Time Needed

One class period (50 minutes).

Materials

- The food web circles on pages 83-84. (copied on card stock if possible).
- Sheet of plain paper for calculations.
- Pencil.
- String or yarn.
- Tape or glue.
- Scissors.

In this FACTivity, you will answer the question: What are some ways that albizia leaves may be changing the Hawaiian stream food web? The method you will use to answer this question is:

Using the information in tables 1 and 2 (in the article you have just read), complete the tables below. To do this, use plain paper to calculate the average percentage in each cell of tables 1 and 2. Because a range is given, you will use only two numbers to calculate the average. Then, round the average percentage to the nearest whole percentage and write it in the cell below. If a range is not given, round the percentage or use the percentage given. The first row is completed as an example. Leave the white columns blank for now.

Upstream area without albizia (Calculate from table 1, page 78)														
	Amphipods (average whole %)		Caddisfly larvae (average whole %)		Swordtails (average whole %)		Guppies (average whole %)		Young guppies (average whole %)		Young crayfish (average whole %)		Crayfish (average whole %)	
POM (Particulate Organic Matter)	Less than 10	1	50	5	3	0	3	0	8	1	24	3	7	1
Algae														
Amphipods														
Caddisfly larvae														
Swordtails														
Guppies														
Young guppies														

Downstream area with albizia (Calculate from table 2, page 79)														
	Amphipods (average whole %)		Caddisfly larvae (average whole %)		Swordtails (average whole %)		Guppies (average whole %)		Young guppies (average whole %)		Young crayfish (average whole %)		Crayfish (average whole %)	
Albizia leaves														
POM														
Algae														
Amphipods														
Caddisfly larvae														
Swordtails														
Guppies														
Young guppies														

Using the formula below, write a number in the white columns for each cell of each table:

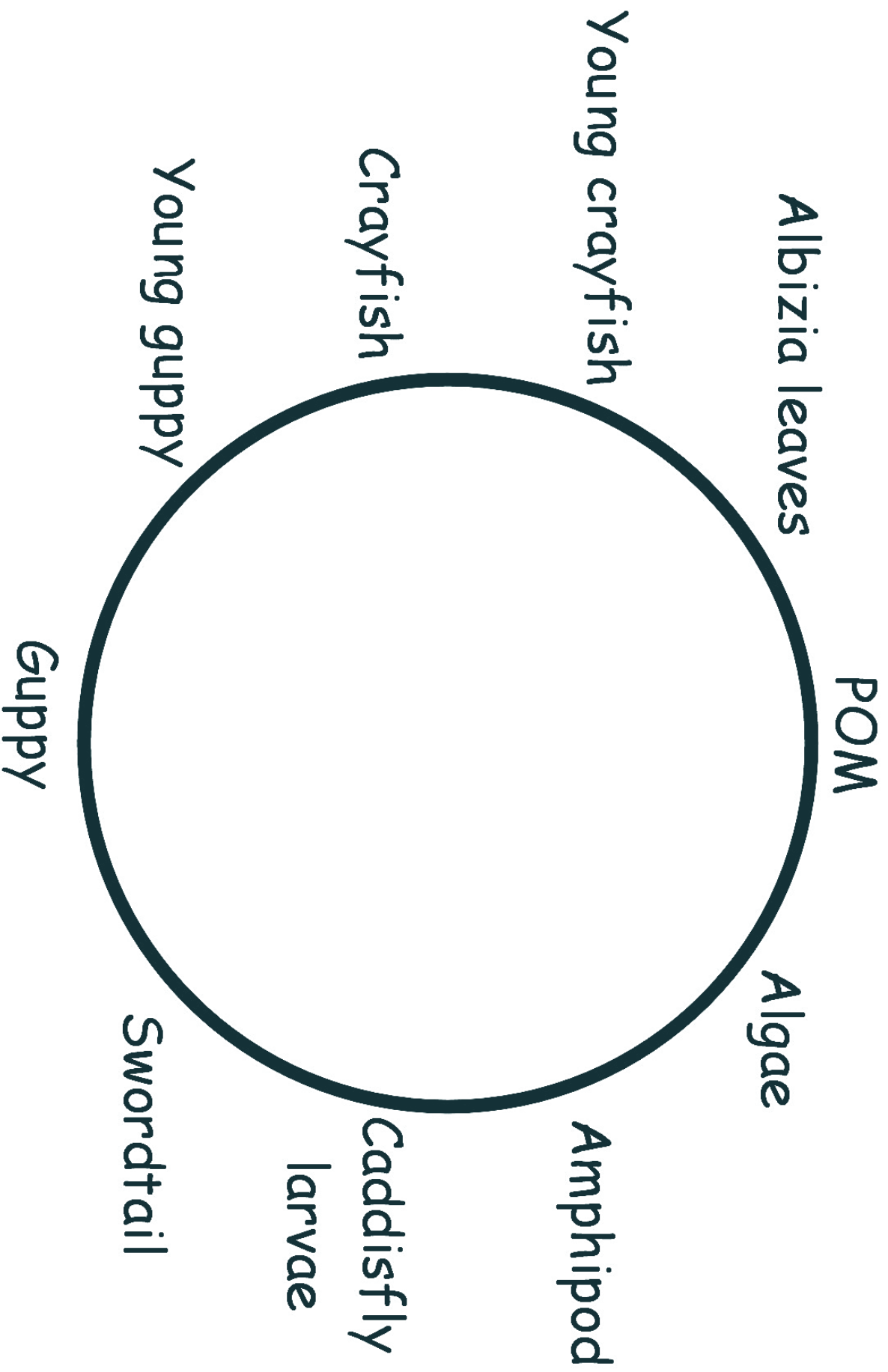| If the percentage is:	You write:
Between 0 and 5	0
Between 6 and 10	1
Between 11 and 20	2
Between 21 and 30	3
Between 31 and 40	4
Between 41 and 50	5
Between 51 and 60	6
Between 61 and 70	7
Between 71 and 80	8
Between 81 and 90	9
Between 91 and 100	10

Using the numbers from 1 to 10, you will complete the food web tables on pages 81-82. For example, in the first table, less than 10 percent of the amphipods' diet is POM. About 50 percent of the caddisfly larvae's diet is POM.

Taking the string or yarn, cut and tape or glue pieces to connect each animal with its food source. The number of strings connecting each should correspond to a number from 0 to 10. This number is based on your calculations and the formula used on the left. For example, glue one piece of string between POM and young guppies. Do this exercise for both food webs on page 81-82.

Notes: A ruler and pencil may be substituted for string and glue.

FACTivity continues on page 85.

Young crayfish

Crayfish

Young guppy

Guppy

POW

Algae

Amphipod

Swordtail

Caddisfly larvae

Young crayfish

Albizia leaves

Crayfish

POM

Young guppy

Algae

Guppy

Amphipod

Swordtail

Caddisfly larvae
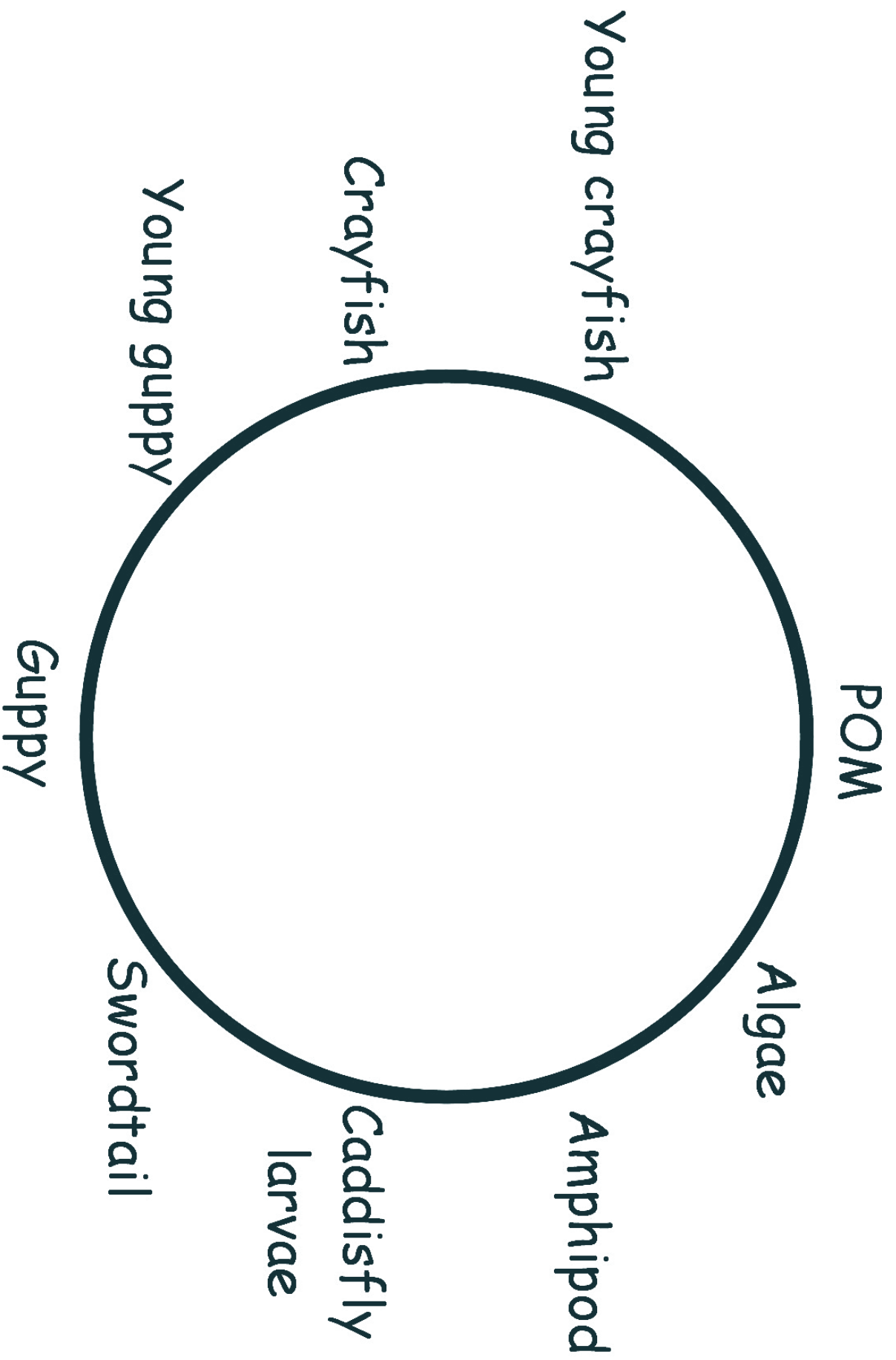
After you have completed both food web circles, take a moment to compare and contrast them. What does each string represent? In the first web, what do you notice about the relationship of algae to the rest of the web? What happens when albizia is introduced into the food web? What are the differences between the two food webs? Answer the question posed at the beginning of this FACTivity. Think about other food webs, such as those in a natural area near you. Do you think the introduction of an invasive plant or animal species could change these other food webs? Why?

Figure 13. Taro growing in a wetland in *Waipi'o* Valley. Taro has been an important food crop for Hawaiians. Photo by Dr. J. B. Friday.

Water Is Wealth

Water— Wai

For early Hawaiians, life revolved around water *(wai)*. *Wai* was the source of land and man. It gave life to food, plants, and vegetation. For most Hawaiians, water also produced the staff of life—*kalo* (or taro, a root crop) (**figure 13**). Having an abundance of water on your land demonstrated your wealth. The word *Waiwai* means wealth, prosperity, ownership, possession. Literally it is "water-water." *Wai* was the possession of no man, even chief *(ali'i)* or king *(mō'ī)*. Every family that lived on and cultivated the land used a given water source. To have a right to use the water, the family would help to maintain the water source. If the family did not use or help to maintain the water source, they had no right to claim it.

Dividing Wai—Ahupua'a System

In old Hawai'i, districts, lands, and lots were subdivided into *ahupua'a*, the chief political system. Each *ahupua'a* stretched from the seashore up into the mountains. Ridges, rocks, stream channels, and sometimes a tree would mark the boundaries. At the seashore of each *ahupua'a*, an altar of rocks *(ahu)* would be placed with a wooden image of a pig *(pua'a)* to mark the boundaries; thus, the word *ahupua'a*. Offerings were also placed on the *ahu* for the rain god or to pay tax to the chief of the *ahupua'a*. This system assured **sustenance** and survival through the exchange and sharing of food, fish, water, firewood, house timbers,