Question Set #2

Chapter 11, Polar Regions
1) What is pack ice? How is it formed? How is it different from icebergs in its formation?
2) Does sea ice last longer in the Arctic or the Antarctic? Why?
3) How do planktonic organisms get into sea ice?
4) What phytoplankton group is the most common in sea ice? What groups of consumers occur in sea ice? Are these groups more or less concentrated than in the open sea around them? What effect does this sea ice biota have on organisms that aren’t living in it? Do krill exploit the sea ice ecosystem?
5) Why are krill viewed as being a “keystone” species in Antarctica? How does sea ice affect krill distribution patterns? How do krill and salp population dynamics interact?
6) How does melting sea ice affect the primary producers? What about the consumers in the system? What about sinking flux of organic matter at the melting ice edge (marginal ice zone)?
7) The Southern Ocean is considered a high nutrient-low chlorophyll area. Why isn’t the Arctic Ocean also considered as a HNLC area? In other words, what limits phytoplankton growth in Arctic waters?
8) What does “endemism” mean? What percent of the fish and species are endemic to Antarctica? How does a species become endemic? That is, why are more species in Antarctica endemic relative to species found in the Arctic?
9) What is gigantism? How does it occur and what is thought to be the primary cause of it?
10) There is a saying, “If you can see it, it isn’t important.” How does this saying apply to the biomass of bacteria in the Southern Ocean relative to the biomass of whales or krill? We tend to call the latter “charismatic” organisms...
11) What are the main food items for birds and mammals in the Arctic?
12) Why does the extent of sea ice in the Arctic affect the distribution and population levels of polar bears?
13) How would a reduction in sea ice potentially affect the krill populations?
14) How would a reduction in sea ice potentially affect the emperor penguin?

10 March 08 Lecture
1) How are grazing rates inferred from natural populations, with no incubations? What are the problems with this approach?
2) What is meant by using a tracer technique to measure grazing rate? Describe one common method used.
3) Describe a community manipulation method of measuring grazing, along with its assumptions and possible problems.
4) Describe how the size fractionation technique gives information about food web structure.
5) What are the key assumptions that underlie the seawater dilution method for determining growth and grazing rate?
6) Why do we usually add nutrients to such experiments and what is the necessary control treatment to determine the natural rate of phytoplankton growth ($\mu$) in such experiments?
7) What is the advantage of a 2-bottle dilution measurement over using a whole series of dilution bottles to determine growth and grazing? What is the critical assumption you have to validate before using this approach?
8) What does sloppy feeding refer to? What members of the plankton would you expect to demonstrate it the most? The least? What role does the relative size between predator and prey play in the amount of sloppy feeding produced?
9) Why do we talk about faecal pellets in the context of biological oceanography? What is their biogeochemical relevance?
10) Would you expect a salp or a euphausiid to have more impact on vertical carbon flux and why?

12 March 08 Lecture
1) How is metabolism usually measured? What are the products of metabolic activity?
2) How does metabolic rate change with body weight?
3) Why would smaller organisms grow at a faster rate than larger organisms?
4) What group, crustaceans or ciliates, would have a higher basal metabolic rate? Which one would have a higher active metabolism?
5) Based on what was presented in class, what group would contribute to nitrogen remineralization more – heterotrophic bacteria or flagellate grazers? Why?
6) What is a reasonable estimate for gross growth efficiency in planktonic organisms?