2017

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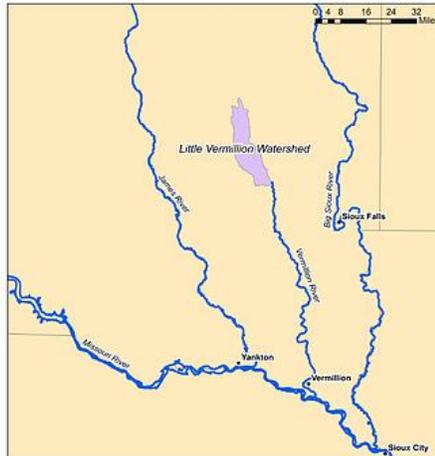
Ethan Jennings

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By: Ethan Jennings

My project in the Sustainable RIVER program this year was to develop an efficient method to digitally determine land use change along streams in a watershed. Previously, this work required labor-intensive field surveys or looking through historical satellite photos to get a rough idea of the changes. I was tasked with finding an more trackable and accurate digital method that monitored changes in infrastructure while still retaining an accessible database.

We used ESRI's ArcGIS mapping software, as it is the industry standard, and searched for digital maps that could be used to determine watershed boundaries as well as land use change. Using U.S. Geological Survey (USGS) digital elevation models and ArcGIS Hydrology tools, we determined the extent of a small watershed; it's a small watershed on the split rock creek drainage system. Using these tools, we saw how the watershed has changed over the years. We used this watershed at a set scale to calibrate our method to capture and record future changes. To determine land use change, we used images from the National Agriculture Imagery Program (NAIP); photos were taken from the air during the height of the growing season. This ensures that vegetation will likely be captured in the photos, and that the photos can be compared to one another because they will be captured around the same time each year. We analyzed and compared the imagery from 2005—2015; we tracked areas that experienced a change and merged them by using lines that made up the streams. This resulted in a massive body of data that detailed every stream that has experienced a land use change!

After a few tweaks, we increased the scale of the watershed and chose a larger river: The Little Vermillion. We made the work relevant to the present day by comparing 2006 to 2016 NAIP images. After a lot of hard work, processing time, edits, and corrections, we documented the many changes along streams within the small watershed on the split rock creek drainage system.

A scaled image of the Little Vermillion Watershed that was on the split rock creek drainage system. Map made by E. Jennings and created using ArcGIS.
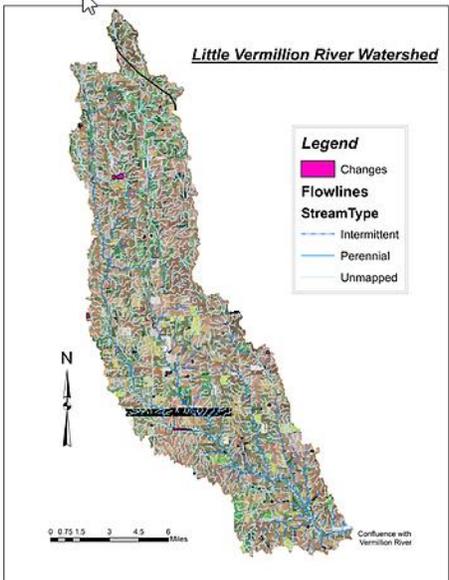
Little Vermillion Watershed map. Map made by E. Jennings and created using ArcGIS.

Ethan is a student at the University of South Dakota. He worked with Dr. Brennan Jordan (http://brennanjordan.org/) on his project for the 2017 Sustainable RIVER REU program.