Crystal Cove® CONSERVANCY

Session 4: Diving Deeper

Focus: Building Background Knowledge
Grade Level: 7-12
Session Length: 45-60 minutes or longer

Driving Questions

- What else do we need to know to refine our model of the Crystal Cove SMCA

NGSS Links

- Designing and 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 fourth and optional session of the MPA Exploration, students identify the questions that they have about their model and conduct background investigations to learn more about different parts of the system.

At the start of the session, research teams return to the models that they created in Session 3 and identify any questions that they need to answer. Based on the questions that students identify, they set up a chart to track what they learn and use lateral search techniques to research the answers online. The teacher can also choose to have students take part in other related labs or investigations outside of the MPA Exploration program.

Learning Outcomes & Assessments

By the end of this module, students will be able to...	***You can assess this using...***
1. ***Identify*** questions that they have about the marine ecosystem in the Crystal Cove SMCA.	Field notebook entry
2. ***Plan*** and conduct background research or investigations to answer their questions.	Research team discussions
3. ***Develop*** and carry out a plan to refine their model of the Crystal Cove SMCA.	Research team models; Field notebook reflections

Session Overview

Section	Description	Length	Format
Launch	Students watch a video of Erick, who introduces the task for Session 4: they will be asked to identify and answer questions about their model so that they can refine it.	5 minutes	Whole class
Explore	Research teams generate a list of questions that they still have about their model and come up with a plan to answer them. The latter part of the session is flexible. Students can research the answers to their questions online using the lateral search technique that they practiced in Session 2. The teacher can also choose to insert other scientific investigations to explore specific topics related to their models.	20 minutes 30 minutes and up	Research teams & individual Individual or Research teams
Share	Student research teams share what they've learned and make updates to their model.	20-25 minutes	Whole class
Reflect	Students reflect on what they've learned from their model and what their next steps might be.	5 minutes	Individual

Virtual Materials

- Session 4 Google Slides Presentation: **https://bit.ly/3lRISuk**
- Session 4 Field Notebook template (optional): **https://bit.ly/33YaKXE**

Each student will need...

- A device with internet access (a computer, smartphone, or tablet will all work!)
- Field notebook and pencil

Before You Start Teaching

- Review research teams' models from Session 3 and take note of any common misunderstandings or questions that they identified.
- Decide how you want students to conduct background research. You can let them look for information online, or you can integrate other investigations (such as ***an ocean acidification lab*** to learn more about how ocean acidification affects pH and fish or ***building a food web*** of a marine ecosystem).
- Copy over the ***Session 4 Slideshow*** for your chosen platform to your own Google Drive account. Test to make sure that the videos work. (If not, you may have to check the permissions on the Crystal Cove Conservancy Youtube Account.)
- Review the lesson plan and decide how you will structure the session in terms of timing. Depending on how you want to have students conduct their research and refine their model, you may want to break the Explore section over multiple class sessions or assign it as independent work.
- If there are specific extension investigations that you want to add into the lesson, update ***Slide 5*** with any information that may be unique to your class.

Learning Sequence

Launch

Getting Started with Modeling (5 minutes)

1. Open the ***Session 4 Slideshow*** and play the video on ***Slide 2*** for your class. In this video, Erick will briefly introduce introduce Session 4 and the idea that research teams will want to refine their models.

2. After watching the video, move on to ***Slide 3***, which gives an overview of what students will do and learn during Session 4.

Explore

Digging Deeper (75+ minutes)
Part 1: Identifying Questions (20-25 minutes)

1. Advance to ***Slide 4*** and play the video. Erick will ask research teams to review their model, identify any questions that they have, and come up with a plan to answer those questions.

2. Once the video is done, move on to ***Slide 5*** and reiterate the task for students: They will review their models and identify at least 3-5 questions that they still have and then come up with a plan to answer those questions.

Let students know how you want them to record their list (in a shared Google doc, in their field notebook, etc.). If there are specific questions that you want to tackle as a class through extension investigations, make sure to note these.

3. Break students into their research teams and give them 15 minutes to identify their questions and come up with a plan to answer them. If possible, give them a two-minute reminder before the end of the brainstorming time.

Part 2: Conducting Background Research (30+ minutes)

4. When the research teams are done brainstorming, play the video on ***Slide 6***. Move on to ***Slide 7*** and ask students to being working on their background research.

As students work, they should keep track of what they learn in a Digging Deeper chart.

Question	What I Did	What I Learned	Clues for Our Model
What question are you trying to answer?	How did you find the answer to the question?	What did you learn that answered the question?	What do you plan to add to your model as a result?

5. Give students time to conduct their background research. You can have them do this individually in class or assign it as individual work outside of class.

Share

Sharing Our Findings & Revising Out Model (Optional) (20-25 minutes)

1. Open *Slide 8* and play the video, where Erick will invite them to share their findings with their research team.

2. Move on to *Slide 9*. Ask students to return to their research teams and share their findings with their teammates. When they're ready, they can begin refining the collaborative model that they created in Session 3.

3. Give students time to work. If possible, move between the discussions. Invite students to share how their thinking and understanding changed as they conducted the background research.

Reflect

Reflecting on Session 4 (5 minutes)

1. When the research teams are done updating their models, tell students that they have one last task, as always. In the slideshow, advance to *Slide 10* and play the video, where Erick will invite them to spend a few minutes reflecting.

2. Move on to the final slide, which will share reflection questions. Ask students to spend five minutes reflecting on their experiences today in their field notebook.

3. Finally, thank the class for their time today. Tell them that when you gather again, they will learn about the different monitoring processes that Crystal Cove Conservancy, Crystal Cove State Park, and UC Irvine are using to study the Crystal Cove SMCA, and will prepare to help with data collection.