

FY21 RSM IPR

Coastal and Hydraulics Laboratory

Geomorphic Analysis Package Phase II

Casey Mayne



BLUF: The effort is a continuation of the Geomorphic Analysis Package (GAP) tool development. This phase focused on further refinement of the GAP and the development of tools to aid in slope and stream power analysis using stage-discharge from long term stream gaging stations.

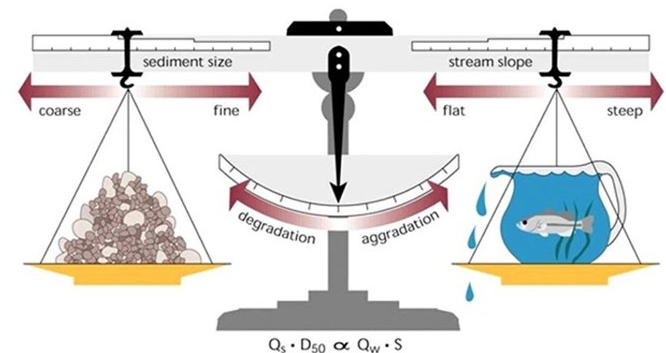
Challenge/Objectives

- Develop conceptual structure for the slope and stream power components
- Integrate new features within the existing GAP framework
- Review options for improving distribution and accessibility

Approach: Using R programming language, develop a beta tool for performing slope and stream power analysis using stage-discharge data and incorporate into existing GAP



Lane's Balance



FY21 RSM IPR

ERDC-CHL: Geomorphic Analysis Package Phase II



District/Other USACE PDT Members

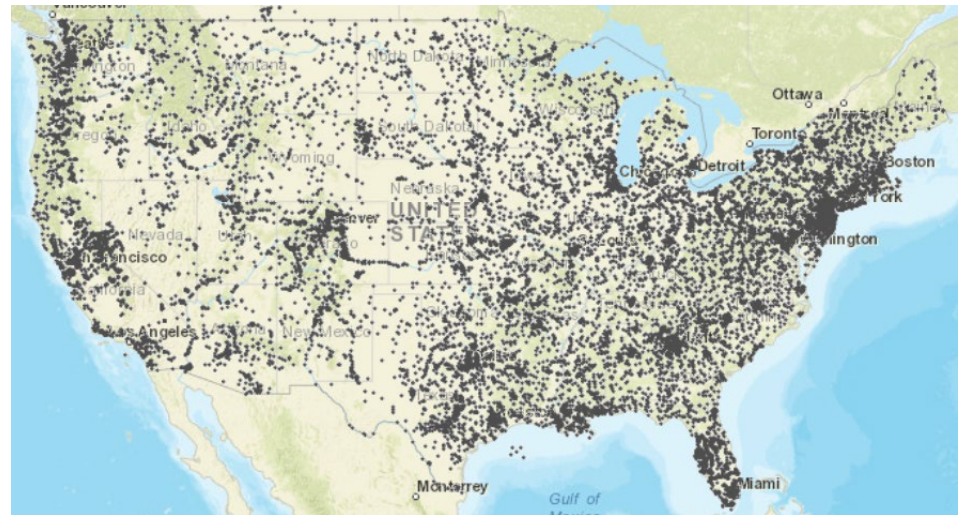
Casey Mayne (ERDC-CHL)

Stakeholders/Partners

Dr. Katie Brutsche; RSM Program Manager

Leveraging/Collaborative Opportunities

- The primary leveraging for this project will be through the use of publicly available data sets
- The opportunities for collaboration have been through tool application and testing during on-going research efforts
- Potential for future collaboration with other RSM efforts



FY21 RSM IPR

ERDC-CHL: Geomorphic Analysis Package Phase II



Accomplishments/Deliverables

- Developed the initial beta tool for conducting slope and stream power analysis
- Integrated the beta tool into existing GAP tool suite
- Conducted beta testing and demonstrated utility through on-going research efforts
- Incorporated additional data management/editing features within GAP
- Explored options for improving distribution/accessibility
- Initiated the development of an R-package

The screenshots show the GAP software interface. The top screenshot displays a 'Data Import' window with a table of data points. The middle screenshot shows a 'Data Data' window with a table and a line graph. The bottom screenshot shows a 'Data Data' window with a table and a scatter plot.

IMPORT

REVIEW

OUTPUT



FY21 RSM IPR

ERDC-CHL: Geomorphic Analysis Package Phase II

- Managing the complexity of the program as new components are added
- Defining the limits of the tool in terms of functions/features
- Addressing data issues and/or limitations
- Improving user accessibility and providing supporting documents

The screenshot displays the GAP (Geomorphic Analysis Package) software interface. The left sidebar contains navigation options: Data, Data Import, View Data, Data Engineering, Specific Gage Tabs, Model, Predictions, Summary, Plots, Diagnostics, Model comparison, Extras, Slope Curve, and Info and disclaimer. The main panel is titled 'Slope Record Development' and includes several configuration sections:

- Select Reference Discharge:** Helena_Q_Daily_user
- Time Column:** Date
- Discharge Column:** Discharge
- Flagged Data:** data_check
- Select Upstream Gages:** Hickman_Daily_user
- Select Downstream Gages:** Osceola_Daily_user, Memphis_Daily_user, Helena_Daily_user, Arkansas_City_Daily_user
- Time Column(s):** Date
- Gage Height Column(s):** Gage

Below the settings, a data preview shows 117,495 rows and 12 columns. The columns are key, key_1, key_2, t_var, dec_date, q_var, h_var_1, h_var_2, distance, mi, s, and qs. The data is grouped by key, key_1, and key_2.

At the bottom, a line graph plots discharge (qs) over time (Year) for five different reaches: Hickman.Arkansas City, Hickman.Helena, Hickman.Memphis, and Hickman.Osceola. The y-axis ranges from 7.0e-05 to 9.0e-05, and the x-axis ranges from 1950 to 2000. The graph shows fluctuating discharge levels across the different reaches over the period.

FY21 RSM IPR

ERDC-CHL: Geomorphic Analysis Package Phase II



Benefits:

- Incorporated additional tools to an existing framework, expanding the utility of the GAP
- Compiled on a free, publicly available software environment for statistical computing. The tool is shareable and works on ACE-IT machines.
- Improved the efficiency and extended the technical capabilities of traditional methodologies through automated processes
- Utilized readily available water-resources data offered by the USGS, and potential to connect to other data sources in the future
- Provided tool for usage and technical support for multiple research efforts conducted over the FY



FY21 RSM IPR

ERDC-CHL: Geomorphic Analysis Package Phase II

Questions?