

## **When the Sea Gets a Fever: Understanding Marine Heatwaves**

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Developed as part of the ARET@LTERS program, Summer 2024



<b>Teacher:</b> Shelton Reynolds	<b>Unit:</b> Under the Heat: How Marine Heatwaves Impact Oceans
<b>Grade/Course:</b> 6th Grade Science	<b>Lesson Title:</b> When the Sea Gets a Fever: Understanding Marine Heatwaves
<b>Objectives:</b> I can ask questions about marine heatwaves, oceans, and climate change.	<b>Investigative Question:</b> How does the heat from marine heat waves affect sea urchin kelp consumption? How can marine heatwaves impact our oceans?
<b>NGSS Performance Expectation:</b> <b>MS-ESS3-3.</b> Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment. <b>MS-ESS3-5.</b> Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.	
<b>Real World Phenomenon Addressed in the Lesson:</b> Marine Heatwaves & Our Ocean	
<b>3 Dimensions of Science</b>	
<b>Science &amp; Engineering Practice(s) Used:</b>	
<ul style="list-style-type: none"> <li>• Asking Questions</li> <li>• Planning and Carrying Out Investigations</li> <li>• Constructing Explanations</li> </ul>	
<b>Crosscutting Concept(s) Used:</b>	
<ul style="list-style-type: none"> <li>• System and System Models</li> <li>• Patterns</li> <li>• Stability and Change</li> </ul>	
<b>Disciplinary Core Idea(s)</b>	
<ul style="list-style-type: none"> <li>• Human activities, such as the release of greenhouse gases from burning fossil fuels, are major factors in the current rise in Earth's mean surface temperature (global warming). Reducing the level of climate change and reducing human vulnerability to whatever climate changes do occur depend on the understanding of climate science, engineering capabilities, and other kinds of knowledge, such as understanding of human behavior and on applying that knowledge wisely in decisions and activities. (MS-ESS3-5)</li> <li>• Human activities have significantly altered the biosphere, sometimes damaging or destroying natural habitats and causing the extinction of other species. But changes to Earth's environments can have different impacts (negative and positive) for different living things. (MS-ESS3-3)</li> </ul>	
<b>Background Information</b>	

**Prior Student Knowledge:** Students will engage in this mini-unit after our oceans, atmosphere, and climate unit and before our climate change unit. Students will have information on ocean currents and salinity and be able to model and explain how we have different climates on Earth. Students will model why we have the climate in Ventura County. Students will learn what El Nio/ La Nia is and how it can also impact our ocean temperatures. Students only have a little information on the kelp forest ecosystems at this point besides looking at some organisms from the kelp forest under a microscope in our cells unit.

**Possible Preconceptions/Misconceptions:** Students may think that marine heat waves happen to the same extent every year throughout the Earth's history. Students may think that climate change doesn't impact our oceans. Students may only understand some of the different uses of the ocean besides the fact that animals live there.

**Content Information for Teacher:** Teachers should understand marine heat waves, how they have been increasing in our local community, and how to set up the sea urchin feeding lab with kelp in their classroom.

**Google Slides for Lesson:**

[https://docs.google.com/presentation/d/12oDJ7JJSz\\_HomfiAY6XA05seBcNjuRDkulxkAe5r3d0/edit?usp=sharing](https://docs.google.com/presentation/d/12oDJ7JJSz_HomfiAY6XA05seBcNjuRDkulxkAe5r3d0/edit?usp=sharing)

5E	Evidence of Use/Student Activity
<b>Engage/Explain</b>	At the beginning of class, a science starter will activate students' prior knowledge by asking them to list anything they know about oceans.
<b>Engage/Explore</b>	Students will engage and explore marine heat waves by looking at various visualizations in the Google Slides and then complete a <a href="#">Predict-Observe-Explain</a> activity about Marine Heat Waves and sea Urchins/Kelp that we will revisit at the end of the mini-unit. In the predict-observe-explain activity, students will list any curiosities or questions they have about oceans, climate change, or marine heat waves.
<b>Engage/Explain/Evaluate</b>	Students will begin our <a href="#">Sea Urchin &amp; Kelp Feeding Lab</a> by making predictions, assigning lab group roles, setting up the experiment, and collecting their initial data for the experiment.
<b>Elaborate/ Evaluate Lesson Closure</b>	Students will complete an exit ticket Google Form for the day, sharing one thing they are looking forward to or one thing they want to learn in this unit. They will also self-reflect on their lab role for today, rank how well they

	did, and explain with evidence why they deserve that score.
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