1.1 Where in the World is our Water?

Subject
Earth and Space Sciences

Objectives
The students will:

- Discuss where water is stored on our planet and draw a supporting diagram
- Describe how water moves from one place to another as an introduction to the water cycle
- Describe and graph percentages of water in various reservoirs

Materials

- *Students for Salmon Journal*
- Art Supplies—crayons, markers, pencils
- Globe or World Map

Size/Setting/Duration
Entire class and small groups/classroom/~45 minutes

Background
Where is our water stored?

Polar ice caps and Glaciers: The amount of ice and snow has changed through global glaciations and periods of warming in Earth's history. This includes water locked up in polar ice caps, glaciers, and snow packs.

Surface Water: Surface freshwater includes: lakes and swamps that hold water at the surface and rivers that transport water great distances.

Atmosphere: The air is full of molecules we can't see, including water vapor molecules. The atmosphere moves water all over our planet!

Oceans: 97% of the water on Earth can be found in our oceans, so it is not surprising that almost all of our clouds come from the ocean evaporating from liquid to gas.

Groundwater: The soil and rocks beneath our feet contain many cracks and spaces where water can exist underground.

What processes move water between these storage areas?

There are more details to explore with the water cycle, but for this introduction we will simplify the processes. It is important to remember that the water cycle is driven by the sun. The sun heats the Earth, driving evaporation and causing wind which moves water in the form of clouds around our planet.

Evaporation: evaporation changes liquid and frozen water into water vapor gas, which floats up to become clouds because of the sun's energy (heat).

Condensation: As water vapor particles float up into the cooler air higher in the atmosphere, it condenses, which means the vapor turns into water droplets, forming clouds.
Precipitation: Clouds are a collection of tiny water droplets. When these water droplets combine into heavier drops, those can fall as rain, snow, or hail, known as precipitation.
Runoff: Water runs over the landscape due to precipitation or melting ice and snow, reaching rivers, creeks, lakes, and oceans.
Infiltration: When rain falls on the landscape, some of it soaks into the ground to join groundwater.
Groundwater Flow: Water is beneath our feet and is always moving, transporting groundwater to oceans, lakes, and rivers.

Earth's Water Percentages

All Earth's Water
97 % Salt Water
3 % Fresh Water

Of Earth's **Fresh Water**
68.7 % Ice caps, Glaciers
30.1 % Groundwater
0.3 % Surface Water
0.9 % Other

Of Earth's **Surface Water**
87 % Lakes
11 % Swamps
2 % Rivers

Procedure

1. Show students the globe or map—ask, where in the world is our water?

2. Explain to students that there has always been the same amount of water on our planet—there never has been more or less, and there will never be more or less. What does change is where water is stored and in what form it can be found (vapor, liquid, solid).

3. Have students brainstorm in smaller groups where in the world we find water. More specifically, where is water stored? Share thoughts as an entire class. Water is stored/can be found in the atmosphere, ice and snow, lakes and rivers (freshwater), groundwater, and oceans (saltwater).

4. Have students draw a full-page diagram that includes the main water storage areas—atmosphere, ice and snow, lakes and rivers, groundwater, and oceans. If needed, show the class an example.

5. Have students discuss in their small groups how water might move between these different storage areas—they may know some of the vocabulary already, but its ok for them to simply think it through without being given the terms. If they need prompts for discussion, assign groups pathways. Group 1-discuss how water moves from the atmosphere to snow and ice, Group 2-discuss how water moves from oceans into the atmosphere, Group 3-discuss how water moves from the ground to oceans, etc…

6. After students have had time to discuss, bring class back together. Display your own labeled diagram on the board—as students share these relationships as a whole class, make notes of key thoughts, observations, or words they're using to describe the cycling of water on your diagram.

7. Next, walk through these processes and add the proper terms to your diagram. Have students label their own diagram as well.

8. Transition to *The Water Cycle* lesson to further discuss the vocabulary behind these processes.

Extension

MATH EXTENSION: For a visual of where our water is stored, students can draw a diagram that represents this graphically. Provide students with the percentages under "Background" section of this lesson plan. Using graph paper, have students draw three 10 by 10 block squares and label them Total Water, Total Fresh Water, and Total Surface Area. Students color in boxes—one box per one percentage—to match the proportions provided.

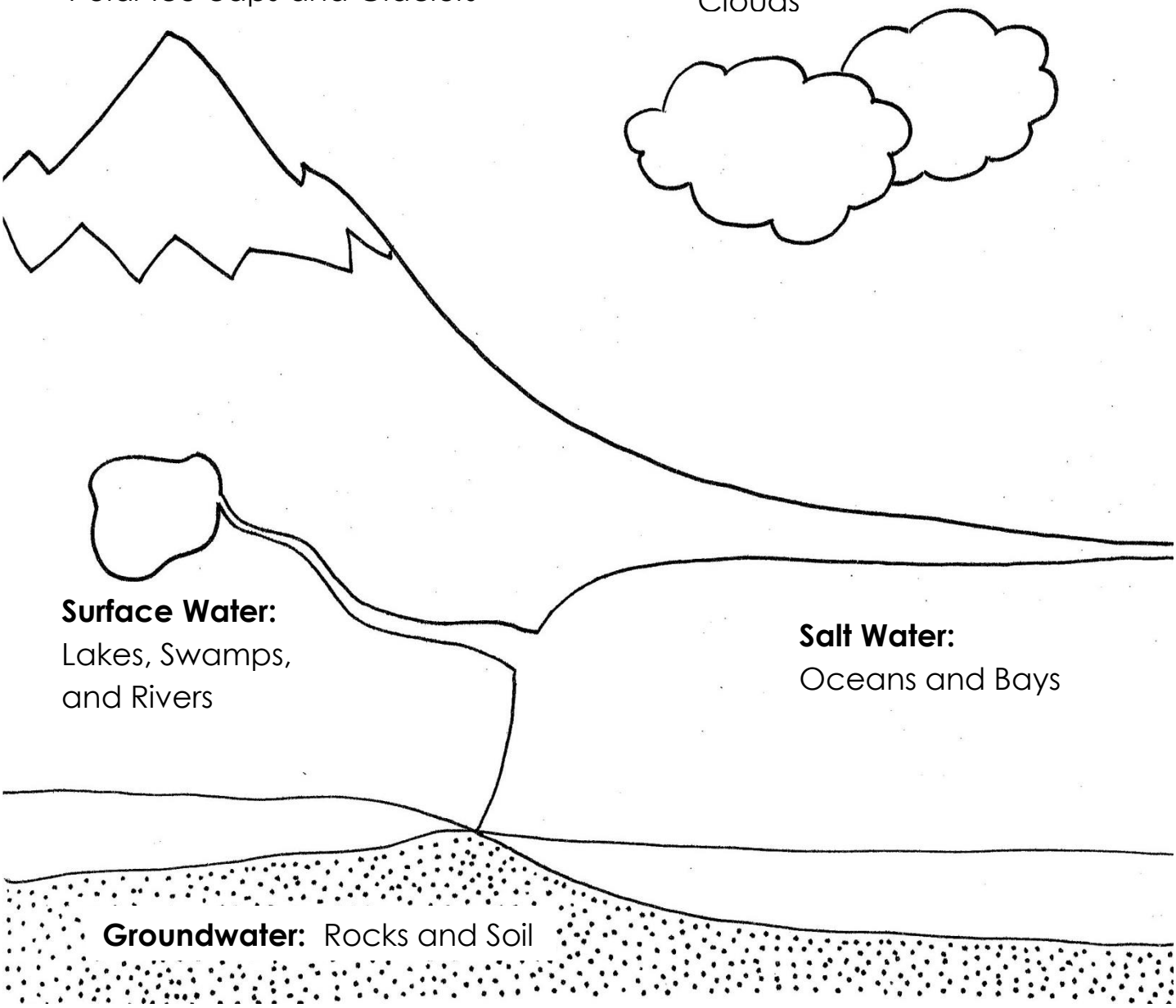
Next Generation Science Standards

Performance Expectations		
5-ESS2-1: Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact. **5-ESS2-2**: Describe and graph the amounts and percentages of water and fresh water in various resevoirs to provide evidence about the distribution of water on Earth.		
Scientific and Engineering Practices	**Disciplinary Core Ideas**	**Crosscutting Concepts**
▪ Developing and Using Models ▪ Analyzing and Interpreting Data ▪ Using Mathematics and Computatational Thinking	▪ ESS2.A: Earth Materials and Systems ▪ ESS2.C: The Roles of Water in Earth's Surface Processes	▪ Scale, Proportion, and Quantity ▪ Systems and System Models

Where in the World is our Water? *–Example*

Ice:
Polar Ice caps and Glaciers

Atmosphere:
Clouds

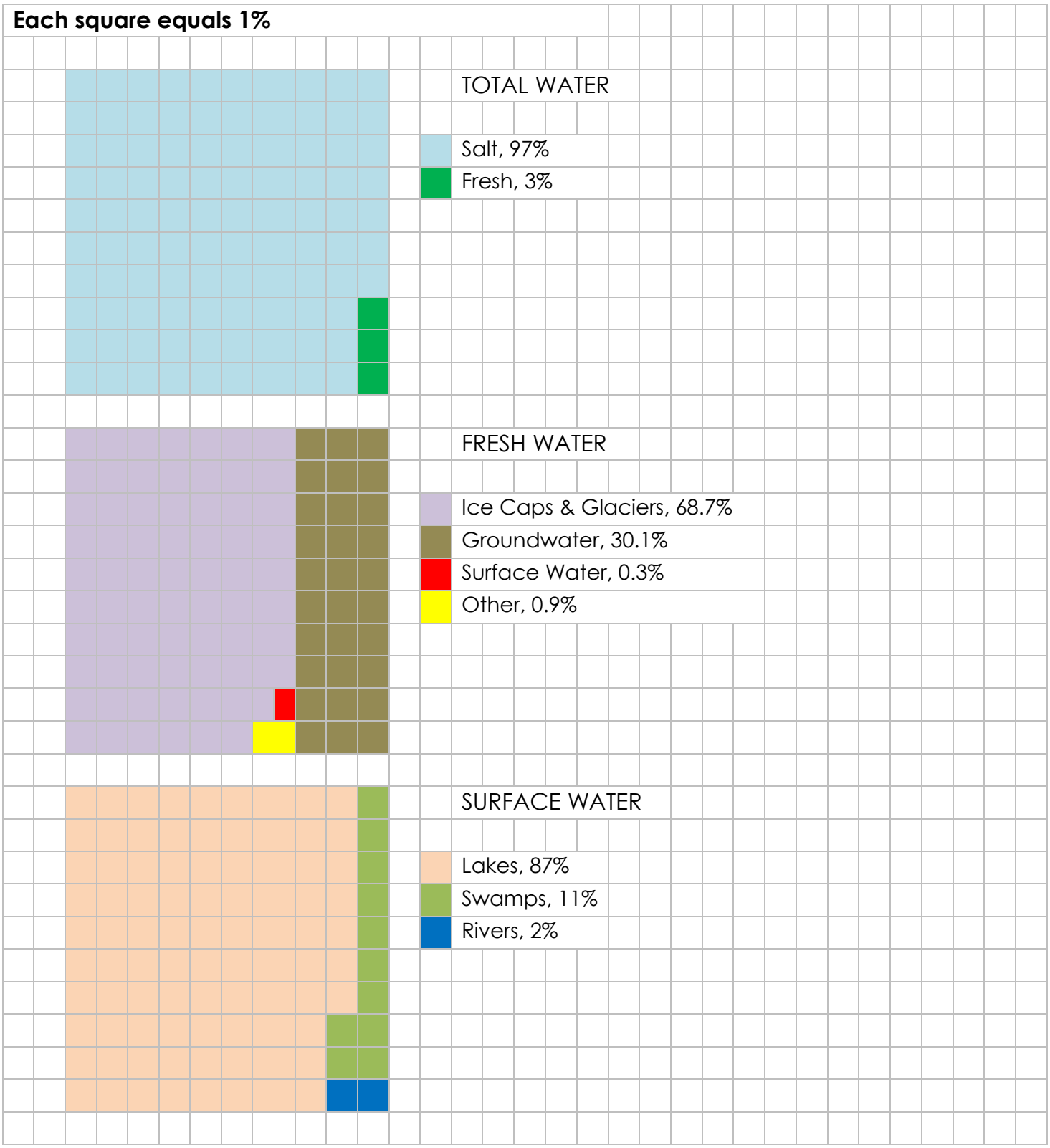


Surface Water:
Lakes, Swamps, and Rivers

Salt Water:
Oceans and Bays

Groundwater: Rocks and Soil

Where in the World is our Water, by Numbers?-*Math Extension*



Where in the World is our Water?

Draw a diagram that shows where Earth's water is stored. Include labels!

Where in the World is our Water?