

Section 3.1 Review Answers

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1. A population includes all interacting members of a particular species occupying the same geographical space. A community consists of all individuals in all interacting populations in the same geographical area.
2. A fallen tree could have many interacting organisms of different species (fungi, bacteria, mosses, lichen, etc.) living upon it. All of these organisms interact with the physical environment and are influenced by abiotic factors, such as light availability, moisture, nutrients, and temperature.
3. Limber pine trees grow with their branches pointed in the direction of the prevailing winds. The dry, windy conditions would limit the height the tree could reach. The silver bark would help to reflect the intense rays of the sun, helping to keep the tree cool on a sunny, summer day. Students' answers should show a clear awareness of an abiotic factor and some suggestion of how it might influence the physical characteristics of the species.
4. (a) The three components of a population are all the members of the same species living in a specific area at a specific time.

(b) All of the coyotes can be considered a single population because they are the same species (*Canis latrans*) located within a particular boundary (that of the national park), in June 2006.

(c) All of the families of coyotes in WLNP can be considered separate populations. The national park boundary is political; it is not based on ecological boundaries (and although coyotes may live in the park, their ranges do cross over the political boundary of the park). As such, this human-constructed boundary of the park cannot be considered a natural boundary for a coyote population. Many ecosystems exist within the boundaries of WLNP, and within these ecosystems exist several populations of coyotes.

Note: The following is additional information for students and can be used to help explain the answer to Part (C).

Families of coyotes are commonly referred to as packs. Coyote packs are highly territorial, and they defend their range from other packs. Packs do not overlap in territory, and breeding occurs within packs between the alpha male and the alpha female. Based on this biological information, individual families of coyotes can be considered separate populations.

(d) Students will likely argue that their second response is more reasonable because all the coyotes in WLNP can interbreed.

5. Any species in Great Slave Lake is part of a larger population. For example, an individual pike belongs to the population of all pike in the lake. In turn, the pike population interacts with other populations of different species including other fish, algae, plankton, etc., through predator-prey relationships and competition. These lake communities, coupled with the abiotic factors of the lake, make up the Great Slave Lake ecosystem.
6. An ecologist studying plants that are eaten by bighorn sheep would also study the nutrient contents in soils because soils affect animals indirectly. The soil composition will dictate which plants grow; if the soil does not grow the right plants, the sheep will not eat there. Since bighorns also eat soil for the salt content, ecologists would analyze soil samples for both nutrient and salt content. This will help them determine the relationship between nutrient content and plant growth, and then analyze predicted ranges for bighorn sheep.
7. Students could include natural disturbances such as a fire, tsunami, volcanic eruption, flood, changing precipitation patterns, climate change, etc. These natural disturbances can affect the distribution and range of living things.

Students could also look at the impact of human activities on the distribution and range of living things. Examples may include: deforestation; over-fishing; poaching, hunting, and trapping; extirpation of the buffalo; clearing lands for agriculture; damming rivers; open-pit mining; urban sprawl; use of pesticides; habitat

fragmentation; fish-farming; releasing pollutants into waterways; breeding organisms and releasing them into the wild; or the arrival of invasive species.

- 8.** All the ecosystems in the world and their interactions make up the biosphere. The biosphere includes all parts of Earth that are inhabitable by some type of life—all the land surfaces and bodies of water on Earth—and extends several kilometres into the atmosphere and under Earth's crust. All living things that inhabit these environments, as well as the abiotic components with which they interact, are part of the biosphere.