**APES Study Guide**

**Unit 3: ECOLOGY & BIODIVERSITY**

***DUE****: Due on day of unit test.*

*Directions:**Answer each question in complete sentences.* ***Must be handwritten in order to receive credit.***

**Textbook Reference:**

Chapter 3 Sections 1-6: Ecosystems (pg. 50-74)

Chapter 4 Sections 1-2 & 4-6: Biodiversity & Evolution (pg. 77-84; 86-97)

Chapter 5 Sections 1-2 & 4: Biodiversity, Species Interactions & Population Control (pg. 100-108; 115-119)

Chapter 7 Sections 2-3: Terrestrial Biodiversity (pg. 145-157)

Chapter 8 Sections 1-5: Aquatic Biodiversity (pg. 162-180)

Chapter 9 Sections 1-4: Sustaining Biodiversity – Species Approach (pg. 183-211)

Chapter 10 Sections 1-5: Sustaining Terrestrial Biodiversity – Ecosystem Approach (pg. 215-245)

Chapter 11 Sections 1-6: Sustaining Aquatic Biodiversity (pg. 250-272)

Supplement 7: Classifying & Naming Species (pg. S46)

Supplement 9: Components & Interactions in Major Biomes (pg. S53-S58)

**Case Studies:**

Tropical Rainforest are Dying Out (pg. 50)

American Alligator (pg. 77)

Southern Sea Otters in Yellowstone Case Study (pg. 100)

Coral Reef Case Study (pg. 162)

Passenger Pigeon (pg. 183)

Grey Wolves in Yellowstone Case Study (pg. 235)

Lake Victoria (pg. 248)

**Study Guide Questions (SGQ):**

*Directions:**Answer each question in your own words as you read through the text. Answers must be in complete handwritten sentences.*

Chapter 3

1. What are greenhouse gases and why are they important?
2. Describe the flow of energy to and from the earth.
3. Distinguish between the living and nonliving components in ecosystems and give two examples of each.
4. Distinguish among producers (autotrophs), consumers (heterotrophs), and decomposers and detritus feeders and give an example of each in an ecosystem.
5. Distinguish among primary consumers (herbivores), secondary consumers (carnivores), tertiary (third-level) consumers, and omnivores, and give an example of each.
6. Distinguish between a food chain and a food web.
7. Explain what happens to energy as it flows through the food chains and food webs.
8. What happens to matter in an ecosystem?
9. Identify and describe one distinguishing characteristic and the primary reservoir of the following cycles: carbon, nitrogen, phosphorus, sulfur and water.
10. Identify and discuss the consequences of human activities that have resulted in major changes to the nitrogen, carbon and phosphorus cycle. For each activity identified, suggest one strategy got lessening the impact of the human activity.
11. Discuss the environmental problems in a small lake associated with insufficient phosphorus within the ecosystem, and with excessive phosphorus within the ecosystem.

Chapter 4

1. What are the four major components of biodiversity (biological diversity)?
2. What is the importance of biodiversity?
3. Summarize the theory of evolution.
4. Explain how mutations, natural selection, geographic isolation, genetic drift, and migration contribute to biological evolution.
5. Distinguish between geographic isolation and reproductive isolation and explain how they can lead to the formation of a new species.
6. Distinguish between artificial selection and genetic engineering and give an example of each.
7. What is species diversity? Distinguish between species richness and species evenness and give an example of each.
8. Summarize and explain the theory of island biogeography.
9. What is an ecological niche? Distinguish between specialist species and generalist species and give an example of each.
10. Biological diversity is one of the most important indicators of the health of an ecosystem. List and describe several environmental factors that affect diversity, and state whether each factor tends to increase or decrease biological diversity.
11. Distinguish among native, nonnative and indicator species and give an example of each type.
12. Distinguish between keystone and foundation species. Describe the role of some sharks as keystone species.

Chapter 5

1. Define interspecific competition, predation, parasitism, mutalism, and commensalism and give an example of each. Explain how each of these species interactions can affect the population sizes of species in ecosystems.
2. Describe and give an example of resource partitioning and explain how it can increase species diversity.
3. Distinguish between a predator and a prey species and give an example of each. What is a predator– prey relationship?
4. Describe three ways in which prey species can avoid their predators and three ways in which predators can increase their chances of feeding on their prey.
5. Define and give an example of coevolution.
6. Describe four variables that govern changes in population size and write an equation showing how they interact.
7. What is a population’s age structure and what are three major age groups called?
8. Distinguish between the environmental resistance and the carrying capacity of an environment, and use these concepts to explain why there are always limits to population growth in nature.
9. Define and give an example of a population crash.
10. Explain why humans are not exempt from nature’s population controls. Describe the exploding white-tailed deer population problem in the United States and discuss options for dealing with it.
11. Describe two different reproductive strategies that can enhance the long-term survival of a species.
12. Define population density and explain how it can affect the size of some but not all populations.
13. Distinguish between primary ecological succession and secondary ecological succession and give an example of each.
14. Explain why succession does not follow a predictable path.

Chapter 7

1. Describe how differences in climate lead to formation of tropical, temperate, and polar deserts, grasslands, and forests.
2. Define ocean currents and explain how they, along with global air circulation, support the formation of forests, grasslands, and deserts.
3. Why do cities tend to have more haze and smog, higher temperatures, and lower wind speeds than the surrounding countryside?
4. Describe how climate and vegetation vary with latitude and elevation.
5. Describe how the three major types of deserts differ in their climate and vegetation.
6. How do desert plants and animals survive?
7. Why have many of the world’s temperate grasslands disappeared?
8. What is permafrost?
9. Why is biodiversity so high in tropical rain forests?
10. Why do most soils in tropical rain forests hold few plant nutrients?
11. What important ecological roles do mountains play?
12. Describe how human activities have affected the world’s deserts, grasslands, forests, and mountains.

Chapter 8

1. Distinguish between a saltwater (marine) life zone and a freshwater life zone and give two examples of each.
2. List five factors that determine the types and numbers of organisms found in the three layers of aquatic life zones?
3. What is turbidity, and how does it occur? Describe one of its harmful impacts.
4. What major ecological and economic services are provided by marine systems?
5. What are the three major life zones in an ocean?
6. Explain the importance of sea grass beds.
7. What is a mangrove forest and what is its ecological and economic importance?
8. Describe the three major zones in the open sea.
9. What human activities pose major threats to marine systems and to coral reefs?
10. What major ecological and economic services do fresh-water systems provide?
11. Describe the three zones that a stream passes through as it flows from mountains to the sea.
12. Give three examples of inland wetlands and explain the ecological and economic importance of such wetlands.
13. What are four ways in which human activities are disrupting and degrading freshwater systems?

Chapter 9

1. How can the extinction of a species affect other species and ecosystem services?
2. Give three reasons why many extinction experts believe that human activities are now causing a sixth mass extinction.
3. Distinguish between endangered species and threatened species and give an example of each.
4. List four characteristics that make some species especially vulnerable to extinction.
5. Describe two economic and two ecological benefits of having the current variety of species.
6. In order, what are the six largest causes of premature extinction of species resulting from human activities?
7. Describe the major effects of habitat loss and fragmentation.
8. Why are island species especially vulnerable to extinction?
9. Give two examples of the benefits of introducing some nonnative species.
10. Give two examples of the harmful effects of nonnative species that have been introduced (a) deliberately and (b) accidentally.
11. List four ways to limit the harmful impacts of nonnative species.
12. Explain how pesticides such as DDT can be biomagnified in food chains and webs.
13. Describe the poaching of wild species and give three examples of species that are threatened by this illegal activity.
14. Describe two international treaties that are used to help protect species and summarize the history of the U.S. Endangered Species Act.
15. Describe the roles and limitations of wildlife refuges, gene banks, botanical gardens, wildlife farms, zoos, and aquariums in protecting some species.

Chapter 10

1. What major ecological and economic benefits do forests provide?
2. Describe the harm caused by building roads into previously inaccessible forests.
3. Distinguish among selective cutting, clear-cutting, and strip cutting in the harvesting of trees.
4. What are the major advantages and disadvantages of clear- cutting forests?
5. What are two types of forest fires?
6. What are some ecological benefits of occasional surface fires?
7. What are four ways to reduce the harmful impacts of diseases and insects on forests?
8. What effects might projected climate change have on forests?
9. What is deforestation and what parts of the world are experiencing the greatest forest losses?
10. List some major harmful environmental effects of deforestation.
11. Describe four ways to manage forests more sustainably.
12. What are four ways to reduce the harms to forests and to people from forest fires?
13. What is prescribed fire?
14. What are three ways to reduce the need to harvest trees?
15. Describe the fuel wood crisis and list three ways to reduce its severity.
16. What are five ways to protect tropical forests and use them more sustainably?
17. What is overgrazing and what are its harmful effects?
18. What major environmental threats affect national parks in the world and in the United States?
19. How could national parks in the United States be used more sustainably?
20. How should nature reserves be designed and connected?
21. Describe the controversy over protecting wilderness in the United States.
22. What is a biodiversity hotspot and why is it important to protect such areas?
23. Describe a science-based, four-point strategy for carrying out ecological restoration and rehabilitation?
24. What are four ways in which we can all help sustain the earth’s terrestrial biodiversity?

Chapter 11

1. Describe how human activities have threatened whale populations.
2. What is the International Whaling Commission and what has it done to protect whales?
3. What are three general patterns of marine biodiversity?
4. Describe the threat to marine biodiversity from bottom trawling.
5. How have coral reefs been threatened?
6. Give two examples of threats to aquatic systems from invasive species and two of the same for freshwater systems.
7. Why is marine biodiversity higher ( a) near coasts than in the open sea and ( b) on the ocean’s bottom than at its surface?
8. What are two harmful effects on aquatic systems resulting from the increase in the human population in coastal areas?
9. What are three ways in which projected climate change could threaten aquatic biodiversity?
10. What are three major harmful effects of overfishing?
11. Describe the effects of trawler fishing, purse- seine fishing, longlining, and drift- net fishing.
12. How have laws and treaties been used to help sustain aquatic species?
13. What is the main problem that interferes with enforcing international agreements?
14. Describe the use of marine protected areas and marine reserves to help sustain aquatic biodiversity and ecosystem services.
15. How can the precautionary principle help in managing fisheries and large marine systems?
16. Describe how consumers can help to sustain fisheries and aquatic biodiversity and ecosystem services.
17. What are major ecological services provided by wetlands?
18. Describe efforts to restore the Florida Everglades.
19. Describe the major threats to the world’s rivers and other freshwater systems.
20. Describe invasions of the U. S. Great Lakes by nonnative species.

**Vocabulary:**

*Directions: Review key vocabulary, words may appear in quizzes and/or tests. You are not required to write the definitions but are encouraged to review them.*

Chapter 3

* + Cells
  + Cell theory
  + Prokaryotic cell
  + Eukrayotic cell
  + Species
  + Ecology
  + Population
  + Genetic diversity
  + Habitat
  + Community
  + Biological community
  + Ecosystem
  + Biosphere
  + Abiotic
  + Biotic
  + Range of tolerance
  + Limiting factors
  + Limiting factor principle
  + Trophic level
  + Producers
  + Autotrophs
  + Photosynthesis
  + Chemosynthesis
  + Consumers
  + Heterotrophs
  + Primary consumers
  + Herbivors
  + Secondary consumers
  + Carnivores
  + Higherlevel consumers
  + Omnivores
  + Decomposers
  + Detritus feeders/detritivores
  + Aerobic respiration
  + Anaerobic respiration
  + Fermentation
  + Food chain
  + Food web
  + Ecological efficiency
  + Pyramid of energy flow
  + Biomass
  + Gross primary productivity (GPP)
  + Net primary productivity (NPP)
  + Biogeochemical cycles
  + Nutrient cycles
  + Hydrologic cycle
  + Transpiration
  + Carbon cycle
  + Nitrogen cycle
  + Phosphorus cycle
  + Sulfur cycle

Chapter 4

* Biological diversity/biodiversity
* Biological evolution
* Natural selection
* Mutations
* Differential reproduction
* Adaptation
* Adaptive trait
* Speciation
* Geographic isolation
* Reproductive isolation
* Extinction
* Endemic species
* Background extinction
* Mass extinction
* Species diversity
* Species richness
* Species evenness
* Ecological niche
* Generalist species
* Specialist species
* Native species
* Nonnative species
* Indicator species
* Keystone species
* Foundation species

Chapter 5

* Interspecific competition
* Predation
* Parasitism
* Mutualism
* Commensalism
* Predation
* Predator
* Predator-prey relationship
* Coevolution
* Resource partitioning
* Ecological succession
* Primary succession
* Secondary succession
* Inertia
* Persistence
* Resilience
* Tipping point

Chapter 7

* Biomes
* Desert
* Grasslands
* Permafrost
* Forest systems

Chapter 8

* Coastal zone
* Estuaries
* Coastal wetlands
* Intertidal zone
* Lakes
* Oligotrophic lakes
* Eutropic lakes
* Cultural eutrophication
* Hypereutrophic
* Mesotrophic lakes
* Surface water
* Runoff
* Watershed
* Drainage basin
* Inland wetlands

Chapter 9

* Background extinction
* Extinction rate
* Mass extinction
* Endangered species
* Threatened species
* Instrumental value
* Intrinsic value
* Existence value
* HIPPCO
* Precautionary principle

Chapter 10

* Old-growth forest
* Second-growth forest
* Tree plantation
* Tree farm
* Commercial forest
* Rangelands
* Pastures
* Overgrazing
* Wilderness
* Biodiversity hotspots
* Ecological restoration
* Reconciliation
* Applied ecology