

Reflection Section Answer Guide

Note to Educator: The purpose of the Reflection section questions is to encourage students to think critically about what they have read. The following “answers” are only suggestions to assist you in using these questions in the classroom.

Amphibious Assault: How Climate Change May Affect Amphibian Breeding

Introduction

What is the problem the scientists wanted to answer in this study? *Scientists wanted to find out how amphibian breeding may be affected by climate change.*

Why might cold-blooded animals be more quickly affected by climate change? *Cold-blooded animals may be affected more quickly by climate change because their body temperature and activities depend on the environment. Therefore, if the temperature of the environment changes, so do the temperature and activities of the cold-blooded animal.*

Method

Why do you think scientists chose to study frogs and toads in three different areas? *Scientists often choose to gather their data from more than one location because it helps the scientists make sure that their findings are reliable. Also scientists may want to compare similarities and differences across different areas and species.*

Why do you think scientists wanted to know what the daily air temperature was in the 3 months before breeding season? *To have a good understanding of the changing temperature and how that may affect amphibian breeding, the scientists needed to have several months of data on the air temperature. This way, the scientists could see how the temperature changed over that period and how that change may have affected the amphibians.*

Findings

Based on the scientists’ findings, does it look like climate change is having an effect on when the amphibians breed? *Based on the scientists’ findings, it does not look like climate change is having a significant effect on*

amphibian breeding, up to the time of the study (year 2000) and for most of the species and sites surveyed in this study.

Look at the findings for the western toad. Why do you think it is important to test at different sites? *It is important to test at different sites because if the scientists had only tested two sites, they may not have seen a change at one site. Instead, they may have concluded that there were no changes at all.*

Look at the periods studied in figure 3. What is one possible reason the scientists found that frogs and toads were not breeding earlier? *The periods may not have been long enough to show enough of a change in the temperature. If the scientists had studied frog and toad breeding over the past 50 years, for example, they may have had different results.*

Discussion

Why would amphibians be particularly sensitive to changes in temperature? *Amphibians are cold-blooded, which means they are sensitive to changes in temperature.*

Do you agree with the scientists that more studies should be done? Why or why not? *This is an individual question. Students should be able to support their answers with sound logic and reasoning.*

Seed Ya Later! Predicting the Movement of Trees in a Changing Climate

Introduction

How does a tree move to a new location? *Tree species move to new locations through the movement of their seeds.*

Why do you think the scientists in this study wanted to include the movement of tree seeds into their models? (Hint: Reread the first two sentences in the “Introduction.”) *The rate at which tree species can move in a changing climate is related to the method and distance of seed dispersal. If the scientists could include this information in their models, they can make more accurate predictions of what might happen in a changing climate.*

Method

Why is it important for the scientists to know how far and how fast seeds can move? *Trees move somewhat slowly as a species. The climate is changing, and therefore the scientists must be able to compare the rate of climate change with the rate of movement for different tree species.*

Why was it important to know which tree seeds step and which ones can jump? *Jumping seeds can travel longer distances and therefore may enable some tree species to move faster, over time, than other species. These species may be more successful at becoming established in new areas as the climate changes.*

Findings

As the climate warms, do you think different types of trees will be more likely to move north or south? Why? *Students should be able to reason that tree species will be more likely to move north, as a favorable climate will move farther north.*

The scientists found that it was easier to predict the movement of trees with wind-blown seeds. Do you think it was also easier to predict the movement of trees whose seeds can float downstream? Why or why not? *Students should realize that it is easier to predict the movement of plants and trees whose seeds can float, as the direction and speed of streams and rivers can be easily determined.*

Discussion

If a type of tree is able to successfully move to a new location, what else might move with it? *Animals that use the type of tree for habitat and as a food source would likely move as the trees move. This includes mammals, birds, and insects.*

Could the types of trees growing near your home change over the next 100 years? Why or why not? *Students should reason this for themselves, but should conclude that as the climate changes over the next 100 years, the types of trees growing near their home may change as well.*

There's Snow Place Like Home: Tracking the Range of Wolverines Over Time

Introduction

State in your own words and in the form of a question, the problems the scientists were trying to study. *What is the geographic range of wolverines over time? How could climate change affect the geographic range of wolverines?*

What are some other animals that burrow or make dens for their homes? *There are many different animals that burrow or make dens. Some examples include groundhogs, ants, hamsters, foxes, ferrets, chipmunks, badgers, moles, prairie dogs, pikas, rabbits, shrews, and sand dollars.*

Method

Why do you think the scientists divided the years up into different time periods? *The scientists divided the time because it was easier to discuss and compare their findings based on three smaller periods.*

How do you think warmer temperatures might affect wolverines? (Hint: Look back at the "Introduction" section to see where wolverines typically give birth.) *Warmer temperatures may cause the snow to melt earlier. If the snow melts earlier, the wolverine's denning habitat won't be as good.*

Findings

Summarize what the scientists found in your own words. *The scientists found that spring snow cover, alpine areas, and conifer forests were important to the geographic range of wolverines. They also found that by the 1950s, wolverine range had shrunk.*

Do you think the findings support the idea that the wolverine's habitat may be in danger? Why or why not? *This is an individual question. Students should be able to support their answers with examples from the article.*

Discussion

Why would the wolverine's reproduction be affected? (Hint: Think about why wolverines need spring snow cover.) *The wolverines make their dens in the snow. They reproduce and raise their kits in these dens.*

Based on what you have learned from this article, do you think it is possible that the wolverine may need to be listed as an endangered species at some point? Why or why not? *This is an individual question. Students should be able to support their answers with examples from the article.*

Frozen Food: How Glaciers Provide Food for Animals That Live in the Ocean

Introduction

State what the scientists wanted to study in the form of a question. *Is the carbon in glacier water too old to be useful to animals living in nearby rivers and bays?*

Why did the scientists think the carbon might be too old to be useful to animals living in the rivers and bays? (Hint: Reread the last sentence in the first paragraph of the "Introduction.") *Earlier studies of rivers with forests along their banks had shown that as carbon in plant material in the rivers gets older, it is less useful to the animals living in the rivers and bays. If the same thing were true of glaciers, the ancient carbon and nutrients would not be very useful to the animals.*

Method

Why did the scientists avoid getting salt water in their samples? *The scientists were studying freshwater coming from glacial rivers. If they got salt water in their samples, they would not be testing the glacier water.*

Think about the water coming out of the glaciers. Do you think the scientists found that the carbon was quite old? Why or why not? *Students should reason that because glaciers are quite old, the material being held in their ice is quite old as well. Regardless, students should be able to back up their answer with logic.*

Findings

Are you surprised that the glacier water contained little material from ancient forests? Why or why not? *This is an individual question and students should back up their answer with logic.*

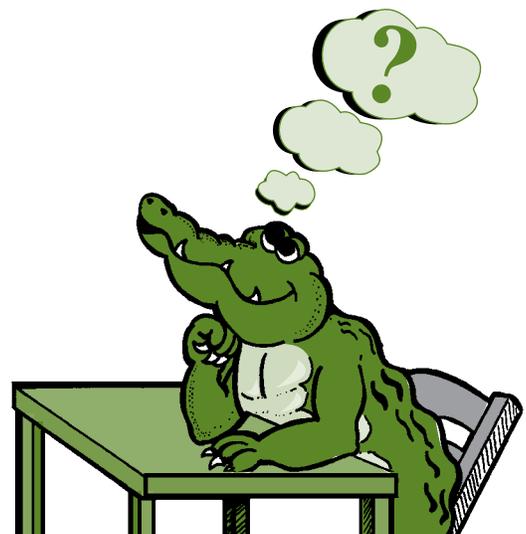
What might happen to the flow of glacier water as the global climate changes? *Students should realize that the glaciers will melt faster, causing more water to flow into rivers and bays.*

Discussion

Are you surprised that carbon that is thousands of years old is useful to animals living in nearby rivers and bays? Why or why not? *This is an individual question, however based on studies of rivers with forested banks, students should be surprised that the situation is different in glacial waters.*

As more glacier water runs into rivers and bays, will more or less nutrients be available to animals living there? *Students should realize that more nutrients will be available to animals living in rivers and bays near glaciers. This is true in the short term. However in the long term, especially after the glaciers have almost completely melted, fewer nutrients will be available.*

In the long term, what might happen to the food source coming from glaciers? *Students should reason that after the glaciers have melted, the carbon that is used as a food source will no longer be available to animals living in the rivers and bays.*



United States of America

