Agenda

- Warm up

- CM CH 8 – 10

- Data on Primary Productivity lab

10/1 Understanding Populations
Obj. TSW learn about how populations growth rate is measured, and how graphs can represent how populations grow. P. 62NB

1. How is Growth rate measured?

2. Draw a graph of Exponential growth, what shape is the curve and give an example of an organism with this pattern.

3. Compare and Contrast a K- selected species and a r-selected species, how are their graphs different, how are the organisms they represent different?

Growth Rate

- Growth Rate = Births – Deaths
  - Movement of individuals = Gene Flow
    - Immigration
    - Emigration
  - (births + immigration) – (deaths + emigration) = population change

Factors that Influence Population Size

- Density-dependent factors- the size of the population will influence an individual's probability of survival.

- Density-independent factors- the size of the population has no effect on the individual's probability of survival.

Exponential Growth Model

- Growth rate- the number of offspring an individual can produce in a given time period, minus the deaths of the individual or offspring during the same period.

- Intrinsic growth rate- under ideal conditions, with unlimited resources, the maximum potential for growth.

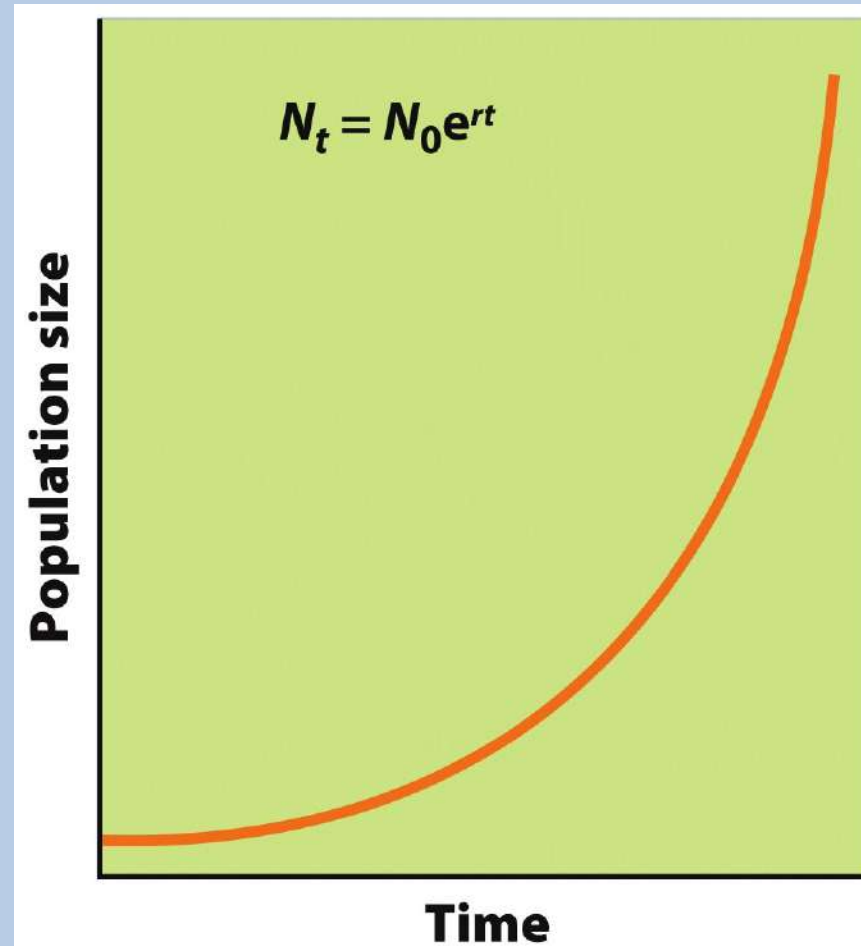 J-shaped curve- when graphed the exponential growth model looks like this.

$$N_t = N_0 e^{rt}$$

Population size

Time

Figure 6.5
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Logistic Growth Model

- Logistic growth- when a population whose growth is initially exponential, but slows as the population approaches the carrying capacity.

- S-shaped curve- when graphed the logistic growth model produces an "S".
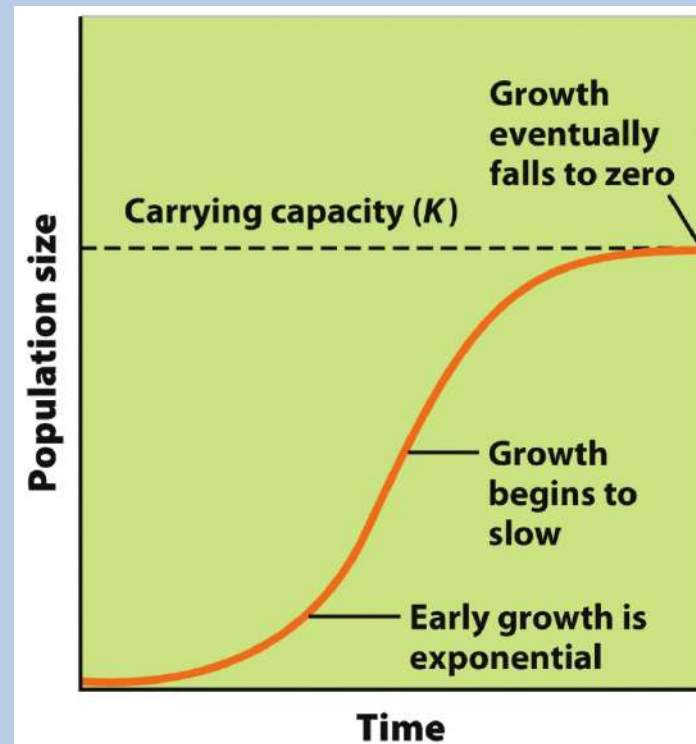

Figure 6.7
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Variations of the Logistic Model

- If food becomes scarce, the population will experience an overshoot by becoming larger than the spring carrying capacity and will result in a die-off, or population crash.
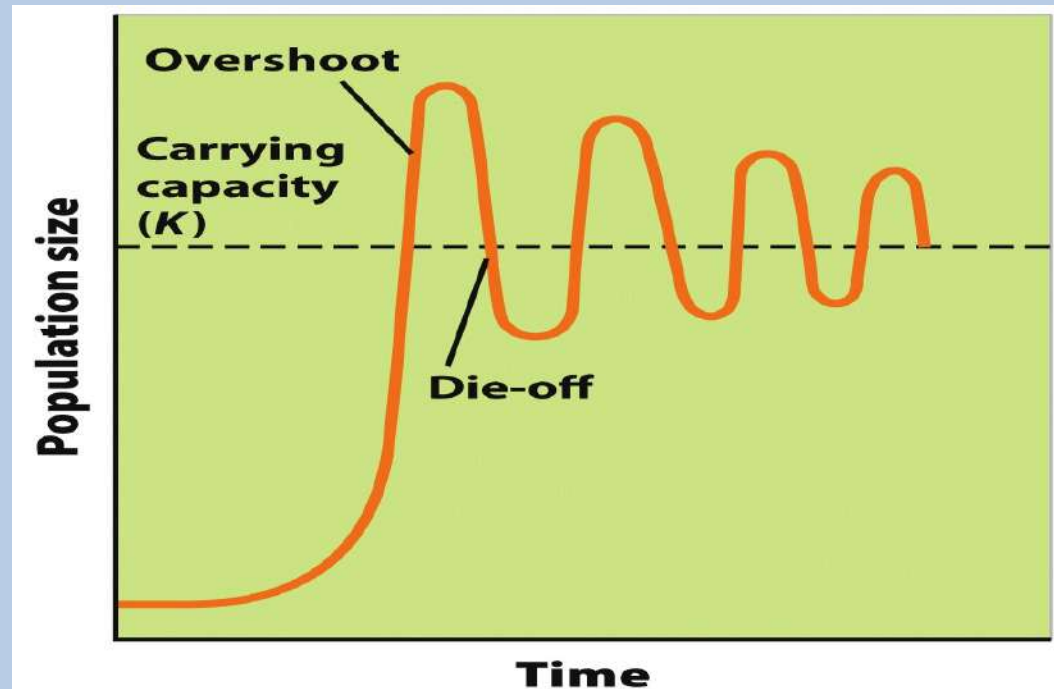

Figure 6.9
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Reproductive Strategies

- K-selected species- the population of a species that grows slowly until it reaches the carrying capacity. Ex. elephants, whales, and humans.

- R-selected species- the population of a species that grows quickly and is often followed by overshoots and die-offs. Ex. mosquitoes and dandelions

TABLE 6.1 — Traits of *K*-selected and *r*-selected species

Trait	*K*-selected species	*r*-selected species
Life span	Long	Short
Time to reproductive maturity	Long	Short
Number of reproductive events	Few	Many
Number of offspring	Few	Many
Size of offspring	Large	Small
Parental care	Present	Absent
Population growth rate	Slow	Fast
Population regulation independent	Density dependent	Density
Population dynamics	Stable, near carrying capacity	Highly variable

Table 6.1
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Theory of Island Biogeography

- Theory of island biogeography- the theory that explains that both habitat size and distance determine species richness.
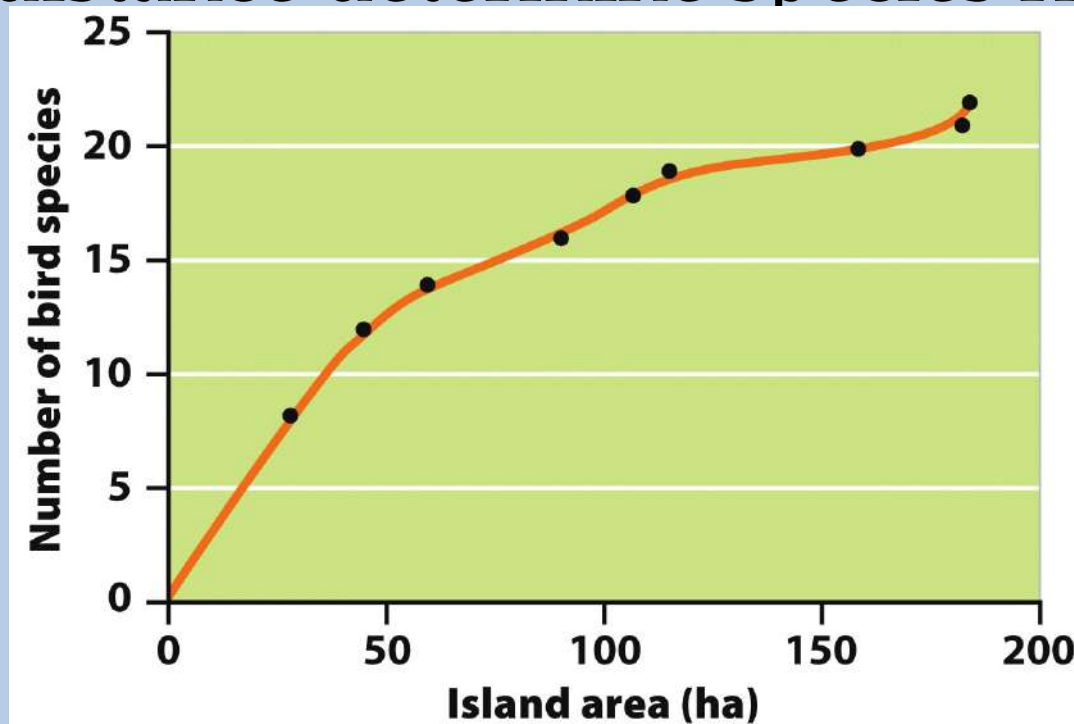

Figure 6.26
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Eutrophication
p. 53 NB

8. Life forms existed in the original pond water.

Life forms existed in the control for a least two days.

No life forms were found in the fertilizer water.

9. A larger sample of water was needed to collect data

Analysis

1. The 10 tsp of fertilizer would have the most algae

2. Our sample showed no signs of life.

3. Did obs. Match predictions?

4****** Artificial eutrophication can be prevented by stop the run off of farms & ranches by building a natural watershed – wetlands.

Agenda

- Warm up

- Test Answers
  - Test correction due Monday
  - Monday – Population Quiz

- Environmental Science Current Event

- Transecting – Biodiversity
  - Species Richness
  - Species Evenness

9/30 Population Growth Rate
Obj. TSW learn how to use doubling time and population change problems. P. 62NB
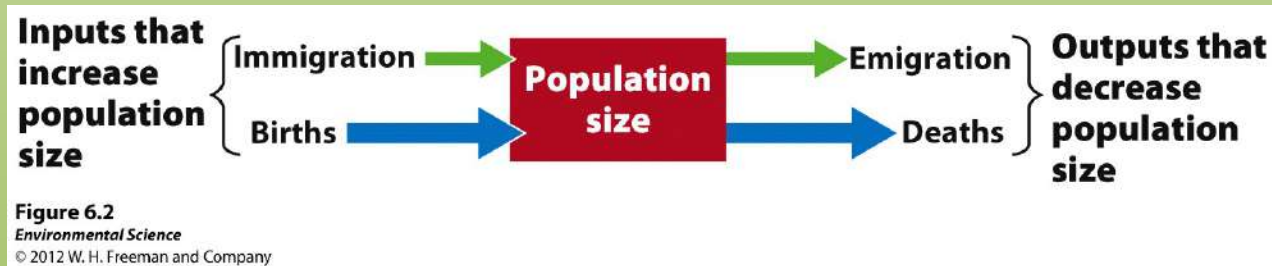
1. In the spring time, the population of Dandelion weeds explodes in your yard. If you start with a population of 12 weeds, and the rate is 30%, what is the **doubling time** of your dandelion population?

2. You are fed up with these weeds, and don't have time to pull them out by hand. So you spray a pesticide, this slows the rate to 5%, how many days does it take for the little buggers to grow now?

3. **Population Change**   A herd of 5 deer, have 4 fawns, and one buck. One doe without a fawn joins the herd. Two fawns sleep forever from a wolf invasion. One doe leaves the herd as a result. What is the population change?

Answers!

- Doubling time!
- (1) $\dfrac{70}{30\%}$ = $\dfrac{70}{x}$ = 2.3 days to get to 24 weeds

- (2) $\dfrac{70}{5\%}$ = $\dfrac{70}{x}$ = 14 days to get to 24 weeds

- (3) Herd= 5 + (4+1- 2) + (1-1)

      = 8 deer

How do Populations change in size

Inputs that increase population size
{ Immigration → **Population size** → Emigration }
{ Births → **Population size** → Deaths }
Outputs that decrease population size

Figure 6.2
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- **Global Scale:** Birth rate – death rate = growth rate
  - b - d = r   growth rate (r) can be + or –
- **Local Scale:** movement from one region to another
  - Immigration – # individuals entering a population
  - Emigration - # individuals leaving a population
    - r = (b – d) + (i – e)

10/1 Population problems

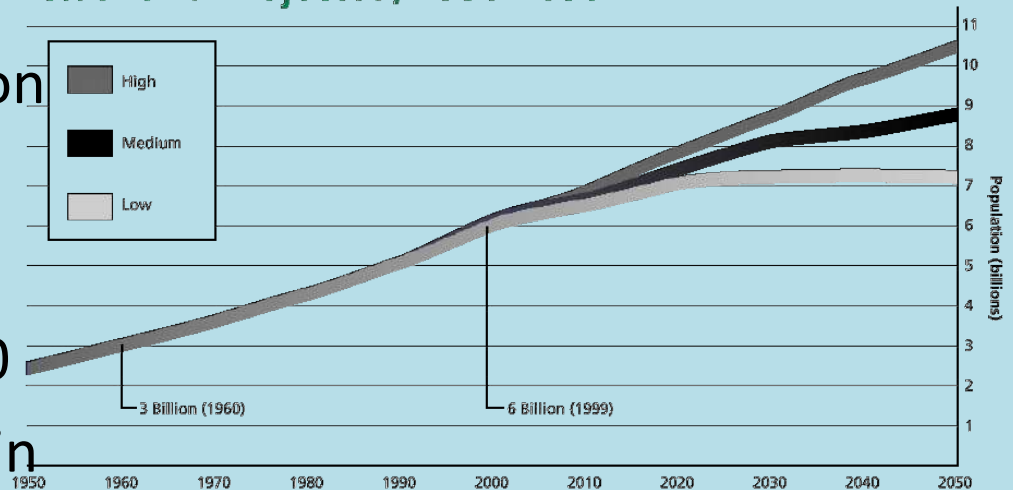Obj. TSW learn how to proficiently perform population problems.
P.64NB

1.Doubling Time –The [world population](#) is growing at 1.16%, What year will it double from today?

http://www.worldometers.info/world-population/

2**. Percent Change** – What is

the percent change in population

From 1960 – 2020?

3. [Population Change](#) – CA has

521,265 births, approx. 270,000

immigrate to CA/year. Deaths in

CA are 233,143. The Growth
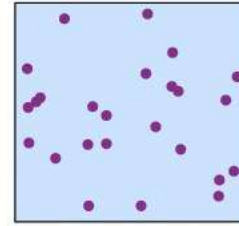
rate in CA is 0%, how many people emigrated?

World Population Growth, Actual and Projected, 1950-2050

High
Medium
Low

Population (billions)

3 Billion (1960)   6 Billion (1999)

1950   1960   1970   1980   1990   2000   2010   2020   2030   2040   2050

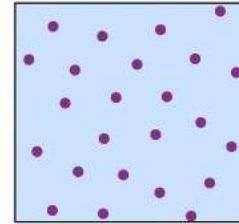Source: United Nations. 1998. *World Population Prospects (The 1998 Revision).*

How Populations are distributed.

(a) **Random distribution**

(b) **Uniform distribution**

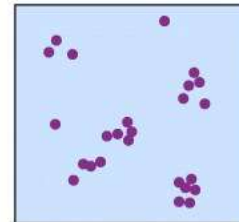(c) **Clumped distribution**

Figure 6.3
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Wetland Presentation

- Groups of 3 or 4
- (1)
- (2)
- (3)
- (4)
- (5)
- Include: