

Building a GIST Certificate in Western New York

Assistant Professor: Jonathon Little

MCC GIST Certificate student: Wayne Howard

October 18, 2017



Monroe Community College

STATE UNIVERSITY OF NEW YORK



The GeoTech Consortium of Western New York was funded through the U.S. National Science Foundation (NSF) Office of Advanced Technological Education under Grants Award # 1501076 to Monroe Community College. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.



The first steps

- ▶ Integrated Geospatial Education and Technology Training (iGETT-Remote Sensing)

- ▶ Mentor-Connect



- ▶ National Science Foundation Advanced Technological Education (ATE)

- ▶ Mentors work with a community college that has not benefitted from National Science Foundation grant funding in the past 10 years.

- ▶ Mentor **Vince DiNoto (GeoTech Center Director)**

- ▶ Mentor meets team (Remegia Mitchell, Grants Coordinator; Dan Robertson; Jon Little)

- ▶ Began by focusing on the goal and objectives.

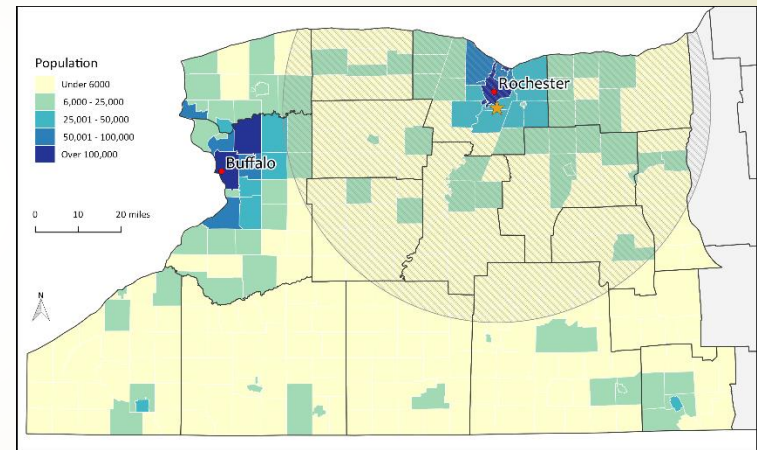


NSF ATE proposal

- **Goal** : The *GeoTech Consortium of Western New York (GTCWNY)* program goal is to build the Geospatial Information Science Technology (GIST) industry.

- **Key Objectives**

- **Objective 1**: Embed GIST content in secondary STEM disciplines through PD of high school teachers.
- **Objective 2**: Develop dual enrollment opportunities for high schools.
- **Objective 3**: Build a credit-based geospatial certificate program.
- **Objective 4**: Expand college students' GIST opportunities in regional markets.
- **Objective 5**: Provide PD for full and part-time faculty.



NSF ATE proposal

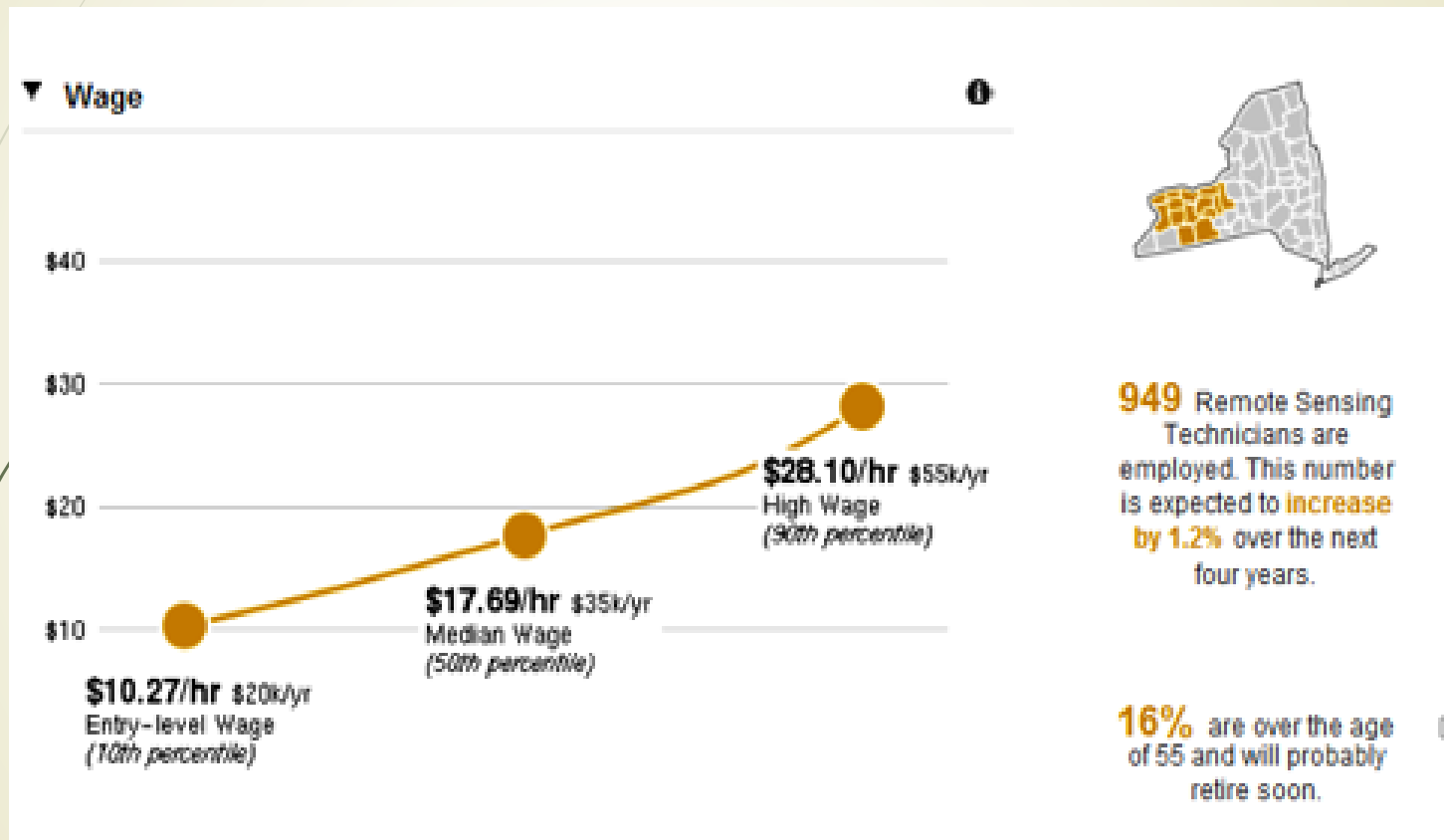
- ▶ Proposal components:
 - ▶ Narrative (15 pages, single spaced)
 - ▶ Supplemental documents
 - ▶ List of specific activities, job data, Logic model

GTCWNY Activity Table

Activity	Description
1.1	Develop curriculum and provide a two day, professional development summer workshop to ten cohort 1 high school teachers.
1.2	Cohort 1 will modify a 160 minute activity for use in their classroom the following fall.
1.3	Observe the activity implemented in the classrooms of cohort 1.

- ▶ Letters of Commitment
- ▶ Budget
- ▶ External evaluator (Donna Lange, Rochester Institute of Technology)

Geospatial Technician Data within 50 miles of MCC (2014)



MCC's Career Coach uses Economic Modeling Specialists, International (EMSI) and Equifax business data to provide current employment data for western New York. EMSI Data is often cited in *The New York Times* and *Wall Street Journal*.

Letters of Commitment and GIS Advisory Group

- ▶ Original
 - ▶ GeoTech Center: Vince DiNoto
 - ▶ GIS/SIG (local GIS group – 300 + members): Dan Allen and Stacy Stanton
 - ▶ Monroe County: Justin Cole
 - ▶ EagleView Pictometry International: Andy Mendola
 - ▶ Northeast Area Development: Joseph Becker
 - ▶ New York Geographic Alliance: Tim McDonnell
 - ▶ Lighttower Fibertech Networks: Jackie Sax
 - ▶ President, Monroe Community College: Dr. Anne Kress
 - ▶ City of Rochester, Michael Ross and Michael Staples
 - ▶ Town of Ontario
 - ▶ Local school districts
 - ▶ Webster (Bill Ottman)
 - ▶ Rochester (Dr. Bolgen Vargas)
 - ▶ Rush-Henrietta

Implementation

- ▶ **Objective 1:** Embed GIST content into secondary STEM disciplines through professional development of high school teachers.
- ▶ Cohort 1 two-day workshop (Aug 2015)
- ▶ Cohort 1 fall 2015 workshop
- ▶ Cohort 1: 160-minute GIS Activity implemented in classroom (8/10 implemented)
- ▶ Cohort 1 workshop activities
<http://www.nygeographicalliance.org/node/36>
- ▶ Cohort 2 (2016-17)
- ▶ Reunion Workshop for cohort 1 and 2 (Aug 2017)



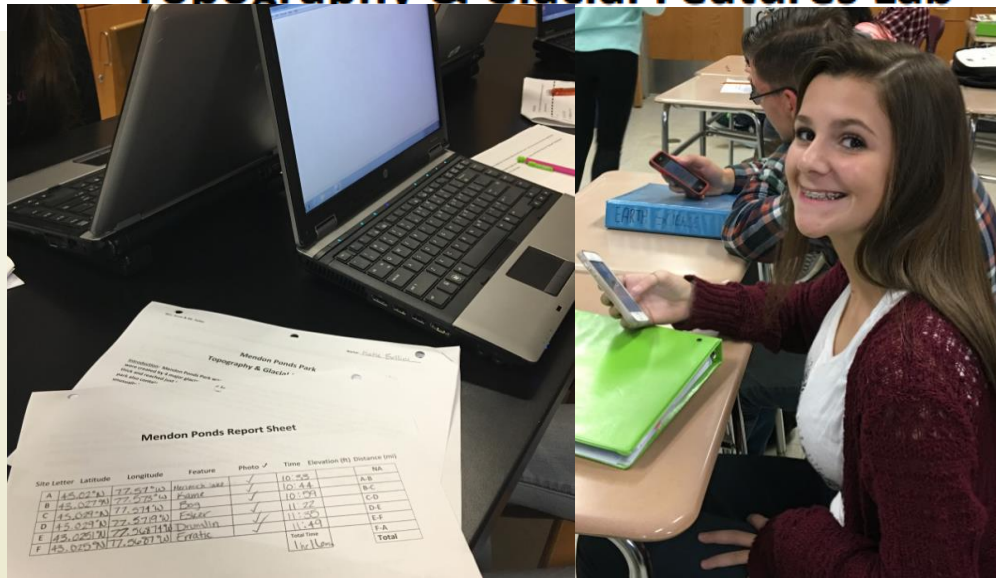
Implemented Activity

Teacher created or modified

- Write your initials Across the U.S.A (or world)
- Exploring New York State Rock Types
- Mendon Ponds Topo/GPS and Glacial Field Lab

Mendon Ponds Park

Topography & Glacial Features Lab



Implementation

- ▶ **Objective 2:** Develop dual enrollment opportunities in high schools.
 - ▶ Selected teacher takes Intro GIS course
 - ▶ If high grade, will receive additional mentoring in preparation to teach
 - ▶ Three dual enrollment courses 2016-17
 - ▶ Five total 2017-18

HS promotional
[video link](#)



Implementation

- ▶ **Objective 3:** Build credit-based geospatial certificate program.
 - ▶ Cartography, Spatial Analysis and GIS, Capstone in Geospatial Technology
 - ▶ GIS instructors: Heather Pierce, Justin Cole and Razy Kased, and Jon Little



Get the 24 credit GIST Certificate!



Geospatial Information Systems Certificate

FIRST SEMESTER:

- GEG 100 Physical Geography I Laboratory
- GEG 101 Physical Geography
- GEG 130 Digital Earth
- GEG 131 Cartography
- GEG 133 Introduction to Remote Sensing

SECOND SEMESTER:

- GEG 102 Human Geography
- GEG 230 Spatial Analysis and GIS
- GEG 239 Capstone Course in Geospatial Technology

ELECTIVE

ELECTIVE COURSES:

- GEG 135 (Business GIS)
 - CPT 101 (Programming in Python)
 - CIS 200 (Programming for Information Systems)
 - ENG 251 (Technical Communication)
- [Other elective courses must be approved by the Certificate Program Director]

TOTAL CREDITS: 24

Core software used in classes: ArcGIS 10.x, QGIS, OSM, Inkscape, Python, and plan to use ArcPro soon.

GIST Certificate approved

- ▶ Get the GIST @ MCC Video

https://ensemble.itec.suny.edu/Watch/MCC_GetTheGIST



Intro GIS (Digital Earth) Project Example



2013 - 2015 MCC Veteran and Military Student Duty and Service Stations



Introduction

When presented with the opportunity to choose our own topics for our final project, I knew I wanted to find something centered around the Military and Veterans community. The reason I am able to take these classes today is due to my own service in The United States Army. I am grateful for this opportunity I have and am always looking for ways to tie projects back to the Military. When I was informed by the professor that there were maps that have been stored here at MCC in the Veterans Service Office for years that were potentially in danger of being lost or damaged, I jumped on the opportunity to help MCC digitally preserve these maps not only for my final project but for future use of the Veterans Service Office and MCC as well.

Problem Statement

Every Soldier joins the Military for different reasons, one of the more popular reasons is for the opportunity to meet new people and travel the world. MCC has a large number of Military and Veteran Students and Alumni that have attended classes over the years. If you go to the Veterans Lounge in the Library you will find a large map with a branch of colored thumbtacks all over the place. A different color representing each branch of the Military: The Air Force, Army, Navy, Marines and The Coast Guard. Students would place the pins in the map showing the locations of their duty stations or where they were deployed during their service.

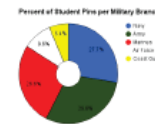
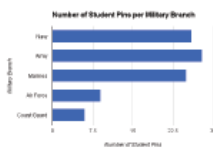
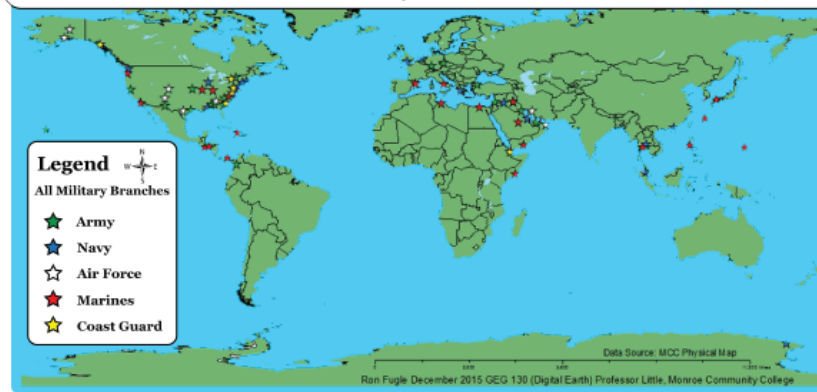
Currently 3 maps exist, one is hanging the lounge to day, the second is from 2013 - 2015 and the oldest map is from 2011 - 2013. This project will digitally preserve the 2013 - 2015 map that was being stored in the Veterans Service Office. The data gathered from the original maps as well as detailed photographs of the pin placements taken during the process will be presented to both departments for future use.

Methodology

Photographs were taken prior to any work being done with the maps. Each pin was individually removed and the location was manually documented. In areas that were extremely popular like Iraq for example specific locations were unfortunately unable to be determined due to the density of pins. In these cases only the country was able to be documented.

Once all locations were recorded with their corresponding service branches the exact longitudes and latitudes coordinates were researched and recorded using Google. Google docs was also used to manage all of this data and Arc Maps was used to bring this data to life.

2013 - 2015 MCC Veteran and Military Student Service Stations - All Branches



Results

I planned to produce more than 5 maps one for each branch of the Military and at least one with all branches represented. Photographs of the original map and graphs are also included showing relevant information about the MCC Veterans and Military students.

Discussion

I am very pleased with the results of the data collection and documentation process. Extreme care was taken to get as much accurate and detailed information and data from the original source. The original map is completely intact and can be returned to the Veterans Service Department if desired.

Conclusion

These maps only begin to show the diversity of the past and present MCC Military and Veterans students. I would like to thank everyone one of them for their service and I hope that the maps and data collected can be used by future students and departments of MCC.

References

The original maps and Military and Veteran student information was provided by the Veterans Service office.



Acknowledgments

I would like to thank Professor Jonathan Little, Professor Heather Preece and Les Barthovick in the Veterans Service Office for their assistance with this project.



2013 - 2015 MCC Veteran and Military Student Service Stations U.S. Army



2013 - 2015 MCC Veteran and Military Student Service Stations U.S. Navy



2013 - 2015 MCC Veteran and Military Student Service Stations U.S. Air Force



2013 - 2015 MCC Veteran and Military Student Service Stations U.S. Marines



2013 - 2015 MCC Veteran and Military Student Service Stations Coast Guard



Cartography Project Example

THINGS YOU DIDN'T KNOW MCC HAD

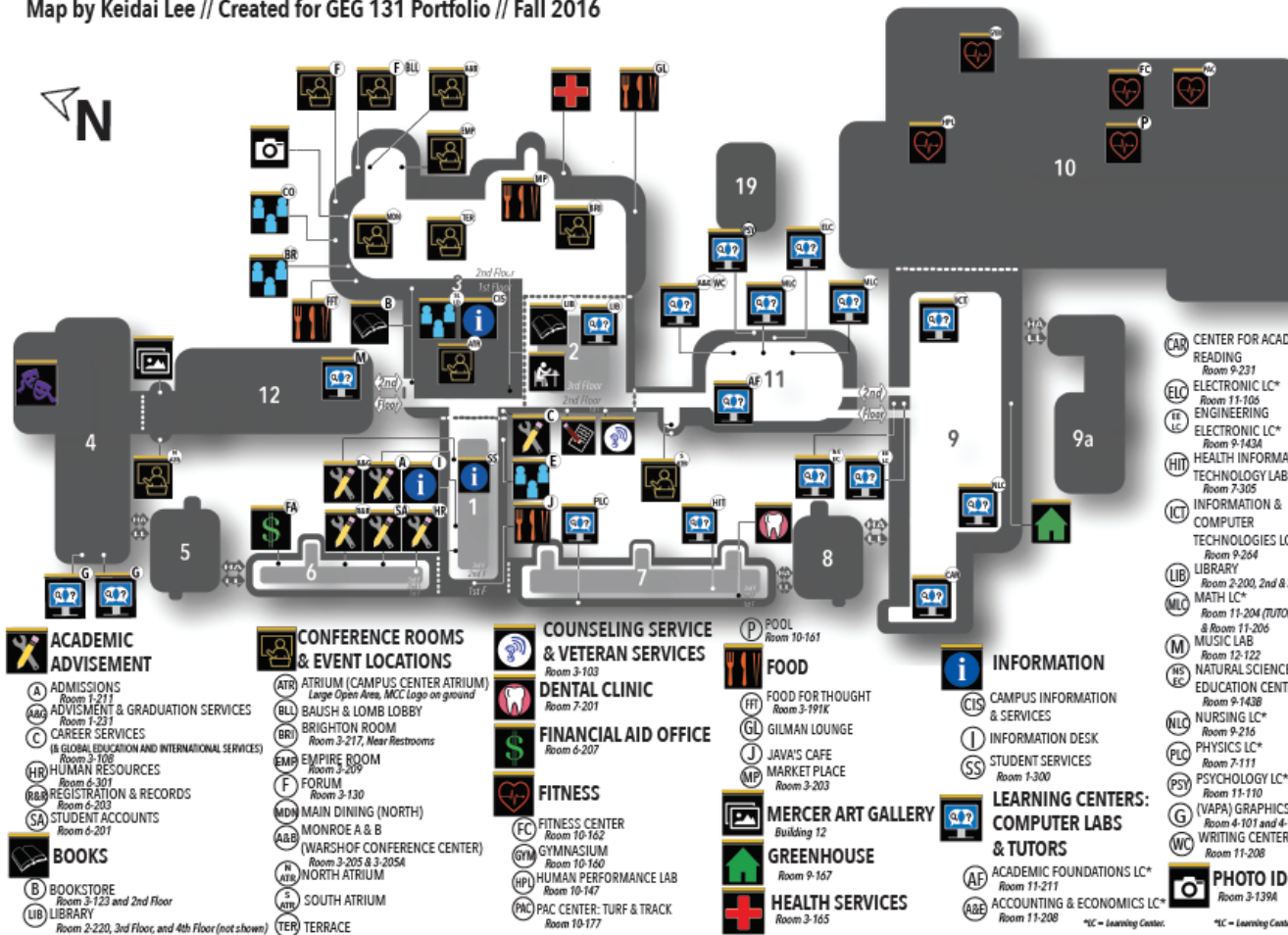
Yes, your tuition is paying for these. Here's the ultimate MCC resource survival guide to a successful school year.
Map by Keidai Lee // Created for GEG 131 Portfolio // Fall 2016

Data Sources:
Monroe Community College,
The Noun Project,
Free Icon,
And ms. Hoarey!



THOUSANDS OF STUDENTS attend MCC (Rochester, NY) each year from various locations all over the country and the world. However, few students know about the abundance resources the school provides. In fact, part of the reason you pay tuition is to fund these resources!

But don't worry; these resources are all around for your benefit. They're there to help you succeed in school! With this map, be more confident in taking advantage of what you're already paying for.



- ACADEMIC ADVISEMENT**
 - A ADMISSIONS Room 1-211
 - ABC ADVISMENT & GRADUATION SERVICES Room 1-231
 - C CAREER SERVICES (B GLOBAL EDUCATION AND INTERNATIONAL SERVICES) Room 1-108
 - HR HUMAN RESOURCES Room 6-301
 - REG REGISTRATION & RECORDS Room 6-203
 - SA STUDENT ACCOUNTS Room 6-201
- BOOKS**
 - B BOOKSTORE Room 3-123 and 2nd Floor
 - LIB LIBRARY Room 2-220, 3rd Floor, and 4th Floor (not shown)
- CONFERENCE ROOMS & EVENT LOCATIONS**
 - ATR ATRIUM (CAMPUS CENTER ATRIUM) Large Open Area, MCC Logo on ground
 - BLU BAUSH & LOMB LOBBY
 - BR1 BRIGHTON ROOM Room 3-217, Near Restrooms
 - EMP EMPIRE ROOM Room 3-209
 - F FORUM Room 3-130
 - MDN MAIN DINING (NORTH) MONROE A & B (WARSHOF CONFERENCE CENTER) Room 3-205 & 3-205A
 - N ATR NORTH ATRIUM
 - S ATR SOUTH ATRIUM
 - TER TERRACE
- COUNSELING SERVICE & VETERAN SERVICES**
 - FC FITNESS CENTER Room 10-162
 - GYM GYMNASIUM Room 10-160
 - HP HUMAN PERFORMANCE LAB Room 10-147
 - PAC PAC CENTER: TURF & TRACK Room 10-177
- DENTAL CLINIC**
 - DP DENTAL CLINIC Room 7-201
- FINANCIAL AID OFFICE**
 - FA FINANCIAL AID OFFICE Room 6-207
- FITNESS**
 - FC FITNESS CENTER Room 10-162
 - GYM GYMNASIUM Room 10-160
 - HP HUMAN PERFORMANCE LAB Room 10-147
 - PAC PAC CENTER: TURF & TRACK Room 10-177
- FOOD**
 - FF FOOD FOR THOUGHT Room 3-191K
 - GL GILMAN LOUNGE
 - J JAVA'S CAFE MARKET PLACE Room 3-203
- MERCER ART GALLERY**
 - MA MERCER ART GALLERY Building 12
- GREENHOUSE**
 - GH GREENHOUSE Room 9-167
- HEALTH SERVICES**
 - HS HEALTH SERVICES Room 3-165
- INFORMATION**
 - CIS CAMPUS INFORMATION & SERVICES
 - I INFORMATION DESK
 - SS STUDENT SERVICES Room 1-300
- LEARNING CENTERS: COMPUTER LABS & TUTORS**
 - AF ACADEMIC FOUNDATIONS LC* Room 11-211
 - ABE ACCOUNTING & ECONOMICS LC* Room 11-208
 - IC INFORMATION & COMPUTER TECHNOLOGIES LC* Room 9-264
 - LIB LIBRARY Room 2-200, 2nd & 3rd Floor
 - MATH MATH LC* Room 11-204 (TUTORS ONLY) & Room 11-206
 - MUSIC MUSIC LAB Room 12-122
 - NS NATURAL SCIENCE EDUCATION CENTER Room 9-143B
 - NURSING LC* Room 9-216
 - PHYSICS LC* Room 7-111
 - PSY PSYCHOLOGY LC* Room 11-110
 - VAPA (VAPA) GRAPHICS LC* Room 4-101 and 4-103
 - WC WRITING CENTER Room 11-208
- PHOTO ID**
 - PI PHOTO ID Room 3-139A
- SOCIAL**
 - BR BREAK ROOM Room 3-138
 - CO CLUBS & ORGANIZATIONS Includes:
 - Student Government Association,
 - Campus Activities Board,
 - Phi Theta Kappa Honor Society,
 - Monroe Doctrine (Newspaper),
 - WACC, Production Studio,
 - and many more!
 - E E-LOUNGE Room 1-110
 - SL STUDENT LIFE AND LEADERSHIP DEVELOPMENT Room 9-264
- STUDY ROOMS**
 - SR STUDY ROOMS Library (2-200), 3rd & 4th Floor (not pictured)
- TESTING & ASSESSMENT CENTER**
 - TAC TESTING & ASSESSMENT CENTER Room 3-107
- THEATRE**
 - TH THEATRE

DID YOU KNOW? Signing in to Learning Centers and school computer labs helps the centers receive funding, thus helping it stay open!

Learning centers are a great way to access computers and tutors to study and do homework.

So, make sure you sign in to Learning Centers. It's not to annoy you. People just want to make sure they're funding their learning centers for the right reasons.

Implementation

- ▶ **Objective 4:** Expand college students' GIST opportunities in regional markets.
 - ▶ Articulation agreements with SUNY 4-year schools
 - ▶ Capstone experience
 - ▶ Internships or simulated workforce experience
 - ▶ Networking at local GIS meetings



Capstone Course

- ▶ Post class: Students are working on developing a mapping app for Water for South Sudan



- ▶ Future:
 - ▶ Possible internships with GIS Scholars (inner city Rochester)
 - ▶ Online domestic and/or international internships

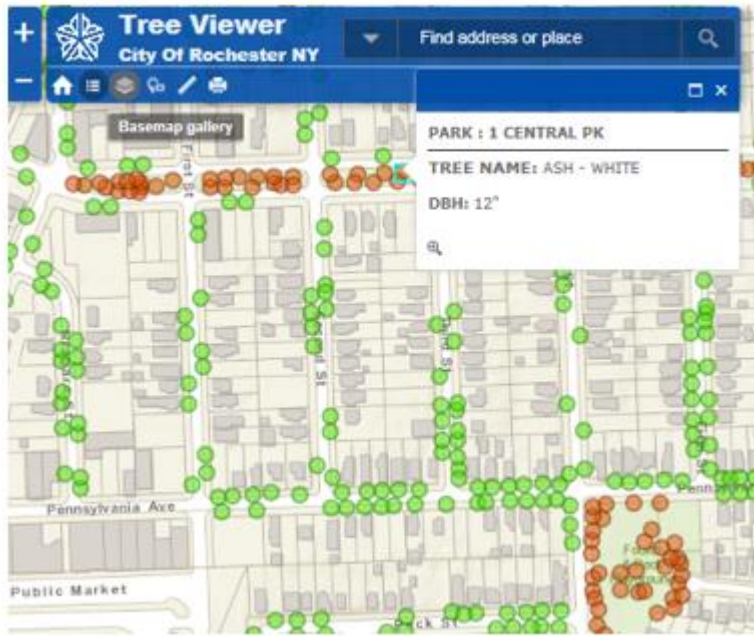
GIST Student Employment

- ▶ Local
 - ▶ Town of Ontario
 - ▶ Agrinitex
 - ▶ EagleView Pictometry International
- ▶ National
 - ▶ Esri (California)
 - ▶ Banking (Texas)
 - ▶ Federal Reserve (Washington DC)
 - ▶ Student reports: “Used my final project from Digital Earth to secure a job at the **Board of Governors of the Federal Reserve.**”



Implementation

- **Objective 5:** Provide professional development for full and part-time faculty.



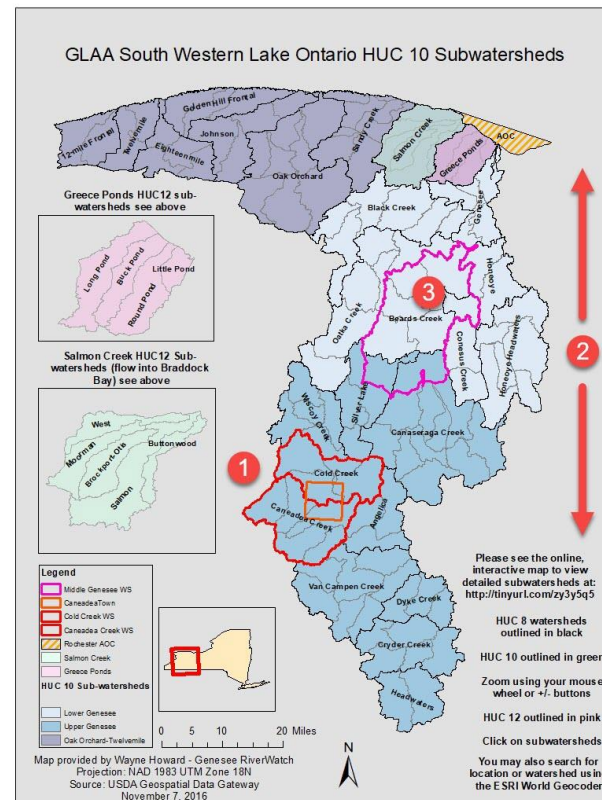
- Externship with City of Rochester IT and Forestry dept. (summer 2016)
 - Collector App to map 50,000+ trees
 - Created web app/mobile field mapping exercise for classroom use
- Future:
 - Externship with crime mapping unit
 - Develop labs for Intro GIS class geared for criminal justice students

Future

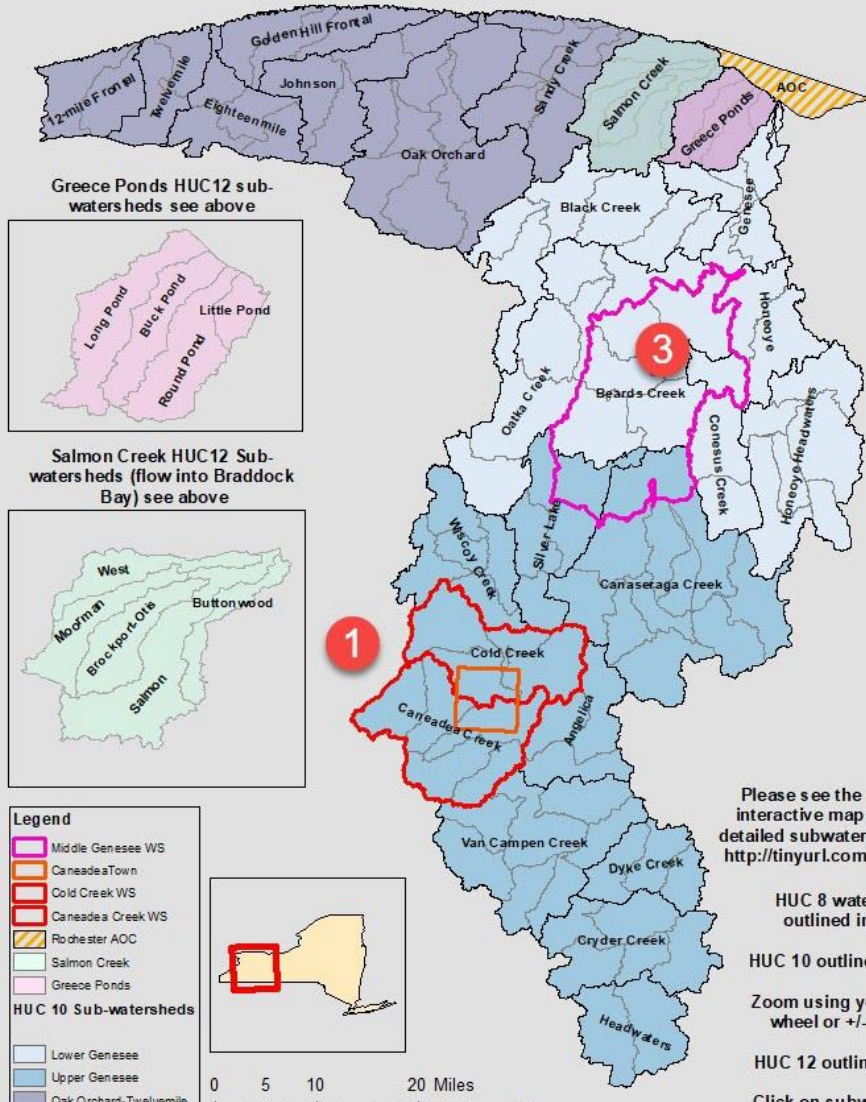
- ▶ **Write a proposal for a second NSF grant**
- ▶ Submit October 2018
- ▶ Ideas/Objectives:
 - ▶ Provide HS teachers and GIST professionals with workshops across NY state
 - ▶ Develop more online courses
 - ▶ Develop online internships with employers in NY state
 - ▶ Submit NSF ATE II proposal for ~\$½ million.
 - ▶ If you are interested in discussing, let me know-
jlittle@monroecc.edu
- ▶ So let's see some student work!

Using Cartography and Spatial Analysis to improve communication and augment decision making in watershed management

- Wayne Howard
- MCC student
- Genesee River Watch



GLAA South Western Lake Ontario HUC 10 Subwatersheds



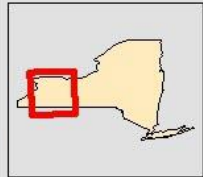
Greece Ponds HUC12 subwatersheds see above



Salmon Creek HUC12 Subwatersheds (flow into Braddock Bay) see above



- Legend**
- Middle Genesee WS
 - CanadeaTown
 - Cold Creek WS
 - Canadea Creek WS
 - Rochester AOC
 - Salmon Creek
 - Greece Ponds
- HUC 10 Sub-watersheds**
- Lower Genesee
 - Upper Genesee
 - Oak Orchard-Twelve-mile



1

3

2

Please see the online, interactive map to view detailed subwatersheds at: <http://tinyurl.com/zy3y5q5>

HUC 8 watersheds outlined in black

HUC 10 outlined in green

Zoom using your mouse wheel or +/- buttons

HUC 12 outlined in pink

Click on subwatersheds

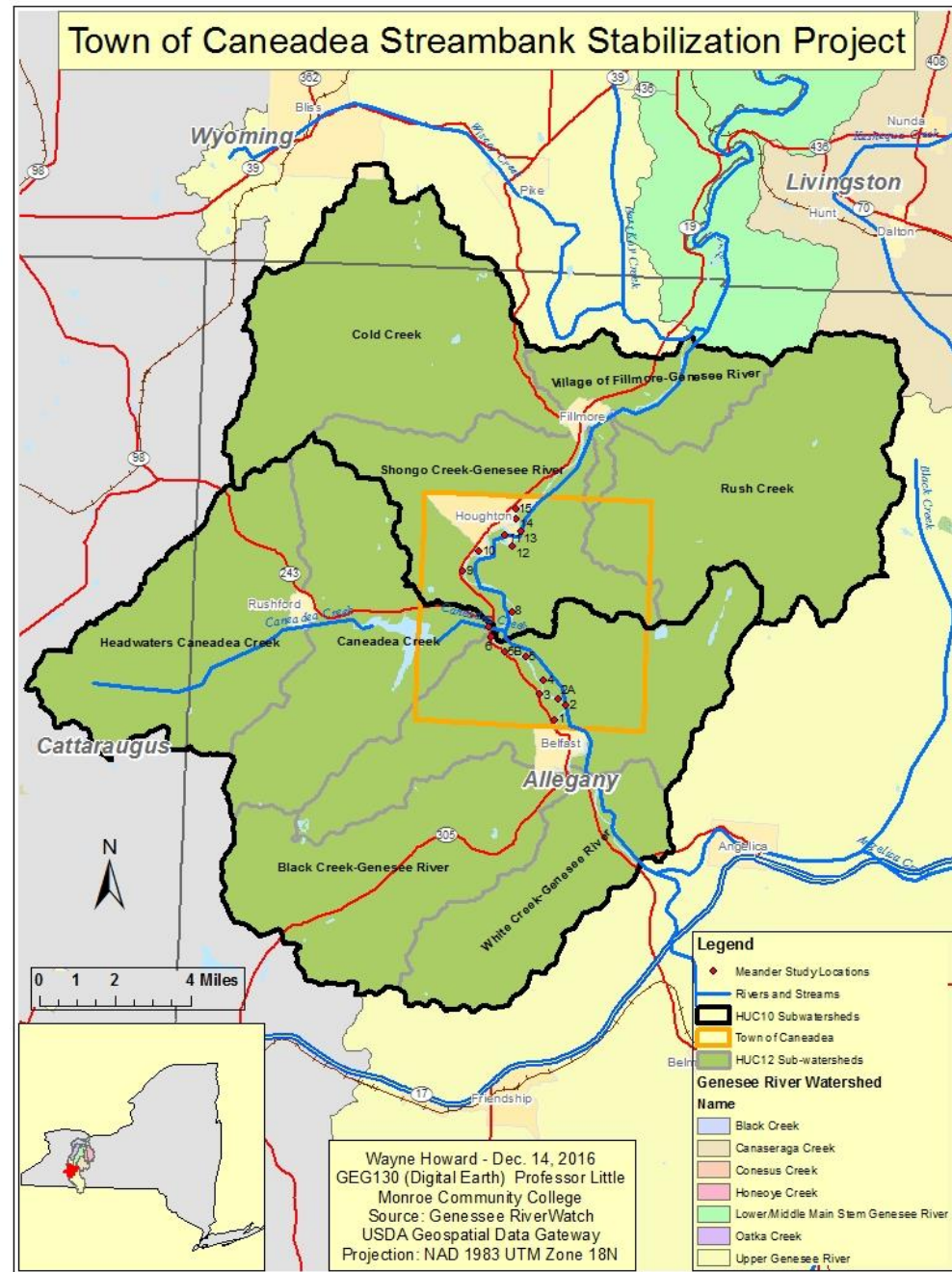
You may also search for location or watershed using the ESRI World Geocoder

Map provided by Wayne Howard - Genesee RiverWatch
 Projection: NAD 1983 UTM Zone 18N
 Source: USDA Geospatial Data Gateway
 November 7, 2016



Digital Earth:

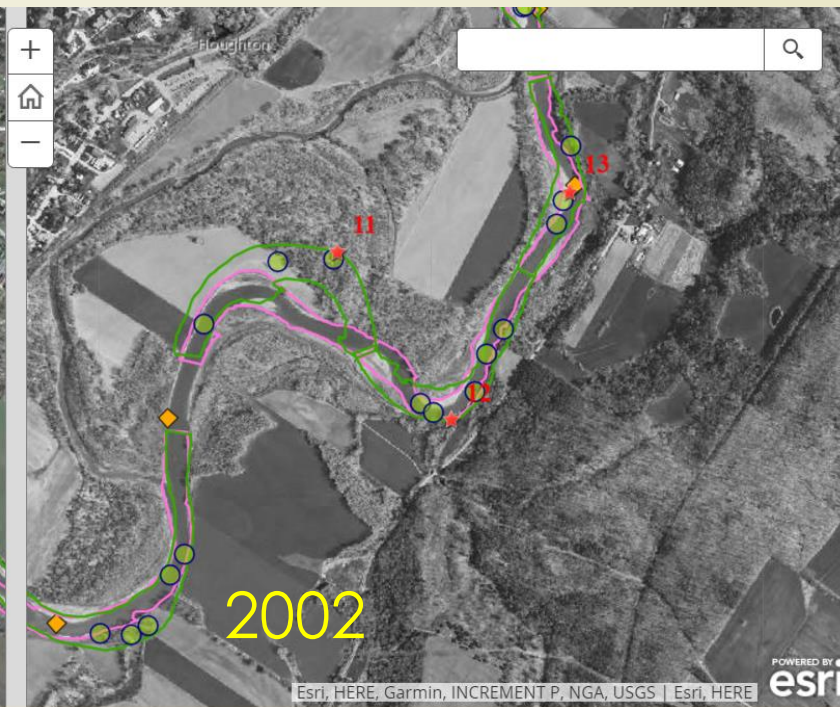
Using EPA's Waterscape as a Method for Prioritizing Watersheds for Streambank Stabilization in the Genesee River Basin of New York



Site 11 - Largest amount of land lost over study period.

Sandy upper bank, sandy gravel base, one section mostly woody debris.

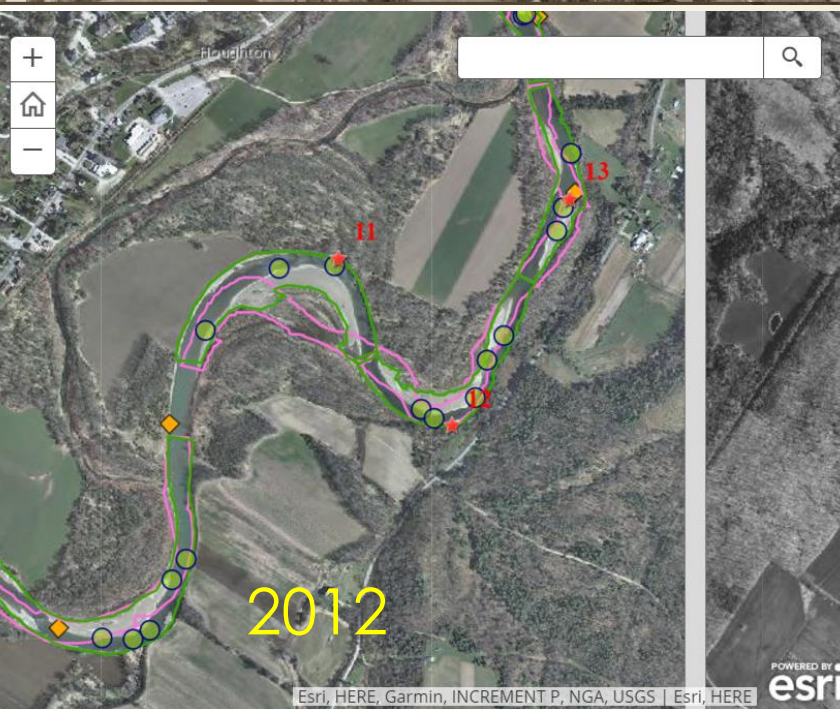
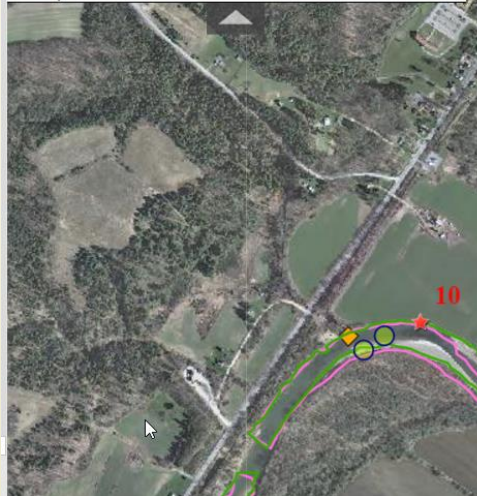
See the [full SBS study](#) with fully-interactive swipe tool.



Site 11 - Largest amount of land lost over study period.

Sandy upper bank, sandy gravel base, one section mostly woody debris.

See the [full SBS study](#) with fully-interactive swipe tool.



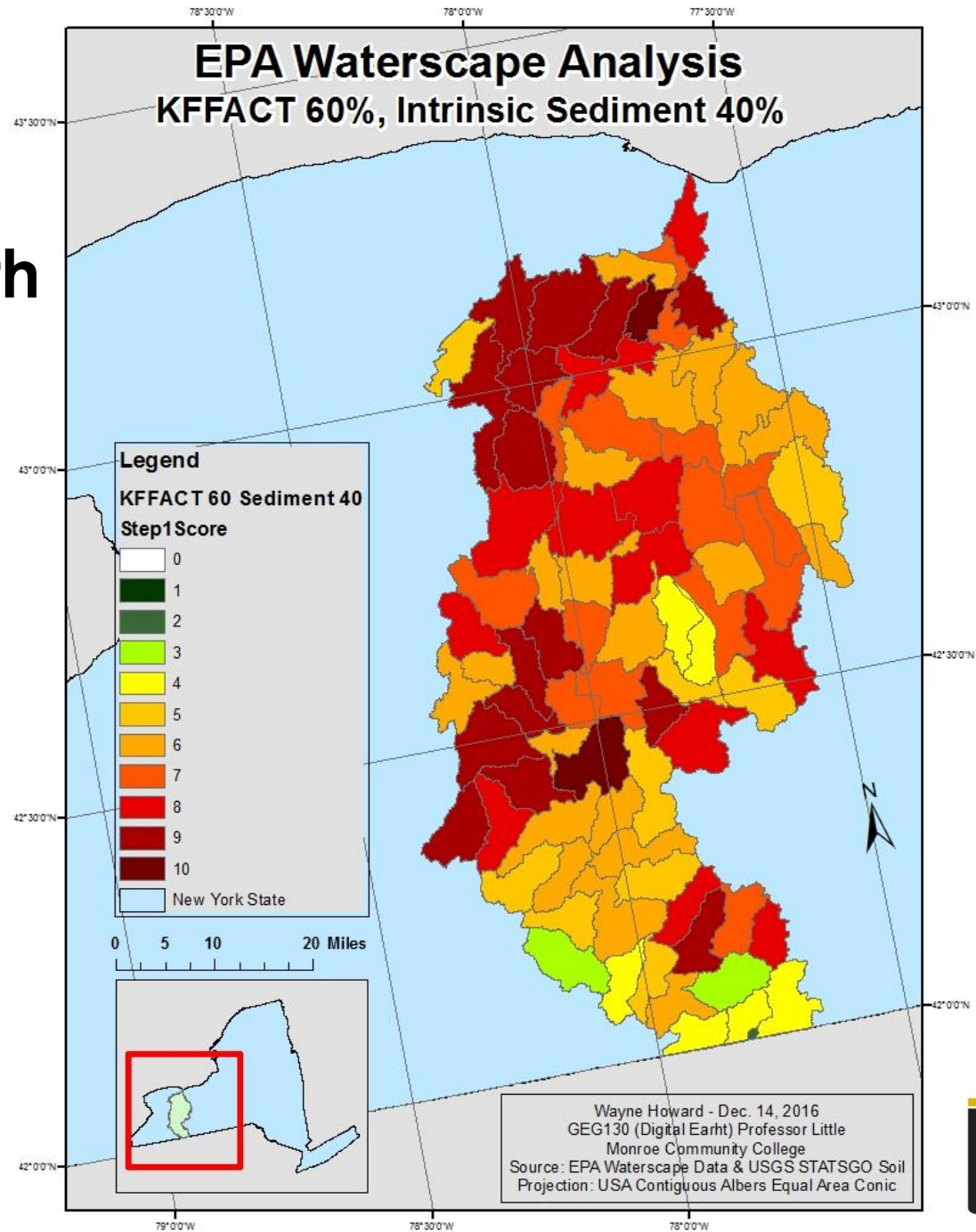
EPA's Waterscape watershed prioritization tool

1. Waterscape is a GIS-based framework for identifying priority HUC12 watersheds.
2. Screen for sites that are prone to sediment erosion and nutrient (phosphorus and nitrogen) release.
3. It's an ArcGIS Desktop add-in made by ESRI for the EPA
4. Intrinsic data ("properties") derived from industry standard spatial datasets.
5. Add your own weighting criteria to prioritize these intrinsic factors, using local knowledge of the watershed.
6. Customizable: Additional spatial factors (derived from other HUC12 watershed layers) may also be added by the user.

The screenshot displays the EPA Waterscape software interface. At the top, the 'Analysis' section shows 'Title' as 'New Analysis', 'Study Area' as 'NY', and 'Properties' as 'All Properties'. Below this, the 'Analysis Step' section shows 'Source' as 'NewAnalysis_S1' and 'Target' as 'NewAnalysis_S2'. The 'Generate Subset' section includes a 'Select Features' dropdown set to 'Step1Score' with a value of '10', and buttons for 'Apply Score Selection' and 'Switch Selection'. The 'Add Features' section has a 'Source' field and 'Select' and 'Add Features' buttons. The 'Assign Properties Weights' section contains a table with columns for 'Group', 'Property', 'Invert', 'Weight', and 'Step'. The 'None' group is selected, and the 'KFFACT' property is highlighted with a weight of 100 and step 1. Below the table, there are buttons for 'Calculate Scores', 'Save Scores', and a 'Show MapTips' checkbox. The 'Rendering' section shows 'Step1Score' selected, 'Color Ramp' set to 'Green Yellow Red', and 'Polygons' selected. At the bottom, the 'Analysis Summary' table shows the following steps:

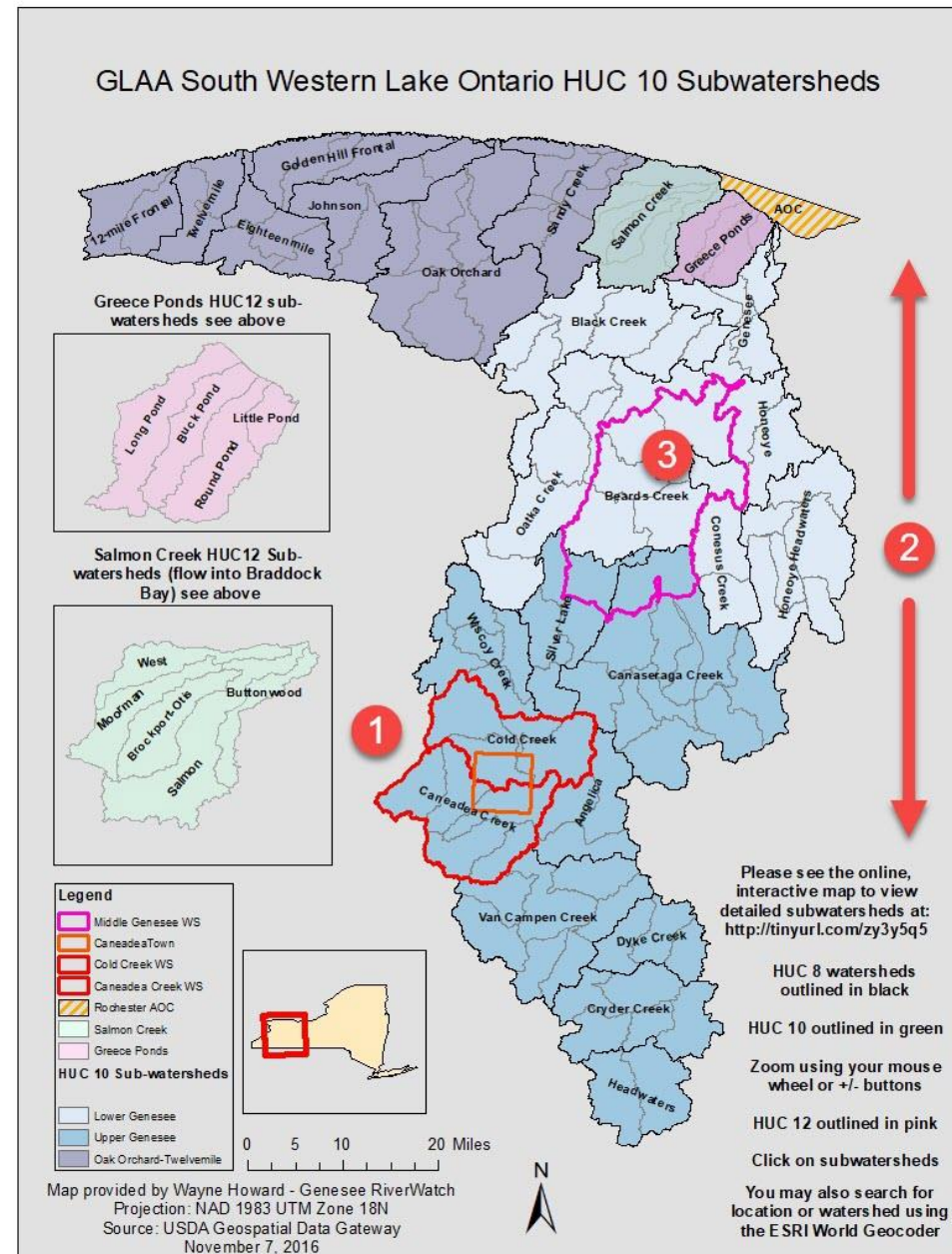
Step	Action	Layer	Description
0	Source Layer Copy	NewAnalysis_S0	Copy NY_HUC12->NewAnalysis_S0
1	Score Calculation	NewAnalysis_S1	Weight: KFFACT=100

Digital Earth (GEG 130)



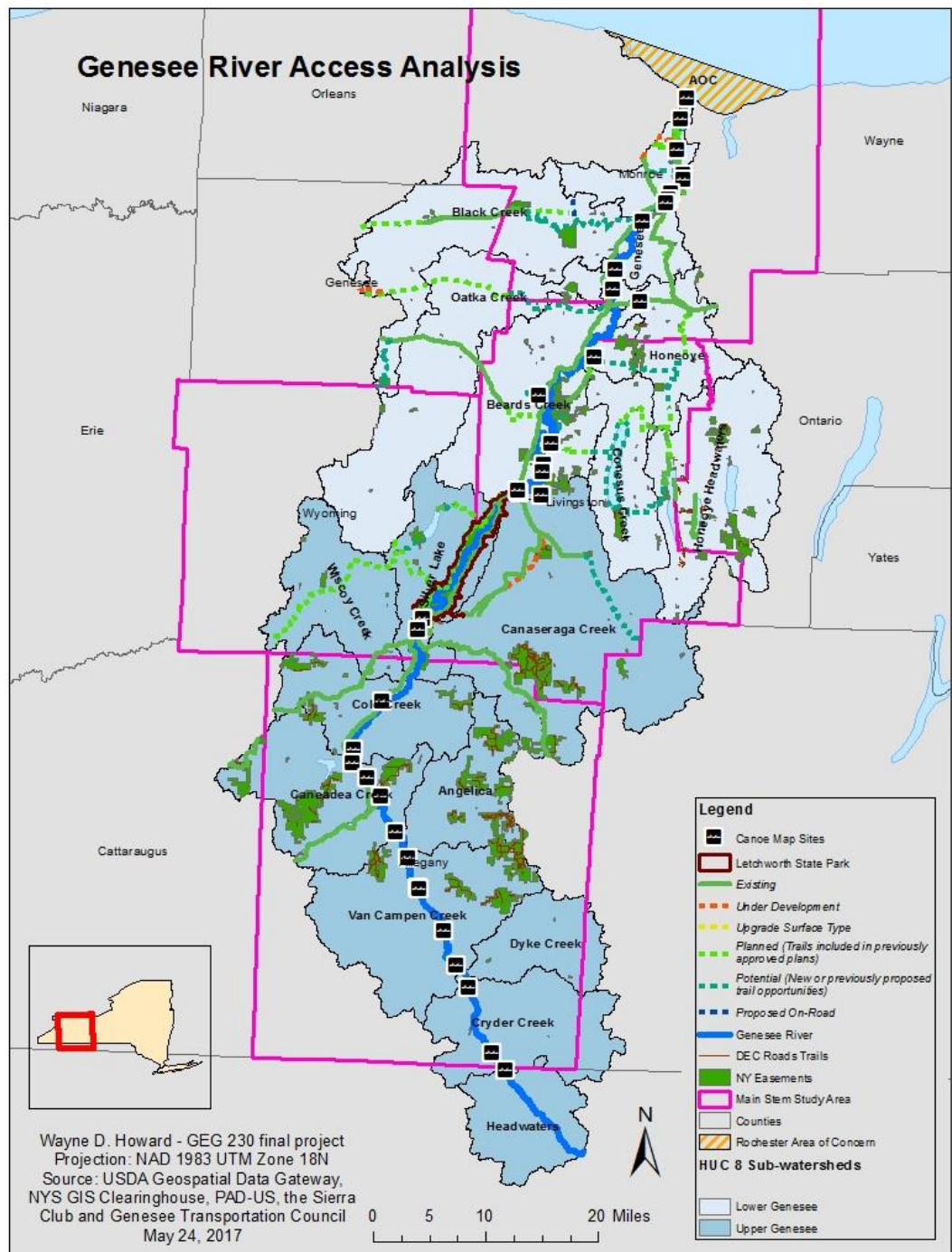
Spatial Analysis (GEG 230)

Genesee River Access and Recreational Opportunities Site Assessment



GEG 230 (Spatial Analysis)

Study area



Methodology – Model development & analysis

1. Created a slope layer using a 30m DEM raster using the Slope tool
2. Created a 0.75 mile buffer layer around the Genesee River using a “Dissolve All” attribute
3. For Livingston County - Ran a series of Select by Attribute and Select by Location queries on these parcels.
4. Developed a model using Model Builder
5. Developed a second model using Zonal Statistics as Table and the Join Field tools and added this column to the selected parcels.
6. Used these models to analyze Wyoming, Monroe and Allegany Counties

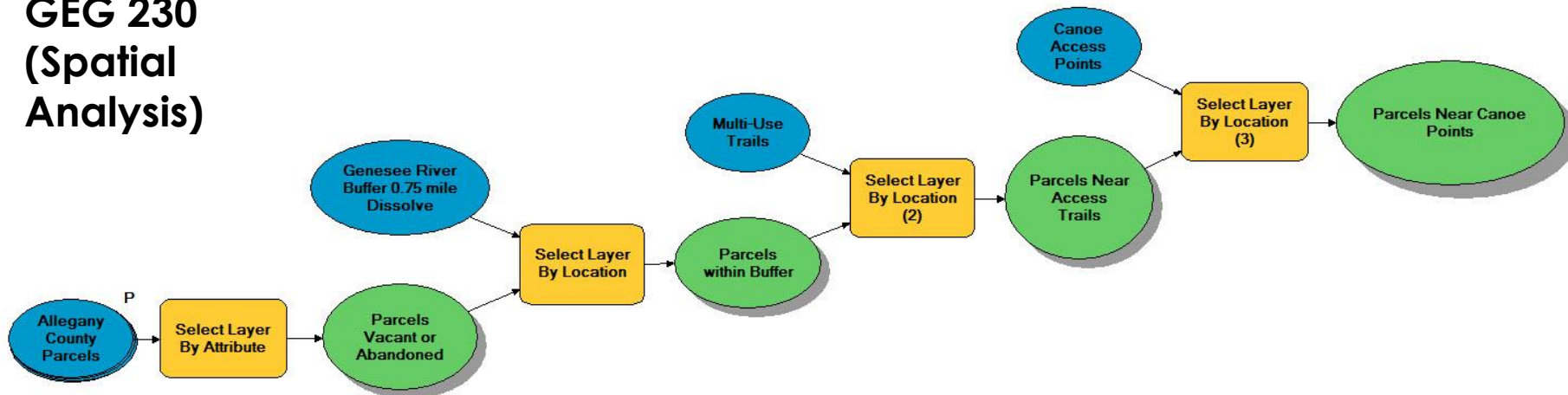


Criteria examined for each of the 4 counties:

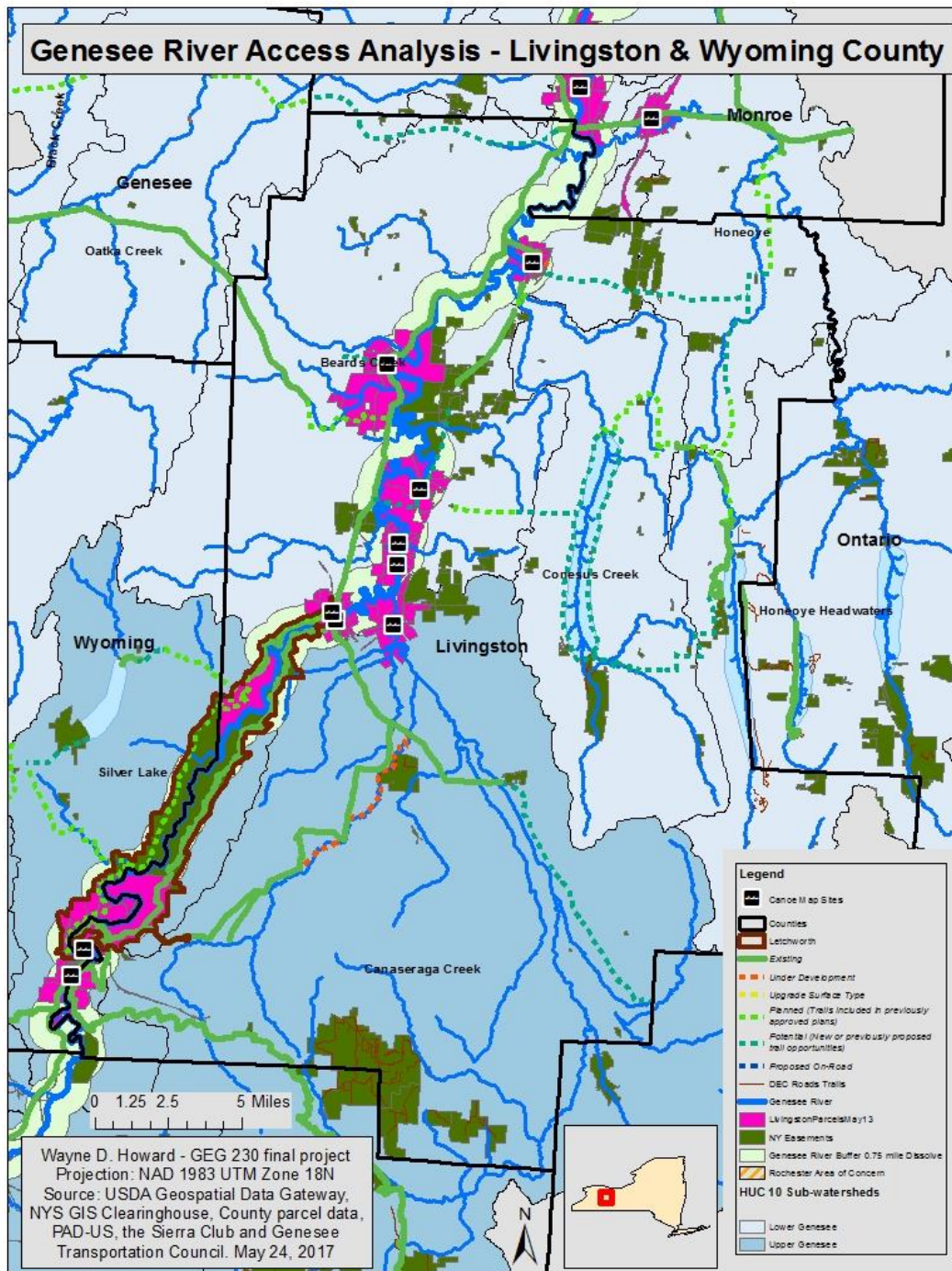
- Parcels that are on vacant or abandoned lands,
- that are within a 0.75 mile buffer along the Genesee River
- that are within 0.5 miles of current or existing access trails,
- and sites that are within 0.5 miles of the canoe access sites
- An additional calculation of slope of the proposed access sites was also conducted to help rule out sites that are too steep for safe access.
- Existing public lands and conservation easements are also considered visually but are separate from the analysis

Created a model in ArcGIS Model Builder:

GEG 230 (Spatial Analysis)

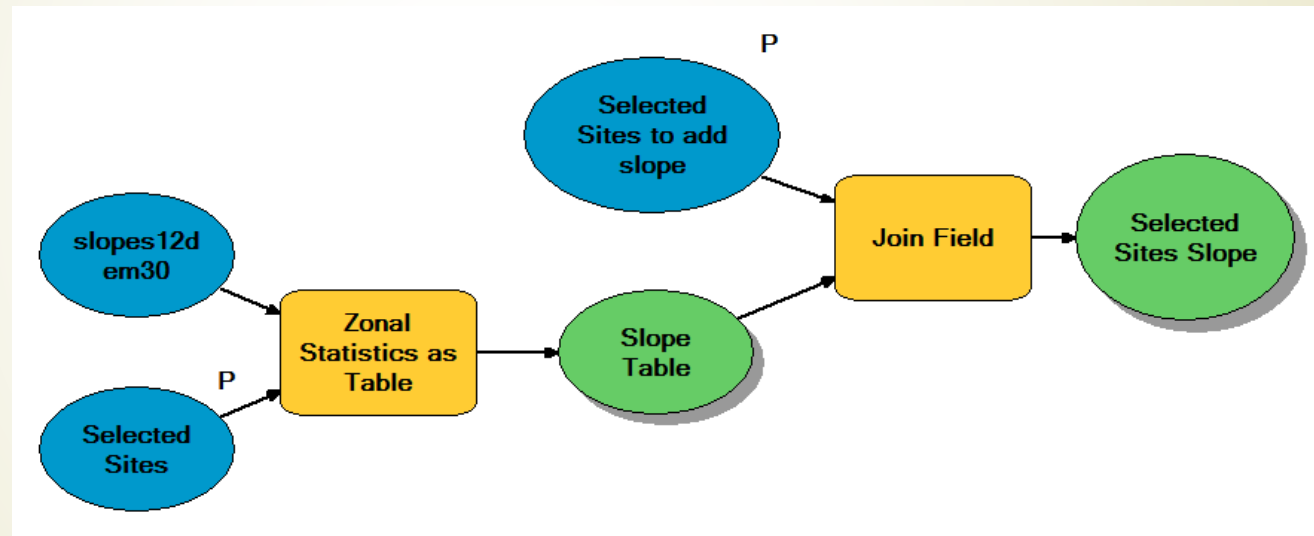


GEG 230 (Spatial Analysis)

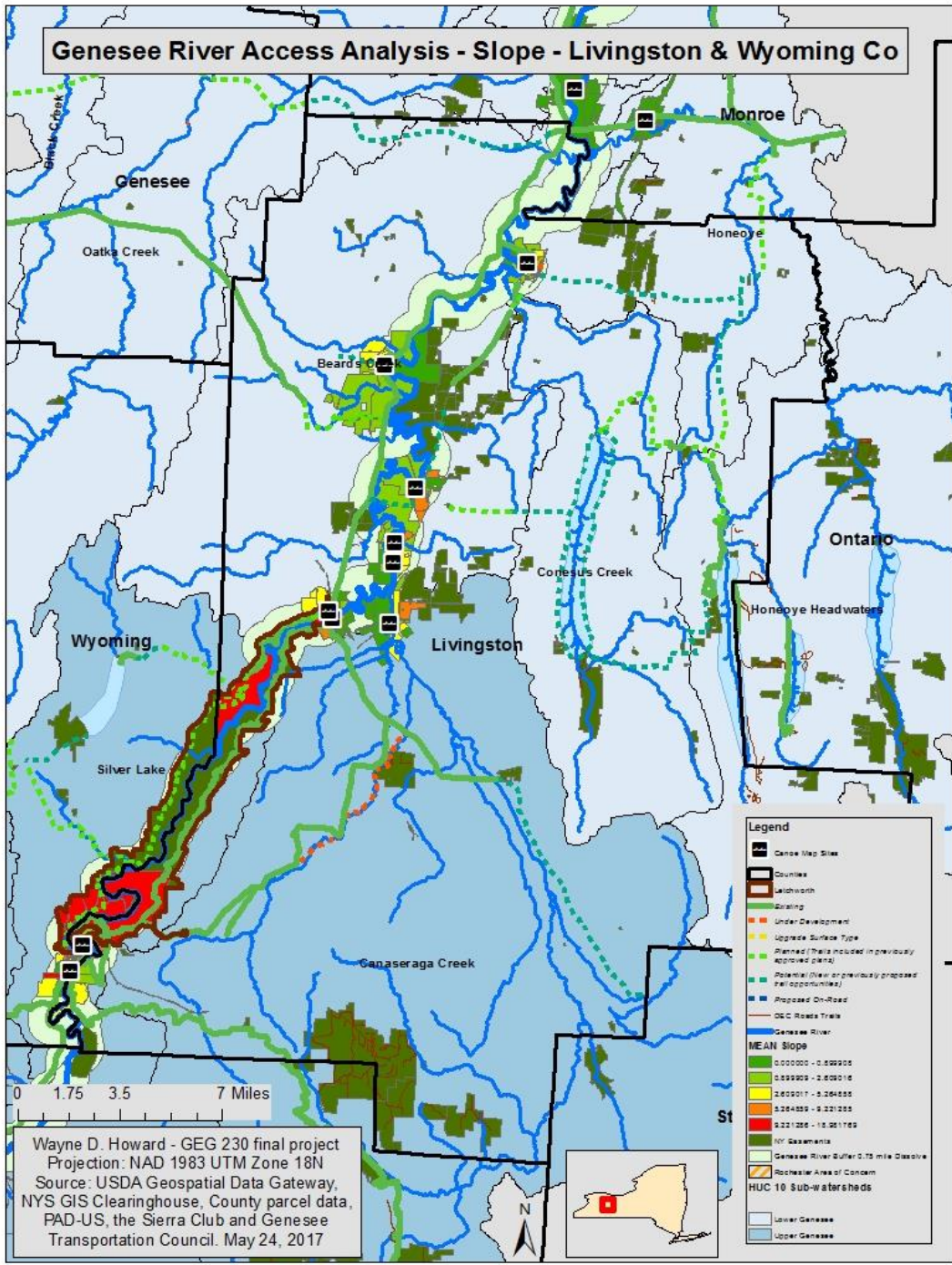


Created another model in ArcGIS Model Builder to examine slope:

GEG 230
(Spatial
Analysis)

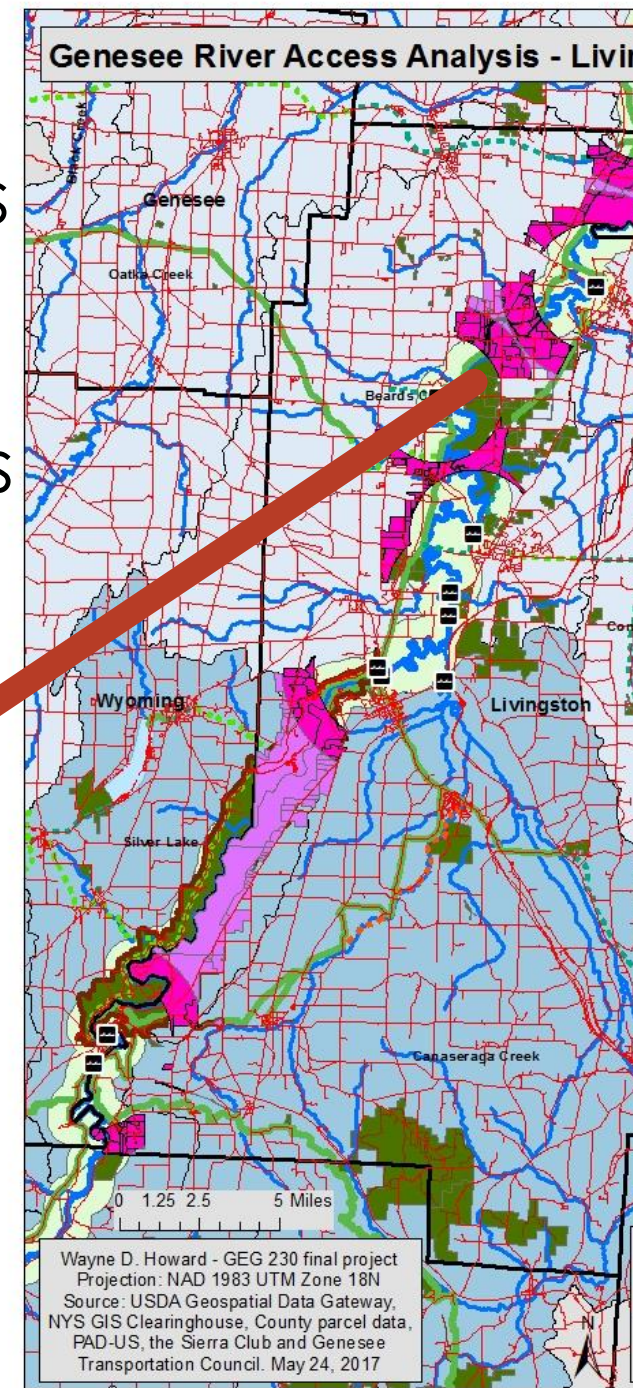
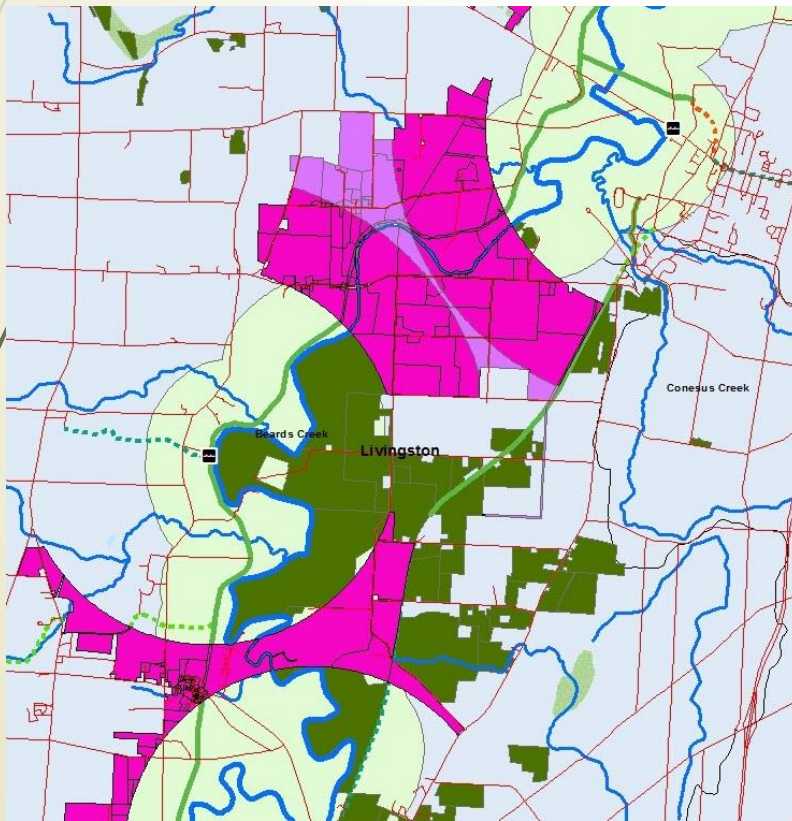


GEG 230 (Spatial Analysis)



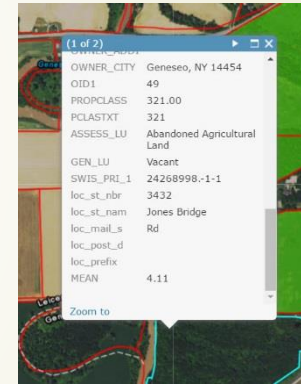
Scenario Testing:

- Here: further than 2 miles away from existing Canoe Sites and
- Within 0.25 miles of roads



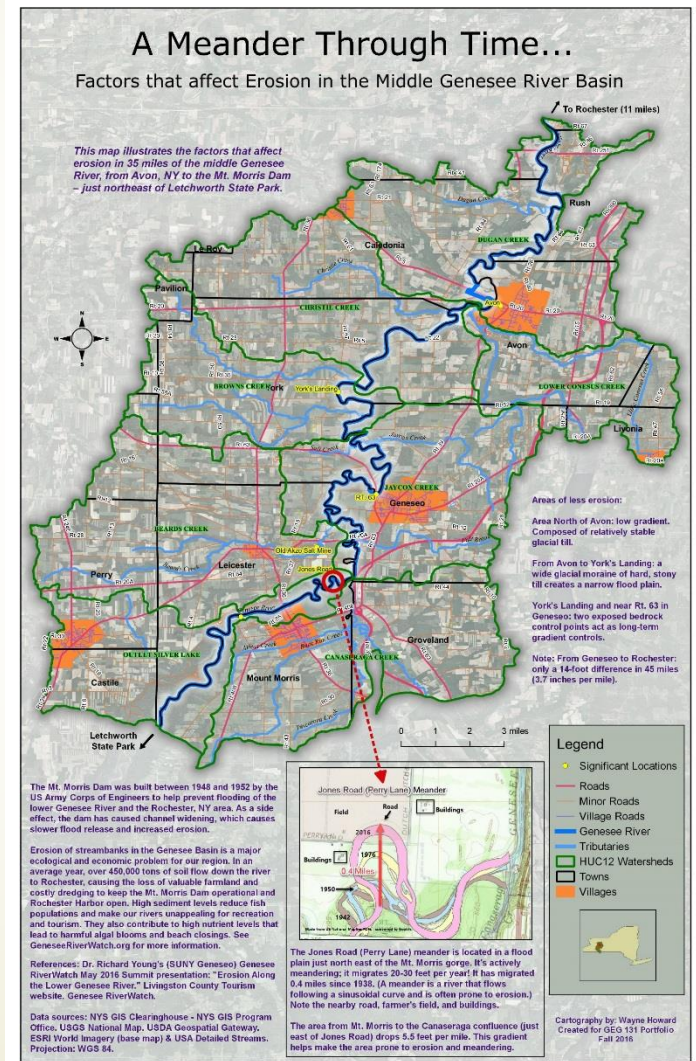
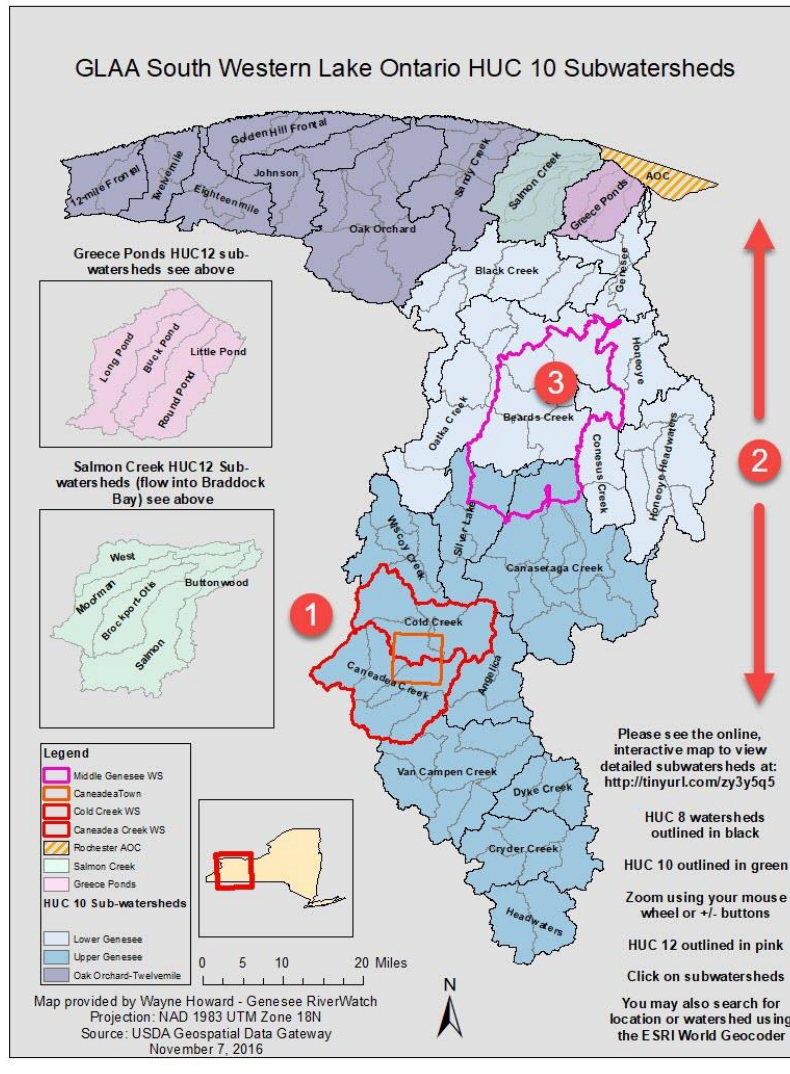
Ground truthing

- ▶ This analysis acts as a good screen for potential access sites
- ▶ Each site needs to be assessed in greater detail...
- ▶ Using the [online interactive map](#) that I made for this project:

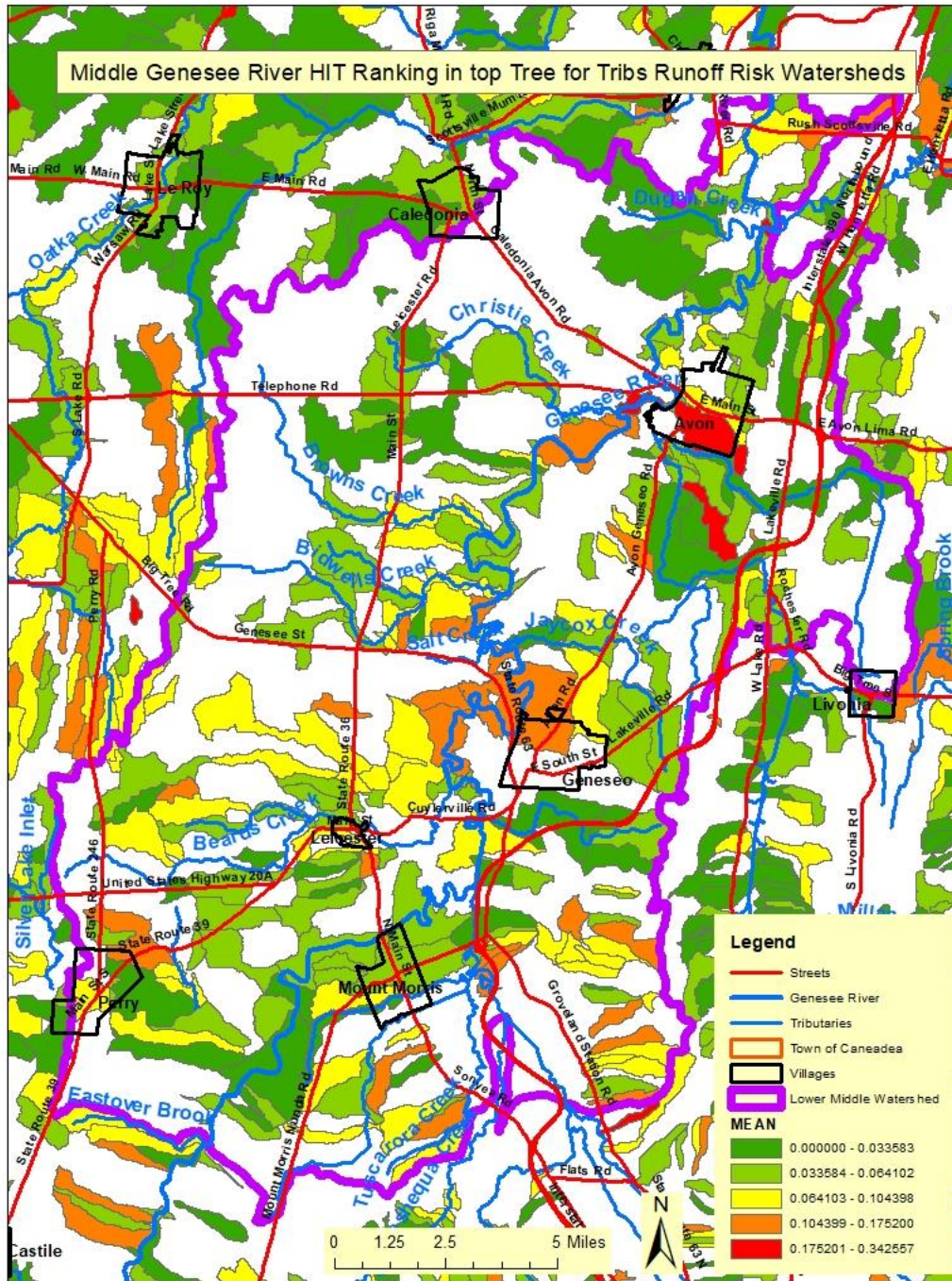


- ▶ Red outline: potential access sites (parcels) identified in this analysis
- ▶ Green: public lands and conservation easement data
- ▶ And ground truthing of the screened sites

Current work - Middle Genesee River sediment loading meander Site Assessment



Middle Genesee River HIT Ranking in top Tree for Tribs Runoff Risk Watersheds



Current work:

More Site Selection analysis and

Remote Sensing for nutrients using Landsat data (GEG 133)

Thank you! Questions?



MCC's new Geography/GIST program
<http://www.monroecc.edu/depts/geography/>

- ▶ A.S. degree in Geography
- ▶ GIST Certificate
- ▶ Contact: Jonathon Little jlittle@monroecc.edu or 585-292-2396, Monroe Community College (SUNY)
- ▶ Wayne Howard



The image shows a screenshot of the Geography department website on the left and a photograph of a lecture on the right. The website screenshot includes a navigation menu with the following items: GEOGRAPHY, Majors & Programs, Courses, New & Upcoming Courses, What Can I Do with a Geography Degree?, Archived News, and Faculty & Staff. The photograph shows a man in a white shirt and tie pointing at a map of the United States on a wall, while another man in a grey shirt looks on.

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