GIS SW Trash Mapping of Jordan Lake & Implications for Watershed-Wide Prevention

Francis DiGiano, Prof. Emeritus UNC-CH, Founder Clean Jordan Lake
Laurel Krynock, GIS Administrator, Office of University Architect, NCSU

Presentation Outline

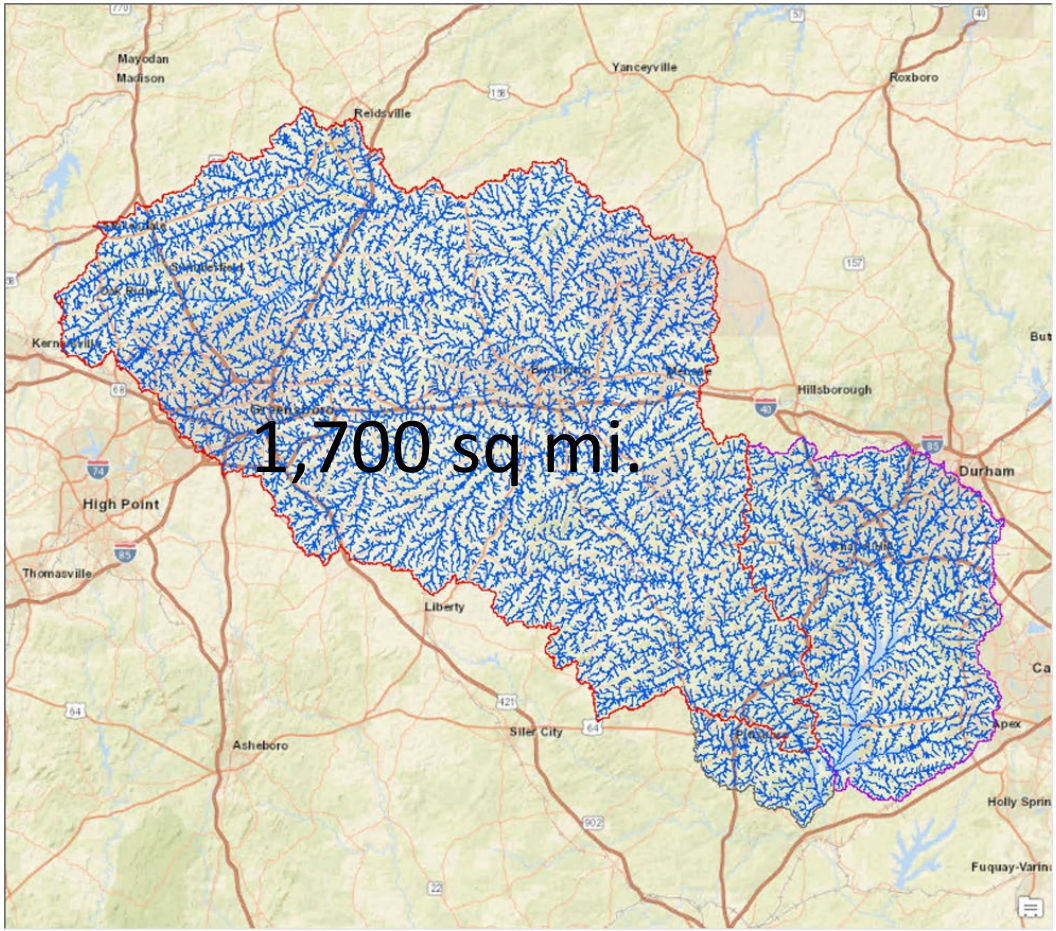
- Mission and Accomplishments of Clean Jordan Lake
- NCSU MGIST Capstone Projects: Apply GIS to Characterize Stormwater-Trash Nexus
- Phone APP to Add Trash Cleanups to GIS Mapping
- GIS Trash Mapping Tools at Clean Jordan Lake Website

Clean Jordan Lake

Incorporated in July 2009
501(c)(3) nonprofit in May 2010

MISSION

- Remove trash from shoreline to restore natural habitats and beauty
- Promote more effective trash prevention programs in watershed counties



Jordan Lake Watershed

800,000 people
6,000 mi. Highways

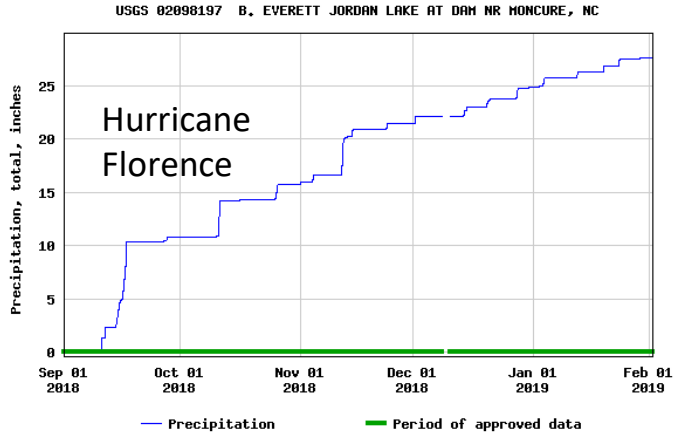
Major Subwatersheds
- Haw River
- New Hope Creek

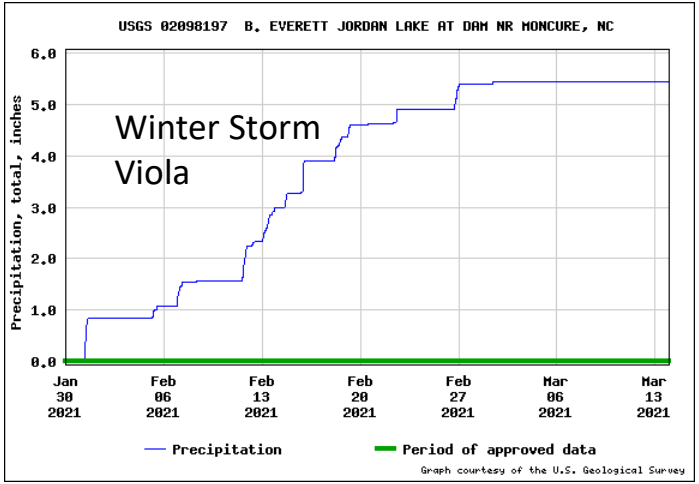
Origins of Trash
- 20% Recreation
- 80% Stormwater

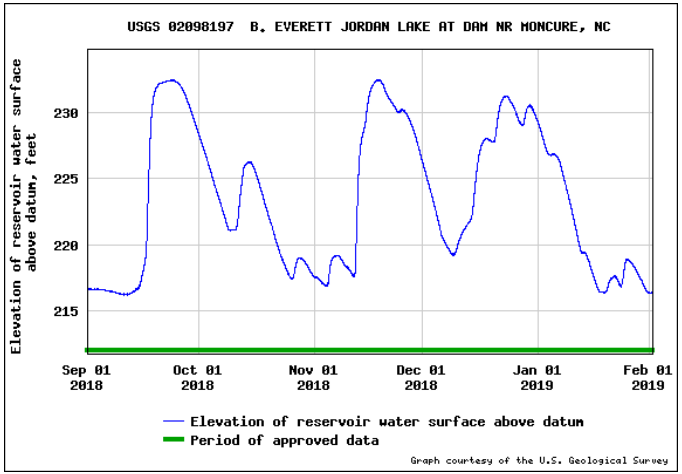
180 Miles of Shoreline

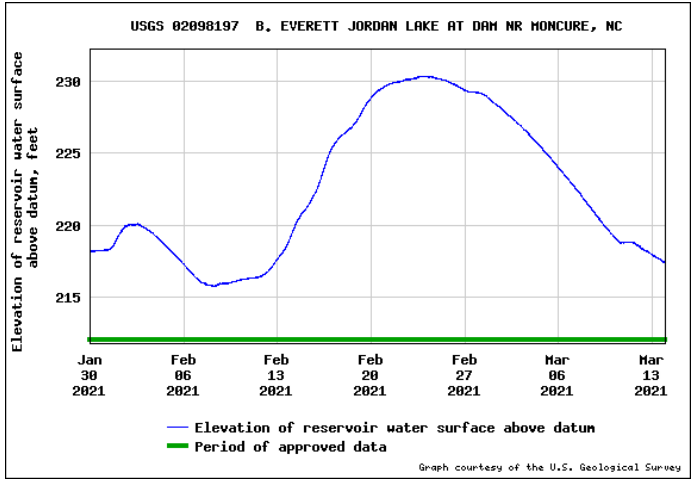
Our Accomplishments

700 Cleanups (1-200 volunteers)
9,000 Volunteers
20,000 Bags of Trash (200 tons!), 4,800 Tires
30 Miles of Shoreline Cleaned, Multiple Times


USGS 02098197 B. EVERETT JORDAN LAKE AT DAM NR MONCURE, NC
Hurricane
Florence
Precipitation, total, inches
0
5
10
15
20
25
Sep 01 2018
Oct 01 2018
Nov 01 2018
Dec 01 2018
Jan 01 2019
Feb 01 2019
Precipitation
Period of approved data


USGS 02098197 B. EVERETT JORDAN LAKE AT DAM NR MONCURE, NC
Winter Storm
Viola
Precipitation, total, inches
0.0
1.0
2.0
3.0
4.0
5.0
6.0
Jan 30 2021
Feb 06 2021
Feb 13 2021
Feb 20 2021
Feb 27 2021
Mar 06 2021
Mar 13 2021
Precipitation
Period of approved data
Graph courtesy of the U.S. Geological Survey


USGS 02098197 B. EVERETT JORDAN LAKE AT DAM NR MONCURE, NC
Elevation of reservoir water surface above datum, feet
215
220
225
230
Sep 01 2018
Oct 01 2018
Nov 01 2018
Dec 01 2018
Jan 01 2019
Feb 01 2019
Elevation of reservoir water surface above datum
Period of approved data
Graph courtesy of the U.S. Geological Survey


USGS 02098197 B. EVERETT JORDAN LAKE AT DAM NR MONCURE, NC
Elevation of reservoir water surface above datum, feet
215
220
225
230
Jan 30 2021
Feb 06 2021
Feb 13 2021
Feb 20 2021
Feb 27 2021
Mar 06 2021
Mar 13 2021
Elevation of reservoir water surface above datum
Period of approved data
Graph courtesy of the U.S. Geological Survey

GIS Trash Map Evolution

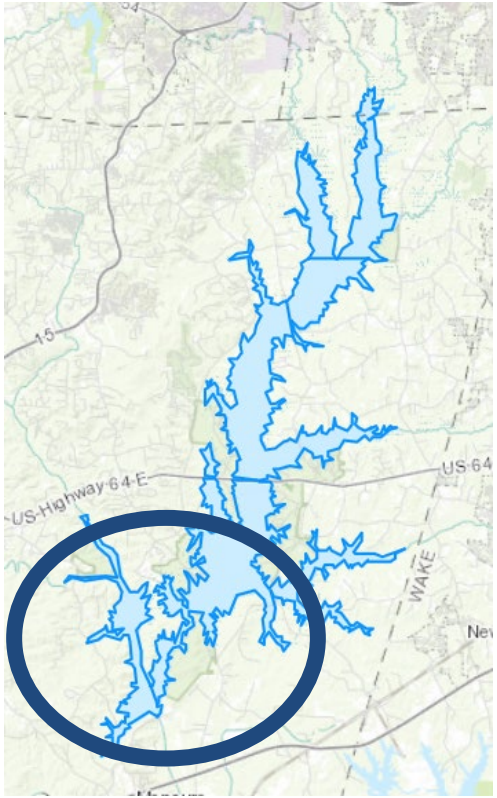
- NCSU Master of Geospatial Information Science and Technology (MGIST)
- **CAPSTONE EXPERIENCE**

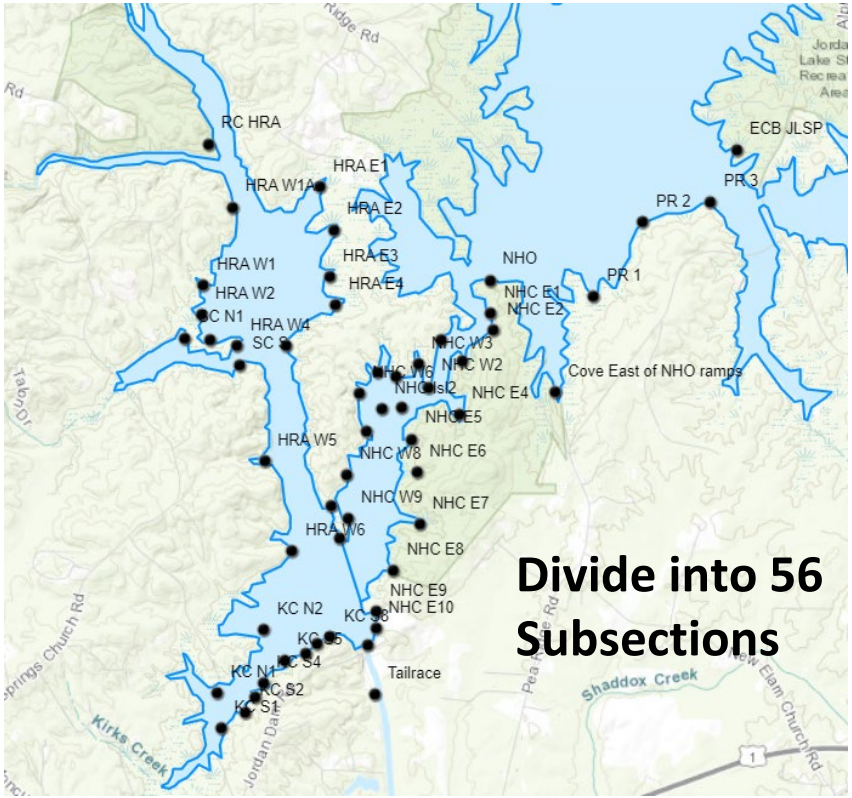
  Students work directly with community and industry partners to apply the knowledge and skills they have developed in the program to real-world problems. The program works closely with each student to identify an appropriate project based on our partner's needs and the interests of the individual students.
- 4 Partnerships with Clean Jordan Lake since 2018

MGIST Projects

Year	Student	Project
2018	Sue King	- Import cleanup data from CJL spreadsheet into GIS web map - Estimate lake level rise (LLR) from inspection of USGS record of lake elevation to correlate trash load to rainfall - Hot spot analysis to investigate spatial distribution of trash
2020	Kelsey Little	- Phone APP for cleanup data entry by volunteers - Web map incorporating estimated LLRs from Sue King
2021	Laurel Krynock	- Improved Phone APP for cleanup data entry by volunteers - Web scraping from USGS data base for automatic detection into improved GIS map of LLRs, height and duration
2022	Ben Maxson	- GIS mapping of DOT highway trash data - Development of Trash Threat Level Index to project trash loads

GIS Trash Mapping Location





GIS Trash Mapping Metrics

- Temporal and Spatial Impacts of Stormwater Trash
- 25 mi. Of Shoreline Divided Into 56 Subsections
- Each Subsection
  - No. Bags of Trash/100 ft
  - Pounds of Trash/100 ft
  - No. Tires/100 ft
  - No. of Cleanups
- Trash Accumulation from Stormwater Events
  - No. and Intensity of Stormwater Events Btwn Successive Cleanups at Same Subsection
  - No. and Cumulative Height of Lake Level Rises as Surrogates for Rainfall Events e.g.,

    lb trash/100 ft/Lake Level Rise, lb trash/Cumulative LLR

Estimated Total Trash & Tires Per Rainfall

Number of LLRs since 1-1-14	52	
Total Bags	6,188	
Total Tires	1,089	
Bags per rainfall	104.1	
Wt. per bag	20	lb
Wt. of trash per rainfall	1.2	tons
Tires per rainfall	25	