

Chapter 9 Summary

9-1 Population Dynamics and Carrying Capacity

Population dynamics occur in response to environmental stress and changes in environmental conditions. As a result, a population can change in its size, density, dispersion, and age structure.

A population's theoretical capacity for growth is described by its **biotic potential**. However, **environmental resistance** limits actual population growth. Together, biotic potential and environmental resistance determine a population's **carrying capacity (K)**. Populations that exceed their carrying capacity can suffer from a dieback or crash of their numbers.

The **intrinsic rate of increase (r)** of many species depends on having the minimum viable population (MVP). During exponential growth, a population's growth rate increases with time. With **logistic growth**, the growth rate decreases as the population gets larger. The population stabilizes near carrying capacity.

Unseasonable weather and habitat loss are examples of density-independent population controls. Competition and disease are examples of density-dependent population controls.

There are four general types of population fluctuations in nature: stable, irruptive, irregular, and cyclic.

9-2 Reproductive Patterns and Survival

Asexual reproduction produces exact genetic copies (clones) of a parent. **Sexual reproduction** produces combinations of parental traits.

Species are characterized by their reproductive patterns as **r-selected species** or **K-selected species**. Most organisms have reproductive patterns between the two extremes, or change from one extreme to the other with environmental conditions. A **survivorship curve** shows the number of survivors of each age group for a particular species. Early loss curves are typical for r-selected species, late loss curves for K-selected species, and constant loss curves for species with intermediate reproductive patterns.

9-3 Effects of Genetic Variations on Population Size

Factors that can play a role in a population's survival and genetic diversity are the founder effect, demographic bottlenecks, inbreeding, and genetic drift. Metapopulations occur when geographically separated populations meet and mate.

9-4 Human Impacts on Natural Systems: Learning from Nature

Human activities have fragmented and degraded habitat, simplified ecosystems, strengthened some pest species, eliminated some predators, introduced nonnative species, overharvested renewable resources, overused and wasted too much of the

earth's net primary productivity, and interfered with normal chemical cycling and energy flow of ecosystems.

By observing nature, ecologists have identified three principles of sustainability that operate in nature:

1. Our lives are dependent on the sun and earth.
2. Everything is connected to and interdependent with everything else.
3. We can never do merely one thing.