

Introduction:

This task, administered as a summative transfer assessment completed at the end of Bend 2 of the NextGen Storylines unit “[Why don’t antibiotics work like they used to?](#)”, asks students to consider a phenomenon-based problem: bird population decline on Norfolk Island in the South Pacific. Throughout the task, students consider data about genetic and physical similarities and differences to make supported claims about whether a population of birds found on Norfolk Island be issued special protections as a species, or if they should be considered part of others species’ populations.

STANDARDS:

This task is intended to assess progress toward the following NGSS Performance Expectations:

HS-LS4-1: Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence.

HS-LS4-4: Construct an explanation based on evidence for how natural selection leads to adaptation of populations

HS-LS4-5: 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.

ANNOTATION KEY

EQUITY	SCENARIOS	SEPs	DCIs	CCCs	SENSE-MAKING	ASSESSMENT PURPOSE
Supporting a wide range of diverse students.	Information provided to elicit performances.	Opportunities to demonstrate science and engineering practices.	Opportunities to demonstrate understanding of disciplinary core ideas.	Opportunities to demonstrate understanding of crosscutting concepts.	Opportunities for reasoning about phenomena and problems.	Highlights how the task features connect to intended assessment use.

STRENGTHS

This task is centered around a **real-world phenomenon-based problem** that is specific and intriguing. The scenario makes it clear to students why this question was posed and why it was important to answer it, and creates a need to understand the scenario using ideas about speciation. ■

The task routinely asks students to **engage in sense-making using multiple dimensions**. ■

Questions 1–3 offer students an **opportunity to develop HS-level CCC** understanding of patterns, even if they are not assessed. ■

The task includes **many opportunities to reveal student thinking**—including current understanding, gaps, and misconceptions—and **provides substantial opportunities to value student ideas and decision making** about which data and ideas they will use to support their thinking. This includes opportunities for multiple correct answers. ■ ■

The task seems **well-aligned to the aspects of the three-dimensions targeted that were included as part of curriculum (opportunity to learn)**. ■

! OPPORTUNITIES FOR IMPROVEMENT

Much of the task can be successfully completed using **MS-level SEP and DCI elements** without this being explicitly acknowledged in the scoring guidance—in other words, the task does not necessarily elicit the distinguishing aspects of HS-level SEPs and DCIs, but doesn't make this clear for those interpreting student progress. Some notable examples include: ■ ■ ■

- Questions 1–3 connect to part of HS.LS4.A, but can likely be successfully completed using the MS-level understanding focused on anatomical similarities and differences as an indicator of evolutionary lines of descent because the genetic information and the anatomical information provided suggest the same conclusions.
- The data provided to students in the scenario is very simple, and limits the level of sophistication of student ideas that can be elicited—this is problematic here because it pushes the student thinking revealed to the MS level. For example, the “genetic similarity” data students are using is really just a comparison of numbers.

While the CCC patterns is practiced in the task, **students do not need to bring HS-level understanding of patterns (or other CCCs) to respond to the task**. ■

Several aspects of the identified PEs were not assessed here, without being explicitly identified or articulated in the provided scoring guidance: ■

- Several aspects of the DCIs, such as ideas about overlaps in DNA sequences, amino acid sequences, the combination of genetic and anatomical/embryological evidence; and complete ideas about natural selection and adaptation.
- HS-level patterns and cause and effect elements identified
- Several specific parts of the SEPs identified, including communicating information in multiple formats, and the use of multiple sources of valid and reliable data (and decisions about what makes data valid and reliable implied).

✓ STRENGTHS

Throughout the task, there are opportunities for student to use parts of **DCIs and SEPs together to make sense** of various aspects of the phenomenon presented. For example: 

- Throughout the task, students are routinely asked to make claims that are supported by evidence from data and their understanding of speciation and indicators of common ancestry. The task also supports students in constructing unique arguments that reflect varying degrees of sense-making, which can reveal different facets of student understanding across all students completing this task.
- Almost all questions in the task require students to use at least a part of a DCI as justification for a claim, a suggested piece of additional data, or predictions about observations of the birds on Norfolk island over time. This intentional coupling of DCIs as the reasoning component for specific claims/data interpretation is an effective way to require integration of SEPs and DCIs in service of sense-making.

! OPPORTUNITIES FOR IMPROVEMENT

The scenario **did not make clear enough the connection between ideas about common ancestry and the current question about whether the birds in question are a separate species**. This limited the coherence of the task and might be confusing to some students. 

The task is somewhat dependent on students' using **written language** to convey their thinking in open-ended questions, which might obscure some students' science understanding and abilities. 

The **scoring guidance does not provide enough information about what can be inferred about students' progress** relative to the PEs targeted. 

How does this task support all students?

✓ This task is focused on a specific, observable [phenomenon](#) and presents the relevant scenario information through both text-based descriptions as well as a graph. The task includes clear scaffolding to help students dive more deeply into what the data are showing and how to both interpret and critique evidence and claims—this can help [engage a wide range of students](#) with varying grasps on the SEPs and DCIs in sense-making while still leaving room for students to demonstrate facets of their understanding. It is particularly notable that this task is designed to advantage and value student ideas and their own agency as sense-makers by authentically placing students in the role of the scientist and allowing students to make decisions among multiple acceptable ideas, as long as they are well-supported. This is relatively unique among science tasks, and this is a nice example of supporting all students not only in being able to engage with the task, but connect to the material in ways that might make it 1) more likely that they will make their ideas visible, and 2) set students up to have ownership over their scientific thinking.

! The task does rely heavily on language—the scenario is text-heavy, and the emphasis on justifying answers, while completely understandable from a content perspective, may frequently requires long written responses without clear options that would more easily allow students with more limited English language abilities to show their thinking in other ways (e.g., diagrams, discourse, etc). Additionally, the task provides limited opportunities for students to connect to why common ancestry is important to consider here, which might limit their engagement with certain parts of the task (e.g., Questions 1–3).

What are the major takeaways?



SUMMARY POINTS:

- Overall, this task is a unique example of a task that enables multiple correct student responses without sacrificing a focus on particular assessment targets across the three-dimensions, providing a nice example of how to [balance tasks that are engaging, value student ideas and decision-making, and focus on particular assessment targets](#).
- The task robustly requires students to use [SEPs](#) and DCIs together in service of [sense-making](#)—a nice example of integration—but is set up such that [CCCs are not explicitly needed to respond](#) to the task and MS-level DCIs are frequently sufficient.
- While the task connects well with instruction, the scoring guidance does not meaningfully support student and teacher interpretation of student progress toward the standards (and associated SEP, DCI, and CCC elements) identified as the target.



SUGGESTED IMPROVEMENTS

The task would be improved if:

1. The task—including both the questions and scoring guidance—focused more on the distinguishing aspects of the HS-level expectations for student understanding of the targeted DCIs.
2. The scoring guidance was modified to include 1) specific connections to the assessment targets, including what is and is not assessed; and 2) notes about MS-level performances that might be elicited, including support for interpreting student performance across progressions.
3. The task—through prompts and/or scoring guidance—emphasized alternative ways for students to make their thinking visible. This could include explicit options for things like diagrams, verbal communication, etc, or could expand to including questions in the task that require the targeted reasoning but are demonstrated without needing to articulate that reasoning.
4. The task [scenario](#) was expanded to include 1) more supports—in multiple modalities—for understanding the task context, 2) a clearer connection between the scenario and the DCIs targeted (specifically ideas about common ancestry) to help improve coherence, and 3) more meaningful and varied data, enabling students to better use the HS-level DCIs, SEPs, and CCCs.
5. Bringing the CCC to the forefront. If the task intends to target the CCCs associated with the PEs—HS elements of Cause and Effect and Patterns—some suggestions might be:
 - Presenting students with discrepant observations or data that requires them to 1) consider which source of data (and at which scale) is more relevant, and 2) use those patterns to make supported arguments involving the distinction between cause and correlation.
 - Providing more varied and robust data about macroscopic (trait) and microscopic (DNA sequences) that could be used to support claims about speciation.

How should this task be used?

This task can be used as intended—a classroom summative assessment after students have completed Bend 2 of the associated instructional unit—provided that it is made clear to teachers and students how student performance does and does not reflect the complete expectations associated with the targeted PEs. This assessment might be especially useful the unit is taught either relatively early in high school. This task might also be a helpful assessment used to assess **part of or progress toward** the targeted PEs, SEPs, and DCIs. It should not be used—without modifications—as the sole or major summative assessment intended to indicate student proficiency on all parts of the targeted PEs due to the gaps between what is elicited by the task and the expectations associated with the PES.