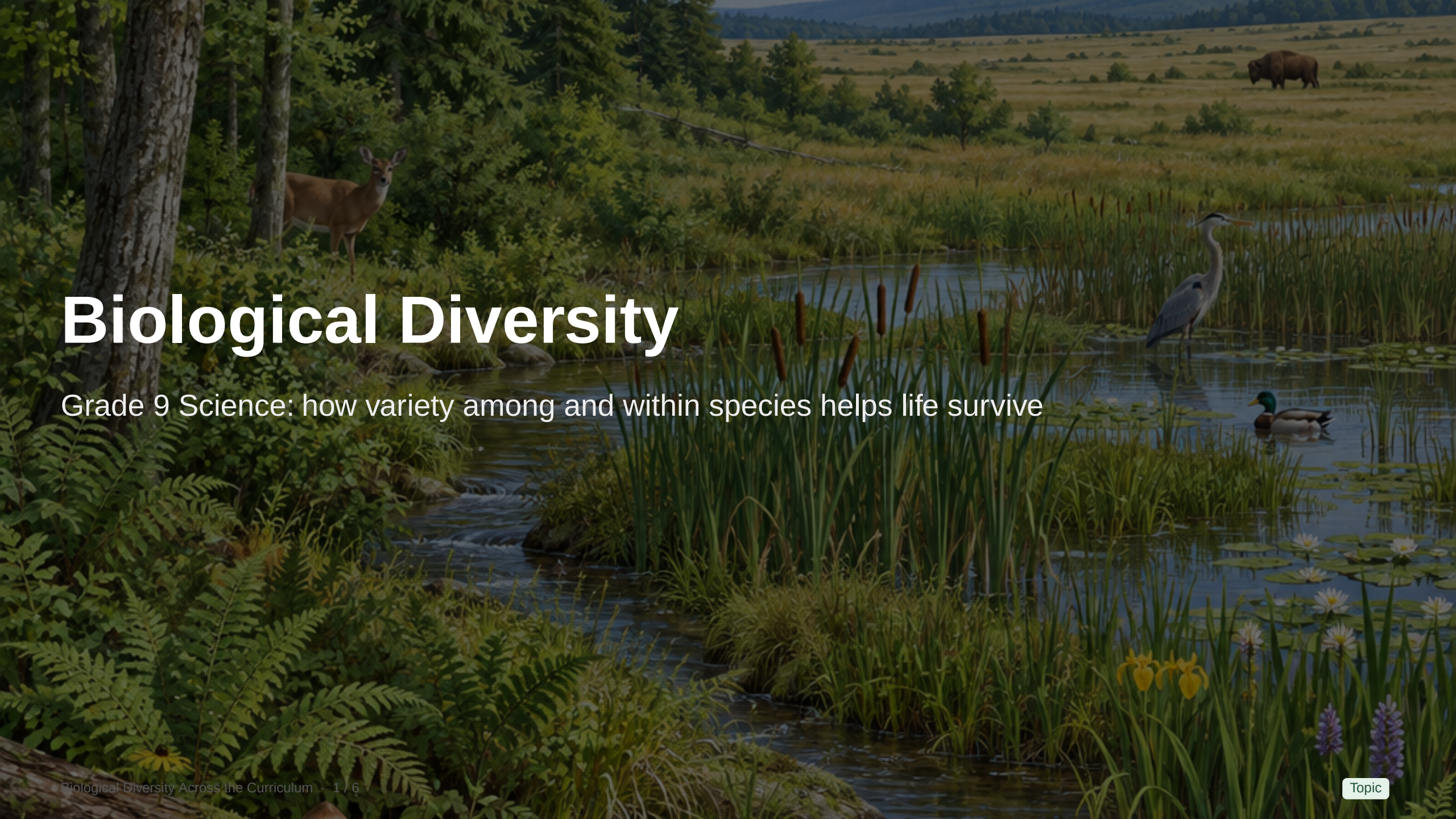




Biological Diversity

Grade 9 Science: how variety among and within species helps life survive

Grade 9 Science: What Is Biological Diversity?

- Biological diversity shows up as the range of species in an environment and as variation within a single species.
- Diversity is maintained through sexual and asexual reproduction, passed from parents to offspring.
- Variation among and within species helps organisms survive in a shared ecosystem, such as different bird species using different niches in a park.
- Symbiotic relationships link species together and are classified as mutualism, commensalism or parasitism.
- Variation helps species survive changing conditions, such as disease resistance or tolerance of harsh environments.

Grade 9 Science: Passing Traits to the Next Generation

Reproduction and Inheritance

Sexual and asexual reproduction both transmit species characteristics, including binary fission, budding, spore production and cross-fertilization. Offspring traits can match one parent, both parents, fall in between, or differ from both. Chromosomes, genes and DNA store genetic information, and meiosis halves genetic material to form sex cells.

Selection and Human Impact

Natural and artificial selection both shape which characteristics persist, as seen in bird beak shapes or high milk production in dairy cows. Human activity drives extinction and extirpation of species, and strategies like zoo breeding programs, seed banks and protected areas aim to limit diversity loss.

Biology 20: Ecosystems Support Diversity

1

Ecosystem structure

Terrestrial and aquatic ecosystems each have distinct biotic and abiotic characteristics.

2

Habitats and niches

Layers such as canopy, forest floor, littoral and profundal zones support many organisms.

3

Classifying organisms

Taxonomy and binomial nomenclature organize species by nutrition mode and morphology.

4

Populations change

Heritable mutations create variability, and some mutations offer a selective advantage.

Biology 30: Populations, Gene Pools and Communities

Community as gene pool

A community is a composite of populations whose individuals contribute to a gene pool that can change over time.

Forces of change

Gene pool diversity shifts through natural selection, genetic drift, gene flow, nonrandom mating, bottleneck and founder effects, migration and mutation.

Quantitative tools

Population genetics, including the Hardy-Weinberg principle, and population growth curves let scientists measure change over time.

Interactions matter

Individuals interact within and between populations, shaping community dynamics and succession.

Diversity, Traced Across Three Courses

Grade 9 Science introduces biological diversity as variation among and within species, maintained by reproduction and threatened by human activity. Biology 20 extends this into ecosystem structure, niches and natural selection. Biology 30 adds the quantitative study of gene pools and population change over time.

If a local wetland lost half its plant species tomorrow, which animal species do you think would be affected first, and why?