

Lesson # 1

Title: The Great Lakes St. Lawrence Seaway System: An Overview

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Target Grade:

8-12 science or social studies

Lesson Overview:

Students will learn about the St. Lawrence Seaway by answering questions to a web based assignment.

Sources Consulted:

Duluth Seaway Port Authority: <http://www.duluthport.com/port-stats-facts.php>

Learning Objectives:

The students will be able to:

- List the major commodities coming in and out of the port of Duluth /Superior
- Identify where the major commodities are coming from and what they are used for
- Define maritime terms such as *Saltie* and *Laker*
- Compare and contrast monetary and environmental costs associated with different types of transport

State Benchmarks Addressed:

E1.1E: Describe a reason for a given conclusion using evidence from an investigation

E2.4d: Describe the life cycle of a product including the resources, production, packaging, transportation, disposal and pollution

E1.05: Use examples to show that people cannot produce everything they want (specialization) and depend on trade with others to meet their wants

E1.03: Analyze how Michigan's location and natural resources influenced its economic development (e.g., how waterways and other natural resources have influenced economic activities such as mining, lumbering, automobile manufacturing and furniture making).

Focus Question:

Why would the Duluth/Superior Port and the St. Lawrence Seaway be important to the nation?

Materials:

This is a web based assignment. Students will need access to a computer and they will need a copy of the questions to be answered.

New Vocabulary:

Commodity – Anything useful. Anything bought and sold

Lakers – Bulk carriers specifically built to move bulk cargo on the Great Lakes

Salties – Ships that can travel through the St. Lawrence Seaway and on the Ocean

Procedure:

Students will log onto their computers and go to the “Great Lakes/Seaway System-Duluth Seaway Port Authority” site at: www.duluthport.com/port-seaway.php. You can also access the site by using Google to search for “Duluth Seaway Port Authority”, then click on the link to “Port of Duluth-Superior”.

Questions to be Answered:

Select “Overview” from the left tool bar and answer the following questions:

- 1) The port of Duluth-Superior has long been known as the Great Lakes_____.
- 2) By far the largest and busiest on the Great Lakes, the port of Duluth Superior handles an average of _____ million short tons of cargo and over _____ vessel visits per year.
- 3) The docks of Duluth and Superior handle diversified commodities ranging from_____.
- 4) In terms of cargo tonnage, the Duluth/Superior port ranks among the top _____ in the United States.
- 5) What two types of ships visit the Port?
 - A)_____
 - B)_____
- 6) A) What are Lakers? _____
 - b) The biggest lakers are over _____ feet long, _____ feet wide and they have a hull depth of _____ feet.
 - c) How much can be carried by the largest “Lakers”? _____
 - d) Why can’t lakers get to the Atlantic Ocean? Be specific.
- 7) a) What are Salties? _____
 - b) The maximum size of a saltie is _____ feet in length and _____ feet in width.
 - c) How many miles is it from the Atlantic Ocean to the Duluth-Superior Harbor _____
 - d) How many locks do ships have to travel through on this journey? _____
 - e) The navigation season within the seaway is generally limited to _____ months. Why do you think it doesn’t last all year long? _____

To answer the next questions, click on “Great Lakes/Seaway System “ in the left hand tool bar

- 1) When did Duluth/Superior become a world port? _____
- 2) The opening of the St. Lawrence Seaway created the world’s _____
Inland waterway.
- 3) On average, how many tons of freight are moved on the seaway each year? _____
- 4) How long does it take for a vessel to transit the full length of the
waterway? _____
- 5) Identify 4 reasons why it is desirable to move cargo on the seaway:
-
-
-
-
- 6) According to a study, how many U. S. jobs are directly tied to Great Lakes Shipping? _____
- 7) Why is water the clear choice for shipping? Per ton of cargo, ships today are still
more _____ efficient, less _____ and significantly _____
than other modes of transportation.
- 8) A) When using a truck, one ton of cargo can be carried _____ miles per gallon of fuel.
b) When using a train, one ton of cargo can be carried _____ miles, while a Great Lakes carrier
can transport one ton of cargo _____ miles for every gallon of fuel.
c) How do the CO2 emissions compare between the three modes of transportation? Why would this be
an important factor?

d) How would lower transportation costs related to shipping make selling domestic products more
competitive? Explain.

Next, click on “Tonnage/Port Stats “ in the Left side tool bar

- 1) What accounts for 80% of Duluth/Superior’s total tonnage? _____
- 2) Where does the iron ore come from? _____
- 3) Where does the coal come from and what is special about
it? _____

Lastly, when in the “Tonnage/Port Stats”, click on the link to “Quick Facts”

- 1) How many feet above sea level is Lake Superior? _____ Because of this fact, ships coming through the seaway have to go through a series of what to change elevation? _____
- 2) What is the maximum length a ship can be and still travel through the Soo Locks? _____
Where are the Soo Locks located? _____
- 3) When ranked by cargo loadings, Duluth/Superior ranks for:
Ore: _____
Coal: _____
Grain: _____

Congratulations, you have finished the questions! You may explore this site until other members of the class have finished or you are instructed to do something else.

Answers to Above Questions:

Overview:

- 1) Bulk Cargo Capital
- 2) 46, 1100
- 3) Coal, grain, limestone, cement, salt, wood pulp, steel coil and wind turbine components
- 4) 20
- 5) Salties, lakers
- 6) A) bulk carriers specifically built to move bulk cargo in the Great Lakes
B) 1000, 105, 56
C) 70,000
D) They can't fit through the Welland Canal which bi-passes Niagara Falls
- 7) A) Ships that can travel through the St. Lawrence Seaway
B) 740, 78
C) 2,342
D) 16
E) 9, ice

Great Lakes/Seaway System

- 1) When the St. Lawrence Seaway opened up in 1959
 - 2) Largest
 - 3) 200 million
 - 4) About 1 week
 - 5) Safest, most fuel efficient, most environmentally friendly, most reliable
 - 6) 44,000
 - 7) Fuel, polluting, safer
 - 8) A) 59
B) 202, 607
- C) Trucks produce the most followed by trains and ships. This is important because CO2 Emissions contribute to the Green House Effect and Global Warming
- D) Lower transportation costs make domestic products more competitive and easier to sell

Tonnage/Port Stats

- 1) Coal and iron ore
- 2) Minnesota's Iron Range
- 3) Montana and Wyoming, it is low in sulfur

Quick Facts

- 1) 601, locks
- 2) 1100 feet, Sault St. Marie, Michigan
- 3) Ore is # 1 nationally, Coal is # 4 nationally, Grain is #1 on the Great Lakes

Assessment:

Students will be assessed by answering the questions included in this activity.

Title: Great Lakes Cargo and Commodities

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Target Grade:

8- 12 science or social studies

Lesson Overview:

Students will interpret and analyze the “Cargo Volume and Commodities by Port in Tons, 2007”, chart.

Sources Consulted:

U. S. Army Corps of Engineers Chart: “The Great Lakes Navigation System” and “Cargo Volume and Commodities By Port in Tons, 2007”

Learning Objectives:

The students will be able to:

- Compare and contrast the various cargos and commodities being shipped from various ports in the Great Lakes.
- Get practice reading and interpreting pie charts.
- Identify where different bulk cargos originate and where they are sent.
- Predict what a port will ship out based on what natural resources are located in the area.

State Benchmarks Addressed:

E1.1E: Describe a reason for a given conclusion using evidence from an investigation

E2.4d: Describe the life cycle of a product including the resources, production, packaging, transportation, disposal and pollution.

G5.02: Describe how people adapt to, use, and modify the natural resources of Michigan

E1.03: Analyze how Michigan’s location and natural resources influenced its economic development (e.g., how waterways and other natural resources have influenced economic activities such as mining, lumbering, automobile manufacturing, and furniture making).

E.SE.03.31: Identify Earth materials used to construct some common objects

Focus Question:

Where are commonly shipped products such as iron ore, western coal, eastern coal and limestone mined and where are these products shipped?

Materials:

I use the U. S. Army Corps of Engineers,” The Great Lakes Navigation System” and “Cargo Volume and Commodities by Port in tons, 2007” flier.

New Vocabulary:

Commodity – Any useful thing. Anything bought and sold.

Procedure:

Students will use the, “Great Lakes Navigation System” flier to answer the following questions.

Questions to be Answered:

1) Identify 5 ports that ship out iron ore:

A) _____

B) _____

C) _____

D) _____

E) _____

2) Which state is producing the most iron ore? _____

3) Identify cities in the following states with steel plants that are receiving the iron ore that is shipped through the Great Lakes:

- Indiana: _____

- Michigan: _____
 - Ohio: _____
 - Pennsylvania: _____
- 4) Which state has the most steel mills? _____
 - 5) Speculate as to why so many steel mills are in the state identified in number 5. * Hint: look at other commodities listed on this chart. _____
 - 6) Identify two Western States that serve as the origin for our Western Coal:

 - 7) Most Western Coal is shipped out through what port? _____
 - 8) Identify three ports where western coal is sent:

 - 9) Identify what Western Coal is used for: _____
 - 10) Identify 5 states that produce Eastern Coal: _____
 - 11) The Eastern Coal deposits seem to correspond with what mountain range?

 - 12) Using the pie chart portion of the table, identify the two ports that ship out the most cement:

 - 13) Where are most of Michigan's limestone deposits? _____
 - 14) Limestone is a major component of what commodity shipped on the Great Lakes? * Hint – it is orange in the pie chart. _____
 - 15) Are the ports that ship cement, located near the major limestone deposits? _____
 - 16) From 2003-2007, which port on average shipped the largest tonnage? _____
 - 17) Which port shipped out almost all iron ore? _____
 - 18) By percent, the port of Indiana Harbor receives more of what cargo than any other?
_____ Based on your first answer in this question, what do you think is located at the port of Indiana Harbor? _____
 - 19) How many locks would a ship pass through when going from Duluth to Chicago? _____ Where is this lock located? _____
 - 20) Based on the questions you answered and the charts you interpreted, what things determine what commodities a port ships out or receives?

Answers to above Questions:

- 1) Duluth/Superior, Two Harbors, Silver Bay, Presque Isle, Escanaba
- 2) Minnesota
- 3) Indiana: Indiana Harbor, Gary, Burns
Michigan: Detroit, Dearborn
Ohio: Toledo, Lorain, Cleveland, Ashtabula, Middletown, Younstown
Pennsylvania: Conneaut, Pittsburg
- 4) Ohio
- 5) Answers may include: These steel plants are located near Eastern Coal deposits or these plants are located near major manufacturing centers
- 6) Montana, Wyoming
- 7) Duluth/Superior
- 8) Marquette, Milwaukee, Muskegon, St. Clair, Marine City, Monroe, Toledo
- 9) Power plants and steel mills
- 10) Pennsylvania, Ohio, Kentucky, Tennessee, Alabama
- 11) Appalachian
- 12) Charlevoix and Alpena
- 13) Eastern Upper Peninsula and Northern Lower Peninsula
- 14) Cement
- 15) Yes
- 16) Duluth/Superior
- 17) Two Harbors
- 18) Iron ore, Steel Mills
- 19) 1

20) Proximity to the resource and need for raw materials

Assessment:

Students will be assessed by answering the questions included in this activity.