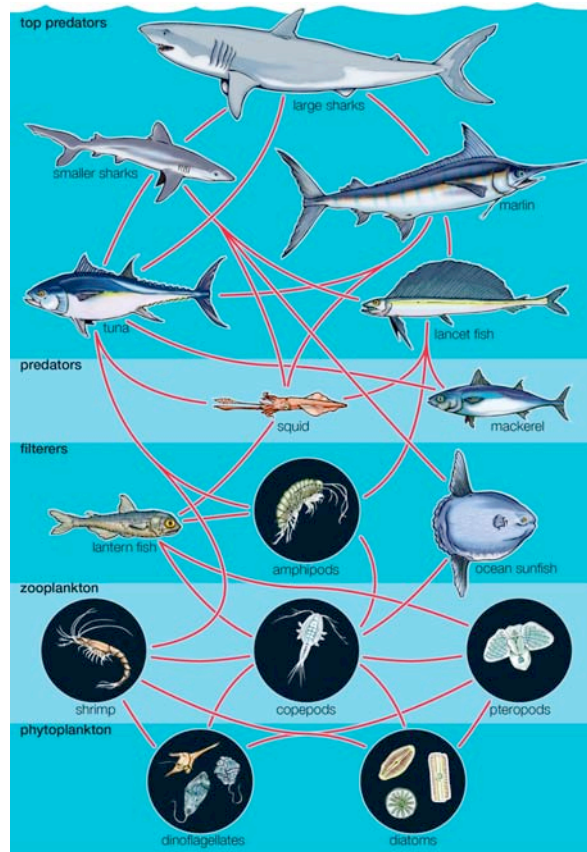


## How Fish Eat



© 2010 Encyclopædia Britannica, Inc.

Illustration of a basic marine food web, beginning with the primary producers on the bottom.

Source: Encyclopedia Britannica (<http://www.britannica.com/EBchecked/media/27634/Generalized-aquatic-food-web-showing-the-network-of-feeding-relationships>)

Fish can be classified by how they eat and at which level in the **trophic structure** of their community they eat. Trophic structures can be represented through **food webs**. Although the complexity of **food webs** can vary by geography, with the most complex existing in the **tropics**, they all follow a simple order.

The first or primary trophic level of any given ecosystem consists of **primary producers**. Primary producers like **algae**, bacteria, and **phytoplankton** use energy from the sun and the process of photosynthesis to convert inorganic carbon dioxide into organic carbon. Primary producers feed the **primary consumers** of the second trophic level. First order consumers are small animals called **zooplankton** (like krill and copepods) and can also consist of the **larvae** of many fish and invertebrate **species**. Larger fish, i.e. **herbivores**, may also feed on the primary producers.



# Fishery Science — Biology & Ecology

Next, secondary consumers or **filter feeders** feed on the first order consumers. Filter feeders feed primarily on zooplankton and larvae by taking water into their mouths and filtering out any organic materials. Filter feeders include both adult and **juvenile** fishes and invertebrates and can vary in size from the 30 cm (1ft) long **Pacific Sardine** (See California Fisheries), a staple of California's fisheries, to the 13 m (40ft) long Whale Shark, the world's **largest living fish**.

The next levels of consumers in the trophic structures are intermediate **predators**. Intermediate predators feed on smaller filter feeding fish and crustaceans, as well as herbivorous fishes. These predators, like **Chinook Salmon** (See California Fisheries), also can fall prey to larger intermediate predators. For example, Salmon may feed on juvenile filter feeding fish but also may be preyed upon by a larger predator like a Shark.

Top predators hold the highest level of the food web. Top predators are any fish, like Bluefin Tuna and White Sharks, or marine mammals (like Killer Whales) that do not have any natural predators within the ecosystem that they inhabit.

## References

Allen L, Pondella D, Horn M. Ecology of marine fishes: California and adjacent waters. Berkeley (CA): University of California Press; 2006.

Castro P, Huber M. Marine biology. 3<sup>rd</sup> edition. Boston (MA): McGraw-Hill; 2000.

MarineBio.org. Marine vertebrates [Internet]. Encinitas (CA): MarineBio.org; c1998-2011 [updated 2010 Nov 26; cited 2011 May 22]. Available from: <http://marinebio.org/oceans/marine-vertebrates.asp>

Nybakken JW, Bertness MD. Marine biology: and ecological approach. 6<sup>th</sup> edition. San Francisco (CA): Pearson Education; 2005.

Stewart R. Fish and fisheries. In: Ocean World [Internet]. College Station (TX): Texas A&M University; c2005 [modified 2009 Apr 2; cited 2011 May 22]. Available from: <http://oceanworld.tamu.edu/resources/oceanography-book/fisheries.htm>

Stewart R. Marine fisheries food webs. In: Ocean World [Internet]. College Station (TX): Texas A&M University; c2005 [modified 2009 Aug 3; cited 2011 May 22]. Available from: <http://oceanworld.tamu.edu/resources/oceanography-book/marinefoodwebs.htm>