

# Populations



# Populations

- Definition: a group of individuals of the same species, living in a shared space at a specific point in time. Population may vary depending on season.

# Factors affecting population size

Increase in Population	Decrease in Population
Births Immigration	Deaths Emigration

## Stable population:

Exists when:

births + immigration

=

deaths + emigration

# Example 1

- In a seagull community: if 36 birds hatched, 15 flew away for the summer, 32 died and 1 emigrated. Was there an increase or decrease in the seagull population?

$$\text{Population change} = (I+B) - (E+D)$$

$$\text{Population change} = (36) - (15+32+1)$$

$$\text{Population change} = 36 - 48 = -12$$

decrease by 12

## Example 2

- In a population of birds there were 22 births. Four deaths were due to natural causes while three were shot by hunters. 15 new birds flew into the area because of the rich food source and none left. Was there an increase or a decrease in the population?

$$\text{Population change} = (I+B) - (E+D)$$

$$\text{Population change} = (22+15) - (4+3)$$

$$\text{Population change} = 37-7 = 30$$

increase by 30

# Population Density

- Definition:
  - the number of individuals per unit area or volume
  - formula:

$$\frac{\textit{\# individuals}}{\textit{space occupied}}$$

Units: km<sup>2</sup>, m<sup>2</sup>, mL or L

# Example 1

- What is the population density of clownfish per litre of water if 530 clownfish are found in 1000L of water?

$$\frac{\# \textit{ individuals}}{\textit{space occupied}}$$

$$\frac{530}{1000L}$$
$$0.53/L$$

## Example 2

- You counted 180 squirrels in a 200 km<sup>2</sup> area.  
How many would be found in 1 km<sup>2</sup>?

$$\frac{\# \text{ individuals}}{\text{space occupied}}$$

$$\frac{180}{200 \text{ km}^2}$$
$$0.9/\text{km}^2$$



# Factors Affecting Density

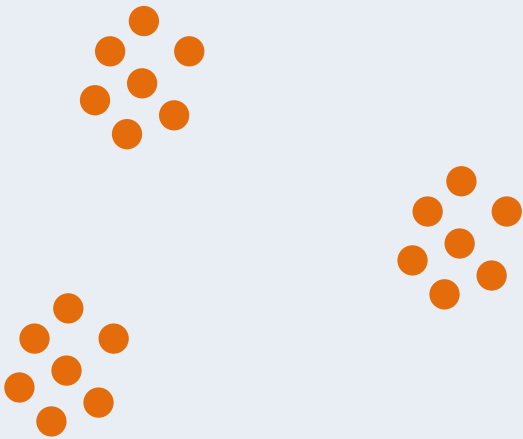
- Population density depends on many factors:
  - presence of food
  - presence of water
  - presence of predators
  - climate
  - amount of disease, parasites
  - natural disasters
  - human disasters

# Population Distribution

- Definition:
  - the way individuals are dispersed within their habitat.
- 3 types:
  - Clumped
  - Uniform
  - Random

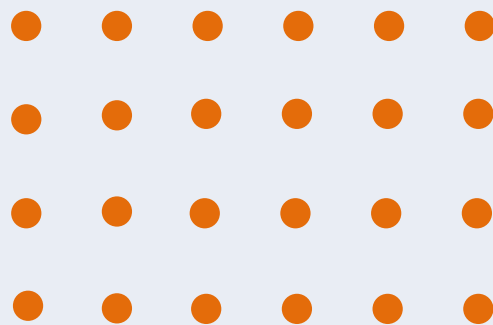
## Clumped

Population forms a group which stays and travels together. ex: fish schools and buffalo herds



## Uniform

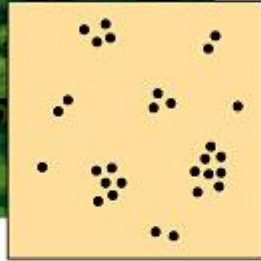
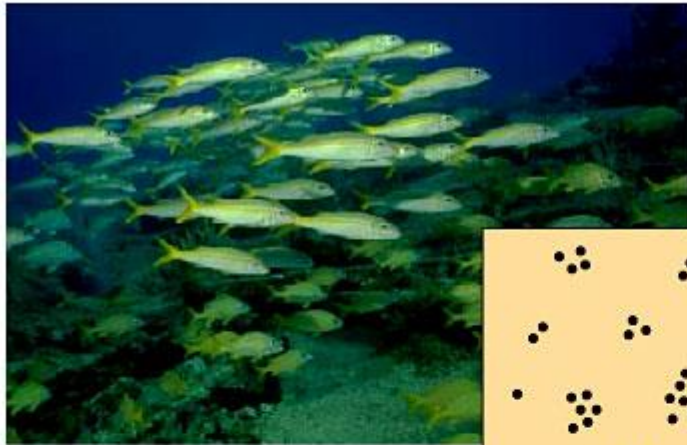
Population spread equally in its environment. ex: seals



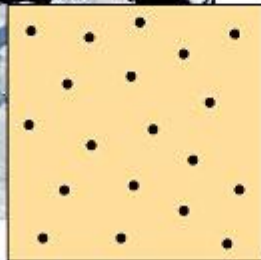
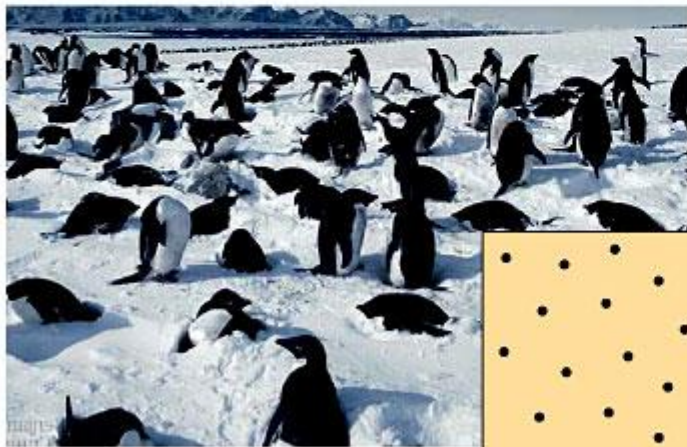
## Random

Population spread with no pattern. ex: Bushes and bee hives.

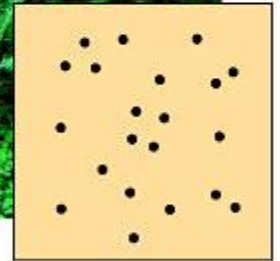




**(a) Clumped**



**(b) Uniform**



**(c) Random**

# Ecological Factors

- Definition:
  - an aspect of a habitat that will affect the organisms living there.
- 2 types:
  - Abiotic
  - Biotic

# Abiotic & Biotic Factors

<b>Abiotic</b>	<b>Biotic</b>
Non-living factors which affect an organism.	Living factors which affect an organism.
Ex: Amount of light, temperature and pH of soil/water	Ex: birth/death rate, disease, predation and food source

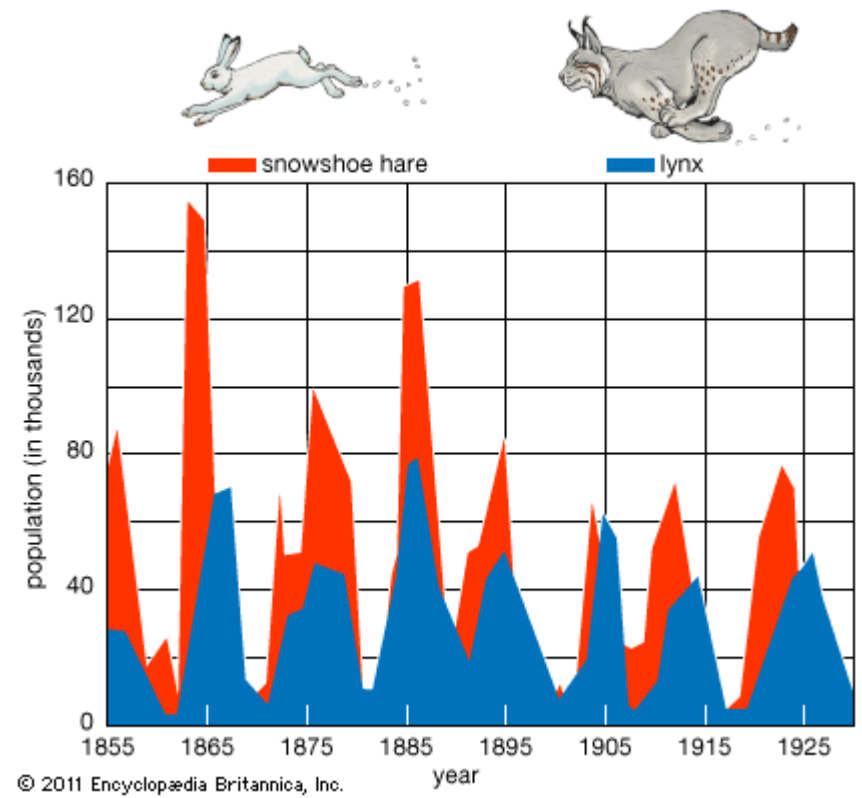
# Limiting Factor

- Definition:
  - ecological factor that causes the population density to **decrease**
- examples:
  - fires, drought, disease and hunting

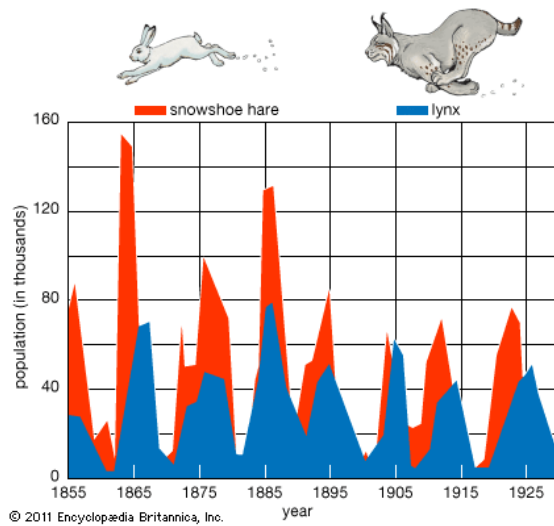
# Biological Cycles

- Definition:
  - Population of a species in an environment varying due to the predator/prey relationship.

ex. hare and lynx populations







Situation	Reaction	Explanation
increase in hare population	increase in lynx population	Lynx have more food
increase in lynx population	decrease in hare population	hares eaten by lynx
decrease in hare population	decrease in lynx population	not enough food for lynx
decrease in lynx population	increase in hare population	less lynx eating hare, hare can reproduce

# Other Cycles

