

## Homework Assignment #6 (Due in Section March 7)

- 1) Choose an organism that you are familiar with (or interested in) from the marine environment. Describe 3 adaptations that organism has made to its environment (example: using *Prochlorococcus*, a small single-celled photosynthetic bacterium, it has the smallest cell size of any photosynthetic organism, which keeps it suspended in the water column by reducing sinking; it has lost the ability to use nitrate, but has a high affinity for ammonium, because it is found in the oligotrophic gyres; it uses a special type of chlorophyll that is shifted slightly towards the blue, making it a more efficient light harvester in deep, blue waters).
- 2) Explain the difference between primary production (or productivity) and biomass. If you were in charge of measuring both phytoplankton biomass and primary productivity in the Monterey Bay National Marine Sanctuary, how would you do it?
- 3) The North Atlantic experiences both a spring and a fall bloom. Explain why these blooms (spring and fall) occur.
- 4) What is a harmful algal bloom? How is this related to red tides?
- 5) As far as we know, the blue whale is the largest organism currently living on the planet. Based on your understanding of food webs and energy transfer, explain why it is unlikely that there could be an organism ten times larger than a blue whale. If we assumed that such an organism did exist, how would it acquire energy (i.e. what would it eat), and why?

Extra Credit: this is separate from the homework, and represents an opportunity to get extra credit. Read the Nature paper (available on the website) discussing Harmful Algal Blooms in Monterey Bay (Scholin et al.) and answer the associated essay question.

Based on the lecture material, text, and the article from Nature discussing the large Harmful Algal Bloom event in Monterey Bay, discuss the following. What is a Harmful Algal Bloom? Why was the 1998 event in Monterey considered to be a HAB event? If you were put in charge of the Monterey Bay National Marine Sanctuary, how would you go about monitoring for the occurrence of HABs (including the advantages and disadvantages of your methods)?