



## Ohio Academic Standards Addressed By Zoo Program

### GUIDED TOUR—PROTECTING BIODIVERSITY (K-12)

Program description:

Develop an awareness of the dangers that animals and natural habitats now face. Discuss how we can help solve the problems.

Ohio Science Standards addressed by this program, organized by grade bands and then standard:

### GRADES K-2

#### **Standard: Life Sciences**

**Benchmark A:** Discover that there are living things, non-living things and pretend things, and describe the basic needs of living things (organisms).

##### **Indicators:**

###### Grade 1

1. Explore that organisms, including people, have basic needs which include air, water, food, living space and shelter.
4. Investigate that animals eat plants and/or other animals for food and may also use plants or other animals for shelter and nesting.

###### Grade 2

1. Explain that animals, including people, need air, water, food, living space and shelter; plants need air, water and nutrients (e.g., minerals), living space and light to survive.
5. Explain that food is a basic need of plants and animals (e.g., plants need sunlight to make food and to grow, animals eat plants and/or other animals for food, food chain) and is important because it is a source of energy (e.g., energy used to play, ride bicycles, read, etc.).

**Benchmark B:** Explain how organisms function and interact with their physical environment.

##### **Indicators**

###### Grade 2

3. Explain why organisms can survive only in environments that meet their needs (e.g., organisms that once lived on Earth have disappeared for different reasons such as natural forces or human-caused effects).

#### **Standard: Science and Technology**

**Benchmark A:** Explain why people, when building or making something, need to determine what it will be made of, how it will affect other people and the environment.

##### **Indicators:**

###### Kindergarten

2. Explore that some kinds of materials can be used over and over again (e.g., plastic or glass containers, cardboard boxes and tubes).

Grade 1

3. Identify some materials that can be saved for community recycling projects (e.g., newspapers, glass and aluminum).
5. Identify how people can save energy by turning things off when they are not using them (e.g., lights and motors).

Grade 2

3. Predict how building or trying something new might affect other people and the environment.

**Standard:** Scientific Inquiry

**Benchmark A:** Ask a testable question.

**Indicators:**

Kindergarten

1. Ask “what if” questions.

Grade 1

1. Ask “what if” questions.

Grade 2

1. Ask “how can I/we” questions.

**Standard:** Scientific Ways of Knowing

**Benchmark B:** Recognize the importance of respect for all living things.

**Indicators:**

Kindergarten

3. Interact with living things and the environment in ways that promote respect.

Grade 2

3. Describe ways in which using the solution to a problem might affect other people and the environment.

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**GRADES 3-5**

**Standard:** Life Sciences

**Benchmark A:** Differentiate between the life cycles of different plants and animals.

**Indicators:**

Grade 4

5. Describe how organisms interact with one another in various ways (e.g., many plants depend on animals for carrying pollen or dispersing seeds)

**Benchmark B:** Analyze plant and animal structures and functions needed for survival and describe the flow of energy through a system that all organisms use to survive.

**Indicators:**

Grade 5

3. Trace the organization of simple food chains and food webs (e.g., producers, herbivores, carnivores, omnivores and decomposers).

**Benchmark C:** Compare changes in an organism’s ecosystem/habitat that affect its survival.

**Indicators**

Grade 3

6. Describe how changes in an organism’s habitat are sometimes beneficial and sometimes harmful.

## Grade 5

4. Summarize that organisms can survive only in ecosystems in which their needs can be met (e.g., food, water, shelter, air, carrying capacity and waste disposal). The world has different ecosystems and distinct ecosystems support the lives of different types of organisms.
5. Support how organism's patterns of behavior are related to the nature of that organism's ecosystem, including the kinds and numbers of other organisms present, the availability of food resources, and the changing physical characteristics of the ecosystem.
6. Analyze how all organisms, including humans, cause changes in their ecosystems and how these changes can be beneficial, neutral or detrimental (e.g., beaver ponds, earthworm burrows, grasshoppers eating plants, people planting and cutting trees and people introducing a new species).

### **Standard:** Science and Technology

**Benchmark A:** Describe how technology affects human life.

#### **Indicators:**

##### Grade 5

1. Investigate positive and negative impacts of human activity and technology on the environment.

**Benchmark B:** Describe and illustrate the design process.

#### **Indicators:**

##### Grade 5

3. Explain how the solutions to one problem may create other problems.

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## **GRADES 6-8**

### **Standard:** Life Sciences

**Benchmark B:** Describe the characteristics of an organism in terms of a combination of inherited traits and recognize reproduction as a characteristic of living organism essential to the continuation of the species.

#### **Indicators:**

##### Grade 7

8. Investigate the great diversity among organisms.

**Benchmark C:** Explain how energy entering the ecosystems as sunlight supports the life of organisms through photosynthesis and the transfer of energy through the interactions of organisms and the environment.

#### **Indicators:**

##### Grade 6

8. Describe how organisms may interact with one another.

##### Grade 7

2. Investigate how organisms or populations may interact with one another through symbiotic relationships and how some species have become so adapted to each other that neither could survive without the other (e.g., predator-prey, parasitism, mutualism and commensalism).
3. Explain how the number of organisms an ecosystem can support depends on adequate biotic (living) resources (e.g., plants, animals) and abiotic (non-living) resources (e.g., light, water and soil).
6. Summarize the ways that natural occurrences and human activity affect the transfer of energy in Earth's ecosystems (e.g., fire, hurricanes, roads and oil spills).

**Benchmark D:** Explain how extinction of a species occurs when the environment changes and its adaptive characteristics are insufficient to allow survival (as seen in evidence of the fossil record).

**Indicators:**

Grade 7

4. Investigate how overpopulation impacts an ecosystem.

**Standard:** Science and Technology

**Benchmark A:** Give examples of how technological advances, influenced by scientific knowledge, affect the quality of life.

**Indicators:**

Grade 6

2. Explain how decisions about the use of products and systems can result in desirable or undesirable consequences (e.g., social and environmental).

Grade 7

1. Explain how needs, attitudes and values influences the direction of technological development in various cultures.
2. Describe how decisions to develop and use technologies often put environmental and economic concerns in direct competition with each other.

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**GRADES 9-10**

**Standard:** Life Sciences

**Benchmark G:** Describe how human activities can impact the status of natural systems.

**Indicators:**

Grade 10

18. Describe ways that human activities can deliberately or inadvertently alter the equilibrium in ecosystems. Explain how changes in technology/biotechnology can cause significant changes, either positive or negative, in environmental quality and carrying capacity.
19. Illustrate how uses of resources at local, state, regional, national, and global levels have affected the quality of life (e.g., energy production and sustainable vs. nonsustainable agriculture).

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**GRADES 11-12**

**Standard:** Life Sciences

**Benchmark B:** Explain how humans are connected to and impact natural systems.

**Indicators:**

Grade 11

5. Investigate the impact on the structure and stability of ecosystems due to changes in their biotic and abiotic components as a result of human activity.

**Benchmark D:** Relate how biotic and abiotic global changes have occurred in the past and will continue to do so in the future.

**Indicators:**

Grade 11

12. Recognize that ecosystems change when significant climate changes occur or when one or more new species appear as a result of immigration or speciation.

**Benchmark E:** Explain the interconnectedness of the components of a natural system.

**Indicators:**

Grade 11

6. Predict some possible impacts on an ecosystem with the introduction of a non-native species.
8. Recognize that populations can reach or temporarily exceed the carrying capacity of a given environment. Show that the limitation is not just the availability of space but the number of organisms in relation to resources and the capacity of earth systems to support life.

Grade 12

7. Relate diversity and adaptation to structures and functions of living organisms at various levels of organization.
8. Based on the structure and stability of ecosystems and their nonliving components, predict the biotic and abiotic changes in such systems when disturbed (e.g., introduction of non-native species, climatic change, etc.).

**Benchmark F:** Explain how human choices today will affect the quality and quantity of life on earth.

**Indicators:**

Grade 11

9. Give examples of how human activity can accelerate rates of natural change and can have unforeseen consequences.
11. Investigate issues of environmental quality at local, regional, national and global levels such as population growth, resources use, population distribution, over-consumption, the capacity of technology to solve problems, poverty, the role of economics, politics and different ways humans view the earth.

**Standard:** Science and Technology

**Benchmark A:** Predict how human choices today will determine the quality and quantity of life on Earth.

**Indicators:**

Grade 11

2. Predict how decisions regarding the implementation of technologies involve the weighing of trade-offs between predicted positive and negative effects on the environment and/or humans.

**Standard:** Scientific Ways of Knowing

**Benchmark C:** Explain how societal issues and considerations affect the progress of science and technology.

**Indicators:**

Grade 11

9. Explain how natural and human-induced hazards present the need for humans to assess potential danger and risk. Many changes in the environment designed by humans bring benefits to society as well as cause risks.