Deformity and Decline in Amphibian Populations: A Case Study

Introduction

CONCEPT 1.1 Events in the natural world are interconnected.

Connections in Nature

- Early observations suggest that parasites cause amphibian deformities
- A laboratory experiment tests the role of parasites
- A field experiment suggests that multiple factors influence frog deformities
- Connections in nature can lead to unanticipated side effects

CONCEPT 1.2 Ecology is the scientific study of interactions between organisms and their environment.

What Is Ecology?

- Public and professional ideas about ecology often differ
- The scale of an ecological study affects what can be learned from it
- Ecology is broad in scope
- Some key terms are helpful for studying connections in nature

CONCEPT 1.3 Ecologists evaluate competing hypotheses about natural systems with observations, experiments, and models.

Answering Ecological Questions

- Ecologists use experiments, observations, and models to answer ecological questions
- Experiments are designed and analyzed in consistent ways
- ECOLOGICAL TOOLKIT 1.1 Designing Ecological Experiments
- What we know about ecology is always changing

A Case Study Revisited: Deformity and Decline in Amphibian Populations

- ANALYZING DATA 1.1 Are introduced predators a cause of amphibian decline?
Climate Variation and Salmon Abundance: A Case Study

Introduction

CONCEPT 2.1 Climate is the most fundamental component of the physical environment.

Climate

- Climate controls where and how organisms live
- Global energy balance drives the climate system

CONCEPT 2.2 Winds and ocean currents result from differences in solar radiation across Earth’s surface.

Atmospheric and Oceanic Circulation

- Atmospheric circulation cells are established in regular latitudinal patterns
- Atmospheric circulation cells create surface wind patterns
- Ocean currents are driven by surface winds

CONCEPT 2.3 Large-scale atmospheric and oceanic circulation patterns establish global patterns of temperature and precipitation.

Global Climate Patterns

- Oceanic circulation and the distribution and topography of continents influence global temperatures
- Patterns of atmospheric pressure and topography influence precipitation

CONCEPT 2.4 Regional climates reflect the influence of oceans and continents, mountains, and vegetation.
Regional Climate Influences

- Proximity to oceans influences regional climates
- Mountains influence wind patterns and gradients in temperature and precipitation
- Vegetation affects climate via surface energy exchange
- ANALYZING DATA 2.1 How do changes in vegetation cover influence climate?

CONCEPT 2.5 Seasonal and long-term climate variation are associated with changes in Earth’s position relative to the sun.

Climate Variation over Time

- Seasonality results from the tilt of Earth’s axis
- Seasonal changes in aquatic environments are associated with changes in water temperature and density
- Climate variation over years and decades results from changes in atmospheric pressure cells
- Long-term climate change is associated with variation in Earth’s orbital path

CONCEPT 2.6 Salinity, acidity, and oxygen concentrations are major determinants of the chemical environment.

The Chemical Environment

- All waters contain dissolved salts
- Organisms are sensitive to the acidity of their environment
- Oxygen concentrations vary with elevation, diffusion, and consumption

A Case Study Revisited: Climate Variation and Salmon Abundance

Connections in Nature: Climate Variation and Ecology