

MS-LS2-4 Ecosystems: Interactions, Energy, and Dynamics

California Science Test—Item Content Specifications

# MS-LS2-4 Ecosystems: Interactions, Energy, and Dynamics

Students who demonstrate understanding can:

Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.

[Clarification Statement: 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.]

Continue to the next page for the Science and Engineering Practices, Disciplinary Core Ideas, and Crosscutting Concepts.

| Science and Engineering Practices | Disciplinary Core Ideas | Crosscutting Concepts |
| --- | --- | --- |
| Engaging in Argument from Evidence  Engaging in argument from evidence in 6–8 builds on K–5 experiences and progresses to constructing a convincing argument that supports or refutes claims for either explanations or solutions about the natural and designed world(s).  Construct an oral and written argument supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon or a solution to a problem.  Connections to Nature of Science  Scientific Knowledge is Based on Empirical Evidence  Science disciplines share common rules of obtaining and evaluating empirical evidence. | LS2.C: Ecosystem Dynamics, Functioning, and Resilience  2. 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. | Stability and Change  Small changes in one part of a system might cause large changes in another part. |

## 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.

7.1 Ability to construct scientific arguments

7.2 Ability to compare, evaluate, and critique competing arguments

### 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.

7.1.1 Ability to identify evidence/data that supports a claim

7.1.2 Ability to develop scientific arguments that are supported by evidence/data

7.1.3 Ability to use reasoning to explain how relevant evidence/data supports or refutes the claim; the reasoning should reflect application of scientific concepts, principles, ideas, and models

7.2.1 Ability to evaluate arguments about a natural phenomenon based on scientific concepts, principles, and big ideas

7.2.3 Ability to evaluate competing perspectives/claims using reasoning and evidence

### Disciplinary Core Idea Assessment Targets

#### LS2.C.2

* Describe changes in the physical or biological components of an ecosystem that can affect populations
* Identify evidence showing changes in populations of an ecosystem
* Describe how specific changes in the physical or biological components of an ecosystem can cause changes that can affect the survival of individual organisms within that ecosystem
* Describe how factors that affect the survival and reproduction of organisms can cause changes in the population of those organisms
* Describe how a change in a physical or biological component of an ecosystem can cause changes in another component

### Crosscutting Concept Assessment Target(s)

CCC7 Identify that small changes in one part of a system might cause large changes in another part

## Examples of Integration of Assessment Targets and Evidence

Note that the list in this section is not exhaustive.

Task provides data documenting changes that occurred in a physical/biological component of an ecosystem:

* Constructs or selects an argument that contains an appropriate claim about how the change to a physical/biological component of an ecosystem affects populations within the ecosystem (7.1.1, LS2.C.2, and CCC7)
* Links the evidence/data to a claim about how the change affects populations within the ecosystem (7.1.1, LS2.C.2, and CCC7)

Task provides a claim that changes to a physical/biological component of an ecosystem can affect populations within the ecosystem with supporting evidence/data:

* Identifies the evidence/data supporting the provided claim (7.1.2, LS2.C.2, and CCC7)
* Explains whether the provided evidence/data is sufficient to support the claim (7.1.3, LS2.C.2, and CCC7)
* Evaluates the claim demonstrating understanding of scientific concepts and principles (7.2.1, LS2.C.2, and CCC7)

Task provides two competing claims about how changes in physical/biological components of an ecosystem impact populations within the ecosystem, and supporting evidence/data:

* Evaluates the competing claims and explains how the evidence/data supports or does not support the claims (7.2.3, LS2.C.2, and CCC7)

## 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.

* Effect of changes in available sunlight, temperature patterns, or precipitation levels on populations
* Effect of changes to soil or water chemistry (fertilizer use, pollution, etc.) on populations
* Human-caused changes to the landscape or populations (dams, roads, farming, overfishing, etc.)
* Effect of invasive species or other competitors on native populations
* Changes in types of parasites and/or pathogens

## Common Misconceptions

Note that the list in this section is not exhaustive.

* Human intervention is good for an ecosystem.
* Populations exist in states of constant growth.

## Additional Assessment Boundaries

None listed at this time.

## Additional References

MS-LS2-4 Evidence Statement [https://www.nextgenscience.org/sites/default/files/evidence\_statement/black\_white/MS-LS2-4 Evidence Statements June 2015 asterisks.pdf](https://www.nextgenscience.org/sites/default/files/evidence_statement/black_white/MS-LS2-4%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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