NO PREP

Zooplankton

Tiny Drifters with a Big Impact

Includes: Student reading, case study, differentiated questions, teacher key

MORE LESSONS LESS PLANNING · MLLP · FREE TODAY · FREE TOMORROW · FREE FOREVER

Name: Period: Date:

Zooplankton: Tiny Drifters with a Big Impact

At first glance, the open ocean may look empty, but it is teeming with life at microscopic and macroscopic scales. Among the most important organisms drifting in the currents are zooplankton. Unlike phytoplankton, which are producers, zooplankton are consumers, feeding on phytoplankton and transferring energy up the food chain. The term "zooplankton" refers not to a single species but to a diverse community of animals, ranging from microscopic protozoans to the larval stages of fish, crabs, and jellyfish. Despite their small size and drifting nature, zooplankton play a central role in marine ecosystems. They form a critical link between primary producers and larger predators, including fish, seabirds, and whales. Without zooplankton, energy captured by phytoplankton would never reach higher levels of the food web. Their abundance, diversity, and ecological roles make zooplankton one of the most important yet underappreciated components of the ocean.

Types of Zooplankton

Name: **Period:** **Date:**

Zooplankton: Tiny Drifters with a Big Impact

At first glance, the open ocean may look empty, but it is teeming with life at microscopic and macroscopic scales. Among the most important organisms drifting in the currents are zooplankton. Unlike phytoplankton, which are producers, zooplankton are consumers, feeding on phytoplankton and transferring energy up the food chain. The term "zooplankton" refers not to a single species but to a diverse community of animals, ranging from microscopic protozoans to the larval stages of fish, crabs, and jellyfish. Despite their small size and drifting nature, zooplankton play a central role in marine ecosystems. They form a critical link between primary producers and larger predators, including fish, seabirds, and whales. Without zooplankton, energy captured by phytoplankton would never reach higher levels of the food web. Their abundance, diversity, and ecological roles make zooplankton one of the most important yet underappreciated components of the ocean.

Types of Zooplankton

Zooplankton can be divided into two broad groups: holoplankton and meroplankton. Holoplankton spend their entire lives as plankton, drifting in the water column. Examples include copepods, krill, and some jellyfish. Copepods are especially abundant; in fact, they may be the most numerous multicellular animals on Earth. Krill, another type of holoplankton, are famous for supporting the massive food webs of the Southern Ocean, where they feed whales, seals, and seabirds. Meroplankton, on the other hand, are organisms that only spend part of their life cycle as plankton. Many marine animals, such as fish, crabs, and sea stars, release their eggs into the water, where the larvae drift as plankton before settling down into adult forms. This strategy allows their offspring to disperse widely, increasing the chances of survival and colonization of new habitats. The combination of holoplankton and meroplankton ensures that zooplankton communities are diverse and highly adaptable.

The Role of Zooplankton in Food Webs

Zooplankton serve as the primary consumers in ocean food chains. They graze on phytoplankton, bacteria, and even smaller zooplankton, transferring energy to larger predators. This role makes them essential to fisheries, as the productivity of fish populations often depends on the availability of zooplankton. For instance, sardines, anchovies, and other forage fish feed heavily on zooplankton, and these fish then become prey for larger fish, seabirds, and humans. Another important aspect of zooplankton ecology is their role in the biological pump. When zooplankton consume phytoplankton, they package carbon into sinking fecal pellets that descend into deeper waters. This process helps transport carbon from the surface to the deep ocean, where it can remain stored for centuries. In this way, zooplankton not only sustain food webs but also influence Earth's climate by regulating carbon cycling.

Daily Rhythms and Vertical Migration

One of the most remarkable behaviors of zooplankton is diel vertical migration. Each day, zooplankton rise toward the surface at night to feed on phytoplankton and descend into deeper, darker waters during the day to avoid predators. This daily movement is considered the largest migration on Earth in terms of biomass. It is so massive that sonar equipment can detect entire layers of zooplankton moving up and down in the water column. This migration is more than just predator avoidance; it also contributes to the cycling of nutrients and carbon. By moving between surface and deep waters, zooplankton actively transport organic matter, fueling ecosystems and reinforcing the role of the biological pump. Understanding this behavior helps scientists predict how changes in climate and predator populations may affect ocean ecosystems on a global scale.

Key Information: Table: Zooplankton Categories and Roles

Category	Examples	Ecological Role
Holoplankton	Copepods, krill	Permanent plankton, major grazers
Meroplankton	Fish larvae, crab larvae	Disperse offspring, temporary plankton
Gelatinous zooplankton	Jellyfish, salps	Can dominate ecosystems, prey on small plankton

Case Study: Krill and the Southern Ocean

In the icy waters surrounding Antarctica, one species of zooplankton dominates the food web: Antarctic krill (Euphausia superba). These small, shrimp-like crustaceans form massive swarms that can stretch for kilometers and include billions of individuals. Krill feed primarily on phytoplankton during the summer months when sunlight drives high productivity. In turn, they provide food for nearly every major predator in the region, from penguins and seals to the largest animals on Earth—the baleen whales. The importance of krill to the Southern Ocean cannot be overstated. Entire ecosystems depend on their abundance. However, krill populations are sensitive to climate change and human activities. Warming waters and reductions in sea ice limit the growth of phytoplankton, reducing krill food supply. At the same time, krill are increasingly harvested for commercial purposes, particularly for use in nutritional supplements and aquaculture feed. This dual pressure from environmental change and human exploitation poses risks not only to krill themselves but also to the countless species that depend on them.

1. Why are Antarctic krill considered a keystone species in the Southern Ocean?

_____

_____

2. What environmental and human factors threaten krill populations?

_____

_____

Multiple Choice

1. Which type of zooplankton spends its entire life as plankton?

    a) Fish larvae

    b) Holoplankton

    c) Crab larvae

    d) Meroplankton

2. What role do zooplankton play in the biological pump?

    a) They package carbon into sinking fecal pellets

    b) They photosynthesize in deep water

    c) They release oxygen into the atmosphere

    d) They form small calcium carbonate plates that sink

3. Why do zooplankton migrate vertically each day?

    a) To find better breeding conditions near the surface

    b) To escape cold water

    c) To hunt larger fish

    d) To avoid predators during daylight

Matching

Write the letter of the correct definition on the line next to each term.

Term	Definition
1. ___ Holoplankton	A) Temporary plankton during larval stage
2. ___ Meroplankton	B) Daily upward and downward movement
3. ___ Copepods	C) Keystone species in the Southern Ocean
4. ___ Vertical migration	D) Permanent plankton, include krill
5. ___ Krill	E) One of the most abundant animals on Earth

Fill-in-the-Blank

1. Zooplankton that spend only part of their life cycle drifting are called _____.

2. Antarctic krill are heavily dependent on _____ for food.

3. Diel vertical migration is the largest _____ on Earth in terms of biomass.

Short Answer

Answer each question in 2-4 complete sentences.

1. Why are zooplankton essential to global fisheries?

_____

_____

_____

2. Explain how diel vertical migration influences nutrient and carbon cycling.

_____

_____

_____

3. What makes copepods especially significant in marine ecosystems?

_____

_____

_____