



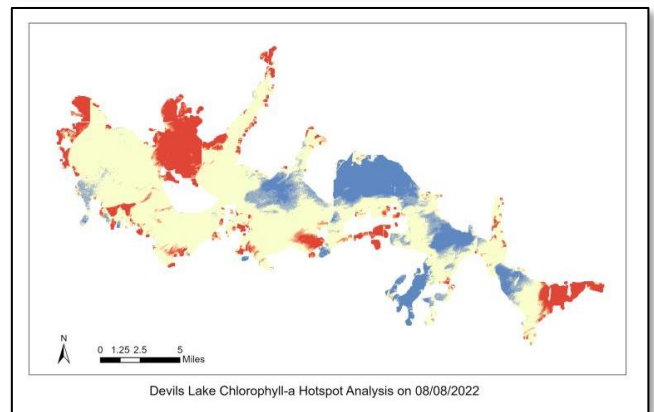
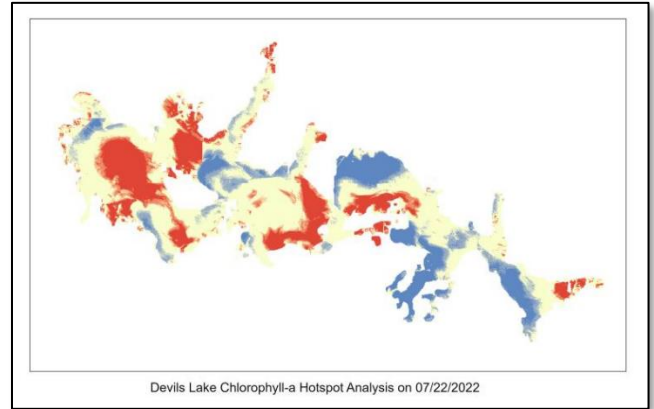
NORTH DAKOTA VIEW 2022 - 2023

AmericaViewSM
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NORTH DAKOTA VIEW 2022 - 2023 ACTIVITIES

Water Quality Assessment of Lakes Using Remote Sensing

- Algal blooms can occur on a regular basis in selected lakes in North Dakota. These algal blooms can produce toxins harmful to humans, pets, and livestock. Aquatic organisms such as fish can also be harmed by the toxins, or the depletion of oxygen from massive algal blooms.
- Students were trained in advanced remote sensing and geospatial techniques and conducted research to identify algae growth patterns in six lakes in eastern North Dakota using remote sensing imagery from Landsat 8 and 9, and Sentinel-2 satellites. The lakes include Devils (pilot study), Homme, Fordville, Larimore, North Golden and South Golden lakes.
- Water samples collected from the lakes were analyzed for many parameters such as nutrients (e.g. phosphorus and nitrogen), dissolved oxygen, and chlorophyll-a (used to identify algal blooms in satellite imagery).
- Chlorophyll-a produce fluorescence (emit light) when exposed to certain light wavelengths. This property was used to measure the amount of chlorophyll in water filter samples at the physical geography laboratory at the University of North Dakota by the students. Laboratory chlorophyll-a levels were then compared with the satellite-derived chlorophyll indexes.
- Different patterns of algae growth were identified in the lakes during the sample events and ongoing satellite imagery analysis is being conducted to determine what the hotspot locations and patterns are.
- Results of this study can be useful for local and state agencies in monitoring harmful algal blooms and understanding how they develop over time.



Comparison of Chlorophyll-a hotspots in Devils Lake, ND between 7/22/22 and 8/8/22. Images created using Normalized Difference Chlorophyll Index from Sentinel-2 Imagery.



Algal bloom in Homme lake (8/15/2023).



Sae Young Lee collecting water quality data (9/22/2023).



Sae Young Lee and JamesGuy Gierisch filtering water for chlorophyll analysis (8/15/23).

North DakotaView is a member of the AmericaView Consortium, a nationally coordinated network of academic, agency, non-profit, and industry partners and cooperators that share the vision of promoting and supporting the use of remote sensing data and technology within each state. AmericaView is funded by USGS grant agreement G18AP00077.

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AmericaView Website:
www.AmericaView.org
Christopher McGinty, Executive Director:
chris.mcginty@americaview.org
Lisa Wirth, Program Director:
lisa.wirth@americaview.org
John McGee, Board Chair:
jmcg@vt.edu

BENEFITS TO NORTH DAKOTA

- NDView provided scholarships for four graduate students at the University of North Dakota for research and training in remote sensing-related areas. Students conducted research in water quality from melting snow and ice, changes in wetlands, harmful algal blooms, and the tracking of wild turkeys using GPS and GIS mapping.
- NDView hired a graduate research assistant to help collect and analyze water samples as part of a harmful algal bloom study.
- NDView provided training in streams and watersheds to more than 100 middle and high school students using an augmented reality sand table at the River Watch Forum in Grand Forks, ND.
- NDView met with ND Congressional staffer to provide an update on its projects at UND and in the state on remote sensing education and research.
- NDView helped support research and education in remote sensing in the state through the purchase of equipment and supplies.



Cailey Issacson, Ph.D. student in Biology with GPS transmitter for turkey study (2023).



Area students working with augmented reality sand table at River Watch Forum (3/1/2023).

NORTH DAKOTAVIEW CONSORTIUM MEMBERSHIP



North DakotaView Principal Investigator:

Bradley Rundquist

University of North Dakota

701-777-4246

mbongowo.mguh@und.edu



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