

Chapter 5: STUDY NOTES **POPULATION BIOLOGY**

I) Population Dynamics

- **population growth**: is the change in the size of a population with time
- populations do not experience linear growth
- population growth results in a J-shaped curve
- exponential growth of a population of organisms occurs when the number of organisms increases at an ever increasing rate

- populations do not grow forever since there are limiting factors: ex. food & space
- **CARRYING CAPACITY**: the number of organisms of a population that a particular environment can support over an indefinite period of time
- symbol (K)
- births will exceed deaths until the carrying capacity is reached

- populations may follow an s-shaped curve: initial slow growth phase; period of exponential growth; plateau where carrying capacity is reached
- most important factor that determines population growth = reproductive pattern

- 2 basic growth patterns:
 - a) reproduce very rapidly, produce many offspring in a short period of time; ex. mosquitoes
 - b) others reproduce at a slow rate & produce relatively few young; ex. elephants

- these growth patterns are dependent upon: environmental conditions
- Ex. mosquitoes: small body size, mature rapidly, reproduce early, short life span
- population increases rapidly & declines rapidly as environmental conditions change
- EX. elephants: live in stable conditions; large in size; reproduce and mature slowly

- limiting factors are biotic & abiotic
- DENSITY-DEPENDENT FACTORS: disease, competition, parasites (biotic factors)
- DENSITY-INDEPENDENT FACTORS: are abiotic factors; temperature, storms, floods and droughts

- predation is a population limiting factor
- predation ensures the continuation of the flow of energy in a community
- prey-predation relationships are important for the health of populations

- competition for resources is another limiting factor
- the resources include food, water and territory
- competition depend upon the size of populations

- stress results from increased crowding
- symptoms = aggression; decrease in parental care; decreased fertility; decreased resistance to disease

II) HUMAN POPULATION GROWTH

- **demographics:** is the study of population growth characteristics such as growth rate, age structure and geographic distribution
- humans reduce environmental effects: eliminate competition, increase foods production, control disease

- population growth rate= the difference between birth rate and death rate
- in the US, people live longer but the fertility rate is decreasing
- families have fewer children
- women have children later in life

- fertility = the number of offspring a female produces during her reproductive years
- age structure = proportion of the population that are either in their pre-productive years; productive years, or their post productive years
- movement of people makes it difficult to make population predictions

- immigrations = movement of individuals into a population
- emigration = movement of people from a population
- affects national population growth
- stresses schools, roads, police & fire services