

Focus: Designing a Model
Grade Level: Fifth Grade
Module Length: 2-4 hours

Driving Questions

- What is our project research question?
- How does using water-saver plants vs water-spender plants in restoration affect the number of insects at The Bowl experiment?

NGSS Links

- 5-LS1-1
- 5-LS1-2
- Developing & Using Models

Systems Thinking Characteristics

- Identifying System Components & Processes
- Identifying Simple Relationships Between System Components
- Organizing System Components & Processes within a Framework of Relationships
- Identifying Hidden Dimensions of the System

In the second module of Project Crystal, students are introduced to the driving question: How does using water-saver plants vs water-spender plants in restoration affect the number of insects at The Bowl experiment?

As students are introduced to our two testable research questions, they compare the two types of plants -- water-savers and water spenders -- that we will test in our experiment in Moro Canyon. Then, students make a list of all the factors and processes that could affect the survival of insects in Moro Canyon. They then use their list to build a model that shows their initial ideas about how the factors and processes might interact to impact insect populations in our experiment in Moro Canyon.

Learning Outcomes & Assessments

<i>By the end of this module, students will be able to...</i>	<i>You can assess this using...</i>
1. Describe what a healthy ecosystem should contain.	Observations of class discussion
2. Share the Project Crystal research project.	Observations of class discussion; Science journals
3. Compare and contrast water-saver and water-spender plants.	Science journal; Observations of class discussion
4. Generate a list of components and processes that affect the survival of insects in Moro Canyon.	Science journals
5. Design a model that shows the interaction between different parts of the ecosystem in our experiments and their impact on insect abundance.	Student models

Module Sequence

Section	Session Title	Length	Format
Launch	<p><i>Introduction to our Research Project</i></p> <p>Students are introduced to our Project Crystal research questions and the seed mixes that we will be comparing in our experiment: water-saver plants and water-spender plants.</p>	30 minutes	Whole class and research teams
Explore	<p><i>Building a Model</i></p> <p>Students generate a list of components and processes that affect the survival of insects in Moro Canyon, then students draw a model to show how the use of water-saver and water-spender plants in restoration affects the number of insects.</p>	30-45 minutes	Research teams
Share	<p><i>Sharing Thoughts on Moro Canyon</i></p> <p>In a group discussion, students share their initial ideas about the mulch experiment and what factors they think will impact insect populations.</p>	20-30 minutes	Whole class or research teams
Extend	<p><i>Explore at Home: Exploring with Seek by iNaturalist (Optional)</i></p> <p>Students use the app Seek by iNaturalist to identify plant and animal species in their area. They then use their science journal to start making a field guide for their local plants and animals.</p>	30 minutes	Individual
Reflect	<p><i>Based on your model, what factors do you think will have the biggest effect on how many insects are found in each seed mix?</i></p> <p>Students share their initial ideas about how plant type will affect the presence of insects.</p>	15 minutes	Individual

Materials

- Science Journal and Pencil (1 per student)
- Poster paper and colored crayons, pencils, or markers (1 per research team)
- **Module 2 Introduction Slideshow**
- **Building a Model Slideshow**
- **Module 2 Discussion Slideshow**
- Module 2 Explore at Home
 - **Science Journaling Slideshow** (English)
 - **Family Instructions** (English)
 - **Science Journaling Slideshow** (Spanish)
 - **Family Instructions** (Spanish)
- Module 2 Reflection Video Prompt hosted on Flipgrid, Padlet, or to host on the platform of your choice:
 - Option 1: Flipgrid**
 - Option 2: Padlet**
 - Option 3: Video** to host on the private platform of your choice

Before You Start Teaching

- Copy over the **Launch Slideshow**, the appropriate **Explore Slideshow** (see more details below), **Share Slideshow**, and **Explore at Home Slideshow** to your own Google Drive account.
- Decide how you will host the Share discussion for this module. If your class already has established science communication norms, open your copy of the **Share Slideshow** and update **Slide 3** with your discussion guidelines and **Slide 4** with any sentence starters.
- Decide how you want students to share their reflections. They can post their thoughts publicly on Crystal Cove Conservancy's **Flipgrid** or **Padlet**, or you can host the discussion prompt video on the platform of your choice. We recommend sticking to the same format as the previous module.

Learning Sequence

Launch

Introduction to our Project Crystal Research Question (20-30 minutes)

Slideshow Link

In this slideshow, Dr. Kailen Mooney, the project scientist for Project Crystal, introduces his research interests in Crystal Cove State Park. The students are then introduced to the two testable research questions for Project Crystal about insect abundance and bird activity. Finally, they compare the two types of plants, water-savers and water-spenders, and record their initial observations in their science journals. If you have California Bush Sunflower and California Sagebrush plants at your school site, you can have students make their observations of the plants in person and skip slides 12-20 of the slideshow.

Explore

Investigation: Building a Model (30-45 minutes)

Slideshow Link

In this investigation, students develop a list of components and processes that affect the survival of insects in Moro Canyon. They then work with their research teams to develop a model of the system to show how using water-saver plants and water spender plants in restoration affects the number of insects.

Share

Discussion: Sharing Thoughts on Our Project Crystal Experiment (20-30 minutes)

Slideshow Link

Once students have taken part in the Explore activity, this discussion lets them share what they've noticed and learned about our Project Crystal research project and their initial ideas about their model. This discussion can take place either as a whole class or in their research teams.

Before diving into the Module 2 discussion questions, you can remind students again of the science communication norms. Suggested norms and sentence starters are included in the Google Slides presentation, although you can edit them or use your own!

Extend

Explore at Home: Exploring with Seek (30 minutes)

Slideshow Link (English)

Slideshow Link (Spanish)

Family Directions (English)

Family Directions (Spanish)

During this optional Explore at Home Investigation, students step away from the screen and practice using the mobile app Seek by iNaturalist to identify plant and animal species around their own home, neighborhood, or backyard. They can then pick a new species that they have identified to create a field guide entry in their science journal.

As an extension, you might choose to have students share their field guide with their classmates, either during a small group discussion or by filming a video for Flipgrid or another platform. You can also encourage them to share their field guide with a family member or friend.

Reflect

Reflection Question: *Based on your model, what factors do you think will have the biggest effect on how many insects are found in each seed mix?*
(15 minutes)

Flipgrid Link

Padlet Link

Video Link

At the end of the module, students reflect on the Project Crystal experiment and their models by sharing their initial ideas about mulch and how it will affect the growth of the plants in our study. Students can share their reflections with the broader Project Crystal community on our public Padlet or Flipgrid pages, or you can host the video reflection prompt on your own discussion platform of choice.