

HS-LS4-5 Biological Evolution: Unity and Diversity

California Science Test—Item Content Specifications

# HS-LS4-5 Biological Evolution: Unity and Diversity

Students who demonstrate understanding can:

Evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.

[Clarification Statement: Emphasis is on determining cause and effect relationships for how changes to the environment such as deforestation, fishing, application of fertilizers, drought, flood, and the rate of change of the environment affect distribution or disappearance of traits in species.]

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 EvidenceEngaging 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 or historical episodes in science.Evaluate the evidence behind currently accepted explanations or solutions to determine the merits of arguments. | LS4.C: Adaptation1. Changes in the physical environment, whether naturally occurring or human induced, have thus contributed to the expansion of some species, the emergence of new distinct species as populations diverge under different conditions, and the decline — and sometimes the extinction — of some species.

Species become extinct because they can no longer survive and reproduce in their altered environment. If members cannot adjust to change that is too fast or drastic, the opportunity for the species’ evolution is lost. | Cause and EffectEmpirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects. |

## 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

7.2.2 Ability to respond to a critique from others by revising an argument after analysis of the reasoning and evidence

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

### Disciplinary Core Idea Assessment Targets

#### LS4.C.6

* Identify changes in environmental conditions that could potentially result in an increase in the number of some species, lead to the emergence of new species over time, and/or lead to the extinction of other species
* Identify the evidence supporting a claim that changes in environmental conditions can affect species both positively and/or negatively
* Evaluate the evidence supporting a claim that changes in environmental conditions affected a species positively or negatively
* Evaluate evidence supporting that environmental factors can determine the ability of individuals in a species to survive and reproduce

#### LS4.C.7

* Explain why a change in an environment may cause extinction of a species
* Explain why an inability to reproduce can lead to extinction

### Crosscutting Concept Assessment Target(s)

CCC2 Identify empirical evidence to differentiate between cause and correlation and make claims about specific causes and effects

## Examples of Integration of Assessment Targets and Evidence

Note that the list in this section is not exhaustive.

Task provides a claim stating that changing environmental conditions affect a species:

* Identifies evidence that could be used to support the claim (7.2.1, LS4.C.6, and CCC2)
* Describes the conditions under which the claim can be supported (7.2.1, LS4.C.6, and CCC2)

Task provides a claim and supporting data on how changing environmental conditions affect a species:

* Evaluates whether the claim is supported by the data (7.2.1, LS4.C.6, and CCC2)
* Critiques the claim with supporting reasoning and/or evidence (7.2.1, LS4.C.6, and CCC2)

Task provides a claim and supporting data on how changing environmental conditions lead to species extinction:

* Evaluates whether the claim is supported by the data (7.2.1, LS4.C.7, and CCC2)
* Critiques the claim with supporting reasoning and/or evidence (7.2.1, LS4.C.7, and CCC2)

Task provides a claim and supporting data on how changing environmental conditions can lead to species extinction:

* Revises the claim based on an adequate critique (7.2.2, LS4.C.7, and CCC2)

Task provides competing claims about how changing environmental conditions affect a species:

* Identifies possible evidence and reasoning that can be used to justify the different claims (7.2.3, LS4.C.6, and CCC2)
* Student can evaluate the competing claims using reasoning and evidence (7.2.3, LS4.C.6, 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.

## Possible Phenomena or Contexts

Note that the list in this section is not exhaustive.

* Natural disasters (e.g., storms, mudslides, etc.)
* Human activities (e.g., overhunting, pollution, etc.)
* Range expansion or contraction for a specific species
* Increases in the population size of one species while the population size of another species in the same ecosystem decreases

## Common Misconceptions

Note that the list in this section is not exhaustive.

* Environmental changes are always bad for organisms.
* Naturally occurring events are better for species survival than are human-caused ones.
* All species are equally affected by environmental changes.

## Additional Assessment Boundaries

None listed at this time.

## Additional References

HS-LS4-5 Evidence Statement [https://www.nextgenscience.org/sites/default/files/evidence\_statement/black\_white/HS-LS4-5 Evidence Statements June 2015 asterisks.pdf](https://www.nextgenscience.org/sites/default/files/evidence_statement/black_white/HS-LS4-5%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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