

## Discussion

- **Would you say that the scientists' test of their new method to estimate the amount of carbon in Hawai'i was successful? Why or why not?** *Students should conclude that the test of this new method was successful. They should come to this conclusion because scientists were able to create an accurate carbon map of the entire island of Hawai'i using their method that combines the in-person calculations with new technology.*
- **Do you think that this method could be used for other large areas of forest and other land cover? Why?** *Students should realize that this method could be used for any defined area of land to estimate carbon storage as long as land cover maps or Landsat photographs, DBH-carbon equations, and LiDAR measurements were available or could be obtained.*

## Don't Litter the Stream!

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### Introduction

- **State what the scientists wanted to know in the form of a question.** *Are organisms living in some Hawaiian streams eating albizia leaf litter instead of algae? Or, has albizia leaf litter replaced algae as the base of the food web in some Hawaiian streams?*
- **Review "Thinking About Science."** **How do you think the scientists might have answered their question?** *Students will have individual answers, but they should realize that the scientists would use technology to help them understand how much nitrogen was in the organisms that might be eating albizia leaf litter. Students should also realize that the scientists would have to compare*

*this amount with the amount of nitrogen in organisms in streams with no albizia growing nearby.*

### Methods

- **Why did the scientists have to find streams that were alike in every way except for the albizia trees growing nearby?** *If there were other differences between the streams, then the scientists would not know if any observed differences in the diets of the aquatic consumers were because of the albizia or something else.*
- **Finding higher-than-normal levels of nitrogen in the tissues of consumers might lead the scientists to what conclusion about albizia leaves as a food source?** *That albizia, whose leaves contain a lot of nitrogen, was being used as a food source for aquatic consumers.*
- **Reading the captions of figures 6-10, what might you include about the aquatic organisms in this stream?** *Students may have other observations, but one that stands out is that only one of the aquatic organisms is native to Hawai'i.*

### Findings

- **Look at the way the numbers occupy the cells in tables 1 and 2. Both show a pattern from left to right. Why do the cells increase from left to right?** *Students should realize that these tables are showing a food web that includes more consumers being consumed as one goes up the food chain. The consumers on the right are at a higher level. Educators may want to introduce the idea of trophic levels to the class at this time.*

- **Compare the first row in tables 1 and 2. What does this row reveal about albizia as a food source?** *This row indicates that albizia is a major food source for amphipods and caddisflies where albizia is growing.*

## Discussion

- **If the stream food webs change across Hawai'i because of albizia, do you think the food webs that exist on the land beside streams could change as well? Why or why not?** *Because some land-based animals eat aquatic animals, the increase in nitrogen may be passed to animal species living near the streams.*
- **An increase in nitrogen in Hawaiian streams may cause more algae to grow. If more algae grow, how might the stream be further changed by albizia?** *Students will have individual answers to this question. Students may realize that if albizia trees continue to be the preferred food, too much algae could grow in the stream because of the increased nitrogen and fewer consumers would be eating it. Too much algae in the stream could become a problem.*

## Left High and Dry?

### Introduction

- **Why do you think it is important to save native ecosystems?** *Students will have individual answers to this question. They should, however, back up their reasons with logic. Some possible answers are to preserve the habitat of native birds, mammals, and insects; to save the few remaining trees or plants of a particularly endangered species; to stop the spread of invasive species; and to preserve the cultural values of native ecosystems.*
- **What is one way to restore a native forest?** *Students will have individual answers to this question. They should, however, back up their reasons with logic. Some possible answers are to plant seeds of native plant and tree species; to plant small native trees and other native plants; to remove the invasive plants; and to exclude any animal species that are destroying the native plants and trees.*
- **What question did the scientists want to answer? What things were done that created success in the restoration of the dry tropical forest? What did the scientists want to do after they answered their question?** *They wanted to develop recommendations for others interested in restoring dry tropical forests, anywhere they are found.*

### Methods

- **Why do you think the scientists wanted to keep track of each plant species and the date of planting?** *Students will have individual responses, however, they should back up their answers with logic. Students should realize that it would be impossible to calculate how many plants and trees of each species had died without the tags, and that the age of the plant was needed to determine how long the plants and trees had survived.*
- **From this method, could the scientists determine whether it was necessary to kill the grass with a chemical after they had cut it? Why or why not?** *Students should realize that the scientists could not say whether they needed to kill the grass with a chemical. They could not say this because they killed all of the grass. If the scientists had left some areas of grass alive after cutting it, they could have compared the areas of cut grass with areas of grass that had been cut and had the chemical applied.*