

## Middle School Lesson: "Whose Job Is It?"

### Overview:

This lesson would fit well in a unit about ecosystems or ecology. If the students already have an understanding of producers, consumers, and decomposers then ignore #1 and #2 in the lesson. Begin with asking for local examples of the three.

Time Frame/Audience: 60 min./middle school

### Standards:

National Science Standards:

C.4 Students should develop an understanding of populations and ecosystems

Alaska State Standards:

SC.3 A student should develop an understanding that all organisms are linked to each other and their physical environments through the transfer and transformation of matter and energy.

### Objectives:

After instruction and practice students will:

- 1) identify, in writing, organisms found in one Arctic sea ice food chain.
- 2) verbally identify the producers and primary, secondary, and tertiary consumers in an Arctic sea ice food chain.

### Materials:

- student handouts (see end of lesson)
- computer
- projector
- sea ice video (online)
- white board or similar

### Lesson:

- 1) make 3 columns on the board, each column is titled with either producer, consumer, or decomposer
- 2) discuss producers, consumers (make sure to discuss primary, secondary, and tertiary consumers), and decomposers and their jobs in an ecosystem (make sure to discuss that the sun is the basic source of energy for the vast majority of ecosystems)
- 3) write the basic definition under each title - ask for local examples of each and write them within each column
- 4) *optional here based on time:* access the following website (brings up a number of organisms and you must decide whether each is a producer, consumer, or decomposer) and decide what each organism is as a class, have a student come up and click on the correct answer each time <http://www.sheppardsoftware.com/content/animals/kidscorner/games/producersconsumersgame.htm>
- 5) explain that there are different producers etc. in different ecosystems, ask what the producers might be in an ecosystem that centers around Arctic sea ice

- 6) ensure that all students have the handout, explain that as they will watch a video about Arctic sea ice which will discuss one possible food chain found in the sea ice ecosystem - they must look for the food chain and should begin to fill in the blank boxes on the handout – play the video
- 7) cue the video back to 1:50, right as the food chain starts – work through the boxes on the handout together as a class, reviewing the video as necessary

*Assessment:*

Monitor student understanding of producers, consumers, and decomposers. After working through the handout together as a class, ask students which organism is the producer in this sea ice food chain, the primary consumer, the secondary consumer, and the tertiary consumers. Collect the handouts.

*Extension Activities:*

The following website has a great food web activity for both the tundra and the boreal forest in Alaska. The role and importance of producers, consumers, and decomposers in an ecosystem can be easily seen in the activity.

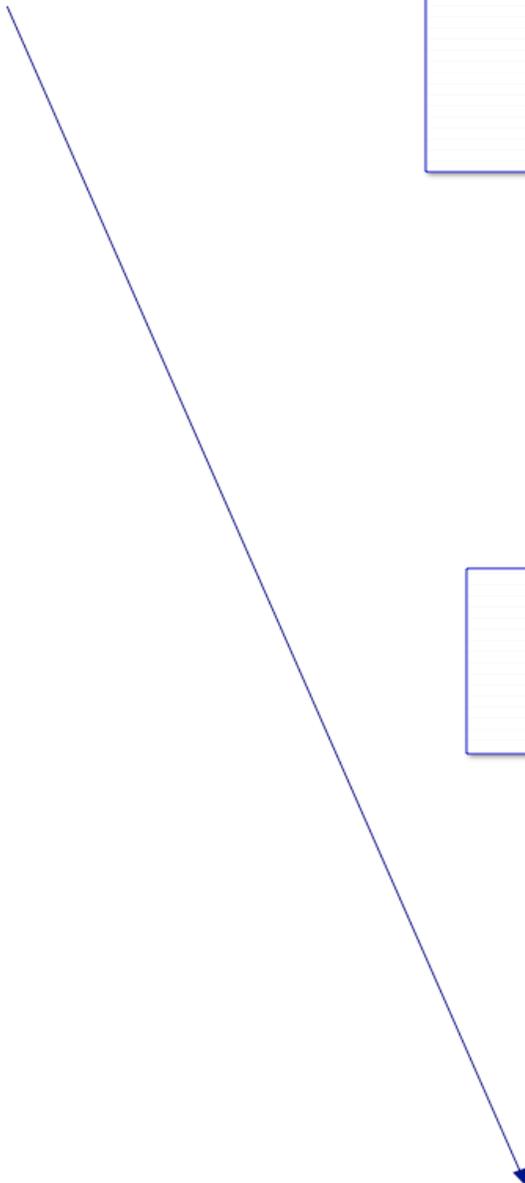
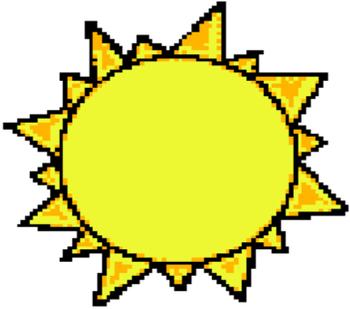
[http://alaska.fws.gov/fire/role/unit1/making\\_connection.cfm](http://alaska.fws.gov/fire/role/unit1/making_connection.cfm)

Students can build upon the food chain described in the video. They can research other species found in the same ecosystem to create a large food web.

Name \_\_\_\_\_

Period \_\_\_\_\_

Arctic Sea Ice Food Chain



\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

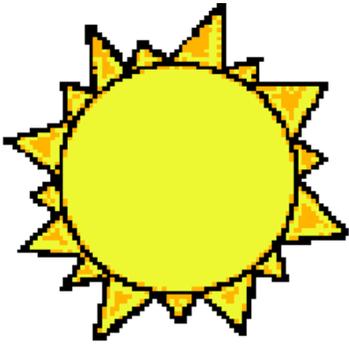
\_\_\_\_\_

\_\_\_\_\_

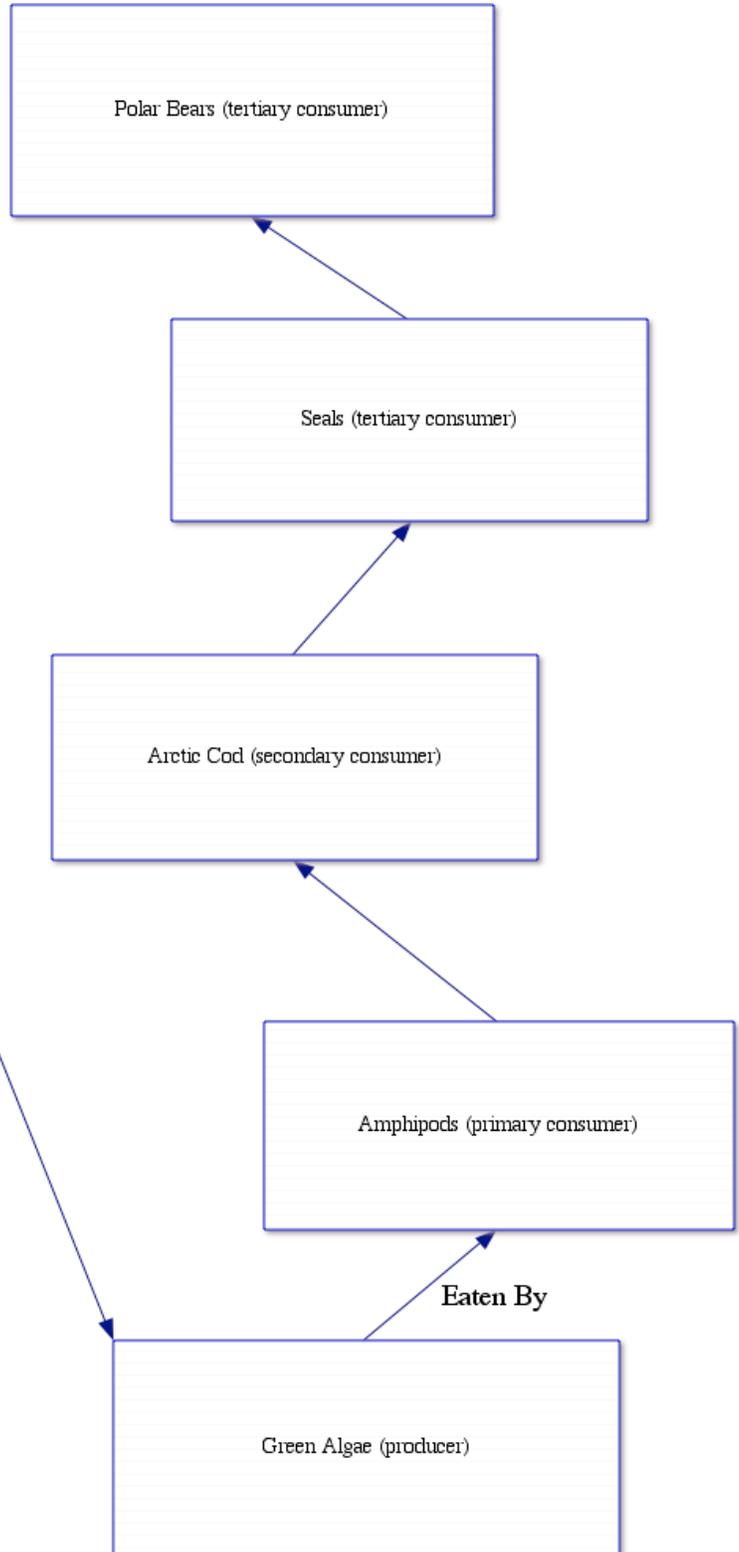
\_\_\_\_\_

\_\_\_\_\_

Eaten By



# KEY



## High School Lesson: “ Algae Rule!”

### Overview:

This lesson would fit well into any unit involving ecology. It would also work as an activity about photosynthesis.

Time Frame/Audience: 60 min./high school

### Standards:

#### National Science Standards:

C.4 Students should develop an understanding of interdependence of organism.

C. 5 Students should develop an understanding of matter, energy and organization in living systems.

#### Alaska State Standards:

SC.3 A student should develop an understanding that all organisms are linked to each other and their physical environments through the transfer and transformation of matter and energy.

### Objectives:

After instruction and practice students will:

- 1) form a hypothesis that explains why photosynthetic algae are found at the bottom of sea ice rather than closer to the sun elsewhere in the ice
- 2) verbally identify the time of year in which the photosynthetic algae would increase in numbers and the way in which this would affect the other species in the food chain
- 3) verbally identify 2 reasons why photosynthetic algae are found at the bottom of sea ice.

### Materials:

- paper
- computer
- projector
- sea ice video (online)

### Lesson:

- 1) begin by asking students to write down everything they know about an Arctic sea ice ecosystem  
- give them 1 minute to write whatever comes into their heads (species, habitat, predator/prey relationships, biomass, etc.)
- 2) ask some students to share what they wrote
- 3) explain to students that they will now watch a short video about the Arctic sea ice ecosystem, ask them to look for information that indicates they were either correct or incorrect about their knowledge written in step #1 – play the video
- 4) when the video is done review whether students were correct in their prior knowledge
- 5) bring the students attention to the beginning of the video in which the professor discusses the growth of algae on the *bottom* of the sea ice, this algae is the plant life at the base of the food chain – replay the beginning of the video until 1:15
- 6) break the students into groups of 3 or 4, explain that their task is to create a hypothesis to

explain why the photosynthetic algae grows on the bottom of the sea ice rather than higher up in the ice where there is more sunlight, in addition to creating a hypothesis the students need to create a way in which to test their hypothesis – allow students to work

- 7) bring the class back together and ask each group to present their hypothesis and way in which to test the hypothesis to the class – ask pertinent questions that help the students to think critically, encourage other students to ask questions as well
- 8) if it is not possible to allow students to conduct their experiments that test their hypotheses, explain the reason for the placement of the algae
- 9) *explanation:* The algae need light so they move up as close to the sun as possible. If they were floating in the water under the ice, they would get less light, also because they would be drifting up and down in the water (as much 150 feet or deeper where it's very dark) because of the way the water is mixing. In the ice, they are better protected from the little shrimp and copepods that eat them. However, because algae need both sunlight and nutrients to grow, if they were to move further up in the ice where there might be more light, they would have fewer nutrients. The bottom of the ice is the best of both worlds because the way the water sloshes past the ice bottom, they get lots of nutrients (more in fact than if they were just floating in the water) but also the optimum amount of sunlight.
- 10) ask students when (what time of year – answer: spring/early summer) the photosynthetic algae might drastically increase in numbers, how would this affect the other species in the food chain

#### Assessment:

Monitor student understanding as they create their hypotheses and tests. At the end of the lesson ask the following review questions:

- what is the basis for the Arctic sea ice food chain found in the video
- name 2 reasons why the photosynthetic algae are found at the bottom of the ice rather than closer to the sun elsewhere in the ice
- at what time of year would the photosynthetic algae increase drastically in numbers, how would this affect the other species in the food chain

#### Extension Activities:

If possible the teacher can allow students to actually do the experiment to test their hypothesis about the growth of algae on the bottom of the sea ice.

Students can build upon the food chain described in the video. They can research other species found in the same ecosystem to create a large food web.