

Possible Answers to Questions in the Reflection Sections

INTRODUCTION

What is the question the scientists wanted to answer? *How might the flow of water change in areas near mountain streams if eastern hemlock trees are killed by the hemlock woolly adelgid?*

Do you think the loss of a particular tree species can impact the flow of water in a natural area? Why or why not? *Students will have to answer this question based on the information they have read in the first sections of this article. Therefore, they can only speculate on the answer. However, students should be able to back up their answer with logic.*

METHOD

If the relative humidity is high, do you think trees transpire more or less than if the relative humidity is low? Why or why not? *Students should realize that if there is more moisture in the air, trees will transpire less because the air will be less able to hold more water.*

Why did the scientists take measurements from some of the trees, instead of taking measurements from all of the trees? *Students should realize that it would cost too much and take too much time to take measurements from all of the trees. Plus, it would make little sense to damage all of the trees. This question provides an opportunity to discuss the concept of taking a sample and how samples are used by scientists to represent the whole population.*

FINDINGS

From the findings, how do you think the loss of eastern hemlock trees would change the flow of water in the ground and in streams in areas like the one studied by the scientists? *Students should realize that the loss of hemlock trees would increase the amount of water in the soil and the amount of water flowing into streams. Students may also remember that hemlock trees intercept rain, causing it to fall more gently to the ground and allowing some of it to evaporate off of needles. Thus, the loss of hemlock trees will also increase the amount of rain falling directly onto the ground, which would cause more rain to flow directly into nearby streams. This could also cause an increase in soil erosion into the streams.*

Look at figure 15. Describe in your own words what the figure is showing. *Figure 15 shows normal streamwater flow during the night and daytime when the hemlock trees are present. This is because hemlock trees transpire during the day and streamflow is lower then. At night when hemlock trees are not transpiring, more groundwater is flowing into the stream. The figure contrasts the normal condition with what might happen after hemlock trees are killed by the adelgid. The figure shows that following hemlock tree death, there is less difference between streamflow in the day and nighttime. This is because with the hemlock trees gone, transpiration is much lower in the daytime, and, therefore, more groundwater is flowing into the stream.*

DISCUSSION

What is one thing scientists could do to help prevent changes in the flow of water in southern Appalachian mountain areas that have a lot of eastern hemlock trees?

The first thing they could do is what they are currently doing; that is, they are trying to stop the spread of hemlock woolly adelgid in eastern hemlock trees. Students may come up with other things that scientists could do to prevent changes in the flow of water in these areas. An example is planting other evergreen tree species that are native to the southern Appalachian mountains in place of the hemlock trees.

What do you think will happen to eastern hemlock trees growing in the Northeast United States as the climate continues to get warmer? *Students should realize that a warmer climate would be more favorable to the hemlock woolly adelgid. This will probably result in greater rates of death of eastern hemlock trees, especially in the Northeast, where cold winters currently reduce the numbers of hemlock woolly adelgids.*

A scientist who studies insects such as the hemlock woolly adelgid is called an entomologist (en tə ma la jist). A scientist who studies the flow of ground and stream water is called a hydrologist (hi draw la jist). A scientist who studies the growth of trees is called a silviculturist (sil va kul jür ist). One of the scientists in this study is a tree ecophysiologicalist (e kə fiz e ol uh jist). She studies how trees work in relation to where they live. The other scientist is an ecologist. He studies the relationships of

living and nonliving things in an area. From reading this study, do you think different kind of scientists should work together? Why or why not? *Students should realize that different kinds of scientists must work together to discover the answers to some of their questions. Without working together, the scientists would only have part of the information they need to answer questions and solve problems.*

Which National Science Education Standards Can Be Addressed Using This Monograph?

Standards • Journal Article: *Woolly Bully*

Science as Inquiry

- Abilities Necessary To Do Scientific Inquiry
- Understanding About Scientific Inquiry

Life Science

- Structure & Function in Living Systems
- Regulation & Behavior
- Populations & Ecosystems
- Diversity & Adaptations of Organisms

Earth Science

- Structure of Earth Systems

Science in Personal & Social Perspectives

- Natural Hazards
- Risks & Benefits

Science & Technology in Society

- Science & Technology
- Understanding About Science & Technology

History & Nature of Science

- Science as a Human Endeavor
- Nature of Science