FY20 RSM IPR Coastal and Hydraulics Laboratory Geomorphic Analysis Package Casey Mayne



BLUF: The effort focused on the development of a tool suite for automating tasks often used to assess the historical stability of a river system. The first component of the GAP established a general framework for the tool suite as well as an initial beta tool for performing specific gage analysis.

Challenge/Objectives

- Automate common tasks and analyses
- Provide flexibility and user interaction
- Offer access to readily available databases
- Supply statistical outputs and support for users

Approach: Establish a framework for the tool suite within R programming language and develop an initial beta tool for performing specific gage analysis using stage-discharge rating curves.





District/Other USACE PDT Members Mr. Casey Mayne (CHL) Stakeholders/Partners Name, agency, email address

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



Accomplishments/Deliverables Lessons Learned

- Established the methodology and framework for the tool suite
- Developed the initial beta tool for conducting specific gage analysis
- Conducted beta testing and demonstrated utility through on-going research efforts
- Provided direct access to waterresources data offered by NWIS database through the USGS, in addition to local data imports
- Modified traditional methodologies to improve the capabilities and flexibility of the specific gage tool









- Balancing automation and user interaction (control)
- Creating a more universal approach
- Addressing data issues and/or limitations
- Scalability and distribution of the beta tool

| GAP: Specific Gage | | | | | | |
|-----------------------|------------------------|------------------------------------|---|--|------------------------------------|------------------------|
| 🛢 Data < | Variable selection | - Time | | X-var | | |
| Data Import View Data | Select Data | 1929-03-27 | | 2020-03-09 58.2 | 70,178 | 124,000 |
| | 02486000_Measured_usgs | ▼ 1929-08-27 1989-03-27 1949-00-26 | 1959-03-25 1969-03-25 1979-03-25 1969-03-24 | 1999-01-24 2009-03-23 20090909899 56.2 12,452 24,848 | 37,244 49,640 62,038 74,432 86,828 | 99,224 111,620 124,000 |
| | Response Variable | 1.00 - | | 1.00- | | |
| ecific Gage Tabs | gage_height_va | • 0.75- | | 0.75- | | |
| 🗱 Model | Explanatory Variable | | | | | |
| Predictions | discharge_va | ▼ \$10.50 - | | 30.00- | | |
| 2 Summary | Time Variable | 0.25 - | | 0.25- | | |
| 🗠 Plots | measurement_dt | ▼ | | | | |
| 😣 Diagnostics 🗸 | Edge Adjustment | 0.00 | 1950 1975 | 2000 | 4000 80000 | 120000 |
| Model comparison | Flagged Data | 100- | dec_date | | x_var | |
| | data_check | • • | | 35- | 844 6000 0000 C | 56.24 |
| ras | Time Window | 0.75 - | | 1 1 | · | w |
| 📽 Slope Curve | 7 | 9 0.50 * | | | | 0.75 |
| | X-var Window | | | 25- | | 0.50 |
| Info and disclaimer | 2 | 0.25 - | | | | |
| | Min. Observations | 0.00- | | | | |
| | | 1925 | 1950 1975 dec_date | 2000 20000 | 40000 60000 X_V3r | 80000 |
| | Apply | | | | | |
| | Segmented regression | Enter a name for the mode | l | | | |
| | | | | | | |
| | | Save model | | | | |
| | | | | | | |
| | | Delete selected model | | | | |

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Benefits:

- Established framework which could serve as a foundation to future work or tool development
- 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
- Advanced techniques for developing rating curves, specifically in situations where data limitations exist



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