

Survivors and Newcomers: How Mount St. Helens Came Back

Learning target: I can use evidence from a passage to explain why recovery after a disturbance was faster in some places than others, and what survivors and pioneer species each contributed.

Reading with evidence

About 40 min

Individual

MS-LS2-4 · practice

reading

writing

Name _____

Date _____

Period _____

Directions

Read the passage once straight through. Read it a second time with a pencil: number the paragraphs 1 to 7 and mark every date, every number and every named organism. Answer in complete sentences. When a question asks for evidence, quote or closely paraphrase the passage and give the paragraph number.

You will need: This worksheet, Pencil

Survivors and Newcomers

[1] On May 18, 1980, Mount St. Helens in Washington State had been swelling for about two months as magma pushed up inside it. At 8:32 a.m. a magnitude 5.1 earthquake shook the volcano, and its bulging north side gave way in the largest landslide in recorded history. Hot gas, rock and ash then blasted sideways across the valleys to the north. Forests were flattened or scorched across about 600 square kilometers, and 57 people died. Ash rose more than 20 kilometers high, and the summit ended the day about 400 meters lower.

[2] The damage was not the same everywhere, and that difference shaped the next forty years. Closest to the crater, flows of hot pumice buried the ground many meters deep, creating the Pumice Plain. Nothing there survived: no soil, no roots, no seeds. Farther out, in the blowdown zone, the blast laid whole forests flat under a blanket of ash. But beneath the ash lay the old forest soil, and in it were roots, seeds, fungi and animals that had been underground when the blast passed. Each zone was a different starting line.

[3] Scientists who hiked into the blowdown zone that first summer found more survivors than anyone expected. Northern pocket gophers, small burrowing rodents, had been safe in their tunnels, and their digging soon pushed old soil up through the ash, making patches where seeds could sprout. Many slopes were still under late-spring snow on May 18, and small plants and young trees beneath it were shielded. Frogs, toads and salamanders survived too, some underground and some in ponds still sealed with ice. Where survivors remained, recovery began right away. Ecologists call this secondary succession.

[4] The Pumice Plain had no survivors, so every living thing there had to arrive from outside. Seeds blew in on the wind, but most landed on loose pumice that held little water and almost no usable

nitrogen, and the seedlings died. Within about two years of the eruption, scientists found a single prairie lupine, a low purple-flowered plant, growing on the plain far from other plants. Bacteria in small bumps on lupine roots take nitrogen gas from the air and change it into a form plants can use. Dead lupines left nitrogen-rich litter behind, and living lupines caught windblown seeds. Seedlings of other species did especially well where a lupine had died. This is primary succession, and the lupine was one of its pioneers.

[5] Larger animals changed the land too. Elk wandered back into the blast zone to graze; their hooves broke up the crusted ash, and their droppings carried seeds and nutrients. Along streams, willows and red alders took root; alders, like lupines, host microbes that capture nitrogen from the air. Spirit Lake, north of the crater, was struck by the landslide and covered with a floating mat of blasted trees. At first its water held almost no oxygen, because bacteria were feeding on the dead material, but within a few years oxygen returned, and algae, insects and amphibians followed.

[6] In 1982 Congress set aside the area as the Mount St. Helens National Volcanic Monument. Most of the blast zone inside it was left to recover on its own instead of being replanted, which made the mountain a huge natural experiment. Scientists marked permanent study plots and returned to them summer after summer to count plants, measure how much ground they covered, and record insects, birds and small mammals. The counts told a consistent story: where survivors remained, the number of species climbed quickly; on the Pumice Plain, species arrived slowly and unevenly, clustering around lupines and streams.

[7] Today meadows, shrub thickets and young trees cover much of the blast zone, and elk, birds and amphibians are common. Yet the Pumice Plain is still open and patchy, and no part of the landscape looks exactly as it did on May 17, 1980. Succession follows patterns that scientists can recognize, but it runs on no fixed schedule and does not promise to rebuild the community that grew there before. How fast a place recovers, and what it becomes, depends on what survived, what arrived, and what the first arrivals did to the ground.

Part A: Find and explain the evidence

1. Paragraph 1 describes the eruption with several numbers. Choose two of them and explain what each one tells you about the size of the disturbance.

2. Paragraph 2 says the differences in damage 'shaped the next forty years.' Describe the two zones the passage compares and the one difference between them that mattered most.

3. Name three kinds of survivors from paragraph 3 and explain how **one** of them helped recovery begin.

4. Why did most seeds that landed on the Pumice Plain die, and how did the lupine solve that problem for the plants that came after it? Cite paragraph 4.

5. Paragraphs 3 and 4 use the terms secondary succession and primary succession. Using only what the passage says, explain the difference in your own words.

6. Paragraph 6 describes how scientists collected evidence. What did they do, and why does returning to the same plots every year make the evidence stronger than a single visit would?

7. Find the sentence in paragraph 7 that corrects the idea that succession is a fixed schedule that rebuilds the original ecosystem. Copy or closely paraphrase it, and give one piece of evidence from earlier in the passage that supports it.

Part B: Make an argument

8. Write an argument: **Recovery at Mount St. Helens was shaped more by what survived than by what arrived.** Agree or disagree. Support your position with evidence from at least two different paragraphs, and explain how the evidence supports it.

Finding evidence fast

Each question names the paragraph where its evidence lives. Go to that paragraph first and underline the sentence that answers the question before you write. For q8, make a two-column list before writing: 'survivors' on the left (gophers, snow-covered plants, amphibians, old soil) and 'newcomers' on the right (lupine, elk, windblown seeds, willows and alders). Decide which column had the bigger effect in which zone; the best arguments notice that the answer depends on the zone.

Design the next study

Scientists at the monument still return to their plots every summer. Suppose you could add one new measurement to their study for the next ten years. Choose it, explain what question it would answer about succession or resilience, and describe how you would compare the Pumice Plain with the blowdown zone so the comparison is fair. Then predict what you expect the numbers to show, and say what result would surprise you.