



## Education Standards for Museum Programs Middle School (6-8 Grade)

### Great Lakes

**S.IP.E.1** Inquiry involves generating questions, conducting investigations, and developing solutions to problems through reasoning and observation.

**S.IA.E.1** Inquiry includes an analysis and presentation of findings that lead to future questions, research, and investigations.

**S.RS.E.1** Reflecting on knowledge is the application of scientific knowledge to new and different situations. Reflecting on knowledge requires careful analysis of evidence that guides decision making and the application of science throughout history and within society.

**LS2.A** Interdependent Relationships in Ecosystems—Organisms, and populations or organisms, are dependent on their environmental interactions both with other living things and with nonliving factors.

**LS2.A** Interdependent Relationships in Ecosystems—In any ecosystem, organisms and populations with similar requirements for food, water, oxygen, or other resources may compete with each other for limited resources, access to which consequently constrains their growth and reproduction.

**LS2.A** Interdependent Relationships in Ecosystems—Similarly, predatory interactions may reduce the number of organisms or eliminate whole populations of organisms. Mutually beneficial interactions, in contrast, may become so interdependent that each organism requires the other for survival. Although the species involved in these competitive, predatory, and mutually beneficial interactions vary across ecosystems, the patterns of interactions of organisms with their environments, both living and nonliving, are shared.

**LS2.C: Ecosystem Dynamics, Functioning, and Resilience**—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.

**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 its populations.

**LS4.D** Biodiversity and Humans—Changes in biodiversity can influence humans' resources, such as food, energy, and medicines, as well as ecosystem services that humans rely on—for example, water purification and recycling.

**ESS3.A** Natural Resources—Humans depend on Earth's land, ocean, atmosphere, and biosphere for many different resources. Minerals, fresh water, and biosphere resources are limited, and many are not renewable or replaceable over human lifetimes. These resources are distributed unevenly around the planet as a result of past geologic processes.

**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 other species. But changes to Earth's environments can have different impacts for different living things.

**RST.6-8.8** Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.

**RST.6-8.9** Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.

**SL.8.1** Engage effectively in a range of collaborative discussions (one-o-one, in groups, and teacher-led) with diverse partners on grade 8 topics, texts and issues, building on others' ideas and expressing their own clearly.

### Great Lakes Food Web

**LS2.A** Interdependent Relationships in Ecosystems—Similarly, predatory interactions may reduce the number of organisms or eliminate whole populations or organisms. Mutually beneficial interactions, in contrast, may become so interdependent that each organism requires the other for survival. Although the species involved in these competitive, predatory, and mutually beneficial interactions vary across ecosystems, the patterns of interactions of organisms with their environments, both living nonliving, are shared.

**LS2.B** Cycle 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 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. The atoms that make up the organisms in an ecosystem are cycled repeatedly between the living and nonliving parts of the ecosystem.

**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 its populations.

### Invasive Species Musical Chairs

**LS2.A** Interdependent Relationship in Ecosystems—In any ecosystem, organisms and populations with similar requirements for food, water, oxygen, or other resources may compete with each other for limited resources, access to which consequently constrains their growth and reproduction.

**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 its populations.

### Sea Lamprey Suck! Vampire Tag

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## Things That Fly

**PS2.A Forces and Motion**—For any pair of interacting objects, the force exerted by the first object on the second object is equal in strength to the force that the second object exerts on the first, but in the opposite direction (Newton’s third law).

**PS2.A Forces and Motion**—The motion of an object is determined by the sum of the forces acting on it; if the total force on the object is not zero, its motion will change. The greater the mass of the object, the greater the force needed to achieve the same change in motion. For any given object, a larger force causes a larger change in motion.

**PS3.A Definitions of Energy**—The Term “heat” as used in everyday language refers both to thermal energy (the motion of atoms or molecules within a substance) and the transfer of that thermal energy from one object to another. In science, heat is used only for the second meaning; it refers to the energy transferred due to the temperature difference between two objects.

**PS3.A Definitions of Energy**—Motion energy is properly called kinetic energy; it is proportional to the mass of the moving object and grows with the square of its speed.