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## **Bonneville Salt Flats Ecosystem**

### **Abstract:**

The following activity explores the habitat changes of the Bonneville Salt Flats. Specifically, students will observe the annual ecosystem changes and the current additional flooding of the Bonneville Salt Flats by man.

**Grade level:** 3<sup>rd</sup>

### **Utah Elementary Core Curriculum Standard:**

3030-01 Students will explore ecosystems and discover relationships among living organisms and the nonliving world.

- Compare and contrast similarities and differences of various habitats.
- Observe and describe a variety of habitats.

3030-02

- Experiment to determine the effects of habitat changes.

**In Class Instructional time:** 30 Minutes

### **Terminology:**

*Evaporation* To remove moisture or liquid.

*Eco-system* The complex of a community of organisms and its environment functioning as an ecological unit.

*Dissolve* To cause to pass into solution

*Extraction* To pull or take out; to separate

*Brine* Water saturated with common salt

*Artificial* Humanly contrived often on a natural model: man made

### **Intended learning outcomes:**

Students will be able to explain the annual ecosystem changes of the Bonneville Salt Flats and the artificial changes made by man.

### **Background:**

The Bonneville Salt Flats is an ecosystem comprised of potassium, magnesium, lithium, and sodium chloride (common table salt). The natural ecosystem includes rainwater flooding the surface each winter and then the hot sun evaporating the water each summer. Man is disrupting this naturally occurring ecosystem by extracting minerals from the area that includes a loss of 850,000 tons of salt each year.

An experiment is currently being conducted in which brine is being flooded back onto the salt surface. The expectation was that the surface thickness will increase, however the experiment hasn't worked exactly as the officials had planned. There is very little

evidence that points to the salt crust being any thicker than it was in 1997. Test results have shown that the surface area has become 5 miles wider during that same period.

**Materials:**

- 1 cup salt
- Water
- 2 paper plates covered in aluminum foil.
- Science Journals

**Assessment of Prior Knowledge:**

Ask the students if they know what the area west of the Great Salt Lake is called. Give them the clue that men and women race cars there and try to make land speed records. Show them pictures of the area and ask what they think the surface is. Use this opportunity to build on what they know and to fill in gaps on what they do not.

**Instructional Procedures:**

Ask the students what they think happens to the salt surface when it gets rained on. Ask them to write their hypothesis in their journals whether they think the salt layer will absorb the water or whether it will sit on top. Engage the students in a discussion and then set up the first experiment.

- Pour approximately one inch of salt on the surface of the aluminum covered paper plate.
- Gently sprinkle with your hand enough water to cover the salt surface.
- Observe what happens to the water.
- After the experiment is completed, discuss the results as a group and have students record their findings in journals.

**Discussion Questions:**

- Write on the board the “terminology” words. As each word is discussed during the lesson have the students write the definition in their journals.
- Discuss with the class that this flooding of the salt layer is what happens naturally each year to the Bonneville Salt Flats.
- Discuss with the class that there are companies that are extracting salt and other minerals from the Salt Flats. Ask them what they think might happen if the companies continue to take the salt and minerals out.
- Discuss with the class that the car racers have seen a difference in the surface crust, ten years ago they were not able to find a good 3 or 4-mile stretch to race on.
- Man is currently pumping brine back onto the surface of the Salt Flats to thicken it. Six point four million tons of salt have been added since 1997, but to the surprise of scientists the Salt Flats have not gotten much thicker but it has gotten wider. Ask students to hypothesize why they think the lake has gotten wider but not much thicker?

SEE SALT CRYSTAL EXPERIMENT

**Assessment Strategies:**

- Have the students write or draw a picture in their science journals of what the Bonneville Salt Flats look like when rainfall occurs.
- Have them write or label what the surface is made of.

**References:**

Smith, Christopher. "5 Miles Wider But Not 1 Inch Thicker." Salt Lake Tribune 21 April 2002: A1+

<http://www.ugs.state.ut.us/online/PI-39/PI39PG10.HTM>

<http://www.lib.utah.edu/spc/photo/bonn/bonn.htm>

<http://www.etravelplan.com/list.asp?ObjectID=8216>

[http://www.uroc.org/html/hellfire\\_location.html](http://www.uroc.org/html/hellfire_location.html)

<http://www.ut.blm.gov/wh3bsfsalt.html>

## Salt Crystal Formations

**Abstract:** This experimental lesson deals with some exploration of the salt in the Great Salt Lake (GSL). The lesson is geared toward Bonneville Salt Flats. Through the following experiment, students can see if the salt from the GSL forms differently under different conditions. This information can then be used to form a conclusion as to the best solution for increasing the thickness of the Bonneville Salt Flats.

**Grade Level:** 3

**Utah Elementary Core Curriculum Standards:** 3030-01

**Standard:** 3030-0102- Students will analyze the influence of people in ecosystems.

- **Objective:** Students will conduct an experiment to determine the effects of habitat changes.

**In-class instruction time:** This experiment will take approximately 1 to 1,1/2 weeks.

**Terminology:** Salinity- salt level in the water

**Indented Learning Outcome:** Students will be able to see that different conditions cause the salt crystals in the GSL to form differently.

**Background Information:**

- Teachers will need to have a basic knowledge of the Great Salt Lake. The web site [http://www.americansouthwest.net/utah/salt\\_lake\\_desert/](http://www.americansouthwest.net/utah/salt_lake_desert/) helps the teacher become familiar with the lake. Read the section on the lake and its salinity levels. Also read the section on the Bonneville Salt Flats. Both of these areas have the information the teacher needs to have for this experiment.
- This topic is important because it is dealing with a real life problem. The Bonneville Salt Flats are a national landmark and need to be preserved. It is

important to find out what would be the best solution to increase the thickness of the salt flats. The salt flats are getting wider, but not thicker. The wider the salt flats get, the land that is not naturally part of the salt flats is taken over by the salt. Another reason why this experiment is important is that NASCAR uses that area for racing, and the salt needs to be thicker for them to race on. The experiment connects to the benchmarks for science learning. The benchmark states, “by the end of 5<sup>th</sup> grade, students should understand that heating and cooling causes changes in the properties of materials. Many kinds of changes occur faster under hotter conditions.” The experiment also connects to the National Science Education Standard for K-4, which states, “all students should develop an understanding of properties of objects and materials.”

**Materials:**

- Table Salt
- Great Salt Lake Water (if not available, use water with a 10% salinity level, about the level in the South Arm of the lake. This can be accomplished by using 14 teaspoons of table salt mixed with 1000ml of water.)
- Same size pie tins (9 for this specific experiment)
- 2 heat lamps
- Fan
- Microscopes
- Students will need a lab notebook

**Prior Knowledge Assessment:**

- Start by asking the students the question: Where does salt come from? (lake, ocean)
- Does the salt form at the bottom of the lake or ocean, or is it mixed in with the water?
- Bring out some table salt
- Let the students feel the salt and have them describe all the attributes of salt

Discuss why they are talking about salt. Include the information about the article from the introduction lesson “5 Miles Wider But Not 1 Inch Thicker.” [Salt Lake Tribune 21 April 2002: A1+](#). Ask them if they have any ideas how they could use the information they already know about salt to help the Salt Flat workers.

**Procedures:**

- Teacher has previously collected some GSL water, or has a water sample of ten % salinity level.
- Start by asking the question: Do salt crystals from the Great Salt Lake form differently under different conditions?
- Discuss the term salinity levels and tell the students that this means there are different percentages of salt in the water.

- Set up the experiment
  - The pie tins should be set up on a back table
  - 3 tins with  $\frac{1}{4}$  cup of GSL water need to be under the heat lamps
  - 3 tins with  $\frac{1}{4}$  cup of GSL water need to have the fan blowing over the tops of them.
  - 3 tins with  $\frac{1}{4}$  cup of GSL water need to be left alone, or under normal conditions.
  
- Let the water sit until all the water evaporates
- Students should be observing what is happening every day. They should keep this information in their lab notebooks.
- All the water should evaporate within a week to 10 days.
- Observe the salt crystallizations under a microscope to see if there are any differences in the formation of the salt crystals.
- Discuss the results of what happened. Students should write this information in their lab notebooks.

**Closure:**

- Ask the students what they think the best solution is for thickening the Salt Flats.
- Have a discussion as to their reasoning

**Assessment:**

- Ongoing observation: About what the students are doing and writing about.
- Questioning: Teacher wants to know that the students understand that the Bonneville Salt Flats are an eco-system all to itself, and they should be aware of man's influence on them.
- Discussion: About the salt crystal formations and the best solution to the problem.
- Lab Notebook: Students observations and questions.

**Extensions:**

- Students could write a letter to the newspaper about the Salt Flats and their findings when they conducted their experiment.
- Do another type of the same experiment, but change the salinity levels of the water and compare results.
- Do the same experiment comparing table salt to the Great Salt Lake salt.

**References:**

- [http://www.americansouthwest.net/utah/salt\\_lake\\_desert/](http://www.americansouthwest.net/utah/salt_lake_desert/)
- <http://www.sltrib.com/>

## Salt Crystal Formation

Do salt crystals from the Great Salt Lake form differently under different conditions?

**Hypothesis** \_\_\_\_\_

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| Condition | Observations | Picture |
|-----------|--------------|---------|
| Heat      |              |         |
| Wind      |              |         |
| Normal    |              |         |

Accept/Reject hypothesis and why?

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