

# Sediment Build-Up and Bank Erosion Along the Grass, Rapid, and Torch Rivers

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January 30th, 2013

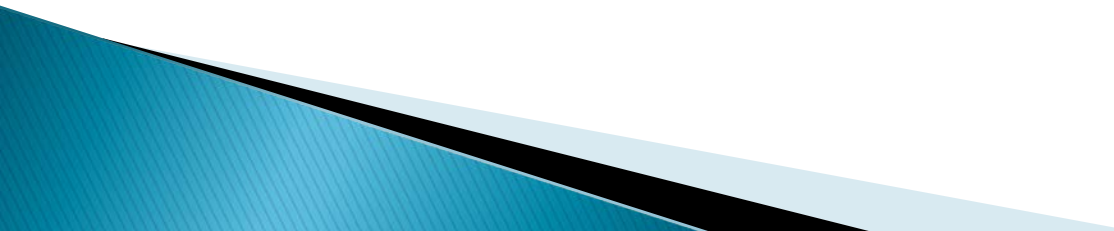


**MSU**  
**Hydrogeology**

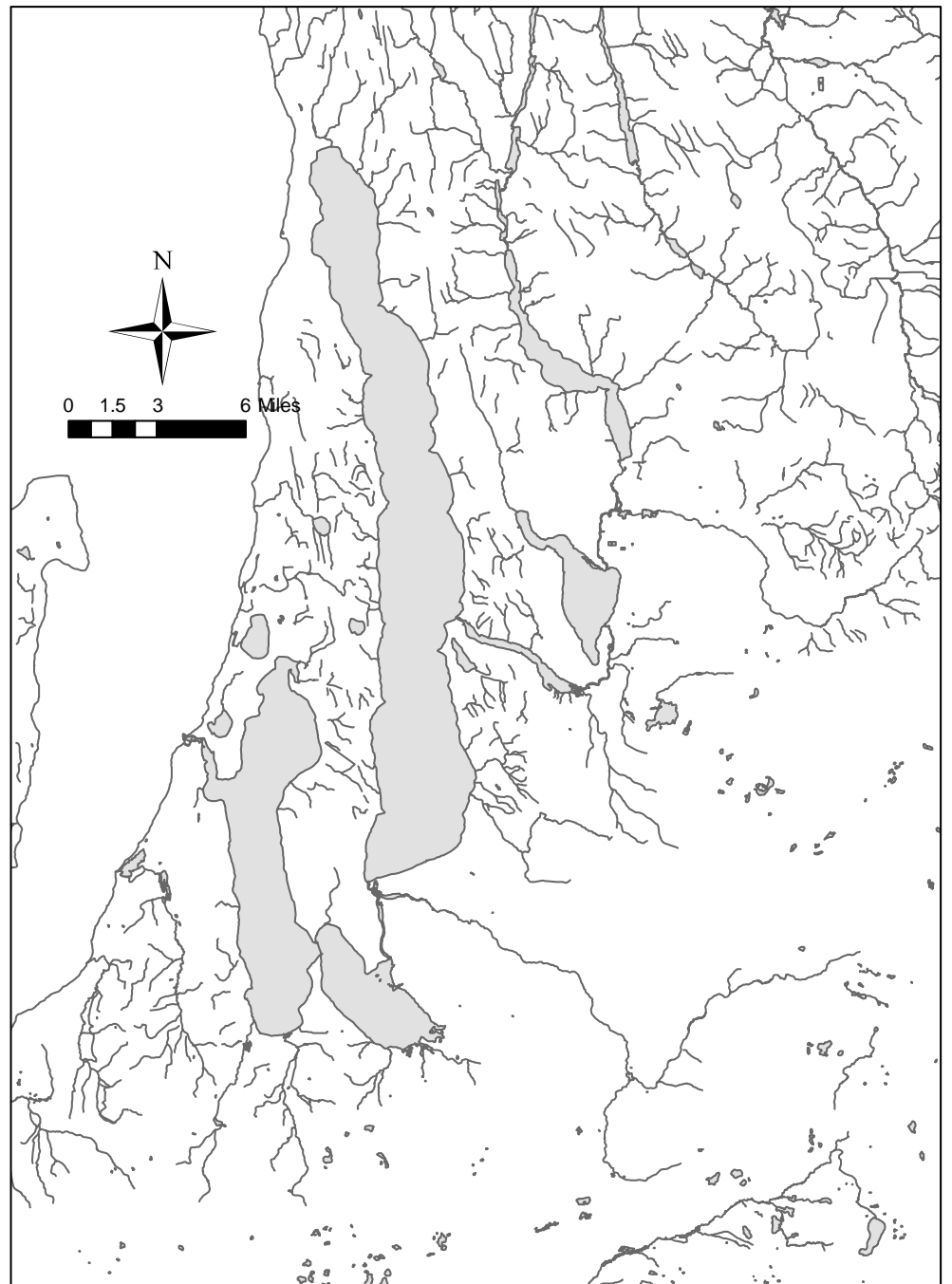
# Project Partners

- ▶ Funders:
  - Elk Skegemog Lakes Association
  - Three Lakes Association
- ▶ Field and lab associates from MSU:
  - Lon Cooper, Blaze Budd, and Jordan Hein
- ▶ Local volunteers:
  - Dean Branson, Bob Kingon, Fred Sittel
- ▶ Co-Investigators:
  - Brett Fessell and Frank Dituri  
*Grand Traverse Band of Chippewa and Ottawa Indians*
  - Kevin Cronk  
*Tip of the Mitt Watershed Council*
  - Paul Richards  
*State University of New York, Brockport*

# Project Elements

- ▶ Watershed sediment source modeling
  - ▶ Surveying historical condition
  - ▶ Field campaign
    - Channel depths
    - Stream flows
    - Stream and lake elevations
  - ▶ Make recommendations for management options
- 

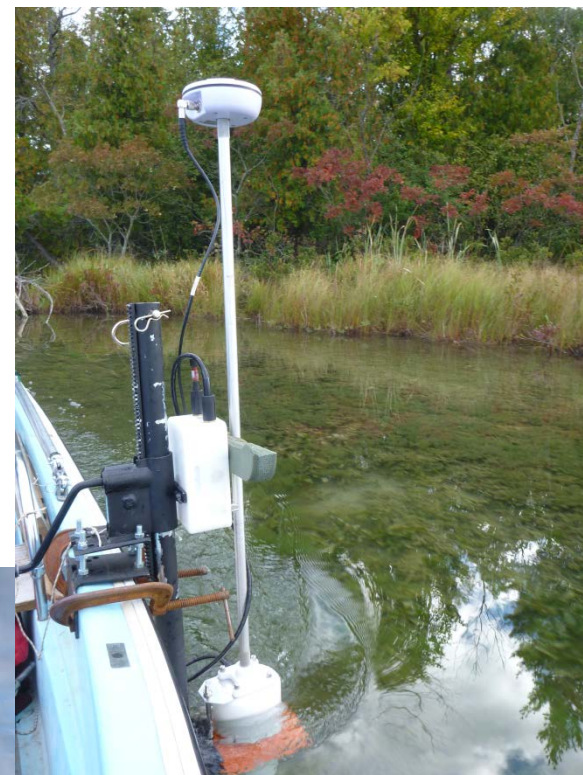
# Study Area



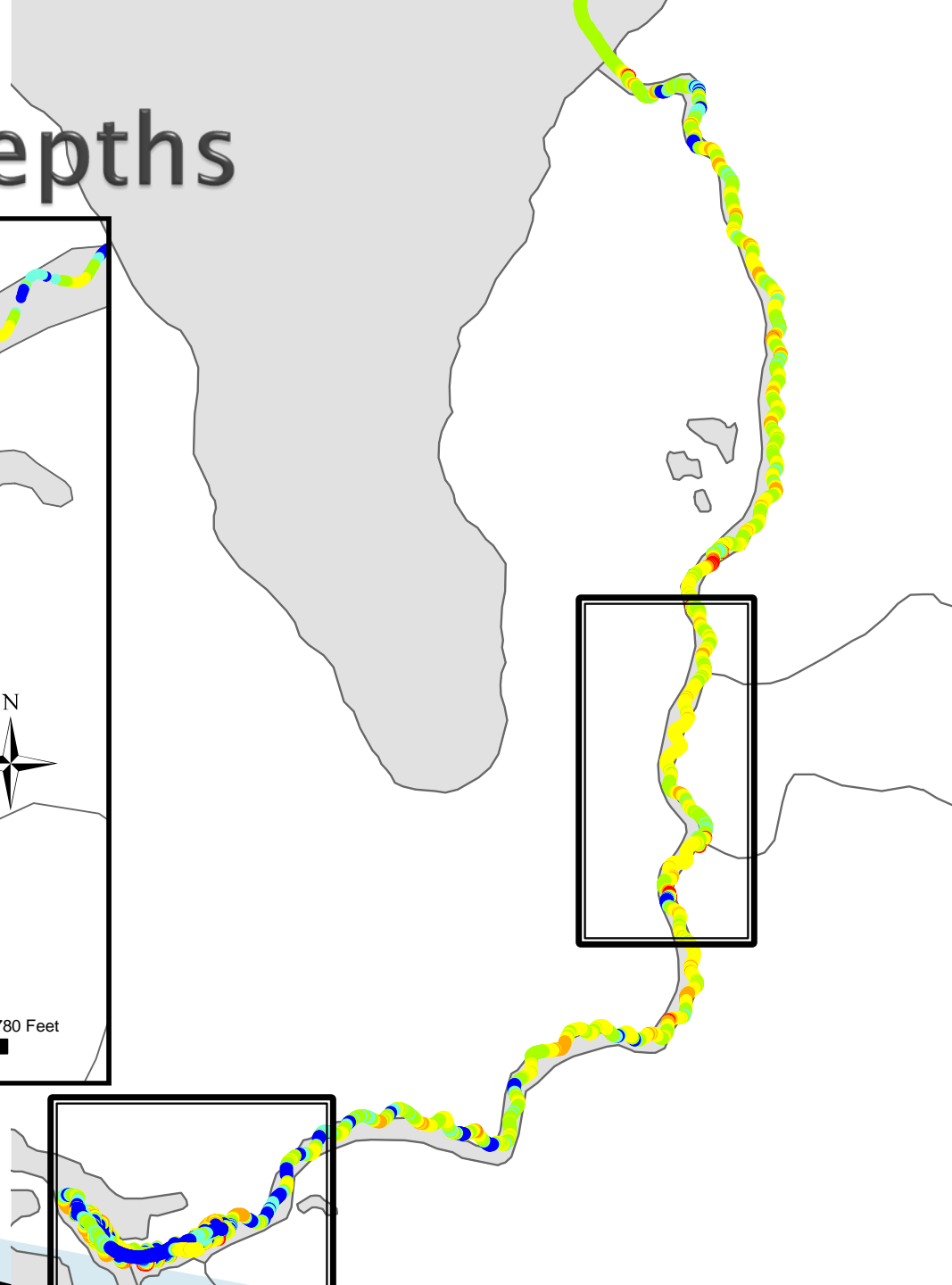
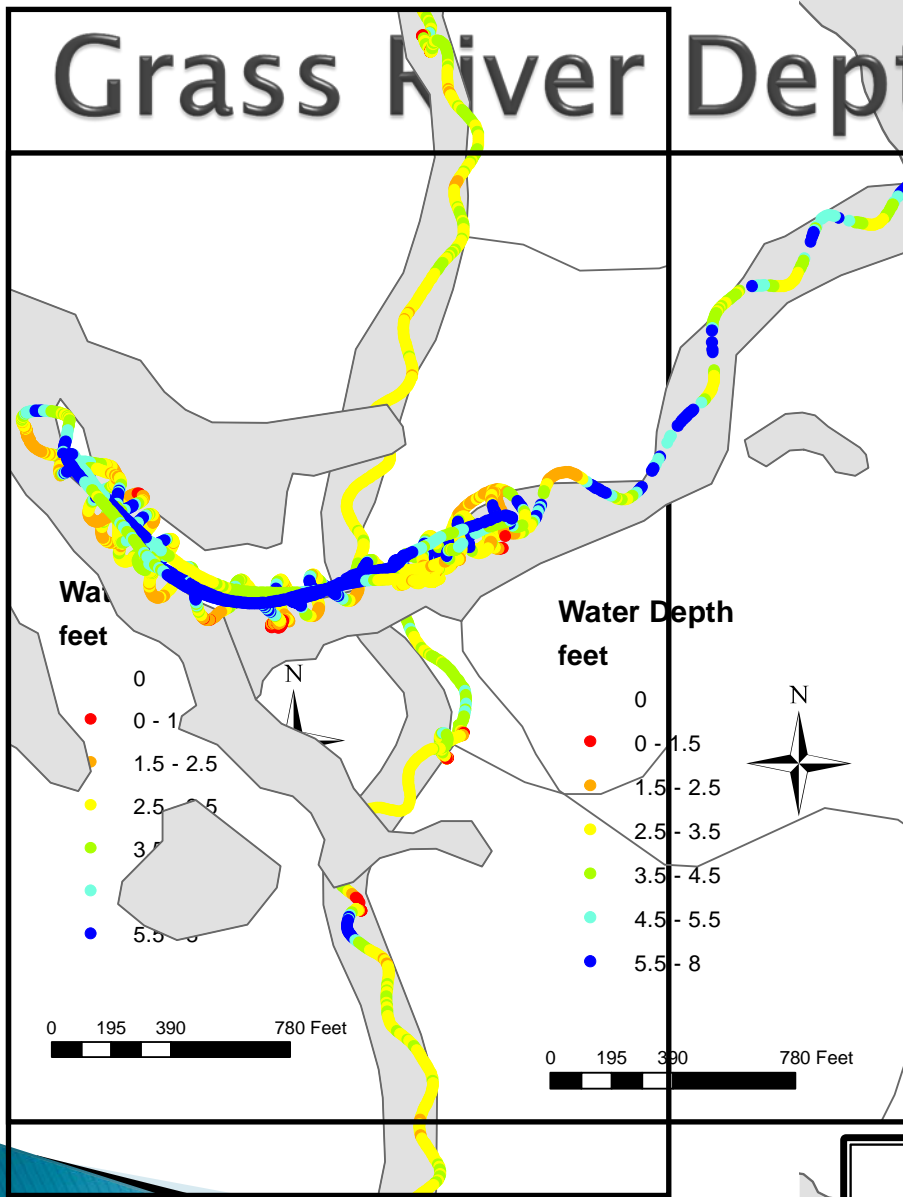
# GPS Data Collection



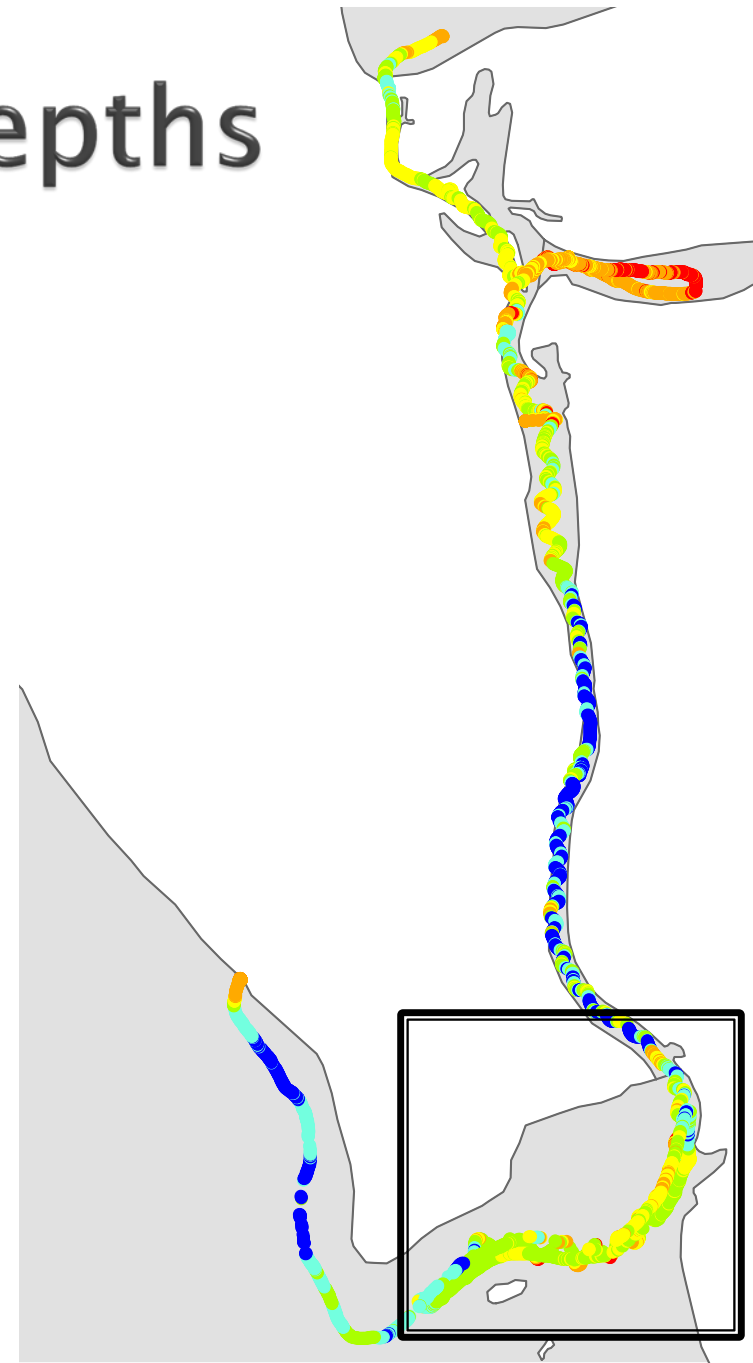
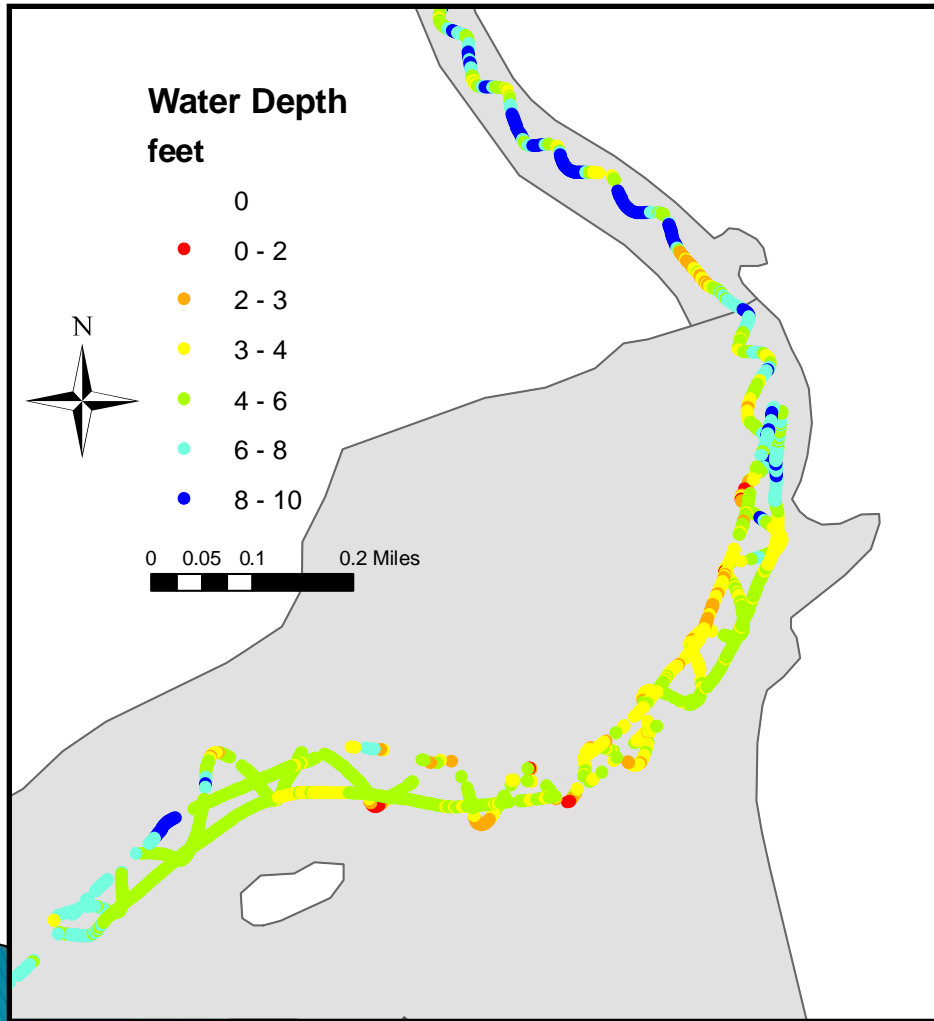
# Bathymetry Data



# Grass River Depths

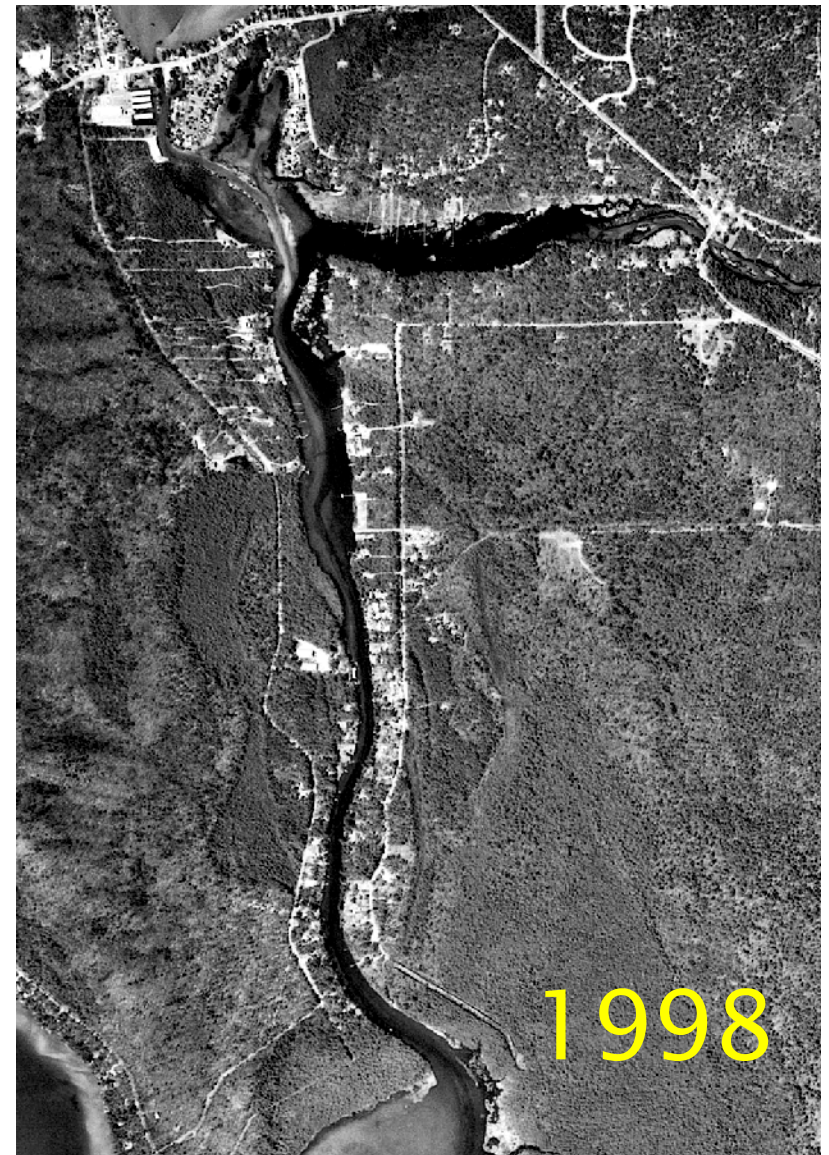
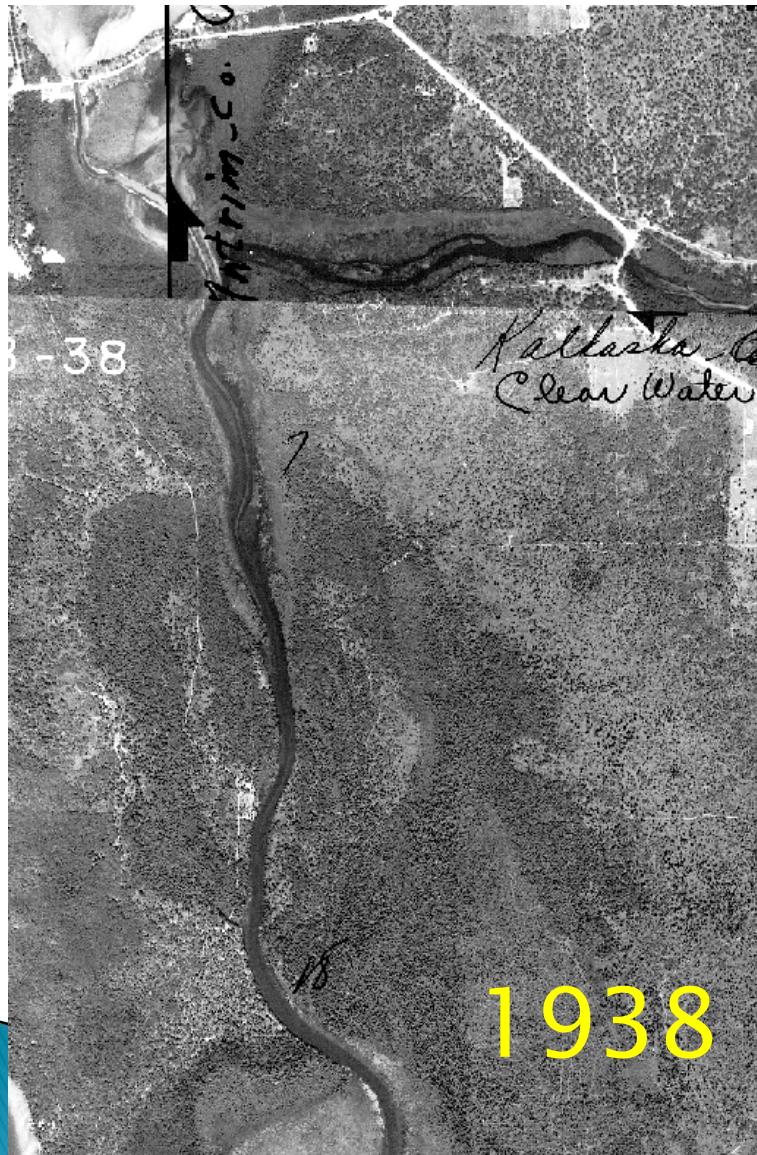


# Torch and Rapid Depths

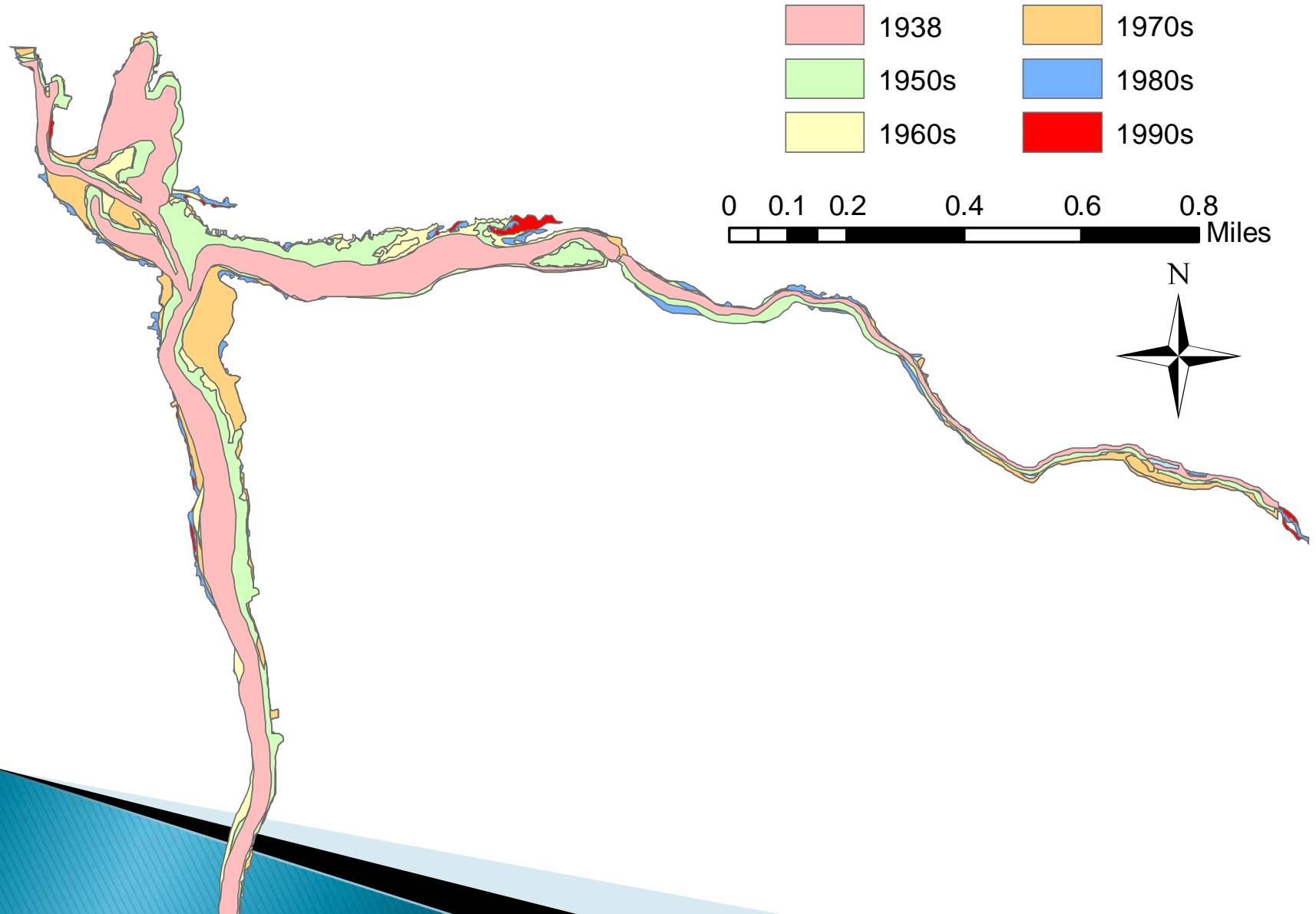




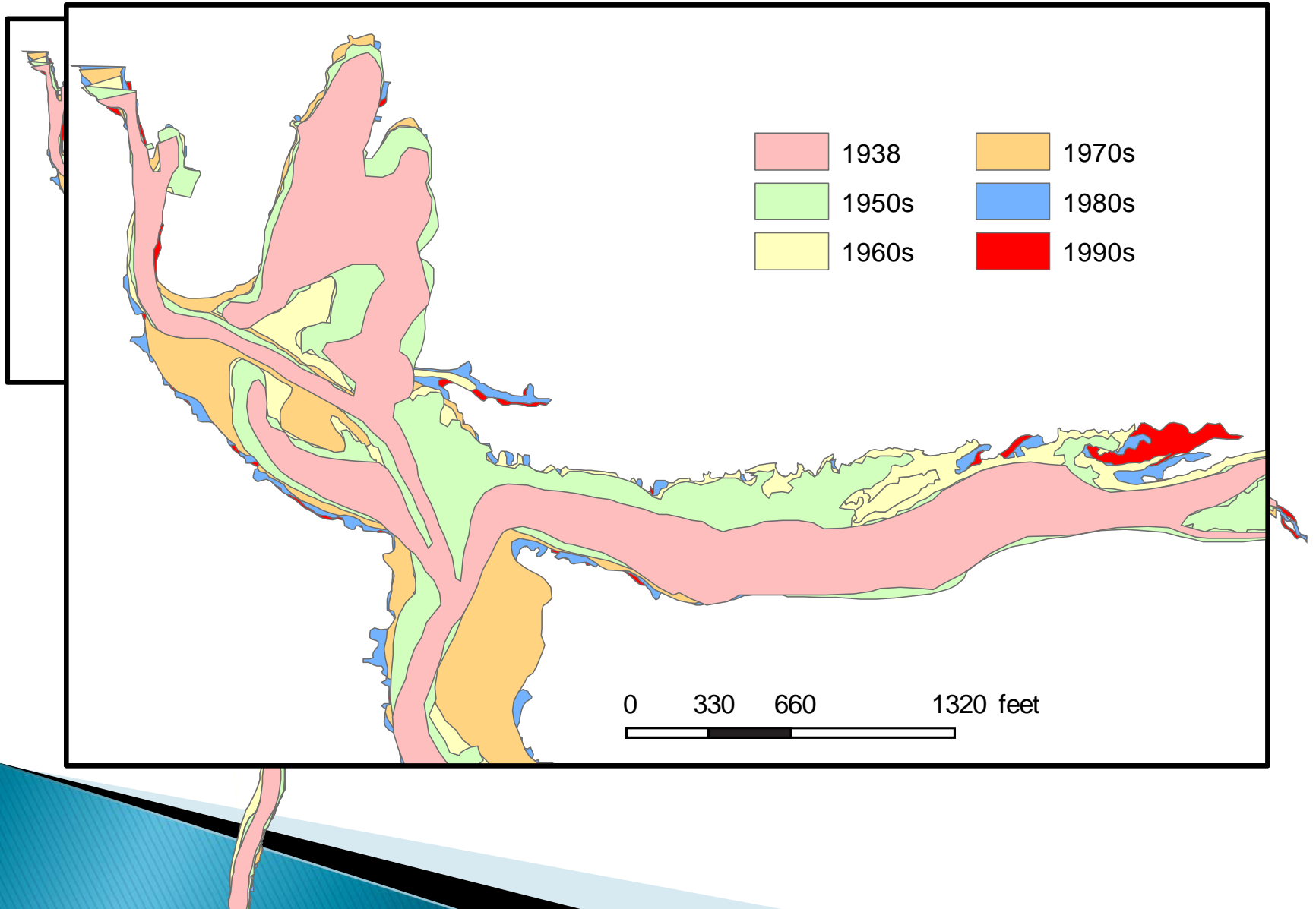
# Aerial Photo Analysis



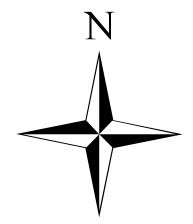
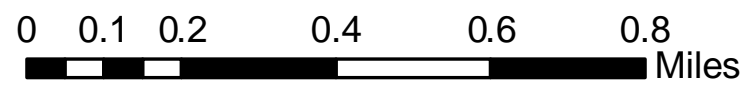
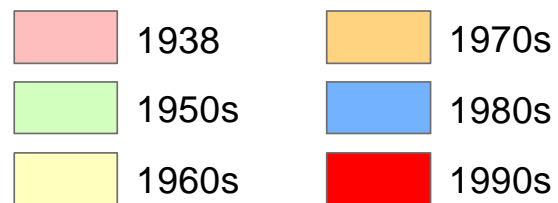
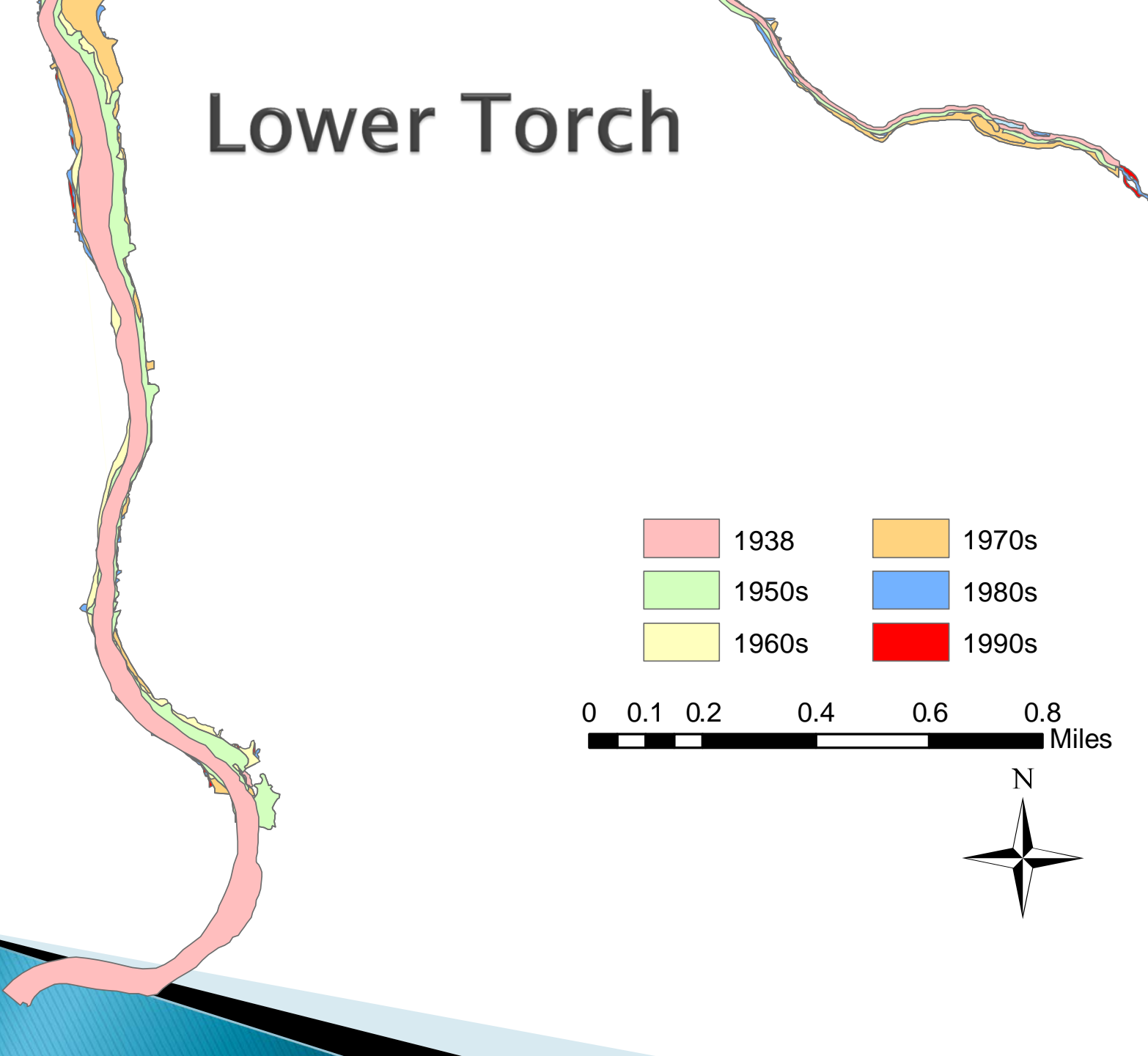
# Upper Torch and Lower Rapid



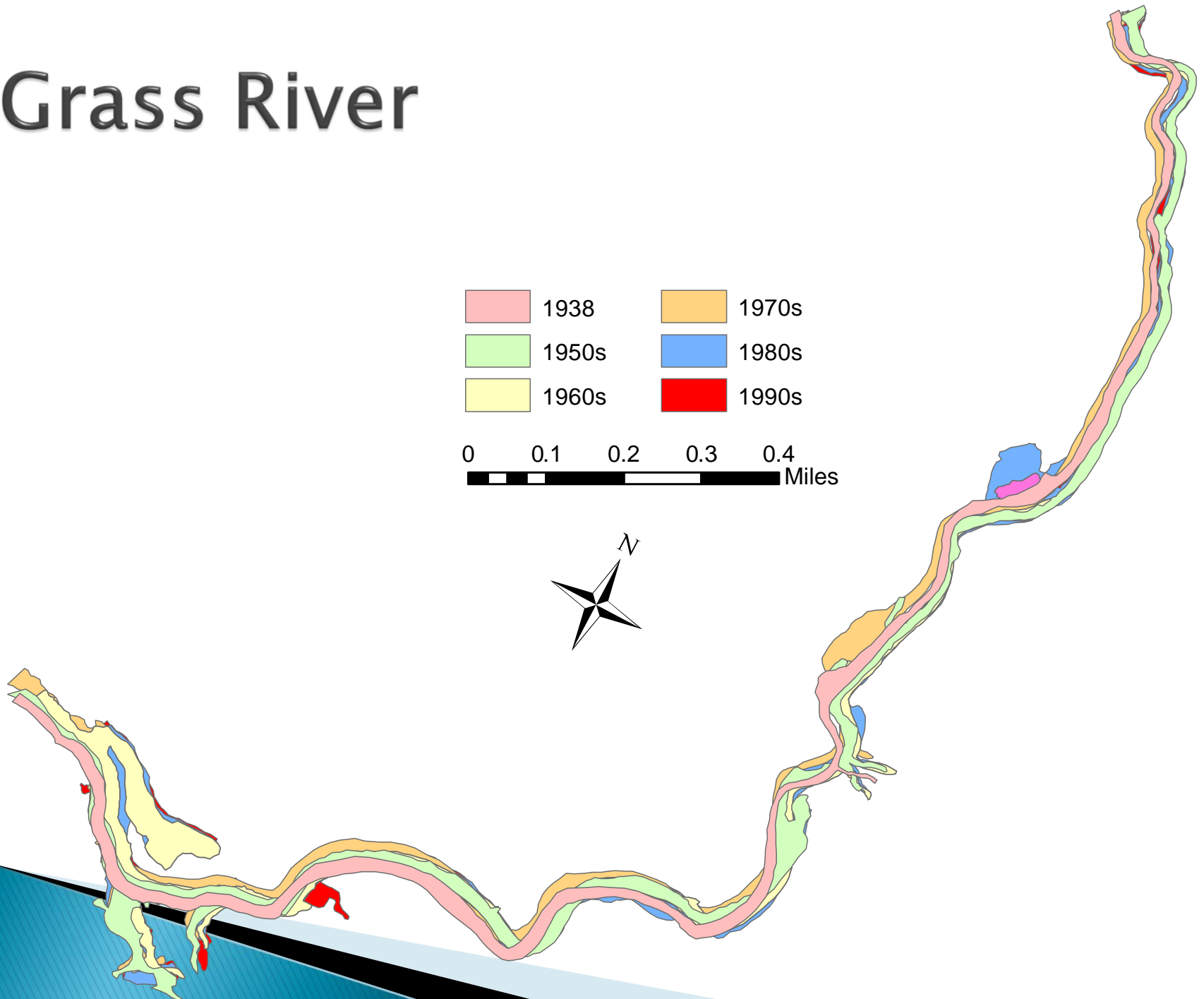
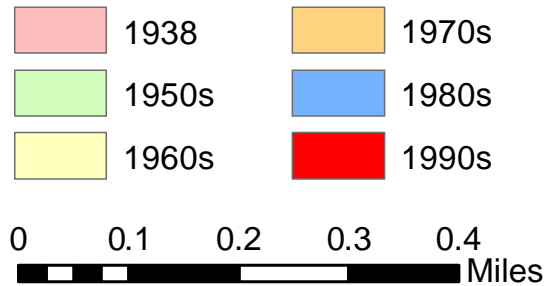
# Confluence of Torch and Rapid



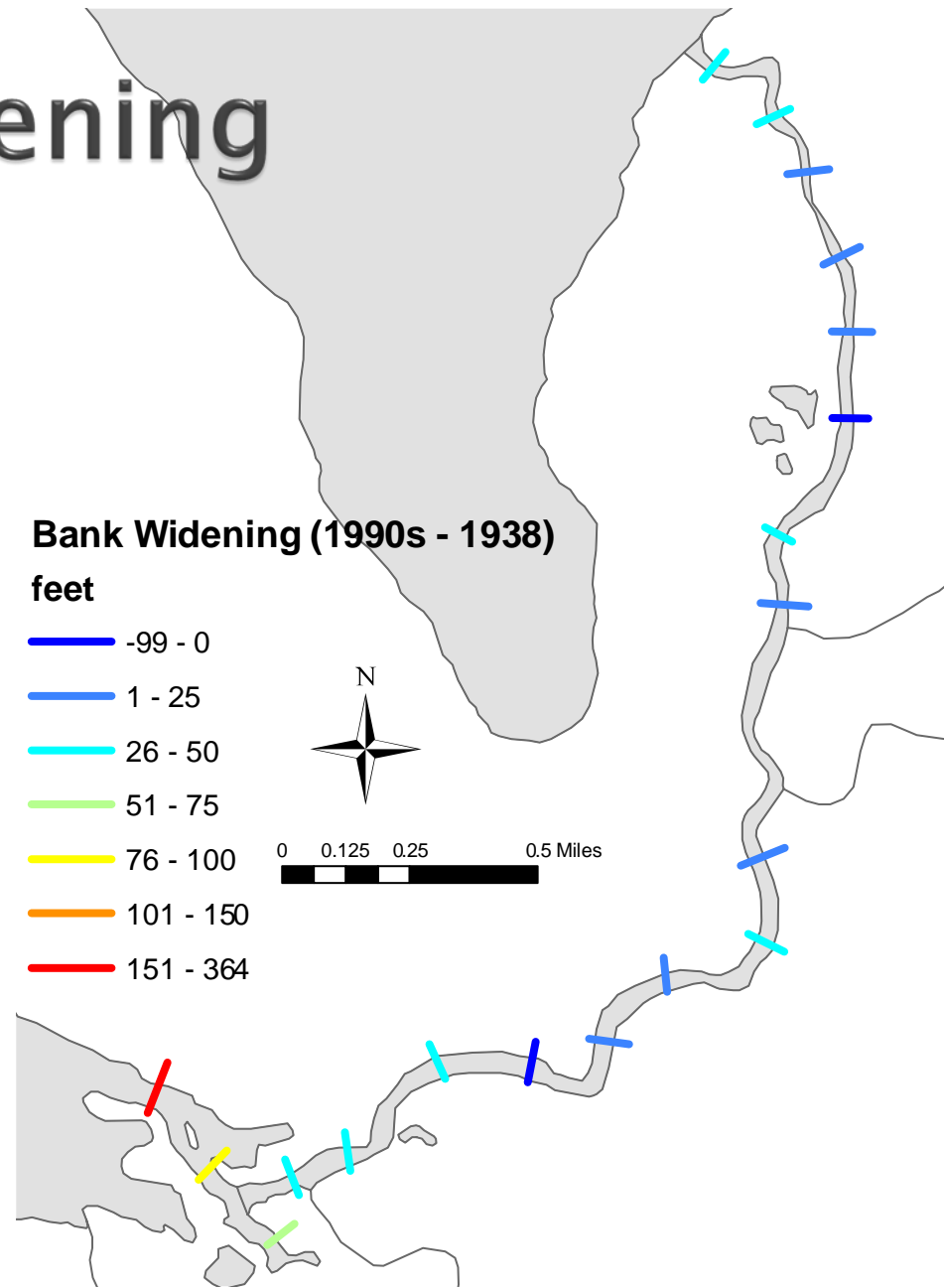
# Lower Torch



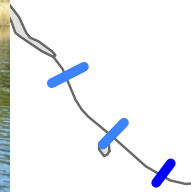
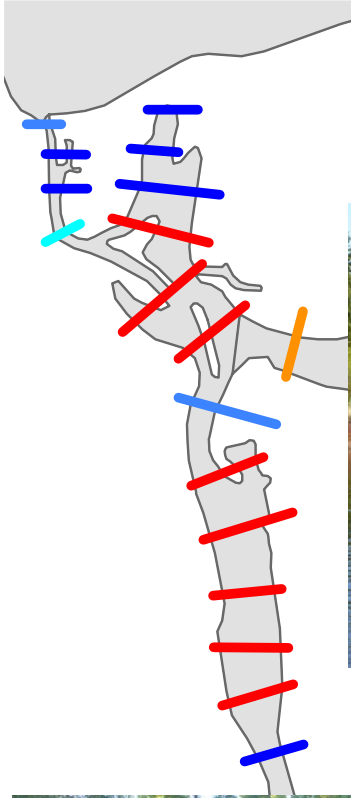
# Grass River



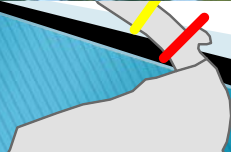
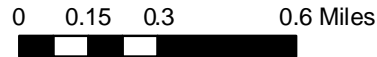
# Grass River Widening



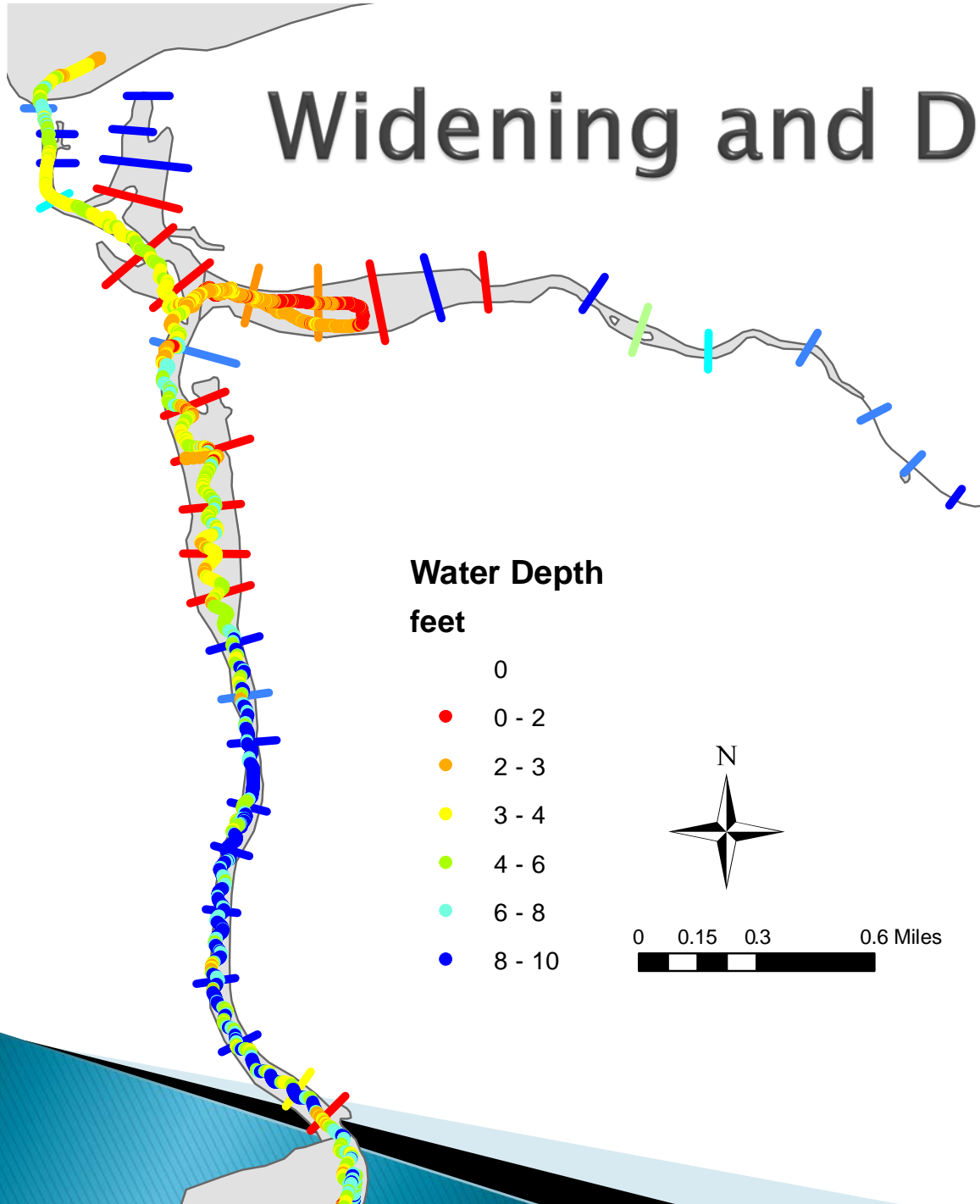
# Torch River Widening



**Bank Widening (1990s - 1938)**  
feet



# Widening and Depths





# Management Options: A Holistic Approach

- ▶ Sedimentation and bank erosion is a problem caused largely by human activities: damming Elk Lake, land use in watersheds, engineered structures, climate change, etc.
  - But these rivers always move sand!
- ▶ It has taken over 100 years for the state of the system to reach this point
- ▶ Any action must take into account all of the users and uses of the waterways and watersheds

# Bank Armoring with Large Woody Debris

*Photos: US Forest Service*



# Managing Elk Lake's Off-Season Level

