

A Brief Introduction to the Great Lakes



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Geographical History

- The Great Lakes were formed during the last ice age, roughly 10,000 years ago
- The Glaciers carved the lakes out of an existing basin, and when the glaciers receded the meltwater filled up the holes.
- The Great Lakes are generally considered to be the big 5, but many, many smaller lakes throughout the region are included in this massive basin, all tracing their beginnings back to the same source

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Lake Ontario

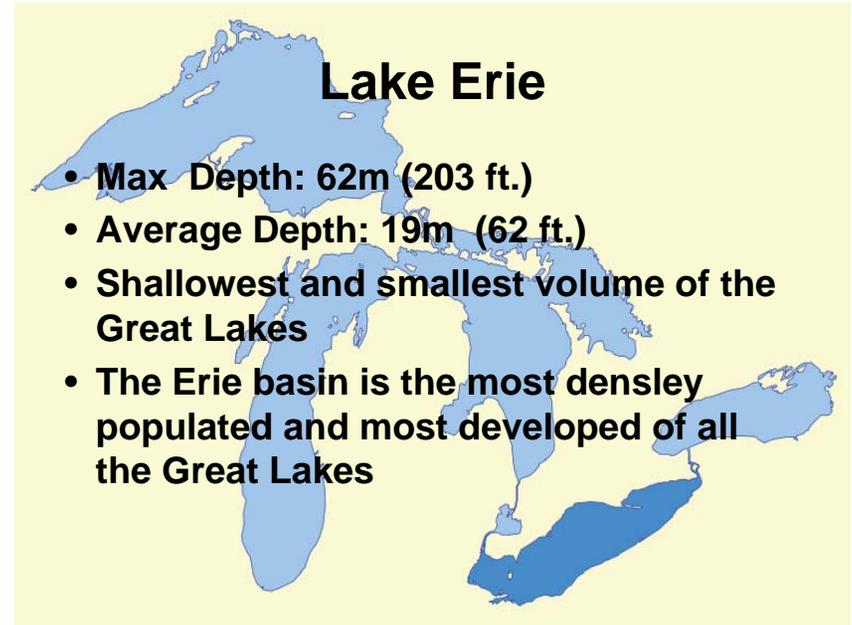
- **Maximum Depth: 246m (807 ft.)**
- **Average Depth: 86m (283 ft.)**
- **Smallest surface area of all the Great Lakes**
- **The only Great Lake that doesn't touch the state of Michigan**



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Lake Erie

- **Max Depth: 62m (203 ft.)**
- **Average Depth: 19m (62 ft.)**
- **Shallowest and smallest volume of the Great Lakes**
- **The Erie basin is the most densely populated and most developed of all the Great Lakes**



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Lake Huron

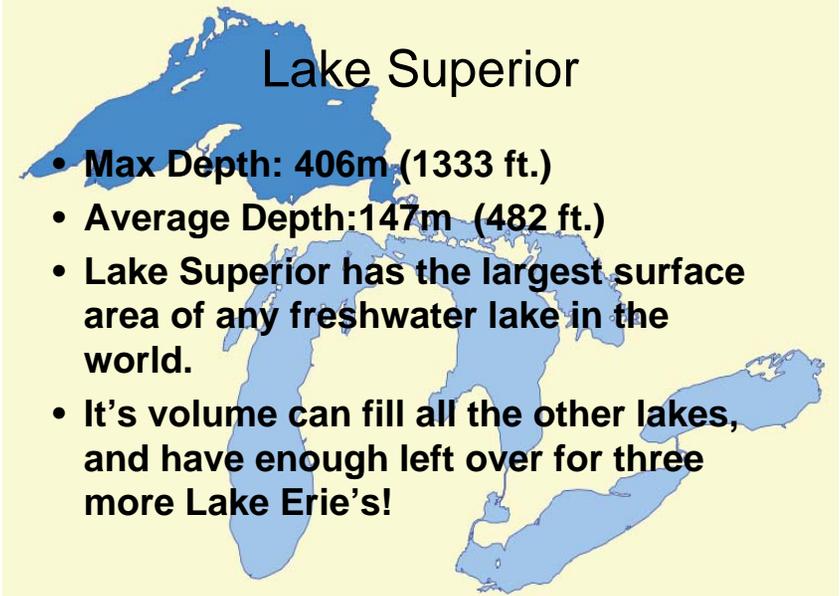
- Max. Depth: 229 m (750 ft.)
- Average Depth: 195 ft.
- Manitoulin Island, in the north of the lake is the world's largest freshwater island.



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Lake Superior

- Max Depth: 406m (1333 ft.)
- Average Depth: 147m (482 ft.)
- Lake Superior has the largest surface area of any freshwater lake in the world.
- It's volume can fill all the other lakes, and have enough left over for three more Lake Erie's!



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Lake Michigan

- Max. Depth: 281 m (925 ft.)
- Average Depth: 82m (270 ft.)
- The only Great Lake exclusively covered by the United States
- It is hydrologically inseparable from Lake Huron due to the wide Straits of Mackinaw

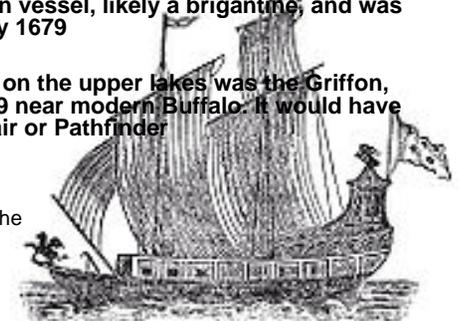


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Great Lakes History

- The Great Lakes have always been a major thoroughfare and trading route.
- Natives have used the lakes and rivers in the Basin since pre-history.
- The first European ship on the lakes was the Frontenac, built by Sieur de la Salle. It was a 10-ton vessel, likely a brigantine, and was lost on Lake Ontario in January 1679
- The first large European ships on the upper lakes was the Griffon, also built by de la Salle, in 1679 near modern Buffalo. It would have been roughly the size of Playfair or Pathfinder

The Griffon went missing in the fall of 1679, and no record or trace of it has been found



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Conflict on the Lakes

- The lakes were used for numerous naval engagements throughout the 17th, 18th and early 19th century.
- The British and French battled it out throughout the Great Lakes Basin until 1756, when the British finally defeated France and took control of all of North America

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Conflict on the Lakes

- Within a few decades trouble was back with the American Revolution
- There were some minor naval battles during this time, but with the end of the conflict naval forces on the lakes were reduced and relative peace reigned.

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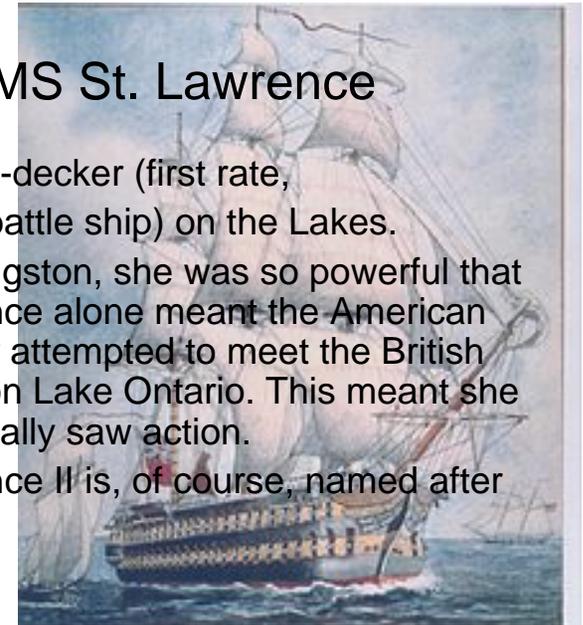
War of 1812

- As the United States gained more strength and more confidence, trouble was again on the horizon
- When war broke out there were many conflicts throughout the basin.
- The culmination of this showdown was the Battle of Lake Erie, on September 10th, 1813.
- The Battle was fought in the west end of the Lake, in and around the Bass Islands and Put-In-Bay Ohio.
- The Americans soundly won the battle, and it allowed them to retake Detroit, as well as command the Lake for the rest of the War.
- The war eventually ended in stalemate, with little land having actually traded hands. The Americans won almost every naval engagement though, both in the lakes and on the coasts.

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HMS St. Lawrence

- The only 3-decker (first rate, or line-of-battle ship) on the Lakes.
- Built in Kingston, she was so powerful that her presence alone meant the American fleet never attempted to meet the British for battle on Lake Ontario. This meant she never actually saw action.
- St. Lawrence II is, of course, named after her.



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Trading under Sail



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Lake Schooners

- The schooner quickly became the rig of choice in the Great Lakes due to their manoeuvrability and relatively smaller crew than a square-rigged vessel
- Most schooners maintained a yard on the foremast so as to set a course and raffee when the wind was fair

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Lake Schooners

- Another variation on the coastal schooner rigs was that lake schooners generally had masts of different height, whereas coastal ones generally had masts of the same height
- Centreboards were also very popular with lake schooners, the first vessel known to have had one was the Challenge, built in Wisconsin in 1852.

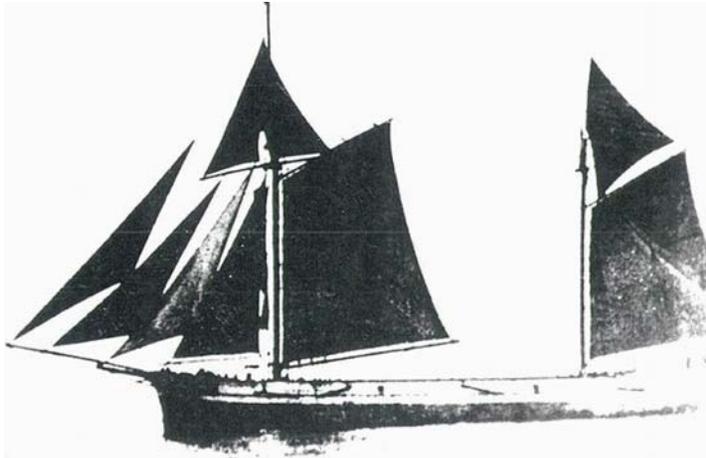
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- Trade under sail continued well into the early 20th century
- By the late 1800's tugboats had been introduced, and most of the work in and out of ports was done with help



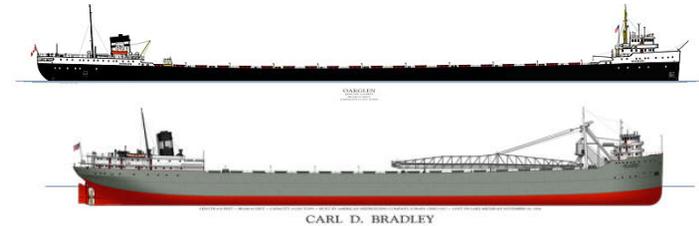
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Grand Haven Rig



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Lake Freighters or "Lakers"



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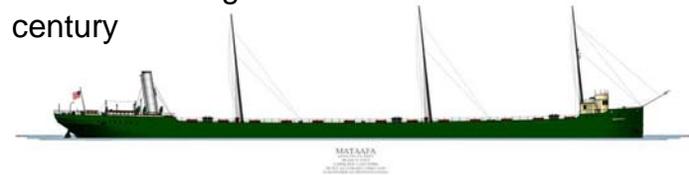


Built in 1906 as SAMUEL MATHER she was renamed PATHFINDER in 1925, and was subsequently known as GODERICH

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Lakers

- Lake Freighters are long, straight and narrow. The conditions on the Lakes allow for this kind of construction due to smaller swells and waves.
- The bow shape is also unique to the lakes
- Traditional Lakers also have their wheelhouses on the bow, as opposed to the stern
- The basic design traces back to the turn of the century



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J.A.W. Iglehart

Built in 1935
as the Pan-
Amoco



Dodged a torpedo
attack in 1943 while
on the East Coast

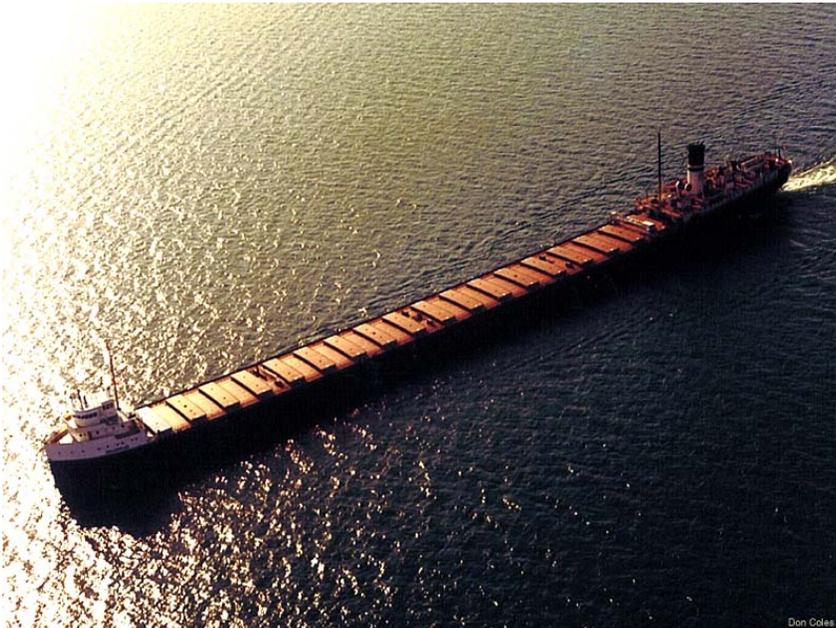
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Edmund Fitzgerald

- Built in 1958
- Foundered in Lake Superior in 1975, she was lost with all hands and the exact cause continues to be a mystery



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Modernizing the Fleet



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Modern Lakers

- Modern Lakers, those built after the mid-1970's roughly, are different from the older designs.
- The wheelhouses have been moved aft, and the classic lines have been largely erased.
- The bows have also been flattened
- These measures are mainly economical, resulting in cheaper and faster building

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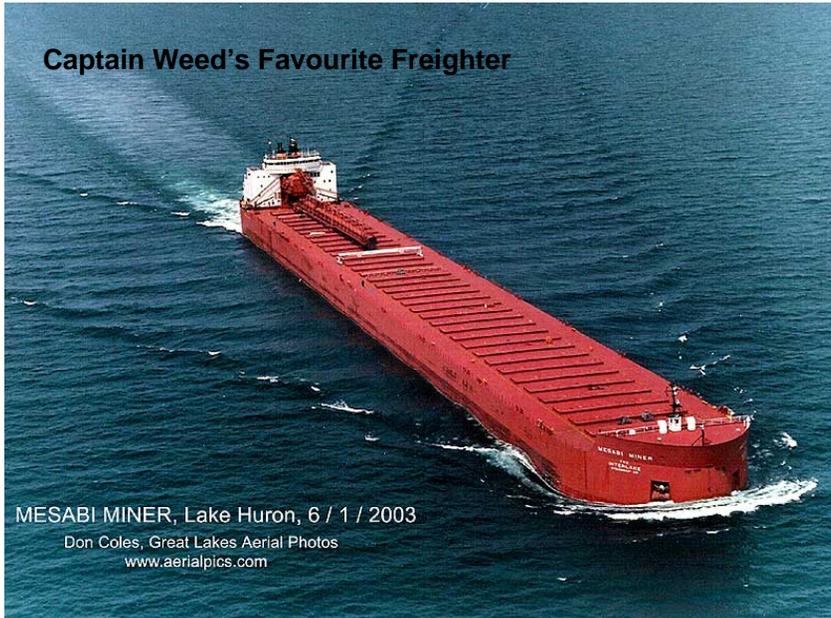
1,000 Footers



Great Lakes Aerial Photos
Don Cowie

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Captain Weed's Favourite Freighter



MESABI MINER, Lake Huron, 6 / 1 / 2003

Don Coles, Great Lakes Aerial Photos
www.aerialpics.com

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- The other Pathfinder on the Lakes

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- Combined with the tug Dorothy Anne, they make up an articulated-barge unit.



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Contemporary Commercial Fishing

On the Canadian side of the lakes there are still commercial fishing vessels.



Playfair II



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Commercial Fishing

- The Americans have removed all of their commercial fishing industry, and now only have sport fishing from their ports.
- The Canadian industry is quite large, mainly focused in Lake Erie

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The Windoc



- The Windoc had a lift bridge dropped on her in the Welland Canal in 2001, subsequently while in Hamilton she broke free and washed ashore during a storm.
- At this point she remains in Montreal where she has been since September 2002.

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Welland Canal

- There have been various different Welland Canals over the many years.
- The first was built in the 1820's



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Later Canals

- There have been four total, this picture is a lock from the Second Canal.



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Present Canal

- This is the fourth Canal, though a fifth was started and now is just known as the 'Welland Bypass' and is part of the current Canal



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Present Canal

- There are 8 locks between Port Weller on Lake Ontario, and Port Colborne on Lake Erie. The total height the the canal lifts a ship is 99.5 metres
- Lock 8 is for adjustment to current water levels and the rise is typically only a few centimetres
- The maximum dimensions for ships are:
 - 225.5m length
 - 8.2m draft
 - 35.5m air draft

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Great Lakes Weather



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Great Lakes Weather

- The Great Lakes are an area of complicated and rapidly changing weather patterns
- This is very different from what is normally experienced in coastal and offshore sailing
- Systems move through quickly, and there are many variables resulting in challenging, and often severe weather

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General Weather

- The weather is largely dictated by systems coming over from Western North America or the North Pacific Ocean
- These are brought by the prevailing winds, which are Westerly
- The many different pressure grades and warm/cold fronts mean that the weather is constantly changing
- Combined with the heat storage of the Lakes, it makes for very interesting weather, and potential for very powerful, damaging windstorms

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General Weather

- Winds are stronger mid-lake
- Waves and swell are larger the further downwind you get
- Islands and shoreline will bend winds and waves around them, as well as slow them down
- Due to their shape and layout there is a lot of funnelling of wind in the Great Lakes

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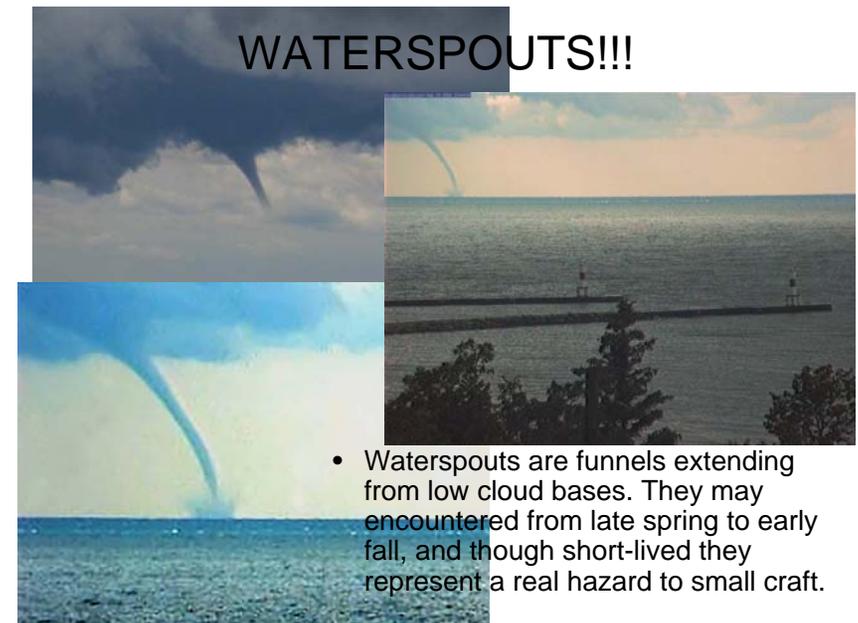


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Seiches

- A Seiche is the “Free oscillation of water in a closed or semi-closed basin; frequently observed in harbours bays lakes and in almost any distinct basin of moderate size”
- Basically sloshing back and forth on a very large scale
- This is typically started by a meteorological disturbance, such as sustained wind from one direction which dies out suddenly
- Longitudinal seiche period on Lake Ontario is about 5 hours, with a range of 0.2 meters (<1 ft.)
- Longitudinal seiche period on Erie is about 14 hours, with a range of 2m (6 ft.)

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Toronto

- Established in 1793, as York



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Toronto

- Toronto quickly became a very important port due to its islands that created great natural shelter
- Many schooners and then lakers operated out of Toronto
- Up until the 1980's Toronto's waterfront was still mainly a commercial area

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Toronto

- Toronto continues to be a commercial port
- The city has a large sugar refinery as well as the container port in the Docklands
- A thriving industry of tour boats also helps keep Toronto's waterfront alive and well, though the new development plans for the waterfront seem to forget that there are boats on the waterfront

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Invasive Species

- Invasive species such as Zebra Mussels and Lampreys continue to be a problem



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Water Levels

- Water Levels also continue to be a problem, with a steady dropping occurring, combined with rapid yearly fluctuations.



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