Things to know for the second Ichthyology lecture exam

The second exam will cover lecture material from 5 October through 2 November lectures and readings.

1) Diversity
    a. Know key features that distinguish Elasmobranchii, Holocephali, Elopomorpha, Osteoglossomorpha, Clupeomorpha, Ostariophysi, Otophysi, and Protacanthopterygii from other fishes
    b. Be able to describe the form and function of leptocephalus larvae
    c. Be familiar with the key features (whether they evolved in that group or not) of the fishes and families I **highlighted** in class (I do not expect you to know every family or species, except those where I highlighted a special feature or behavior)
    d. Understand general trends and patterns in sharks (e.g., life history, senses, top predators, reproduction)
2) Physiology: buoyancy and thermogregulation
    a. How do swim bladders work? What other adaptations are there for buoyancy?
    b. Know the anatomy and function of swim bladders
    c. Know the terms "root off," "root on," and salting-out
    d. How do fish thermoregulate? (And why?)
3) Ion balance
    a. Be able to define/explain hyposmotic versus hyperosmotic versus isosmotic
    b. Understand ion movement for fish (what is actively transported vs. diffused)
    c. Know the general differences in physiology between fresh and saltwater fish, osmoconformers, and sharks in terms of hydromineral balance
    d. Understand environmental effects on ion balance and feedbacks with respiration
4) Digestive system
    a. Know the digestive organs and functions from the mouth to the anus
    b. Review the special feeding adaptations we covered in class
    c. Know how different fish with different diets differ internally (e.g., stomach, intestines) and externally (e.g., mouth, dentition, body shape, swimming)
5) Senses
    a. Understand what organs and their parts are involved in:
        i. Mechanoreception (ears, lateral line, Weberian Ossicles, gas bladder)
        ii. Vision (eyes, their parts, and properties of light in water)
        iii. Chemoreception (nares and taste buds)
        iv. Electroreception and magnetoreception (including classes of electric fish)
        v. Keep in mind that some sensory organs are used for multiple "senses" and multiple purposes
    b. Know when each type of sense might be advantageous and some of the more unusual instances of each that we covered in class (e.g., four eyed fish, electric fish)
6) Migration and schooling
    a. Be able to define terms used to describe migrations based on pattern and frequency
    b. Know how and why fish shoal and school
    c. Understand techniques and effects of shoaling and schooling for predators and prey
7) As always, know the special uses of mucus, uses of counter current exchange, and form and function from the examples we covered during these lectures and earlier in the class