Understanding the Key Issues Affecting Lake Erie

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Today's Talk

Great Lakes and Lake Erie 101 Background on 6 key issues causing huge changes in Lake Erie. Climate Change/Lake Levels/Severe Storms Sedimentation/Water Clarity/Dredging Nutrients and Phosphorus HABs—Harmful Algal Blooms Dead Zone Als—Aquatic Invasive Species





Great Lakes Coastlines







Great Lakes Basin Land Use 1985



Forest / Agriculture / Residential /Other



As a Result, Lake Erie Gets:

More sediment

More nutrients (fertilizers and sewage)

More pesticides

The above 3 items are exacerbated by storms

And is still biologically, the most productive of the Great Lakes



Lake Erie Stats

Drinking water for 11 million people

- Over 20 power plants
- 300 marinas in Ohio alone
- Walleye Capital of the World
- 40% of all Great Lakes charter boats
- \$1 billion sport fishery
- Largest freshwater commercial fishery in the world

Historical Trends: The Lake Erie Ecosystem

Getting worse annually to 1970
Stable 1970-75
Improving 1975-1990 or 1995
1995+ Getting worse

Sedimentation

Reduced water quality
 Nutrients and contaminants attached to sediment particles
 Can trace Maumee River sediments from open lake disposal to Fairport

Nutrients and Phosphorus

Blue-green Algae Bloom circa 1970, Lake Erie



"I heard Lake Erie is the place fish go to die."

--Johnny Carson, 1976

Phosphorus Loading

Limiting nutrient for plant growth
29,000 tons in 1969
Hit 11,000 target by mid-80s
Became Walleye Capital of the World
Soluble form increasing since 1995

Dissolved Reactive Phosphorus



Source: P. Richards, Heidelberg College

Impacts of Increased **Phosphorus Concentrations** HABs Microcystis Microcystin levels 60 times WHO Cylindrospermopsis Nuisance Algae Blooms Lyngbya—Western Basin Attached Cladophora—Whole Lake Attached Dead Zone

HABs (Harmful Algal Blooms): Western Basin Problem



Blue-green Algae Bloom circa 1970, Lake Erie







HAB Requirements

Warm water (summer problem)
 High phosphorus levels
 Zebra/quagga mussels (remove competition)

HABs: Western Basin Problem But Contribute to Oxygen Demand in the Central Basin, i.e. the **Dead Zone**

Dead Zone: Central Basin Problem



The Dead Zone: Anoxic Hypolimnion



Central Basin with Thermocline





Global warming and climate change are real and will make these problems worse!

Warm water favors HABs

- Warm water increases oxygen depletion rates
- Lower water levels make it easier to resuspend and transport bottom sediments
- More severe storms will resuspend more sediment and increase erosion and sediment loading
- Lake levels will go down



Over 180 species in Great Lakes
75% since Seaway opened
Zebra and quagga mussels
Phragmites and loosestrife
Round gobies
Next?
How do we close the door?

Zebra Mussel vs Quagga Mussel





Because Lake Erie is the southernmost, shallowest, warmest, and most nutrientenriched of the Great Lakes, it is likely that AIS will always present the greatest problem, and have the greatest impact, in Lake Erie.

1974—Before Zebra Mussels



1994—After Zebra Mussels



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