

HS-LS2-6 Ecosystems: Interactions, Energy, and Dynamics

California Science Test—Item Content Specifications

# HS-LS2-6 Ecosystems: Interactions, Energy, and Dynamics

Students who demonstrate understanding can:

Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions but changing conditions may result in a new ecosystem.

[Clarification Statement: Examples of changes in ecosystem conditions could include modest biological or physical changes, such as moderate hunting or a seasonal flood; and extreme changes, such as volcanic eruption or sea level rise.]

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 9–12 builds on K–8 experiences and progresses to using appropriate and sufficient evidence and scientific reasoning to defend and critique claims and explanations about the natural and designed world(s). Arguments may also come from current scientific or historical episodes in science.  Evaluate the claims, evidence, and reasoning behind currently accepted explanations or solutions to determine the merits of arguments.  Connections to Nature of Science  Scientific Knowledge is Open to Revision in Light of New Evidence  Scientific argumentation is a mode of logical discourse used to clarify the strength of relationships between ideas and evidence that may result in revision of an explanation. | LS2.C: Ecosystem Dynamics, Functioning, and Resilience  4. A complex set of interactions within an ecosystem can keep its numbers and types of organisms relatively constant over long periods of time under stable conditions. If a modest biological or physical disturbance to an ecosystem occurs, it may return to its more or less original status (i.e., the ecosystem is resilient), as opposed to becoming a very different ecosystem. Extreme fluctuations in conditions or the size of any population, however, can challenge the functioning of ecosystems in terms of resources and habitat availability. | Stability and Change  Much of science deals with constructing explanations of how things change and how they remain stable. |

## 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.

7.2 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.

7.2.1 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.4

* Describe the strengths and weaknesses of the given claim explaining a response to a changing condition in an ecosystem
* Identify the factors that affect biodiversity
* Explain the relationships between species and the physical environment in an ecosystem
* Use additional evidence to assess the validity and reliability of the given evidence and its ability to support the argument that resiliency of an ecosystem is subject to the degree of change in the biological and physical environment of an ecosystem
* Distinguish between disturbances in an ecosystem that maintain relatively consistent numbers and types of organisms and those that can result in a change to the ecosystem

### Crosscutting Concept Assessment Target(s)

CCC7 Construct explanations of how things change and how they remain stable

## Examples of Integration of Assessment Targets and Evidence

Note that the list in this section is not exhaustive.

Task provides data illustrating the resulting changes in population size for various species in the ecosystem as an argument for a disturbance affecting the ecosystem:

* Explains how the data illustrate the effects of the disturbance on various species (7.2.1, LS2.C.4, and CCC7)
* Predicts the future effects of the disturbance on species distribution and biodiversity (7.2.1, LS2.C.4, and CCC7)

Task provides a claim about the effect of an environmental disturbance and data illustrating the resulting changes in population size for various species in the ecosystem:

* Interprets the evidence to describe the impact of the disturbance on the various species (7.2.1, LS2.C.4, and CCC7)
* Explains the relationships between species and the physical environment in the ecosystem (7.2.1, LS2.C.4, and CCC7)
* Identifies additional evidence that could be used to assess the validity and reliability of the given evidence and its ability to support the given claim (7.2.1, LS2.C.4, and CCC7)

Task provides competing claims about the effects of one or more disturbances on an ecosystem in conjunction with data:

* Uses the evidence to evaluate the claims (7.2.3, LS2.C.4, and CCC7)
* Uses evidence and reasoning to explain why some disturbances in an ecosystem maintain relatively consistent numbers and types of organisms in stable conditions while other disturbances result in new ecosystems (7.2.3, LS2.C.4, and CCC7)

## California Environmental Principles and Concepts

* EP2: The long-term functioning and health of terrestrial, freshwater, coastal, and marine ecosystems are influenced by their relationships with human societies.
* EP4: The exchange of matter between natural systems and human societies affects the long-term functioning of both.

## Possible Phenomena or Contexts

Note that the list in this section is not exhaustive.

* Reintroduction of an endangered species to an ecosystem
* Clear-cutting of forests for agricultural use
* Introduction of a nonnative invasive species to an ecosystem
* Environmental disturbances to an ecosystem (i.e., changes in water temperature, pH, nutrients, and salinity) used as bioindicators of the health of that ecosystem
* Relationship of ecosystem stability and complexity

## Common Misconceptions

Note that the list in this section is not exhaustive.

* Disturbances are always detrimental to an ecosystem.
* New species are beneficial to an ecosystem because they increase biodiversity.

## Additional Assessment Boundaries

None listed at this time.

## Additional References

HS-LS2-6 Evidence Statement [https://www.nextgenscience.org/sites/default/files/evidence\_statement/black\_white/HS-LS2-6 Evidence Statements June 2015 asterisks.pdf](https://www.nextgenscience.org/sites/default/files/evidence_statement/black_white/HS-LS2-6%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 Environmental Principles and Concepts <https://www.cde.ca.gov/ci/sc/cf/documents/scifwappendix2.pdf>

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