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| **K.OTE Organisms and Their Environments** |
| Students who demonstrate understanding can:  **a. Use observations and information to classify living things as plants or animals based on what they need to survive.** [Clarification Statement: To survive and grow, animals need food, water, and air. Plants need water, light, and air to live and grow.]  **b. Use observations to describe how plants and animals depend on the air, land, and water where they live to meet their needs, and they in turn, can change their environment.** [Clarification Statement: Examples of how plants and animals change their environment could include ants making anthills, plant roots breaking concrete, or beavers building dams.]  **c. Use observations and information to identify patterns in how animals get their food.** [Clarification Statement: Animals get their food by various means. Some animals eat plants, some eat other animals, and some eat both.]  **d. Provide evidence that humans’ uses of natural resources can affect the world around them, and share solutions that reduce human impact.** [Clarification Statement: Examples of how humans’ uses of natural resources can affect the world include cutting trees for lumber and paper products or discarding plastic bags and other waste that affects animal habitats. Humans can reduce their impact by recycling and avoiding littering.] |

**NEXT GENERATION SCIENCE STANDARDS - ECOSYSTEMS**

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| **2.IOS Interdependence of Organisms and Their Surroundings** |
| **Students who demonstrate understanding can:**  **a. Construct a representation in which plants and animals depend on their environment and each other to meet their needs.** [Assessment Boundary: Needs to be limited to food, water, shelter, and a favorable temperature for animals; light, water, and soil for plants.]  **b. Ask questions to clarify ideas about how plants may depend on animals for pollination or to move their seeds around.**  **c. Plan and carry out investigations to test whether plants from different settings have different needs for water, sunlight, and type of soil.** [Clarification Statement: Examples of different settings could be a sunny vs. shady area or a garden vs. a parking lot.]  **d. Observe and compare the many kinds of living things that are found in different areas.** [Clarification Statement: Examples of different areas could be salt vs. fresh water or desert vs. woodland.]  **e. Analyze a representation of a particular habitat showing the locations and shapes of both land and water features of that habitat and communicate how the land and water support animals and plants.** [Clarification Statement: Examples could include plants and animals in the school yard, a park, a pond, a terrarium, or an aquarium.]  **f. Construct an explanation about the effect of environmental changes – whether slow or rapid – on the survival of plants and animals that live there.** [Clarification Statement: Examples of slow or rapid environmental changes could be droughts or floods.]  **g. Obtain and communicate information that some kinds of animals and plants that once lived on Earth are no longer found anywhere, although others living now may resemble them.** [Clarification Statement: Examples elephants which resemble mammoths or tigers which resemble saber-tooth cats.] |
| **3.EIO Environmental Impacts on Organisms** |
| Students who demonstrate understanding can:  **a. Obtain, evaluate, and communicate information about the types of habitats in which organisms live, and ask questions based on that information.** [Clarification Statement: Examples of habitats could be ponds, woods, grasslands, or deserts. Questions could include how changes in habitats affect the organisms living there.]  **b. Obtain, evaluate, and communicate information that in any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all.** [Clarification Statement: An example could be that plants that require a lot of water would not survive well in a desert.]  **c. Analyze data to describe how humans, like all other organisms, obtain living and non-living resources from their environment.** [Clarification Statement: Examples of living and non-living resources could include minerals, food, and energy.]  **d. Use models to evaluate how environmental changes in a habitat affect the number and types of organisms that live there; some remain, move in, move out, and/or die.** [Clarification Statement: Examples of environmental changes could be extra water in a normally dry area, pollution, or fire. An example of how environmental changes can affect organisms could be the effects of a decrease in grass on a rabbit population.]  **e. Use evidence to argue that some changes in an organism’s habitat can be beneficial or harmful to the organism.**  **f. Obtain and communicate information about the characteristics of groups of organisms and evaluate how groups help organisms survive.** [Clarification Statement: The characteristics of organisms students should address are composition, organization, specialization, and stability. Examples of how groups help organisms survive could be worker bees supplying food and queens reproducing, female lions in a pride hunting and males patrolling the territory, or human families caring for children.] [Assessment Boundary: Detailed structure of social insect societies not to be included.]  **g. Use data about the characteristics of organisms and habitats to design an artificial habitat in which the organisms can survive.** |

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| **MS.LS-IRE Interdependent Relationships in Ecosystems** |
| Students who demonstrate understanding can:  **a. Use a model to demonstrate the effect of resource availability on organisms and populations of organisms in an ecosystem.**  **b. Construct explanations to describe competitive, predatory, and mutually beneficial interactions as patterns across various ecosystems.**  **c. Ask researchable questions about the ways organisms obtain matter and energy across multiple and varied ecosystems.** [Assessment Boundary: Biochemical details of photosynthesis and cellular respiration are not to be treated in terms of mechanism.]  **d. Use models to explain the role of biodiversity in ecosystems.**  **e. Use evidence to construct arguments for how biodiversity can influence humans’ resources as well as ecosystem services that humans rely on.** [Clarification Statement: Examples of humans’ resources include food, energy, medicines. Ecosystem services can include water purification and recycling.]  **f. Pose questions about patterns in social interactions and grouping behaviors of animals that contribute to survival advantages.** |

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| **HS.LS-IRE Interdependent Relationships in Ecosystems** |
| Students who demonstrate understanding can:  **a. Evaluate data to explain resource availability and other environmental factors that affect carrying capacity of ecosystems.** [Clarification Statement: The explanation could be based on computational or mathematical models. Environmental factors should include availability of living and nonliving resources and from challenges (e.g., predation, competition, disease).]  **b. Design solutions for creating or maintaining the sustainability of local ecosystems.**  **c. Construct and use a model to communicate how complex sets of interactions in ecosystems maintain relatively consistent numbers and types of organisms for long periods of time when conditions are stable.**  **d. Construct arguments from evidence about the effects of natural biological or physical disturbances in terms of the time needed to reestablish a stable ecosystem and how the new system differs from the original system.** [Clarification Statement: Computational models could be used to support collect evidence to support the argument.]  **e. Use evidence to construct explanations and design solutions for the impact of human activities on the environment and ways to sustain biodiversity and maintain the planet’s natural capital.** [Clarification Statement: Explanations and solutions should include anthropogenic changes (e.g., habitat destruction, pollution, introduction of invasive species, overexploitation, climate change).]  **f. Argue from evidence obtained from scientific literature the role group behavior has in increasing the chances of survival for individuals and their genetic relatives.**  **g. Plan and carry out investigations to make mathematical comparisons of the populations and biodiversities of two similar ecosystems at different scales.** [Clarification Statement: Students compare, mathematically, the biodiversity of a small ecosystem to a large ecosystem (e.g., woodlot to a forest, small pond near a city to a wetland estuary).] |