TASK OVERVIEW

MIDDLE SCHOOL LIFE SCIENCE: BURNING BIODIVERSITY

Three-Dimensional Claim

Students can apply their understanding that populations in an ecosystem change over time by constructing explanations, engaging in argument, and asking questions, highlighting an understanding that cause and effect relationships may be used to predict an ecosystems response to natural catastrophe.

Disciplinary Core Ideas Crosscutting Concepts Science and Engineering Practices

Tennessee Academic Standards for Science

This task is intended to elicit student learning of the following Tennessee Science Standard:

6.LS2.6: Ecosystems: Interactions, Energy, and Dynamics: Research the ways in which an ecosystem has changed over time in response to changes in physical conditions, population balances, human interactions, and natural catastrophes.

Next Generation Science Standards

This task is intended to elicit student learning of the following NGSS elements for each of the three dimensions:

Science and Engineering Practices

Constructing Explanations and Designing Solutions

- *Middle School Element:* Apply scientific ideas, principles, and/or evidence to construct, revise and/or use an explanation for real world phenomena, examples, or events.

Engaging in Argument from Evidence

- *Middle School Element:* Compare and critique two arguments on the same topic and analyze whether they emphasize similar or different evidence and/or interpretations of facts.

Asking Questions and Defining Problems

Patterns

- *Middle School Element:* Ask questions that arise from careful observation of phenomena, models, or unexpected results, to clarify and/or seek additional information.

Disciplinary Core Ideas

LS2.C: Ecosystem Dynamics, Functioning, and Resilience

- *Middle School Element:* Ecosystems are dynamic in nature; their characteristics can vary over time. Disruptions to any physical or biological components of an ecosystem can lead to shifts in all its populations.

Crosscutting Concepts

Cause and Effect: Mechanism and Prediction

- *Middle School Element:* Cause and effect relationships may be used to predict phenomena in natural or designed systems.

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	STRENGTHS	OPPORTUNITIES FOR IMPROVEMENT
SCENARIO	The scenario details a specific event – the Chimney Tops Fire – and a specific set of observations that occurred after the fire. The phenomenon is central to the task – students need to engage with the fire event and its effects to complete the task. The task is comprehensible and includes images to help students get a sense of the damage caused by the fire.	The scenario could be framed to be more uncertain and puzzling for students (e.g., how is it possible that some populations bounced back right away and some experienced low numbers for years after?). Consider including additional information about why investigating populations after fires is important for understanding ecosystems and how ecosystems bounce back after major disruptions.
SENSE-MAKING	Students need to use more than just rote knowledge (e.g., definitions, prescriptive, or memorized procedure) to answer the prompts about the Chimney Tops Fire.	Students are not asked to put the pieces together to explain why the dynamics of the ecosystem could account for the changes in the population data of the small mammals. Thus, the majority of the task does not require students to use reasoning.
INTEGRATED DIMENSIONS	Two- and three-dimensional prompts are used throughout the task. The task does a particularly good job of eliciting evidence of students' ability to ask questions to seek additional information.	To fully elicit evidence of students' understanding of the targeted disciplinary core idea, the task needs to go beyond relationships between two components within an ecosystem. Additionally, the task may provide more evidence of student understanding if students develop a model or explanation instead of (or in addition to) critiquing an argument.
EQUITY	Some prompts are open-ended in such a way that both low- and high-achieving students can show what they know and can do (e.g., the final prompt in which students ask questions).	Coherence from the student perspective could be improved by providing a reason for why they need to compare or critique arguments in Prompt 3. Right now, the purpose is not clear, potentially making it more of a reading comprehension activity.
FEEDBACK SUPPORT	The teacher support documents are well developed and helpful, outlining the assessment targets for each prompt along with example responses and "look fors".	Building out opportunities for students to construct explanations more thoroughly could better elicit direct, observable evidence of the three-dimensional learning target and students' abilities to make sense of phenomena.

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Suggestions for Use

This task could be used formatively as students begin to engage with the ideas of stability and changes in ecosystems. Alternatively, the task could be slightly modified and used as a formative or summative assessment of the idea that the "populations of organisms are dependent on their environmental interaction… [and] population increases are limited by access to resources" (LS2.A).

What Are The Major Takeaways?

SUMMARY POINTS	SUGGESTIONS FOR IMPROVEMENT
The phenomenon is central to the task – students need to engage with the specific, real world, a local Chimney Tops Fire event and its effects to complete the task. Students have opportunities to demonstrate multi-dimensional understanding throughout the task, and some prompts are open-ended in such a way that both low- and high-achieving students have an opportunity to show what they know and can do. The teacher support documents are well developed and helpful.	To provide evidence of student understanding of the disciplinary core idea and to make sense of stability of and change to the forest after the fire, the task could go beyond relationships between two components within an ecosystem (potentially by developing a model or explanation).

What Should I Do Before Using This Task?

Users should review the provided guidance to familiarize themselves with instructions and disclosures before using these tasks.

How Were These Tasks Developed?

The tasks were developed and revised by teacher work groups from participating districts in the Tennessee District Science Network (TDSciN), which was launched in early 2019 and managed by NextGenScience. Tasks were evaluated using an adapted version of the Science Task Screener. Teachers worked collaboratively across districts to develop and revise these tasks after attending multiple professional learning sessions. Find out more about the development process here.

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