Classification of Marine Organisms

A wide variety of organisms inhabit the marine environment. These organisms range in size from microscopic bacteria and algae to the largest organisms alive today—blue whales, which are as long as three buses lined up end to end. Marine biologists have identified over 250,000 marine species. This number is constantly increasing as new organisms are discovered.

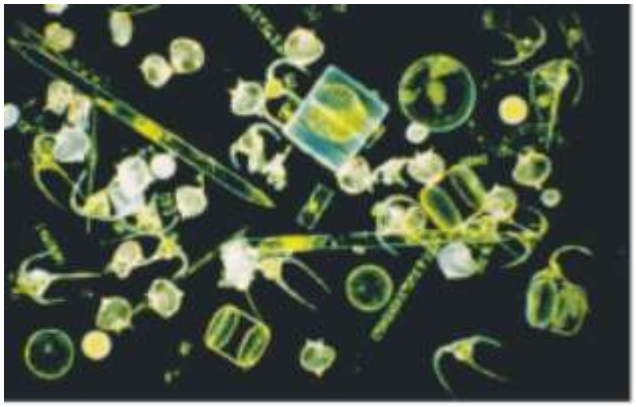
Most marine organisms live within the sunlit surface waters. Strong sunlight supports photosynthesis by marine algae. Algae either directly or indirectly provide food for the majority of organisms. All marine algae live near the surface because they need sunlight to survive. Most marine animals also live near the surface because this is where they can find food. The Epipelagic layer is the most productive because it is the only layer photosynthesis can take place in.

Marine organisms can be classified according to where they live and how they move.

They can be classified as either plankton (floaters) or nekton (swimmers). All other organisms are benthos, or bottom dwellers.

Plankton(*planktos* **= wandering) include all organisms—algae, animals, and bacteria—that drift with ocean currents.** Just because plankton drift does not mean they are unable to swim. Many plankton can swim but either move very weakly or move only vertically. An easy way to determine if an organism is a plankton or nekton is to determine whether it can swim against a current. If it cannot then it is most likely a plankton. However, if it is able to swim against a current it is most likely a nekton. There are of course exceptions to every rule. Two examples are the Box Jellyfish, Chironex fleckeri, and the seahorse. Chironex fleckeri can swim faster than a human, but since it is a type of jellyfish is considered a plankton. Seahorses are very weak swimmers but since they are a type of fish they are considered nekton.

Among plankton, the algae that undergo photosynthesis are called **phytoplankton**. Most phytoplankton, such as diatoms, are microscopic. Animal plankton, are called **zooplankton**. Zooplankton include the larval stages of many marine organisms such as fish, sea stars, lobsters, and crabs. Figure 7 shows members of each group.



Norman Nicoll/Natural Visions

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Figure 7 Plankton are organisms that drift with ocean currents. **A** This photo shows a variety of phytoplankton from the Atlantic Ocean. **B** The zooplankton shown here include copepods and the larval stages of other common marine organisms.

Nekton(*nektos* = swimming) include all animals capable of moving independently of the ocean currents, by swimming or other means of propulsion. Nekton are able to determine their position within the ocean and in many cases complete long migrations. Nekton include most adult fish and squid, marine mammals, and marine reptiles. Figure 8 shows examples of nekton.

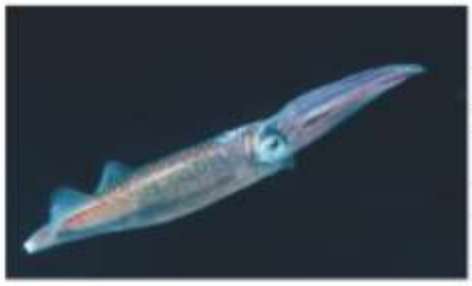

Figure 8 Nekton includes all animals capable of moving independently of ocean currents. **A** This squid can use propulsion to move through the water. **B** This school of grunts swims through the water with ease. **Inferring** Why do you think some organisms, such as fish, are classified as plankton during some stages of their lives and nekton during other stages?

Fish may appear to exist everywhere in the oceans, but they are more abundant near continents and islands and in colder waters. Some fish, such as salmon, swim upstream in fresh water rivers to spawn. Many eels do just the reverse, growing to maturity in fresh water and then swimming out of the streams to breed in the depths of the ocean.

Benthos

The term benthos(*benthos* = bottom) describes organisms living on or in the ocean bottom. Figure 9 shows some examples of benthos organisms. The shallow coastal ocean floor contains a wide variety of physical conditions and nutrient levels. Most benthos organisms can be found living in this area. Shallow coastal areas are the only locations where large marine algae, often called seaweeds, are found attached to the bottom. These are the only areas of the seafloor that receive enough sunlight for the algae to survive.

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Figure 9 Benthos describes organisms living on or in the ocean bottom. **A** Sea star **B** Coral crab.

Throughout most of the deeper parts of the seafloor, animals live in perpetual darkness, where photosynthesis cannot occur. They must feed on each other or on whatever nutrients fall from the productive surface waters. The deep-sea bottom is an environment of coldness, stillness, and darkness. Under these conditions, life progresses slowly. Organisms that live in the deep sea usually are widely distributed because physical conditions vary little on the deep-ocean floor

Marine Life Zones

The distribution of marine organisms is affected by the chemistry, physics, and geology of the oceans. Marine organisms are influenced by a variety of physical factors. **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.** Figure 10 shows the different zones in which marine life can be found.

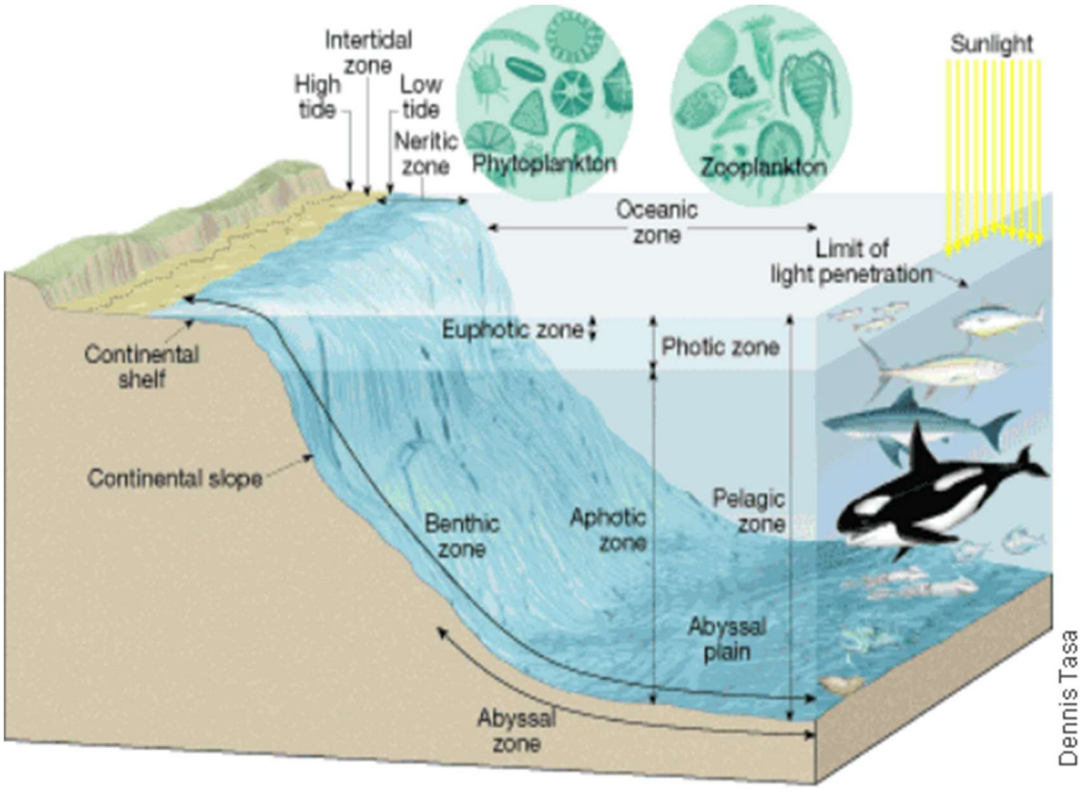

Figure 10 Marine Life Zones The ocean is divided into marine life zones, based on availability of light, distance from shore, and water depth.

Availability of Sunlight

The upper part of the ocean into which sunlight penetrates is called the **Euphotic zone** (*photos* = light). The clarity of seawater is affected by many

factors, such as the amount of plankton, suspended sediment, and decaying organic particles in the water. In addition, the amount of sunlight varies with atmospheric conditions, time of day, season of the year, and latitude.

The euphotic zone is the portion of the photic zone near the surface where light is strong enough for photosynthesis to occur. In the open ocean, this zone can reach a depth of 100 meters, but the zone will be much shallower close to shore where water clarity is typically reduced. In the euphotic zone, phytoplankton use sunlight to produce food and become the basis of most oceanic food webs.

Although photosynthesis cannot occur much below 100 meters, there is enough light in the lower photic zone for marine animals to avoid predators, find food, recognize their species, and locate mates. This layer is also known as the **disphotic zone**. Below this zone is the **aphotic zone**, where there is no sunlight.

Distance from Shore

Marine life zones can also be subdivided based on distance from shore. The area where the land and ocean meet and overlap is the **intertidal zone** (littoral Zone). This narrow strip of land between high and low tides is alternately covered and uncovered by seawater with each tidal change. It appears to be a harsh place to live with crashing waves, periodic drying out, and rapid changes in temperature, salinity, and oxygen concentrations. However, the species that live here are well adapted to the constant environmental changes.

Seaward from the low-tide line is the **neritic zone**. This zone covers the gently sloping continental shelf. The neritic zone can be very narrow or may extend hundreds of kilometers from shore. It is often shallow enough for sunlight to reach all the way to the ocean floor, putting it entirely within the Euphotic zone.

Although the neritic zone covers only about 5 percent of the world ocean, it is rich in both biomass and number of species. Many organisms find the conditions here ideal because photosynthesis occurs readily, nutrients wash in from the land, and the bottom provides shelter and habitat. This zone is so rich that it supports 90 percent of the world's commercial fisheries.

Beyond the continental shelf is the **oceanic zone**. The open ocean reaches great depths. As a result, surface waters typically have lower nutrient concentrations because nutrients tend to sink out of the photic zone to the deep-ocean floor. This low nutrient concentration usually results in smaller populations than the more productive neritic zone.

Water Depth

A third method of classifying marine habitats is based on water depth. Open ocean of any depth is called the **pelagic zone**. Animals in this zone swim or float freely. The photic part of the pelagic zone is home to phytoplankton, zooplankton, and nekton, such as tuna, sea turtles, and dolphins. The aphotic part of this zone has giant squid and other species that are adapted to life in deep water.

Benthos organisms such as giant kelp, sponges, crabs, sea anemones, sea stars, and marine worms that attach to, crawl upon, or burrow into the seafloor occupy parts of the benthic zone. The **benthic zone** includes any sea-bottom surface regardless of its distance from shore and is mostly inhabited by benthos organisms.

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The **abyssal zone** is a subdivision of the benthic zone. The abyssal zone includes the deep-ocean floor, such as abyssal plains. This zone is characterized by extremely high water pressure, consistently low temperature, no sunlight, and sparse life. Food sources at abyssal depths typically come from the surface. Some food is in the form of tiny decaying particles that steadily “rain” down from the surface, this is called Marine Snow. These particles provide food for filter-feeders, brittle stars, and burrowing worms. Other food arrives as large fragments or entire carcasses of organisms that sink from the surface. These pieces supply meals for actively searching fish, such as the grenadier, tripod fish, and hagfish.