

# Unit 10: Ecology

## Populations

# Characteristics of a Population:

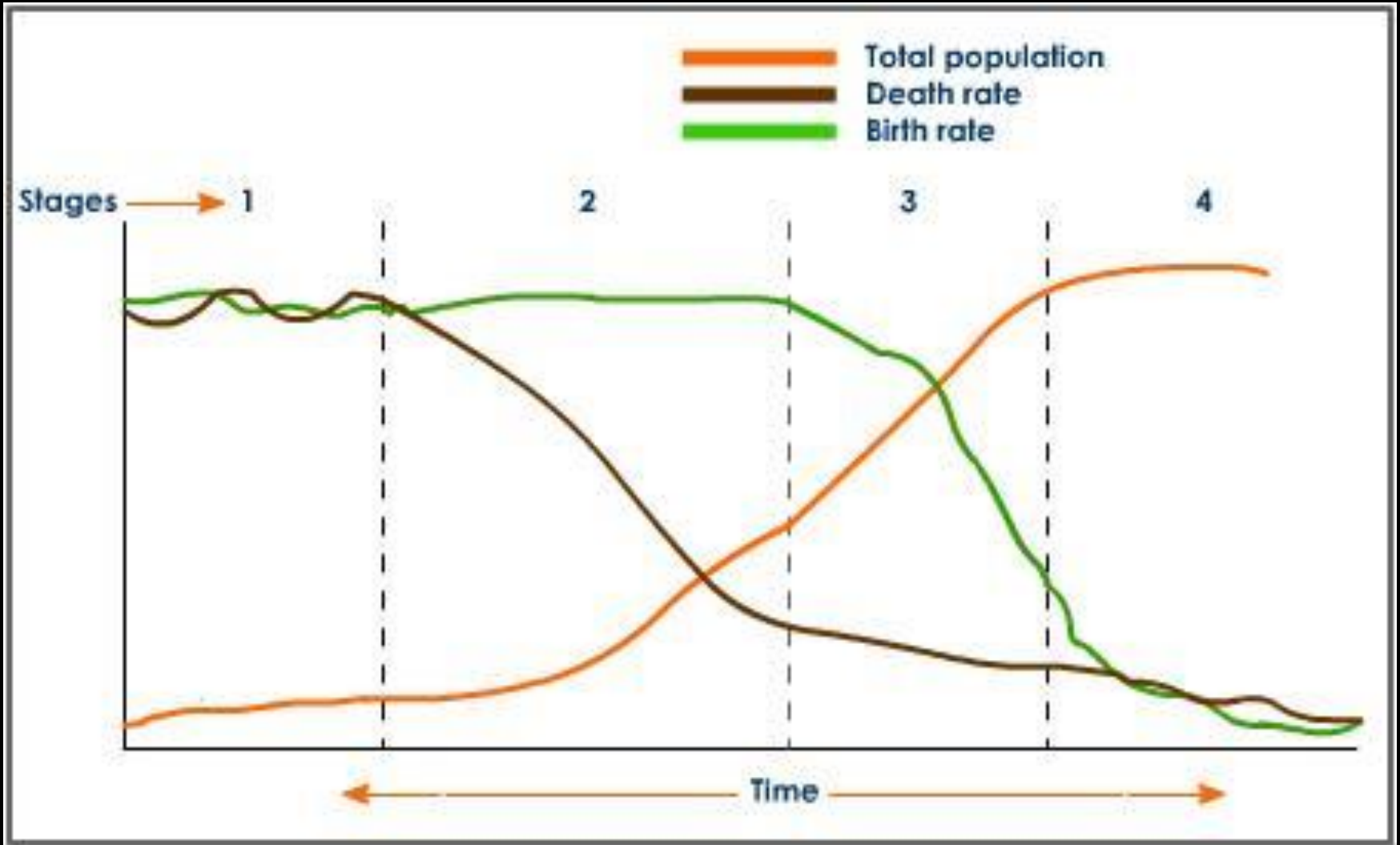
- Geographic distribution – where its located
- Density – how many people/organisms are in it
- Growth rate – how fast is the population growing

# What factors affect population size?

1. Number of births
2. Number of deaths
3. Individuals leaving/entering the population

# When does a population grow?

**BIRTH RATE > DEATH RATE!!!**



The human population is currently growing at an exponential rate. What does that mean about our birth and death rates?

- Birth rate is high
- Death rate is low

# World Population size

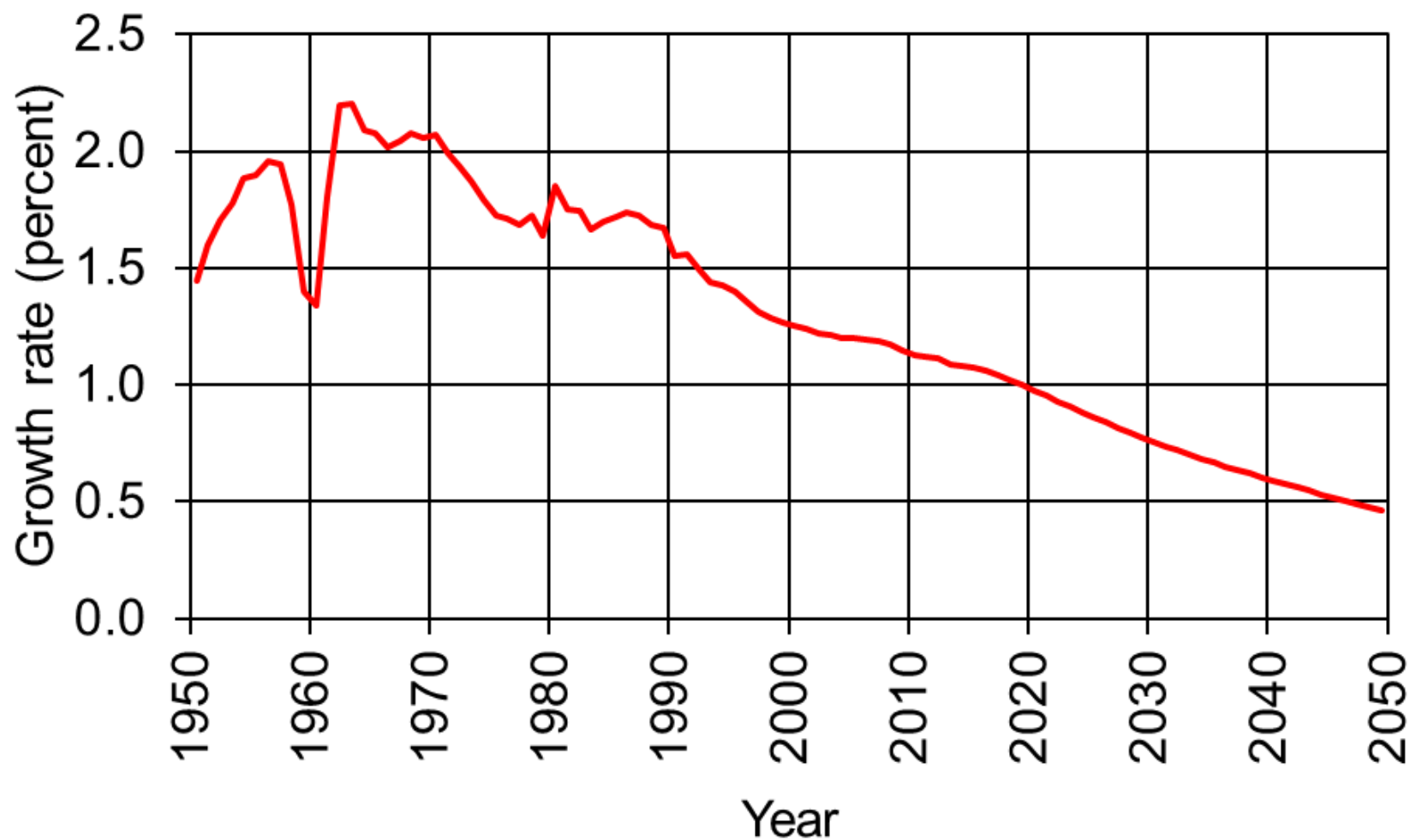
- <http://www.census.gov/popclock/>
- <http://www.worldometers.info/world-population/>

# How did we get to over 7 billion people?

- Dawn of agriculture (8000 B.C.) – 5 million
- 1800 – 1 billion
- 1930 – 2 billion
- 1959 – 3 billion
- 1974 – 4 billion
- 1987 – 5 billion

Why did it take SO long to reach the first billion people?

# World Population Growth Rates: 1950-2050



Source: U.S. Census Bureau, International Data Base, July 2015 Update.

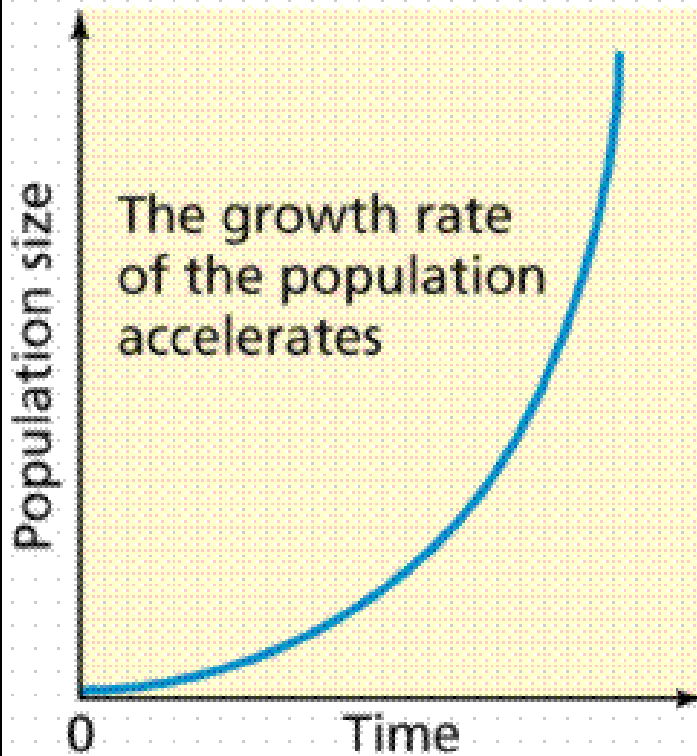


# Why are growth rates declining?

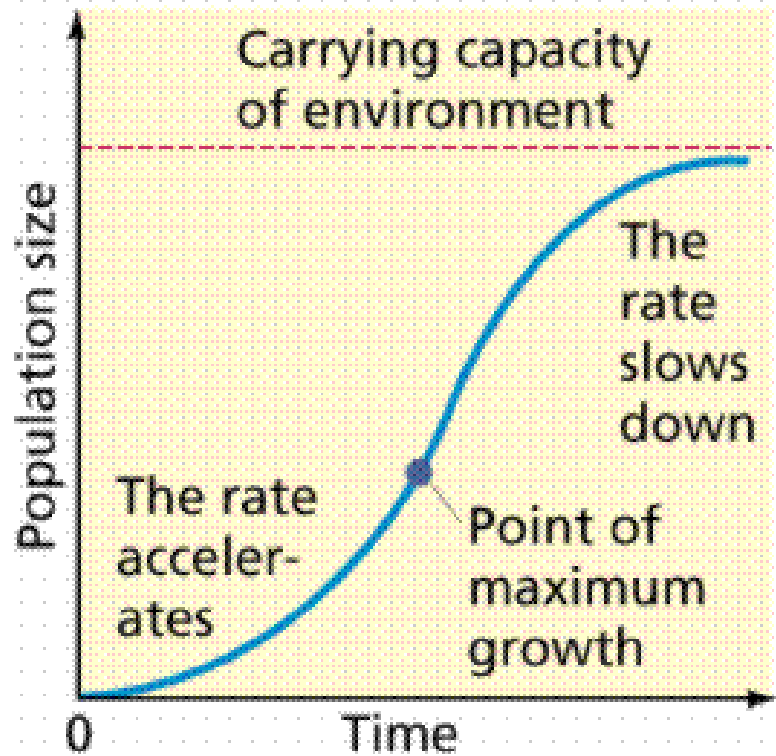
- United States – decrease in immigration
- Population aging (baby boomers)
- Lower fertility rates

# Two Modes of Population Growth:

(a) Exponential (unrestricted) growth



(b) Logistic (restricted) growth



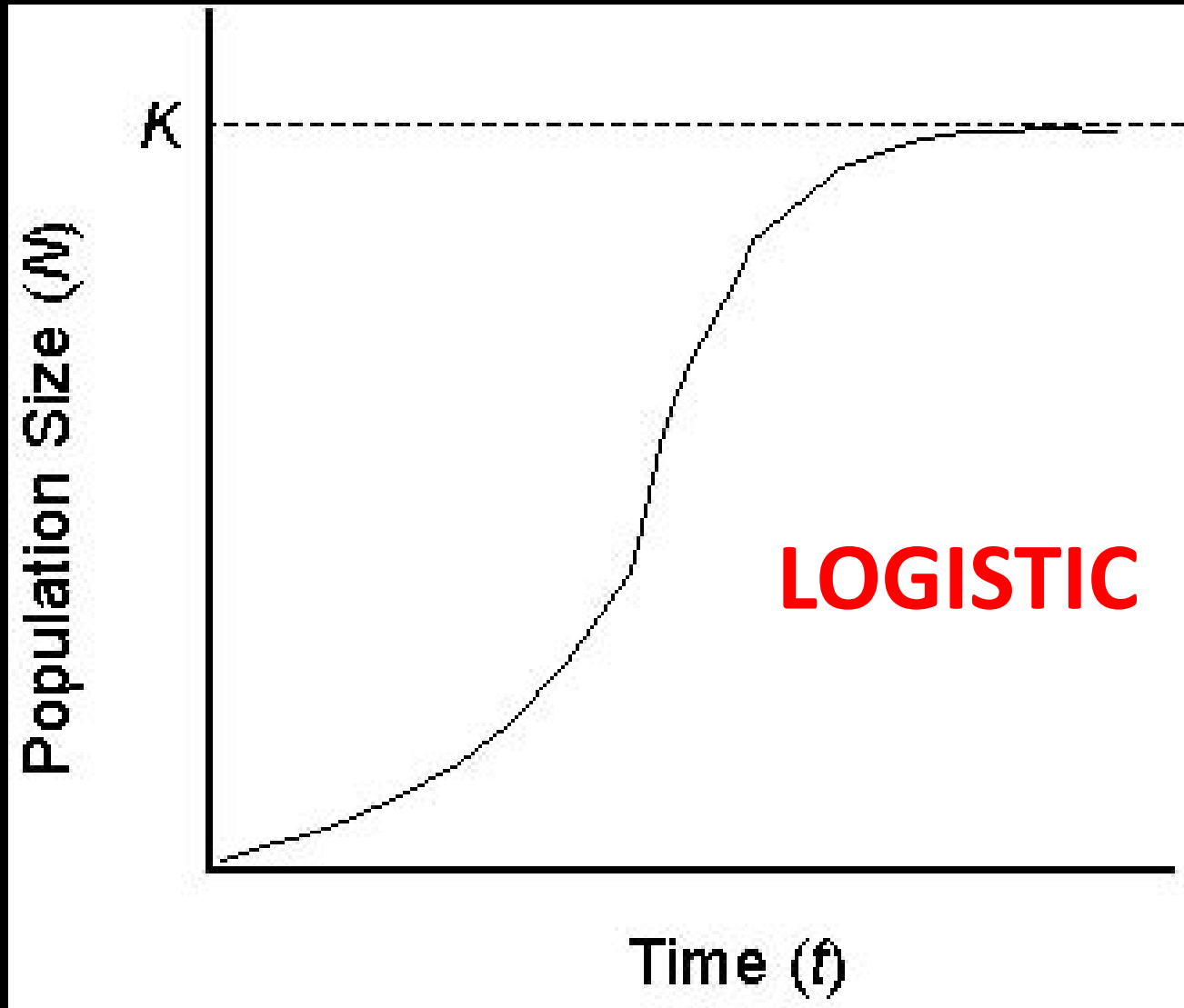
# Exponential Growth

- A population will grow exponentially (constant rate, without stopping) as long as there are:
  - Unlimited resources
  - No predation
  - No disease

# Logistic Growth

- Population grows until resources become unavailable (or lessen)
  - Growth rate slows or stops
- Levels off at a populations carrying capacity
  - Number of individuals an environment can support with its resources

Is this exponential or logistic growth?



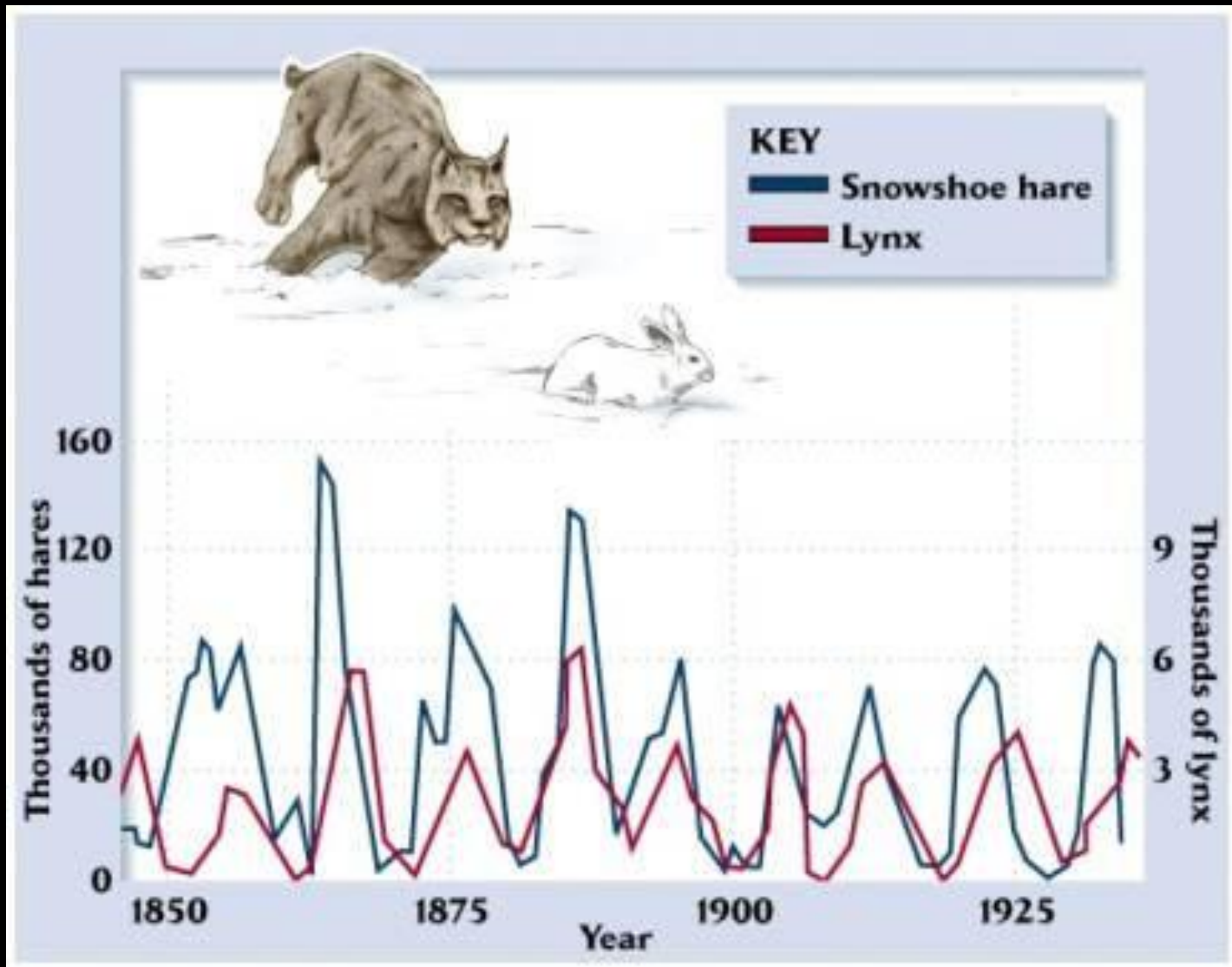
# Limiting Factors to Population Growth

- Limiting factors – a factor that causes a population to decrease
- Two types:
  1. Density-dependent
  2. Density-independent

# Density-Dependent Limiting Factors

- Affects large and dense populations
- Examples:
  - Competition
  - Predation
  - Parasitism
  - Disease

# Predator-Prey Cycles





# Density-Independent Limiting Factors

- Affects all populations regardless of size
- Examples:
  - Natural disasters
  - Seasonal cycle
  - Human activities – damming rivers, clear-cutting forests

# How can disease affect an ecosystem?

- Case Studies:
  - Dutch Elm Disease

# Dutch Elm Disease

- Affects Elm trees
  - Kills branches and eventually the entire tree
- Caused by a parasitic fungus
- Spread by elm bark beetles

