

Focus: Building Background Knowledge
Grade Level: 7-12
Session Length: Varies; At least two sessions of 45-60 minutes

Driving Questions

- What else do we need to know to refine our systems model of Crystal Cove's North Beach?

NGSS Links

- Asking Questions
- Planning and Carrying Out Investigations

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 third session of the Coastal Dynamics program, student 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, project teams return to the models that they created in Session 2 to look back at the questions they identified within their models. Based on the questions that students identify, they will come up with a plan to investigate and set up a chart to track what they learn through the diving deeper sections 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 Coastal Dynamics program.

This session also offers students an opportunity to dive deeper into specific topics linked to Physics, such as the mechanics of ocean waves.

Learning Outcomes & Assessments

<i>By the end of this module, students will be able to...</i>	<i>You can assess this using...</i>
1. Identify questions that they have about the system surrounding the North Beach.	Field notebook entry
2. Plan and conduct background research or investigations to answer their questions.	Project team discussions
3. Develop and carry out a plan to refine their model of system at Crystal Cove's North Beach.	Project team models; Field notebook reflection

Session Overview

Section	Description	Length	Format
Launch	Students watch a video of Shelbi, who introduces the task for Session 3: they will be asked to identify and answer questions about their model so that they can refine it.	5 minutes	Whole class
Explore	<p>Project teams generate a list of questions that they still have about their model and come up with a plan to answer them.</p> <p>The latter part of the session is flexible. Students can research the answers to their questions online by taking part in the Diving Deeper investigations or by using the lateral search technique. The teacher can also choose to insert other scientific investigations to explore specific topics related to their models.</p>	<p>20 minutes</p> <p>30 minutes and up</p>	<p>Project teams</p> <p>Individual or project teams</p>
Share	Student project teams share what they've learned through their investigations and think about how they might refine their model.	20-25 minutes	Whole class or project teams
Reflect	Students reflect on what they've learned from their model and what their next steps might be to refine it.	5 minutes	Individual

Virtual Materials

- Session 3 Google Slides Presentation: <https://bit.ly/39vghI2>
- Session 3 Field Notebook template (optional): *coming soon*
- Diving Deeper Presentations:
 - Introduction to Lateral Search: <https://bit.ly/3ufBD43>
 - Introduction to Wave Dynamics: *coming soon*
 - Introduction to Sand Movement: *coming soon*
 - Introduction to Coastal Adaptations: *coming soon*

Each student will need...

- A device with internet access (a computer, smartphone, or tablet will all work!)
- Field notebook and pencil
- Their project team's models from Session 2

Before You Start Teaching

- Review project teams' models from Session 2 and take note of any common misunderstandings or questions that they identified.
- Decide how you want students to conduct background research. You can assign specific background investigations to specific students and have them share back with their entire team, let them look for information online using lateral search techniques, or give them a set amount of time and let them prioritize how to find their own answers.
- Copy over the [Session 3 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.)
- If there are specific extension investigations that you want to add into the lesson, update [Slide 6](#) with any information that may be unique to your class.

Learning Sequence

Launch

Getting Started with Modeling (5 minutes)

1. Open the [Session 3 Slideshow](#) and play the video on [Slide 2](#) for your class. In this video, Shelbi will briefly introduce Session 3 and the idea that project teams will want to investigate the questions they identified in their model to refine their models.
2. After watching the video, move on to [Slide 3](#), which gives an overview of where they are currently at in the environmental engineering process.
3. Once you've gone over the new step in the engineering design process, advance to [Slide 4](#) to give students an overview of what they will do and learn during Session 3.

Explore

Part 1: Identifying Questions (20-25 minutes)

1. Advance to [Slide 5](#) and play the video. Shelbi will ask project 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 6](#) and reiterate the task for students: They will review their models, identify at least 3-5 questions that they still have, and then come up with a plan to answer those questions. On Slide 6, you'll find examples of questions that they might ask.
3. Move on to [Slide 7](#), which shows an example chart that students might use to identify and rank their questions. Let students know how you want them to record their list of questions (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.
4. Break students into their project 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)

5. When the project teams are done brainstorming, play the video on *Slide 8*. In this video, Shelbi will describe the routes students can take to investigate the questions that they identified in their models. Move on to *Slide 9* and ask students to begin coming up with a plan to answer their questions.

As students work, they should keep track of what they learn in a Diving 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?

6. Advance to *Slide 10* where students will be given options to dive deeper or conduct lateral searches to continue their investigations.

7. Give students time to conduct their background research. This part of the session may stretch over multiple class meetings. You can have them conduct their investigations individually in class or assign it as individual work outside of class.



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

1. When students are finished investigating, move to *Slide 11*. Ask students to return to their project teams and share their findings with their teammates.

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

3. If time allows, give students some time to share their findings with the class.



Reflect

Reflecting on Session 3 (5 minutes)

- 1.** When the project teams are done sharing what they investigated, tell students that they have one last task, as always. In the slideshow, advance to **Slide 11** and play the video, where Shelbi 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 use the information they learned through investigating their questions they had about their model to revise their model.