



## PLANKTON OUTDOOR LAB LESSON PLAN

**Subject Area:** Plankton identification & food web relationships

**Grade Level:** Middle School

**Seasonal timing:** Fall – there will usually be more available plankton in the fall when the water is warmer and more productive.

**Instructional time:** 45 minutes

**A. Learning Goal:** Understand the role of plankton in the lake food web and distinguish between various types of freshwater plankton.

**B. Objectives:**

- Introduce safe and effective microscope procedures.
- Practice using a microscope to examine plankton from lake water samples.
- Distinguish between zooplankton and phytoplankton.
- Identify *Daphnia*, cyclopoids, diatoms, algae.
- Describe the global importance of plankton for transferring energy as a base of the food web and releasing oxygen through photosynthesis.

**C. State Standards:**

- SCI.CC5.m – Students understand matter is conserved because atoms are conserved in physical and chemical processes. They also understand that within a natural or designed system the transfer of energy drives the motion and cycling of matter. Energy may take different forms (e.g., energy in fields, thermal energy, and energy of motion). The transfer of energy can be tracked as energy flows through a designed or natural system.
- SCI.LS1.C.m – Plants use the energy from light to make sugars through photosynthesis. Within individual organisms, food is broken down through a series of chemical reactions that rearrange molecules and release energy.
- SCI.LS2.A.m – Organisms and populations are dependent on their environmental interactions both with other living things and with nonliving factors, any of which can limit their growth. Competitive, predatory, and mutually beneficial interactions vary across ecosystems but the patterns are shared.
- SCI.LS2.B.m – The atoms that make up the organisms in an ecosystem are cycled repeatedly between the living and nonliving parts of the ecosystem. Food webs model how matter and energy are transferred among producers, consumers, and decomposers as the three groups interact within an ecosystem.
- SCI.LS2.D.m – Changes in biodiversity can influence humans' resources, such as food, energy, and medicines, as well as ecosystem services that humans rely on — for example, water purification and recycling.

**D. Setting:** Classroom with lab environment for microscope study.

**E. Materials/Resources:**

- Student lab manual with writing utensil.
- Plankton identification guides at each table.
- A water sample from a local lake.
- Prepared plankton slides to view samples from a backup plankton sample from another site (in case of low plankton population).
- Compound/dissecting microscopes.
- Depression slides and covers.
- Dropping pipettes for each microscope.
- Hand lenses, magnifying glasses (if available).

**F. General delivery, see teacher guide for detailed implementation suggestions:**

**Introduction of Lesson:**

**Large Group:** Go over introductory materials and demonstrate handling equipment properly and safely.

- Phytoplankton as primary producers, zooplankton as primary consumer.
- Aquatic food pyramid, web, chain, minnow as secondary consumer.
- Plankton differentiation: phytoplankton (plant) and zooplankton (animal).
- Photosynthesis, chlorophyll, use of carbon dioxide, release of oxygen, sunlight as energy source.

**Small Group:**

- Each small group will make slides to examine a plankton sample.
- Each group will use the pipettes, slides, identification charts and microscopes to find and identify plankton.
- Each group will show the instructor and record on their lab sheet a copepod, daphnia, and algae, and diatom.

**Extended Student Options:**

- Learner researches and writes an essay about one of the plankton types they found.
- Learner researches what might affect algae quality or quantity in a lake environment.
- Learner brings in a water sample to class to search for plankton.

**G. Assessment:**

- Discuss/review what plankton are and how they fit into the water environment.
- Have an informal class discussion (wrap-up) about the activity.

