Ecosystems in the Open Sea
1. What is a basic Neuston and Plankton ecosystem? Include why neuston are being studied and the two different types of plankton.

2. What are the descriptions of the three levels of consumer animals in the open ocean? Give examples for each level.

3. What are 3 traits that make these organisms successful and how do they defend themselves from predation?
Neuston Ecosystem

- **Neuston** - organisms that live on the sea surface.
- Very thin – only a few millimeters in many instances deep.
- Main abiotic factor
  - Sunlight, abundant
An ecosystem under much scrutiny

- Covers about 71% of the Earth’s surface.
- Many pollutants appear to affect it profoundly.
  - Kill the primary producers
- Holds more nutrients, chlorophyll a, and carbon compounds.
- Surface tension supports eggs, larvae, and microscopic life on the top film of the water.
Plankton Communities

**Plankton** - A group of organisms that drift/swim weakly at the mercy of water motion near the surface of the ocean
- include autotrophs, heterotrophs, predators and grazers.

Plankton are not one species, but many species
- Most are very small
Types of Plankton

- **Phytoplankton**
  - primary *producers* responsible for more than 92% of marine production

- **Zooplankton**
  - primary and secondary *consumers* of other plankton.
Animals of the Open Sea community

- This community overlaps neuston and plankton
- **Nekton** - the large, strong swimmers
  - Most familiar organisms
  - Nearly all are carnivorous
- Fishes, marine mammals, squid, turtles, penguins etc.
Small Fishes – Low level consumers

- Herring, sardines, anchovies
  - These eat small prey like zooplankton
- Filter food with gill rakers
  - Slender projections on the inside of the gills in the mouth
  - When feeding, swim with abnormally large mouths open
- Usually occur in immense schools
- Important food source for many other organisms
Mid level consumers

- Medium sized fishes
  - Mackerel, salmon, tuna, flying fish
- These fish are joined by other organisms
  - seals and sea lions
  - Birds - penguins, pelicans, albatross
Top level consumers

- Sperm Whale is largest - eats squid (Giant and Colossal)
- Killer Whales (next biggest predator)
  - Eats porpoises, seals, salmon, penguins, other whales
- Great White and Mako sharks
  - Some of the biggest sharks
  - Eat billfish (Marlin, sailfish etc.) also penguins, seals
What makes them successful

- **Specialized sensory organs**
  - Detect prey with **highly developed eyes**
  - **Lateral Line**
    - Line down the middle of the side of fish
    - Extremely sensitive to vibrations in water
  - **Echolocation**
    - Found in dolphins and whales
    - Locate prey at a distance by bouncing sound off
Defense

- No hiding places
- Safety in numbers for many
- Protective coloration - universal
  - Transparency of plankton
  - Countershading
    - Dorsal (back) = dark (green, blue, black)
    - Ventral (belly) = white, silver
  - Silvery sides help reflect light and confuse predators
- Flying fish - jump out of water a glide through air for short time
  - Billfish love to catch them
  - http://www.youtube.com/watch?v=OmWRCdUw17E
  - http://www.youtube.com/watch?v=gAjzH0vWSIA&feature=related
Swimming

- No resting places so must always swim
  - Whoever eats or is eaten is the fastest swimmer (usually)
- Streamlined smooth bodies
- Very muscular
  - Tail used for propulsion and pectoral fins for steering
  - High and narrow tail = most efficient for high-speed swimming