POUL 1010E Topical Outline

I. The importance of birds to the global ecosystem and humans
II. Bird evolution
    A. Modern definition of a bird
    B. Fossil dating and the scarcity of bird fossils
    C. Cladistics
    D. Convergent evolution
    E. Theropod dinosaurs and the origins of birds
    F. Evolution of feathers
    G. Arboreal and cursorial origins of flight
    H. *Archaeopteryx* and other early bird forms
    I. Anatomical differences between prehistoric birds and modern-day birds
    J. Controversies and unanswered questions related to birds evolving from theropod dinosaurs
    K. Modern bird phylogenetic relationships and taxonomy
III. The current state of birds
    A. The International Union for Conservation of Nature (IUCN) and the IUCN Red List
    B. Monitoring and classifying bird populations with regard to endangerment status
    C. Extinction biology
    D. Current population trends for birds
    E. Repercussions of reduced bird numbers
    F. Factors that predispose animal species to endangerment
    G. Causational factors of endangerment
    H. Current threats to bird populations
    I. Potential impact of climate change on bird numbers
    J. Endangered species recovery programs
IV. Bird biology
    A. Flight and feathers
        1. Advantages and disadvantages of flight
        2. Torpor in birds
        3. Evolution of flightless birds; advantages and disadvantages
        4. The avian skeleton
        5. The major anatomical and physiological adaptations for flight
        6. The mechanics of flight and the anatomical structure of wings that create lift
        7. Methods birds use to get into the air and economical flight
        8. Hovering
        9. Feather structure and growth
        10. Types of feathers

11. Functions of feathers
12. Feather color
    a. Pigment biology
    b. Structural colors
13. Feather maintenance and molting
14. Bird migration biology

B. Senses
1. Vision
    a. Eye structure
    b. The importance of UV vision
    c. Visual acuity and motion detection
    d. Unihemispheric slow wave sleep
2. Auditory
    a. Ear structure and sound resolving ability
    b. The advantage of vocal communication over visual communication
3. Smell
    a. Olfactory structure and variation between species in the sense of smell
4. Taste

C. The mechanics of sound production in birds

D. Respiration
1. Anatomy and functional efficiency for flight

E. Nutrition
1. Avian diets
2. Acquisition of food through specialized anatomy, senses, use of tools, and other animals
3. Anatomy and physiology of the gastrointestinal system
4. Comparative anatomy across species and implications for captive management

F. Reproduction
1. Reproductive strategies
2. Anatomy and physiology of the male and female reproductive system
3. The evolutionary biology of intromittent organ retention and loss
4. Cues for reproduction and hormonal control of reproduction
5. Sex ratio manipulation
6. Egg biology
7. Incubation, embryology, and hatching biology
    a. Incubation strategies
    b. Precocious and altricious chicks
    c. Synchronous and asynchronous hatching
8. Chick survival after hatch

V. Birds of economic importance

A. Parrots

1. Illegal wildlife trade
    a. Threats to the United States from illegal wildlife smuggling
    b. Methods used by wildlife smugglers
    c. Legal importation regulations
2. Natural history and unique biology
3. Parrots as pets
    a. Husbandry and behavioral basics
4. Parrots as cognitive models for humans
5. The pet food industry
6. The difficulty of captive breeding
7. Other caged pet birds

B. Raptors

1. Natural history, taxonomy, and specialized anatomy
2. Carrying capacity limitations
3. Sensitivity to environmental chemical contaminates
4. Falconry
    a. History
    b. Procedures for becoming a falconer
    c. Bird training

C. Pigeons

1. Natural history and unique biology
2. Lessons learned from the extinction of the most abundant bird - the Passenger Pigeon
3. Invasive bird species in the United States and their impact
4. Historical perspective (symbolism and use in wars)
5. The biological basis for homing ability
6. Captive husbandry and management of pigeons
7. The sport of racing pigeons from million dollar purses to performance enhancing drugs

D. Waterfowl and Landfowl

1. Natural history and classification
2. Threats to wild populations
3. The role of hunting in generating revenue for wetland conservation
4. Domestication and the role of the chicken in world history
5. The development of the U.S. poultry industry into the most successful component of animal agriculture
6. The use of chickens in medical research
7. Chicken production and hormones

8. Avian influenza

E. Ratites

1. Natural history and unique biology
2. Commercial aspects of emus and ostriches

VI. The value and future of birds

A. The economic importance of birds:

1. Bird watching and ecotourism
2. Agriculture (meat and eggs)
3. Pet industry
4. Ecosystem service

B. Issues to be confronted in the future

C. Things you can do to preserve birds

D. The importance of education and research in preserving birds

VII. Conducting field studies on avian species

A. Types of field studies

B. Data collection methods & types of data

1. Qualitative data
2. Quantitative data

C. Technology and software utilized in qualitative data collection

1. Behavioral data recording devices
2. Behavioral data software packages