Name: _____ Date: _____ Group: _____

Silence of the Frogs

Lexile 1040L

1 Amphibians require specific habitats. They need a moist environment to be active and standing water to breed in. They need food for both tadpoles and adults. Predator numbers affect both adult and tadpole survival. As their skin is water permeable, they are very sensitive to water pollution. One species of frog that lives in alpine environments serves as an example of how both potential climate change and human changes to the environment can put species survival at risk.

2 The Cascades frog, *Rana cascadae,* was named after the Cascade mountain range in the western United States. This range extends from northern Washington State through Oregon and into northern California. This species of frog is found in both the Cascade and Olympic mountain ranges. The frogs live at altitudes between 665 and 2,450 meters. Cascades frogs are medium-sized and slender. They have a green and brown mottled back and a yellow underside as an adult. A dark stripe extends across the eyes toward the neck. Adult males are up to 7 cm in length, where adult females are slightly larger, at 8 cm. Their feet are only partly webbed. Their call is low and grating and has been described as a chuckle. Calls are produced during the day and at night, both from land and under water. The diet of adult cascade frogs is poorly understood. Adults fall prey to raccoons and garter snakes, as well as several bird species.

3 Cascades frogs have evolved to lay their eggs in small, temporary pools located in alpine wetlands. These wetlands are fed by snowmelt from higher elevations. The adults usually return to the same breeding location year after year, so the frogs hibernate near their breeding sites. They only breed once a year, soon after emerging. The speed of egg development is highly dependent on the water temperature. Once the ice thaws, they emerge and begin looking for mates. Tadpoles typically hatch within two to four weeks. Tadpoles are speckled with dark spots. Before the end of summer, they will grow to about 5 cm and undergo metamorphosis to become miniature adults. Tadpoles are benthic feeders, staying close to the bottom of the small pools in which they hatched. In the wild, tadpoles may be eaten by adult cascade frogs as well as long toed salamanders. As many of the breeding pools only exist for a short time during runoff, fish predators are generally absent. This absence of fish predators increases the breeding success of the frogs.

4 Scientists have been monitoring the Cascades frog population for many years. The scientists catch the adult frogs at different times during the year. Then they insert a small magnetic tag under the skin, about the size of a grain of rice. When the same frogs are caught again at different times of year, they can be identified through a scanner similar to the ones used at grocery store registers. The data collected shows that some cascade frogs can live to be 13 years old! In addition to counting and identifying the frogs, scientists also monitor other aspects of the frogs' environment. Scientists monitor the breeding sites of the frogs. They measure the depth and water temperature of each breeding pool. As a result, scientists are able to see the types of changes that have occurred in the frogs' environment from year to year.

5 In recent years, the frogs' environment has changed in a number of ways. Changes in climate have decreased snowpack, or the amount of snow falling during the winter. As snowpack decreases, there is less snow to melt and flow into the wetlands. Therefore, the wetlands are becoming drier. The small pools are becoming shallower and less numerous. Increasing summer temperatures have also led to the breeding pools drying earlier than normal. As a result, the pools could become dry before tadpoles have undergone metamorphosis, preventing future generations from growing up. Drier wetlands may also affect adult survival, as access to water and other aquatic food sources are diminished.

6 Human activities have also had an impact on the Cascades frog populations. The number and extent of alpine wetlands may also be reduced due to fire suppression. Fires play a critical role in a healthy forest in most alpine areas. Fires remove dead and decaying matter and underbrush, and create open areas for meadows and wetlands. Forest fires also remove small trees, allowing sunlight to reach the ground and encouraging meadow and wetland vegetation to flourish. Without regular fires, young trees have the chance to grow, and meadows slowly become part of the forest. Humans have also introduced new predators into the alpine ecosystem such as bull frogs. Bull frogs are larger and prey on eggs and tadpoles. And, as more and more people are drawn to alpine areas, human-made products such as fertilizer are introduced. Fertilizers are toxic to both tadpoles and adult frogs.

7 One question that scientists are asking is can the Cascades frogs adapt and lay their eggs in other sites? Larger lakes are less susceptible to water level and temperature fluctuations. This would provide a more stable environment for tadpoles. Lake water may also dilute some of the toxins that have been introduced into these areas. Unfortunately, many alpine lakes have been stocked with trout for fly fishermen to enjoy. Trout prey on frog eggs and possibly tadpoles. So even if frogs can adapt to use other breeding sites, success is not assured. Like many amphibians, Cascades frogs face a changing habitat. If their habitat changes slowly, frogs are likely to adapt, perhaps by shifting their range to find more hospitable habitat. However, if their habitat changes too rapidly, populations of Cascades frogs will shrink to such low levels that they will eventually become extinct. Then the chuckling sound will disappear from the summer mountain soundscape.

1 How do Cascades frogs survive the winter? The frogs —

A huddle in large groups inside caves.

B migrate to lower, warmer altitudes.

C hibernate near their breeding sites.

D swim in mountain lakes.

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2 What is the most likely effect of increasing water temperature on Cascades frog development?

A Eggs will hatch into tadpoles in a shorter period of time.

B Tadpoles will not metamorphose successfully.

C Adult frogs will lay fewer eggs.

D Tadpoles are more likely to retain their tail.

3 What is the most likely effect of a decrease in long toed salamander population on Cascades frogs?

A Adult frogs starve.

B The number of frog breeding sites increases.

C Adult frogs find mates more readily.

D More tadpoles survive to metamorphose.

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4 How do scientists determine the life span of Cascades frogs?

A By measuring the thickness of the face stripe.

B By scanning the unique magnetic tags year after year.

C By weighing the frogs, as their weight increases predictably.

D By counting the number of spots on the back.

5 What is the most likely effect of decreased snowpack on the habitat of the Cascades frog?

A Summer temperatures may be higher.

B Temporary pools may be fewer.

C Winter temperatures may be lower.

D Prey numbers may increase.

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6 What factor appears most likely to prevent the Cascades frogs from breeding successfully in larger lakes?

A Presence of trout.

B Lake water temperature is less stable.

C Lakes dry up in summer.

D Lake water may be more polluted.