

Population Practice (A. Population Biology Concepts)

Name _____

Collaborate with a partner to discuss and create responses to the following prompts.

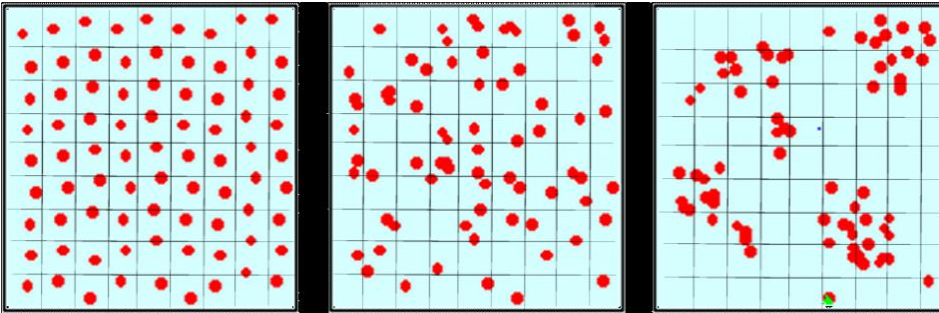
1. Population Density a. Define population, population density

→ What influences population density? Consider the following examples and offer evidence below:

Bangladesh	164,425,000 people	55,598.69 mi ²	2,957.35 p/mi ²
UK	62,041,708	94,525.49	656.35
USA	309,975,000	3,717,811.29	83.38

II. Population Dispersion/Distribution a. Describe population dispersion/distribution (random, clumping, uniform)

→ How individuals are arranged in space can tell you a great deal about their ecology. Behavioral and ecological factors influence the dispersion of a population.



*Identify each pattern

*Brainstorm examples for such each pattern

*Identify a species as a contextual example.

III. Population Biotic Potential b. Explain the biotic potential of a population.

- “This kid is not living up to their potential” - discuss what the word potential means.
- How would you define biotic potential?

IV. Population Carrying Capacity b. Explain the carrying capacity of a particular region in regards to populations.

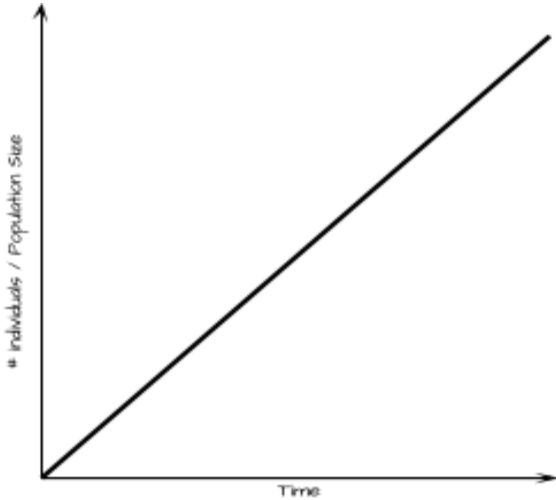
- “My fuel tank is at less than ½ its capacity” - discuss what the word capacity means.
- What in nature increases an area’s capacity to carry populations?

V. Population Environmental Resistance b. Explain the environmental resistance ecosystems apply to populations.

- “When driving North in a car the driver applies the brakes (force to the wheels) to provide resistance against the cars direction of travel” - discuss the word resistance.
- What forces in nature act as resistance to population growth?

VI. Population Growth Curves & Models *b. Compare logistic, exponential and linear growth graphs.*

- Using a different color: draw a logistic growth curve
- Using a different color: draw an exponential growth curve
- Using a different color draw an graph of a population overshoots carrying capacity and recovers.



Why is the exponential growth curve different than the linear?

Why is the logistic growth curve different than the exponential?

Why does the population that overshoots carrying capacity recover back to carrying capacity eventually?

VII. Reproduction Strategies *c. Compare reproductive strategies (r-selected and K-selected).*

- Populations generally are categorized as an r-selected species (biotic potential) and K-selected species (carrying capacity). Apply your understanding of those terms and generate a list of traits you would expect from r and K selected species.

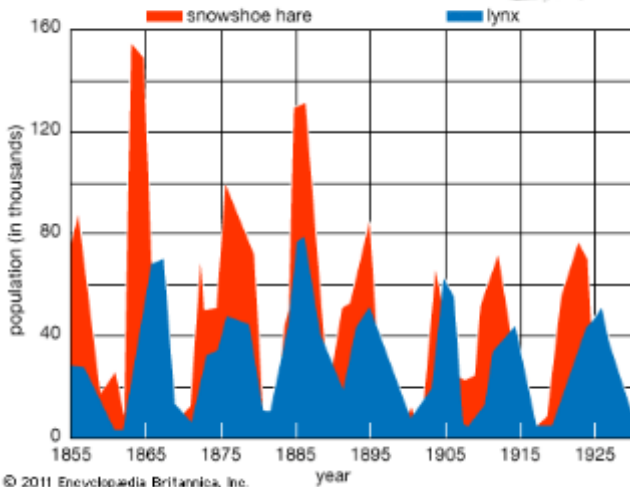
◆ r-selected

K-selected



VIII. Population Cycles & Lag Time *d. Describe a boom-and-bust cycle. Describe a predator-prey cycle.*

- Use the popular graph below to consider the following:



The lynx is a specialist hunter solely preying on snowshoe hare. What do you believe the carrying capacity is for lynx in this ecosystem?

Explain why this ecosystem is able to carry more hare than lynx.

Circle in the graph evidence that illustrates the lag time required for lynx to respond to a higher population of hare. Explain why there is a lag time.

What is a population boom? and bust?

IX. Population Density Dependent/Independent Variables e. Identify density-dependent factors density-independent factors for population growth.

→ Read the article below and IDENTIFY as many DD (density dependent) and DI (density independent) variables that you can.

YELLOW PERCH IN LAKE WINNIPEG

Located 217 m above sea level, Lake Winnipeg is a shallow lake composed of two basins: a wide north basin and a narrow south basin. On average, Lake Winnipeg is only 12 meters deep and receives 517 mm of precipitation annually. Lake Winnipeg provides a habitat for over 50 different species of fish including yellow perch, chestnut lampreys and rainbow smelt.

Yellow perch prefer water that has little current. They can tolerate moderate turbidity. Also, they prefer a temperature range of 18 to 20 degrees Celsius. If the temperature of the water varies too much above this range, yellow perch will either move to a new location or die.

Yellow perch spawn in May or early June when water temperatures are above 6 degrees Celsius. First, they migrate to tributaries and then several males attend a female while she releases her eggs.

Yellow perch can grow to 302 mm in length. Their life span is approximately 9 years. If there is a lack of resources or too many of them (over-population), yellow perch adapt by stunting. This means that instead of starving, they simply do not grow as large as normal. Thus, they are able to live off less food.

Yellow perch feed in midwater or on the bottom of Lake Winnipeg. They eat a wide variety of invertebrates, and fish such as emerald shiners. The eyes of yellow perch allow them to see almost 360 degrees around them. Thus, they are better able to spot their prey and evade predators.

In Lake Winnipeg, yellow perch are eaten by northern pike and walleye. They are also caught for food by commercial fishers and anglers.

Chestnut lampreys are also found in Lake Winnipeg. Lampreys are parasitic fish that attach to other species of fish (such as yellow perch) to feed on their blood and tissues.

Recently, rainbow smelt have been introduced into Lake Winnipeg. Rainbow smelt are a very invasive and competitive species. They have been thought to have caused a decrease in the emerald shiner population.

Lake Winnipeg provides a home for many species of fish. However, a severe drought could disrupt this ecosystem greatly. Lake Winnipeg's water level would drop, the temperature could change and it could become more turbid. Thus, the carrying capacity of the lake would change.

But, in its current condition, Lake Winnipeg is an excellent habitat for many species of fish.

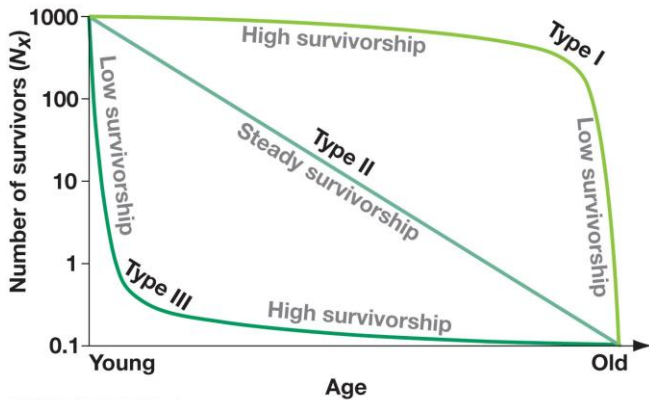
Density Dependent:

Density Independent:

X. Population Survivorship f. Identify survivorship curves (early loss, constant loss, late loss)

→ Use the image below to answer the following questions:

(a) Three general types of survivorship curves



Which type is:

- Early Loss _____
- Constant Loss _____
- Late Loss _____

Which type do you believe Humans are? Explain.

Provide an example and characteristics for each type of survivorship curve.