# HS BIOLOGY: GALAPAGOS GROUND FINCHES

## Introduction:

This task, administered as a summative transfer assessment completed at the end of Bend 1 or 2 of the NextGen Storylines unit "Why don't antibiotics work like they used to?", asks students to consider changes in finch beak length and wing length to make a claim regarding which trait has changed the most over time and provide an account—through both explanation and a prediction—for how food availability may have influenced the change in observed beak length in the population. The task depends on the evaluation of four graphs that show the distribution of beak and wing length in 1973 and 1978.

The task appears to be assessing knowledge the students learned during instruction, and connects closely related phenomena concerning trait changes in birds (Juncos) and how this relates to survival advantages (limited/near transfer).

## STANDARDS:

This task is intended to assess the NGSS PE:

**HS-LS4-3:** Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait.

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.

## ✓ STRENGTHS

This task is centered around **easily comprehended real-world observations,** using well-crafted and realistic data.

The task asks students to **engage in sense-making** by asking them to interpret data and make claims, support explanations, and make predictions.

The task includes some opportunities for student to use parts of **DCIs, SEPs, and CCCs together in two- and three-dimensional combinations to make sense** of various aspects of the phenomenon presented. For example, Q5 may provide students with the opportunity to combine the evidence from Q1-3 with a simple understanding of natural selection and adaptation to provide a plausible causal account for how food availability could influence finch traits.

The task offers **scaffolding of the data analysis (Q1-3) before asking students to use the evidence.** This both offers an opportunity to reveal student understanding of SEP4 while also asking them to integrate the dimensions.

## ! OPPORTUNITIES FOR IMPROVEMENT

The **scenario does not help students understand why this is something that needs to be figured out.** This can limit student engagement, and does not cue them to begin thinking about which ideas would be helpful for making sense of the observations.

The vast majority of the task can be successfully completed using **MS-level SEP elements,** although HS-level expectations are cited.

The majority of the task (both by prompts and score points) **does not require students to use aspects of the DCI to respond**.

While the CCC patterns are explicitly signaled in the task, **students do not need to use an HS-level understanding of patterns (or other CCCs) to respond to the task**. For example, Q1-3 focus on simple pattern recognition (3-5 CCC elements).

The scoring guidance does not provide enough **support for teachers and students in determining how student responses connect back to three-dimensional expectations— and what is and is not assessed.**

For example, several aspects of the identified PEs were not assessed here, without being explicitly identified or articulated in the provided scoring guidance. This includes:

- Some aspects of the DCIs, such as ideas when natural selection can occur (under what conditions).
- HS-level patterns and cause and effect elements identified.
- HS-level analyzing and interpreting data or using mathematical and computational thinking.

## How does this task support all students?

✓ The task includes clear scaffolding to guide student interpretation of the graphs provided. The assessment also offers some important contextual information (e.g., definition of finches, real images) that can help students understand the scenario. The task used simple, straightforward language that was sufficient for the task at hand.

! The task focuses on a somewhat irrelevant and distant (in both space and time) phenomenon—without making it clear to students why this is something intriguing that needs to be addressed, it might be difficult for many students to connect with and be motivated by the phenomenon. It should be noted that if this task is used with the instructional materials intended, there might be different considerations between bend 1 and bend 2: this might be more intriguing and require more sense-making after bend 1, but may be more familiar after bend 2. For more information on features of tasks that support diverse learners, see this resource.

## What are the major takeaways?

### SUMMARY POINTS:

Overall, this task provides evidence of whether students can interpret graphical data, identify patterns, and connect this information with some understanding of the targeted DCI to form an explanation. In many instances, this task seemed more like an applied mathematics task or a formative mid-unit check on student progress than a task designed to elicit meaningful scientific sense-making that would provide evidence of students' proficiency with the targeted PE.

### SUGGESTED IMPROVEMENTS

The task would be improved if:

- the task focused on a more relevant and engaging phenomenon that is clearly problematized for students.
- 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 dimensions. This might involve removing scaffolding, increasing the sophistication of the scenario, including richer and more varied data and information, and asking more nuanced questions.It should be noted that any modifications made should take into account opportunity to learn.
- 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.

## How should this task be used?

This task could be useful in the classroom to formatively reveal student progress in sense-making with data and some science ideas. If the task is used with the targeted unit, it will likely engage more meaningful sense-making after Bend 1 than Bend 2 (at which point students will have engaged with very similar scenarios previously). If this task is used more summatively (to provide a grade and or to make claims about student proficiency and progress toward the standards), the opportunities for improvement above should be taken into account (e.g., students successfully completing this task doesn't provide complete evidence that students understand and can use the ideas represented in the PE, or in the HS-identified elements).

If this task is used in a different context (i.e., with different instructional materials or instructional sequence), teachers should pay close attention to how the task connects to instruction—because this is a highly common scenario/context used in traditional biology texts and lessons, the task might require representation of previously explored ideas rather than sense-making.