Model Lock System
Barbara L. Maxwell, 2012 Great Lakes Maritime Teacher Institute

Grade Level: Middle School

Duration: One day

Materials Needed:
Two 30 oz. Pepperidge Farm Goldfish cartons. (Milk cartons work well)
   Water soluble clay.
   Regular Marshmallows
   Scissors.
   Large plastic tub-5 gallon or larger.

Lesson Overview
Students will construct a working water lock system and successfully float a marshmallow boat through its opening.

Learning Objectives
After this lesson students will be able to:
1. Identify the different lake levels of the Great Lakes noting the low and high points of each lake.
2. Identify problems associated with shipping and navigation without a lock system.
3. Define new vocabulary: chamber, channel, economic growth, gate, lock, navigation,
4. Construct a working water lock system.

Background
Shipping along the Great Lakes, especially between Lakes Superior and Huron are problematic because of the differing lake levels. Constructing a system of locks opened the waterway between Lakes Superior and Huron to large vessels, allowing for the shipment of iron ore, salt, limestone, coal, and oil. This began a new method of economic growth for the region and the state.

Pre-lab Assignment – Watch the Army Corps of Engineers video Animated Lock Demonstration as a class. Describe the process of the lock system in your own words, to a partner. View A Vital Waterway. Discuss the levels of the five Great Lakes as a class. Ask questions of students on how ships could navigate the Great Lakes when they are at differing heights. Explore the economical impact the locks have on moving the natural resources from ports around Lake Superior to other ports, both on the Great Lakes and around the world.

Vocabulary
Chamber- the enclosed space between the walls, gates, and floor of the lock.
Channel- the deeper part of the river.
Economic Growth-An increase in the capacity of an economy to produce goods and services.
Gate- a moveable structure that swings on hinges and controls the entrance to the lock.
Lock- an enclosure with gates at each end used to raise and
lower boats.
Navigation- the act of steering or directing a ship.

Procedure
1.) Cut the goldfish carton approximately 1/3 from the top.
2.) Cut a 3 inch x 3 inch three sided opening along the bottom of the carton. Be sure to leave
3.) The connected portion on the corner side. Fold this back.
4.) Seal the opening with a small portion of water soluble clay.
5.) Cut an identical opening on the opposite side at the top of the carton. Fold back and seal
with clay.
6.) On a third side of the goldfish carton, use the edge of the scissors to cut 3-4 openings at the top of
the carton about one inch from the top. Seal with clay.
7.) Place the weighted carton into a large plastic tub filled with water up to the top of the upper
opening.
8.) Place rocks or marbles to weigh the carton down in the plastic tub.
9.) Using a single marshmallow as a boat, place in the bottom of the goldfish carton.
10.) Slowly remove the clay from the holes at the top of the carton.
11.) Once the water has filled the carton to the top of the upper opening, remove the clay and allow the
marshmallow boat to move through the opening.

Assessment of Student Learning
Students will be able to:
- Explain how the lock works to a younger class.
- Sketch the lock system and how it works.
- Demonstrate the lock system to a younger class.
- Explain the need for a lock system and the impact it has on Great Lakes shipping.

Extensions
Explore other lock systems from around the world. Compare and contrast their construction, year
they were built, economic impact the lock has on the region. Visit the Soo Locks and ride the Soo
Lock Boat Tour to physically experience how the lock works.

Standards
Standard P1.2C Scientific implication and social reflection
Develop an understanding of a scientific concept by accessing information from multiple sources.
Evaluate the scientific accuracy and significance of the information.

Standard P3.1 Basic Forces in Nature
Objects can interact with each other by “direct contact” (e.g., pushes or pulls, friction) or at a
distance (e.g., gravity, electromagnetism, nuclear).

References
A Vital Waterway, St. Lawrence Seaway Development Corporation, 2003. DVD
Great Lakes, The; What’s New  http://www.great-lakes.net/lakes/
History of Panama Canal  http://www.eclipse.co.uk/~sl5763/panama.htm
Water Level Forecasts  