Monarch Butterflies and Other Culturally Important Organisms

Science Performance Assessment

Middle School

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About This Task

Task Name	Monarch Butterflies and Other Culturally Important Organisms	**Grade Level or Course**	Middle School
Phenomenon	How did the changing in farming practices after 1990 affect the Monarch butterflies? How does a change in resource availability impact organisms that are important to us?	**What instruction or experiences should learners have before completing this task?**	Students should have experience with analyzing data to make sense of the cause and effect relationships between resource availability and populations across different time scales.
Time Required & Materials	**Part 1 Time:** ~60 minutes (including 15 minutes of teacher facilitation) **Part 2 Time:** ~60-120 minutes **Materials** • Copies of the task worksheet for each student. • Facilitation slides • Internet access for students to conduct their research. • Paper and writing materials if students want to create visuals for their stories.		
Considerations and Adaptation Suggestion(s)	This task could be expanded to include multigenerational and community relationships by adding in an interview or community-based collaborative component as part of the research around an important organism in the community.		

Standards Emphasis

Assessment is a balancing act involving multiple tradeoffs. No one task can do everything, and often good design carefully considers what *not* to assess. The targeted NGSS Performance Expectation and supporting dimensions are shown below. The parts of the standard not addressed in the task are ~~struck through~~. Each item in the task may target one or more of the dimensions - not every item has to assess every dimension. What matters is that the task as a whole addresses all three dimensions.

NGSS Performance Expectations

- **MS-LS2-1:** Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.
  Clarification Statement: Emphasis is on cause and effect relationships between resources and growth of individual organisms and the numbers of organisms in ecosystems during periods of abundant and scarce resources.

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Analyzing and Interpreting Data Use graphical displays (e.g., maps, charts, graphs, and/or tables) of large data sets to identify temporal and spatial relationships	**LS2.A: Interdependent Relationships in Ecosystems** Organisms, and populations of organisms, are dependent on their environmental interactions both with other living things and with nonliving factors. In any ecosystem, organisms and populations with similar requirements for food, water, oxygen, or other resources may compete with each other for limited resources, access to which consequently constrains their growth and reproduction. Growth of organisms and population increases are limited by access to resources.	**Cause and Effect** Cause-and-effect relationships may be used to predict phenomena in natural or designed systems. **Stability and Change** Stability might be disturbed either by sudden events or gradual changes that accumulate over time.

PADI Design Principles Emphasis

The PADI design principles are present in varying ways and to different degrees across these teacher-created science performance tasks. The design principles highlighted for each task represent those that are intentionally emphasized in the task. Educators utilizing these tasks may develop their own interpretations of the application of the design principles, and modifications to the tasks could naturally influence the extent to which each principle manifests.

The PADI Design Principles are:
Student Voice & Agency. Task or activity ensures that the students can make choices within and have agency over some aspects of the learning and assessment experience.

Relationships. Task or activity provides opportunities for students to make connections with others both within and beyond the classroom.

Identity and Inclusion. Task or activity ensures that each student can bring a sense of joy and pride around their identity and individuality to the task. Students should feel safe to be vulnerable and should feel supported by their classroom community (teachers and students).

Groundedness. Task or activity ensures that students can complete the task in their current environment using their current context to apply real-world knowledge to the place where they live. All participants should have awareness of self, others, and surroundings. Task or activity should prioritize presence over productivity. Students should feel like they can answer the question: "Where are my feet planted? What can I do from here?"

This task foregrounds:

- **Relationships** by asking students to consider and describe the cultural significance of ecosystem changes and changes in populations or organisms in a collaborative part of the task.
- **Identity and Inclusion** by centering the narrative of a community that is experiencing the change in the monarch butterfly population. The task also asks students to describe an organism that is culturally significant to them and consider how changes in that organism's population might impact their community.

Teacher Facilitation Guidance

Often performance assessments are new to students. They usually require some degree of transfer from their classroom learning experience and students will need support to share all their ideas in the task.

1. **Review the Task.** Complete the performance assessment acting as a student in your classroom. Think about the unit you have taught/are teaching. Where might your learners need additional support? What additional activities might you need to do before the Performance Assessment? What adjustments do you need to make to the assessment (e.g., a classroom discussion of the phenomenon) before you send students to complete the task.
2. **Orient to the Transfer Task Routine.** Refer to the "During–" and "After the Transfer Task Implementation" guidance in the "Transfer Task Routine" document on how to support students in their experience. Consider what additional support your students may need as they work to apply science ideas they have developed to a new scenario.
3. **Make a Plan for Time.** This is a two part task. Make a plan for how you want to split the time across the two parts. Part 1 (45 min) is a class introduction via the slides and then an individual component. Part 2 (45-90 min) is a class discussion followed by group work to develop additional cases of organism/resource availability relationships.
4. **Introduce Part 1.** Explain to students that this is a two part task and let them know what to expect. Part 1 facilitation guidance is included in the slide notes (slides 1-6). Slide 7 is an optional graph that can support students during the assessment, if needed. Review and adapt as needed for your classroom.
5. **Wrap up Part 1.** Wrap up Part 1 by asking the class to summarize what they figured out in the table on slide 8.
6. **Introduce Part 2.** Share with students that monarch butterflies are not the only organisms that are important to communities. Slides 9-10 describe Part 2.
    a. **Discuss as a Class.** What plants, insects, or animals do you have a connection to? What stories do you have about what it is like to experience a change in the population of that organism?
    b. **Optional.** Share the video which describes another type of butterfly and their significance to the Purépecha indigenous community in Mexico: The Big Lie About Monarch Butterflies.
        - Debrief the video.
            - Recap that the little white butterflies in the video are important to the Purépecha people and help communicate with children about their connection to the land. If there were fewer little white butterflies, what might be the impact on the Purépecha people?
            - The video mentions that monarch butterflies are important to other Indigenous communities in Mexico. What do you think they are feeling and doing now that the Monarch butterfly numbers are declining
7. **Facilitate Part 2.** Ask students to work in groups spending about 30 minutes (or more if you have time) with access to a computer to research and develop their story.
8. **Group Sharing.** Ask each group to share their story in 2-5 minutes and as a class, complete the table on slide 10 to capture the information from each group's story.

Student Task Worksheet

A student version of the task worksheet is linked here.

Feedback and Scoring Guidance

For **Part 1,** use the scoring guidance directly from Lesson 10 of the 7.5 OpenSciEd unit.
For **Part 2**, look for the following in each group story and use the guiding questions to follow up and probe for additional thinking.

In each group's story, look for the following:

LOOK FORS	GUIDING QUESTIONS
Environmental Interactions. A description of the environmental interactions of the organism and how they interact with living and nonliving things in the ecosystem.	*Tell me more about how this organism interacts with other plants and animals in the area?* *How does this organism interact with water, air, and land?*
Requirements. The requirements for the organism to survive and reproduce.	*What did you find out about the things this organism needs to survive and reproduce?*
Cause and effect relationship. A description of a plausible cause and effect relationship between resource availability and the population of the organism that makes sense in the context of the environmental interactions and requirements.	*What do you think caused this population to change?* *Based on this organism's requirements, what might have changed in the ecosystem to see this change in the population.*
Data. (Optional, if time). Data to support their story about the change in the population and available resources.	*If you were able to find data, how do you know this data supports your cause and effect relationship description?*
Community Impact. The impact on an individual or community.	*How and why does the change in their organism impact the community?* *What might it feel like to be a member of the community and experiencing this change?*
Group Participation: All group members contribute to the creation and sharing of the story.	*Share with a partner about your contribution to the group. Tell me a story about how you supported your group members. What would you do the same or different next time?*