

Unit Three: Plankton

Biotic Components of Ecosystems

- Autotrophs, or producers, make their own food. Usually, this is through _____; however, chemosynthesis occurs at hydrothermal vents in the deep ocean.
- Heterotrophs, or consumers, feed on other organisms.
 - Primary consumers (herbivores) feed directly on autotrophs
 - Secondary consumers (carnivores) feed on primary consumers
 - Tertiary consumers (carnivores) feed on secondary consumers
 - _____ are consumers that eat both plants and animals
 - Scavengers feed on dead organisms killed by other organisms
 - Detritivores, include detritus feeders and _____

Primary Production

- Primary production is the formation of organic compounds from inorganic materials. This is accomplished through photosynthesis or _____.
- The standing crop is the total amount of the organism's biomass present in a given volume of water at a given time.

Factors Affecting Primary Productivity

- The most important physical and chemical factors affecting primary production are:
 - light, for photosynthesis
 - nutrient supply, specifically _____ (as nitrate, NO_3^- , nitrite, NO_2^{2-} , or ammonium NH_4^+), phosphate (PO_4^{3-}), and silicate (SiO_2)
 - _____, which comprises all factors that act to move water masses

Energy Flow in Ecosystems

- The transfer of energy from a producer through a given series of consumers is called a food _____.
- The organisms in most ecosystems form a complex network of interconnected food chains called a food _____.
 - Each organism is assigned a trophic level (producers in the 1st, primary consumers in the 2nd, etc.)
- Energy stored in biomass is transferred from one trophic level to another, with some usable energy degraded or lost to the environment as low-quality heat in each transfer. (ecological _____)

Plankton Terminology

- Plankton are free-floating organisms that they have such weak swimming ability that they are at the mercy of the prevailing water movement
 - phytoplankton are capable of _____
 - _____ are animals
 - bacterioplankton are heterotrophic and autotrophic bacteria
 - viroplankton are viruses
- Plankton are classified by size as well.
 - _____ (above 20 cm)
 - macroplankton (2 to 20 cm)
 - mesoplankton (20 to 200 μm)
 - _____ (2 to 20 μm)
 - picoplankton (0.2 to 2 μm)
 - femtoplankton (0.02 to 0.2 μm)
- holoplankton spend their entire lives as plankton
- meroplankton spend only a portion of their lives as plankton
- tychoplankton are only planktonic after being stirred up by _____ and will settle out again

Major Plankton Groups

- Major Phytoplankton groups: _____, Dinoflagellates and Prochlorophytes
- Major Zooplankton groups: _____, Hydrozoa and Scyphozoa

Jellyfish & Comb Jellies

- Jellyfish (Cnidaria) and Comb Jellies (Ctenophora) are _____ animals that drift through the ocean, although some can actively swim in slower currents. They both have very simple anatomy; Jellyfish with a pulsating bell and flowing tentacles, Comb Jellies with groups of _____ they use to paddle through the water.

Krill

- _____ (order Euphausiacea) are possibly the most important species in the sea. Feeding on phytoplankton themselves, these small crustaceans are the main food source for many marine mammals, birds, fish and squid. The entire _____ ecosystem would collapse without krill.

Flotation Mechanisms

- Most plankton are more dense than seawater, therefore employ specific techniques to stay up in the water column.
 - reduce weight and density through _____, replacement of heavy ions with lighter ones, or employing gas-filled floats
 - increase surface area to increase _____
 - change orientation in the water column to “ride” currents

Anti-Predator Mechanisms

- Phytoplankton employ several methods to avoid predation, including: Spines and elongation of cell, chain formation and colonization, and _____

Plankton Distribution

- Plankton tend to be distributed in patches. Patches may be caused by physical factors such as:
 - advection (movement of water masses in which plankton is embedded)
 - _____ or eddies (circular motions of water)
- or by biological factors such as:
 - _____
 - vertical migration
 - marine snow (amorphous particulate material from living organisms that float down the water column).

Taxonomy

- Example: Spotted Eagle Ray, *Aetobatus narinari*
 - Kingdom – Animalia (animals)
 - Phylum – Chordata (vertebrates)
 - Class – Chondrichthyes (cartilaginous fishes) - Subclass – Elasmobranchii (sharks, rays & skates)
 - Order – Myliobatiformes (rays)
 - Family – Myliobatidea (eagle rays)
 - _____ – *Aetobatus* (eagle rays)
 - _____ – *narinari* (spotted eagle ray)

Major Plankton Phyla

- Monera (kingdom) – bacteria & cyanobacteria
- Protista (kingdom) – algae & protozoa
- _____ – jellyfish
- Ctenophora – comb jellies
- Arthropoda – copepods, krill
- Meroplankton Phyla
 - Annelida – segmented worms
 - Mollusca – shellfish & snails
 - Echinodermata – starfish & sea urchins
 - _____ - fish