

WAYFINDER Population Dynamics

The following North Carolina State Science Standards are relevant to this Wayfinder:

Grade 6	7.01, 7.02, 7.03, 7.05
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Introduction

The Museum of Life and Science's *Explore the Wild* nature park is home to its very own ecosystem. The wetland area is a great place to bring your students to observe and interact with nature. Students should keep a watchful eye out for frogs, dragonflies, ducks and many other animal species. If they stay observant they may also see intriguing and unique plant life. While they explore the area, the following concepts can be reinforced: organisms interact with each other and non-living elements within an environment; different species within an ecosystem can coexist in a stable environment; many factors impact the stability and health of an ecosystem; and, changes in the environment can have great impact on living organisms.

In the *Magic Wings Butterfly House*, students will have a chance to consider how this artificial environment may differ from a natural ecosystem. This exhibit is an example of a managed environment, with almost all elements provided and maintained by humans. Yet even in this environment, patterns and rules of population dynamics can be applied.

Before your visit

Discuss the elements that are required within a stable environment in order to maintain a healthy population. Examples may include: water, light, temperature, etc. Think about how organisms exist with one another in the same environment and how coexistence, cooperation, competition, and symbiosis play a part in maintaining a stable population.

Discuss implications of changes to the environment and the impact that these changes might have. Consider local changes, like lack of resources, climate change and global fluctuations.

During your visit

Visit the wetland in *Explore the Wild*. Allow students a chance to carefully explore the area, keeping a watchful eye for organisms that are living here. Have students informally list organisms in this ecosystem that they can find and observe – don't forget the non-animals! While there are many animals that visit and use this wetland, the ducks, tadpoles/frogs, dragonflies, fish and turtles can be most easily spotted. Consider the following questions while you are here:

- 1) Many duck species that visit this wetland tend to look for food near each other when ducklings are still with them. When the snapping turtle is nearby, one duck will let out an alarm call to its mate and ducklings. Other ducks from both the same species and different species may flee the area. Is this an example of competition, coexistence or cooperation? Why? *Cooperation. Other ducks will use the alarm call of another species to help them survive. Neither duck species loses anything from this relationship.*

- 2) Often plant-eating fish swim in the same area as tadpoles that are searching for insects to eat. Is this an example of competition, coexistence or cooperation? *Coexistence. These animals are in the same space, but are not competing for resources.*
- 3) Can you think of examples of competition that might occur here within the same species? Between species? *Same species examples: fish looking for the same food, turtles fighting for a place to bask on a log, ducks competing for a mate. Different species examples: frogs and turtles eating the same insect, algae and lily pads using the same space.*
- 4) If the algae in this wetland were to become overgrown, which animals here might be affected? How?
- 5) Using one of your animal answers from the previous question, how might the change you stated for that animal affect other organisms in this wetland?
- 6) If the city were to divert water from this wetland to another source, how might the environment change here? How would that affect the animals? How long might it take for these changes to take place?
- 7) How can this small wetland have such biodiversity? Why can it support so many different organisms? *All animals fit into their own niche within the habitat. For instance, turtles and frogs both eat insects and it would be harmful if they competed for the exact same insects. Therefore, turtles hang out low to the water and may eat insects that sit on the surface, while frogs have access to insects that fly higher.*

Visit the *Magic Wings Butterfly House*. Spend time looking around the exhibit and observing all the elements included in this environment – living and non-living. Have students keep in mind that this environment was created specifically for butterfly survival. Everything included in the conservatory has been carefully chosen. Once they have had time to explore, ask the following questions:

- 1) What factors of growth and survival of butterflies have been included in this environment? *Consider: Why is the conservatory made of glass? Is this temperature like that of the rest of the museum? Other than animals, what things have been included in this environment?*
- 2) How do these elements work to keep the population stable? Which elements might work to keep the population from decreasing? Which elements might help keep the population from increasing?
- 3) What might happen here if there were too many butterflies for this space to support?
- 4) Ladybugs eat insects called aphids, which feed intensely on plant material. The Museum staff releases ladybugs into the Butterfly House twice a week. What might occur over the next year if they didn't do this?

After your visit

Having spent time considering all the ways that nature keeps a population stable and how even small changes can produce drastic results, you may want to discuss how humans fit in to the bigger picture. As a class or in small groups, students can discuss:

- 1) What is the human habitat?
- 2) What factors limit/contribute to human population growth?
- 3) How have humans positively affected their environment?
- 4) How have humans negatively affected their environment?
- 5) How does/would overpopulation of humans affect their environment?