

# SCIENCE TASK ANNOTATION

## ANNOTATION KEY

**EQUITY**

Supporting a wide range of diverse students.

**SCENARIOS**

Information provided to elicit performances.

**SEPs**

Opportunities to demonstrate science and engineering practices.

**DCIs**

Opportunities to demonstrate understanding of disciplinary core ideas.

**CCCs**

Opportunities to demonstrate understanding of crosscutting concepts.

**SENSE-MAKING**

Opportunities for reasoning about phenomena and problems.

**ASSESSMENT PURPOSE**

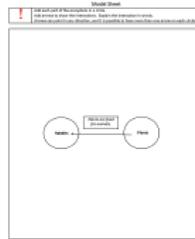
Highlights how the task features connect to intended assessment use.

## MODELING RABBITS AND THE MOVEMENT OF MATTER SHORT PERFORMANCE ASSESSMENT

### Materials Needed



Stapled Assessment Packet (this paper)



Model Sheet (separate paper)

### Instructions Used in this Assessment



Instructions



Read



Answer



Add to Your Model

### Let's Begin!



In this task, you will develop a model that will help you describe the relationships between parts of an ecosystem.

You will read a story about this ecosystem. We started a model of the ecosystem for you on the separate model sheet. Each time you read a new part of the story, you will add new information to the model. Then, you will use the model to help you answer questions.

# MODELING RABBITS AND THE MOVEMENT OF MATTER SHORT PERFORMANCE ASSESSMENT (CONTINUED)

(Whole task) Overall, this task elicits student understanding of the DCI with some opportunities to practice CCCs. The SEPs are somewhat backgrounded, and are used both as a mechanism for students to show their DCI understanding (part 1) as well as a support for sense-making (part 2). The two parts of the task offer some nice and clear contrasts about how scenarios focused on topics vs. scenarios focused on phenomena/problems elicit different kinds of student responses—one more rote/descriptive, while the other is more grounded in sense-making. This also acts to scaffold student engagement with the DCIs, SEPs, and CCCs as students move from part 1 to part 2.

SEPs

CCCs

DCIs

SENSE-MAKING

SCENARIOS

## Part 1: The Australian Ecosystem

|  |  |  |
|--|--|--|
| <p>This is a true story that took place in Australia.</p>                          | <p>The Australian ecosystem had open spaces with small hills covered with plants, such as grass and trees.</p> | <p>One animal in this ecosystem was the kangaroo. Kangaroos eat different kinds of plants.</p> |
|  |                              |             |

This part of the scenario is based around a relatively specific topic—the Australian ecosystem—rather than a phenomenon. This limits the kind of sense-making that students can show in part 1, because there is no observation or specific instance to make sense of—questions connected to this scenario will be more likely to be “about” the topic, rather than figuring something out.

SCENARIOS



Find the model sheet. We have started the model for you by showing two parts of the ecosystem, the kangaroos and the plants. The arrow indicates how matter moves from the plants to the kangaroos.



1

Describe how matter moves from plants to kangaroos in this ecosystem.

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The model sheet provided (located at the end of the task) shows that matter moves from plants to kangaroos. This question can provide a helpful scaffold to help students orient to the task and ensure that they understand the diagram they will be modifying. It also provides an opportunity to surface some initial understanding of 5-LS2.A.

EQUITY

DCIs

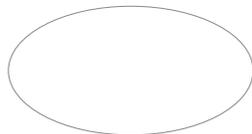
## MODELING RABBITS AND THE MOVEMENT OF MATTER SHORT PERFORMANCE ASSESSMENT (CONTINUED)



2a

One non-living thing that plants need in order to grow is soil.

Write one more non-living thing that plants need in order to grow in the second circle below.



2b

- Add both non-living things to your model on the Model Sheet.

- Draw arrows to show how matter moves between the non-living things and the rest of the ecosystem.

(Hint: Arrows can point in any direction, and it is possible to have more than one arrow on each circle.)

Question 2 (parts A and B) serves to ask students to describe the DCI in ways that could be rote, and does not elicit knowledge-in-use or making sense of a phenomenon. This could be used as a scaffold for the rest of the task, and to support interpretation of student understanding across the whole task.

SENSE-MAKING

DCIs

CONNECTION TO ASSESSMENT PURPOSE

This requires rote understanding of non-living things that plants need to grow (connected to 5.LS2.A).

DCIs

This is a highly scripted drawing, asking students to represent their understanding of the DCI (how matter cycles among living and non-living things in an ecosystem) through a guided diagram, rather than asking them to make a model to explain a phenomenon. This provides a nice opportunity for students to practice skills/mechanics associated with the SEP rather than to assess students' proficiency with the SEP, and can be appropriate scaffolding for the rest of the task.

SEPs

CONNECTION TO ASSESSMENT PURPOSE

## MODELING RABBITS AND THE MOVEMENT OF MATTER SHORT PERFORMANCE ASSESSMENT (CONTINUED)



2c

Describe how matter moves from the non-living things to the kangaroo in this ecosystem. Use specific examples from your model to explain your ideas

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Students are describing understanding of the DCI. While “using the model” is referenced, the diagram was itself a visual representation of the DCI rather than a descriptive or explanatory account for a phenomenon, so this question primarily elicits students’ DCI understanding, while backgrounding sense-making with the DCI or SEP. This can be a helpful scaffold for later parts of the task, when students engage in modeling more deeply, and offers an opportunity for students to practice/develop the SEP.

It should also be noted that the rubric suggests a very complete answer to this question to be considered proficient/excelling—its not clear that students would know how much information should be included based on the question language. Educators should bear this in mind when making judgments about student proficiency.

### CONNECTION TO ASSESSMENT PURPOSE

DCIs

SEPs

SENSE-MAKING

# MODELING RABBITS AND THE MOVEMENT OF MATTER SHORT PERFORMANCE ASSESSMENT (CONTINUED)



## Part 2: Introduction of the Rabbits

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|--|--|--|
| <p>In 1859, a farmer brought 24 rabbits to Australia. There were many green plants for the rabbits to eat.</p> | <p>The rabbits grew strong and reproduced rapidly. By 1950, Australia had 600 million rabbits!</p> | <p>Unfortunately, the rabbits damaged the ecosystem. They ate almost all the green plants.</p> |
|                               |                   |              |

This is a specific set of observations, allowing more sense-making to be elicited in part 2 of this task.

### SCENARIOS



3a

- Add the rabbits to your model sheet.
- Draw one or more arrows to show how matter moves between rabbits and other parts of the ecosystem.



3b

Why do you think many plants could not survive after rabbits were introduced to the ecosystem?

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Question 3 (both parts) builds on the ideas students initially described in part 1 of the task, providing scaffolding to support student thinking, and requires similar understanding to question 2. In this question, students have to use the model and their understanding of 5-LS2.A to make sense of why plants couldn't survive with the introduction of rabbits, a specific phenomenon.

EQUITY

SENSE-MAKING

DCIs

SEPs

## MODELING RABBITS AND THE MOVEMENT OF MATTER SHORT PERFORMANCE ASSESSMENT (CONTINUED)



3c

Describe how the rabbits made the whole ecosystem weaker. Use what you know about ecosystems and examples from your model to support your reasoning.

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This question asks about a specific observation/claim—that the rabbits made the ecosystem weaker. By asking students to address this specific phenomenon, rather than ecosystems more generally, students have to use their understanding of the DCI to make sense of the given situation. Moreover, by asking students to describe how one part of the ecosystem can influence all the other parts, the question draws on CCC understanding as part of the sense-making required.

Specifically, addressing this question requires:

—Part of 5.LS2.A “the food of almost any kind of animal can be traced back to plants. Organisms are related in food webs in which some animals eat plants for food and some animals eat the animals that eat plants...a healthy ecosystem is one in which multiple types of species are each able to meet their needs... newly introduced species can damage the balance of an ecosystem.”

—Part of the 3-5 crosscutting concept element “[a system] can be described in terms of its components and interactions.” [Note the overlap between this CCC and the DCI understanding expected.]

DCIs

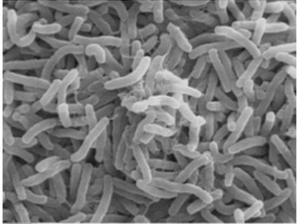
CCCs

SENSE-MAKING

# MODELING RABBITS AND THE MOVEMENT OF MATTER SHORT PERFORMANCE ASSESSMENT (CONTINUED)



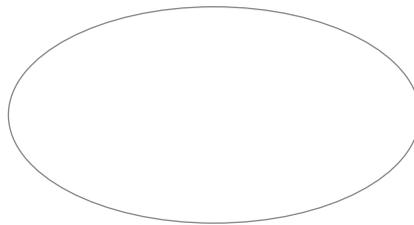
## Part 3: Scientists Reduce the Rabbit Population

|   |   |   |
|---|---|---|
| <p>Scientists decided to try to lower the number of rabbits by releasing a disease into their environment</p> | <p>The disease killed many of the rabbits. But the dead rabbits created problems for the environment.</p> | <p>There were many dead rabbits, but eventually decomposers cleaned them up.</p>    |
|                              |                          |  |



5a

Write the name of a decomposer in the circle below



This requires rote understanding, rather than DCI understanding in use. Like in question 2, it can be useful scaffolding, but student responses should not be used in isolation as evidence for whether students understand and can use the targeted DCI.

DCIs



5b

- Add the decomposer to your model.
- Draw one or more arrows to show how matter moves between the decomposers and other parts of the ecosystem

The diagram students have been updating throughout the task serves as a way to make their DCI understanding visible in non-text-dependent ways and gives students the opportunity to develop and practice some aspects of the SEP developing and using models.

SEPs

DCIs

CONNECTION TO ASSESSMENT PURPOSE

## MODELING RABBITS AND THE MOVEMENT OF MATTER SHORT PERFORMANCE ASSESSMENT (CONTINUED)



5c

This ecosystem would not survive without the decomposers. Describe how decomposers cleaning up the dead rabbits made the whole ecosystem stronger.

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This question builds on question 4 by asking students to bring their understanding of decomposers (also part of 5.LS2.A) to the table. The question elicits similar DCI and CCC understanding [again, note the overlap with ecosystem interactions described by the DCI and systems thinking as the CCC]. The task acts to both elicit CCC understanding, while also providing an opportunity for students to practice and continue building the understanding that systems can be described in terms of their components and interactions, such that it could be used in a different scenario later.

DCIs

CCCs

SENSE-MAKING

## Model Sheet



Add each part of the ecosystem in a circle.

Add arrows to show the interactions.

Arrows can point in any direction, and it is possible to have more than one arrow on each circle.

