

2022 - 2023, HS, Ecology, Quarter 1

Big Ideas/Key Concepts:

- Matter is neither created nor destroyed as it flows through biogeochemical cycles.
- Adaptations in one biome are predictably similar to adaptations in a similar biome.
- The flow of energy in an ecosystem dictates interrelationship between organisms.
- Competition for resources drives evolutionary adaptation.

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| Standards | Student Friendly "I Can" Statements |
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| <p><u>Matter and Energy in Ecosystems</u></p> <p>ECO.LS2.5 Using the laws of conservation of energy, create a model of energy flow through the biosphere. Use the model to explain limitations in energy transfer and the need for ongoing energy input.</p> <p>ECO.LS2.7 Use models to explain relationships among biogeochemical cycles (water, carbon, nitrogen, phosphorus).</p> <p>ECO.LS2.8 Create a diagram tracing carbon through the processes of photosynthesis and respiration. Use the diagram to construct an</p> | <p><u>Matter and Energy in Ecosystems</u></p> <p>I can model energy flow through the biosphere using the law of conservation of energy.</p> <p>I can model limitations in energy transfer and the need for ongoing energy input.</p> <p>I can research and model cycling of matter in our biosphere to explain relationships between biogeochemical cycles.</p> <p>I can predict how changes in a biogeochemical cycle can affect an ecosystem.</p> <p>I can create a diagram and model the flow of carbon and energy between photosynthesis and cellular respiration.</p> |

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| <p>explanation for the importance of photosynthesis and respiration in the carbon cycle.</p> <p>ECO.LS2.9 Construct an argument from evidence regarding the importance of the microbial community in nutrient cycling.</p> <p>ECO.LS2.6 Compare pyramids of energy, numbers, and biomass to calculate rates of productivity within food chains and food webs among various biomes. Using mathematics, explain the relationship between biomass and trophic levels.</p> <p><u>Biomes & Ecosystems</u></p> <p>ECO.LS2.1 Construct explanations for patterns relating to climate, flora, and fauna found in major terrestrial biomes (deserts, temperate grasslands, temperate forests, tropical grasslands, tropical forests, taiga, and tundra).</p> <p>ECO.LS2.2 Research examples of adaptations of organisms in major marine and freshwater ecosystems. Develop an explanation for the formation of these adaptations and predict how the organisms would be affected by environmental disturbances or long-term ecological changes.</p> | <p>I can use a diagram to explain the importance of photosynthesis and respiration in the carbon cycle.</p> <p>I can construct an argument from evidence regarding the importance of the microbial community in nutrient cycling.</p> <p>I can use energy pyramids, numbers, and biomass to calculate rates of productivity among various biomes.</p> <p>I can mathematically explain how a pyramid model illustrates the relationship between biomass and trophic levels.</p> <p><u>Biomes & Ecosystems</u></p> <p>I can recognize patterns relating to climate, flora, and fauna found in major terrestrial biomes.</p> <p>I can analyze data and construct explanations for why specific biomes are associated with certain climate conditions.</p> <p>I can relate the climate conditions of a biome to the flora and fauna found in that biome.</p> <p>I can distinguish the differences between major marine and freshwater ecosystems.</p> <p>I can develop an explanation, based on research, of adaptations in major marine and freshwater ecosystem.</p> <p>I can predict, based on my explanation, how organisms would be affected by environmental disturbances or long-term ecological</p> |
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| <p><u>Ecosystem Interactions</u></p> <p>ECO.LS2.4 Compare patterns of stratification and zonation in various terrestrial and aquatic ecosystems. Construct an argument regarding the importance of these patterns in ecosystem diversity.</p> | <p>changes.</p> <p>I can design a solution, based on my explanation, to solve an environmental disturbance in a specific ecosystem.</p> <p><u>Ecosystem Interactions</u></p> <p>I can compare patterns of stratification in various terrestrial ecosystems.</p> <p>I can compare patterns of zonation in various aquatic ecosystems.</p> <p>I can construct and engage in an argument, from evidence, regarding the importance of these patterns in ecosystem diversity.</p> |
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2022 - 2023, HS, Ecology, Quarter 2

Big Ideas/Key Concepts:

- There are dynamic interactions both within and between populations.
- Adaptations in behavior and physiology increase the fitness of a species.
- Population size can be limited by biotic and abiotic factors.

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| Standards | Student Friendly "I Can" Statements |
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| <p><u>Ecosystem Interactions</u></p> <p>ECO.LS2.3 Create a model of an ecosystem depicting the interrelationships among organisms with a variety of niches. Use the model to explain resource needs of these organisms.</p> <p>ECO.LS4.5 Construct an explanation for the importance of keystone species in ecosystem stability.</p> <p>ECO.LS4.6 Compare resource needs of specialists versus generalists. Construct an explanation regarding the vulnerability of specialists when faced with ecosystem disturbances.</p> | <p><u>Ecosystem Interactions</u></p> <p>I can create a model of an ecosystem that depicts the interrelationships among organisms found in varying niches within that ecosystem.</p> <p>I can use the model to explain biotic and abiotic resource needs of organisms in a variety of niches.</p> <p>I can identify a keystone species in an ecosystem and identify its role.</p> <p>I can construct an explanation for the importance of keystone species in ecosystem stability.</p> <p>I can research resource needs of specialist vs. generalist species and explain the vulnerability of specialists when faced with ecosystem disturbances.</p> |

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| <p><u>Behavior Within Ecosystems</u></p> <p>ECO.LS2.18 Use models to explain the impacts of types of symbiosis on the species involved in the relationship.</p> <p>ECO.LS4.4 Engage in argument from evidence regarding the importance of coevolution in species interactions (competition, predation, symbiosis).</p> <p>ECO.LS2.17 Based on information obtained from research, construct explanations regarding mechanisms by which prey protect themselves from predation (including herbivory).</p> <p>ECO.LS2.15 Compare types of competition and construct an explanation for the importance of niche differentiation in response to competition.</p> <p>ECO.LS2.16 Use a mathematical model to examine predator-prey interactions. Based on the model, construct an argument regarding the importance of predators in maintaining stability of prey populations.</p> <p><u>Interactions between Populations</u></p> <p>ECO.LS2.12 Use mathematical models to construct an explanation for population growth patterns and rates observed in ecosystems. Account for both density-dependent and density-independent factors in your explanation.</p> | <p><u>Behavior Within Ecosystems</u></p> <p>I can model the impacts of types of symbiosis on the species involved in the relationship.</p> <p>I can engage in argument with evidence, regarding the importance of coevolution in species interactions, such as competition, predation and symbiosis.</p> <p>I can research and communicate information by which prey protect themselves from predation.</p> <p>I can identify and describe different types of competition within a niche.</p> <p>I can compare types of competition and construct an explanation for the importance of niche differentiation in response to competition.</p> <p>I can use a mathematical model to examine predator/prey interactions. (Through data collection and analysis of a table/chart showing key role of predator in maintaining stability of the prey population.)</p> <p><u>Interactions between Populations</u></p> <p>I can use mathematical models to construct an explanation for population growth patterns and rates observed in ecosystems, including both density-dependent and density-independent factors in your explanation.</p> <p>I can analyze and categorize limiting factors as density dependent or</p> |
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| <p>ECO.LS2.13 Analyze data regarding exponential and logistic population growth patterns. Use the data to create mathematical models to make predictions regarding carrying capacity.</p> <p>ECO.LS2.14 Obtain information regarding survivorship curves and reproductive strategies of various species. Choose one of these strategies and construct an argument regarding its effectiveness.</p> | <p>density independent, human influenced or non-human influenced, and biotic or abiotic when given scenarios.</p> <p>I can analyze quantitative data regarding exponential and logistic population growth patterns.</p> <p>I can illustrate and interpret the type of survivorship curves created by r-strategists and K-strategists.</p> <p>I can create and analyze population growth curves relating to carrying capacity.</p> <p>I can choose one of these reproductive strategies and construct an argument regarding its effectiveness in regard to survivorship curves.</p> |
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2022 - 2023, HS, Ecology, Quarter 3

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| <p>Big Ideas/Key Concepts:</p> <ul style="list-style-type: none"> ● Ecosystems are complex dynamic systems. ● Disturbances in an ecosystem have far reaching effects. ● Diversity in an ecosystem results in stability. | |
| <p style="text-align: center;">Quick Links within this Document</p> <p style="text-align: center;"> Quarter 1 Quarter 2 Quarter 4 WCS Ecology OER </p> | |
| Standards | Student Friendly “I Can” Statements |
| <p><u>Interactions Between Populations & Ecosystems</u></p> <p>ECO.LS2.11 Obtain information regarding distribution patterns (clumped, uniform, and random) and make predictions regarding types of organisms that will exhibit each type.</p> <p>ECO.LS2.10 Plan and carry out an investigation measuring species diversity (richness and evenness) and density in a local ecosystem.</p> <p>ECO.LS2.19 Carry out an investigation of stability and change within a local ecosystem. Identify signs of succession (primary or secondary). Based on investigation findings, make predictions regarding future changes in this ecosystem.</p> | <p><u>Interactions Between Populations & Ecosystems</u></p> <p>I can investigate distribution patterns (clumped, uniform, and random) to make and defend predictions regarding types of organisms that exhibit each type of pattern.</p> <p>I can plan and carry out an investigation measuring species diversity (richness and evenness) and density in a local ecosystem.</p> <p>I can explain the relationship between species richness and species evenness.</p> <p>I can explain the differences between primary and secondary ecological succession.</p> <p>I can summarize how a disturbance impacts succession and ecosystem stability.</p> <p>I can carry out an investigation that explores the stability and change</p> |

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| <p>ECO.LS4.2 Construct an argument, citing evidence, supporting the influence of natural selection on changes in populations over time.</p> <p><u>Classification</u></p> <p>ECO.LS4.1 Develop and revise a system for classifying organisms. Justify choice of information (morphology, molecular data, energy acquisition, habitat, niche, trophic level, reproduction, etc.) used in developing your system.</p> <p><u>Interactions Between Organisms</u></p> <p>ECO.LS4.3 Design and carry out an investigation examining the importance of animal behaviors and plant tropisms for survival.</p> <p>ECO.LS2.21 Gather information regarding types of learned behaviors (fixed action patterns, imprinting, imitation, habituation, trial-and-error, associative learning – classical conditioning, operant conditioning). Ask questions regarding the importance of these behaviors in species survival.</p> <p>ECO.LS2.22 Construct an explanation for the relationship between sexual selection and sexual dimorphism.</p> | <p>of a local ecosystem, identifying signs of primary or secondary succession, and make predictions regarding future changes within this ecosystem.</p> <p>I can construct an argument about how natural selection influences changes in populations based on the availability of resources after reading case studies and looking at pictures of divergent evolution (i.e.: Galapagos finches).</p> <p><u>Classification</u></p> <p>I can develop, evaluate, and revise a system for classifying organisms.</p> <p>I can justify choice of information (morphology, molecular data, energy acquisition, habitat, niche, trophic level, reproduction, etc.) used in developing my system of classification.</p> <p><u>Interactions Between Organisms</u></p> <p>I can design and carry out an investigation examining the importance of plant tropisms for survival.</p> <p>I can design and carry out an investigation examining the importance of animal behaviors for survival.</p> <p>I can ask questions regarding the importance of these behaviors in species survival.</p> <p>I can research learned behaviors.</p> <p>I can research and construct an explanation for the relationship between sexual selection and sexual dimorphism.</p> |
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| <p>ECO.LS2.23 Obtain and evaluate information regarding the relationship between altruistic behavior and kin selection.</p> | <p>I can research and evaluate information regarding the relationship between altruistic behavior and kin selection.</p> |
| <p>ECO.LS2.20 Plan and carry out an investigation examining kinesis and taxis in a simple organism. Construct and share explanations regarding observations.</p> | <p>I can research, plan and carry out an investigation examining kinesis and taxis in a simple organism.</p> <p>I can construct and share explanations regarding observations.</p> |

