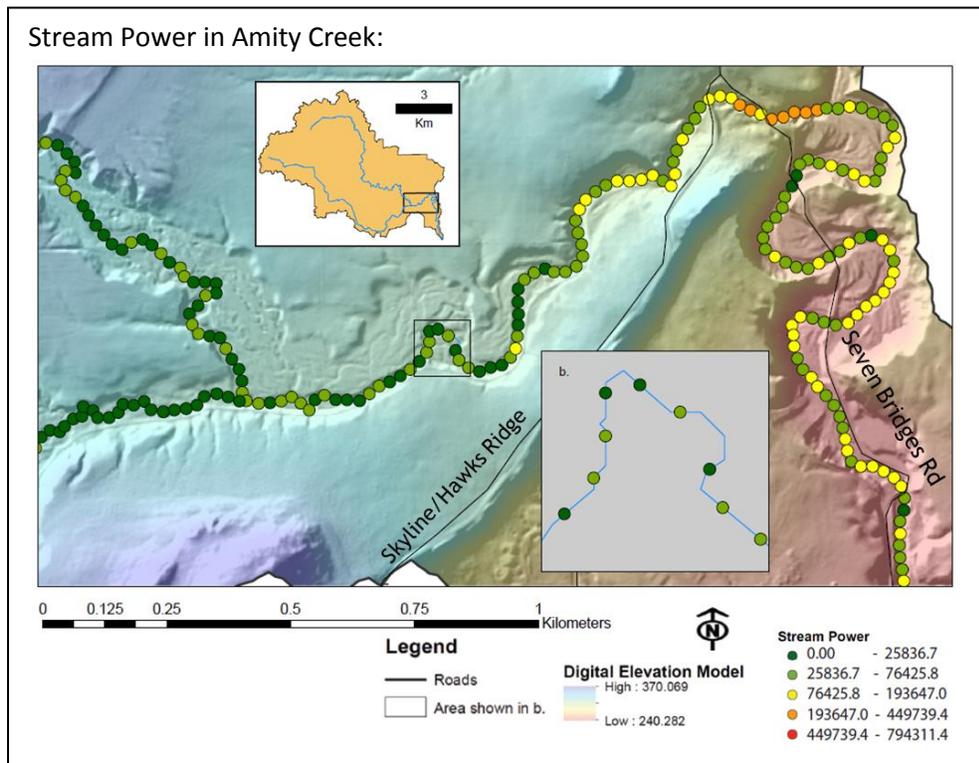


Identifying Erosional Hotspots in North Shore Streams using High-Resolution Elevation and Soils Data

Summary

The goal of this project was to develop a GIS-based model to predict erosion hotspots in three watersheds on the North Shore, Amity Creek, Talmadge River, and French River, all of which are listed as impaired for turbidity due to excess fine sediment. We used high resolution lidar data to calculate a stream power-based index to identify where flows are most erosive along the river, and overlaid that layer with layers showing high bluff locations, soils, and bedrock to identify erosion hotspots. Erosion hotspots, or areas that erode in a 1.5-year bankfull event and contribute to excessive sediment loading, are expected to occur where stream power is high, soils are erodible, and bluffs are tall (high sediment input if undercut). A 500-year flood event during our field season gave us the opportunity to collect erosion data after a major event and validate our erosion hotspot predictions.



Conclusions:

- Bedrock exposure, stream power based erosion index, and bluff proximity effectively predicted erosion hotspots.
- SSURGO soils data are too aggregated to provide enough detail for this type of high-resolution model.
- A logistic model was not effective in predicting erosion hotspots because it was unable to model the concept
- A threshold-based model was 70% accurate for predicting hotspots.
- Limitations of the threshold based model include:
 - There are differences in erosion locations between a single large-scale flood event (e.g. 500 year event) and a bankfull event (e.g. 1 – 2 year event)

- Model is unable to predict local variation such as large woody debris or vegetation patterns which may influence erosion hotspots at a local scale.

Future Work:

- The model may improve if compared/calibrated to a long-term field dataset based on bankfull events.

Availability of high-resolution bedrock exposure data is imperative to use this model effectively.

Erosion potential is very low where the channel is bedrock, but because these areas often have high stream power, the model will artificially predict high potential if bedrock areas are not identified.

- More work is needed to evaluate the potential of feature extraction tools to remotely identify bedrock exposure.
- Even if only low-resolution bedrock exposure data is available, this tool is a good first-pass for resource managers to identify candidates for future restoration and slow-the-flow work.