

## Population Characteristics

Population – Group of potentially interbreeding species in an area at same time

Demography – Study of population characteristics, structure, and growth (vital statistics)

Genet – Organism produced by sexual reproduction (unitary population) each individual a distinct unit

Ramets – Organisms produced via asexual reproduction (modular population) “clones” not counted

## Density

Crude Density - Number/Unit Area

Ecological Density – (hardly used) #/Habitable (usable) Area

Dispersion – Distribution of individuals across landscape (Spatial Distribution)

1. Random – Independent of other individuals (2 factors resource availability & social interactions)  
example clams & mussels
2. Uniform – Evenly distributed (Avoidance, Uniform Resources, Territorial Animals, and Allelopathy). Example: birds spread out on wire
3. Clumped – Resources Localized, High Social Behavior (Herding). Example: Cows

## Dispersal

- 1.) Immigration – into an area
- 2.) Emigration – out of area
- 3.) Migration – Round trip

## Sex Ratio

- 1.) Primary Sex Ratio – At conception. Usually same as Secondary unless aborted fetuses (example Brucellosis causes abortion of males)
- 2.) Secondary Sex Ratio – At Birth

## Natality

- 1.) Physiological (Maximum Natality) max # of individuals a female can reproduce in a lifetime
- 2.) Realized – Actual # of offspring of female in life time

## Age of Pyramids

- 1.) Rapid Growth – Equilateral triangle like shape
- 2.) Slow Growth – Steep triangle shape
- 3.) Zero Growth – Almost square
- 4.) Negative Growth – Base is more narrow than the other levels

## Growth Models

- 1.) Logarithmic Growth – Sigmoid shape
- 2.) Exponential – Asymptotic (no limit of resources)

- 3.) Eruptive –
- 4.) Logistic –  $K$  = Carrying Capacity,  $K/2$  = Fastest Growth.

### Population Regulation

Ability of population to decrease when density is high, or increase when density is low.

Two types:

- 1.) Density Dependent – Food, Habitat, Disease, Predators
- 2.) Density Independent – Climate, Disasters

### -LIFE TABLE & FECUNDITY TABLE NOTES FROM LAB-

### Competition

Interactions between two species

Species #1	Species #2	
+	+	Mutualism (Rhizobium/Mycorrhizae)
+	0	Commensalism (Ramora/Clown Fish)
-	0	Amensalism (Allelopathy)
+	-	Predation/Parasitism
-	-	Competition

Competition = Between two species results in reduced growth, survival, and fecundity for both species involved

Two types:

Intraspecific – Between members of same species

- Exploitative Competition – Both compete for same resources with one being more successful than other. No direct interference. Example: Big Horn Sheep vs. Burrow
- Interference Competition – Both use same resource, but one species interferes with the other species use of resource. Example: Hyena & Lion, Birds at feeder.

Interspecific – Between two different species

### Dispersal

Causes population to drop

Saturation Dispersal – Look for new area to settle (often unhealthy specimens with poor success at colonization)

Pre-Saturation Dispersal – More successful at colonization (example natal dispersion in birds)

Niche - Total range of environmental conditions under which an organism lives and reproduces

An organisms occupation (niche) vs. it's address (habitat)

N-Dimensional hypervolume – defines niche

Niche Width or Niche Breadth - One Dimensional ---|-----|----

Niche Overlap – Region of Competition. The overlap in habitat between two competing species.

Niche Compression – Where both species give up the Niche Overlap in order to avoid competition.

Fundamental Niche – Niche in absence of competition

Realized Niche – Niche reduced due to competition

Competition Exclusion Principle – No two species can occupy the same niche at same time (Gauss), one will exclude the other.

### How Species Coexist

- Resource Partitioning – Example: longer legged birds work the deeper parts of pond, while short legged birds work the more shallow water.
- Character Displacement – Modification of morphology in presence of competition. Example: Darwins Finchs

### Life History Patterns

- Reproduction is Expensive
- Finding & Acquiring a Mate
- Defending Mate/Territory
- Producing Young/Eggs
- Parental Care

Strategies:

Semelparous – Invest all energy into one reproductive effort then die. Example: Salmon

Iteroparous – Produce fewer offspring each time, multiple reproductive efforts

Both have positives and negatives

### Patterns for Reproduction

Asexual reproduction – Binary fission, Budding, Parthenogenesis

Sexual reproduction –

- How to acquire mate
- How many mates?
- What kind of bond with mate?
- What kind of parental care?

### Mating Systems

Monogamy vs Polygamy (Birds) 90% of birds indulge in extra pair matings. Mammals almost all polygamous.

- Polygamy – More than 2 individuals
- Polygyny – 1 male and many females (common)
- Polyandry – 1 female and many males (rare) (example the bird Jacana)

### How to acquire mates

- Resource Defense Polygyny – Defend resources (monopoly) with females gaining resource in exchange for sex
- Female Defense Polygyny- Defends female, male has no resource/territory, uses females resources/territory. Males compete against each other for the “harem”. Example Beachmaster seal
- Male Dominance Polygyny – Males defend very small territories that really have no resources. Males put on displays such as with Lekking species.

Are Females Selecting and Accepting the Territories that Comes with Male? Or Selecting Territory and Whatever Male That Comes With It?

Resource Based or Gene Based? (both) Example: Red Winged Blackbird that has preferred territory due to colouration.

### Parental Care

Depends on the type of young they produce, brush turkey no care.

- Precocial – Well developed, require little care. Example: Ducks, Chickens, Geese
- Altricial – Poorly developed, require much care. Example: Songbirds

### r- And K Selection

#### **r-Selected**

- High reproductive rates (poor survival)
- Early reproductive age (short generation time)
- Single stage of development (semiparous)
- Small body size
- Rapid development
- Minimal parental care
- Generalists (feeding/niche)

#### **K Selected**

- Low reproductive rates (high survival)
- Late reproductive age (long generation time)
- Many stages of development (iteroparous)
- Slow development
- Large body size
- Greater parental care

- Specialists (food/niche)

Predation – When organism eats all or part of another living organism

- Herbivory – eats vegetation
- Parasitism – eats host
- Parasitoidism – Parasite like but will kill host (Botfly)
- Carnivory – eats animal

Predator Response to Prey Density

Yes and No. Yes if prey population is small, no if prey population is large.

Two types of responses:

- 1.) Numerical – Predators numbers increase as prey density increases. Due to increase in birth rates and immigration.
- 2.) Functional – Dietary shift towards more abundant prey. Predator ignores the more difficult game for the more plentiful.