

Water Level Volatility in the Great Lakes Coastal Zone

Wisconsin Governor's Climate Change Taskforce
Via Zoom
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Thesis

- **Great Lakes water levels have fluctuated naturally and extensively during recorded history**
- **Those water levels appear to be entering a period of increased volatility in Great Lakes nearshore areas**
- **Unprecedented weather patterns seem to be driving many of these water-level changes**
- **This volatility is taxing human and natural infrastructure throughout the Great Lakes region**
- **Scientists, government officials and the general public are still coming to grips with this new volatility**
- **Infrastructure adaptation strategies & funding are inadequate in many areas of Great Lakes basin**

Climate Change v. Nat. Variability



USGS Hammond Bay Biological Station, Lake Huron

- Most of the lakes have natural variability of +6 feet
- The Great Lakes ecosystem thrives on this natural variability
- But research now suggests we're entering an era of water level extremes, breaking numerous records in the process
- Higher highs, lower lows, longer lows and more rapid rises

Great Lakes & Climate Change

- **1985-86 Superior, Michigan, Huron, Erie all experienced record highs, according to Corps of Engineers**
- **1998-99 Michigan-Huron plunged 3' in 1 year. Those lakes had never fallen so far, so fast**
- **2013 Michigan-Huron record all-time low water level**
- **1999-2014 Superior, Michigan & Huron see record-long period of low water. Never been so low, so long, before**

Going to Extremes

Data from U.S. Army Corps of Engineers

- **2013-14 after Polar Vortex winter Lake Superior experiences fastest rise on record.**
- **Michigan-Huron 2nd fastest rise on record**
- **2017 Lake Ontario ~4 foot increase in 6 months**
- **Lake Ontario broke all-time high-water record in 2017 and broke that record again in 2019**
- **Lake Erie broke all-time high in 2019 as well**

2020 Water Levels

Data from U.S. Army Corps of Engineers & National Weather Service

- **Lake Superior is down slightly this year**
- **But Michigan and Huron have broken monthly water level records every month so far in 2020**
- **2015-2019 was the wettest five-year period ever recorded in Great Lakes watershed**

What's it All Mean?

New Era of Volatility

“What it means for the Great Lakes is that we need to be prepared for extremes. Whether it is extreme weather patterns, whether it's extreme water levels, whether it's extreme droughts and storms ... we just need to be prepared for extremes.”

-Wendy Leger, co-chair, International Joint Commission's Great Lakes St. Lawrence Adaptive Management Committee

-From *The Great Lakes Water Wars*, p. 59

Lake Erie Algal Blooms

Visible from Space



Photo: European Space Agency Envisat

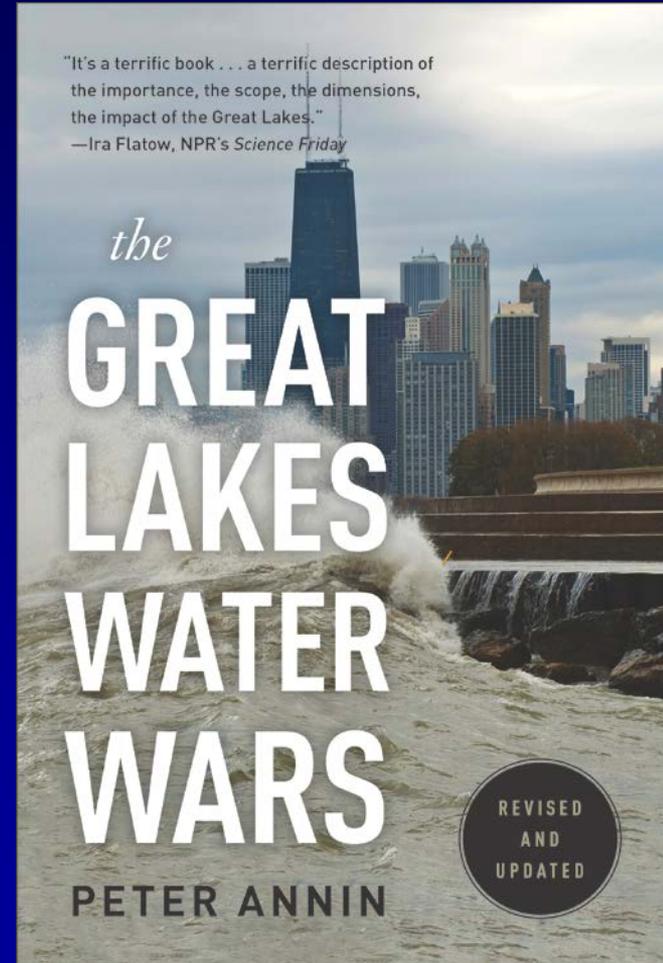
Lake Erie, the warmest and shallowest Great Lake, has experienced repeated, large cyanobacteria blue green algal blooms annually since 2002. This bloom is from 2011.

Take-Home Points

- **Great Lakes water levels have always varied naturally**
- **Water level variability is good for the environment, but challenging for humans**
- **Climate-driven water level volatility is now challenging human *and* natural environments**
- **Algal blooms from Lake Erie to Lake Superior show that issues are more complex than in the past**
- **Regional residents and infrastructure do not seem prepared for this new volatility**
- **The volatility clearly impacts Great Lakes tourism**
- **More adaptation/resiliency awareness and funding are necessary to meet current and future challenges.**

For More Information...

- Chapter devoted to climate change & Great Lakes water levels
- Available at any library
- Make sure it's 2nd edition published in 2018 (gray cover)





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