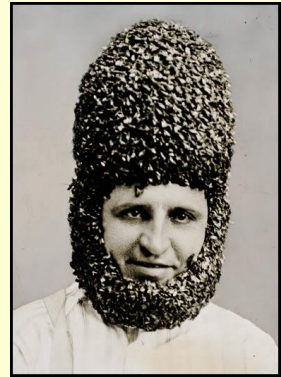## Population dynamics
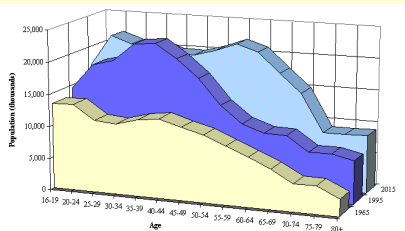### Understanding change

2013

2016

Lecture outline

- Age distributions
- Life tables
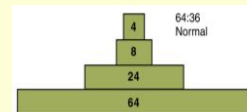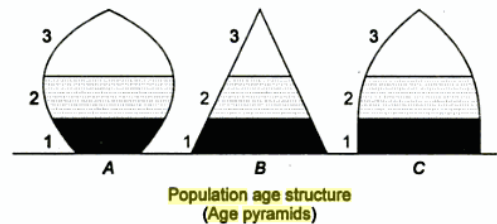- Survivorship curves
- Dispersal

Age structure

- AKA age distribution of populations
- Reflects natality and mortality
- Baby boomers
  - Born between 1946 and 1964
  - About 76 million of 'em

Age pyramids

Population age structure
(Age pyramids)

	64:36
4	Normal
8	
24	
64	

*

## A useful type of age structure

- **Stable age distribution**: proportions in each age group are ?
  - If so, birth and death rates for each age group are ?
- Assuming this stability, how will the abundance of a population change through time?
  - Up? Down? No change? Can't tell?

Age structure issues in plants

- Continuous age distribution?
- Age = size?
- Role of **seed banks**


Germinating seeds from restored wetland soils
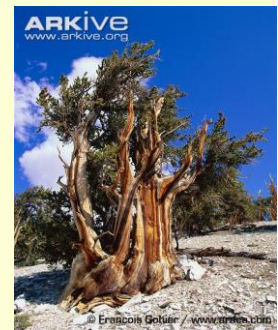
Bristlecone pine
(*Pinus longaeva*)

Life tables

- Putting mortality data together to
  - Determine probabilities of survivorship
  - Determine ages with highest mortality
  - Predict population growth
- Ideally, follow a **cohort**

Actuaries
Risk is Opportunity.

Right Otolith - Sulcus Side Down

Dorsal

Anterior

Posterior
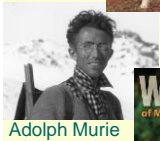
Ventral
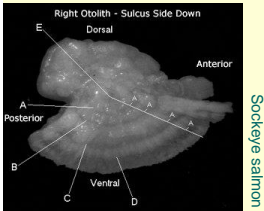
Sockeye salmon

Types of life tables

- **Cohort** or **Dynamic**: follow a single cohort
  - Shows _____ survivorship
  - When would this kind of life table be a challenge?
- **Dynamic-Composite**: follow multiple cohorts and then treat the data as one group
  - One critical assumption?
- **Time-specific** or **Static**: only sample once and age everything you encounter
  - Shows _____ survivorship
  - Many assumptions
- Leads to survivorship curves…

✳

Survivorship examples (I)
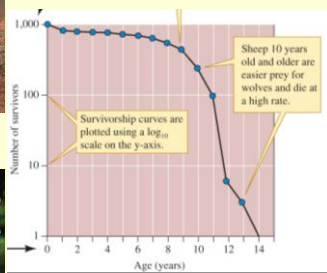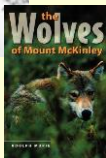
Fig. 10.13;
Dall sheep
Ovis dalli

Adolph Murie

the WOLVES of Mount McKinley

Sheep 10 years old and older are easier prey for wolves and die at a high rate.

Survivorship curves are plotted using a log₁₀ scale on the y-axis.

Fig. 10.14

Survivorship examples (II)

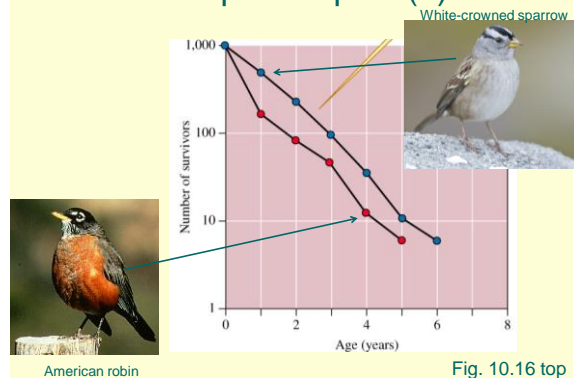White-crowned sparrow

American robin

Fig. 10.16 top

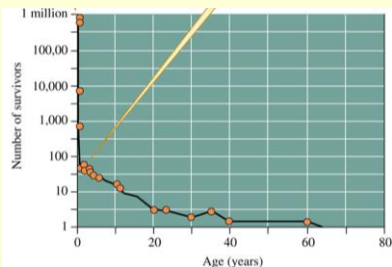## Survivorship examples (III)

Cleome droserifolia

Fig. 10.17

Dispersal movements

- **Immigration** and **emigration**
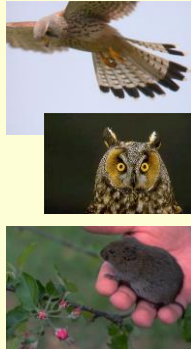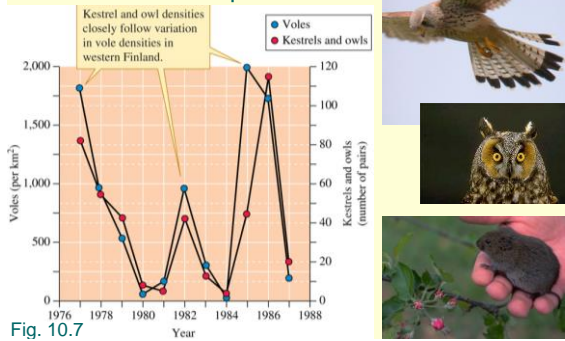 - Linked; depends on point of view
- Can be passive, active, or both

Burr

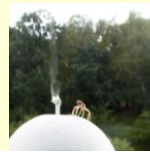Beauty berry

Dispersal: follow the food

• Numerical response

Kestrel and owl densities closely follow variation in vole densities in western Finland.

Legend: ● Voles ● Kestrels and owls

Fig. 10.7

Dispersal: ballooning

St. Andrew's Cross spiders
Australia

Dispersal: Population expansion

Cold winter temperatures will likely halt the northern spread of Africanized honeybees.

Africanized honey bees
Apis melifera

Africanized honeybees have not permanently colonized South America south of 34° S latitude.

Fig. 10.1

Migration

Ebird.org

December 26
Barn Swallow

Amur