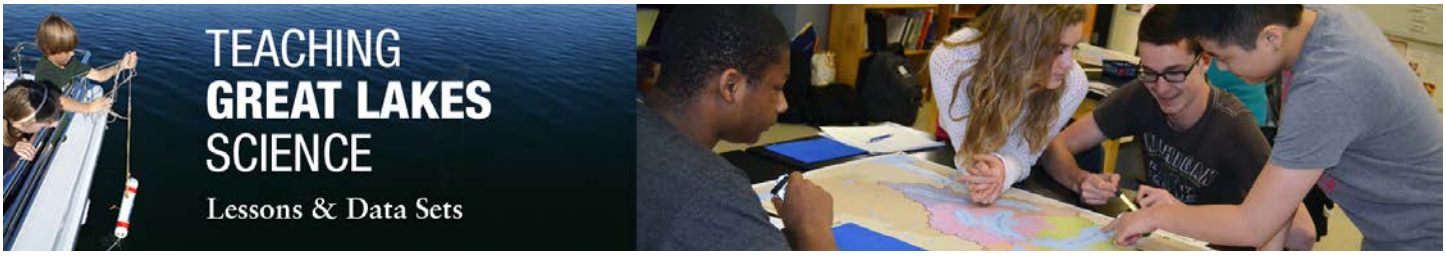


Next Generation Science Standards

Lesson: Food Chains and Webs
Activity: Linking the Chain

Prior Knowledge Should Include:

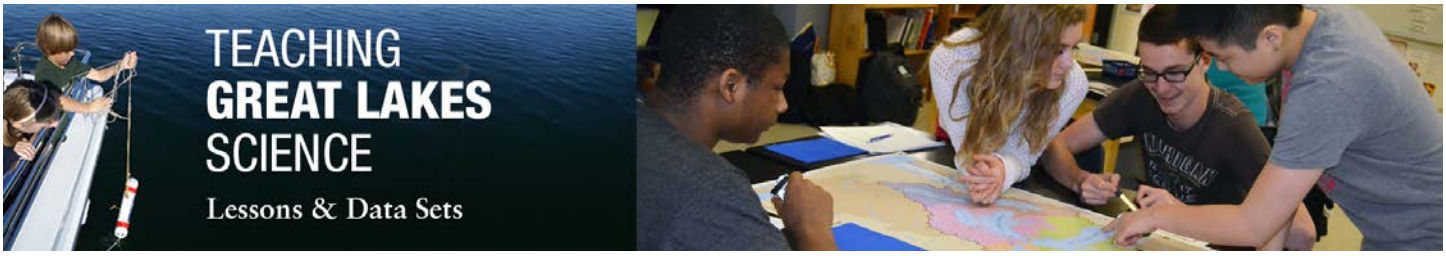
- Plants depend on water and light to grow and also depend on animals for pollination or to distribute their seeds.
- Animals obtain food they need from plants and/or other animals.
- The food of almost any animal can be traced back to plants.
- Organisms are related to food webs in which some animals eat plants for food and other animals eat the animals that eat plants, while decomposers restore some materials back to the soil.

Performance Expectations:

- MS-LS2-1 Ecosystems: Interactions, Energy and Dynamics. Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.
- MS-LS2-2 Ecosystems: Interactions, Energy and Dynamics. Construct an explanation about how the different parts of the food chain are dependent on each other.
- MS-LS2-3 Ecosystems: Interactions, Energy and Dynamics. Develop a model to describe the cycling of matter and flow of energy among living parts of the food chain.
- MS-LS2-4 Ecosystems: Interactions, Energy and Dynamics. Construct an argument, supported by evidence gathered through observation and experience, showing how changes to physical or biological components of an ecosystem affect populations.
- MS-LS2-5 Ecosystems: Interactions, Energy and Dynamics. Evaluate competing design solutions for maintaining biodiversity and ecosystem services.
- MS-ESS3-3 Earth and Human Activity. Answer questions about how pollution affects food chains by applying scientific principles to design a monitoring plan for minimizing the human impact on the environment.

Disciplinary Core Ideas:

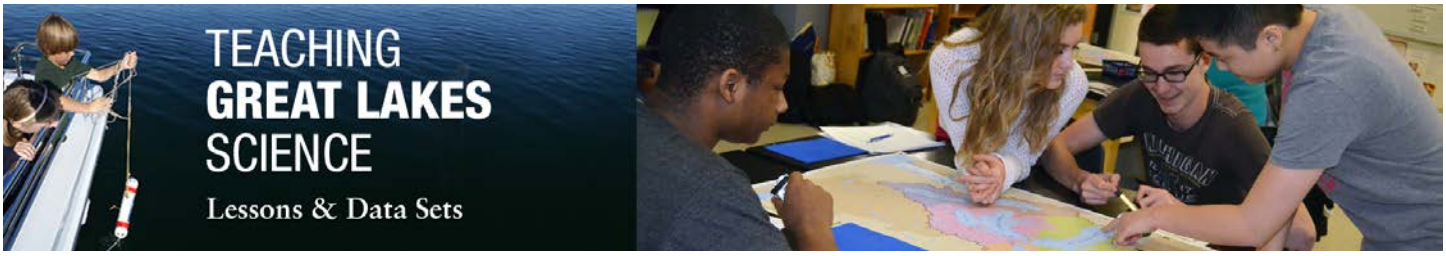
- **LS2.A Interdependent Relationships in Ecosystems:** Organisms and populations of organisms are dependent on their environmental interactions both with biotic and abiotic factors. Growth of organisms and populations are limited by access to resources. In any ecosystem, organisms and populations with similar requirements for food, water, oxygen or other resources may compete with each other for limited resources. This limits their growth and reproduction. Predation may also reduce their growth and reproduction or eliminate populations or organisms. Relationships where each organism depends on each other are called mutually exclusive relationships.



- **LS2.B Cycles of Matter and Energy Transfer in Ecosystems:** Food webs are models that demonstrate how matter and energy is transferred between producers, consumers and decomposers as the three groups interact — primarily for food — within an ecosystem. Transfers of matter into and out of the physical environment occur at every level. Decomposers recycle nutrients from dead plant or animal matter back to the soil in terrestrial environments or to the water in aquatic environments.
- **LS2.C Ecosystem Dynamics, Functioning and Resilience:** 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 of its populations. Biodiversity describes the variety of species found in Earth's terrestrial and oceanic ecosystems. The completeness or integrity of an ecosystem's biodiversity is often used as a measure of its health.
- **LS4.D Biodiversity and Humans:** Biodiversity is the wide range of existing life forms that have adapted to the variety of conditions on Earth, from terrestrial to marine ecosystems. Biodiversity includes genetic variation within a species, in addition to species variation in different habitats and ecosystem types. Changes in biodiversity can influence humans' resources, such as food, energy and medicines, as well as ecosystems services that humans rely on.
- **ESS3.C Human Impacts on Earth Systems:** Human activities have significantly altered the biosphere, sometimes damaging or destroying natural habitats and causing the extinction of many other species. But changes to Earth's environments can have different impacts (negative and positive) for different living things. Typically, as human populations and per-capita consumption of natural resources increase, so do the negative impacts on Earth unless the activities and technologies involved are engineered otherwise.
- **ETS1.B Developing Possible Solutions:** There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem. Sometimes parts of different solutions can be combined to create a solution that is better than any of its predecessors.

Practices:

- **Developing and Using Models (2)** – Progresses to developing, using and revising models to describe, test and predict more abstract phenomena and design systems.
- **Analyzing and Interpreting Data (4)** – Progresses to extending quantitative analysis to investigations, distinguishing between correlation and causation, and basic statistical techniques of data and error analysis.
- **Constructing Explanations and Designing Solutions (6)** – Progresses to include constructing explanations and designing solutions supported by multiple sources of evidence consistent with scientific ideas, principles and theories.
- **Engaging in Argument from Evidence (7)** – Progresses to constructing a convincing argument that supports or refutes claims for either explanations or solutions about the natural and designed world(s).



Crosscutting Concepts:

- **Patterns**: Observed patterns of forms and events guide organization and classification, and they prompt questions about relationships and the factors that influence them.
- **Cause and Effect:** Mechanisms and explanation. Events have causes, sometimes simple, sometimes multifaceted. A major activity of science is investigating and explaining causal relationships and the mechanisms by which they are mediated. Such mechanisms can then be tested across given context and used to predict and explain events in new contexts.
- **Energy and Matter: Glows, Cycles and Conservation:** Tracking fluxes of energy and matter into, out of and within systems helps one understand the systems' possibilities and limitations.
- **Stability and Change***:* For natural and built systems alike, conditions of stability and determinants of rates of change or evolution of a system are critical elements of study.
- **Influence of Engineering, Technology and Science on Society and the Natural World:** New technologies can have deep impacts on society and the environment, including some that were not anticipated. Analysis of costs and benefits is a critical aspect of decisions about technology.

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