I. Ecology of Populations

A. Population properties

B. Population dynamics

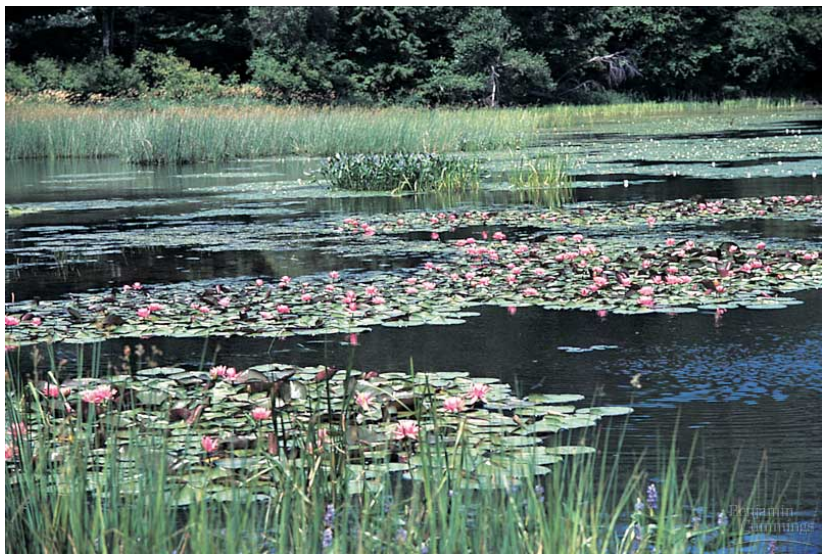
1. Why study population dynamics

2, Processes that determine population dynamics

3. Models of population growth

a. The exponential model

b. The logistic model



Ecology

the study of the distribution and abundance of organisms

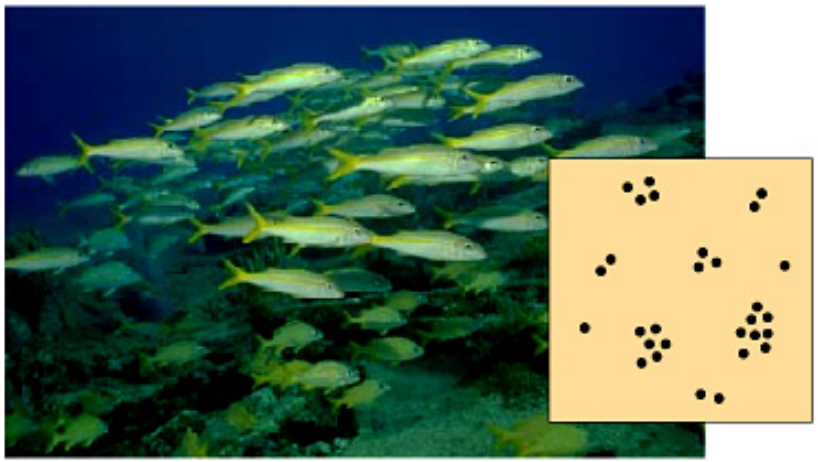
Populations with clumped dispersion patterns

Populations with uniform dispersion patterns

King penguins

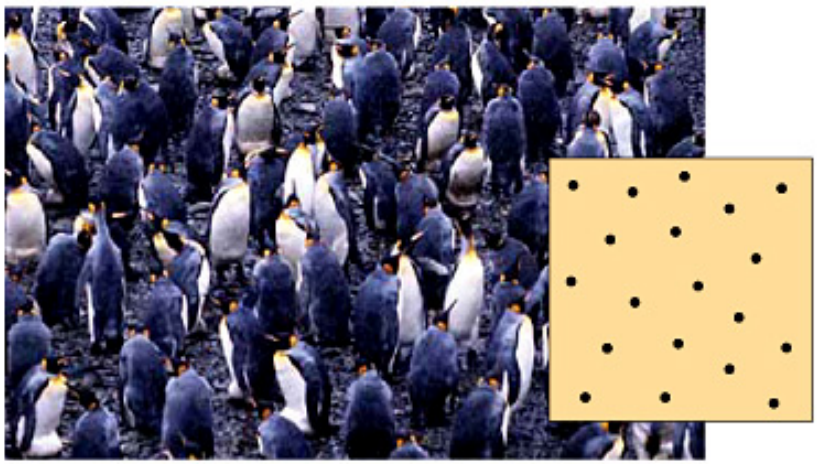
Nesting gannets

Fig. 52.2



(a) Clumped

(c) Random



(b) Uniform

$$\Delta N/\Delta t = B_{irths} - D_{eaths} + I_{mmigration} - E_{migration}$$

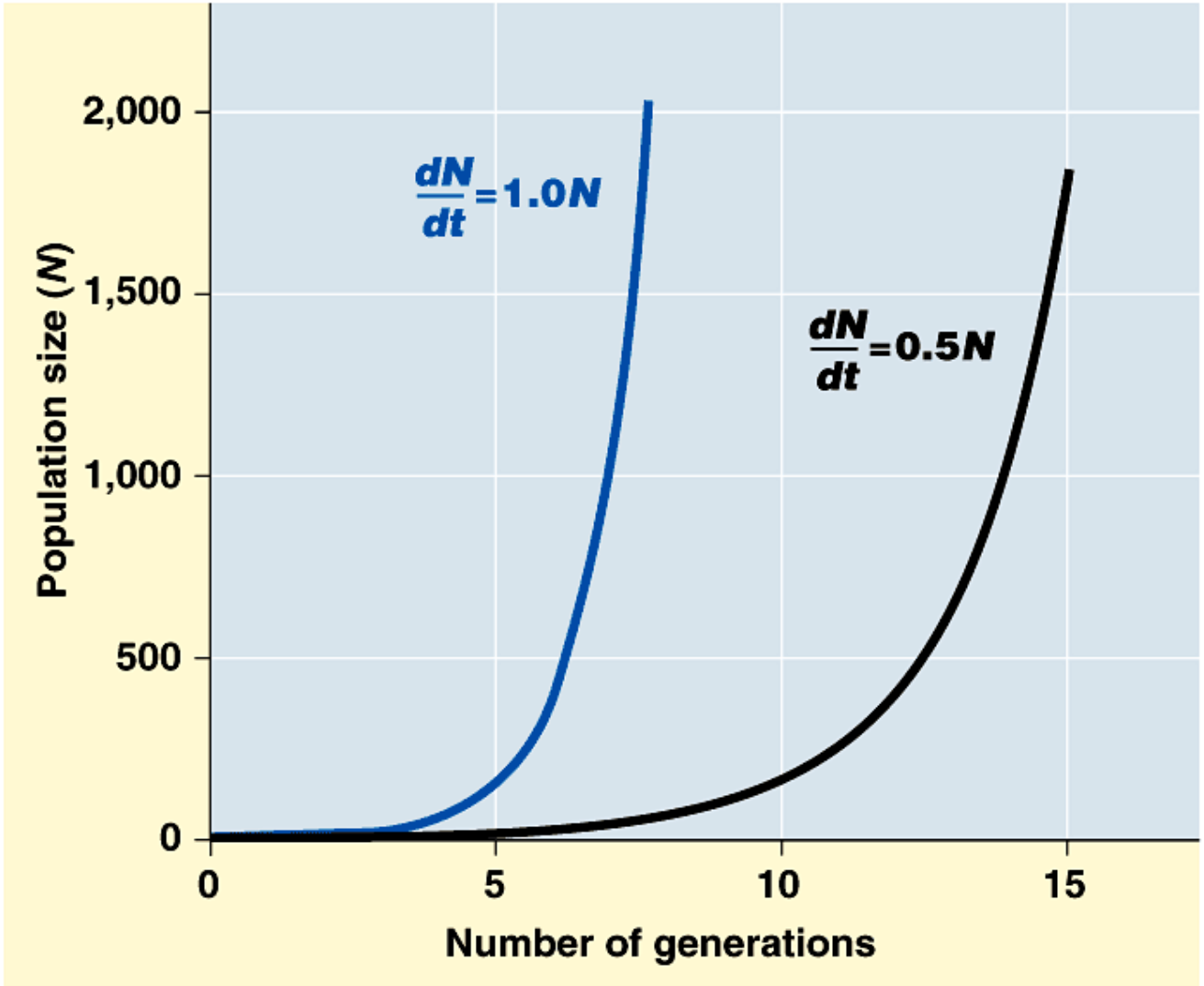
$dN/dt = rN$

$r > 0$ population will grow

$r = 0$ population won’t change

$r < 0$ population will shrink

Fig. 52.8 The exponential model for population growth



Using the exponential model to predict population size in the future

$$N_t = N_0 e^{rt}$$

N_t = Number of individuals in the population at time = t

N_0 = Number of individuals in the population at start

E = base of natural logs

r = per capita rate of increase

t = time

If you know N_0 and r, you can predict N_t

dN/dt = r N [(K - N)/K]

For: r=0.1 K=100

if N = 10 dN/dt = .1 (10) [(100 - 10)/100]
= .1 (10) (.9)
= .9

if N = 99 dN/dt = .1 (99) [(100 - 99)/100]
= .1 (99) (.01)
= .099

Fig. 52.11 The patterns of exponential and logistic population growth