

Standard 6.4.4

<p>Strand 6.4: STABILITY AND CHANGE IN ECOSYSTEMS</p>	<p>The study of ecosystems includes the interaction of organisms with each other and with the physical environment. Consistent interactions occur within and between species in various ecosystems as organisms obtain resources, change the environment, and are affected by the environment. This influences the flow of energy through an ecosystem, resulting in system variations. Additionally, ecosystems benefit humans through processes and resources, such as the production of food, water and air purification, and recreation opportunities. Scientists and engineers investigate interactions among organisms and evaluate design solutions to preserve biodiversity and ecosystem resources.</p>	
<p>Standard: 6.4.4 MS-LS2-4</p>	<p>Construct an argument supported by evidence that the <u>stability</u> of populations is affected by changes to an ecosystem. Emphasize how changes to living and nonliving components in an ecosystem affect populations in that ecosystem. Examples could include Utah ecosystems such as mountains, Great Salt Lake, wetlands, and deserts.</p>	
	<p>Constructing Explanations and Designing Solutions Constructing explanations and designing solutions in 6–8 builds on K–5 experiences and progresses to include constructing explanations and designing solutions supported by multiple sources of evidence consistent with scientific ideas, principles, and theories.</p> <ul style="list-style-type: none"> Construct a scientific explanation based on valid and reliable evidence obtained from sources (including the students' own experiments) and the assumption that theories and laws that describe nature operate today as they did in the past and will continue to do so in the future. 	<p>Stability and Change</p> <ul style="list-style-type: none"> Explanations of stability and change in natural or designed systems can be constructed by examining the changes over time and processes at different scales, including the atomic scale. (MS-ESS2-1)
<p>DCI</p>	<p>LS2.C: Ecosystem Dynamics, Functioning, and Resilience</p> <ul style="list-style-type: none"> Ecosystems are dynamic in nature; their characteristics can vary over time. Disruptions to any physical or biological component of an ecosystem can lead to shifts in all its populations. 	
<p>Student Friendly Objectives</p>	<p>I can construct an argument that the stability of populations is affected by changes to an ecosystem.</p>	
<p>Anchor Phenomena</p>	<p>Changes to living and nonliving components affect the stability of an ecosystem.</p>	
<p>Possible Scenarios</p>	<p>Effect of drought on Great Salt lake ecosystem Effect of forest fire on mountain ecosystem Effect of mountain pine beetle on forest ecosystems Effect of invasive species on Utah's ecosystems</p>	

Vertical Learning Progression Alignment	Previous Science Content (Discussed in K-5 Standards)	Future Science Content (Discussed in 9-12 Standards)
	<ul style="list-style-type: none"> ● When the environment changes some organisms survive and reproduce, some move to new locations, some move into the transformed environment, and some die. 	<ul style="list-style-type: none"> ● If a biological or physical disturbance to an ecosystem occurs, including one induced by human activity, the ecosystem may return to its more or less original state or become a very different ecosystem, depending on the complex set of interactions within the ecosystem

What students should be doing:

1. Supported claims
 - a. a. Students make a claim to be supported about a given explanation or model for a phenomenon. In their claim, students include the idea that changes to physical or biological components of an ecosystem can affect the populations living there.

2. Identifying scientific evidence
 - a. a. Students identify and describe the given evidence (e.g., evidence from data, scientific literature) needed for supporting the claim, including evidence about:
 - i. Changes in the physical or biological components of an ecosystem, including the magnitude of the changes (e.g., data about rainfall, fires, predator removal, species introduction).
 - ii. Changes in the populations of an ecosystem, including the magnitude of the changes (e.g., changes in population size, types of species present, and relative prevalence of a species within the ecosystem).
 - iii. Evidence of causal and correlational relationships between changes in the components of an ecosystem with the changes in populations.
 - b. Students use multiple valid and reliable sources of evidence.

3. Evaluating and critiquing the evidence
 - a. a. Students evaluate the given evidence, identifying the necessary and sufficient evidence for supporting the claim.
 - b. b. Students identify alternative interpretations of the evidence and describe why the evidence supports the student's claim.

4. Reasoning and synthesis
 - a. a. Students use reasoning to connect the appropriate evidence to the claim and construct an oral or written argument about the causal relationship between physical and biological components of an ecosystem and changes in organism populations, based on patterns in the evidence. In the argument, students describe a chain of reasoning that includes:
 - I. Specific changes in the physical or biological components of an ecosystem cause changes that can affect the survival and reproductive likelihood of organisms within that ecosystem (e.g., scarcity of food or the elimination of a predator will alter the survival and reproductive probability of some organisms).
 - II. Factors that affect the survival and reproduction of organisms can cause changes in the populations of those organisms.
 - III. Patterns in the evidence suggest that many different types of changes (e.g., changes in multiple types of physical and biological components) are correlated with changes in organism populations.

- IV. Several consistent correlational patterns, along with the understanding of specific causal relationships between changes in the components of an ecosystem and changes in the survival and reproduction of organisms, suggest that many changes in physical or biological components of ecosystems can cause changes in populations of organisms.
- V. Some small changes in physical or biological components of an ecosystem are associated with large changes in a population, suggesting that small changes in one component of an ecosystem can cause large changes in another component.