

Using Side Scanning Sonar to Map Bottom Substrate Features in North Dakota Rivers

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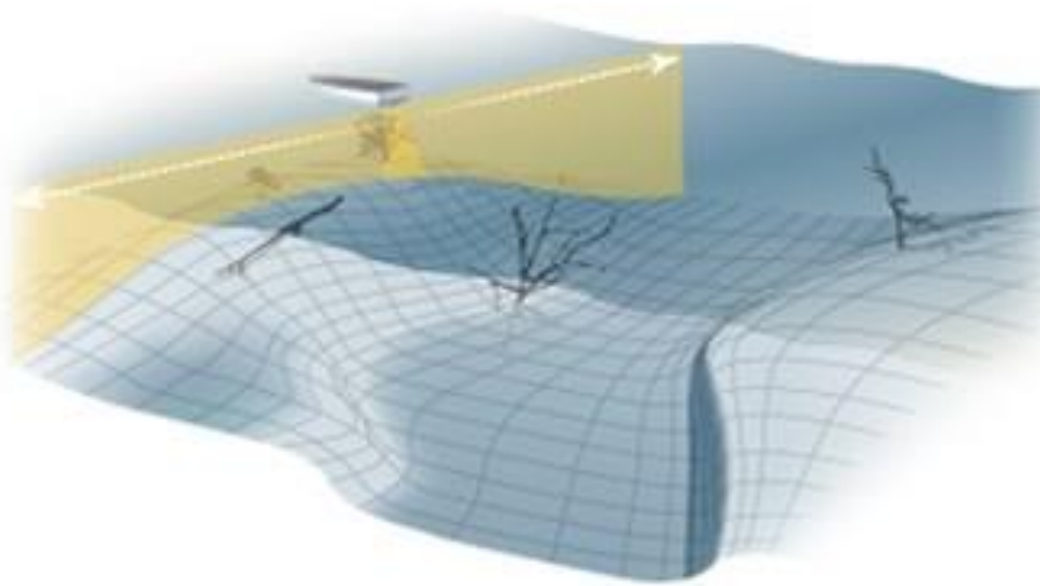
Introduction

- The primary goal of this research is to map the substrate composition of a stretch of the Sheyenne River using side imaging sonar
- Using hands on inspections of 40 sites to confirm composition of the substrate
- Using ArcGIS to process the data
- Why?

Side Scanning Sonar

- Consumer grade side scanning sonar has made it more affordable to access this technology
- Safer and faster than traditional substrate composition analysis
 - Due to debris, depth, and turbidity
 - Can cover ~6 miles per hour, in comparison to ~1 mile per day

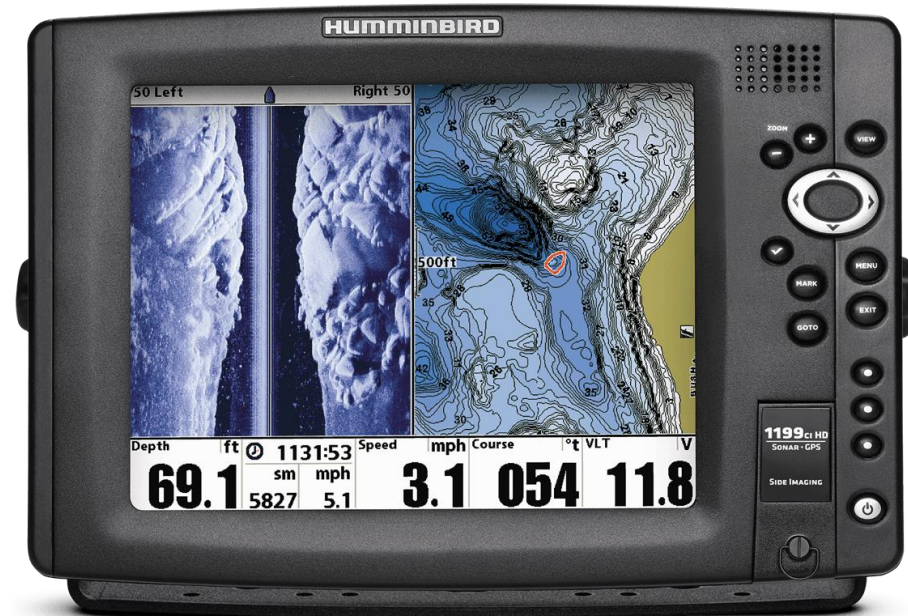
Side Scanning Sonar



Equipment

- Humminbird 1199ci HD SI
 - Receiving power supply from 12v deep cell marine battery
- Garmin GPSMap 78
 - Connected to Humminbird via NMEA connection
 - Margin of accuracy ~3-5 meters
- Porta- bote
- Outboard motor

Equipment



Equipment



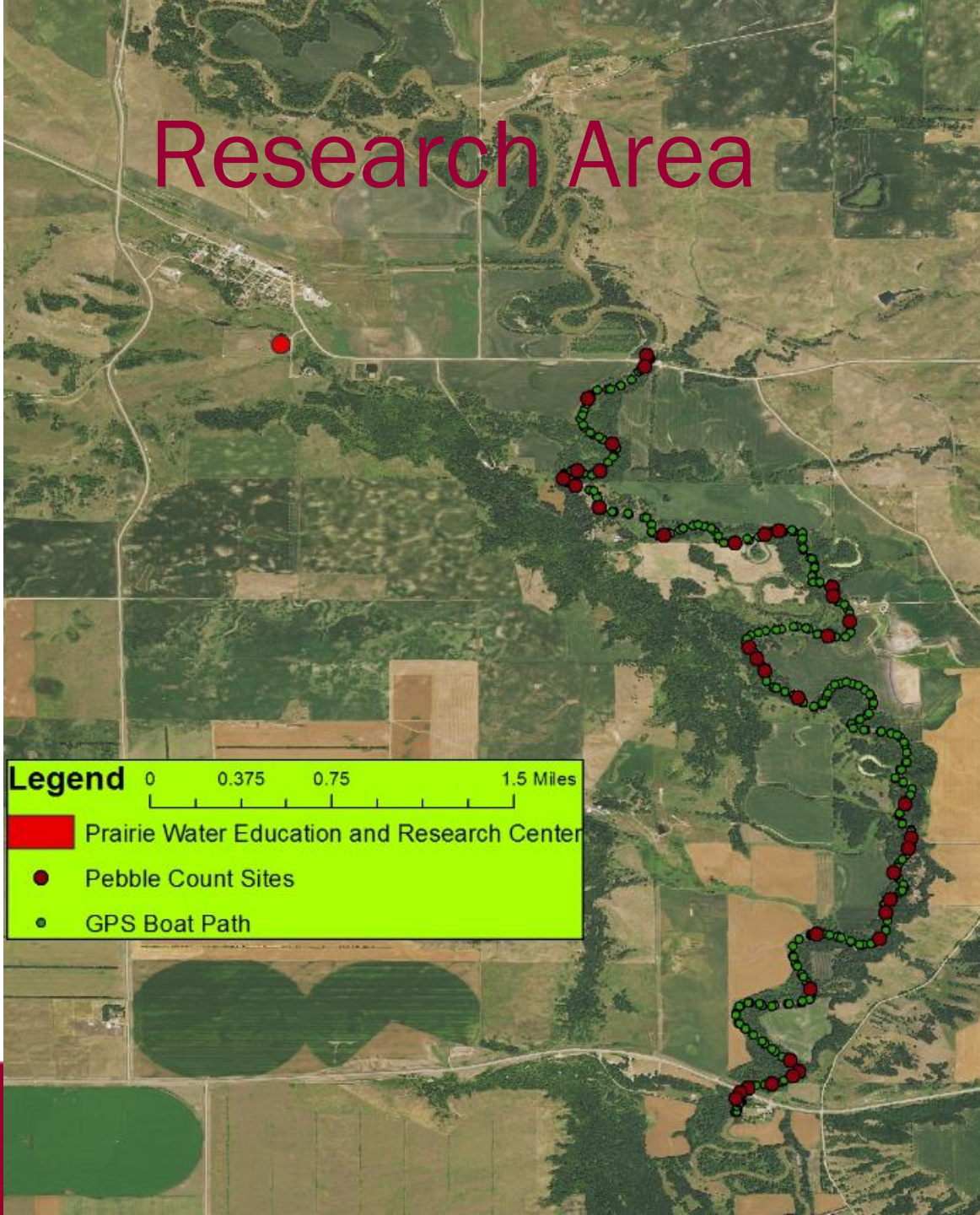
Methods

- Maintaining river center to gather the best depth data and to get the best coverage of both banks
- Using the snapshot feature on the sonar, logging images every three seconds
- Gathering quality images that overlapped

Methods

- Uploading to excel for formatting and data entry
- Pebble counts at 37 of the waypoints to compare substrates to the side scanning images that were gathered
- Inputting pebble count

Research Area

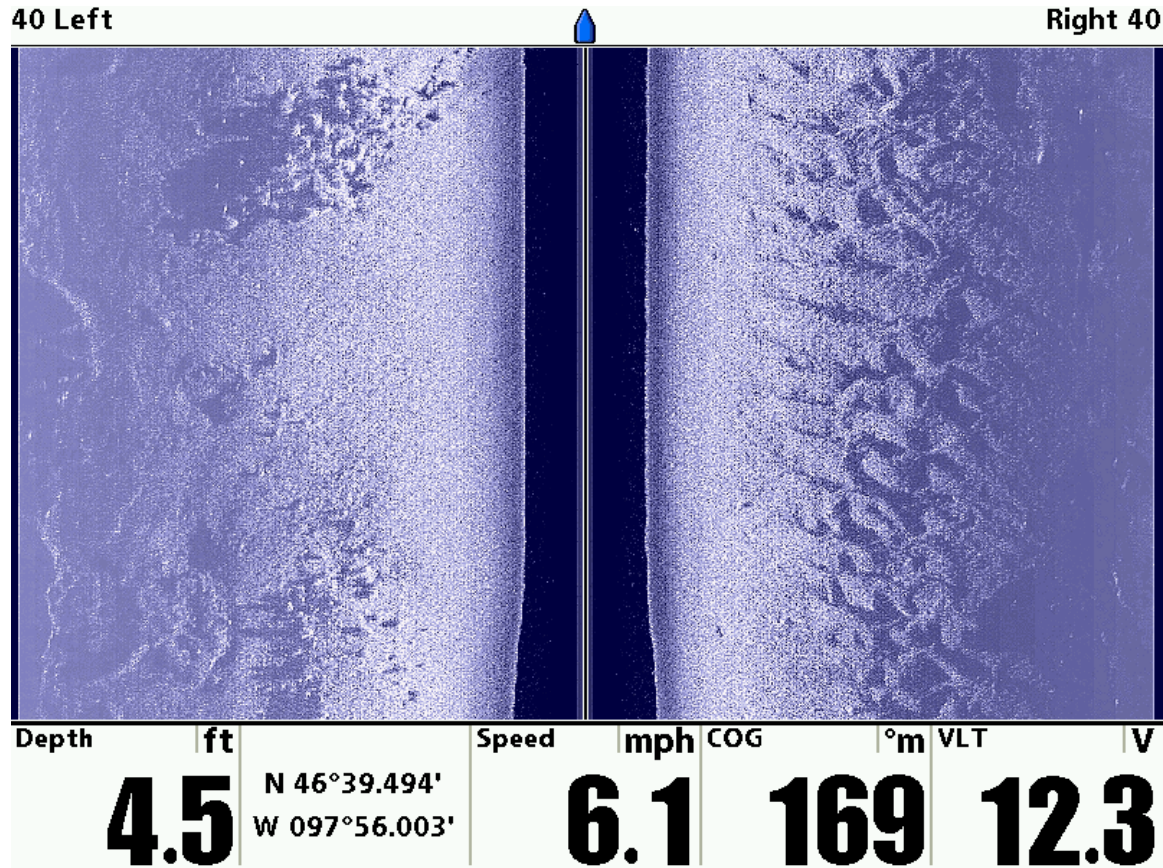


The map displays a winding river through a rural landscape with fields and some wooded areas. A red square marks the location of the Prairie Water Education and Research Center. A series of red dots along the river indicate pebble count sites, and a line of green dots represents the GPS boat path. A legend in the bottom left corner explains these symbols and includes a scale bar from 0 to 1.5 miles.

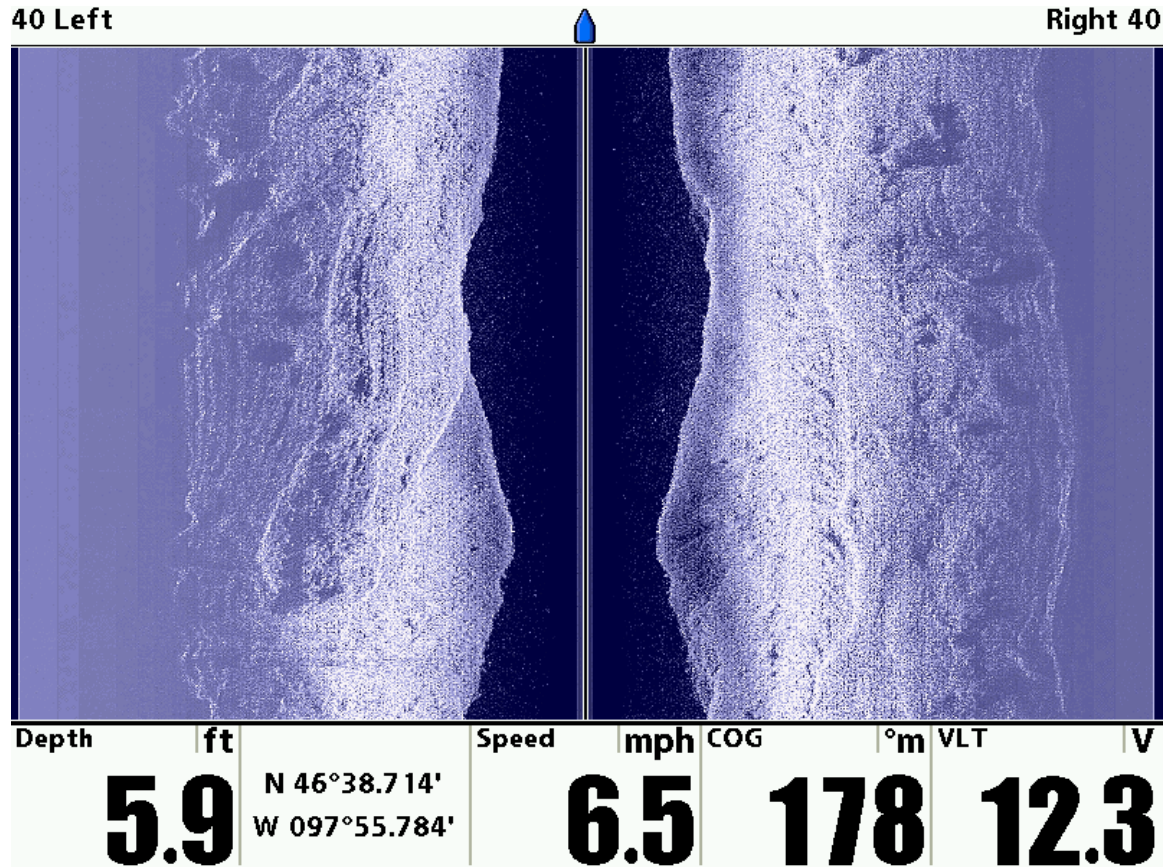
Legend 0 0.375 0.75 1.5 Miles

- Prairie Water Education and Research Center
- Pebble Count Sites
- GPS Boat Path

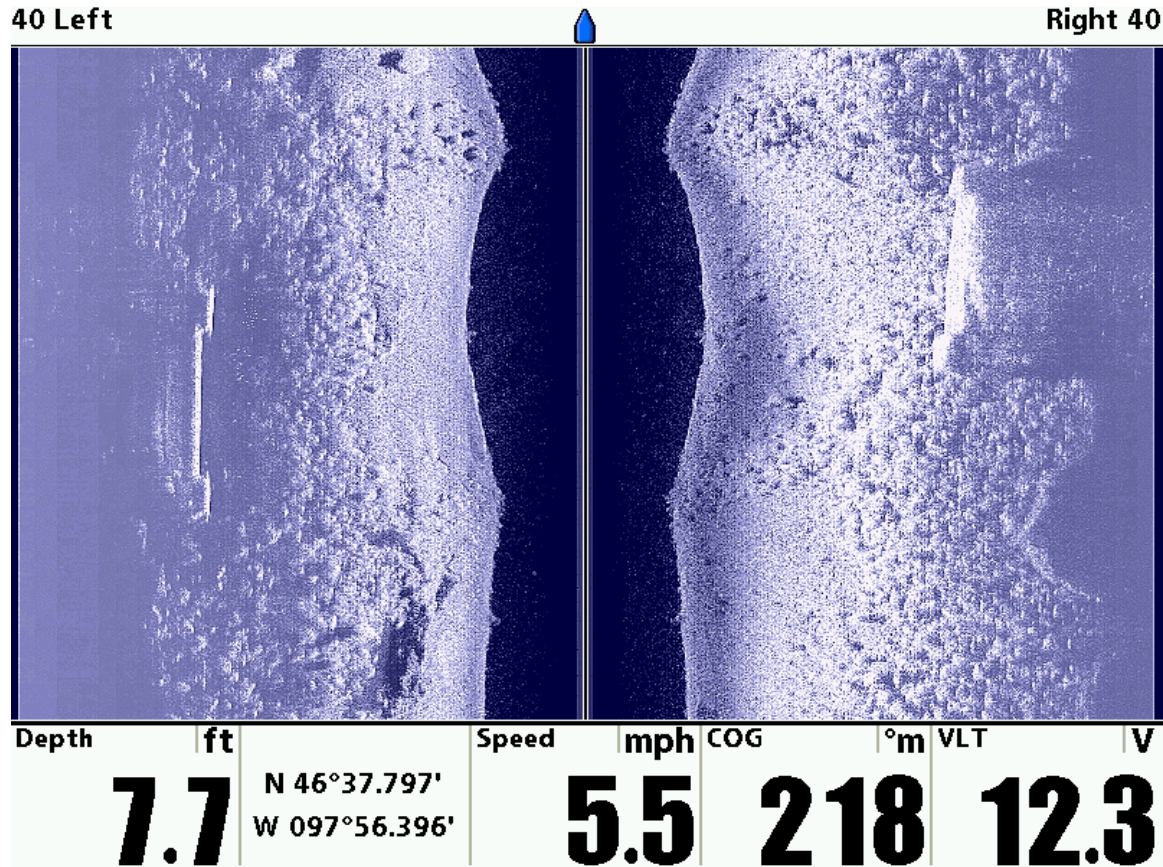
Side Scanning Sonar



Side Scanning Sonar



Side Scanning Sonar



Summary



Summary

- Geospatial analysis in ArcGis is ongoing
 - Working to create effective shapefiles that represent differences in the substrate
- With this data we can now observe how the substrate changes over time

Thank You

- Funding Agencies
 - NASA ND Space Grant Program
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- Jason Rowell
- Michaela Halverson
- Shannon Hone



Sources

- <http://www.humminbird.com/Category/Technology/Side-Imaging/>
- http://www.garmin.com/en-US?gclid=CjwKEAjw55K4BRC53L6x9pyDzl4SJAD_21V1qWHGEubdBWqjpa5bK126J6iuZAfTBBNFDAzqwd2yKR0Cctjw_wcB
- <https://www.porta-bote.com/>