Chapter 3 – Water

1. What is unique about the water molecule and how does this contribute to some of its properties?
2. How much of the world's water is found in the oceans, bound up in ice, or as "freshwater?"
3. Draw the water cycle in a way that helps you understand and remember how water moves through the landscape, waterways, and air.
   a. Where does 60% of the water flow go?
   b. What happens to the remainder of the water?
   c. How does snow pack influence water storage and seasonal streamflow patterns? Rain on snow events?
4. What is the difference between groundwater and an aquifer?
5. a. What are endorheic or internal basins, and where do we find them in California?
   b. How do salts accumulate in these basins?
   c. Why is the southern part of the Central Valley considered to be an alkaline basin?
6. Our three biggest natural lakes in California are the Klamath Lake, Lake Tahoe, and Clear Lake. What is unique about each of these lakes?
7. How do we classify streams within watersheds? How is this useful?
8. Stream inputs (biological, chemical and physical):
   a. Biological inputs include what kinds of materials?
   b. What benefits do woody debris provide?
   c. What kinds of chemical inputs are important for stream processes?
   d. How do these inputs impact food webs?
   e. What happens when stream systems and watersheds become eutrophic?
   f. How are sediments moved within a watershed?
   g. What are the causes and consequences of increased sediment loads in streams?
   h. What impact do invasive aquatic organisms have on our watersheds?
9. What is a typical pathway for a watershed to move through a landscape? What kinds of formations are common in what parts of the watershed?
10. What is a floodplain, and how are flooding regimes important for soils and wetlands?
11. Estuaries:
    a. How are estuaries formed and what is unusual about them in terms of habitat?
    b. Are they oligotrophic or eutrophic?
12. The intertidal zones are rich with biodiversity. What factors drive that biodiversity?
13. What factors influence the high numbers of endemic freshwater fish species found in California? How do precipitation and streamflow patterns influence that diversity?
14. What factors are threatening the survival of many of California's freshwater fish species?
15. What are some of the big changes that humans have made in the last 150 years to California's watersheds?
16. How do dams change water flows and temperatures?
17. What do levees do to streamflow and how do they affect floodplain hydrology?
18. What kinds of changes have occurred in the San Francisco Bay Delta over the last 150 years?
19. How do the many small water catchments in the upstream parts of watersheds impact streams?

For class discussion: Considering different stakeholders and the impact of climate change, evaluate the legitimacy of the California Doctrine (the riparian doctrine and the prior appropriation doctrine) and how you think it should be changed. (For more information on these doctrines: https://www.e-education.psu.edu/earth111/node/700)