4: Population Dynamics

Population size, reproduction, limiting factors, energy flow
Day 1:

Warm Up: What is your favorite type of dessert?

LT: I can explain and graph the two types of population growth.
Discussion Questions:

What factors can cause an ecosystem to become unbalanced?

What factors can impact a population?
“Oh Mouse” Game

- Mouse and Owl
- Graph populations as you go
- Resources: water, food, shelter
- Limit different ones
- Discuss
Post-Game Discussion

- What were some things you noticed during this game?
- When the mouse population increased/decreased, what happened to the owl population?
- When the owl population increased/decreased, what happened to the mouse population?
Population Dynamics

Study of how populations of species change over time
Exponential Population Growth (J CURVE)

- When resources are UNLIMITED, population will increase
- J-shaped graph
- This type of growth is unrealistic for the real world, because there are always factors that impact population growth
Example: deer in Yellowstone. When wolves were removed from the Yellowstone area, the predator of deer was removed, so their population increased very quickly, which drastically altered the ecosystem.
Logistic Population Growth (S Curve)

- Population grows exponentially (quickly) at first
- As population gets larger, it approaches carrying capacity
- **Carrying capacity** - the maximum number of living organisms that an ecosystem can support
- Once a population reaches its carrying capacity, the growth rate slows
- S shaped curve
- Much more realistic type of growth
**Example:** Bears are very large and eat ALOT. An ecosystem can only support a certain number of bears, if the population grows beyond that number (carrying capacity), bears will begin to die or move because there won’t be enough food for them to survive.
Exponential Growth

Logistic Growth

Carrying capacity
Discussion: What are factors that impact population growth and cause populations to reach carrying capacity
Factors that impact population size:

- Predator and Prey relationships
  - Predator
  - Prey
- Resources (water, food, shelter)
- Disease
- Reproductive Potential
- Human impact
- Habitat loss
Day 2:

Warm Up: What are the two types of population growth? Draw a graph of each type.

LT: I can explain how and why populations reach carrying capacity.
Review: Types of population growth

Exponential Growth

![Graph of Exponential Growth](image)

Logistic Growth

![Graph of Logistic Growth](image)

Carrying capacity
WHAT TYPE OF POPULATION GROWTH IS THIS? (Logistic or exponential)

A couple of mice catch a ride in a tractor to a new meadow that is full of resources and no predators. They begin eating and reproducing very quickly.

A: Exponential
WHAT TYPE OF POPULATION GROWTH IS THIS? (Logistic or exponential)

A shark regularly hunts a large school of fish

A: Logistic
WHAT TYPE OF POPULATION GROWTH IS THIS? (Logistic or exponential)

A mountain goat population lives in a remote area with limited resources.

A: Logistic
WHAT TYPE OF POPULATION GROWTH IS THIS? (Logistic or exponential)

A mountain lion population is hunted to extinction, leaving the deer in that region with no predator threat.

A: Exponential
Graph Half Sheet and Go Over Answers
Hare and Lynx Populations WS
Day 3:

LT: What happened with the hare and lynx populations from yesterday’s worksheet?

Warm Up: I can identify density-independent and density-dependent factors that impact populations.
Go over answers to Hare and Lynx WS
Density - Independent Factors

- Natural disasters
- Temperature
- Sunlight
- Human activities
- Physical characteristics
- Behaviors
Density - Dependent Factors

- Competition
- Predation
- Disease
- Parasitism
- Space Availability
- Stress
Is this a Density-Independent or Density-Dependent Factor?

A disease attacking and killing coyotes
A: Density-dependent

A flood
A: Density-independent
Is this a Density-Independent or Density-Dependent Factor?

Competition for space to grow on the forest floor
A: Density-dependent

Competition for mates
A: Density-dependent
Is this a Density-Independent or Density-Dependent Factor?

Poaching elephant tusks for the ivory trade

A: Density-independent
Kaibab Case Study
Day 4: Quiz
Day 5: Field study

LT: I can identify limiting factors and populations in my field study plot.