Seminole County Water Atlas Learning Kit

Shape Shifter Lake *Teacher's Guide*

Students examine a bathymetric map and the changing shape of a lake during drought and flood.

Water Atlas Curriculum Lesson #

Grade Level: Middle School and Upper Elementary

Subject Area/Course: Social Studies, Science , Math

Performance Objectives:

References are to the Next Generation Sunshine State Standards (2007).

Sunshine State Standards:

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Science

SC.3.N.3.2	Recognize that scientists use models to help understand and explain how things work.
SC.3.N.3.3	Recognize that all models are approximations of natural phenomena; as such, they do not perfectly account for all observations.
SCG.2.2.3	Knows that changes in the habitat of an organism may be beneficial or harmful.
SC.6.N.1.1	Define a problem from the sixth grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.

Social Studies

SS.8.G.5	Understand how human actions can impact the environment.
SS.8.G.1	Understand how to use maps and other geographic representations, tools, and technology to report information.

Math

MA.E.1.2	Solves problems by collecting and analyzing data using charts.

Academic Outcomes/Lesson Objectives:

1. Students will locate, print, and analyze a bathymetric map
2. Students will predict the shape of a lake according to contours revealed during low water.

Background Information:

1. The shores of lakes change shape according to the water level in the lake.

2. During times of heavy rain, water levels in lakes and rivers rise as gravity brings storm runoff downhill from higher places to lower places. The water spreads over the flood plain of the river or lake. The lake becomes larger.
3. When there is a drought, there is little or no rainwater to flow into the lake as stormwater runoff, and less spring or seep flow. The level of the lake falls, water recedes from the floodplain, and the lake becomes smaller.
4. Lakes get smaller or larger according to the contours of the lake bottom. A lake contour map, or bathymetric map, shows the lake bottom. The size of the lake for a given depth can be predicted. The FEMA maps (in the Map It section) show projected 10-year floods and 100-year floods and can be used to estimate the shape of the lake in times of high water.
5. Seminole County Watershed Atlas Curriculum for Teachers
6. The 10 and 100-year flood contour lines really refer to the probability that the water level may reach this contour within 10 years, or within 100 years. It does not mean that having a flood will keep the flood away the next year. Please note that the FEMA maps may not match the aerial maps exactly, so the shape of the flooded area will be accurate, but the placement may not be exact.
7. Trees and other plants can often indicate the high water mark. Wetland trees such as willow, cypress, and maple, can live very well with their roots flooded. Oaks and pines are usually above the flood level.
8. Students will visit www.seminole.wateratlas.usf.edu. (Bookmark the site on student computers.) Students will print two maps of the lake's contours (bathymetric map).
9. The activity is written for Rock Lake, but could be adapted for any lake that has a contour-bathymetric map. If a lake with park access is chosen, (such as Lake Mills, Red Bug Lake, and Lake Sylvan) the Lake Verification portion may be assigned for extra credit, and conducted at the park.

Duration:

One Instructional Period for the contour map activity, one additional Instructional Period if the class is to visit a nearby lake.

Materials Needed:

Internet access, printer access, white and blue copy, glue sticks, scissors

Safety:

If students visit a lake, discuss appropriate behavior; make sure students know the reason for and their role in the trip, and stress that students are not to go in the water.

Vocabulary:

contour
A line that shows the boundary between areas with different characteristics.

bathymetric
Related to the measurement of the depth of large bodies of water.

hydrology
The science that deals with water as it occurs in the atmosphere, on the surface of the ground, and underground.

drought
A persistent and abnormal moisture deficiency having adverse impacts on vegetation, animals or people.

flood
An overflowing of water onto land that is normally dry.

infiltrate
To soak in; when water penetrates soil to enter underground aquifers, it is said to infiltrate it.

percolate
To drain or soak through a porous material; water percolates through soil particles.

mean feet above sea level
Used to describe the height of a water body's surface with respect to a fixed vertical reference point; abbreviated MSL.

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Answer Key:

Note: The answers to some questions depend on the level of the lake at the time of the activity, as shown on the Water Atlas Website.

3. (Approximately) 79 feet above mean sea level
4. Both columns will be two feet apart in descending order. Column one will be 0 ft, ¬2 ft, ¬4 feet, etc. Column two will be 79, 77, 75, etc. Note that column one will be the same for any lake, i.e. feet below water level. Column two will vary according to the elevation of the lake shore.
5. Two feet
6. Low=72.7 above MSL, High=81.38 above MSL (as of 9/24/2012)

7. The hypothesis could be, "The shape of the lake will change with rising and falling lake levels." Or, "The lake will be larger with higher water levels." Be sure students state a prediction.
10. The cutout with blue paper showing represents the size of the lake when the water is at its lowest.
11. The lake no longer comes up to docks. They may need to wade out to a boat.
12. c. > 100 feet
13. About 125 feet to 150 feet of lake bottom.
14. About 300 feet across at the lowest water and about 100 feet across when the map was made.(13 and 14 will change with conditions.)

16d. As shown on Rock Lake Water Levels & Flows page

17 & 18. The hypothesis and predictions will be the same as in 7, while the conclusion will state that the shape does change with water level.

Possible answers to "Food for thought" questions:

1. Animals in the lake have less space to live. Lower water may isolate shallow places where wading birds can feed. The mucky bottom soil may solidify, allowing emergent plants to grow when the water returns. Different kinds of plants may grow around the edge providing a variety of foods.
2. If the water level in the aquifer goes down, spring flow is reduced. The water table will go down, and less water will enter the lake from the ground. The water level will go down.
3. The lake models show the changing shape of the lake as the water spreads over the land or retreats downhill.