Key

Biology **NAME**_____

Sonoran Desert / Ecology Test 2008

I. Visuals (14 pts)

Picture

1a. Hover What type of flight adaptation is this? 1. Hummingbird

b. Hummingbird Name the bird pictured.

2. Water What resource is this species adapted to conserve? 2. Cactus or Kangaroo Rat

3a. Stealth Flying What type of flight adaptation does this species have?

b. Comb Effect How do its flight feathers differ from other birds? 3. Owl

4. Heat Dispation What adaptation is shown by this animal? 4. Jack Rabbit - ears

5a. Type/Size Fish List 2 ways these animals' niches reduce overlap.

b. Site to Fish 5. Great Blue Heron Green Heron

6. Hover What flight pattern does this aircraft mimic? 6. Helicopter

7a. Taiga Name the biome where this plant lives.

b. Conifer Name the group this plant belongs to. 7. Boreal Forest

8. Pollinators Identify the role these species play within their communities. 8. White Winged Dove or Bees

9. Structural Color What aspect of biomimicry was discussed with this feather? 9. Peacock Feather

10. Nest Cavity Name a limiting factor that was the cause of this bird's decline. 10. Bluebird

II. Multiple Choice (1 point each)

E 1. Which is true about carrying capacity?
- a. Carrying capacity can raise or lower depending on limiting factor availability
- b. Carrying capacity is fixed and never changes
- c. Carrying capacity determines population density
- d. Carrying capacity determines the amount of limiting factor
- e. a & c
- f. a & d
- g. b & c
- h. b & d

D 2. Photosynthesizing organisms are referred to as:
- a. consumers
- b. heterotrophs
- c. omnivores
- d. autotrophs

D 3. The vertical axis is ___ and is the ___ variable.
- a. x, independent
- b. x, dependent
- c. y, independent
- d. y, dependent

A 4. Which is not an abiotic part of the environment?
- a. decomposer
- b. sunlight
- c. water
- d. soil

A 5. The greatest number of individuals that a space can support indefinitely without degrading the environment is called:
a. carrying capacity b. limiting factor c. density d. homeostasis

A 6. What two factors cause population density to **decrease**?
a. emigration and mortality c. emigration and natality
b. immigration and mortality d. immigration and natality

B 7. Which biome has a wet, mild winter and a hot, dry summer?
a. desert b. chapparal c. grasslands d. taiga

C 8. What conclusion can be drawn from the observation that both downy and pileated woodpeckers are observed at Radnor Lake?
a. each species niche is identical to the other
b. each species niche is 100% different to the other
c. slight niche overlap is expected
d. no conclusion can be drawn

D 9. The feathers of a bird's wing form a continuous surface due to the interlocking _____:
a. vane and barbs b. vane and barbules c. shaft and vane d. barb and barbules

B 10. The biome with the richest, most fertile soil is the:
a. rainforest b. grasslands c. deciduous forest d. chapparal

A 11. Nicotine is a chemical extract produced by _____ to protect against _____.
a. tobacco, herbivores c. milkweed plants, monarch butterflies
b. cocoa beans, carnivores d. caterpillars, predation

A 12. As one moves east away from the Rocky Mountains, rainfall ____ and grasses are ____
a. increases, taller c. decreases, taller
b. increases, shorter d. decreases, shorter

B 13. Which is not a part of the biosphere?
a. oxygenated atmosphere b. earth's rock mantle c. species d. soil e. water

A 14. The stability of a community generally increases with a:
a. greater diversity of organisms and more links in the food web
b. greater diversity of organisms and fewer links in the food web
c. lower diversity of organisms and fewer links in the food web
d. lower diversity of organisms and more links in the food web

A 15. Which best represents carrying capacity for an environment?
a. sum of its limiting factors c. biotic components
b. abiotic components d. population density

C 16. Which does not restrict population growth?
a. predators c. natality rate
b. disease d. competition

D 17. How does carrying capacity differ between coyotes and rabbits?
a. both exist at the same density c. coyotes always have a higher density
b. rabbits always have a higher density d. both respond to the same limiting factors

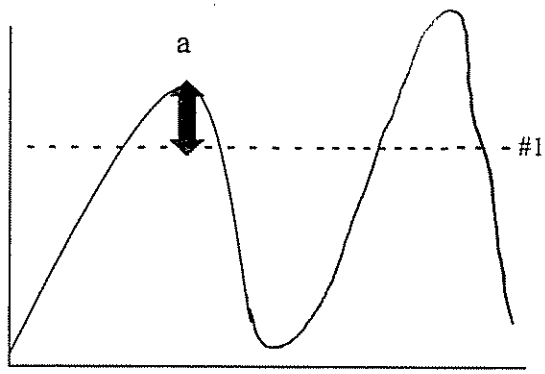
B 18. Flight occurs as _____pressure above a bird's wing and ____ pressure beneath causes lift :
a. high, low c. high, high
b. low, high d. low, low

E 19. A limiting factor can be:
a. abiotic c. positive e. all of the above
b. biotic d. negative

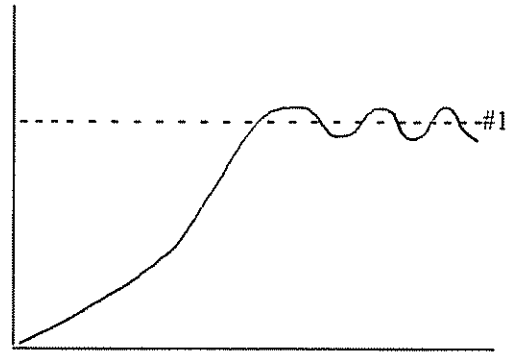
A 20. Which is not an example of biomimicry and its study?
a. camouflaged arctic fox c. wetland based water purification
b. termite mound ventilation d. structural color of butterfly wings

III. PROBLEMS, GRAPHS AND TABLES

1. Growth Rate Curves (8 pts)



A



B

IDENTIFY CURVES: A. Boom & Bust B. S-shaped

What does #1 represent on each graph? Carrying Capacity

What does "a" represent in graph A? Overshoot above Carrying Capacity

Explain in 1 sentence why the line drops quickly in Growth Rate Curve **A**

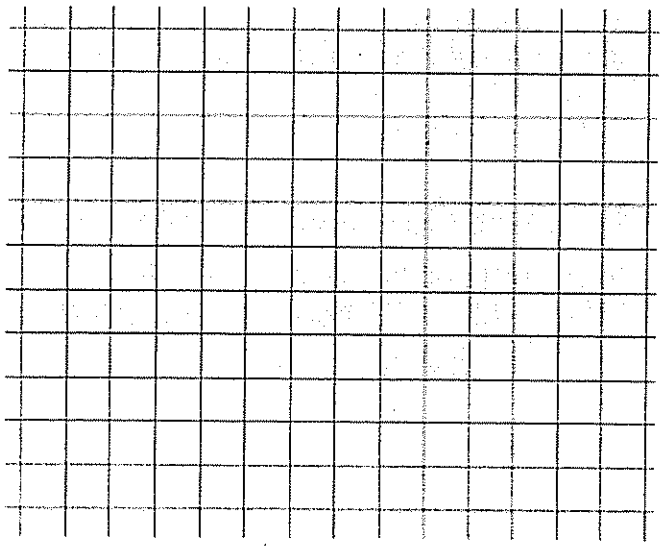
Environmental resources (limiting factors) have been depleted

List 2 examples of species that follow the pattern shown in Graph A.

Lemmings Locusts
Rodents

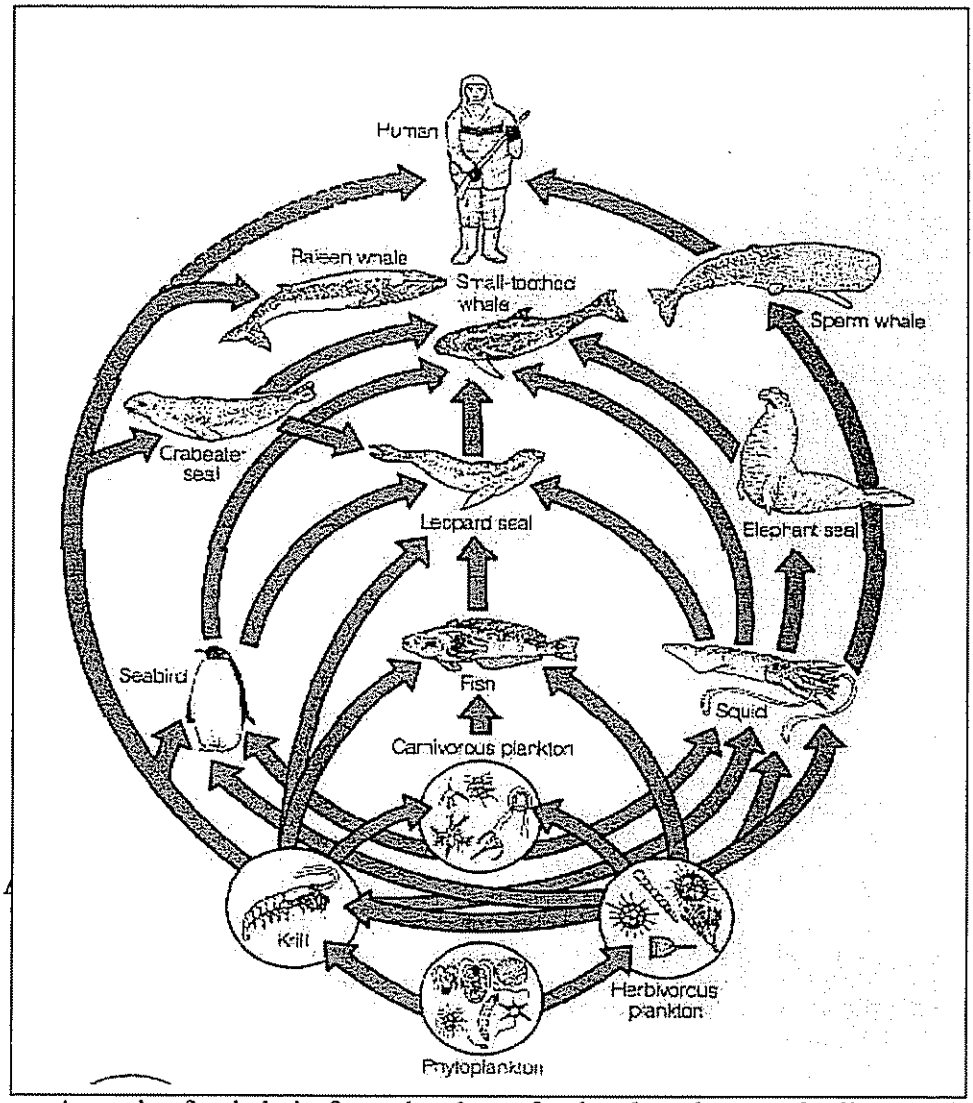
---

2. **Graph** the following data, **label** each axis with all necessary information. Next, **draw** a line on the graph to indicate where carrying capacity is. **(8 pts)**



Date	Deer Density
1983	14
1984	19
1985	26
1986	34
1987	38
1988	46
1989	44
1990	45
1991	46
1992	47
1993	45

3. (6pts)



a. Remove a 4 species food chain from the above food web and correctly diagram (construct) it.

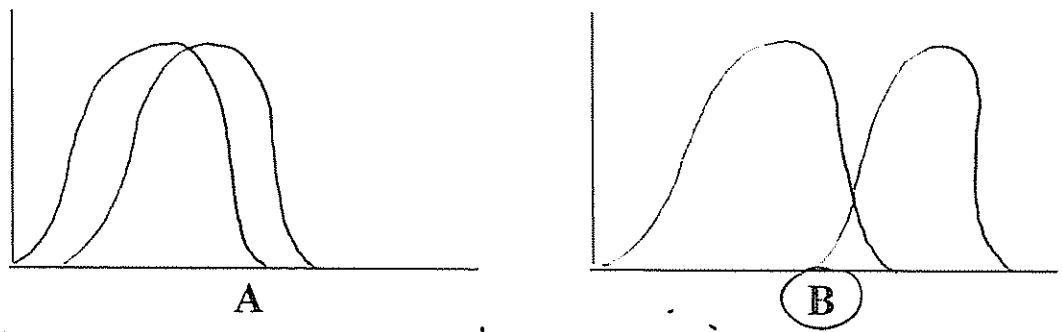
Multiple Answers

Must begin w/ phytoplankton

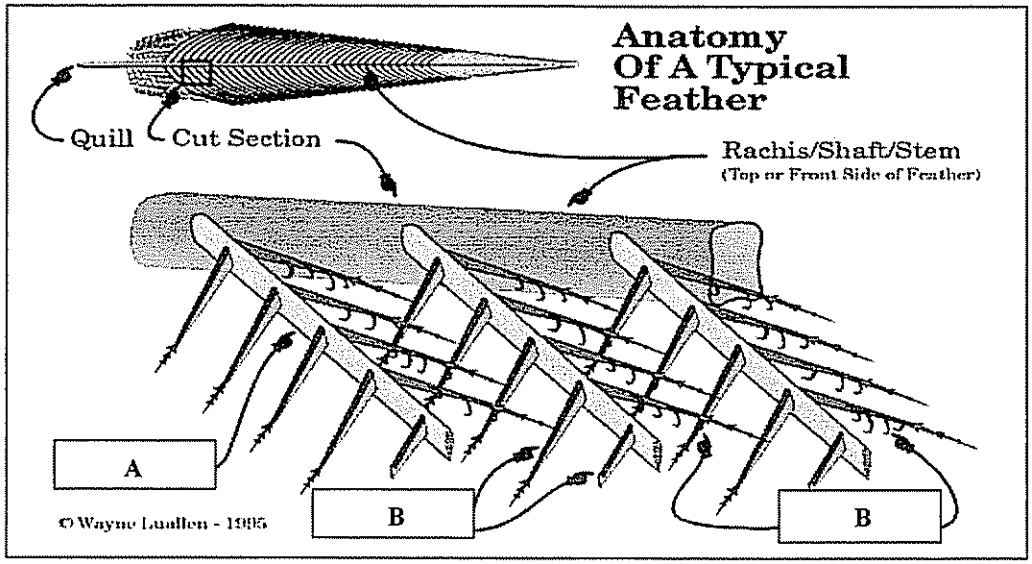
b. List all of the food resources shown for the small toothed whale.

Crabeater Seal
Elephant Seal
Leopard Seal
Seabird
Squid

4. Compare the two graphs below. **CIRCLE** which graph represents two species successful in occupying the same habitat and **explain why** in 2-3 sentences they are successful compared to the unsuccessful graph. (4 pts)



Less niche overlap = ↓ competition



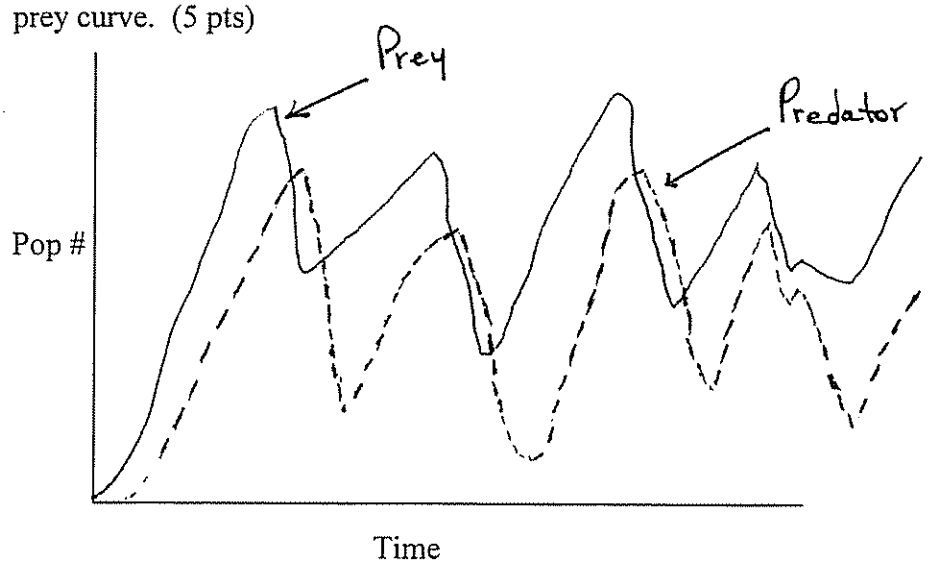
(5 pts)

5. Identify A: Barb B: Barbule

Explain what their function is to the wing of a bird.

Hooked together, wing's feathers form a continuous surface

6. Look at this typical predator-prey cycle. **Label** which is the predator curve and which is the prey curve. (5 pts)

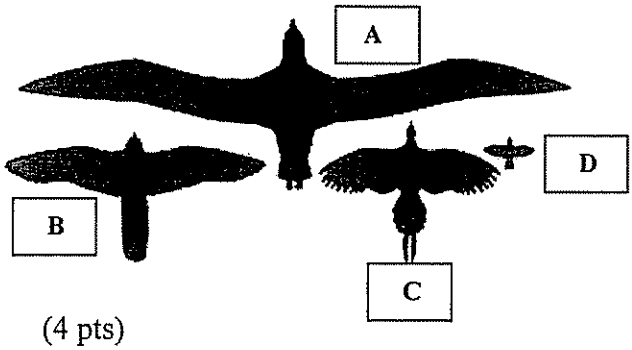


LIST 3 "rules" that apply to a predator-prey relationship:

a. Prey out # Predators

b. Lag time in cycle response

c. Predators are bigger than prey unless predators hunt in social groups "packs"



(4 pts)

7. Identify the silhouette that shows a bird with high flight speeds: B

Identify the silhouette that shows a bird with a gliding flight pattern: A

8. List 3 adaptations plants have evolved to defend themselves against herbivores. (6 pts)

a. Spines b. Toxins

c. Distasteful

9. List 3 vital functions that wetlands serve that would economically benefit humans and demonstrates the need to protect these areas. (6 pts)

Erosion Control Water Filtration

Flood Control

10. List the 3 biomes located at mid-latitudes.(3 pts)

Grasslands Chaparral Deciduous

11. List 3 adaptations that aeronautical engineers have biomimicked AND identify the bird with this trait. (6 pts)

Adaptation	Bird
Hover	Hummingbird
Stealth	Owl
Stoop	Pierregrine

2. Explain the relationships that the white-winged dove has to the following species and how the dove affects the population densities of the other species listed: (7 pts)

Harris antelope ground squirrel
- Competitor for Saguaro fruit & seeds
- Pollinator that is responsible for Saguaro fruits

Harris Hawk
- Prey

Saguaro
- Pollinator
- Cacti provides fruit & seeds to dove

EXTRA CREDIT **3 POINTS EACH**

1. Explain how a prairie cycles to maintain this biome. Include both biotic and abiotic components.

Fire restores grasses → Bison graze grasses → Broadleaves move in → (back to fire)

2. Is the honeybee suited to the study and benefits of biomimicry? Explain.

No - man cannot pollinate the same volume of crops w/ the same outcome. Highly inefficient