



## PLANKTON OUTDOOR LAB LESSON PLAN

**Subject Area:** Plankton identification & aquatic plant and animal relationships

**Grade Level:** Middle School

**Seasonal timing:** Fall during outdoor field trip – 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:**

- Safely conduct plankton netting studies to collect and identify various forms of plankton.
- Understand plankton's importance in aquatic energy relationships.
- Practice using a microscope to examine plankton from lake water samples.
- Distinguish between zooplankton and phytoplankton.
- Identify *Daphnia*, cyclopoids, diatoms, algae.

**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.SEP3.m – Planning and conducting investigations.
- 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:** Local lake.

**E. Materials/Resources:** Students divided into small groups to safely net plankton aboard pontoon or conventional boats and engage on shore.

- Student lab manual with writing utensil and clipboard.
- Plankton identification guides at each table.
- Prepared plankton slides to view samples.
- Backup plankton sample from another site (in case of low plankton population).
- Plankton nets with sampling containers.
- Compound/dissecting microscopes.
- Depression slides and covers.
- Dropping pipettes for each microscope.
- Hand lenses, magnifying glasses (if available).
- Cameras.
- Life preservers.
- First Aid kit.

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

#### **Introduction of Lesson**

1. Briefly review content from indoor session:
  - 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.
2. Review safety aspects (below):
  - Life jackets should be on at all times.
  - Equipment care and maintenance of nets and microscopes.
  - Learners should stay with their groups at all times. Partner-up.
  - First Aid kit should be available.

#### **Large Group**

Go over introductory materials and demonstrate handling equipment properly and safely.

#### **Small Group**

1. Each small group will collect a plankton sample in the plankton net while aboard one of the boats or from the dock.
2. While on shore at the tables each group will use the pipettes, slides, identification charts and microscopes to find and identify plankton found.
3. Each group will show the instructor and record on their lab sheet a copepod, daphnia, and algae, and diatom.

**G. 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.

**H. Assessment:**

- Have *each group* write a short paragraph about their findings on the lab sheet.
- Have *each student* write a short essay on how these findings will affect their attitude towards the water.
- Discuss/review what plankton are and how they fit into the water environment.
- Have an informal class discussion (wrap-up) about the activity.

