**Life Sciences**

**MS-LS2 Ecosystems: Interactions, Energy, and Dynamics**

**MS-LS2-1 Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.**

Further explanation: Emphasis is on cause and effect relationships between resources and the growth of individual organisms and the numbers of organisms in ecosystems during periods of abundant and scarce resources.

Analyzing and interpreting data; interdependent relationships in ecosystems; cause and effect

**MS-LS2-2 Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.**

Further explanation: 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. Potential Maine connections include predation: coyotes and house cats with smaller prey or white tail deer and wolves; mutualism in the union of algae and fungus to form lichen; parasitism in deer ticks on dogs; and commensalism when barnacles attach to minke whales or a grey squirrel makes a nest in a red oak tree.

Constructing explanations and designing solutions; interdependent relationships in ecosystems; patterns

**MS-LS2-3 Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.**

Further explanation: Emphasis is on describing the conservation of matter and flow of energy into and out of various ecosystems and on defining the boundaries of the system. Explore the reason behind burning blueberry fields biennially and the cycling of matter.

Developing and using models; cycle of matter and energy transfer in ecosystems; energy and matter

**MS-LS2-4 Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.**

Further explanation: Emphasis is on recognizing patterns in data and making warranted inferences about changes in populations and on evaluating empirical evidence supporting arguments about changes to ecosystems. Examples include the introduction of invasive species like the green crab or knotweed and their impact on native species. Explore the impacts of farming, urban sprawl and pollution.

Engaging in argument from evidence; ecosystem dynamics, functioning, and resilience; stability and change

**MS-LS2-5 Evaluate competing design solutions for maintaining biodiversity and ecosystem services.**

Further explanation: Examples of ecosystem services could include water purification, nutrient recycling, and prevention of soil erosion. Examples of design solution constraints could include scientific, economic, and social considerations. Consider the balance of conservation with the logging of forests or with the lobster and blueberry industries.

Engaging in argument from evidence; ecosystem dynamics, functioning, and resilience; biodiversity and humans; developing possible solutions; stability and change;