

Getting the Lake Superior Message Out

Outreach for
UMD and MN DNR

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Sugarloaf: The North Shore Stewardship Association

Who is Sugarloaf?

From 1941 – 1971 Consolidated Papers, Inc. used Sugarloaf Cove as a pulpwood landing area



Who is Sugarloaf?

1985 – Land donated to The Nature Conservancy

1987 – TNC sold 34 acres of land to MN DNR

1992 – DNR designated 3.5 acres as SNA; added 6.7 acres in 1996 for a total of 10.2 acres

1993 – SICA was founded

1998 – 24 acres of land transferred from DNR to SICA

2000 – Interpretive Center built



In 2004 SICA became:



Mission:

“To inspire the preservation and restoration of the **North Shore’s** unique environment through **education and exemplary stewardship, especially at Sugarloaf Cove.**”

Sugarloaf's North Shore Outreach Projects

Learning Cart



North Shore Interpretive Center



Learning Cart – What is it?

Short, fun learning activities about the natural and cultural history of Minnesota's North Shore.



Learning Cart

Program topics include:

- Water quality
- Geology
- Invasive species
- North Shore birds and mammals
- Rip Currents



Learning Cart locations

- State Parks
- Canal Park Duluth
- SNAs



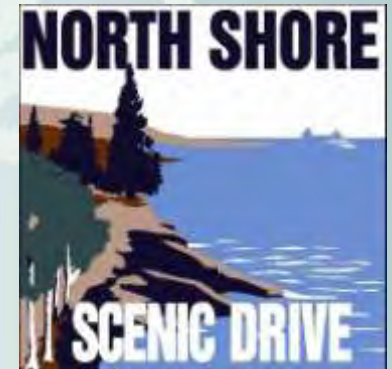
Learning Cart Funding

- Began in 2005 as the ShoreLink Learning Cart
- Funded by a Lake Superior Coastal Program grant



2006 Learning Cart Funding

Funded by a variety of partners



2007 Learning Cart Funding



Started a pilot program
with the Scientific and
Natural Areas Program

Produced a North Shore
SNA guide

2007 Learning Cart Funding

Received funding for
the remainder of
the summer from:



Learning Cart Assessment

- 2006 – 3025 visitors
2007 – 3092 visitors
- Surveys
- Informal comments



Sugarloaf's North Shore Outreach Projects



North Shore
Interpretive Center

North Shore Interpretive Center



Goals:

To serve as an interpretive gateway to the North Shore

To provide information about current Lake Superior related research efforts

North Shore Interpretive Center

Funding sources:

- Minnesota's Lake Superior Coastal Program
- Northland Foundation



North Shore Interpretive Center Spring - Summer 2007

Recruited and
trained 20
volunteers

*North Shore
Ambassadors*



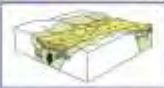


North Shore Interpretive Center Spring - Summer 2007 Developed Posters with University Partners

GEOLOGISTS SAY:

Lake Superior was formed by fire and ice

The dramatic cliffs and rocky beaches of the North Shore were created by massive geological events. 1.1 billion years ago, North America began to split apart.

Three sheets of lava poured from beneath, solidifying to form familiar places like Isle Royale and Soudan Crat. In other places, the rising magma brought other rocks with it, creating unusual features like Cadillac Peak and Soudan Crat.

A rift valley formed, in a U-shaped ditch that ran from northern Ontario through Lake Superior and down to Ohio. Layers of basaltic magma stacked on top of each other, one on each side and toward each other. The rift stopped forming after about 20 million years. The hardest rock left behind was igneous rocks called gabbro.

Since there was more rock in the middle of the rift, it was forced to the middle and the layers tilted to toward the middle.

The main rock type in these two sheets was basalt, the common gray rock of North Shore cliffs and beaches. Other rocks in the North Shore include the red rocks of Soudan Crat and the hard diabase and gabbro of Cadillac Peak and Isle Royale.

How do we know this?

Geologists rely on the "Principle of original horizontality" and the "Law of superposition" to understand rock layers and sequences. Simply put, geologists assume that rock layers were mostly flat when they formed, and that the older layers come on bottom and younger layers on top.

Geologists from the USGS Department of Geological Sciences did most of the research we rely on today to understand the geologic history of the North Shore. Dr. John Green dedicated his research career to the North Shore's geology. With some of his research, Dr. Green identified the correct sequence of lava flows, and then obtained the dates for the flows, using uranium/lead and potassium-argon techniques.




How do we know this?

After its dramatic formation from layers of lava, the Lake Superior basin was carved out by huge continental glaciers during the last ice Age.

Beginning about two million years ago, ice sheets advanced across the continent from the Canadian Rocky area. One lobe of the ice sheet covered the Lake Superior region with ice up to one mile thick. The ice pushed through the old rocks and carved out the lake basin we know today. The heavy ice forced down to the bedrock in many places, and the rocks far below picked up water deposited "glaciers" up to 100 miles away.

The glaciers finally melted and retreated from the Lake Superior area about 12,000 years ago. At one point, the highest water formed a lake 100 feet higher than the current lake.

Geologists look for two main clues that glaciers leave: signs of erosion and places of deposition.

Along the shores of Lake Superior, geologists find many scratches and ridges that formed by the passing ice. Some of the best evidence of glacial erosion is found right here at the Copper River and Isle Royale.

UMD geologist Charlie Natchez specialized in the study of glacial deposits. His research showed that many rocks the glaciers picked up from the Lake Superior region could be found in gravel deposits in southern Minnesota. Some of the best glacial moraine in Minnesota is in Twin Cities park area.

Department of Geology – North Shore Geology

North Shore Interpretive Center Poster development

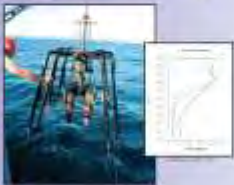
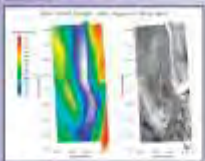
Large Lakes Observatory

LIMNOLOGISTS SAY:

Lake Superior still holds many mysteries

The large lakes of the world, including Lake Superior, are not only beautiful to look at, but they also are important sources of fresh water, valuable fish resources, and are used for commercial transport. Despite their importance, we know more about the oceans than large lakes. For instance, we do not know exactly how climate change affects lake levels. Our understanding of Lake Superior currents comes from studies done in the 1990s with glass bottles thrown overboard.

How do we know this?



The University of Minnesota Duluth is home to the Large Lakes Observatory (LLO), the only institute in the world dedicated to the study of large lakes. They are systematically reviewing and refining existing knowledge about Lake Superior. For example, it turns out Lake Superior is not as deep as we thought it was, but more vulnerable to environmental change.

What Lake Superior mysteries are being solved?

WHAT IS THE BOTTOM LIKE?

Using equipment such as a multibeam sonar or a side-scan sonar (pictured left), Geologists can create images of the lake bottom. The multibeam and side-scan sonars both use sound to image the lake bottom.

This is a 3-D multibeam image of the deepest point in Lake Superior. The white part of the image represents a part of the lake at least 1260 feet deep. For years people have said Lake Superior is 1310 feet deep, but the LLO found it was only 1263 feet deep.

WHAT ENVIRONMENTAL CHANGES HAVE OCCURRED?

Limnologists can collect and study the chemicals in lake-bottom sediment to see how the conditions of the lake have changed. They use several tools to collect sediment. One such tool, a multicorer, is pictured far left.

Pictured near left are some data from multicorer collected from Lake Superior. The graph indicates how the lead and cadmium content of the sediment has decreased. Notice that the lead content of the sediment peaks in the 1970s, just before controls on leaded gasoline were put in place.



The LLO operates the Blue Heron, the largest university-owned research vessel on the Great Lakes. It has 100-ton-deep (100-ton) research work by studying working to understand the biology, chemistry, physics and geology of the lake.



- Bathymetry
- Environmental changes

North Shore Interpretive Center Poster development Minnesota Sea Grant

LIMNOLOGISTS SAY:

Even though it's big, Lake Superior has little capacity to support life.



Some limnologists call Lake Superior a "distilled water ice bath." They have their reasons. Compared to other lakes, Lake Superior is:

- **Geologically young** — about 10,000 years old
- **Low in nutrients** — such as phosphorus
- **Cold** — average temperature is 40°F
- **Deep** — average depth is about 482 feet
- **Surrounded by a small watershed** that lacks rich and deep soils

These characteristics make the lake less productive, meaning that fewer fish can live in it. If Minnesota's Lake Superior is like a prairie and Florida's Lake Okechobee is a jungle, Lake Superior could be the tundra. Even so, since humans discovered the lake, fishing has been an important part of the economic and recreational benefits the lake has to offer.

How do we know this?



Limnologists looked to the past...

Even though the lake looks similar to the way it did about 200 years ago, fish populations continue to have their ups and downs. Better fish, including lake trout, coho salmon, brook trout, lake sturgeon, and cisco, formerly lake herring, were overfished. Also, aquatic invasive species altered the food web as competition and predators. Before sea lamprey and rainbow smelt invaded the lake, annual cisco harvests exceeded 17 million pounds. Lake trout harvests ranged between 4-5 million pounds.

And studied the present...

Lake Superior has 90 fish species (24 have been introduced). Commercial fishermen harvest lake whitefish, cisco, lake trout, charr, smelt, and other species. Recreational anglers enjoy catching lake trout and introduced species including:

- **Rainbow trout** (also called steelhead)
- **Brook trout**
- **Spike** is hybrid cross of lake and brook trout
- **Chinook salmon**
- **Coho salmon**
- **Pink salmon**

And peered into the future

The future for fish and fishing in Lake Superior is bright. Fisheries managers continue to do a great job of controlling sea lamprey, and balancing commercial and recreational fishing. Lake Superior is the only Great Lake where lake trout are reproducing well enough to sustain the population. Sea Grant contributes by conducting research and outreach related to fisheries including food web interactions, population dynamics, genetic implications of fishery management, and contaminants.

WHAT'S IN THE LAKE?

FISHBOUNDS

Lake Superior is the only one of the Great Lakes that has a large fishery.



There is a lot of fish in the lake, but it's not all the same. The lake is home to many different species of fish. Some are native to the lake, while others were introduced. The lake is also home to many different types of fish, including lake trout, lake whitefish, and lake herring.

CRAYFISH

Crayfish are found in the lake, but they are not native to the lake.



Crayfish are found in the lake, but they are not native to the lake. They were introduced to the lake in the 1930s and have since become a major pest species.

BIG FISH

The lake is home to many different species of fish, including lake trout, lake whitefish, and lake herring.



The lake is home to many different species of fish, including lake trout, lake whitefish, and lake herring. These fish are important to the lake's ecosystem and to the people who live around the lake.



- Fisheries
- Aquatic Invasive Species

North Shore Interpretive Center Poster development



Great Lakes Maritime Research Institute
- Great Lakes shipping history



NRRI – Watersheds and Great Lakes
Environmental Indicators Study



Weber Stream Initiative – Stream
restoration

North Shore Interpretive Center Summer 2007

- Opened May 30
- Wednesdays through Saturdays 10-5
- Served over 650 visitors – from Duluth to Africa!
- Over 600 volunteer hours



North Shore Interpretive Center Future Plans

- Improve signage
- Renovate Limno lab
- Use Limno lab as the gateway center to the North Shore
 - Visitor information
 - Short film
 - Bookstore
 - Exhibits

