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| **Science Performance** |
| **Grades 6-12** | **Title****Relationship between abiotic and biotic factors** |
| **Topic – Interdependent relationships & Biogeology** |
| **NGSS Performance Expectation(s): (NGSS)****06-LS2-2. Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.** [Clarification Statement: Emphasis is on predicting consistent patterns of interactions in different ecosystems in terms of the relationships among and between organisms and abiotic components of ecosystems. Examples of types of interactions could include competitive, predatory, and mutually beneficial.] **HS-LS2-1. Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.** [Clarification Statement: Emphasis is on quantitative analysis and comparison of the relationships among interdependent factors including boundaries, resources, climate and competition. Examples of mathematical comparisons could include graphs, charts, histograms, or population changes gathered from  |
| **Lesson Performance Expectations: (LESSON)**1. Carry out an investigation to determine how abiotic factors relate to biotic factors in two different micro environments.
2. Construct an explanation for to describe the relationship between abiotic and biotic factors in an environment.
3. Use mathematical to support the explanation that abiotic factors affect the biotic factors in different environments.
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| **Student Science Performance****Carry out an investigation*****Gathering:*** Students in groups of three (choose teammates from different school district) will be given the following equipment: LabQuests and sensors: wind speed, soil moisture, temperature, compass, meter stick, light reflectivity, collecting equipment—bug boxes, trays, forceps. Explain that they will be collecting data in two different micro-environments—deciduous hardwood forest and coniferous evergreen (hemlock) grove.**Reasoning:** Using these materials, have **students determine what data** they need to collect to answer these questions (and justify why/how the data might be useful): How does the physical environment affect living things? How do living things affect their environment? (Teacher Hint: Have students note in their journals the details of their plan, including how/why the data might be useful. Students should collect data on soil moisture, light reflectivity, air temperature, soil temperature and wind speed. Students should use the meter stick to standardize the data collection sites if appropriate.)**Reasoning:** Students organize their data from each site in a way to make meaning, and to facilitate sharing with the other groups.(Teacher hint: organization of data should reflect grade level appropriate skills. i.e., determine how they can mathematically represent that data.)***Reasoning***Students organize their ? Conduct a group discussion 1. How did the abiotic factors differ in each micro-environment?
2. How did the biotic factors differ in each micro-environment?
3. What is the relationship between the abiotic and biotic factors?
4. What evidence do you have for that relationship?

**Construct and Explanation from Evidence**Then have students construct an explanation about the relationship between the physical factors and the plants and animals in a particular environment. They support the explanation with evidence they collected from the investigation. Students individually write in their journals the explanation and use evidence to support their claim about the relationship. ***Communicating***Have students use mathematical representations to communicate their evidence to support their explanation. |
| **\**Assessment of Student Learning***Have students’ propose where they might find the highest and lowest data points for each of the physical parameters and explain what vegetation types they would find at each of those data points and why. |
| **Science Essentials (***Student Performance Expectations From Appendix C, D, E)* |
| **Science Practices** | Make careful observations that generate evidence.Discuss and compare observations with others observing the same events.Explain scientific observations using evidence.Share explanations with others.Use evidence to support ideas.Make and use measurements as evidence.Analyze simple data sets for patterns that suggest relationships. |
| Carry Out an InvestigationConstruct an ExplanationUsing Mathematics and Computational Thinking  |
| **Crosscutting Concepts** | Use patterns to determine the causes of observed phenomena.Explain interactions across multiple systems.Analyze interactions within a system.Use measurement to compare objects. |
| PatternsScale, Proportion, and Quantity |
| **Disciplinary Core Ideas** | Patterns of interactions of organisms with their environments, both living and nonliving, are shared Limits in carrying capacity result from such factors as the availability of living and nonliving resources  |
| Interdependent Relationships in Ecosystems  |

(B. Moulding, 2011)