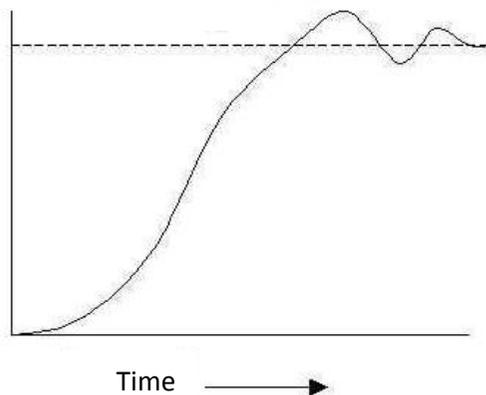


## Population growth curve

- The size of a population is determined by **natality** (birth rate), **mortality** (death rate), **emigration** (members leaving) and **immigration** (new members arriving)
- A population will increase as long as there are sufficient resources and other factors do not limit the population size. e.g. disease, space food availability etc.

### Four stages on graph:

1. Beginning; unlimited resources – growth seems slow because few individuals are breeding
2. Rapid growth; unlimited resources therefore high success rate of breeding organisms, so more individuals are being born, therefore more individuals to breed.
3. Slow phase; population numbers has reached **carrying capacity**: --- line. Resources become limited therefore natality = mortality.
4. Stabilising phase; the population numbers will fluctuate due to seasonal factors, some years there is more food, therefore more breeding success, therefore population rises a little. Other seasons resources are limited, less successful breeding, therefore population decreases.

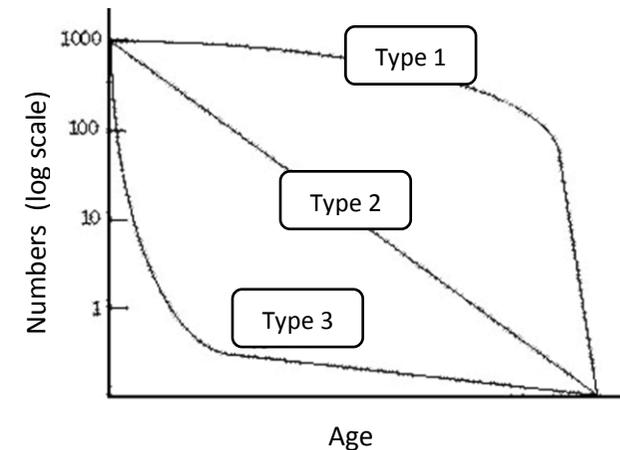


## Populations

A group of organisms of the same species living in an area at a specific time.

### Survivorship curves

- These show the number of individuals surviving to old age.
- Type 1: Organisms which have a high chance of surviving to adult generally produce few young and spend a lot of energy into their survival e.g. humans
- Type 2: Organisms which have a mortality rate constant throughout life e.g. rodents
- Type 3: Organisms which have a low chance of surviving to adult generally produce a large number of young and don't put any energy into their offspring's survival e.g. fish and plants



## Age pyramids

- These display the number of organisms alive in a particular age group within the population.
- Are used to decide if the population is increasing, decreasing or stable.
- The width of a pyramid indicates the number of organisms in each group.

### **Increasing population:**

Pre-reproductive large ★  
Post-reproductive small ■



### **Decreasing population:**

Pre-reproductive large  
Post-reproductive small



### **Stable population:**

Pre-reproductive, reproductive and post-reproductive sizes are about the same.



# Populations

## Limiting factors

- These are environmental factors (biotic and abiotic) that act to the population to regulate the growth and size of the population.
- **Density dependent factors;** factors which come into effect when the density of the population increases e.g. amount of food, water, nutrients, mates, nesting sites, predation, light (plants) etc. As the population increases these factors become in short supply resulting in **intraspecific** competition. Mortality increases and/or natality decreases.
- **Density independent factors;** factors that do not depend on the size of the population and are usually catastrophic events e.g. flood, bush fire etc.

## Population Distribution

- This is the pattern showing how individuals in a population are spread. The pattern is dependent on social relationships and distribution of resources.
- **Clumped;** organisms gather around resources e.g. water etc.
- **Uniform;** organisms are spread evenly around evenly distributed resources. e.g. gannets nesting.
- **Random;** no pattern, individuals spread randomly throughout the area.