

2. What's Greenland Got to Do With the Great Lakes?

Overview and Purpose

To understand and visualize how rising sea levels due to glacial melt from climate change could impact the Great Lakes.

Lesson Summary

Students deepen their knowledge of the impact that climate change and rising water levels can have on the Great Lakes. The focus here is to connect melting glaciers and sea level rise to the volume of water in the Great Lakes.

What does the rise of sea levels have to do with the Great Lakes? If students understand the geographical features of the Great Lakes waterways and how they connect to the Atlantic Ocean, students can begin to see how a melting glacier near Greenland can have an effect on the water levels in the Great Lakes, because the Great Lakes eventually empty out into the Atlantic through the St. Lawrence Seaway.

The goal in this lesson is for students to visualize, through storyboarding, how melting ice from glaciers in the Atlantic ocean will ultimately equilibrate into connected waterways, impacting Great Lakes shorelines a great distance away.

They will learn about glacial melt, and even how unmelted icebergs affect sea level, in Greenland through a 360° Frontline documentary and then storyboard how that would ultimately impact different areas of the Great Lakes region.

The background context that is needed for this lesson is for students to know the names of the Great Lakes and have been introduced to the geography of Great Lakes waterways to know how they are connected. Students also need to know how to make a storyboard.

This lesson focuses on students comparing and connecting knowledge of two distinct topics and integrating that knowledge together with classmates to visually represent their thinking.

ESSENTIAL THEMES	<ul style="list-style-type: none"> ● Geographic features of the Great Lakes waterways and Greenland ● Glacier composition and melt due to climate change
NEXT GENERATION SCIENCE STANDARDS	<ul style="list-style-type: none"> → MS-ESS3.A.1: Describe and graph the amounts of saltwater and fresh water in various reservoirs to provide evidence about the distribution of water on Earth. → 5-ESS2-2 Describe and graph the amounts and percentages of water and fresh water in the Great Lakes to provide evidence about the distribution of water on Earth. → SEP8: Integrate qualitative and/or quantitative scientific and/or technical information in written text with that contained in media and visual displays to clarify claims and findings.
OBJECTIVES	<ul style="list-style-type: none"> <input type="checkbox"/> Be able to explain how glaciers in far-away Greenland can affect the shorelines of the Great Lakes <input type="checkbox"/> Create a storyboard that visually represents the impact of glacial disappearance on Great Lakes water levels
ESTIMATED TIME	❖ 1-2 class periods

Materials Needed

- Video projection monitor or screen/speakers
- Internet access
- Computers or mobile devices (e.g., tablets, cellphones)
- Notebooks and pencils
- Chart paper or a dry erase board and markers

Facilitation Steps

WARM UP: Begin by asking students what they already know about the essential themes of the lesson and what they wonder about it. Have them turn and talk with a shoulder partner. Then, after a minute of conversation, elicit responses from a couple of volunteers and jot down 2-3 ideas on the board under the categories KNOW and WONDER. The teacher should help students clarify their ideas as they are shared by checking for understanding using a talk move such as “so you are saying...” or help students think together by asking for a show of hands of agreement from the class in response to what individual students share.

LAUNCH: Once the warm up has concluded, give a brief overview of the background context to students, making connections to their KNOW and WONDER responses as well as any other

relevant prior knowledge they would have from other lessons they have learned. Describe the activities planned for this lesson to students.

ACTIVITY 1: Greenland Is Melting

First, show the class a map of Greenland and explain to students that they are going to be viewing an interactive 360° documentary, which flies over Greenland to explore the glacial melt and iceberg movement happening in that region of the Atlantic Ocean. They will be able to use the arrows on the video to see in all directions while the video is playing. Inform them that certain locations on the video have text embedded in them for more information—this is a form of augmented reality. This video will provide some basic information to them about the disappearance of Greenland glacier ice and it may address some of their KNOWS/WONDERS from the warm up.

Introduce students to the 4 Notes Summary protocol that they will use after they finish watching the 360° video about Greenland, where they write one of each of the following:

- Oooh! (something that was interesting)
- Aaah! (something that was an ah-ha moment)
- Hmm... (something that left them thinking afterward)
- Huh? (a question they have afterward)

Ask students to give an example of each type of note that they will be making to check for understanding.

Next, have students partner up and view the [Why is Greenland Melting?](#) 360° video from Frontline.

Then, after they finish the video, each student should record in their notebooks a 4 Notes Summary after they complete the documentary.

Last, have partners discuss their takeaways from the video, taking turns sharing what they wrote for their individual responses to the 4 Notes Summary with their partner. Ask for a few volunteers to share with the whole class what they heard their partner say in the discussion.

ACTIVITY 2: Storyboard the Impact of Melting Glaciers

First, ask students to think to themselves about how the glacial melting in Greenland might affect the Great Lakes. After giving a minute of think time, inform students that they and their partners will be cooperating to make a storyboard that will visualize what exactly the melting in Greenland has to do with the Great Lakes.

Teacher Tip: If students are unfamiliar with storyboards, you can utilize this resource on [How to Create Storyboards](#) to help introduce the method to your class.

Next, give students a chance to explore what the geography looks like for these seemingly unconnected areas of the world. Utilize this international resource about [the St. Lawrence Seaway](#) to do so and give students time to check it out.

Then, allow students time to create their storyboards to tell how the melting in Greenland would ultimately affect the shorelines of each of the five Great Lakes. You may optionally choose to set parameters on their storyboards, e.g., what needs to be included and how many steps need to be included in the visualization. The only must do aspects of storyboards are that they contain visuals and text to represent each step in the process of what's being represented.

Last, give students the opportunity to meet up with other partnerships to present their storyboards to one another and discuss similarities and differences between how they represented the connection between Greenland and the Great Lakes.

[OPTIONAL] ACTIVITY 3: An Enrichment Experience With Greenland

This activity is completely optional and can be used as an extension to enrich the learning about how climate change is affecting the Arctic and will ultimately affect connected waterways such as the Great Lakes.

Remind students about the 4 Notes Summary protocol that they used previously, and inform them that they will use that protocol again after they finish watching the expedition video about Greenland. Again, they write one of each of the following:

- Oooh! (something that was interesting)
- Aaah! (something that was an ah-ha moment)
- Hmm... (something that left them thinking afterward)
- Huh? (a question they have afterward)

Next, show the video [Greenland—Frozen Frontier](#) from PBS to the entire class.

Then, after they finish the video, each student should record in their notebooks a 4 Notes Summary after they complete the documentary.

Last, have partners discuss their takeaways from the video, taking turns sharing what they wrote for their individual responses to the 4 Notes Summary with their partner. Ask for a few volunteers to share with the whole class what they heard their partner say in the discussion. Wrap up the activity by asking students to sum up how this Greenland expedition video relates to the Great

Lakes. Have them turn and talk with their partners before choosing a couple of volunteers to share their responses with the class.

SYNTHESIS: Give students individual thinking and writing time in their notebooks to synthesize their learning by jotting down their own reflections using a Word, Phrase, Sentence protocol, with:

- A **word** that they thought was most important from the lesson
- A **phrase** that they would like to remember
- A **sentence** that sums up what they learned in the lesson

After the individual synthesis is complete, students should share their synthesis with a shoulder partner.

COOL DOWN: Have students complete a 3, 2, 1 Review protocol for the lesson with a partner, recording in their notebooks or, optionally, on exit ticket slips to submit, the following:

- **3** things that they liked or learned
- **2** things that make more sense now
- **1** question that they were left with

CLOSURE: Have one student share a response from each of the categories of the 3, 2, 1 Review. Depending on the available time, the teacher can make connections between the ideas students share and the learning objectives of the lesson, and respond to the question that is shared.

EXIT TICKET: Students identify which of the Great Lakes they would expect to be most impacted by glacial melting in Greenland based on the storyboards and explain why.

About the Author

Gary is an educational consultant, award-winning science educator and the author of [Science With Scarlett](#). He is also a double cornea transplant recipient who, since having his sight restored, was moved to use his teaching gifts to make science fun for kids. He lives with his family near Detroit and designs learning experiences to inspire children, like his own daughter, to love science. Gary is the 2014 recipient of the Michigan Teacher of the Year honor. Contact him via his consulting firm, [Saga Educators](#), or connect with him on [Twitter](#).

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