

Focus: Conducting Background Research

Grade Level: Fifth Grade

Module Length: 90+ minutes

Driving Questions

- What questions do we still have about the model of our ecosystem?

NGSS Links

- 5-LS1-1
- 5-LS2-1
- Planning and Carrying Out Investigations
- Constructing Explanations
- Interpreting Data

Systems Thinking Characteristics

- Identifying System Components & Processes
- Identifying Simple Relationships Between System Components
- Identifying Hidden Dimensions of the System

In this third and optional module of Project Crystal, students define what questions they have about the ecosystem in Moro Canyon, and conduct background investigations to learn more about specific parts of the system.

At the start of the module, students look back at their model created in Module 2, and determine what questions they still have and what they wonder about. Based on the questions that students asked, the teacher can decide to have them conduct background investigations to dig deeper into specific components and processes of the ecosystem in Moro Canyon.

Suggested investigations include how plants use water, how plants adapt to their environment, how habitat types affect the presence of birds, and the amount of rainfall 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. Share three questions they have about the ecosystem in Moro Canyon.	Science journals
2. Describe how plants use water and compare the water use of two different plant species.	Science journals; Observations of class discussion
3. Compare the rainfall in Moro Canyon to other parts of California and their own home.	Science journals, Observations of class discussion
4. Build a food web that shows the movement of energy between common organisms within a coastal sage scrub plant.	Science journals, Observations of class discussion
5. Compare the number of bird species found in different habitats at Crystal Cove and at their school.	Science journals, Observation of class discussion

Module Sequence

Section	Session Title	Length	Format
Launch	<p><i>What questions do you have about your model?</i> Students look back at their model of Moro Canyon and come up with at least three questions or things that they wonder about their model.</p>	20-30 minutes	Whole class or individual
Explore	<p><i>Coming Up With a Plan</i> In a group discussion, students share their questions with each other, and plan which questions to investigate further.</p>	20-30 minutes	Whole class or small groups
	<p><i>Digging Deeper</i> Depending on how the educator chooses to structure this module, students take part in background investigations either as a whole class or in research teams.</p>	30-45 minutes each	Individual or small groups
Share	<p><i>Sharing What We Learned</i> In a group discussion, students describe the investigations they conducted and share any new or changed ideas they have about the ecosystem in Moro Canyon.</p>	20-30 minutes	Whole class or small groups
Extend	<p><i>Explore at Home: Making a Home Food Web (Optional)</i> Students identify species near where they live at different trophic levels, and organize them into a food web.</p>	30 minutes	Individual
Reflect	<p><i>What is something you learned that you will add to your model of Moro Canyon's Ecosystem?</i> Students share their initial ideas for how to update their models.</p>	15 minutes	Individual

Planning This Module

Module 3 is designed to be flexible, based on the time that your class has available and where you see your students having questions related to Project Crystal's disciplinary core ideas. You can decide which background investigations will be most beneficial for students' understanding, or let students choose which questions they want to investigate.

If there are other content knowledge-related learning activities that you want to integrate into the program outside of our curriculum, this is also the best place to do so.

Materials

- Science journal and pencil (1 per student)
- **Module 3 Launch Slideshow**
- **Module 3 Planning Our Investigations Slideshow**
- Module 3 Explore Investigations Slideshows:
 - **Transpiration Investigation**
 - **Bird Investigation**
 - **Moro Canyon Rainfall Investigation**
 - **Food Web Investigation**
- **Module 3 Share Slideshow**
- **Module 3 Explore at Home Slideshow** (English)
- **Module 3 Explore at Home Slideshow** (Spanish (Coming soon!))
- **Module 3 Explore at Home Family Directions** (English)
- **Module 3 Explore at Home Family Directions** (Spanish) (Coming soon!)
- Module 3 Reflection Video Prompt:
 - Option 1: Flipgrid**
 - Option 2: Padlet**
 - Option 3: Video** to host on the private platform of your choice

Materials for Running Investigations

Each investigation requires different supplies. We've designed them with options that are commonly found at home, so that students can set up and run the investigations independently if need be.

For each investigation, each team or individual will need:

Transpiration Investigation

- (4) plastic cups (alternatively, students can use (4) glass cups, (2) water bottles and (2) plastic bags, or some other container)
- (2) plastic cup lids
- (1) roll of tape
- (1) small package of Vaseline (optional)
- (2) plant clippings from different species
- (1) 1-cup measuring cup or another small container for pouring water

Bird Investigation

- A device (computer, tablet, or smartphone) with access to the internet
- Thinklink Bird Survey
- Printed Bird Field Guides (for optional school site bird survey)

Moro Canyon Rainfall Investigation

- A device (computer, tablet, or smartphone) with access to the internet

Food Web Investigation

- *Printed species cards*

Before You Start Teaching

- Before starting the module, review students' models that they created in Module 2. Look for places where students commonly had questions or seemed unsure about processes.
- Review the different background investigations in Explore, and decide how you want to conduct the investigations with your students.
- Copy over the [Launch Slideshow](#), the [Explore Slideshows](#), [Share Slideshow](#), and [Explore at Home Slideshow](#) to your own Google Drive account.
- Update the [Launch Slideshow](#) on [Slide 5](#) to include directions for how you would like students to submit questions they still have about their model. You might include a link to a class padlet, a message board, or instructions on how to submit a photo of their notebook page to you.
- Update the [Explore Slideshow](#) on [Slides 3](#) and [4](#) to include any specific directions on how students will conduct the background investigations.
- 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

What Questions Do You Have About Your Model? (20-30 minutes)

Slideshow Link

In this slideshow, Kaitlin prompts the students to look back at the model they created in Module 2, and come up with at least three questions they still have about their model and the ecosystem in Moro Canyon. They can then submit their questions to help you decide what background investigations to use in the Explore section of the module.

Update *Slide 5* of the slideshow with instructions for how they can submit their questions to you. You might include a link to a class padlet, a message board, or instructions on how to submit a photo of their notebook page to you.

Explore

Planning Our Investigations (20-30 minutes)

Slideshow Link

During this short slideshow, students will have the chance to share their questions with each other, and decide which investigations they are going to conduct to help answer their questions. They then set up a table in their science journals to help them keep track of what they learn during each investigation.

Slide 4 lists the possible investigations you can choose from. You can have students choose which investigations interest them the most, or assign them based on the questions submitted from the Launch slideshow. Make sure to update *Slides 3-4* with any specific instructions for your class.

Investigations: Digging Deeper into the Ecosystem (30-45 minutes)

In this series of short investigations, students can dig deeper into specific components or processes of the ecosystem to better understand their models. Each investigation is around 30-45 minutes of active learning, although some include an hour of wait-time in the middle for the investigations to complete.

As students complete each investigation, they should fill in the Digging Deeper chart in their science journal. This will help them keep track of what they've learned so that they can make a plan to update their model later in Session 4.

Transpiration Investigation

Slideshow Link

In this investigation, students set up two terrariums containing water and two different plant species. They leave the terrariums out in the sun, make observations of the movement of water from the bottom cup to the top cup, and make inferences about how water moves through a plant. Finally, they compare the transpiration rates of two different plants in Crystal Cove State Park. You can have each research team set up their own terrariums, or set up one set for the whole class to observe.

Food Web Investigation

Slideshow Link

In this investigation, students think about what organisms live on or within a single buckwheat plant in The Bowl experiment in Moro Canyon, and create a food web to show the flow of energy through the system. They receive a set of species cards describing some of the most common organisms within a plant, sort them into categories based on how they get their energy, then draw a food web in their science journals to show all the different interactions between each organism.

Bird Habitat Investigation

Slideshow Link

Bird Investigation Survey Thinglink

Bird Field Guide

In this investigation, students can identify bird species on a virtual bird survey in Moro Canyon on Thinglink, and compare the number of bird species present in two different restoration sites in Moro Canyon. As an optional extension, they pick two different habitats at their school site to compare, and count the number of bird species found in each habitat type.

Moro Canyon Rainfall Investigation

Slideshow Link

In this investigation, students look at historical rainfall data for Moro Canyon, and compare it to the wettest and driest parts of the state to determine if Moro Canyon is relatively wet or relatively dry. They then create a graph of the rainfall where they live. You can present the slideshow to the whole class, or have students research teams go through the slideshow on their own.

Share

Discussion: Sharing What We Learned (20-30 minutes)

Slideshow Link

Once students have taken part in the Explore investigations, this discussion lets them share what they've noticed and learned about the different components and processes, and discuss how they might improve their models. This discussion can take place on Zoom or in the classroom, either as a whole class or in small breakout groups.

Before diving into the Module 3 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: Making a Home Food Web (30 minutes)

Slideshow Link (English)

Slideshow Link (Spanish) (Coming soon!)

Family Directions (English)

Family Directions (Spanish) (Coming soon!)

During this optional Explore at Home Investigation, students learn about different trophic levels in an ecosystem, identify species near their home at different trophic levels, and organize the organisms they found into a food web in their science journals.

As an extension, you might choose to have students share what they learned with their classmates, either during a small group discussion or by filming a video for Flipgrid or another platform.



Reflect

Reflection Question: *What is something new you learned that you are going to add to your model? (15 minutes)*

Flipgrid Link

Padlet Link

Video Link

At the end of the module, students reflect on the investigations and their models by sharing something new they learned during the module. 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.