Aquatic Ecology: Biodiversity in Aquatic Systems Chapter 7

1. What are the two major types of aquatic life zones?
2. Give two examples of each of these two major types of aquatic life zones.
3. The major types of organisms found in aquatic environments are determined by the water's _____.
4. What two types of organisms comprise coral? What type of symbiosis is occurring here?
5. What is each of the two "players" contributing to the coral relationship?
6. What role does calcium carbonate play in coral reefs?
7. Describe three significant ecological services provided by coral reefs:
8. Describe three significant economic services provided by coral reefs:
9. Describe five major threats to the world's coral reefs.
10. Describe coral bleaching; include a discussion of the two dominate causes of coral bleaching.
11. Be familiar with the main kinds of organisms in Aquatic Life Zones:

    - Plankton = weak swimmers, free-floating; (types of Phyto-, Nano-, Zoo-)
    - Nekton = strong swimmers, consumers, e.g., _____
    - Benthos = bottom-dwellers, e.g., _____
    - Decomposers = mostly _____

13. Describe four major differences between life on Land and life in Water:
14. Species and Habitat Diversity:
    - The Third Dimension --> great variety of organisms
    - Smaller number of distinctly different habitats than on land
    - Less pronounced/fixed physical boundaries than on land
    - Endemism much less common in water habitats than Land (Except: some benthic critters)
15. Trophic Structure and Food webs:
    - In open water, most plants are "micro-floaters", vs. larger land plants rooted in soil
    - Zooplankton smaller than land herbivores
    - More trophic levels --> greater complexity than on land
    - Fluid medium and varied benthic habitats --> more ways of obtaining food than on land

15. Population Characteristics:
    - High Reproductive Output and Short Life Cycles --> significant fluctuations in Pops.
    - Early separation of young from parents
16. Monitoring and Protection:
    - More difficult to monitor/study aquatic ecosystems than land ecosystems
    - More Uncertainty regarding Aquatic than Land
17. Important Factors Limiting Types and Numbers of Organisms found in the Surface, Middle, and Bottom layers:
    - Temperature
    - Access to Sunlight
    - Dissolved Oxygen level
    - Nutrient Availability

e.g., *Photosynthesis primarily occurs in which ocean zone
*The amount of oxygen dissolved in water varies due to? (Name four significant factors which directly influence D.O. levels)
* Open Ocean: is it abundant or limited in the supply of nitrates and/or phosphates

18. Saltwater Life Zones: Discuss/Explain the roles played by oceans in terms of:
    - "Climate Regulators":
    - "Housing Provided":
    - "Dispersing & Diluting":
19. The two major life zones of the Ocean(s):
    - Coastal Zone = _____.
    - Open Ocean/sea
        - Coastal Zone : approximately 10% of all ocean's area, but 90% of all marine species found here; site of most large commercial marine fisheries; very high NPP; varied habitats.
        - Explain how/why coastal zones are the "High NPP" areas which they are; what factors and/or what "dynamics" contribute to this "rich NPP" characteristic?
        - Human Population: 40% of world's population lives within 100 miles of a coast;
        - Potential impacts on coastal water quality?
20. Estuaries and Coastal Wetlands:
    - Define an Estuary:
        - Temperature and Salinity in estuaries vary due to what factors?
        - Describe two economic and two ecological services provided by estuaries and Their associated Coastal Wetlands
        - Describe three human impacts on Estuaries and Coastal Wetlands:
21. The loss of mangrove forests in tropical coastal nations is primarily due to what major contributing factors?
22. Describe four specific ways in which biodiversity is reduced/limited in intertidal zones.
23. Describe barrier islands.
24. Where are coral reefs found, generally?
25. Be familiar with the contributing factors in the loss of coral reefs: (tie in to question #9):
    - Slow growth, Easily disrupted, Clear water of constant temperature (64-86 F, 18-30 C) and relatively constant salinity.
    - Coral bleaching can be triggered by just a 1 degree C increase.
    - Connection of Coral Loss due to Global warming?? Discuss this possible connection(s):
    - What are the biggest threats to the biodiversity of Coral Reefs: Describe five: (again, overlap with question #9)
26. Name the three vertical zones of the Open Sea.
27. Is the average Gross Primary Productivity(GPP) and Net Primary Productivity(NPP) of The Open Ocean relatively high or low, overall? Explain: (this is relative to other aquatic life zones and biomes)
28. Identify the major causes of the depressions which form lake substrate:
29. Briefly describe each of the following Lake Zones:
    - Littoral Zone:
    - Limnetic Zone:
    - Profundal Zone:
    - Benthic Zone:
30. Describe the relative ages, nutrient content, and primary productivity of each of the following:
    - Eutrophic:
    - Mesotrophic:
    - Oligotrophic:
31. Describe what Cultural Eutrophication is, including the sequence of events which take place following an input of nitrates and/or phosphates:
32. Describe two predominate causes of cultural eutrophication:
33. Does Eutrophication occur naturally? Explain:
34. Be familiar with the dynamics of Fall and Spring Turnover:

- What characteristic(s) do lakes which “turnover” possess? (Where are they?)
- Water is most dense at ___ degrees C, = _____ degrees F.
- The freezing temperature of water is ___ degrees C, therefore, water is ____(more or less?) dense at 4 degrees C.
- The above 2 facts are nice, but why are thet significant?
- What does thermal stratification refer to?
- When surface water gradually cools in the fall, its density _____ and it _____ when it cools to 4 degrees C, causing the _____ disappear.
- This turnover brings _____ from the bottom to the top and _____ from top to bottom.
- Illustrate the relative positions of the following:
  - Epilimnion
  - Thermocline
  - Hypolimnion
- During Fall and Spring Overturn, the Temperature of the lake and Dissolved Oxygen levels are roughly the same at all depths.

35. What is a Watershed? It is synonymous with _____.
36. Be familiar with the three components of watersheds: A. Source Zone: B. Transition Zone: C. Floodplain Zone:
37. Why are Freshwater (FW) Inland Wetlands important? Provide three specific economic and/or ecological reasons:
38. Be familiar with each of the following FW Inland Wetlands: Marshes, Swamps, Prairie Potholes, Bogs (fed solely by precipitation), Fens (fed by surface runoff and groundwater, in addition to precipitation), Wet Arctic Tundra, Floodplain Wetlands, Seasonal Wetlands(Prairie Potholes, Floodplain wetlands, Bottomland hardwood swamps. The presence of cattails, bulrushes, and red maples are often used to “confirm” seasonal wetland areas (when dry for a period of years).
39. Describe five important ecological and/or economic roles of Inland Wetlands:
    e.g., *Provide food & habitats for fish, migratory waterfowl, shorebirds: (approx. one-third of E/T species in the U.S.A. are found in Inland Wetlands)
40. Be familiar with the major human impacts on Inland wetlands:
    e.g., *Drained, dredged, filled-in/covered over
    The annual loss of Inland wetlands in the U.S.A. = 400 square km (150 sq. miles)
    Approximately 80% of this is due to _____, with the remaining loss due to mining, forestry, oil/gas extraction, highway construction, and urban/suburban growth/development
41. The “Grand Lesson” = Everything is Connected
    e.g., The Watershed Approach: maintain the integrity of/protecting the whole, not only the “individual river/stream/tributary.

Important Terminology & Concepts Chapter 7

1. Aquatic Life Zones
2. Saltwater/Marine & Freshwater
3. Coral Reefs
4. Salinity
5. Plankton: Phyto-, Nano-, Zoo-
6. Nekton
7. Benthos/Benthic
8. Decomposers

9. Euphotic Zone
10. Coastal Zone
11. Continental Shelf
12. Estuary
13. Coastal Wetlands
14. Intertidal Zone
15. Barrier Islands/Beaches
16. Watershed/Draainage Basin
17. Source Zone, Transition Zone, Floodplain Zone
18. Inland Wetlands
19. Marshes
20. Euphotic Zone (worth repeating)
21. Bathyal Zone
22. Abyssal Zone
23. Deposit Feeders
24. Filter Feeders
25. Freshwater Life Zones: salt concentration of less than 1%
26. Lentic Bodies of Freshwater
27. Lotic Bodies of Freshwater
28. Littoral Zone
29. Limnetic Zone
30. Profundal Zone
31. Benthic Zone
32. Oligotrophic Lake
33. Mesotrophic Lake
34. Eutrophic Lake
35. Eutrophication
36. Cultural Eutrophication
37. Thermal Stratification
38. Fall Turnover(Overturn)
39. Spring Turnover(Overturn)
40. Epilimnion
41. Thermocline
42. Hypolimnion
43. Surface Water/(associated Runoff of some of this)
44. Swamps
45. Prairie Potholes
46. Floodplains
47. Bogs
48. Fens
49. Wet Arctic Tundra
50. Seasonal Wetland