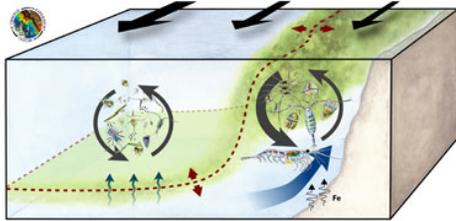


Phytoplankton Growth and Oxygen Production in the California Current

Name: _____

Student Background Information:

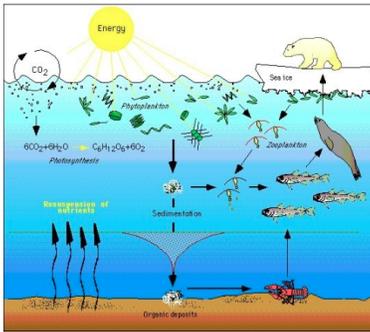
Dr. Mike is an oceanographer studying *phytoplankton* in the **California Current Ecosystem (CCE)**. The California Current is a Pacific Ocean



Current that moves south along the western coast of North America, beginning off southern British Columbia, Canada and ending off southern Baja California in Mexico. The California Current System is a *coastal upwelling biome*. Upwelling brings colder, denser and more nutrient-rich waters up from lower depths



to the more shallow regions of the ocean. Because of the nutrient-rich waters, the **California Current Ecosystem** contains some of the most *productivity* of phytoplankton in the world's oceans. *Productivity is the production of photosynthetic organisms, such as phytoplankton,* which are THE essential component of the oceanic food web.



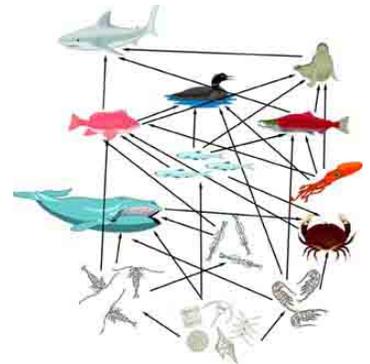
Day #1 Assignment: (Phytoplankton Food Web Assignment)

Oceanic Food Web/Trophic Levels

Directions: Read the passage below. Using the information provided, draw a food web using the names of the organisms listed and draw lines (arrows) connecting the marine food web. Next to the name of the organisms in the food web, *list which trophic level that organism is in.* After you complete your food web, answer the questions at the end of the reading.

Remember: *arrows are drawn in the direction of energy transfer.*

For example, if organism A eats organism B, the arrow is drawn from B to A because the energy is being transferred from B to A.



Marine Food Web Information

Phytoplankton, which are microscopic photosynthetic organisms (*single-celled algae, including diatoms*) that drift in the water, are the *foundation* of the oceanic food chain. Phytoplankton are also known as the *primary producers* of the oceanic food chain because they are able to produce their own food through photosynthesis using sunlight.

Zooplankton, also known as the *primary consumers*, are the “*animal*” plankton. They drift through the water column and feed on the phytoplankton. Zooplankton can range from microscopic **Copepods** up to larger organisms, such as **jellyfish**, all *drifting passively on the ocean currents*. Larger zooplankton can feed animals that are much larger, such as **baleen whales**. Zooplankton nourish filter-feeding organisms that strain their food directly from the water. This third trophic level is called the *secondary consumers* and can include **bivalves** (*clams and mussels*), **amphipods**, and **larval forms of many fish and crustaceans** as well as some **small fish** such as **Anchovies**. This third trophic level feeds the larger fish and are the food of choice for many species up and down the food chain. **Anchovies** are the favorite food of larger fish (**Albacore tuna and other tertiary consumers**) and of bottom-dwelling carnivores, such as lobsters (**tertiary consumers**). **Albacore** are hunted by the *APEX predators*, such as bigger **tunas, sharks and swordfish**. Many of these organisms at the highest level will eat most things on the food web below them, *including members of their own species*. Even animals that have no immediate predators ultimately contribute nutrients to the food web. **Large whales and sea turtles**, do produce waste that is eventually broken down by *decomposers* such as **bacteria**, in a process that releases nutrients that **phytoplankton** and other **marine plants** can use to start the whole cycle again.

Questions: *Answer the following questions using your drawn marine food web diagram.*

1: ***Marine coastal upwelling*** allows deeper ocean waters to come up to the surface waters. Upwelling brings nutrients to the surface waters and allows phytoplankton to thrive in these regions. **Explain how an increase in phytoplankton contributes to a region of higher productivity.**

2: A large proportion of zooplankton in a specific area have been wiped out, ***explain what will happen to the marine food web in this region. Why?***

3: One type of large predatory fish has been hunted to extinction. ***Will this have a devastating effect on the marine food web? Explain what may happen.***