Ecological relationships

Ecology key words - revision

- The b_____ describes the living world.
- An e_____ is made up of living things (b_____ factors) and non-living things (a_____factors).
- A p_____ is a group of organisms of one species which live in the same place at the same time and
- A c_____ is made of populations of different species.

Revision of L1

- List some examples of ecosystems
- List some examples of abiotic factors
- List some examples of biotic factors

Ecology definitions

Biosphere	
Habitat	
Population	
Community	
Ecosystem	

Ecology definitions

	A distinct self-supporting system of organisms interacting with each other (biotic factors) and with the physical environment (abiotic factors)
	Place where specific organisms live.
	The living world (parts of the earth where life is found).
	The populations of all species found in a particular ecosystem at any one time.
	All of the organisms of a particular species found in an ecosystem at any one time.

Ecological relationships- competition

- Interspecific competition (between members of different species)
- Intraspecific competition (between members of the same species)

- What might plants compete for?
- What might animals compete for?

Ecological relationships- competition

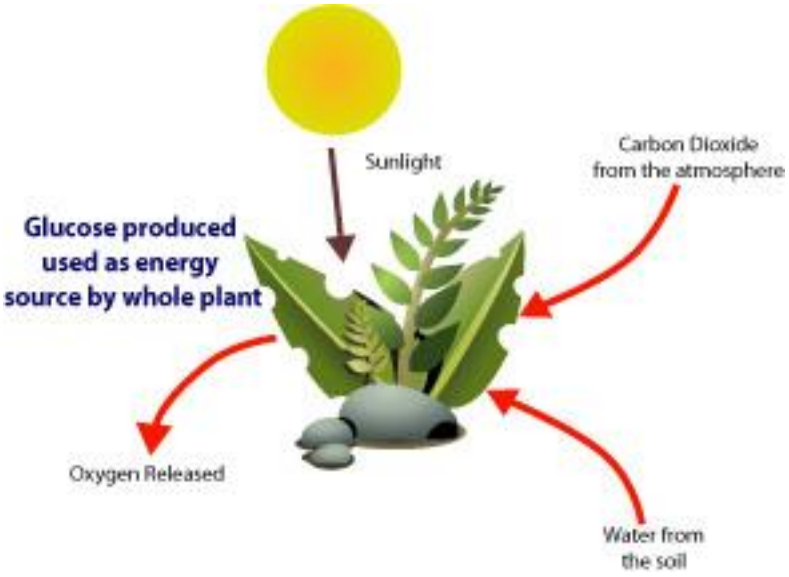
- Plants compete for light, water, minerals (nutrients) and space
- Animals compete for food, water, mates, territory

Ecological relationships

- Do you know what these words mean?
- Producer / autotroph
- Consumer / heterotroph
- predation
- herbivore
- carnivore
- omnivore
- decomposer
- detritivore

Producers

- Plants (and algae) are producers
- A producer is an organism which can photosynthesise.
- They can trap light energy and convert it into chemical energy eg sugars
- They do not need to eat, they ‘make their own food’
- Producers are also called autotrophs



Consumer

- Consumers are organism which needs to eat to obtain food and energy.
- Animals which eat other animals are carnivores
- Animals that eat only plants are called herbivores
- Consumers are also called heterotrophs

Lions are carnivores, whereas koalas are herbivores because they eat only plants.

Consumer: An animal that feeds on living or recently killed organisms via ingestion

Herbivore

Omnivore

Carnivore

- Omnivores eat both plants and animals
- Eg Grizzly bears eat fish and berries

Detritivores

- Detritivores are a type of heterotroph that obtains nutrients from non-living sources, such as detritus and humus
- Detritus is dead, particulate organic matter – such as decaying organic material and faecal matter
- Humus is the term given specifically to the decaying leaf litter intermixed within the topsoil
- Detritivores include dung beetles, earthworms, woodlice, snails and crabs

Detritivore: An animal that feeds on detritus or humus via internal digestion

Snail

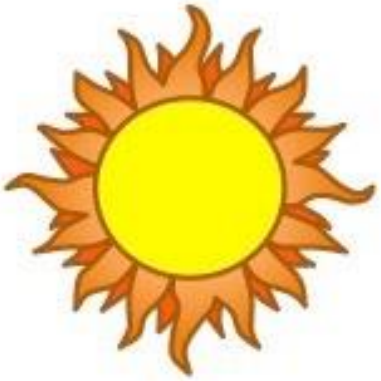
Millipede

Crab

Decomposers

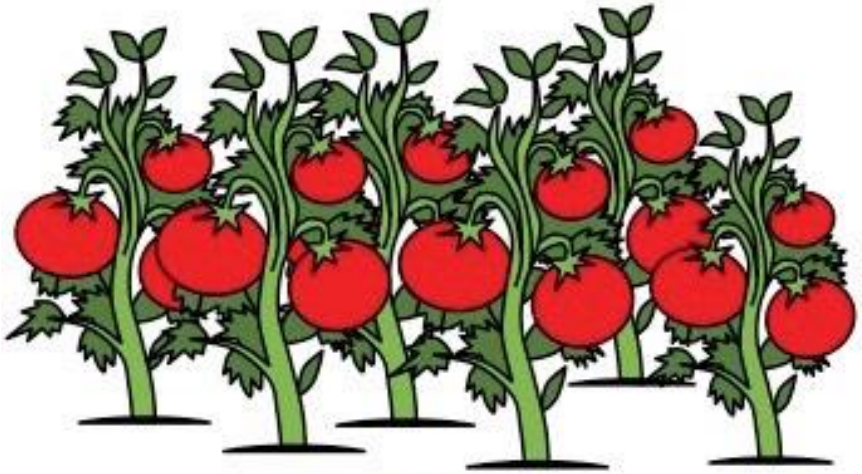
- Bacteria and fungi

- Detritivores ingest their food, then break it down
- Decomposers release enzymes which digest the food externally, then they absorb the small products of digestion.



Sun:
Light is the initial energy source for most communities

Photosynthesis

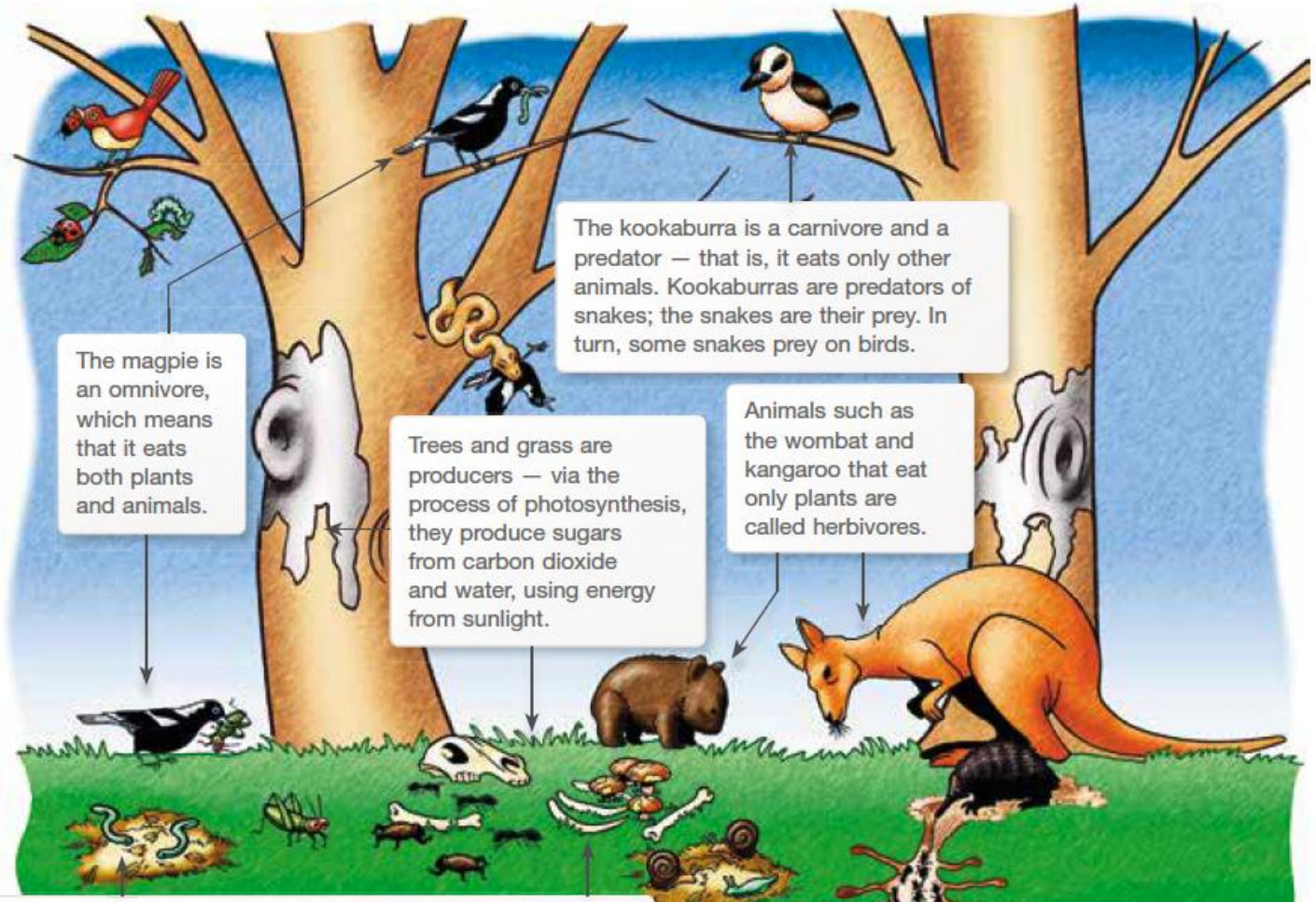


Feeding

Autotrophs:
Synthesizes own organic molecules

Heterotrophs:
Ingests organic molecules

Within an ecosystem, organisms interact with each other and with their non-living environment.



Ecological relationships key terms

- Outline the meaning of the following key terms and think of examples of each
- Producer / Autotroph
- Consumer / Heterotroph
- Carnivore
- Omnivore
- Herbivore
- Decomposer
- Detritivore
- Intraspecific and interspecific competition

- What do the terms predator and prey mean?
- Can you think of any examples?
- What features does the predator have that help to make it a ‘good’ predator?

Predator – Prey relationships

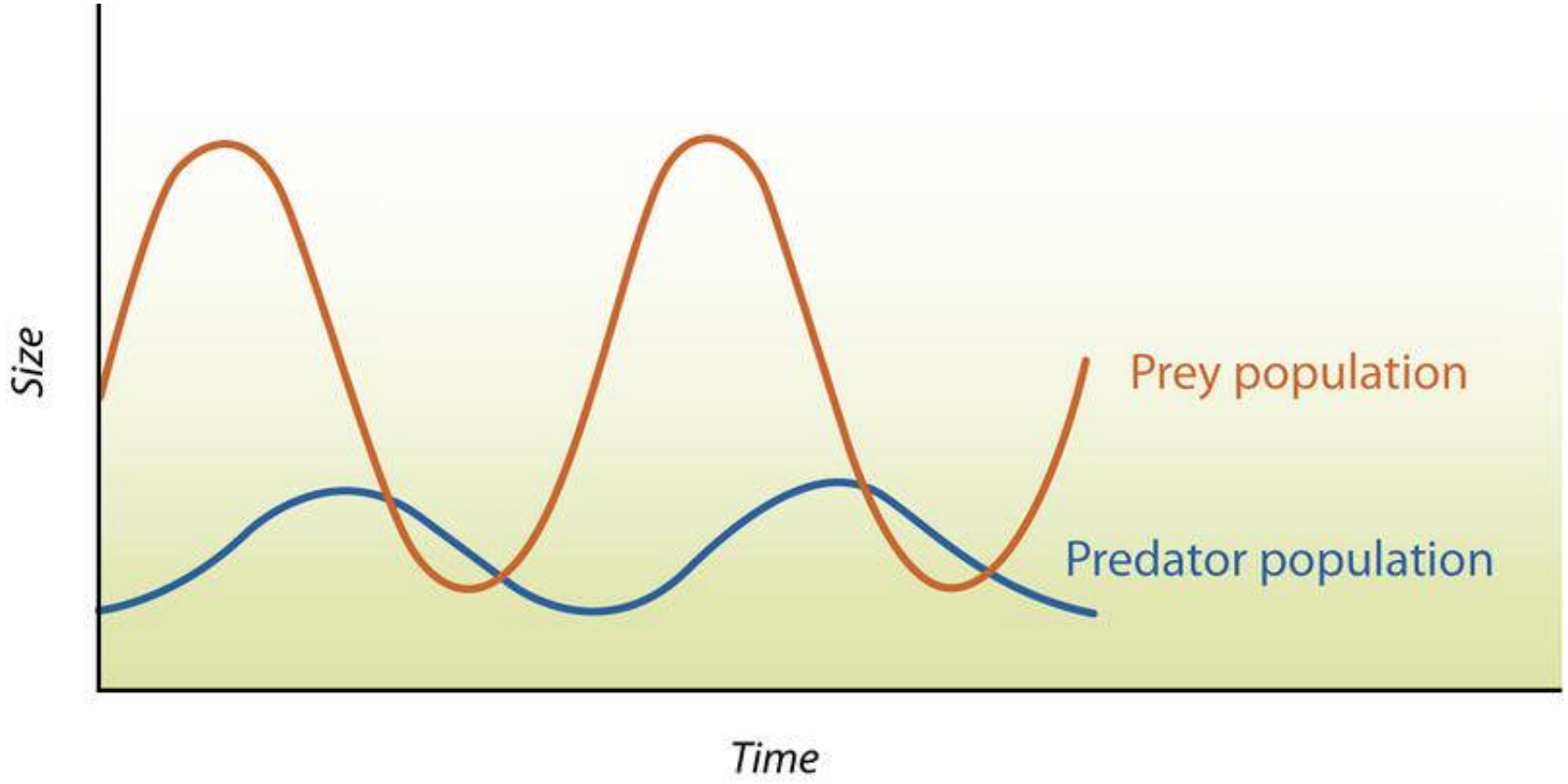
Predator–prey relationship

- Predation is a biological interaction whereby one organism (predator) hunts, kills and feeds on another organism (prey)
- Predation involves a consumer feeding on another consumer
- for example a bird feeding on dragonflies
- a dingo feeding on a red kangaroo
- Because the predator relies on the prey as a food source, their population levels are linked.

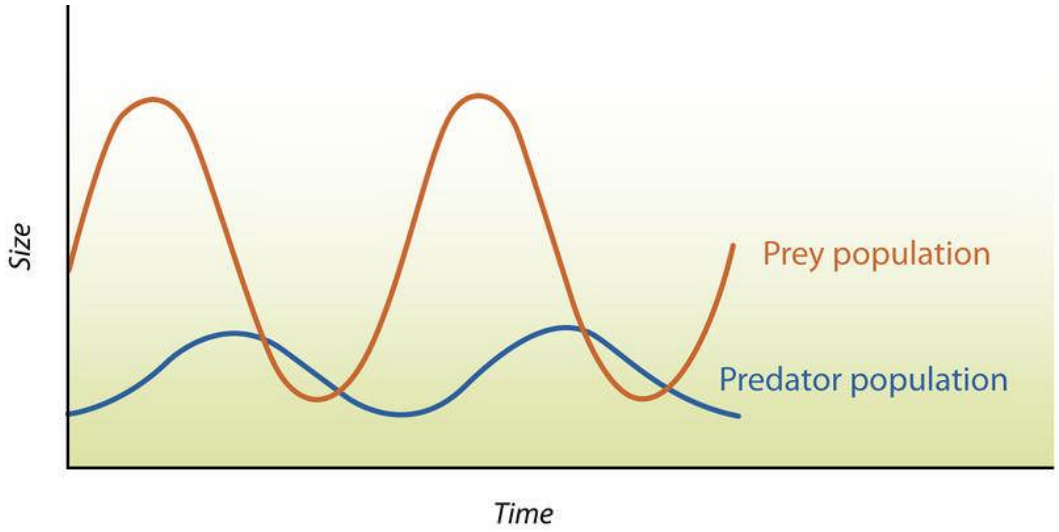
Predators

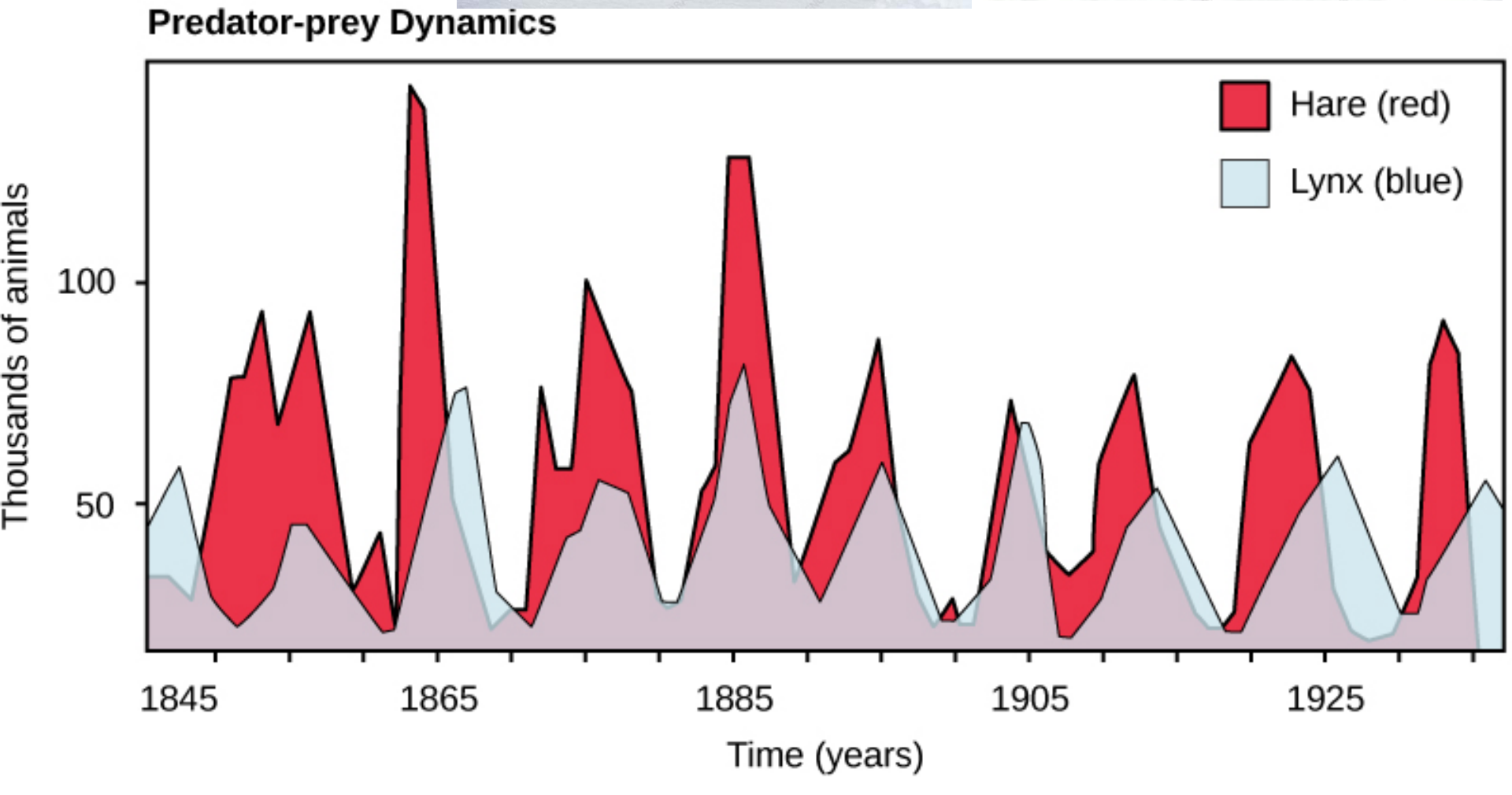
- Predators come in all shapes and sizes, and different species obtain their prey using different strategies.
- Predators have structural, physiological and behavioural features that assist them to obtain food.
- These features include the web-building ability of spiders, claws and canine teeth of big cats, heat-sensitive pits of pythons, poison glands of snakes, visual acuity of eagles and cooperative hunting by dolphins.

- Why do you think the graph looks like this?
- Think about why the lines go up and down.
- Why is the orange peak at a different time to the blue peak?



- Because the predator relies on the prey as a food source, their population levels are intertwined
- If the prey population drops (e.g. due to over-hunting or disease), then predator numbers will eventually decline as result of less food, some predators die of starvation as they compete for limited numbers of prey.
- Low predator numbers then allow the prey population size to increase, less prey organisms are eaten by the few predators, these prey organisms can also live long enough to reproduce.
- A large prey population then means that a larger predator population can be sustained, there is enough food / prey for more predators, so they survive (not starve) and reproduce.
- Then we are back to a large predator population, which results in over-hunting of the prey

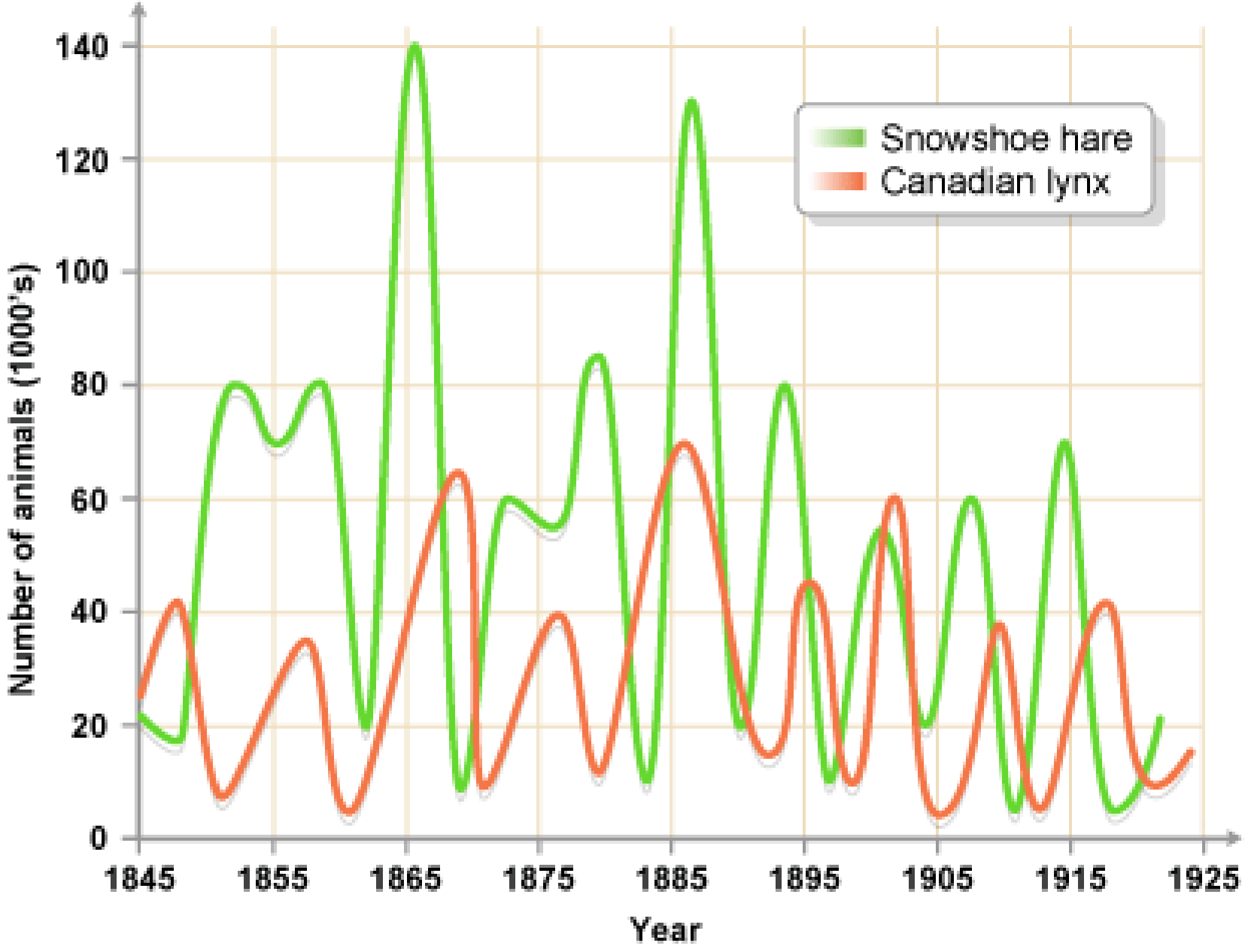



Predator-prey Dynamics
Hare (red)
Lynx (blue)
Thousands of animals
100
50
1845
1865
1885
1905
1925
Time (years)

- Snowshoe hare and Canadian Lynx


SCIENCEphotoLIBRARY


ARKive
www.arkive.org
© Lynn M. Stone / naturepl.com


Snowshoe hare
Canadian lynx
Number of animals (1000's)
140
120
100
80
60
40
20
0
1845
1855
1865
1875
1885
1895
1905
1915
1925
Year

- Predator and prey relationships constantly fluctuate in this way. For example, the Canadian lynx preys almost exclusively on the snowshoe hare.
- The population of hares varies according to factors such as climate, disease, and availability of food. An increase in the hare population leads to an increase in the lynx population.
- When there are more lynxes, the hare population may decline and this in turn may cause the lynx population to decline again.

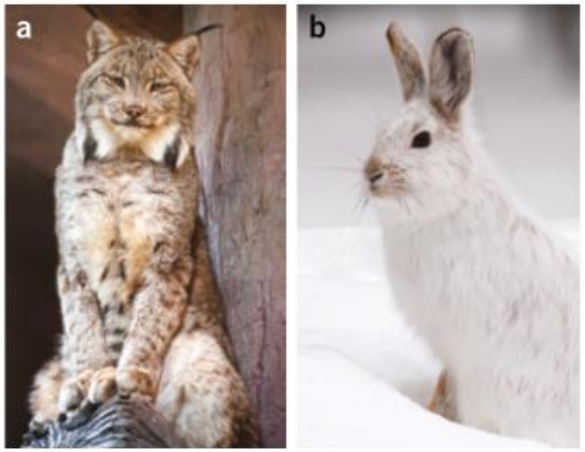
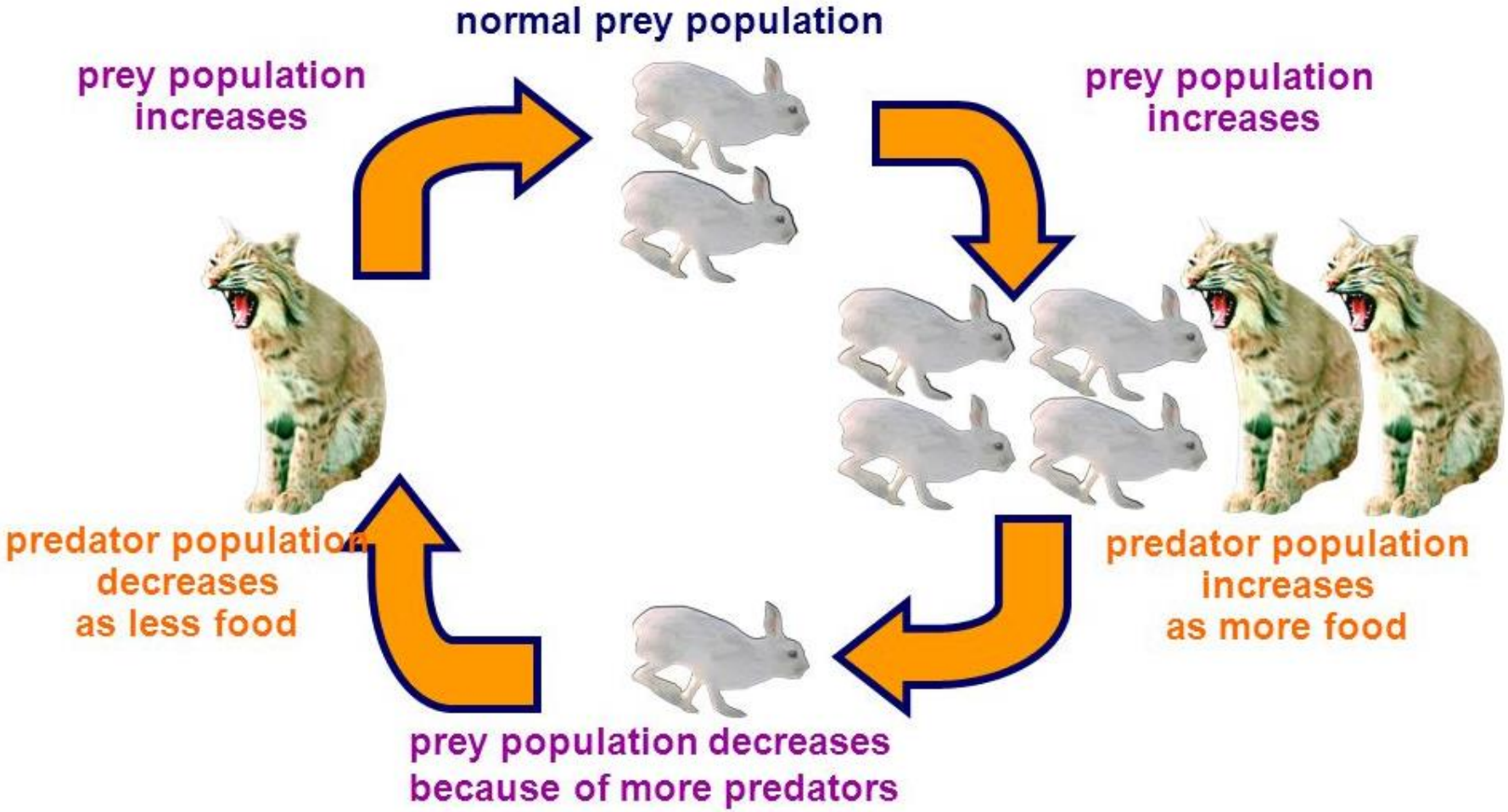


FIGURE 9.3.12 The (a) Canadian lynx (*Lynx canadensis*) and (b) snowshoe hare (*Lepus americanus*) form a predator–prey relationship.

Predator prey relationships

- If the density of the prey species increases, predators will have more access to this food source and their population will increase.
- The increased predation will then reduce the population of the prey species.
- As the number of prey falls, intraspecific competition in the predator population will reduce its population size.


normal prey population
prey population increases
prey population increases
predator population increases as more food
prey population decreases because of more predators
predator population decreases as less food

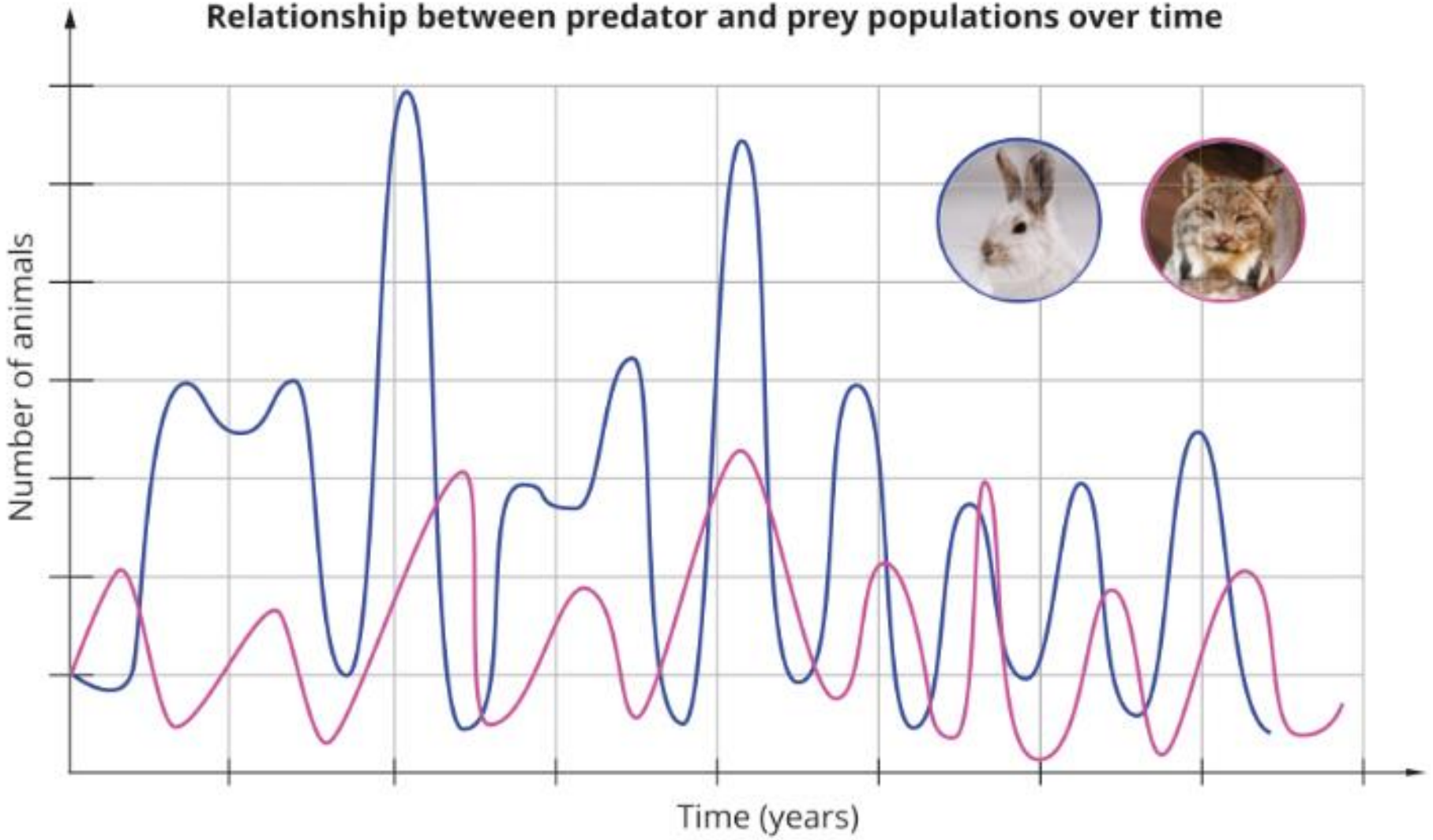
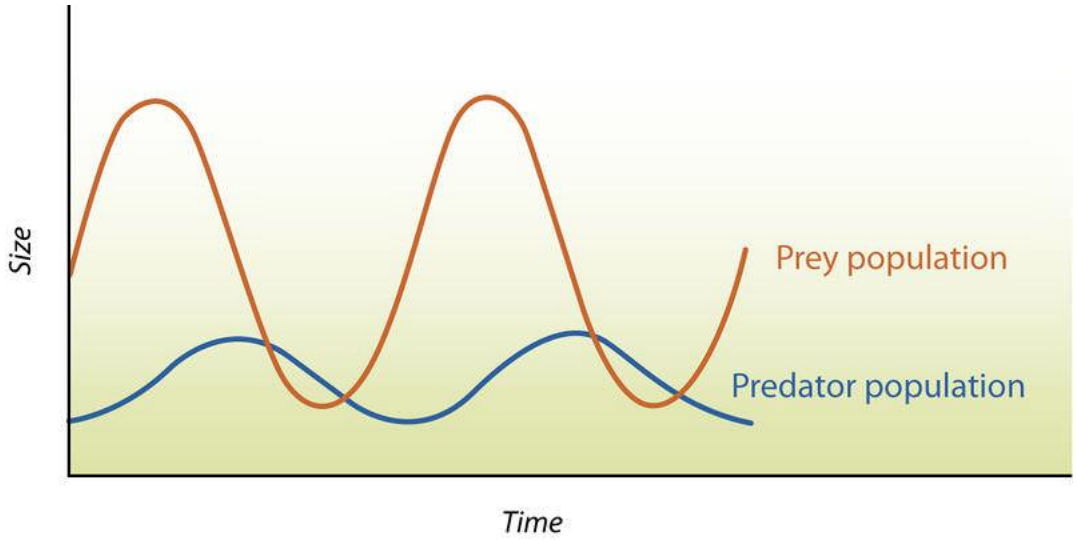
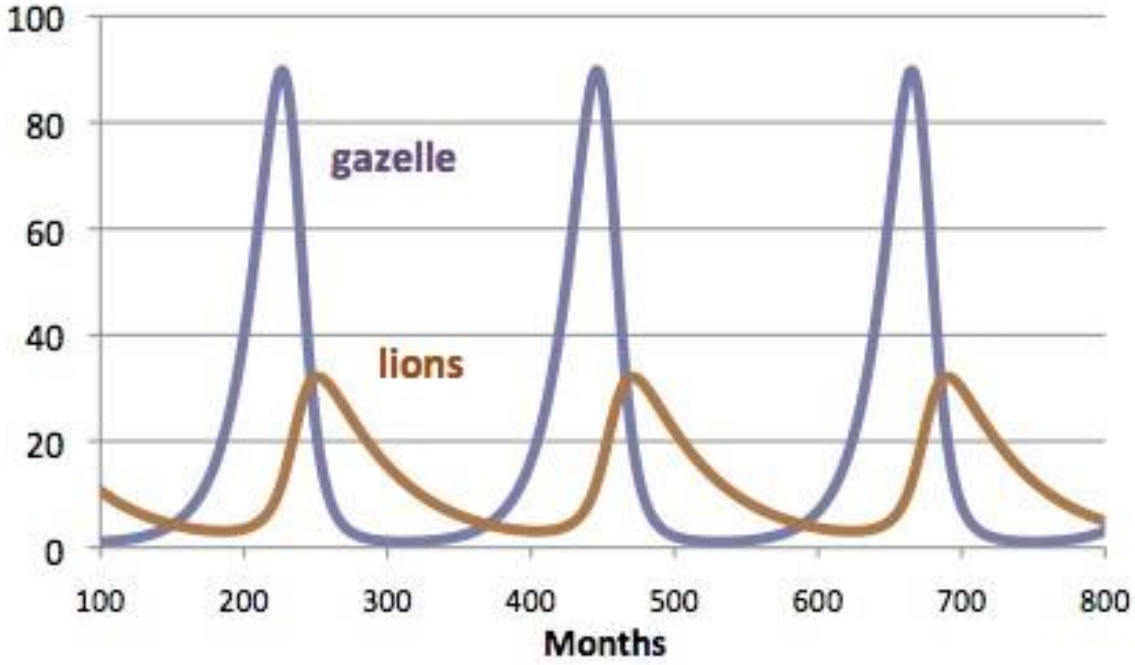
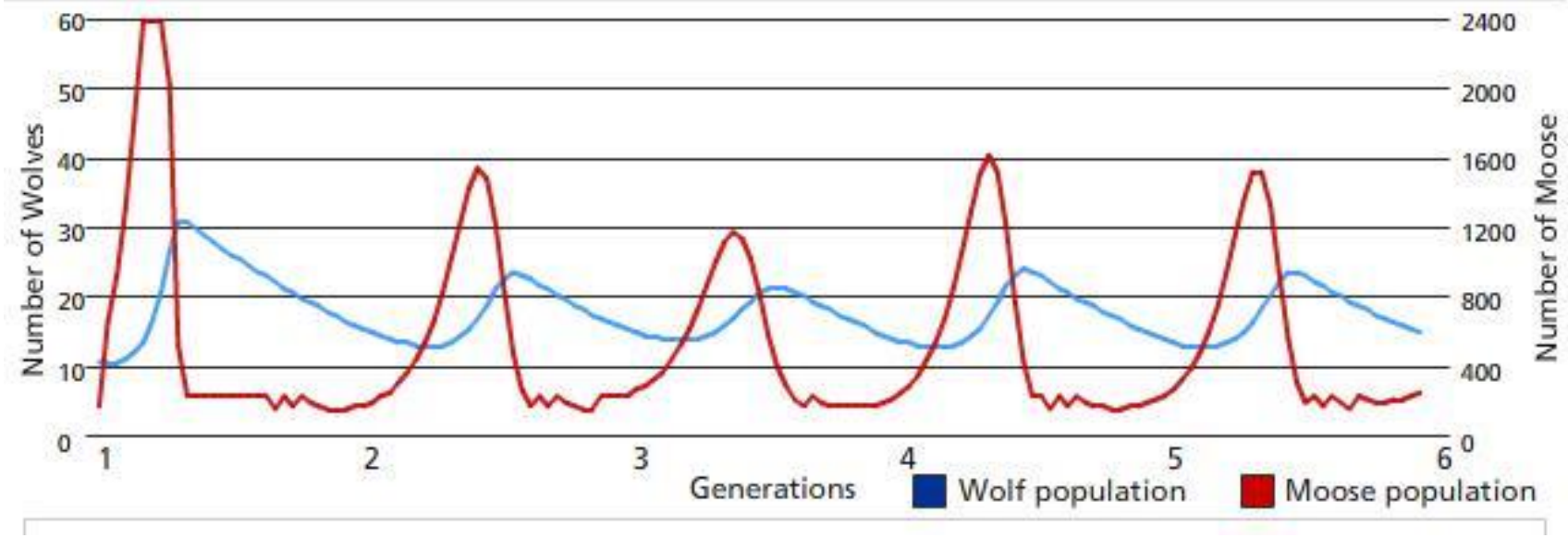


FIGURE 9.3.13 As the number of prey (snowshoe hares, indicated by the blue line) increases, so does the number of predators (Canadian lynxes, indicated by the pink line). Over time the prey population decreases as a result of predation, which leads to a decrease in the predator population.

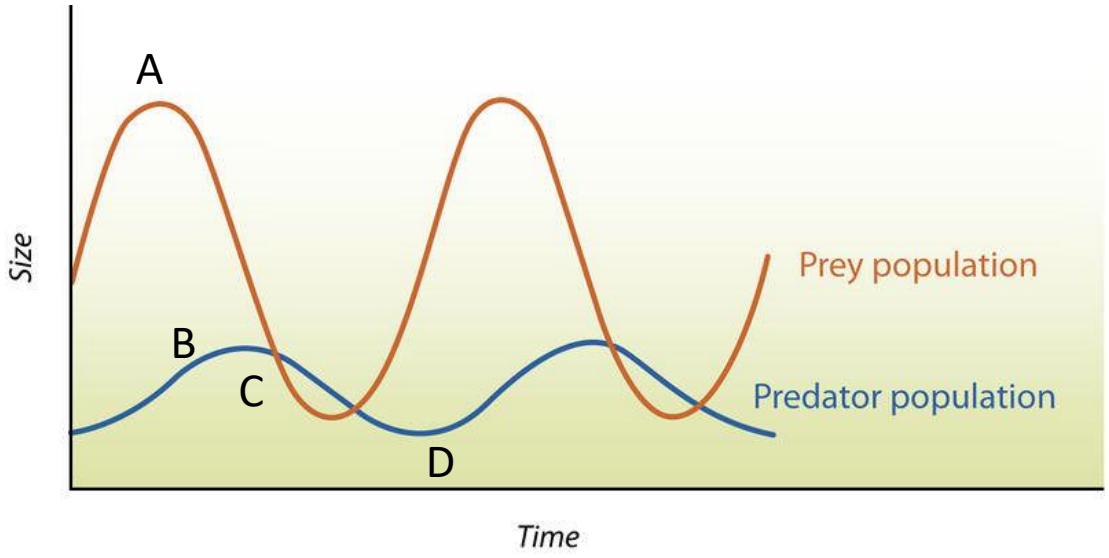
- number of predators influences the number of prey
- eg more foxes--> less rabbits
- But eventually less rabbits → less foxes
- Then less foxes → more rabbits




100
80
60
40
20
0
gazelle
lions
100
200
300
400
500
600
700
800
Months


60
50
40
30
20
10
0
Number of Wolves
2400
2000
1600
1200
800
400
0
Number of Moose
1
2
3
4
5
6
Generations
Wolf population
Moose population

Predator-prey relationships



A- high numbers of prey because ….

B- increasing population of predators because …..

C- decreasing numbers of prey because ….

D- low numbers of predators because ….