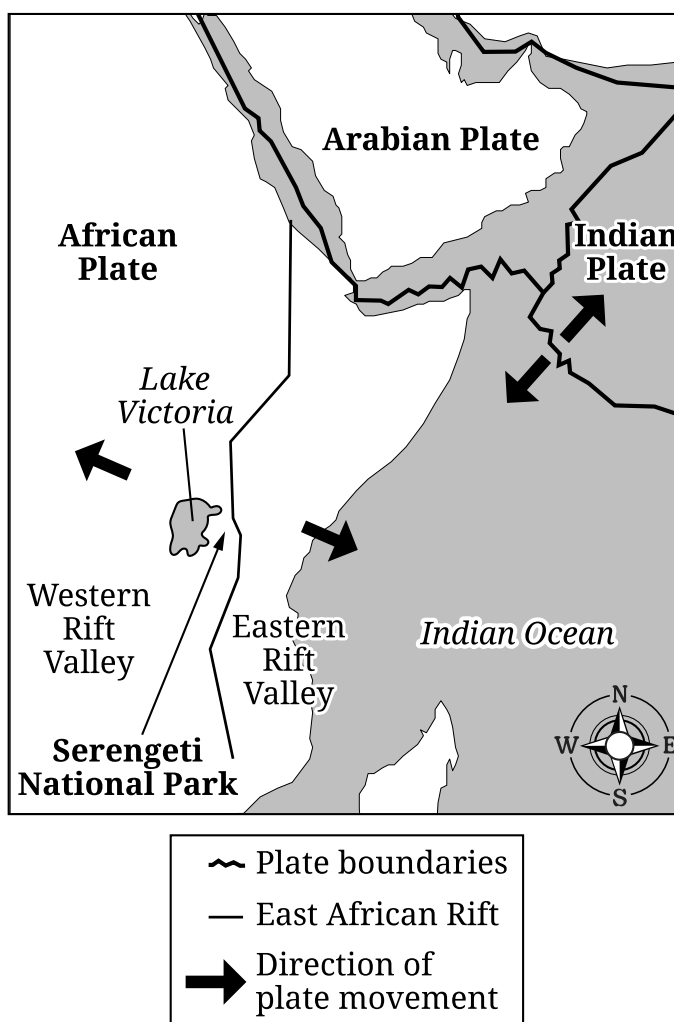


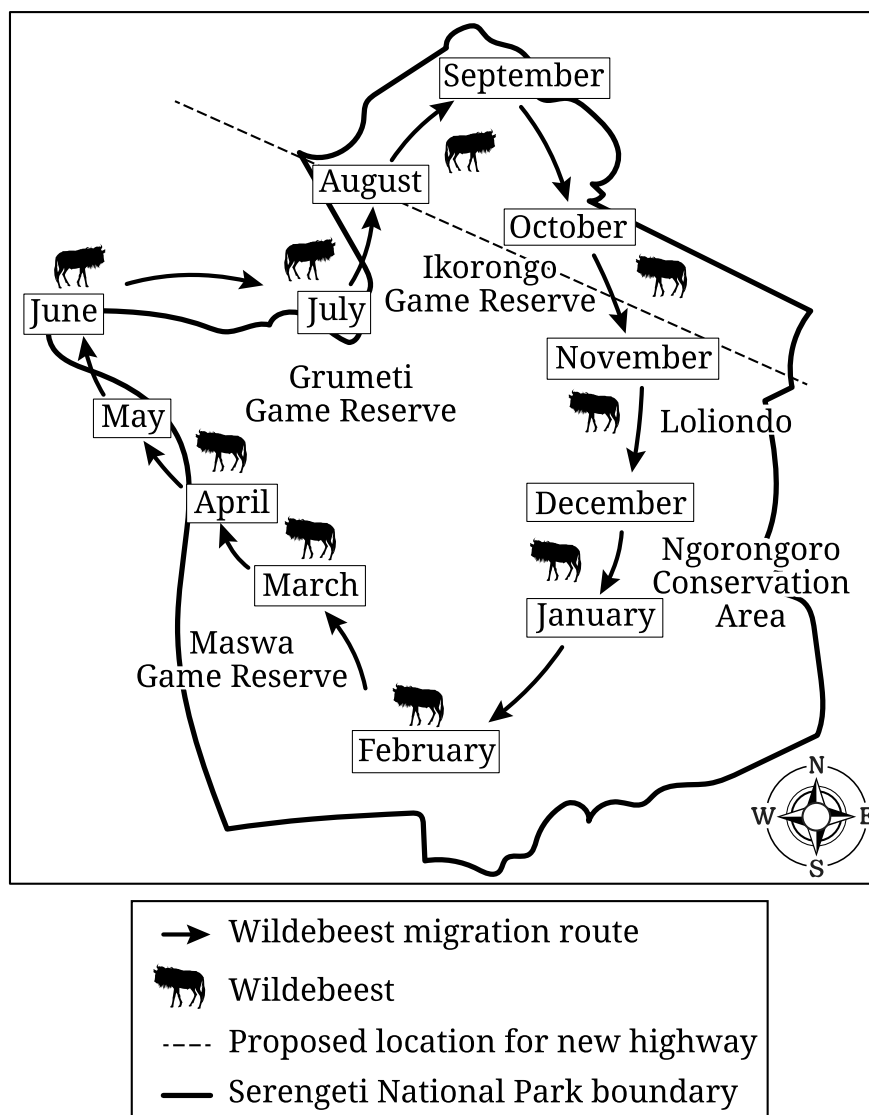
Serengeti National Park is located in Tanzania, Africa. The park is located in a valley along a tectonic plate boundary called the East African Rift. Figure 1 shows the East African Rift and other plate boundaries near the east coast of Africa.

Figure 1. Tectonic Plate Movement near East Coast of Africa



Serengeti National Park contains a variety of tropical habitats but is dominated by wideopen lands that include a variety of grass species with scattered trees and shrubs. Most grass growth occurs after the March through May rainy season. Many of the park's herbivores, such as wildebeest and zebra, migrate through the park in an annual cycle following the growth of new grass (Figure 2).

Figure 2. Annual Migration of Wildebeest in Serengeti National Park



2. Respond to parts A, B, C, D, E, F, G, H, I, and J.

- A.** Based on the information in Figure 1, **identify** the type of plate boundary that runs beneath Serengeti National Park.
- B.** Based on the information provided, **identify** the dominant biome within the Serengeti.
- C.** Wildebeest give birth to their young when new grasses are growing. Based on the information in Figure 2, **identify** the location in the Serengeti where wildebeest are most likely to give birth.
- D.** The Serengeti has two primary types of grasses: long and short. The two grass types provide similar levels of nutrition for animals. Wildebeest primarily consume long grasses, while other herbivores such as gazelle consume the short grasses. These two similar species coexist in Serengeti National Park.

Explain why resource partitioning allows for the coexistence of the wildebeest and the gazelle in the Serengeti.

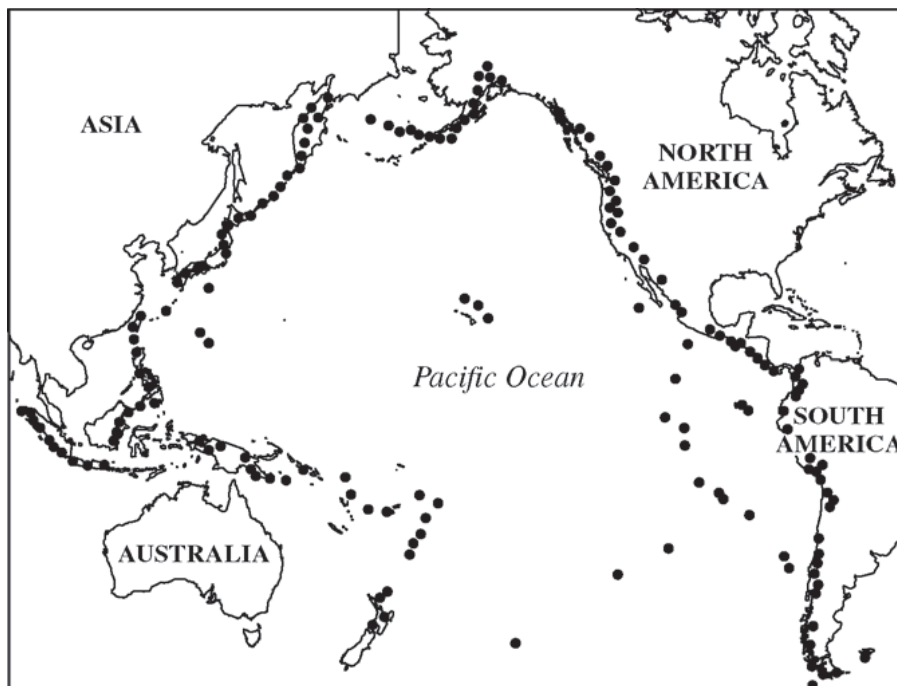
- E.** The Tanzanian government plans to build a highway across the northern portion of the Serengeti, as shown in Figure 2.

Describe one way the planned highway shown in Figure 2 could negatively affect the wildebeest population in the Serengeti.

- F. Propose** a solution to the negative effect created by the planned highway described in part E.
- G.** Many organisms live in grasslands. One weed species, the spotted knapweed, was introduced at one location in North America in the 1890s and is currently found throughout the rangelands of the western United States. The spotted knapweed poses several environmental problems in North America. Farmers often use crop rotation to control populations of pests like the spotted knapweed. A more traditional method of controlling pests involves spraying pesticides.

Describe a characteristic of an invasive species, such as the spotted knapweed, that allows them to outcompete native species.

- H. Justify** the use of crop rotation as an environmental solution by providing an additional advantage, other than controlling pest populations.
- I. Describe** an environmental problem associated with controlling pest populations with large amounts of pesticide.
- J. Propose** a solution to controlling pests, other than pesticides or crop rotation.



3. Plate-tectonic theory states that the Earth's lithosphere is broken into very slowly moving pieces or plates. Plate movements over vast stretches of time have led to the current orientation of our continents and oceans. Individual events along plate boundaries, such as earthquakes and volcanic eruptions, pose periodic threats to human activity and ecosystems. The "Ring of Fire" is a term that describes the location of increased seismic and volcanic activity around the margins of the Pacific Ocean basin. On the map above, each dot represents a volcano or an earthquake.
- (a) Japan, Indonesia, and the Philippines are examples of volcanic island chains that have formed along subduction zones between plates in the western Pacific.
 - (i) **Describe** what happens when two tectonic plates collide along a subduction zone.
 - (ii) **Explain** how subduction leads to volcanic activity.
 - (b) Although the landscape following a volcanic eruption may appear unable to support ecological communities, over time the area can be transformed through succession.
 - (i) What is primary succession?
 - (ii) **Explain** how primary succession can lead to soil formation on a newly formed volcanic landscape.
 - (c) In addition to volcanic activity, highly destructive tsunamis are generated along Pacific Plate subduction zones.
 - (i) **Explain** how a tsunami is generated along a subduction zone.
 - (ii) **Describe** one negative ecological impact that tsunamis have on coastal environments.
 - (d) Southern California experiences periodic devastating earthquakes along the San Andreas Fault, which is a transform boundary located along the eastern edge of the Pacific Plate.
 - (i) **Describe** what happens to the tectonic plates along a transform boundary at the moment when an earthquake occurs.
 - (ii) **Describe** what happens to the tectonic plates along a transform boundary during the time between earthquakes.