CARRYING CAPACITY

Standards: 6.1d, 6.1e

Objective: I can identify various limiting factors that contribute to the carrying capacity of a population.

Motivation

1   **2**

Analyze the image provided and answer the discussion prompts below:

1. What is the image showing?

2. What do you think is the _maximum_ amount of fish that can live in the fishbowl and WHY?
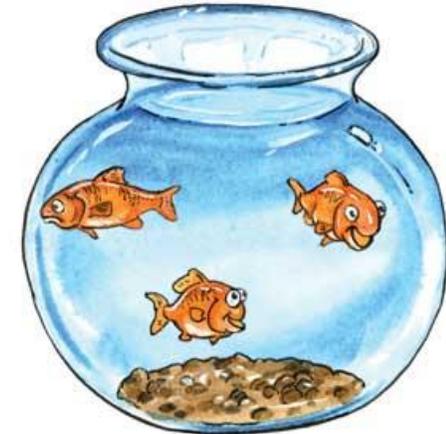
3. Name some things that fish need that _limit_ how many can survive in the fish bowl.

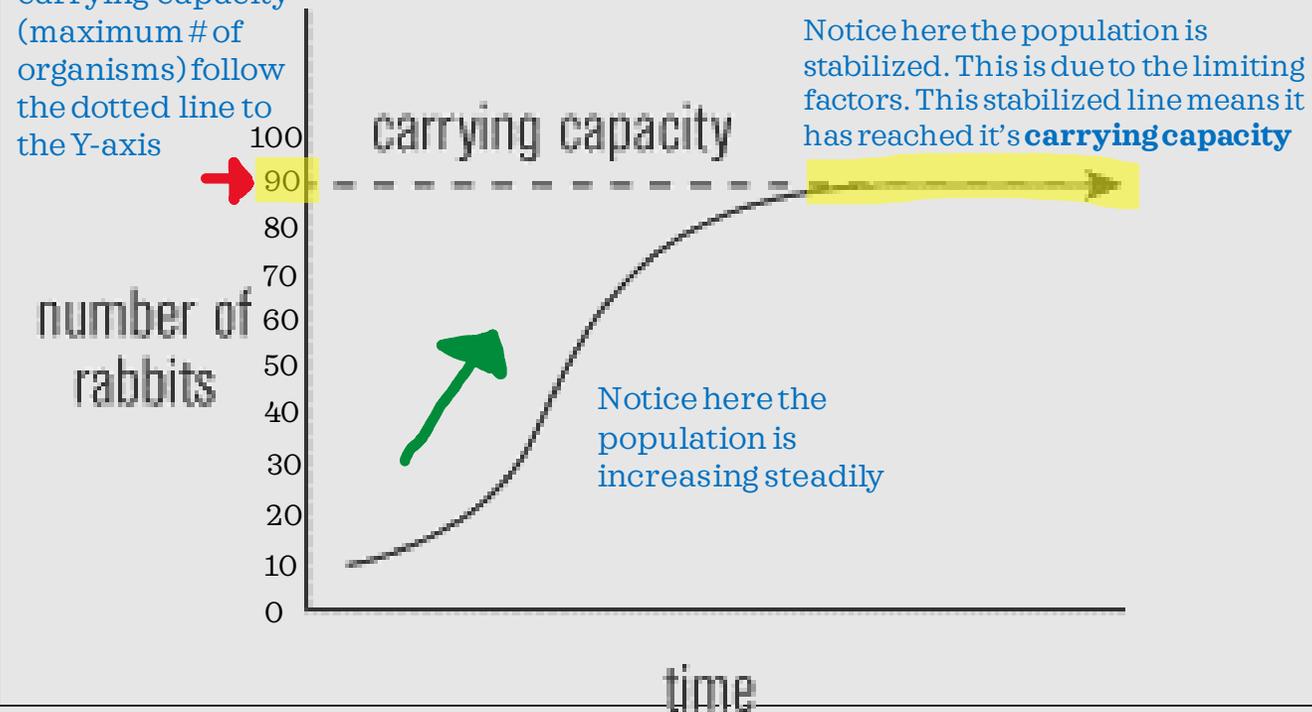Write your responses in both your guided notes and the discussion thread.

Mini Lesson

Limiting Factors: Any biotic or abiotic factor in the environment that *limits* the size of populations (ex: water, food, shelter, space, etc.) Organisms typically compete for the limiting factors.

Carrying Capacity: The *maximum* population that an ecosystem can support due to it's limiting factors.

(number or organisms of any species)

To find the exact carrying capacity (maximum # of organisms) follow the dotted line to the Y-axis

carrying capacity

Notice here the population is stabilized. This is due to the limiting factors. This stabilized line means it has reached it's **carrying capacity**

number of rabbits

Notice here the population is increasing steadily

time

Notice here the population is fluctuating around the **carrying capacity**. This is due to lag in the response to the limiting factors. To calculate the **carrying capacity,** you draw the line through the middle of the fluctuations.

POPULATION

YEARS OF POPULATION GROWTH

Slide3
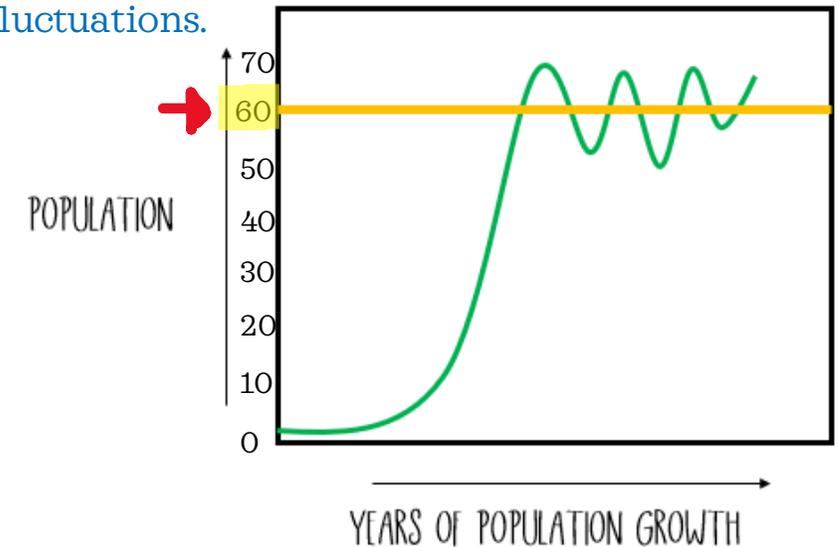
Mini Lesson Simulation

https://sepuplhs.org/high/sgi/teachers/fishery_sim.html

Directions: Run the simulation according to the factors depicted below. Copy the factors for each stage below into your simulation and note the carrying capacity in your guided notes.
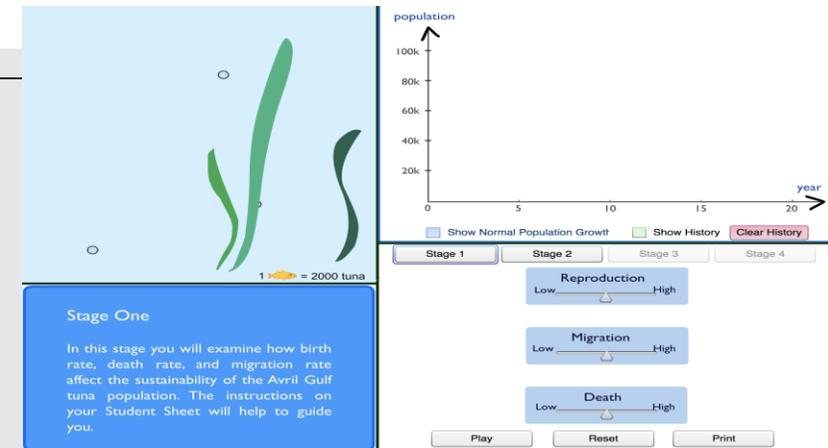
Stage 1

Reproduction
Low _____ High

Migration
Low _____ High

Death
Low _____ High

*Migration refers to how many tuna will leave the ecosystem voluntarily .

Stage 2

Predators
None _____ Many

Food
Little _____ Abundant

Disease   Pollution
  ◉   ◉

*Random occurrences of disease and pollution will occur. Let the entire 20 year simulation run before determining carrying capacity

Stage 3

Summer Fishing
No _____ Heavy

Fall Fishing
No _____ Heavy

Winter Fishing
No _____ Heavy

Spring Fishing
No _____ Heavy

*Tuna population will fluctuate here, therefore, you must estimate where the carrying capacity line will be!

Stage 4

Reproduction   Predators
Low _____ High   None _____ Many

Migration   Food
Low _____ High   Little _____ Abundant

Death   Disease   Pollution
Low _____ High   ◉   ◉

Summer Fishing
No _____ Heavy

Fall Fishing
No _____ Heavy

Winter Fishing
No _____ Heavy
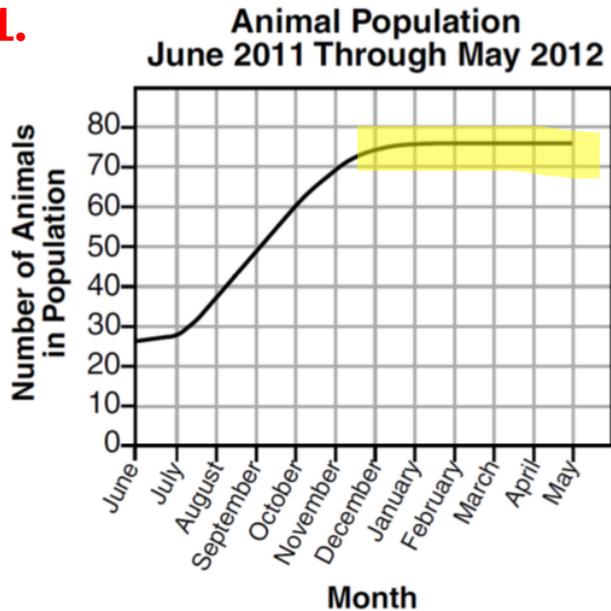
Spring Fishing
No _____ Heavy

*Stage 4 combines all the factors! Be sure to copy the factors exactly and estimate the carrying capacity.

Slide 4 Guided Practice

1.

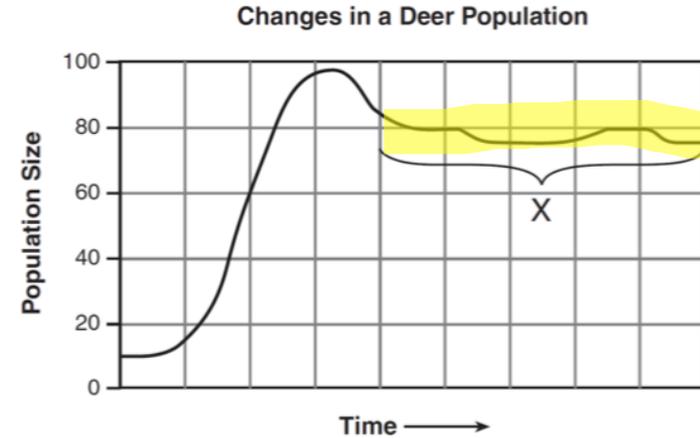### Animal Population
June 2011 Through May 2012

The graph can best be used to illustrate

A) a food chain   B) ecological succession
C) natural selection   D) carrying capacity

2. A finite resource in the environment that keeps a population from steadily increasing is known as

A) dynamic equilibrium
B) a limiting factor
C) a reproductive enzyme
D) ecological successsion

3. Rabbits produce large numbers of offspring during each reproductive season, yet the number of rabbits within a given population changes very little from year to year. The stability of the population size is most likely the result of

A) the development of mutations in young rabbits
B) environmental factors that keep the population in check
C) rabbits continuing to reproduce when the population is large
D) the survival of more female rabbits than male rabbits

4.

Changes in a Deer Population

Which statement best explains section *X*?

A) The population has reached the carrying capacity of its environment.
B) Energy is used for interbreeding between members of different species.
C) A predator recycles the remains of dead organisms.
D) Competition does not occur between members of different species in the same habitat

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Regents Buzz Words

1. "Keep population in check" = Limiting factors
2. Population Stability/ equilibrium = Carrying capacity
3. Finite/Limited Resource = Limited Factor
4. Maximum population that can be "sustained" = Carrying capacity

Closure - Discussion

- **Describe some limiting factors that exist within your living space (apartment, house, etc.)**

- **If a house has 3 bedrooms, 2 bathrooms, a living room, and a kitchen, what do you think the carrying capacity of humans would be and why?**

EXIT ASSESSMENT

Complete your exit assessment either on CastleLearning or via the exit assessment attached pdf