GIS Center Maps Flint Lead Service Lines

The City of Flint water crisis has become a national news story over the past month. However, the residents of Flint have known about the issues for longer than that.

Last October, Dr.’s Marty Kaufman and Greg Rybarczyk visited the City of Flint’s Department of Public Works to examine the records on where lead connections were located in the city. They found out that the City’s records were kept on individual index cards that had a lot of missing information or were very difficult to read. Other records included a series of images showing individual parcels and the location of the curb boxes. So the City did not have a digital database that allows for quick analysis. The GIS Center offered to help create a digital database and the City of Flint granted some funds for the GISC to complete the work.

During the fall, 2015 semester, students in Prof. Rybarczyk’s Spatial Analysis Seminar Course decided to use some of this raw data for their final semester project. The project consisted of developing a baseline method to code the water service lines and then examine the results for significant “hot-spots” of Lead vs. non-Lead pipe zones within a small area in Flint. The results of their work served as a stepping stone for mapping and analysis for the rest of the City.

“Working on this project was incredibly rewarding,” stated Erika Anderson, one of the students, “It afforded me the opportunity to see how GIS can be applied to help solve a real world problem.”

Once the GISC received over 200 image files of the service line connection data, Troy Rosencrants, GIS Center Manager, georeferenced the rest of images using the 2015 parcel dataset as a reference. After the images were georeferenced, the GISC hired 8 students and other community workers to help with the data entry. Through those eight assistants, all the data was entered digitally after one week. The assistants examined each parcel for what type of connection existed (or didn’t) and coded in the data to a shapefile. “I was given a specific area of the city to investigate,” said one of the student assistants (pictured below), David Yeoman, “and moved block by block through the neighborhoods in that particular area coding the houses accordingly so they could then be plotted on a map.”

Troy Rosencrants then went through and merged all data files together, while cleaning up the data for error checking. Ten percent of the parcels were checked to determine the level of accuracy the data provides. Approximately 1% of those parcels were coded incorrectly. Once the error checking was complete, metadata (or data about the data) were entered to help anyone using these data understand exactly how the dataset was created.

One of the visions of the GIS Center is to promote geospatial technology as a tool to help address challenges in Flint and the surrounding regions. Completing this project contributes towards that goal. Through the work on this project, the GISC has been featured on national and local news, including CBS Evening News and NBC Nightly News. All of the news stories that are available on the internet are discussed on the next page of this newsletter.

As of February 12th, the GIS Center completed the contract with the City of Flint and returned the data to the mayor of Flint. If you would like a copy of the GIS shapefile, please visit www.umflint.edu/gis.

Student David Yeoman working on data entry

“I am a concerned resident of Flint. This project was an opportunity to make real and positive change in my community,” stated Yeoman.
New Awards Granted Dealing with Flint Water Crisis

The Department of Earth and Resource Science has received two grant awards to participate in studies investigating the Flint Water Crisis.

Dr. Marty Kaufman is a team member of a grant funded by the University of Michigan President Dr. Mark Schlissel’s office for $65,000. The title of the grant is “Towards long-term water safety in Flint”. This research is designed to address the current and future needs of Flint with respect to its drinking water. The goal is to develop a comprehensive water safety plan through staged actions that will first identify and quantify current water quality risks and vulnerabilities in the water system, and then establish a prioritized set of mitigation strategies to progressively minimize them in order of greatest risk. At the same time, the project team will simultaneously work with the Flint community to reestablish trust in using tap water. To do this, it will be critical to recreate a healthy community spirit, framed in a broad context, and focused on the message that the citizen’s health and safety are priority one and being served by the water experts, water utilities, and government organization charged with these duties.

The second grant involves Dr. Victoria Morckel and Dr. Greg Rybarczyk. The grant was awarded through the University of Michigan also and is for $10,000. The title of their grant is “The Effects of the Flint Water Crisis on Population Dynamics: Will Residents Flee Flint?” This grant will involve spatial components that will be supported by the GIS Center.

The GISC in the News!

The GIS Center and Dr. Marty Kaufman were highlighted by various news outlets for their work on the mapping of the City of Flint service line connections. Below is a list of all the news outlets that featured the GISC, including links to the respective stories.

- CBS Evening News—January 20, 2016
- NBC Nightly News—January 26, 2016
- Marketplace (NPR)—January 27th, 2016
- NPR—February 1st, 2016
- Local NBC affiliate NBC 25—February 2nd, 2016
- Local ABC affiliate ABC 12—February 2nd, 2016

Below are the stories on Dr. Kaufman’s press conference with the mayor on February 22nd:

- Local NBC 25
- Local ABC 12
- Local CBS affiliate WNEM 5
- Fox 2 Detroit (video)
- Detroit Free Press
- Detroit News
- WZZM 13 (ABC in Grand Rapids)
- MLive

Dr. Marty Kaufman also participated in MSNBC’s town hall hosted by Rachel Maddow on January 27th. Troy Rosencrants was interviewed live with NBC 25 on February 24 for the morning news program. The GIS Center and Dr. Kaufman have also been interviewed by correspondents from French National TV, which will air sometime in early April, and will be featured in public service announcements on the Big Ten Network from March 2nd to March 23rd.
Flint Community Visualization: Online Mapping Platform

In September 2015, the GIS Center received a grant from the Charles S. Mott Foundation to build on UM-Flint’s existing spatial data repository and test a prototype interactive geospatial website that will enable various community members to access, visualize, manipulate, and analyze baseline data. The data repository will allow for an inventory, organization, and storage of local and regional data, as well as data from community organizations. These datasets will then be made available to the various community stakeholders and the public for viewing, downloading, and basic spatial analysis.

The goal of the grant is to develop an initial prototype using baseline data and test the interface and the usability with the general public. These baseline data include Census demographics, businesses, environmental data. Through feedback from the stakeholders and Advisory Board, the user interface and set up of the online platform will be determined.

The Advisory Board consists of several groups, including Flint Community Schools, Flint Chamber of Commerce, CS Mott Foundation, Ruth Mott Foundation, Community Foundation of Greater Flint, CRIM Fitness Foundation, City of Flint, among others.

Once the prototype mapping platform is developed, education and training will be completed to help the community stakeholders use the platform to the fullest extent. In addition to helping the stakeholders in the project, the mapping interface will be available to the general public, and to faculty and researchers anywhere. The data repository will provide a rich source of data for those that would like to do research in the greater Flint area.

The GIS Center will hire a new Post-Doctoral Researcher/GIS Web Administrator, who will be charged with managing all of the project’s geospatial data, administering the online GIS website, and collaborating with other researchers. Troy Rosencrants, GIS Center Manager, will be in charge of the new Web Administrator’s day to day activities, as well as communicating with University of Michigan-Flint University Outreach and the community stakeholders about the prototype.

Renew The Avenue Update: Public Safety Project along the University Corridor

In late 2014, the GIS Center became part of a team that was awarded a 3-year, $1 million grant from the Department of Justice Byrne Criminal Justice Innovation (BCJI) Program. The GIS Center is the lead GIS analysts on a team with researchers from the University of Michigan-Ann Arbor, Michigan State University, and Kettering University, along with area community organizations. The overarching goal of this project is to reduce blight and crime in the University Avenue Corridor within the City of Flint.

During the first year of the project, the team went through the Planning Phase of the project. During the Planning Phase, the GIS Center provided crime mapping, spatial analysis, and visibility analysis to the research team to help determine where the highest areas of crime are within the study area. Using data from City of Flint Police Department and the Michigan State Police, hot spot densities, road segment crime density, and grid cell crime density maps were created. Visibility analysis provided areas that are more or less visible to people walking on sidewalks and driving on the streets. Areas of low visibility showed potential locations where crimes could occur.

The Implementation Phase of the project has recently started. During this phase, different strategies and approaches will be used to reduce crime in the study area. The GIS Center will then perform analyses to determine if crime is reducing, increasing, or moving within the city or study area. In addition, the GIS Center will provide any other mapping needs for the group.
GIS Certificate Student Spotlight:  
**Melissa Szymanski**  
What is your major? Master of Science in Biology. I also received a Bachelor’s in Wildlife Biology from the University of Michigan-Flint.

What attracted you to the department? RPL 370 (GIS) is a required class for wildlife biology majors. Once I had taken the first GIS course, I wanted to come back and take all of them.

What made you interested in GIS? GIS can be used for many applications in wildlife biology including but not limited to home range analysis, species distribution modeling, and habitat analysis.

What is your favorite aspect of GIS? It is so versatile and can literally be used in every kind of analysis that you could think of across all fields of study. If you can think of a research question, then you can use GIS to help answer it.

Carrie Hamilton  
What is your major? My major is Biology and my minor is Physical Geography.

What attracted you to the department? I’ve always enjoyed the physical sciences. Also, I felt that this department would be the perfect pairing with biological sciences.

What made you interested in GIS? GIS is the future of research in the sciences. Most people, whether it is policy makers, funding agencies, or scientists, want to see results in a visual representation. GIS allows for results of patterns or the effect/impact on various areas to be easily displayed and easily interpretable for most audiences.

What is your favorite aspect of GIS? The ability to see raw data results “come to life.”
## Current/Recent Activities in the GIS Center

### Presentations
- Dr. Marty Kaufman was invited to host a special seminar for the Civil and Environmental Engineering Department at the University of Michigan-Ann Arbor. His talk discussed how the GIS Center was involved in the Flint Water Crisis.
- Dr. Greg Rybarczyk will be speaking at Tables and Tap, located in Downtown Flint on March 8th at 6pm for their Science on Tap Series. The title is “Doing Yeoman’s Work: Increasing Alternative Transportation Options at UM-Flint”.
- Troy Rosencrants will be presenting at the IMAGIN Annual Conference in May about the work the GIS Center completed to help the City of Flint during the Flint Water Crisis.
- Greg Rybarczyk will be giving a talk titled “Spatiality and food access: Measuring geographic access to ethnic restaurants and grocers” at the Annual AAG meeting in San Francisco, March 29-April 2, 2016.
- Greg Rybarczyk will be presenting “Pathways to happiness: a comparative study linking Twitter and contextual factors” at Mobile Tartu, 2016—Mobile Data at the University of Tartu in Estonia, June 29-July 7, 2016.

### Projects

#### Research
- The GIS Center helped Dr. Victoria Morckel from the Earth and Resource Department create various figures for her research on the Flint Farmer’s Market.

#### Consulting
- The GIS Center created a map of Flint area federal projects, along with other key locations for a potential grant application for Lynda Berge.
- The GIS Center created an online map for the Office of Development of UM-Flint alumni in Florida for their visits during February.
- The GIS Center helped the Genesee County Health Department create maps of elevated blood lead levels in the City of Flint, as well as cases of legionnaires within the county.

### Outreach
- Troy Rosencrants is lead a GIS portion of Dr. Thomas Henthorn’s HIS 363 Historic Preservation class as they learn to use GIS to map information about historical properties in Carriage Town in Flint, MI.
- The GIS Center provided a quick overview the activities within the Center as well as an introduction to GIS for Marlos Scrimger’s Modern Geography course, which is comprised of future secondary social studies teachers.
- The GIS Center will again be participating in UM-Flint’s Super Science Friday in May. This will be the third year that the Center has participated.

### GIS Center and ERS Department Recent Publications

## Upcoming Conferences

- **University of Michigan GIS Community of Practice Meeting**
  - The meeting will consist of lightning talks representing the variety of ways GIS is used at U-M across all three campuses. It will be on March 15th, 3pm-5pm. Location is TBD.
- **AAG Annual Meeting**
- **IMAGIN 2016 Annual Conference**
  - The annual IMAGIN conference will be held at Great Wolf Lodge in Traverse City, MI on May 15-17, 2016. More information is at [www.imagin.org/conference.php](http://www.imagin.org/conference.php).
- **ESRI User Conference: United We Map**
  - The annual User conference by ESRI will be held at the San Diego Convention Center June 27–July 1, 2016. More information is at [http://www.esri.com/events/user-conference](http://www.esri.com/events/user-conference).
- **URISA Leadership Academy**
  - A professional education offering that provides training in GIS leadership. It will take place in Chicago, IL August 1-5, 2016. For more information, visit [http://www.urisa.org/education-events/urisa-leadership-academy](http://www.urisa.org/education-events/urisa-leadership-academy).