

MS-LS2-1 Ecosystems: Interactions, Energy, and Dynamics

California Science Test—Item Content Specifications

# MS-LS2-1 Ecosystems: Interactions, Energy, and Dynamics

Students who demonstrate understanding can:

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

[Clarification Statement: Emphasis is on cause and effect relationships between resources and growth of individual organisms and the numbers of organisms in ecosystems during periods of abundant and scarce resources.]

| Science and Engineering Practices | Disciplinary Core Ideas | Crosscutting Concepts |
| --- | --- | --- |
| Analyzing and Interpreting DataAnalyzing data in 6–8 builds on K–5 experiences and progresses to extending quantitative analysis to investigations, distinguishing between correlation and causation, and basic statistical techniques of data and error analysis.Analyze and interpret data to provide evidence for phenomena. | LS2.A: Interdependent Relationships in Ecosystems4. Organisms, and populations of organisms, are dependent on their environmental interactions both with other living things and with nonliving factors.5. 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.Growth of organisms and population increases are limited by access to resources. | Cause and EffectCause and effect relationships may be used to predict phenomena in natural or designed systems. |

## Assessment Targets

Assessment targets describe the focal knowledge, skills, and abilities for a given three-dimensional Performance Expectation. Please refer to the Introduction for a complete description of assessment targets.

### Science and Engineering Subpractice(s)

Please refer to appendix A for a complete list of Science and Engineering Practices (SEP) subpractices. Note that the list in this section is not exhaustive.

4.2 Ability to analyze data to identify relationships

### Science and Engineering Subpractice Assessment Targets

Please refer to appendix A for a complete list of SEP subpractice assessment targets. Note that the list in this section is not exhaustive.

4.2.1 Ability to use empirical data to describe patterns and relationships

4.2.2 Ability to identify patterns (qualitative or quantitative) among variables represented in data

### Disciplinary Core Idea Assessment Targets

#### LS2.A.4

* Describe that individual organisms depend on biotic and abiotic factors and the interactions between these factors for survival
* Describe that populations of organisms are affected by biotic and abiotic factors and the interactions between these factors

#### LS2.A.5

* Describe that competition between individuals of a single species (intraspecific competition) for available resources occurs
* Describe that competition between individuals from different species (interspecific competition) for available resources occurs

#### LS2.A.6

* Describe that growth of an organism is limited by availability of resources
* Describe that population growth is limited by availability of resources

### Crosscutting Concept Assessment Target(s)

CCC2 Use cause and effect relationships to predict phenomena in natural or designed systems

## Examples of Integration of Assessment Targets and Evidence

Note that the list in this section is not exhaustive.

Task provides a data set showing the numbers of individuals in a population during different months of the year:

* Identifies patterns of change (4.2.1, LS2.A.4, and CCC2)

Task provides data on a change in biotic or abiotic factors:

* Describes the change and how it affects organisms in an ecosystem (4.2.1, LS2.A.4, and CCC2)

Task provides a simulation that provides data showing populations of various organisms following a large environmental change (e.g., a forest fire, flooding, etc.):

* Predicts the likely outcome for the organisms following the environmental change (4.2.2, LS2.A.4, and CCC2)

Task provides data comparing population growth when resources are nonlimiting and limiting:

* Describes the differences in the models (4.2.2, LS2.A.6, and CCC2)
* Explains why the models are different (4.2.2, LS2.A.6, and CCC2)

Task provides data for a community before and after the introduction of an invasive species:

* Describes the changes in interspecies competition introduced by the invasive species (4.2.2, LS2.A.5, and CCC2)

## California Environmental Principles and Concepts

* EP1: The continuation and health of individual human lives and of human communities and societies depend on the health of the natural systems that provide essential goods and ecosystem services.
* EP2: The long-term functioning and health of terrestrial, freshwater, coastal and marine ecosystems are influenced by their relationships with human societies.
* EP3: Natural systems proceed through cycles that humans depend upon, benefit from, and can alter.
* EP4: The exchange of matter between natural systems and human societies affects the long-term functioning of both.
* EP5: Decisions affecting resources and natural systems are based on a wide range of considerations and decision-making processes.

## Possible Phenomena or Contexts

Note that the list in this section is not exhaustive.

* Habitats with highly limited resources
* Seasonal changes to resource availability
* Introduction of a new species to an existing community
* An environmental change that alters resource availability
* Increased competition

## Common Misconceptions

Note that the list in this section is not exhaustive.

* Animals do not compete with others of their species for a limited set of resources (e.g., all the squirrels are friends).
* Since natural resources, like wood and water, are renewable, they cannot be used up and do not limit population growth.
* Plants do not exhibit competition for resources.
* Changes in populations or resource availability only affect resources/organisms that are directly connected in a food chain.

## Additional Assessment Boundaries

None listed at this time.

## Additional References

MS-LS2-1 Evidence Statement [https://www.nextgenscience.org/sites/default/files/evidence\_statement/black\_white/MS-LS2-1 Evidence Statements June 2015 asterisks.pdf](https://www.nextgenscience.org/sites/default/files/evidence_statement/black_white/MS-LS2-1%20Evidence%20Statements%20June%202015%20asterisks.pdf)

California Environmental Principles and Concepts <http://californiaeei.org/abouteei/epc/>

California Education and the Environment Initiative <http://californiaeei.org/>

The *2016 Science Framework for California Public Schools Kindergarten through Grade 12*

Appendix 1: Progression of the Science and Engineering Practices, Disciplinary Core Ideas, and Crosscutting Concepts in Kindergarten through Grade 12 <https://www.cde.ca.gov/ci/sc/cf/documents/scifwappendix1.pdf>

Appendix 2: Connections to California Environmental Principles and Concepts <https://www.cde.ca.gov/ci/sc/cf/documents/scifwappendix2.pdf>

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