

# EXPLORING SHARED INTERESTS IN ENGINEERING WITH NATURE®

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## Fluvial Geomorphology Toolbox

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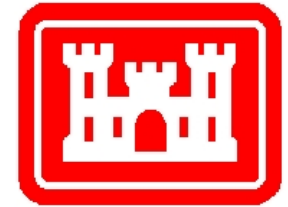
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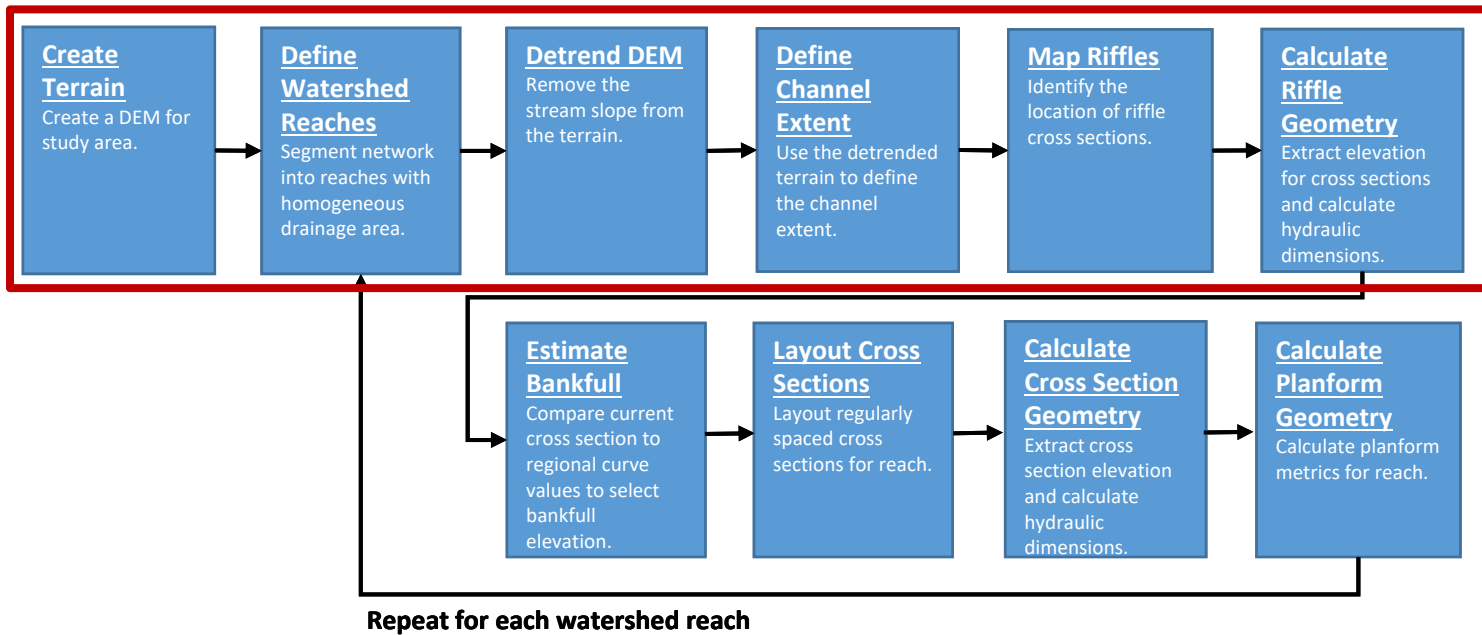
**US Army Corps  
of Engineers.**



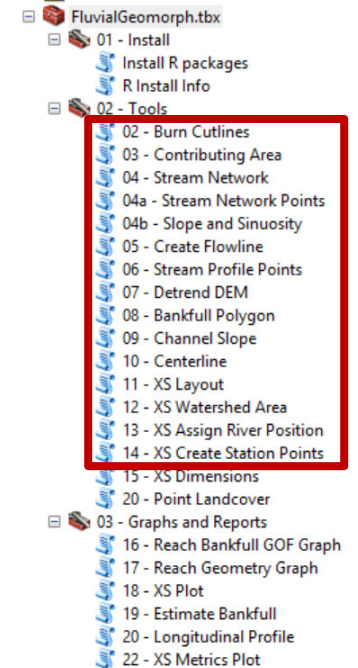
# EMRRP Fluvial Geomorphology Toolbox



## Workflow: Rapid Watershed Assessment for Un-Gaged Streams



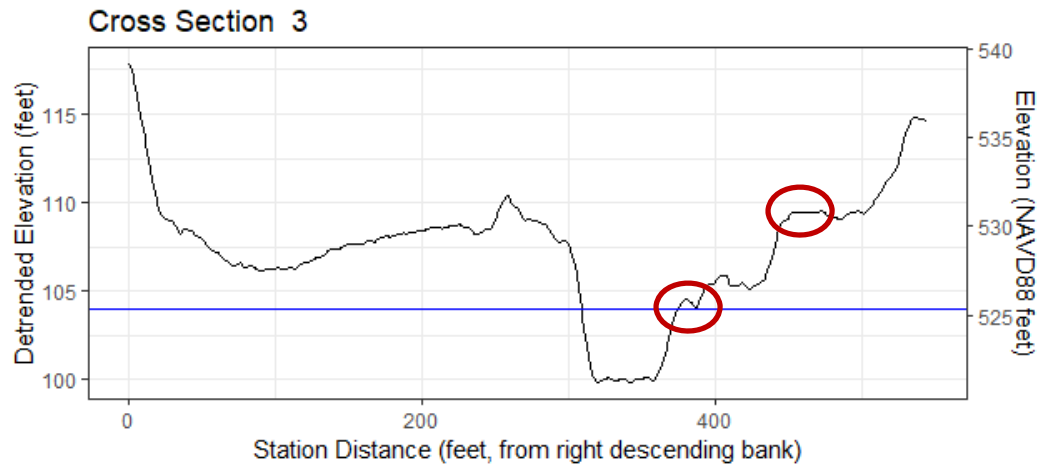
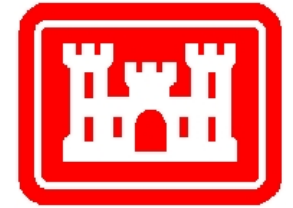
## FluvialGeomorph Toolbox



- GIS analysts follow the workflow
- Use the ArcGIS FluvialGeomorph toolbox tools to complete each task
- R used in the background to perform calculations, graphing, and reporting



## Inspect Cross Sections



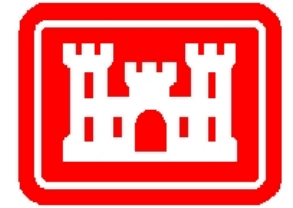
- Detrended elevation is on the left y-axis
- Actual elevation is on the right y-axis
- The black line represents the terrain surface
- The blue line represents the estimated bankfull elevation.

From the previous slides we saw that for this reach detrended elevation 104 minimized mean average error between measured cross-section dimensions and estimates from regional curves.

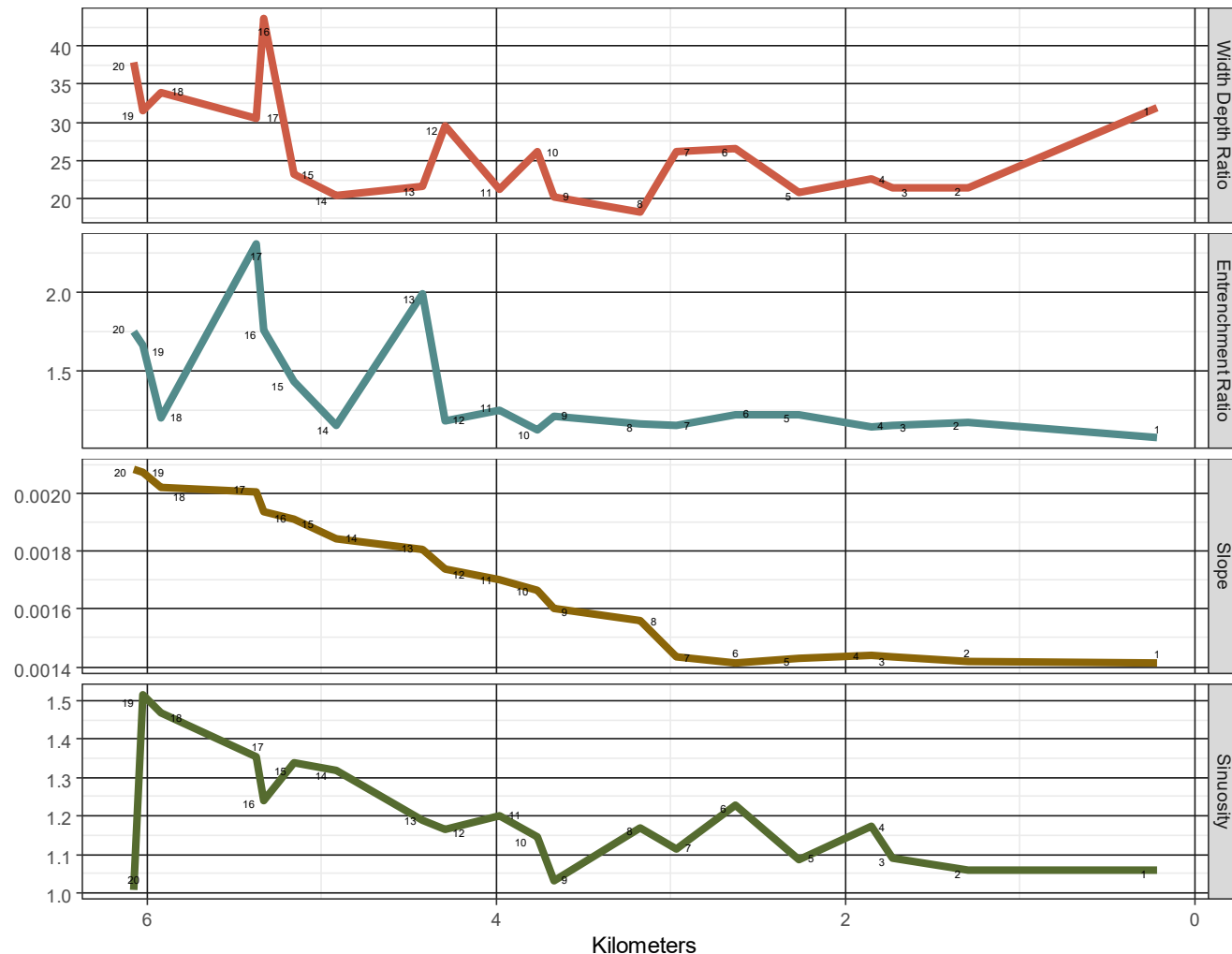
- This approach helps to distinguish between multiple geomorphic indicators.
- Allows geomorphic indicators to be rapidly compared between cross-sections.
- Helps ensure consistency in bankfull indicator selection throughout a reach.



# Reach Metrics Graph



Lower Senachwine Creek



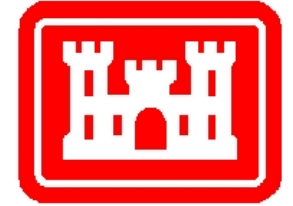
Standard reach metrics are calculated and specialized graphs are created to:

- compare related metrics
- aid rapid interpretation
- facilitate PDT integration of disparate metrics

- 13 - XS Assign River Position
- 14 - XS Create Station Points
- 15 - XS Dimensions
- 16 - Reach Bankfull GOF Graph
- 17 - Reach Geometry Graph
- 18 - XS Plot
- 19 - Estimate Bankfull
- 20 - Longitudinal Profile
- 22 - XS Metrics Plot



# Predicting Fish Habitat using FluvialGeomorph



## **Research Question**

Can fish habitat (measured using fish community data) be predicted using fluvial geomorphic characteristics?

## **Dependent Variables**

Fish community data collected for the MN Index of Biological Indicator (IBI) will be used as response variables (e.g., species richness, IBI, etc.).

## **Independent Variables**

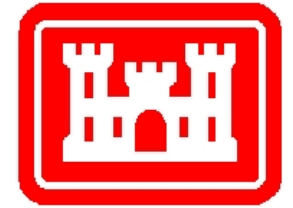
FluvialGeomorph calculated metrics will be used as predictor variables (e.g., W/D, entrenchment ratio, slope, sinuosity, stream power, etc.).

## **Current Efforts**

Preparing terrain data and calculating FluvialGeomorph metrics for a stratified sample of ~100 MN IBI sampling sites.



## Summary: Watershed Assessment Planning Tool



- Developed and continue to refine and test a new watershed assessment tool-FluvialGeomorph
- FluvialGeomorph is an R package based GIS toolbox to make watershed planning and assessments efficient, cost effective, and less-time consuming.
- Tools will be transferable wherever appropriate terrain data exists.
- Testing in different regions of US
- Assessing Minnesota River Fisheries habitat data and the ability to predict habitat relationships from FluvialGeomorph