Populations

Why Do We Care

A conservation group wants a particular insect species placed on the endangered species list.

Fisherfolk believe the creel limits for largemouth bass are too small – there are plenty of bass to go around.

A hunter wants to evaluate his forest for mast for squirrels and turkey

Vector control is asking for money from the Federal government to help spray for mosquitoes

Our "fair share" (aka money Monroe County gets from bigger government) is based on our population

How do we count populations?

Types of Counts

1. Direct Counts - Count the actual number of individuals in study area

2. Indirect Counts - Count a sample of individuals in study area

Methods of Counting

1. Spatial Counts - How many organisms are within the study area

– Primarily used for sessile organisms

2. Temporal Counts - How many organisms pass by a point in a certain time period

– Primarily used for motile organisms

Counting Sessile Organisms

For organisms that do not move around a lot, it is possible to sample how many individuals are in a large area by counting how many individuals are in a small area and doing a little bit of math.

For example, foresters who want to know how many trees are in a 1000-acre forest cannot count every tree. What they can count is how many trees are in one acre and then multiply it by 1,000.

The formula for converting the population of a sample plot to the overall population is shown below.

Counted Population	=	Unknown Population
Area of Sample Plot		Study Area
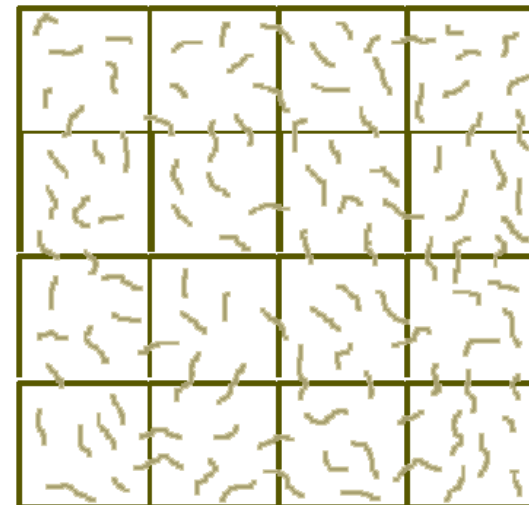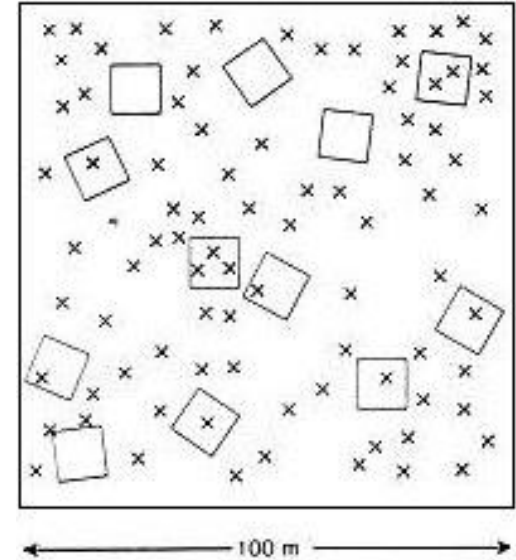
Counting Motile Organisms

For organisms that move around it is not possible to count sample plots because there is no guarantee that the organism will be there. Unlike trees, fish tend to move when you tromp around their lake and set up quadrats. However, there is an alternative. This activity simulates a population census technique commonly used by wildlife biologists in the field. It is a method used when the population cannot be counted directly or when the population moves too much to use a quadrat.

The first step is to trap a random sample of animals of the desired species. These animals are then marked in some way and released. The next step is to trap once again. Some of the animals captured may have been marked from the first sample. Using a simple ratio, the biologist can come up with a quick population estimate.

$$\frac{N}{M} = \frac{n}{m}$$

N=Population estimate (this is what you are trying to calculate)
M=Number of animals captured and marked in first sample
n=Number of animals captured in second sample
m=Number of "n" that were already marked

<u>Why Does a Population Change?</u>

Births   Deaths
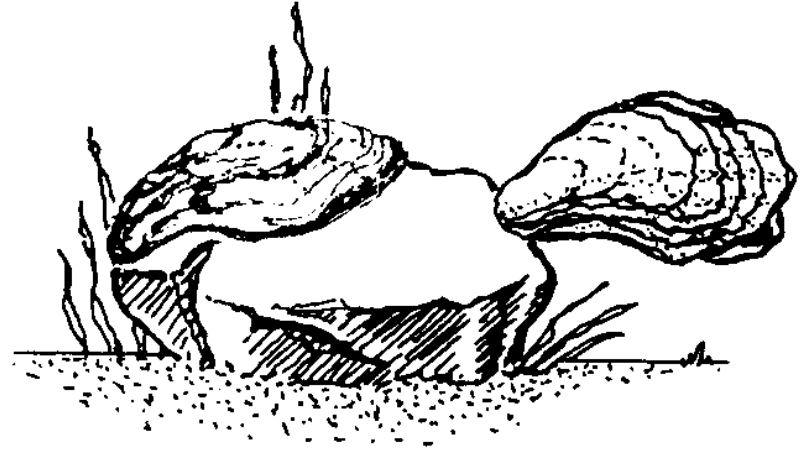Immigration   Emigration

Change in Population Size =

(# Births + Immigration) – (# Deaths + Emigration)

How Fast Does a Population Grow?

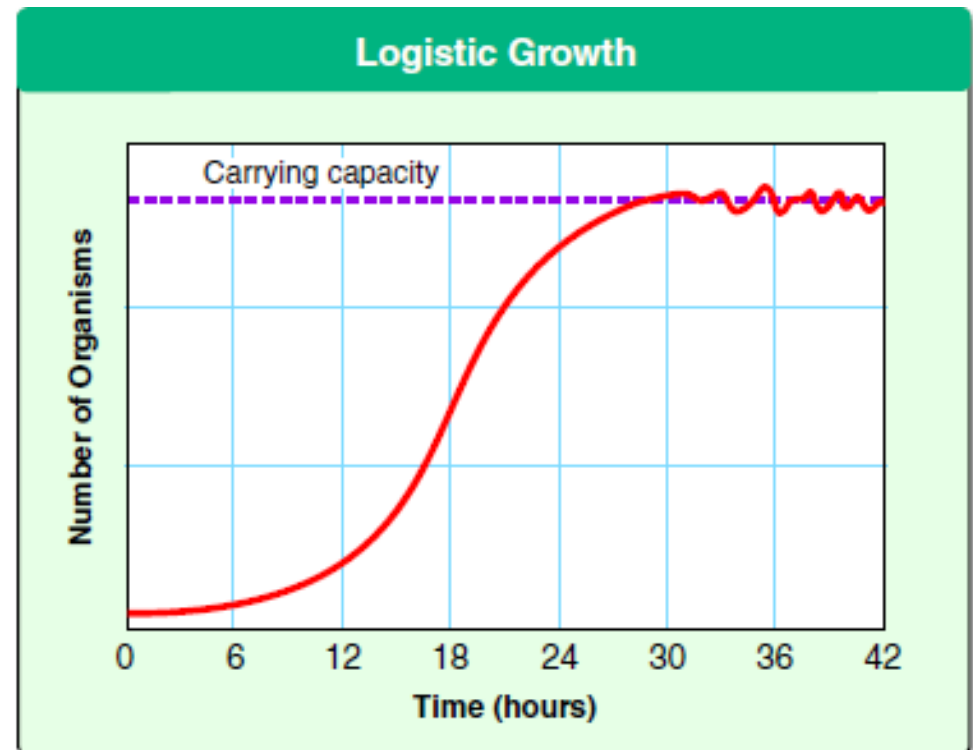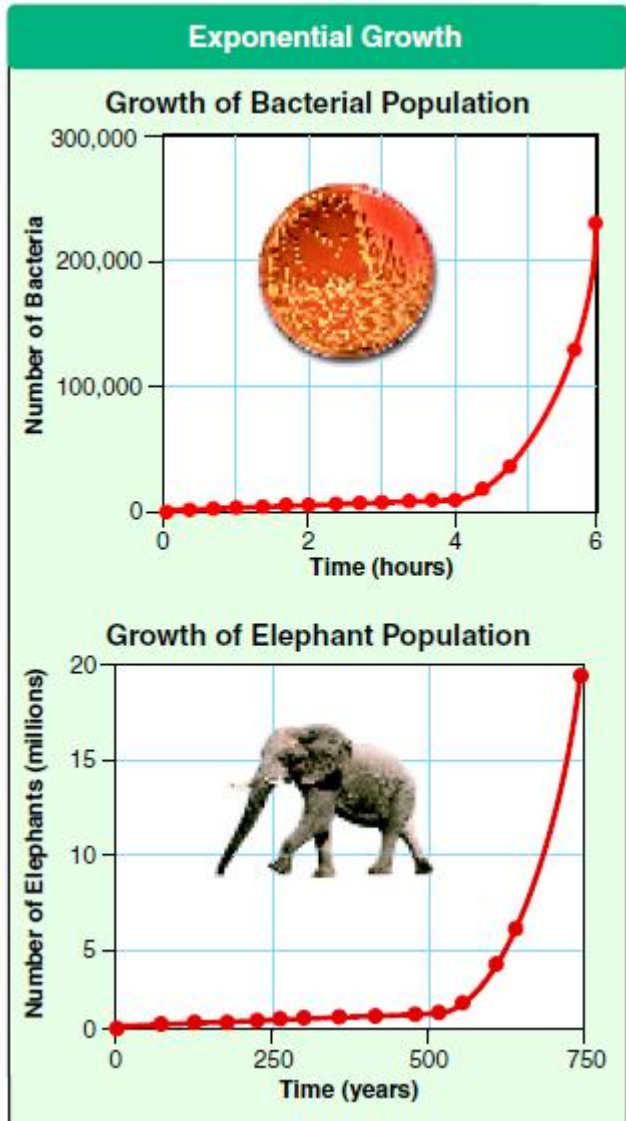Reproductive Potential – maximum number of offspring each member can produce
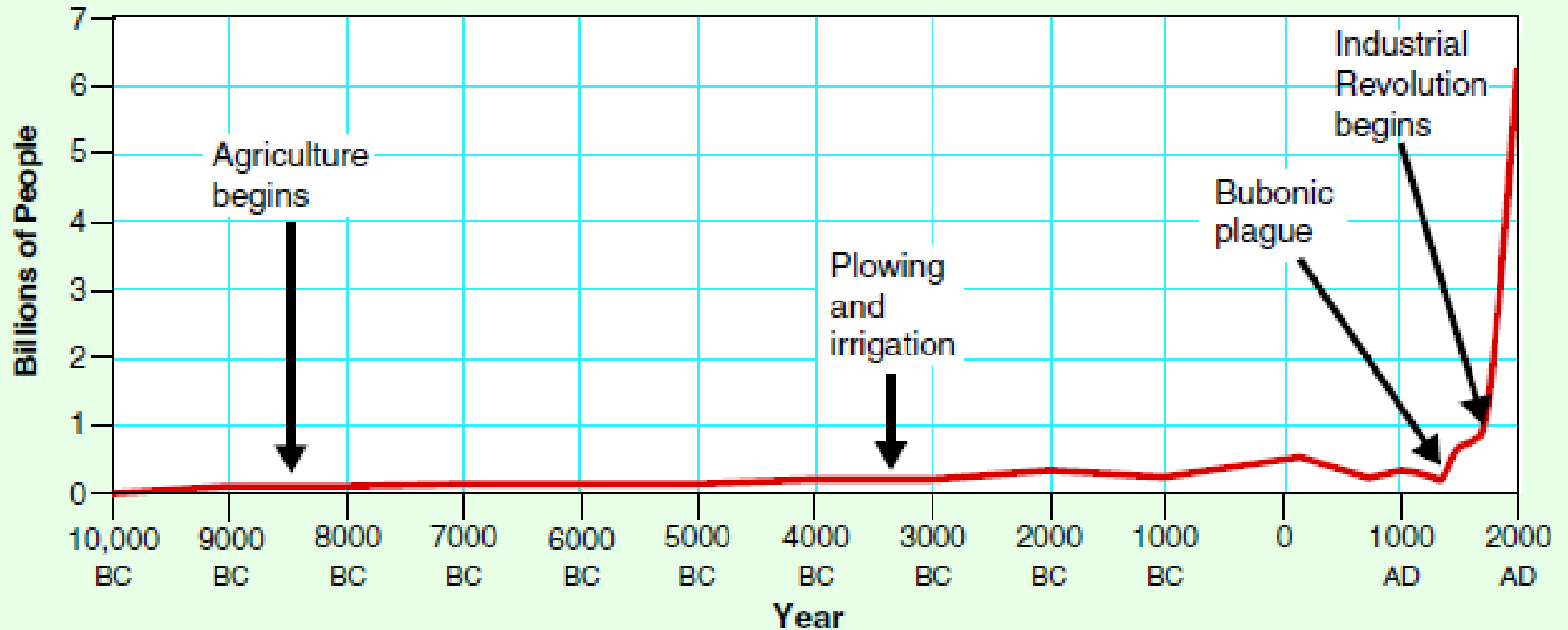

2 cubs every other year or so
K Species

100 million eggs annually
R Species

Exponential & Logistic Growth

The Human Population

Human Population Growth

The Human Population

Human population has increased with time

Some countries have high population growth rates

Other countries grow slowly or not at all

Culture, social, and economic characteristics

Population effected more by density independent factors

Technology has minimized impacts of many density dependent factors