Learning Experience 6

Population Dynamics

DAILY MESSAGE/DO NOW

In an ecosystem there are often connections between populations of different organisms. What are some of the reasons for those connections?

HOOK

Think of one graph for a species you have studied that you'd like to share. Can you describe what you notice about this graph?

Teacher Prep/Materials

- Laptop cart/computers
- EcoMUVE
- Experience 6 Presentation & Do Now (electronic)
- Experience 6 Team Evidence Worksheet (electronic or paper)
- Experience 3 - Team Brainstorming Guide Sheet
- Experience 4 - Scientist Role Guide Sheets & Learning Quests
- Experience 5 - Scientist Roles Perspectives Sheet

Summary

Students will be able to interpret and represent data in multiple formats. Students will be able to share their findings and connect what they've learned about the differences between the two islands among species and scale to interpreting the changes observed in their graphs over time. Revisit the Guide Sheets including Team Brainstorming and Scientist Roles.

Understanding and Performance Goals

- Students will be able to interpret and represent data in multiple formats (data tables and graphs).
- Students will be able to connect what they've learned about the differences among species and scale to interpreting the changes observed in their graphs over time.
- Students will be able to interpret and discuss graphs of population changes over time (specifically: direct relationships, time lags and balance/flux).

Analyze (0 - 10 min.)

Ask students to review the data points from their Scientist Guide Sheets. If any data points are missing, ask students of similar roles to gather together to exchange data to complete the data tables, if needed.

Expand (20 min.)

1. Conduct a whole-class discussion: ask a couple of students to share a description of what the graph for one of the species looks like from looking at the data on their Scientist Guide Sheet. Display the graph that they are describing for the whole class to see. If there are any misunderstandings in the description of the data or graph, correct the mistakes. Confirm that all students are able to interpret the changes in a single population over time.

Time

45 minutes

Key Vocabulary

Population
Direct Relationships
Time Lag
Dynamic Stability
Balance
Flux

2. There are often connections between the populations of different organisms. Ask the students to describe why there might be a connection between two different organism populations (one might eat the other, they may compete with each other, they might be affected by the same environmental factor). You can remind them of the Ecosystem Web activity – organisms that are connected in the Ecosystem Web may show similar patterns of change in their populations. There are many topics you can address with your students:

Direct Relationships:

- What have students learned about the relationship between small mammals and wood ticks? Display an example of the small mammal population and tick population using the projector. Discuss that students can see that tick populations are likely to be high in years when small mammal populations are also high.
- Which is the dependent and which is the independent variable? The tick population depends on small mammals as a host, therefore the small mammals are the independent variable and the tick population is the dependent variable.
- Both small mammals and ticks have life history traits that allow the populations to respond quickly to favorable or unfavorable biotic or abiotic conditions in the environment. However, because of differences in life history traits – it may be tricky to interpret changes in connected populations due to time lags.

Time Lags

- Can students think of any organisms that would be slower to respond to changes in biotic or abiotic conditions? (Wolves, deer, some birds).
- Show the graph of small mammals and hawks over time. Small mammals are a favored prey item for red-tailed hawks. This provides an example of an organism (hawk) whose population is slower to respond to changes in available resources. Instead of changing at the same time as the small mammal population, the hawk population increases over a five-year time scale in response to increases in the small mammal population.

Dynamic Stability or Flux within Balance

- Populations change every year - some individuals die and others are born. Based on the characteristics of the species (the life history traits – see detailed description in Lesson 5) and the environmental conditions, populations may change just a little from year to year or they may change a lot! Ask students to give you examples of which species might be examples of each (small mammals on Willis Island vary a lot, while the deer on Willis Island vary only a little).
- The students are only able to visit the Islands every 5 years. What might the population graphs look like for these species if we could see the data for every year? Have a couple of students draw (on the overhead, smartboard or chalkboard) what they think a yearly graph would look like over ~10 years.

This discussion will reinforce the discussions from the previous day related to thinking about things over different time scales.

- Time lags and dynamic stability can make it tricky to interpret the changes students are seeing over time. To fully understand the fluctuations over time, students will need to consider characteristics of the species along with their interactions within the Ecosystem Web.

Explore (15 min.)

- Ask students to get into their teams and share what they've discovered in their role by completing the Experience 6 Team Evidence Worksheet. Gather around one computer and they should look for trends in the graphs over time. They should decide as a group what other evidence needs to be collected in order to explore the hypotheses they brainstormed during Experience 3.

Review, Extend, Apply (0 - 10 min.)

Students have the remainder of the class period to collect data and graphs. They should focus on collecting data and evidence according to the team discussion.