

Prentice Hall

EARTH SCIENCE



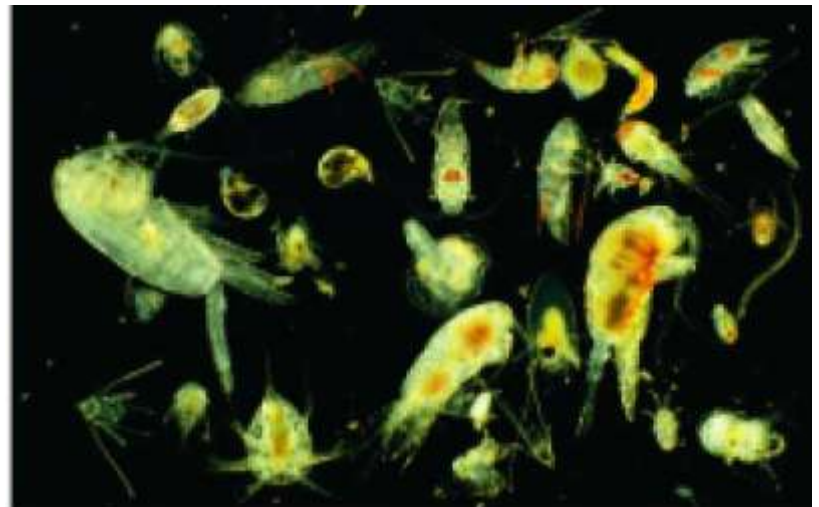
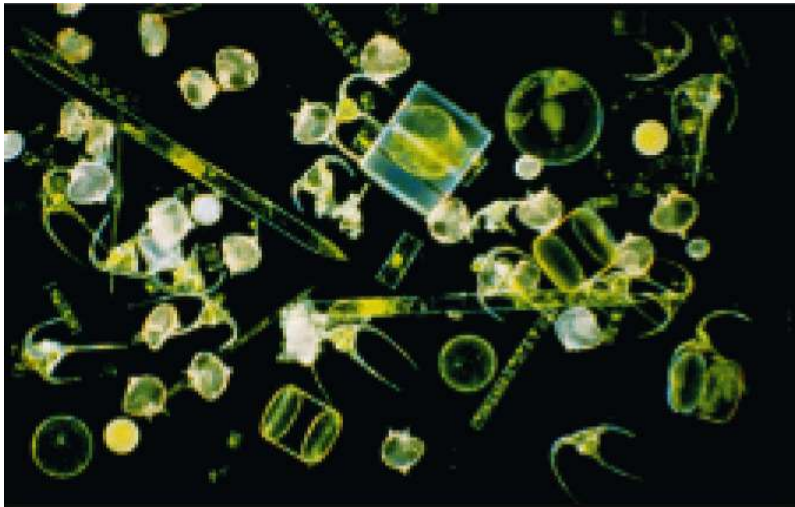
Tarbuck ♦ Lutgens

15.2 The Diversity of Ocean Life

Classification of Marine Organisms

- ◆ Marine organisms can be classified according to where they live and how they move.
- ◆ Plankton
 - **Plankton** include all organisms—algae, animals, and bacteria—that drift with ocean currents.
 - **Phytoplankton** are algal plankton, which are the most important community of primary producers in the ocean.
 - **Zooplankton** are animal plankton.

Plankton



15.2 The Diversity of Ocean Life

Classification of Marine Organisms

◆ Nekton

- **Nekton** include all animals capable of moving independently of the ocean currents, by swimming or other means of propulsion.

◆ Benthos

- **Benthos** describes organisms living on or in the ocean bottom.

Nekton



Benthos



15.2 The Diversity of Ocean Life

Marine Life Zones

- ◆ Three factors are used to divide the ocean into distinct marine life zones: the availability of sunlight, the distance from shore, and the water depth.
- ◆ Availability of Sunlight
 - The **photic zone** is the upper part of the ocean into which sunlight penetrates.

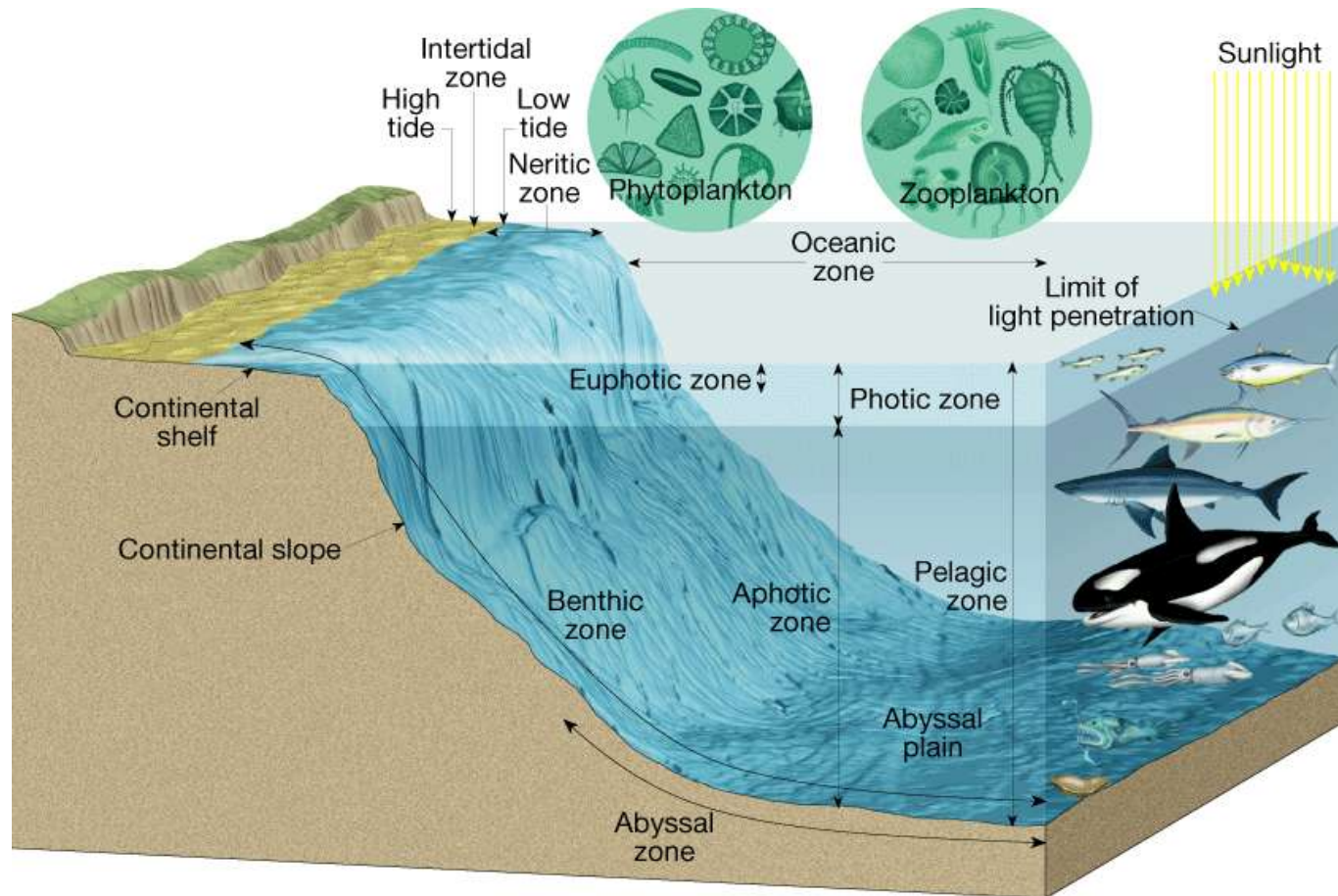
15.2 The Diversity of Ocean Life

Marine Life Zones

◆ Distance from Shore

- The **intertidal zone** is the strip of land where the land and ocean meet and overlap, or the zone between high and low tides.
- The **neritic zone** is the marine-life zone that extends from the low-tide line out to the shelf break.
- The **oceanic zone** is the marine-life zone beyond the continental shelf.

Marine Life Zones



15.2 The Diversity of Ocean Life

Marine Life Zones

◆ Water Depth

- The **pelagic zone** is open zone of any depth. Animals in this zone swim or float freely.
- The **benthic zone** is the marine-life zone that includes any sea-bottom surface regardless of its distance from shore.
- The **abyssal zone** is a subdivision of the benthic zone characterized by extremely high pressures, low temperatures, low oxygen, few nutrients, and no sunlight.

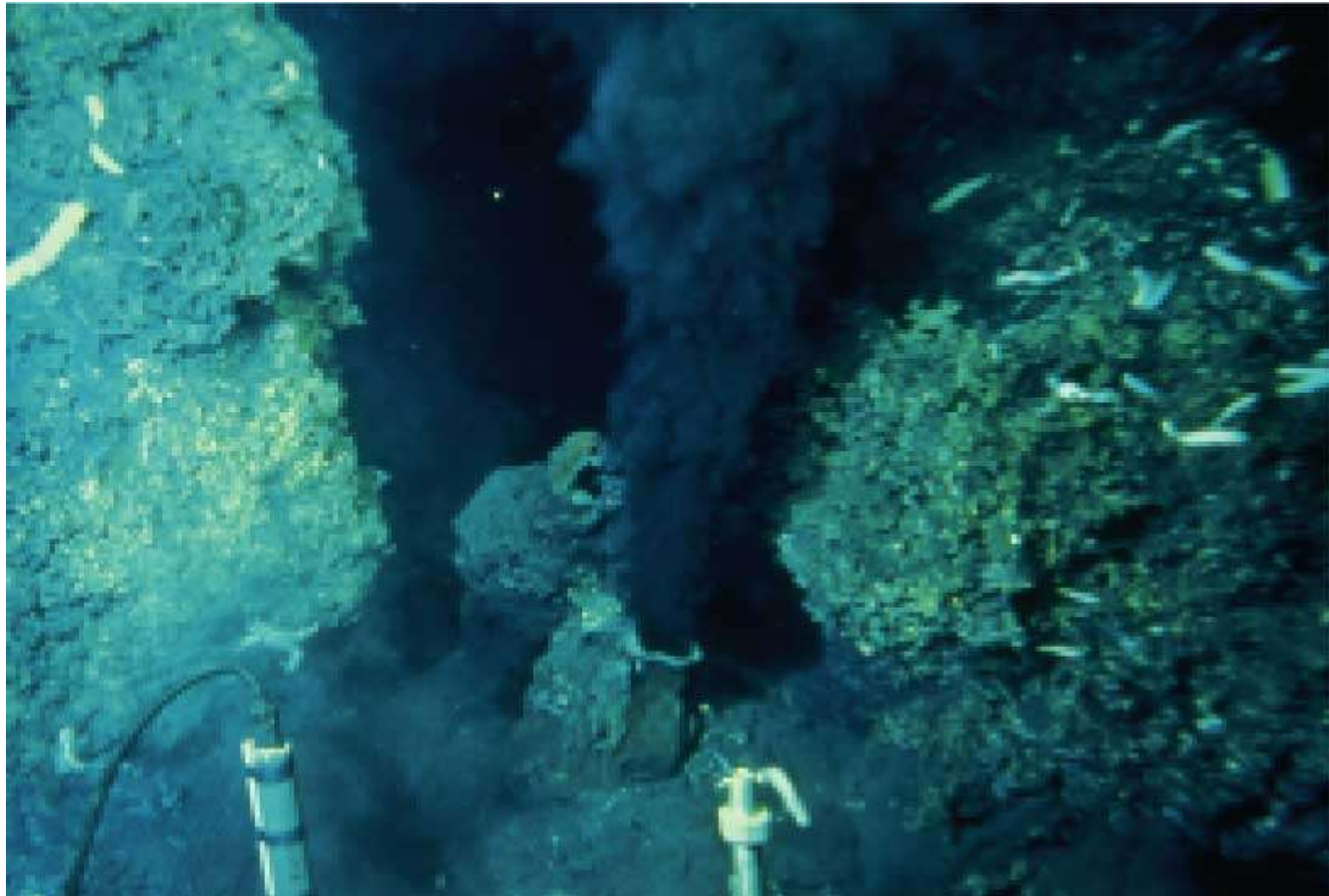
15.2 The Diversity of Ocean Life

Marine Life Zones

◆ Hydrothermal Vents

- Here seawater seeps into the ocean floor through cracks in the crust.
- At some vents, water temperatures of 100°C or higher support communities of organisms found nowhere else in the world.

Hydrothermal Vents



Tube Worms Found Along Hydrothermal Vents

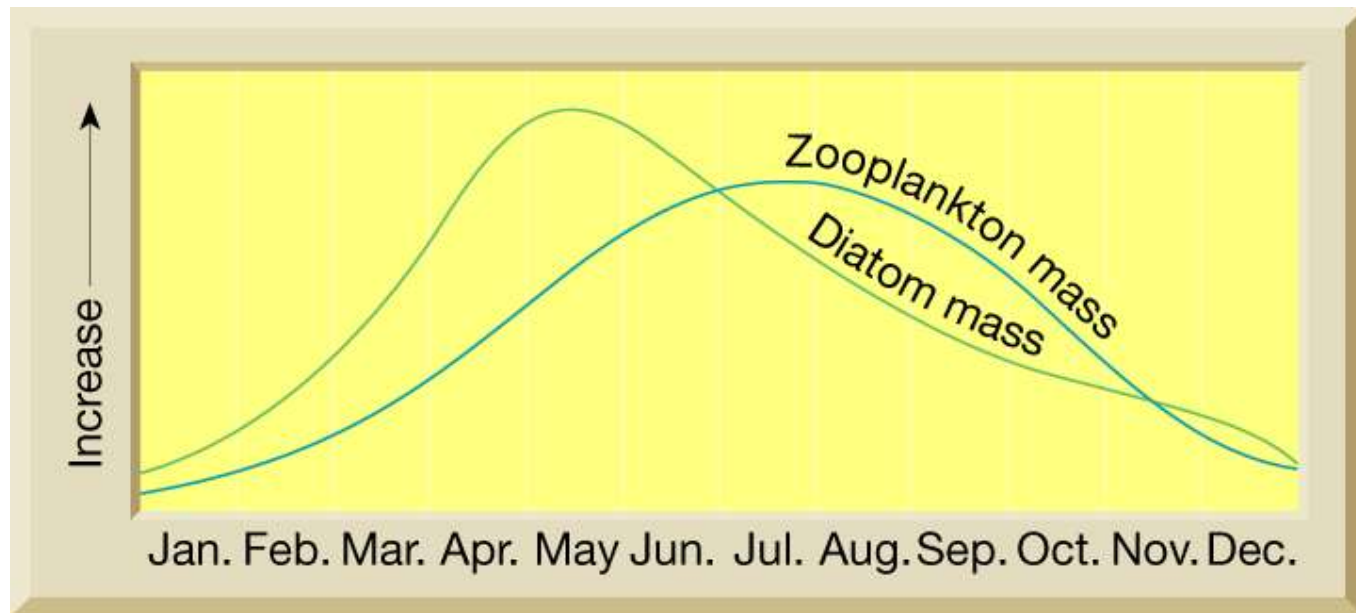


15.3 Oceanic Productivity

Primary Productivity

- ◆ **Primary productivity** is the production of organic compounds from inorganic substances through photosynthesis or chemosynthesis.
- ◆ **Photosynthesis** is the use of light energy to convert water and carbon dioxide into energy-rich glucose molecules.
- ◆ **Chemosynthesis** is the process by which certain microorganisms create organic molecules from inorganic nutrients using chemical energy.

Productivity in the Barents Sea

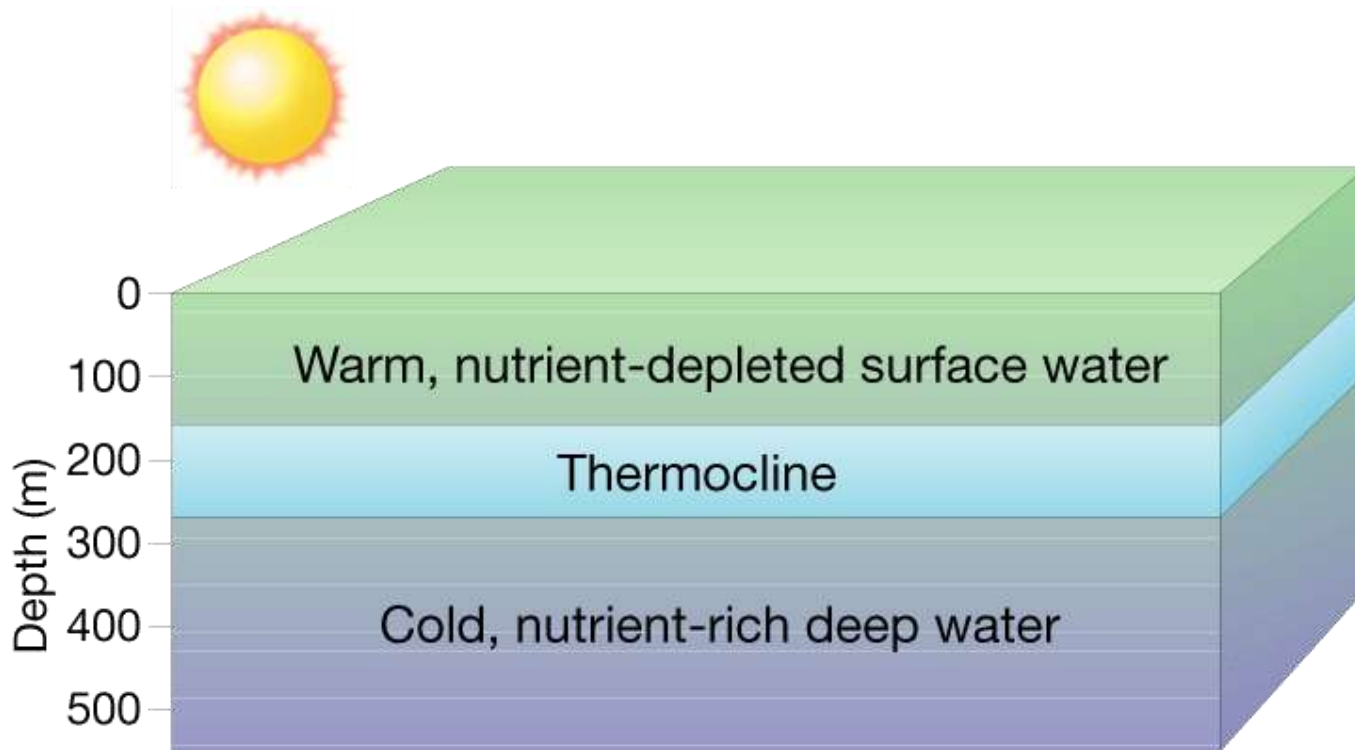


15.3 Oceanic Productivity

Primary Productivity

- ◆ Productivity in Polar Oceans
 - The low availability of solar energy limits photosynthetic productivity in polar areas.
- ◆ Productivity in Tropical Oceans
 - Productivity in tropical regions is limited by the lack of nutrients.

Water Layers in the Tropics



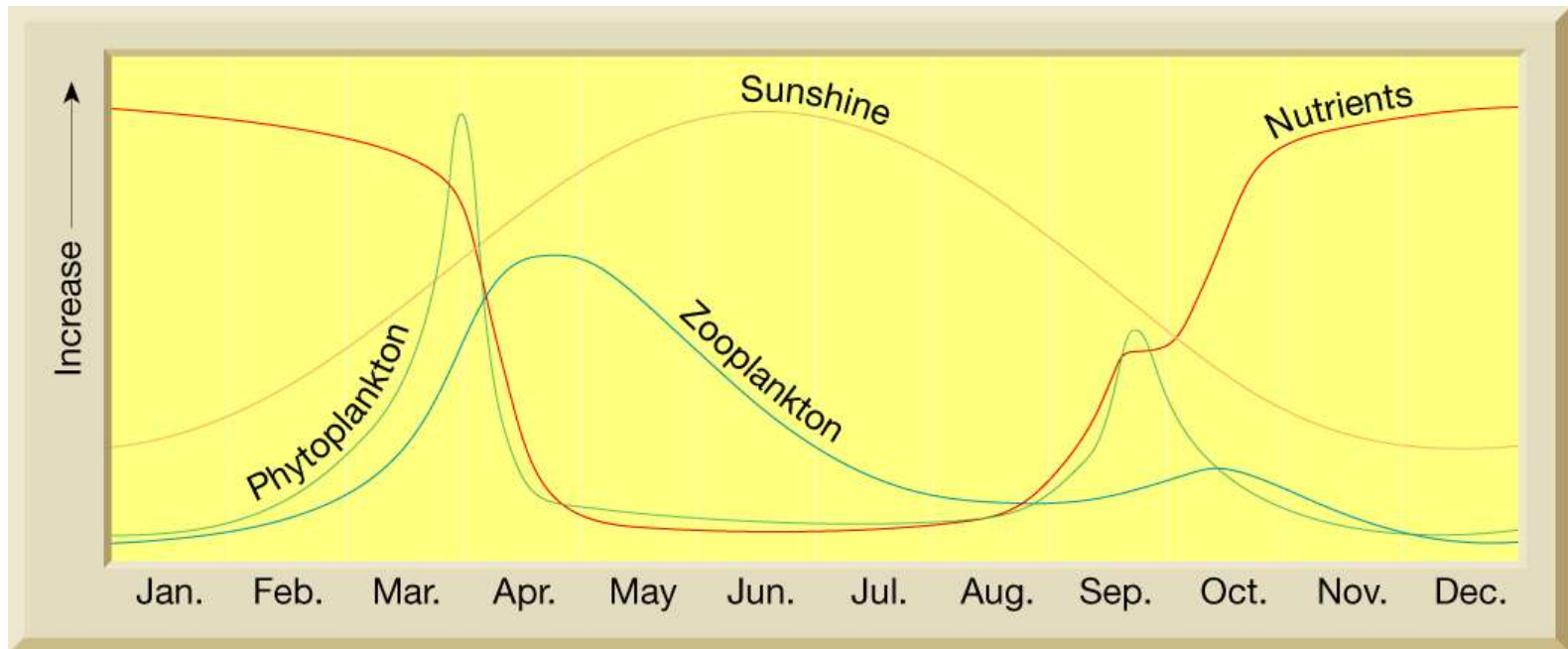
15.3 Oceanic Productivity

Primary Productivity

◆ Productivity in Temperate Oceans

- In temperate regions, which are found at mid-latitudes, a combination of these two limiting factors, sunlight and nutrient supply, controls productivity.
- Winter
 - Low productivity
 - Days are short and sun angle is low.

Productivity in Northern Hemisphere, Temperate Oceans



15.3 Oceanic Productivity

Primary Productivity

◆ Productivity in Temperate Oceans

- Spring
 - Spring bloom of phytoplankton is quickly depleted.
 - Productivity is limited.
- Summer
 - Strong thermocline develops so surface nutrients are not replaced from below.
 - Phytoplankton population remains relatively low.

15.3 Oceanic Productivity

Oceanic Feeding Relationships

◆ Trophic Levels

- A **trophic level** is a nourishment level in a food chain. Plant and algae producers constitute the lowest level, followed by herbivores and a series of carnivores at progressively higher levels.

◆ Transfer Efficiency

- The transfer of energy between trophic levels is very inefficient.

15.3 Oceanic Productivity

Oceanic Feeding Relationships

◆ Food Chains and Food Webs

- A **food chain** is a sequence of organisms through which energy is transferred, starting with the primary producer.
- A **food web** is a group of interrelated food chains.
- Animals that feed through a food web rather than a food chain are more likely to survive because they have alternative foods to eat should one of their food sources diminish or disappear.

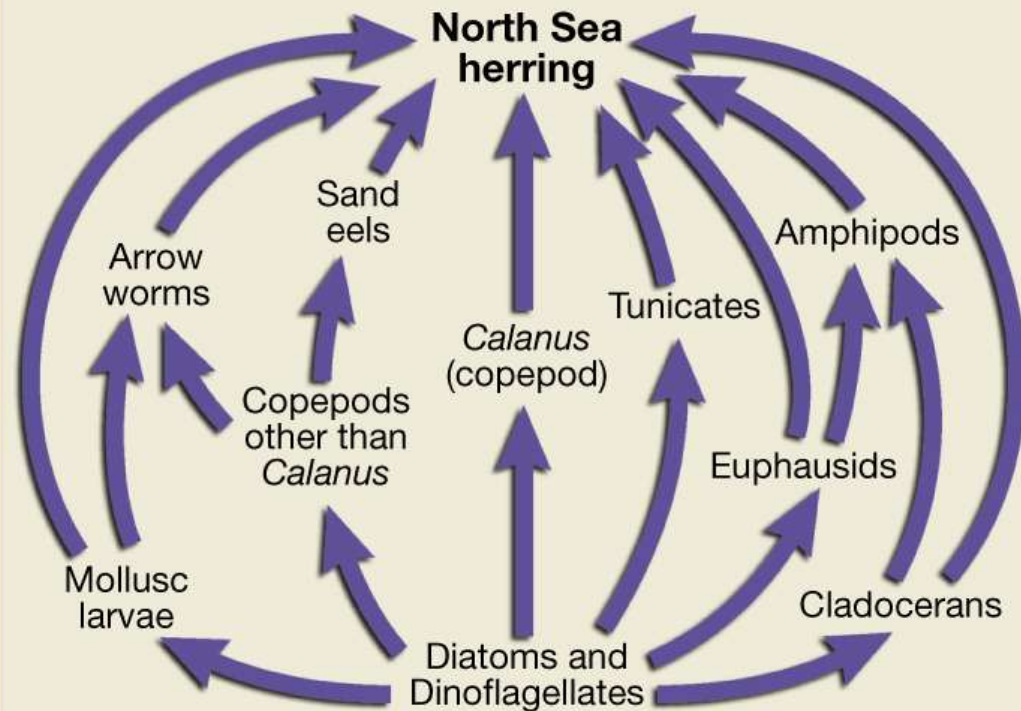
Food Chains and Webs

Newfoundland herring



A food chain is the passage of energy along a single path.

North Sea herring



A food web is more complex with many organisms interacting and depending on each other.