Freshwater/Oceanwater Zooplankton and Phytoplankton Activity 3

Grade Span	Middle School Life Science
Time Span	2 class periods (one for gathering the samples and one for observations)
Standards	Obtaining, Evaluating, and Communicating Information Planning and Carrying Out in Investigation Mathematics and Computational Thinking Analyzing and Interpreting Data ● MS-LS1-6. Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms. ● MS-LS2-1 – Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem. ● MS-LS2-2 – Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems. ● MS-LS2-3 – Ecosystems: Interactions, Energy, and Dynamics. Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem. ● MS-LS2-4 – Ecosystems: Interactions, Energy, and Dynamics. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.
Focus Question	What organisms live at the bottom of our food chain and why are they important in the world?
Overview	Students should understand that there are microscopic organisms living in freshwater. These organisms get their energy from the sun.
Objectives	Students will be able to explain what zooplankton are. Students will be able to explain what phytoplankton are. Students will be able to explain what the difference is between zooplankton and phytoplankton.

	Students will be able to sketch zooplankton. Students will be able to share that zooplankton and phytoplankton are at the bottom of the food chain and how important they are to humans.
Materials Needed	Watch the video on phytoplankton: The Secret Life Of Plankton Five Reasons to Thank Plankton Video: https://www.youtube.com/watch?v=23mrtGCkAH8 Gathering phytoplankton with nets Video Materials link for making a phytoplankton net
Vocabulary	consumer, copepods, crustaceans, food chain, herbivore, invertebrate, larva, nutrients, photosynthesis, phytoplankton, plankton, producer, upwelling, zooplankton
Teacher Prep	This lesson was taken from Plankton Identification Link for making a phytoplankton net Phytoplankton Size in Ecology
Background	Zooplankton are the microscopic living animals in fresh and ocean waters. Phytoplankton are microscopic living plants that live in the fresh and ocean waters. They both use sunlight to survive. These organisms are at the bottom of our food chain and needed to keep nature in balance. 3 Major types of zooplankton Phytoplankton LIst
Procedure	**If you are looking at the ocean this is the lesson you want:** This lesson was taken from Plankton Identification **Engage:** 1. Watch the video on phytoplankton: The Secret Life Of Plankton 2. Watch: What is the difference between zooplankton and phytoplankton. 3. WatchErnest Haeckel video- https://www.youtube.com/watch?v=tl_onFMjJWA See Plankton Identification **Explore:** 1. See Plankton Identification 2. Phytoplankton Card Game **Explanation:** 1. See Plankton Identification 2. Invisible World of Plankton

Extension:

1. See Plankton Identification
2. You could read about plankton in the ocean with this lesson: http://sciencenetlinks.com/lessons/ocean-sunlight-how-tiny-plants-feed-seas/

If you are looking at freshwater this is the lesson you want:

Engage:

1. Watch the video on phytoplankton: The Secret Life Of Plankton
2. Watch: What is the difference between zooplankton and phytoplankton.

Explore:

Option 1:

1. Even though this lesson is taking a sample from ocean water you could do the same lesson with freshwater. Plankton Identification
    a. Use freshwater identification charts, Phytoplankton LIst, to help with identification.

Option 2:

1. Phytoplankton Card Game

Explanation:

1. Plankton Identification
2. Have students draw their phytoplankton.
    a. An option is from this lesson plan: http://phytoheroes.com/wp-content/uploads/2018/05/Lesson-plans-1-intro-final-1.pdf

Extension:

1. Plankton Identification
2. This was a study done in Acadia National Park in 2008 with data on zooplankton in 8 lakes on Mount Desert Island. http://www.gulfofmaine.org/kb/files/9355/Whitmore_07_%20Zooplankton.pdf
    a. From this data look at the graphs provided on page 14.
        i. Ask questions like:
            1. What do you notice?
            2. Why do you think there was a spike in Upper Hadlock Pond?
            3. What do you notice about zooplankton size?
    b. Use any of the graphs on pages 18-22.
        i. If students have been assigned or drawn a zooplankton have them look at the data on the

	pages above to talk about their organism. ii. Ask questions like: 1. What organisms were most abundant? 2. What organisms were least abundant? 3. What do you notice about each graph? 4. Does anything stand out with your graph? 5. What doesn't your graph tell you? 6. Why do you think these graphs are important? 3. Download and play the Phyto Heroes Game on the ipad or phones: http://phytoheroes.com/
Wrap-Up	**Evaluate:** **Formative Assessment:** Check ins Informal conversations with students **Summative:** Students will create a food web. Students will draw their zooplankton or phytoplankton.
Citations	***SOURCE Adapted from Kolb, James A., Project Director. Marine Biology and Oceanography Grades 9 - 12. Marine Science Project: FOR SEA. Marine Science Center. Poulsbo, WA. 1986.***