

Quarterly Progress Report:

Project Number and Title: #C5.2018: Leveraging High-Resolution LiDAR and Stream Geomorphic Assessment Datasets to Expand Regional Hydraulic Geometry Curves for Vermont: A Blueprint for New England States

Research Area: Thrust 1 Develop improved road and bridge monitoring and assessment tools

PI: Kristen Underwood, Ph.D.; University of Vermont

Co-PI(s): Arne Bomblies, Ph.D.; Donna M. Rizzo, Ph.D.; University of Vermont

Reporting Period: 4/1/2020 – 6/30/2020

Submission Date: 6/30/2020

Overview: (Please answer each question individually)

- GIS analysis is complete and has developed catchment-scale variables that will serve as potential explanatory variables in statistical models to predict bankfull channel dimensions for ungauged locations.
- Statistical analyses are underway to develop relationships between catchment- and reach-scale explanatory variables and bankfull channel dimensions (response variables) compiled from stream geomorphic assessment (SGA) datasets.

Provide context as to how these activities are helping achieve the overarching goal(s) of the project...

By relying on SGA datasets to expand the number of observations, and by exploring additional predictor variables that may better refine regression estimates, our objective is to improve the prediction ability and reduce estimation uncertainty using Regional Hydraulic Geometry Curves.

Table 1: Task Progress			
Task Number	Start Date	End Date	% Complete
Task 1: Compile Expanded Set of Observation Sites	6/1/2019	1/31/2020	100%
Task 2: Compile Regression Variables	9/1/2019	6/30/2020	100%
Task 3: Develop and Test Statistical Models	1/1/2020	10/30/2020	40%
Task 4: Summary Report	3/1/2020	1/14/2021	40%
Overall Project:	6/1/2019	Planned End: 5/31/2020 Actual End: 1/14/2021	

Table 2: Budget Progress		
Project Budget	Spend – Project to Date	% Project to Date*
\$141,244	\$128,766	91.2%

**Include the date the budget is current to.*

Describe any opportunities for training/professional development that have been provided...

Masters student, Roberge, completed a multivariate statistics class this semester, successfully defended a research project that leveraged data collected during this TIDC project, graduated from the UVM Civil & Environmental Engineering program, and has started an engineering position with Woodard & Curran, Bangor, ME.

Describe any activities involving the dissemination of research results (be sure to include outputs, outcomes, and the ways in which the outcomes/outputs have had an impact during the reporting period. Please use the tables below for any Publications and Presentations in addition to the description of any other technology transfer efforts that took place during the reporting period.)... Use the tables below to complete information about conferences, workshops, publications, etc. List all other outputs, outcomes, and impacts after the tables (i.e. patent applications, technologies, techniques, licenses issued, and/or website addresses used to disseminate research findings).

Table 3: Presentations at Conferences, Workshops, Seminars, and Other Events

Title	Event	Type	Location	Date(s)
Temporal Stream Gauge Analysis for Clustering Watersheds in and Around Vermont	UVM Masters Project Defense (Sienna Roberge)	Seminar	Via Microsoft Teams	5/6/2020

Table 4: Publications and Submitted Papers and Reports

Type	Title	Citation	Date	Status
Master's Project Report	Temporal Stream Gauge Analysis for Clustering Watersheds in and Around Vermont	Roberge, Sienna, 2020. Temporal Stream Gauge Analysis for Clustering Watersheds in and Around Vermont. Masters Project Report. Univ. of Vermont.	May 2020	Submitted in partial fulfillment of Requirements for the Accelerated Master's Degree Specializing in Civil and Environmental Engineering, University of Vermont

Participants and Collaborators:

Use the table below to list all individuals who have worked on the project.

Table 5: Active Principal Investigators, faculty, administrators, and Management Team Members

Individual Name	Email Address	Department	Role in Research
Kristen Underwood	Kristen.Underwood@uvm.edu	UVM CEE	PI
Donna Rizzo	Donna.Rizzo@uvm.edu	UVM CEE	Co-PI
Arne Bomblies	Arne.Bomblies@uvm.edu	UVM CEE	Co-PI

Use the table below to list all students who have participated in the project during the reporting. (This includes all paid, unpaid, intern, independent study, or any other student that participated in this project.)

Table 6: Student Participants during the reporting period

Student Name	Email Address	Class	Major	Role in research
Sienna Roberge		M.S.	Civil & Env Eng	Data analysis, GIS

Use the table below to list any students who worked on this project and graduated during this reporting period.

Table 7: Student Graduates

Student Name	Role in Research	Degree	Graduation Date
Sienna Roberge	Graduate Research Asst (1/2 time)	M.S.	May 2020

Use the table below to list organizations have been involved as partners on this project and their contribution to the project.

Organization	Location	Contribution to the Project				
		Financial Support Mark the appropriate contribution with an "x"	In-Kind Support	Facilities	Collaborative Research	Personnel Exchanges

Have other collaborators or contacts been involved? If so, who and how? (This would include collaborations with others within the lead or partner universities; especially interdepartmental or interdisciplinary collaborations.)

Table 9: Other Collaborators			
Collaborator Name and Title	Contact Information	Organization and Department	Contribution to Research
Nick Wark, Hydraulics Manager		VT Agency of Transportation	(i.e. Technical Champion)

Who is the Technical Champion for this project?

Name: Nick Wark

Title: Hydraulics Manager

Organization: VT Agency of Transportation

Location (City & State): 219 North Main Street, Barre, VT 05641

Email Address: Nick.Wark@vermont.gov

Changes:

Discuss any actual or anticipated problems or delays and actions or plans to resolve them...

Progress was delayed during the quarter, due to insufficient internet connections for the Masters student assigned to this project. Within this quarter, these tele-working challenges were resolved, and GIS analysis work was able to resume. A no-cost time extension for this grant was requested on March 6, and approved via email by TIDC (Jim Bryce) on April 3, 2020. Updated timelines and Project Info Sheets were supplied to TIDC on April 25 and May 15, 2020. A June 23, 2020, email from Amanda Collamore indicates that this extension was approved.

Extension of the project end date to 1/14/2021 will enable the PI to finish data analysis and reporting amid other ongoing workloads, while working remotely during the ongoing COVID pandemic.

Discuss any changes in approach and the reasons for the change...

Planned Activities:

Description of future activities over the coming months.

- Continue with statistical analyses to generate new empirical relationships.
- Summarize findings in a report.