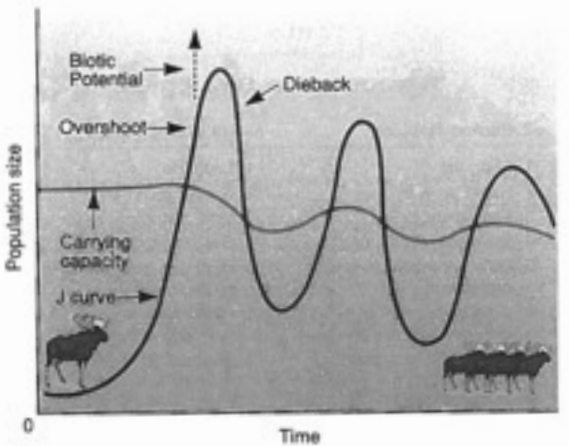


FIGURE 6.3 J curve, or exponential growth curve, with overshoot of carrying capacity. Exponential growth in an unrestrained population (left side of curve) leads to a population crash and oscillations below former levels. After the overshoot, carrying capacity may be reduced because of damage to the resources of the habitat. Moose on Isle Royale in Lake Superior may be exhibiting this growth pattern in response to their changing environment.

$$\frac{dN}{dt} = rN\left(1 - \frac{N}{K}\right)$$

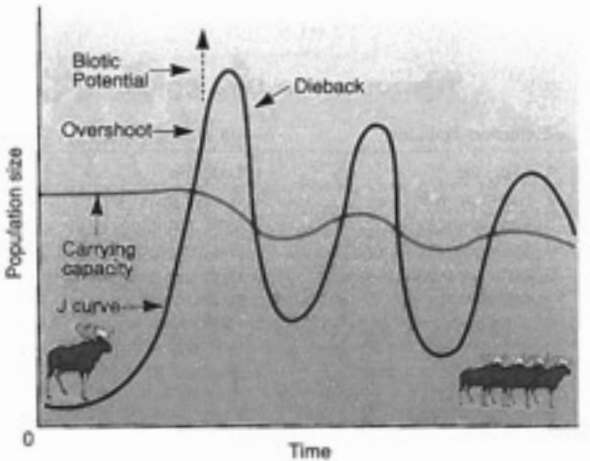


FIGURE 6.3 J curve, or exponential growth curve, with overshoot of carrying capacity. Exponential growth in an unrestrained population (*left side of curve*) leads to a population crash and oscillations below former levels. After the overshoot, carrying capacity may be reduced because of damage to the resources of the habitat. Moose on Isle Royale in Lake Superior may be exhibiting this growth pattern in response to their changing environment.

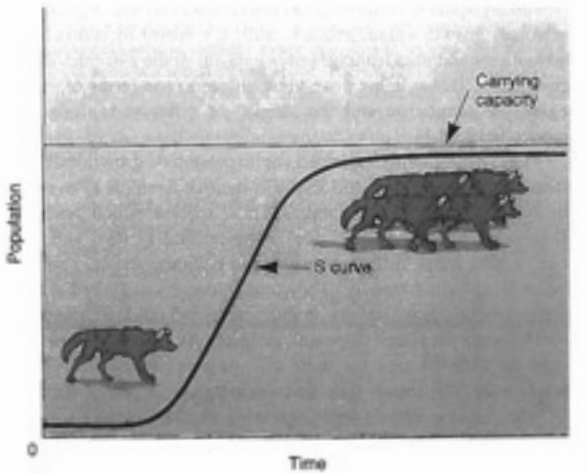


FIGURE 6.4 S curve, or logistic growth curve, describes a population's changing numbers over time in response to feedback from the environment or its own population density. Over the long run, a conservative and predictable population dynamic may win the race over an exponential population dynamic. Species with this growth pattern tend to be *K*-selected.

TABLE 6.1

Reproductive Strategies

r-Selected Species	*K*-Selected Species
1. Short life	1. Long life
2. Rapid growth	2. Slower growth
3. Early maturity	3. Late maturity
4. Many, small offspring	4. Few, large offspring
5. Little parental care and protection	5. High parental care or protection
6. Little investment in individual offspring	6. High investment in individual offspring
7. Adapted to unstable environment	7. Adapted to stable environment
8. Pioneers, colonizers	8. Later stages of succession
9. Niche generalists	9. Niche specialists
10. Prey	10. Predators
11. Regulated mainly by intrinsic factors	11. Regulated mainly by extrinsic factors
12. Low trophic level	12. High trophic level

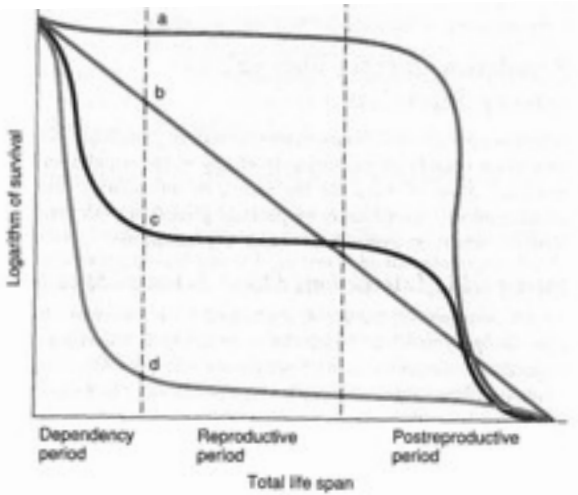


FIGURE 6.6 Four basic types of survivorship curves for organisms with different life histories. Curve (a) represents organisms such as humans or whales, which tend to live out the full physiological life span if they survive early growth. Curve (b) represents organisms such as sea gulls, which have a fairly constant mortality at all age levels. Curve (c) represents such organisms as white-tailed deer, which have high mortality rates in early and late life. Curve (d) represents such organisms as clams and redwood trees, which have a high mortality rate early in life but live a full life if they reach adulthood.

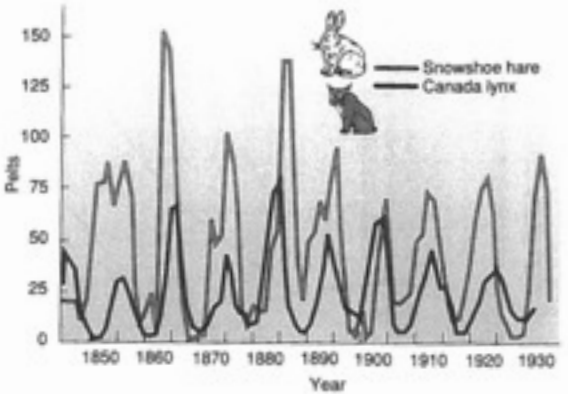


FIGURE 6.8 Ten-year oscillations in the populations of snowshoe hare and lynx in Canada suggest a close linkage of predator and prey, but may not tell the whole story. These data are based on the number of pelts received by the Hudson Bay Company each year, meaning fur-traders were unwitting accomplices in later scientific research.
Source: Data from D. A. MacLulich, *Fluctuations in the Numbers of the Varying Hare* (Lepus americus).Toronto: University of Toronto Press, 1937, reprinted 1974.

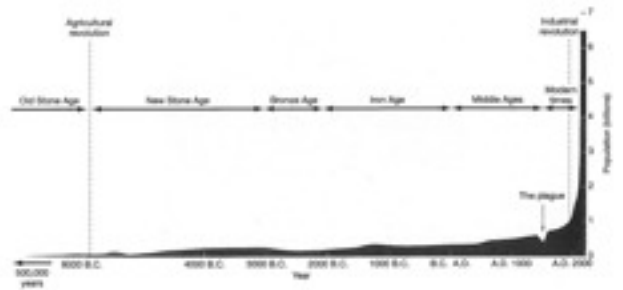


FIGURE 7.3 Human population levels through history. Since about A.D. 1000, our population curve has assumed a J shape. Are we on the upward slope of a population overshoot? Will we be able to adjust our population growth to an S curve? Or can we just continue the present trend indefinitely?

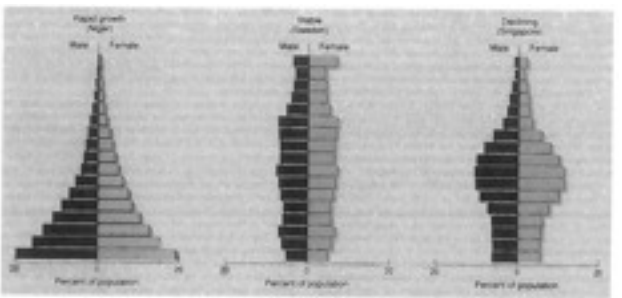


FIGURE 7.11 Age structure graphs for rapidly growing, stable, and declining populations.
Sources: U.S. Census Bureau, 2006.

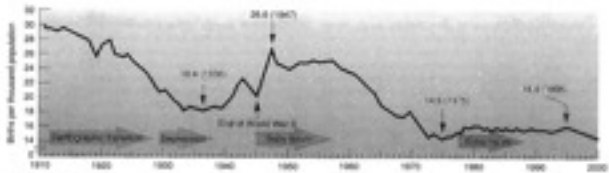


FIGURE 7.14 Birth rates in the United States, 1910-2000. The falling birth rate from 1910 to 1929 represents a demographic transition from an agricultural to an industrial society. The baby boom following World War II lasted from 1945 to 1965. A much smaller "echo boom" occurred around 1990 when the baby boomers started to reproduce.
Sources: Data from Population Reference Bureau and U.S. Bureau of the Census.

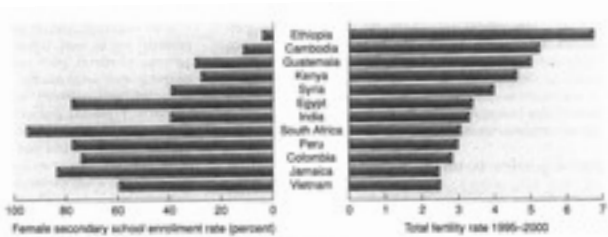
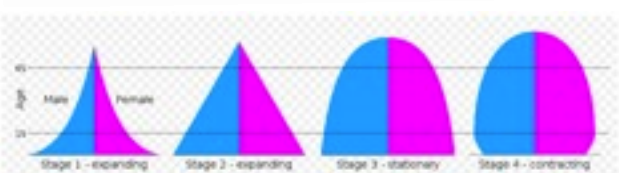
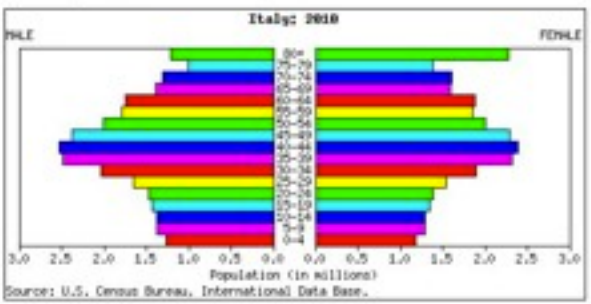


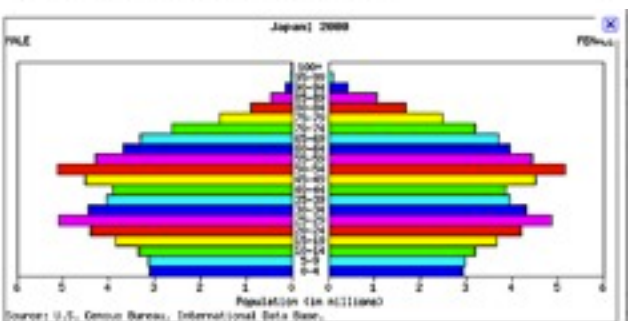
FIGURE 7.17 Total fertility declines as women's education increases.
Source: Worldwatch Institute, 2000.

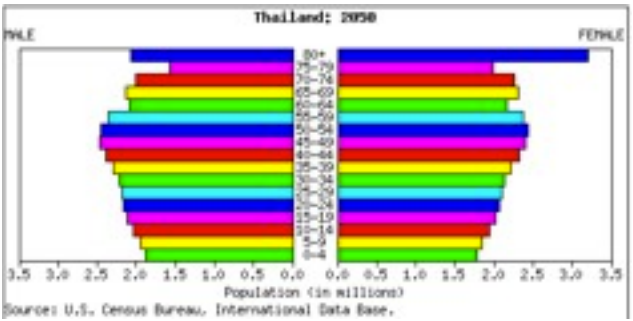


Italy Population Pyramid for 2010

Predicted age and sex distribution for the year 2010:






Thailand: 2050
MALE
FEMALE
80+
75-79
70-74
65-69
60-64
55-59
50-54
45-49
40-44
35-39
30-34
25-29
20-24
15-19
10-14
5-9
0-4
3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5
Population (in millions)
Source: U.S. Census Bureau, International Data Base.