process to deduce a reasonable explanation.
- 2) The student will apply knowledge acquired during the activity.
- 3) The student will compare, contrast and sort observations.
- 4) The student will reach a conclusion and be able to support it with evidence in writing.

Important vocabulary students should know before arriving:

- 1) **Abiotic Factors:** Environmental factors produced other than by living organisms; for example temperature, wind patterns, humidity, pH substrate rock type, and other physical and chemical factors.
- 2) **Consumer:** Make up the heterotrophic element, which uses the food stored by the autotrophic elements, rearranges it, and finally decomposes the organic materials into simple compounds.
- 3) **Ecosystem:** An ecological community of plants, animals and organisms interacting with each other and with non-living resources in the environment.
- 4) **Food Chain:** A term describing the dependence of one organism on another for food, progressing in a series, beginning with primary producers and ending with carnivores.
- 5) **Habitat:** a place or type of place where an organism, population or community live.
- 6) **Hummock:** large mounds of intact chunks of Mount St. Helens deposited by the May 18, 1980 landslide.
- 7) **Landslide:** a rapid and unusually sudden sliding or flowage of unsorted masses of rock and other material falling under the force of gravity
- 8) **Carnivores:** Organisms that feed on herbivores are termed first level carnivores or first level consumers. Consumers that use both plant and animal matter are called omnivores.
- 9) **Producer:** Largely green plants make up the autotrophic element which fixes the energy of the sun and manufactures food from simple inorganic substances.
- 10) **Riparian:** living on or located on the bank of a natural, lake, pond, or watercourse.
- 11) **Wetland:** Lands where saturation with water is the dominant factor determining the nature of soil development and the types of plants and animals living in the soil and on its surface.

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Your Mission: To examine the roles of hummocks, water, plants, and animals in the evolution of habitats on the May 18, 1980 landslide.

Possible Explanations:

- 1) Hummocks and water likely shape habitats.
- 2) Plants and Animals likely shape habitats.
- 3) Hummocks, water, plants, and animals likely shape habitats.

Case Facts:

1. Between March 20th and May of 1980 rising magma forced its way into the north side of Mount St. Helens, pushing solid rock and ice outward to the north 300 to 450 feet. This swollen area on the north side of the volcano was called the **bulge**.
2. The bulge collapsed on May 18, 1980 and generated a gigantic **landslide** that traveled 5 ½ miles north and 13 ½ miles west of the volcano. The depth of the landslide along the hummocks trail is 250 to 400 feet deep.
3. The landslide deposit is composed of huge intact pieces of the volcano called **hummocks**. The small hills or mounds visible on the valley floor are hummocks.
4. Prior to the 1980 eruption, 30 lakes and ponds existed within what is now the blast zone. **118 new lakes, ponds, and wetlands formed** among the hummocks and along the margins of the valley after the landslide filled this valley.
5. The hummocks area is the most biologically diverse landscape in the Monument. Up to 150 plant species have inhabited its **wetland, meadow** and **alder forest** habitats. The area also hosts some of the largest populations of amphibians and elk found in the Pacific Northwest.

Directions: *Stop at the wood posts with the YELLOW TRIANGLES. At each stop read the facts listed below and observe landscape features to answer the questions.*

STOP 1 ▲

1) Face the volcano. What are the large mounds and how did they get here?

2) The hole in the side of the volcano shows where the landslide started. What caused the landslide to flow down this valley? Circle the answer that best explains why this happened.

- a. Erupting lava pushed the landslide down this valley.
- b. The landslide struck Johnston Ridge and was deflected down this valley.
- c. None of the Above.

3) Some areas on the landslide developed into meadows. Make a food chain for the meadow by placing the plants and animals listed below in the right category.

Willow Trees, White Clover, Columbia Black-tailed Deer, Mountain Lion,
Creeping Blackberry, Fireweed, Roosevelt Elk, Grass

Predator	Consumers	Producers
		<hr/>
	<hr/>	<hr/>
<hr/>		<hr/>
	<hr/>	<hr/>
		<hr/>

4) Which member of the food chain (predator, consumer, or producer) do you think has the greatest influence in the ecosystem?

STOP 2 

5) Turn slowly a full circle and look at the landscape as you turn. Circle the answer that explains how pond habitats formed?

- a. Rain and snowmelt flowed into dips and depressions between hummocks.
- b. The landslide carried big blocks of glacial ice that melted and formed ponds.
- c. All of the Above.

8) The big trees here are Sitka and red alders. Observe the trees visible from this site then read the statements below. Circle "T" for true or "F" for false.

T or F Alder trees are big close to the pond and smaller further away from it. This indicates that forests started to develop along the edges of ponds and then spread outward from them.

T or F The 118 new lakes, ponds and wetlands that formed among the hummocks had little influence in the development of alder forests.

9) Alder trees create habitat for shading-loving plants and reduce habitat for sun-loving plants. How would the food chain in a meadow be affected by the spread of alder forests?

STOP 3 

10) Deer and elk usually don't eat conifer trees. They taste bad and lack nutrients. This odd-shaped conifer tree has been eaten by deer and elk. Circle the answer that explains why deer and elk are eating these foods.

- a. There is not enough food available for deer and elk.
- b. Deer and Elk populations are too large.
- c. Both a. and b.

11) Some seeds "hitchhike" inside the stomachs of elk. When elk poop they can "plant" seeds. 15 plant species growing in the Monument sprouted from elk poop. Circle the answer that reveals the power of poop!

- a. Elk diets can change the plant communities.
- b. Elk fertilize hummocks.
- c. Both a. and b.

STOP 4 ▲

12) The 1980 landslide buried the North Fork of the Toutle River. A new river re-formed after the eruption and carved this canyon. Unscramble the letters to make a word that explains the process that carved this canyon.

R E O I S N

_____ O _____

13) Many plants grew beside the pond at the last stop, but few grow next to the river. Circle the answer that best explains why?

- a. Water levels in ponds rise up and down, but there is little shoreline erosion so plants can grow.
- b. The shifting river channel erodes ash, rock, and colonizing plants.
- c. All of the above.

STOP 5 ▲

14) Beaver built the dam and lodge here during the summer of 2007. List two impacts caused by these activities that improved habitat conditions for a plant or animal species.

15) List two impacts caused by these activities that damaged habitat conditions for a plant or animal species.

16) On the hummocks, beaver often have to leave several years after colonizing site because there is not enough food. How will this habitat change if the beaver dam washes away and this becomes a creek again?

Conclusions:

Circle the best possible explanation that describes what is shaping habitats.

- 1) Hummocks and water likely shape habitats.
- 2) Plants and Animals likely shape habitats.
- 3) Hummocks, water, plants, and animals likely shape habitats.

In complete sentences, explain the evidence you used to reach your conclusion.

Answer Sheet Habitat Destruction & Construction

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3. The landslide deposit is composed of huge intact pieces of the volcano called **hummocks**. The small hills or mounds visible on the valley floor are hummocks.
4. Prior to the 1980 eruption, 30 lakes and ponds existed within what is now the blast zone. **118 new lakes, ponds, and wetlands formed** among the hummocks and along the margins of the valley after the landslide filled this valley.
5. The hummocks area is the most biologically diverse landscape in the Monument. Up to 150 plant species have inhabited its **wetland, meadow** and **alder forest** habitats. The area also hosts some of the largest populations of amphibians and elk found in the Pacific Northwest.

Directions: *Stop at the wood posts with the YELLOW TRIANGLES. At each stop read the facts listed below and observe landscape features to answer the questions.*

STOP 1 ▲

1) Face the volcano. What are the large mounds and how did they get here?

The 'case facts' indicate that the mounds are hummocks; gigantic pieces of the volcano that rode down on the top of the landslide. The landslide scoured and buried the valley here with 250 to 400 feet of rock.

2) The hole in the side of the volcano shows where the landslide started. What caused the landslide to flow down this valley? Circle the answer that best explains why this happened.

a. Erupting lava pushed the landslide down this valley.

b. The landslide struck Johnston Ridge and was deflected down this valley.

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3) Some areas on the landslide developed into meadows. Make a food chain for the meadow by placing the plants and animals listed below in the right category.

Willow Trees, White Clover, Columbia Black-tailed Deer, Mountain Lion, Creeping Blackberry, Fireweed, Roosevelt Elk, Grass

Predator	Consumers	Producers
		<u>Willow Trees</u>
	<u>Roosevelt Elk</u>	<u>White Clover</u>
<u>Mountain Lion</u>		<u>Creeping Blackberry</u>
	<u>Columbia Black-tailed Deer</u>	<u>Fireweed</u>
		<u>Grass</u>

c) Which member of the food chain (predator, consumer, or producer) do you think has the greatest influence in the ecosystem?

Producers are the primary source of food and energy that powers an ecosystem. Nutrients and energy are transferred up the food chain through the herbivores and omnivores (consumers) that eat the primary producers (plants) and predators.

STOP 2 

5) Turn slowly a full circle and look at the landscape as you turn. Circle the answer that explains how pond habitats formed?

a. Rain and snowmelt flowed into dips and depressions between hummocks.

b. The landslide carried big blocks of glacial ice that melted and formed ponds.

c. All of the Above.

8) The big trees here are Sitka and red alders. Observe the trees visible from this site then read the statements below. Circle "T" for true or "F" for false.

T or F Alder trees are big close to the pond and smaller further away from it. This indicates that forests started to develop along the edges of ponds and then spread outward from them.

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9) Alder trees create habitat for shading-loving plants and reduce habitat for sun-loving plants. How would the food chain in a meadow be affected by the spread of alder forests?

Producers are the primary source of food and energy that powers an ecosystem. Nutrients and energy are transferred up the food chain through the herbivores and omnivores (consumers) that eat the primary producers (plants) and predators. Changes at the producer level could negatively impact consumers (deer and elk) and predators (mountain lions) examined at the previous stop.

STOP 3 

10) Deer and elk usually don't eat conifer trees. They taste bad and lack nutrients. This odd-shaped conifer tree has been eaten by deer and elk. Circle the answer that explains why deer and elk are eating these foods.

- a. There is not enough food available for deer and elk.
- b. Deer and Elk populations are too large.

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11) Some seeds "hitchhike" inside the stomachs of elk. When elk poop they can "plant" seeds. 15 plant species growing in the Monument sprouted from elk poop. Circle the answer that reveals the power of poop!

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13) Many plants grew beside the pond at the last stop, but few grow next to the river.

Circle the answer that best explains why?

a. Water levels in ponds rise up and down, but there is little shoreline erosion so plants can grow.

b. The shifting river channel erodes ash, rock, and colonizing plants.

c. All of the above.

STOP 5 ▲

14) Beaver built the dam and lodge here during the summer of 2007. List two impacts caused by these activities that improved habitat conditions for a plant or animal species.

1. The beaver dam increased the amount of wetland habitat when water backed up and spread over a much larger surface area. The larger surface area benefits many species of waterfowl—diving ducks, dabbling (buts-up) ducks and wading birds.

2. The larger surface area may also benefit amphibians by allowing for more algae and plankton production that could benefit tadpoles, as well as increasing insect populations that adult amphibians depend on. If more shallow water habitats are created there may also be more breeding habitat for frogs and toads.

3. The larger pond may also benefit plant species like cattails, tules and other aquatic plants, especially if more shallow water habitat is created by the dam.

4. The primary predator of beaver are mountain lions. Beaver burrows and lodges can attract river otters. In 2003 a family of river otters colonized a pond occupied by beavers. The development of shoreline plant communities also attract a range of small mammals that lure predators like weasels and coyotes.

15) List two impacts caused by these activities that damaged habitat conditions for a plant or animal species.

1. Beavers kill trees when they feed on the soft nutrient rich cambium just beneath the bark of trees. Alder and willow tree branches and trunks that the beaver cut down were used to construct dams and lodges. Willows, cattails and tules growing in this wetland are preferred food sources.

2. The beaver dam caused water to back up and spread over a much larger surface area. The larger surface area drowns trees and plants that can not tolerate excessively wet soil conditions. Many of the large alder trees will die due to the dam. The loss of these larger trees reduces habitat conditions for perching birds.

3. The larger pond may be detrimental to amphibians if shallow water (breeding) habitats were lost, but may benefit some waterfowl.

16) On the hummocks, beaver often have to leave several years after colonizing site because there is not enough food. How will this habitat change if the beaver dam washes away and this becomes a creek again?

Beavers abandon dam and lodge sites if there are insufficient food sources to sustain them. When they leave, beaver dams deteriorate and eventually fail, which dramatically changes habitat conditions at the site. When water levels drop, water-loving plants are left high and dry which causes them to eventually die. These former wetland areas often become grassy meadows. Willow and alder tree populations will re-establish along the new streamside, but populations along the edges of the former pond may struggle to survive. Both the amount and type of habitat for waterfowl and amphibians is reduced significantly. Wildlife that favor stream habitats increase and the number of pond-dwelling species decrease.

Conclusions:

Circle the best possible explanation that describes what is shaping habitats.

- 1) Hummocks and water likely shape habitats.
- 2) Plants and Animals likely shape habitats.
- 3) Hummocks, water, plants, and animals likely shape habitats.

In complete sentences, explain the evidence you used to reach your conclusion.

Hummocks created by the 1980 landslide set the stage for distinct habitats to form. The uneven topography—high hummocks and depressions beside them led to the creation of one hundred fifty ponds and wetlands. The landslide also acted as an earthen dam, which blocked Coldwater and Castle Creeks and enabled two massive lakes to form. In areas where water could not collect meadows formed. Some hummocks are so hard today that plants root systems are still unable to penetrate the hard rock.

Some **Plant and Animal** species are having an enormous impact on hummock habitats. Deer and elk have dramatically changed the composition of plant communities through their browsing preferences. Beaver and their dam-building activities change pathways of succession with massive impacts to wetlands. Shade from alder forests is editing some sun-loving plant species from areas and creating new habitats for shade-tolerant species.

Water is powering the return of life on the hummocks! 150 new pond, wetlands, and lakes formed on the hummocks. This fivefold increase in aquatic habitat has fueled spectacular ecological communities. The hummocks are is the most biologically diverse landscape within the Monument. Vibrant wetlands host the one of the largest populations of amphibians in the Pacific Northwest, as well as diverse populations of waterfowl and migratory birds. As plants established along the moist shoreline in the 1980's vegetation spread outward. The alder forest growing here started beside the wet shoreline and spread outward from these moist epicenters. As alder forests spread outward from one pond, they soon began to merge with alder stands growing away from adjacent wetlands, creating dense alder forests. Today over 20% of the landslide is covered with alder forests, largely due to the creation of these new aquatic habitats, and these forests are now spreading up the valley walls—greatly accelerating the pace at which life returns in the surrounding blown down forest. Stable water sources like ponds flourish, but the re-establishment of the Toutle River chronically re-disturb other areas. In areas where water could not collect distinct meadow habitats formed.

Instructional Sequence:

Before Hiking the Trail or Leaving the Parking Lot:

- 1) Make sure that students are dressed appropriately for the weather conditions that they have a pencil, a clipboard or notebook and a copy of the 'Habitat Construction and Destruction' worksheet. **Inform them that they will be hiking within a research area. Hiking in this area is a privilege and that student behavior will determine if future groups will be able to use this site. Off trail travel, the collection of rocks, plants, and wood, and disturbing research sites is strictly prohibited (\$100 fine).**
- 2) There are two trailheads at the parking lot, depart from the trailhead with the bulletin board. Inform the students that you will lead the way because there are specific points along the trail where they will be stopping to observe geographic features and complete answers to questions on their worksheets.

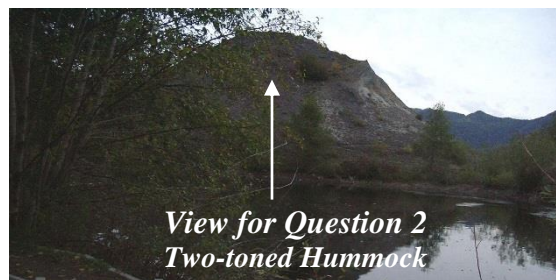
If your group is larger than 30:

Divide your groups in half. Have $\frac{1}{2}$ the group start at the trailhead with the bulletin board, and the other half walk the trail in reverse (the trailhead is located 75 feet to the right of the main trailhead. This second group would need to answer the questions in reverse order or you could create your own version of the activity by cutting and pasting the stops in reverse order.

Student worksheet stop locations are marked with wooden posts with YELLOW TRIANGLES along the trailside. Note: some of the wood posts have other colored shapes on them which designate stop locations for other educational activities.

On the Trail:

- 1) Remind students to use make observations and use the "case facts" provided to answer the questions.
- 2) The hummock to look for in stop two is located across the pond. During sometimes of the year vegetation can obscure views of the two-toned hummock.



- 3) The odd-shaped conifers in stop 3 look like the one in the picture.

