

A close-up photograph of a clownfish (Amphiprioninae) swimming among the tentacles of a sea anemone. The clownfish is orange with two prominent white vertical stripes. The anemone's tentacles are a pale, translucent pinkish-brown color. A semi-transparent circular overlay is centered on the image, containing the text "SPECIES INTERACTIONS" in a bold, white, sans-serif font with a black outline.

# **SPECIES INTERACTIONS**

# SPECIES INTERACTIONS



- Biotic factors have a large impact on the health of a species.
  - For example, the threat of predators can limit the population of a species.
- The **scarcity of resources** and **competition** for food, shelter, and mates can also limit the population.

# SPECIES INTERACTIONS

- Interactions among species do not always lead to negative outcomes for one of the parties, and in some cases, both species thrive from one another.
- **Example interactions:** Competition, parasitism, commensalism, mutualism, predation



Is this a negative or positive interaction, or does it depend? Explain.

# SPECIES INTERACTIONS

## Competition

- When two species are trying to acquire the same resources

**Example:** Lions and cheetahs compete for antelope for their food.



## Parasitism

- When one species lives in or on another organism

**Example:** A tick bites a human to feed on blood.



# SPECIES INTERACTIONS

## Commensalism

- When one species benefits and a second species is neither benefited nor harmed

**Example:** Remora fish attach to larger fish like sharks as a form of protection and to eat scraps of the shark's leftover food.



## Predation

- When one species consumes another species

**Example:** A fox catches and eats a rabbit as part of its diet.



# SPECIES INTERACTIONS

## Mutualism

- When both species benefit from an interaction

### Example:

- The relationship between clownfish and sea anemones.
- The sea anemone provides shelter for the clownfish.
- The clownfish protects the anemone from predators and provides nutrients to the anemone from the clownfish waste.





Use the symbols below to indicate the type of interaction among the species:

- Key:**
- Both species benefit from the interaction (++)
  - Both species are harmed from the interaction (--)
  - One species benefits and one does not (+-)
  - One species benefits and one is unaffected (+0)



Competition

Parasitism

Mutualism

Commensalism

Predation

A large group of ostriches is gathered in a grassy field under a cloudy sky. A semi-transparent white circle is centered over the image, containing the text "CARRYING CAPACITY" in a bold, white, sans-serif font with a black outline. The ostriches are of various shades of brown and grey, with long necks and heads turned in different directions. The background shows rolling green hills and a distant horizon line.

# CARRYING CAPACITY

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- The **carrying capacity** of an environment is the maximum population it can support based on the food, water, and resources available.

What things do all animals need?



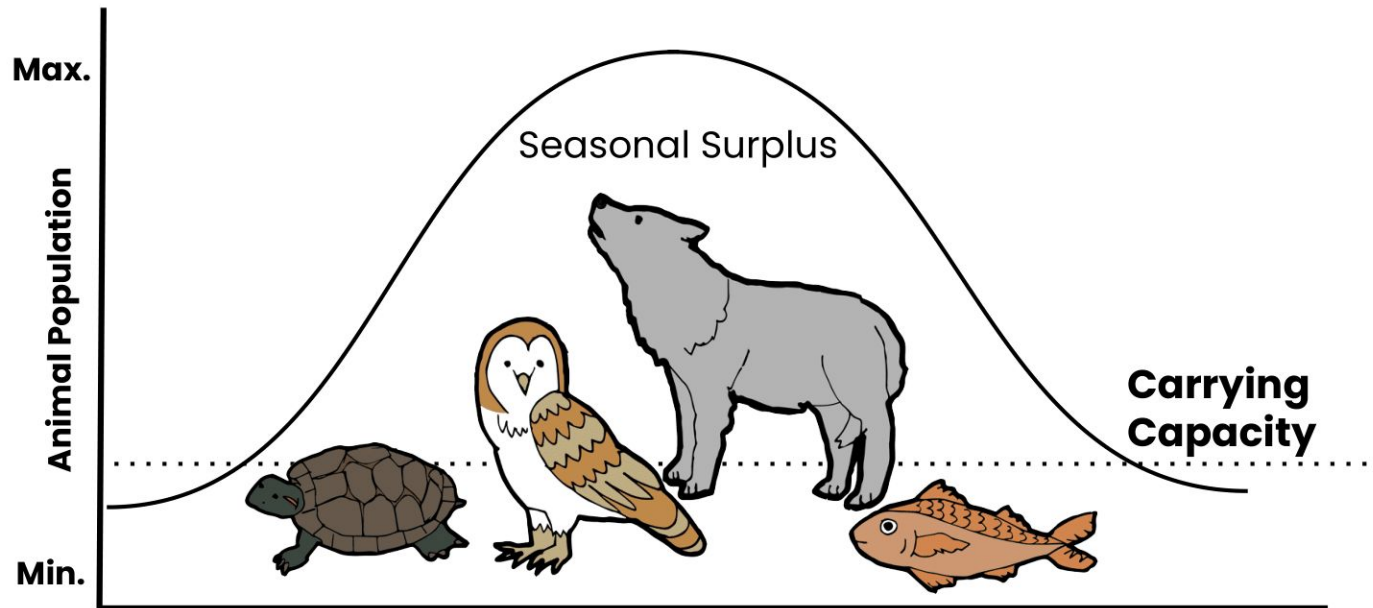
# CARRYING CAPACITY



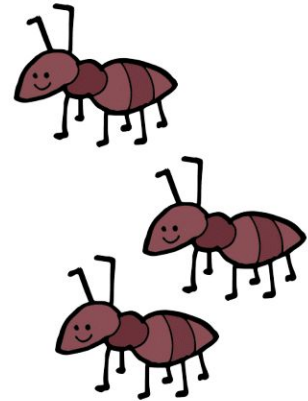
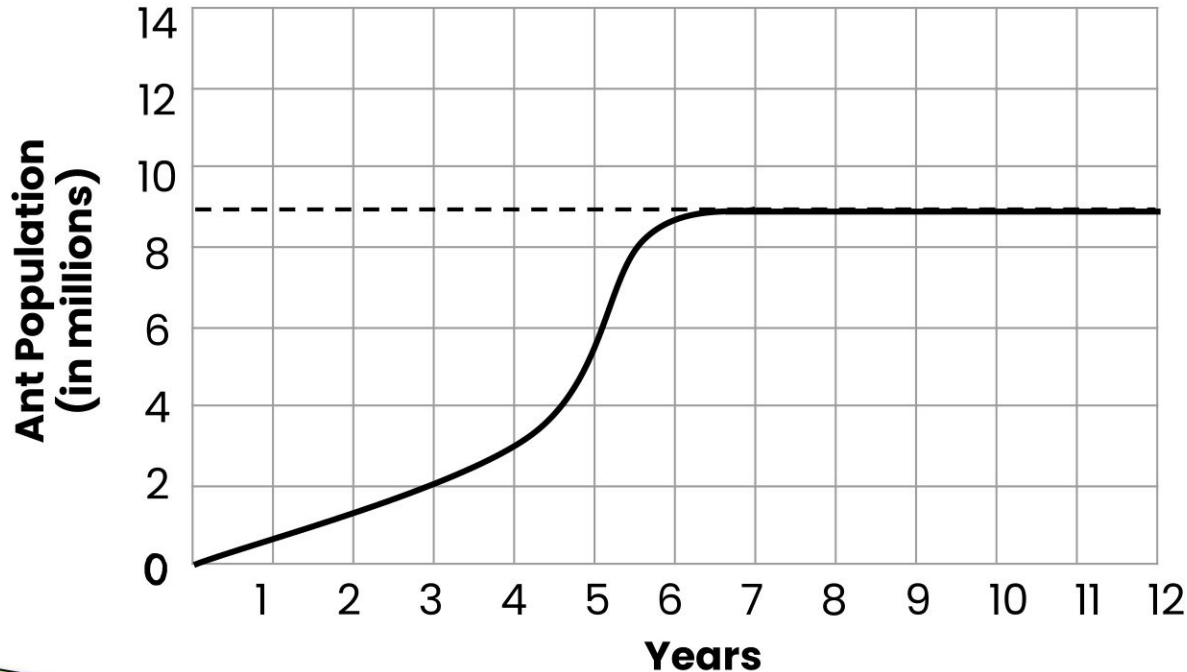
- Usually, growth begins slowly, then enters a rapid growth phase.
  - Eventually levels off when the carrying capacity is reached
- Once capacity has been reached, or in some cases exceeded, there will be a crash to a lower sustainable level.

# CARRYING CAPACITY

- The graph below shows how the animal population grows during seasonal changes, then later returns to the carrying capacity.



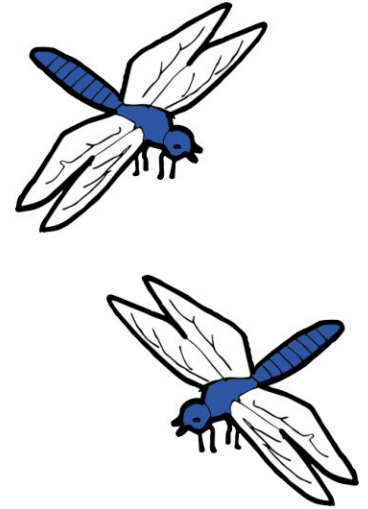
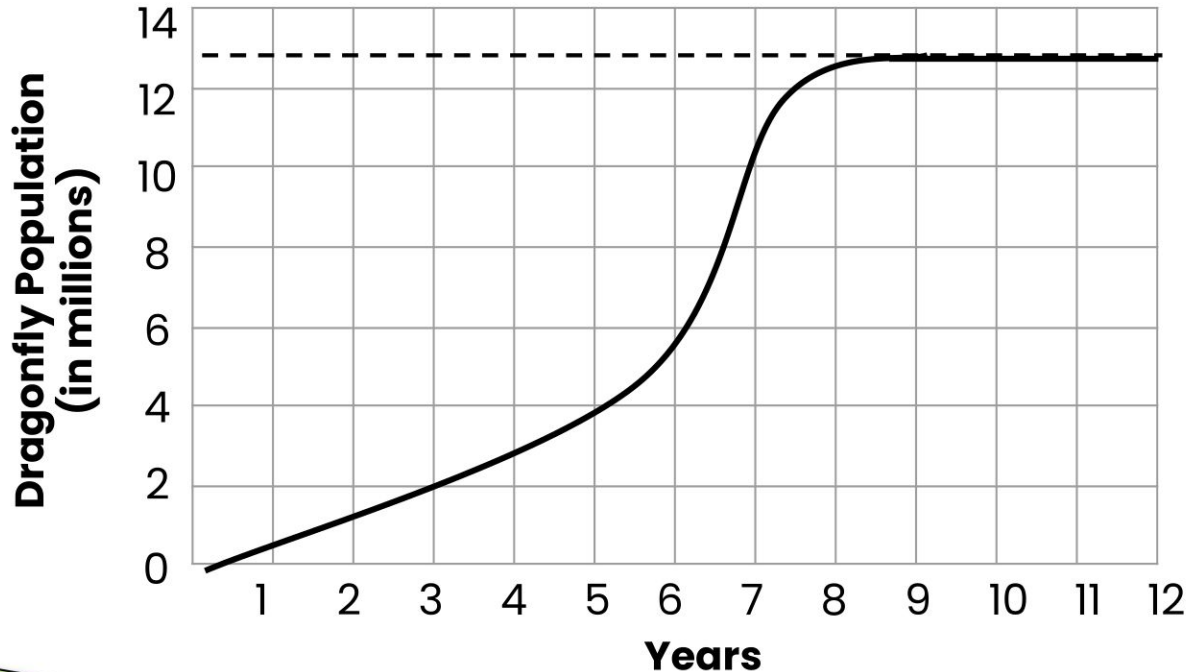
# CARRYING CAPACITY



At what **year** does the ant population reach its carrying capacity?

What is the **population** of ants at the carrying capacity?

# CARRYING CAPACITY



At what **year** does the dragonfly population reach its carrying capacity?

What is the **population** of dragonflies at the carrying capacity?



What might cause a population to drop if the carrying capacity is exceeded?





Why is carrying capacity important for scientists to monitor?

