



Works of Water

K-2 Investigating Earth and Sky Virtual Field Trip



Hubbard Lake. Photo courtesy of Ariel Graphics

This is a supplementary educator guide to assist parents and teachers with the asynchronous portion of the virtual field trip. To reserve your virtual exhibit exploration experience, please fill out the [Virtual Field Trip Request Form](#).

All associated activity guides can be found with the attached documents found on our [website](#).
Additional resources can be found at the end of this guide.

What role does water play in our world?

We experience water in many forms, from filling our water bottles with clean tap water to floating down a local lazy river on an inner tube. The majority of Earth's water is found in the oceans, covering around 71% of Earth's surface. However, out of all the water the Earth holds, only 2.5% of that water is fresh. More so, only 1% of that freshwater is easily accessible. This is why understanding where we can find water and how water shapes our Earth's processes is very important. The more we learn about our natural resources, the better we can shape our actions to protect and conserve the precious resources all living beings need to survive. You can start that stewardship journey for your students with just one question - how does water work?

Connection to the Next Generation Science Standards

During this virtual field trip, your young scientists will learn about the roles of water on Earth. This field trip directly aligns with the Next Generation Science Standards and is a continuation from the lessons presented in [Mystery Science](#). Together, *Works of Water* and Mystery Science covers the Science and Engineering Practices, Disciplinary Core Ideas, and Crosscutting Concepts from 2-ESS2-3.

After this field trip, your 2nd grader should be able to explain these endpoints in their own words: Water is found in the ocean, rivers, lakes and ponds. Water exists as solid ice and in liquid form.

2-ESS2-3. Obtain information to identify where water is found on Earth and that it can be solid or liquid.

Disciplinary Core Ideas: ESS2.C

Through rhythmic patterns and music, students will review the different bodies of water found all over the Earth.

Students will learn that water can exist as a solid and liquid in those bodies of water using local watersheds in Michigan as an example.

Science & Engineering Practices: Obtaining, Evaluating, and Communicating Information

Students will **obtain information** using a digital interactive map and **construct an explanation** for how bodies of water connect to each other.

To understand how water can exist as a solid and a liquid in different bodies of water, students will **develop and use a model** of a lake whose surface freezes during the winter and melts during the summer.

Crosscutting Concepts: Patterns

By learning how lakes change during the seasons, students will be able to identify **patterns** in animal movement and the Earth's processes.

Nearpod Field Trip Outline

1. Welcome and Introduction to your Virtual Field Trip - Works of Water (Slides 1-3)

To start, we meet Jasmine, an educator at the Michigan Science Center, and Kyle, a Fisheries Biologist at Michigan State University. In their conversation, they go over the main story of the field trip: How did the lake Kyle used to fish on change during the seasons, and what does that mean for the plants and animals who live in that lake?

a. Access your student's prior knowledge.

- How many bodies of water can you name?
- Have you ever seen a frozen lake in real life? If you looked into the ice, could you see anything underneath it?
- Have you ever gone fishing with a guardian or friends? What types of fish did you catch?

b. Encourage your student to create a hypothesis.

- How did the ice on the lake get there?
- What happens to the plants and animals who live in the lake when it freezes?

2. Exploring *What We Know* (Slides 4-7)

Use the **Collaborate** board on the next slide to help your student enter their hypothesis in their own words. The Collaborate board saves the comments from all students who have posted in the field trip, allowing an even greater pool of collaboration and conversation to happen!

a. Help your student record their answers by starting sentences with:

- I think ____, because of ____
- I know ____, so that means ____
- When I see ____, it reminds me of ____

Next, Jasmine briefly goes over some common bodies of water and a few facts about how important conserving water is. To explain more about different bodies of water, students will watch a **Flocabulary** video called "Landforms & Bodies of Water."

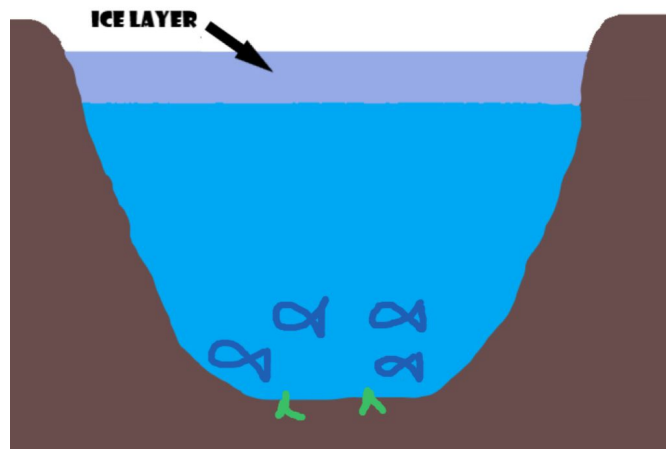
3. Exploring *What We Learned* and Making a New Hypothesis (Slides 8-10)

After a brief overview of the Flocabulary video, Jasmine introduces a website that allows students to make more observations about Hubbard Lake!

Using an interactive map created by the U.S. Geological Survey, she shows students how to find and identify bodies of water that are connected to each other.

After some investigation, we learn that the ice formed from the water in the lake itself. Following the time-lapse video of Mirror Lake in New York freezing over, students have another opportunity to explore what they've learned in a **Draw It** activity in Nearpod.

- a. Help students decide where in the water plants and animals will live, using these questions:
 - Where do the smaller animals, like water striders and frogs, go when the lake freezes over?
 - Where do the larger animals, like fish, go when the lake freezes over?
 - Where do animals that use the lake for gathering food or living, go when the water is frozen?
 - Do any plants or animals die because the water gets too cold?
 - Sample response:



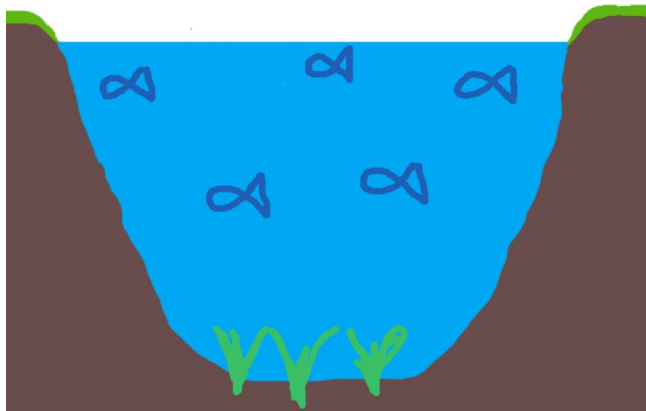
4. Exploring *What We Know* (Slides 11-12)

Next, we explore how plants and animals survive under the ice during the winter. In this next video, Jasmine explains thermal stratification in lakes and some properties of frozen water.

Thermal stratification is not a topic that needs to be covered in order to fulfill the Next Generation Science Standards. This topic is explained in order to follow the story of the program.

After the video, students will be able to depict their answers to how the lake, plants, and animals change when it gets warm out by using the **Draw It** activity in Nearpod.

- Sample response:



Need a break?

This is a great time during the virtual field trip to take a break if you or your students need to get away from the screen. Don't worry, when you return, Jasmine will recap what we've learned so far and jump back into the virtual field trip!

5. Exploring Our Answers and Learning New Information (Slides 13-15)

Jasmine reviews how the lake changes during warmer weather and compares the pictures the students have drawn thus far. She then introduces the at-home activity for this field trip - *Freeze A Lake*. In this activity, students will be using household materials to model a lake that only freezes on the top layer when put in the freezer.

- a. The *Freeze A Lake* activity guide can be downloaded from the Additional Resources under this Virtual Field Trip.

Before you work with students to create the lake, take some time to review what a model is and how it might be used in science:

- a. Can you define what a model is?
 - If a student explains that a model is someone who wears nice clothes and walks down a runway, encourage them to explain more! A runway model is an example of a model, but what are they representing? The clothes they are wearing! A person models how pieces of clothing might look on someone else!
 - A model is a representation of a person, place, or thing.
 - A model shows what something looks like or does.

- b. How is a model different from what it is representing?
 - A model is not always made out of the same materials as the object it represents.
 - A model can be bigger or smaller than what it represents.
- c. Can you think of an example of a model?
 - A model train.
 - A dollhouse.
 - A play kitchen for children.

Helping your student understand that the model they will make is a representation of a lake can help clear up any confusion students may have while using unconventional products to represent water.

6. Making Observations From Our Model Lake (Slide 16)

The purpose of this activity is three-fold: students will create a model of a lake, observe how the water in the lake changes in cold temperatures and observe how the lake changes in warm temperatures.

- a. Both the corn syrup and the water represent all the water in the lake.
- b. Corn syrup is denser than water. That's why it sinks to the bottom, while the water sits on top of it, creating two layers of liquids.
- c. Once put into the freezer, the water will freeze into a solid while the corn syrup will not. This is because corn syrup has a lower freezing point than water.
 - This lower freezing point is known as the *freezing point depression*. When substances are dissolved in water, the temperature at which water freezes is lowered. Essentially, corn syrup is a mixture of cornstarch, water, and enzymes. The addition of substances in the water makes it difficult for ice crystals to form, thus, corn syrup requires colder temperatures before it will freeze into a solid.

While checking on the model of the lake in the freezer, encourage your student to make observations about how the water and the corn syrup is freezing. You can test the water's freezing level by using a toothpick to check the layers, or gently squeeze the sides of the container to feel the different textures. Make note of how the water is freezing- students may see that the water freezes from the edges towards the inner part. If so, this observation is similar to what they saw in the time lapse video of Mirror Lake freezing over. If not, ask the student why this freezing pattern is different from what they saw in the video.

After freezing their lake, students should be able to observe two distinct layers of liquids: the top layer of water should be frozen solid while the bottom layer of corn syrup should be cold yet slightly malleable. As the ice melts, encourage your students to make observations about the unfreezing pattern. As the top layer of water unfreezes, the disk may start to melt from the outside, going in. If so, help your student make the connection of patterns between freezing and unfreezing. If not, ask your student why that might be.

Repeating this experiment in a different container, such as a large bowl instead of a bottle, may yield different results. Even changing which time of day the model lake is put in front of a window may change your results. Whether you do this experiment once or one hundred times, students should be able to see patterns between how the ice forms and melts on the model lake. Be sure to encourage observation and help your student make connections between what they've learned and what they've observed.

7. Congratulations and See You Next Time! (Slide 17-18)

Jasmine and Kyle review everything we learned about different bodies of water, how weather impacts the water's properties, and how and how weather impacts the water's properties. Before she leaves for another "science" trip, she encourages students to explore and become stewards of their waterways. Congratulations on completing your Works of Water Virtual Field Trip!

Additional Resources

Kyle Brumm became passionate about the natural world while fishing as a child. He has since worked on projects to conserve streams and rivers that flow into Lake Michigan, and is currently a PhD student in the Department of Fisheries and Wildlife at Michigan State University. If you have general questions about conservation practices, you can email him at brummkyl@msu.edu. Check out the [MSU Extension](#) website for more information about their programs!

Did a student get done early? Direct them to the [Streamer](#) application developed by the US Geological Survey to explore more bodies of water near where they live. Challenge your student by asking them to find one lake, and write down the names and types of the bodies of water they pass through along the way as the water leads to the ocean.

Ready to get your students involved in the next step towards protecting our local waterways? Check out [Earth Echo International](#) for helpful [Educator Resources](#) that satisfy Common Core and Next Generation Science Standards and bring conservation to your classroom.

Already using Google Earth? Check out [EarthLabs](#) and their “[What’s a Watershed?](#)” to learn how to download a map layer extension that allows your student to further explore watersheds around the world!

Activity Guides

The following Activity Guides have been included with the Virtual Field Trip. We recommend that you look through them and decide how and when to incorporate them within your schedule.

Freeze a Lake 2 Days

Materials:

- Clear bottle or container
- Corn syrup
- Water
- Construction paper (various colors)
- Scissors
- Clear tape

Curriculum Connections

This virtual field is designed to be paired with the Mystery Science: [Work of Water](#) curriculum.

Video References

[Ausable River Association](#). (2018, December 6). *Mirror Lake Freezing*. [Video]. YouTube. <https://www.youtube.com/watch?v=QckfEUxo36I>.