

PROJECT TITLE

Leveraging High-Resolution LiDAR and Stream Geomorphic Assessment Datasets to Expand Regional Hydraulic Geometry Curves for Vermont: A Blueprint for New England States

STUDY TIMELINE

June 2019 – January 2021

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More information about the VTrans Research Program, including additional Fact Sheets, can be found at:
<http://vtrans.vermont.gov/planning/research>

Leveraging High-Resolution LiDAR and Stream Geomorphic Assessment Datasets to Expand Regional Hydraulic Geometry Curves for Vermont

Problem Statement

Regional hydraulic geometry curves (RHGCs) for Vermont are being updated through development of additional observations and use of newly-available high-resolution lidar and stream geomorphic assessment data to improve the prediction ability and reduce estimation uncertainty using RHGCs.

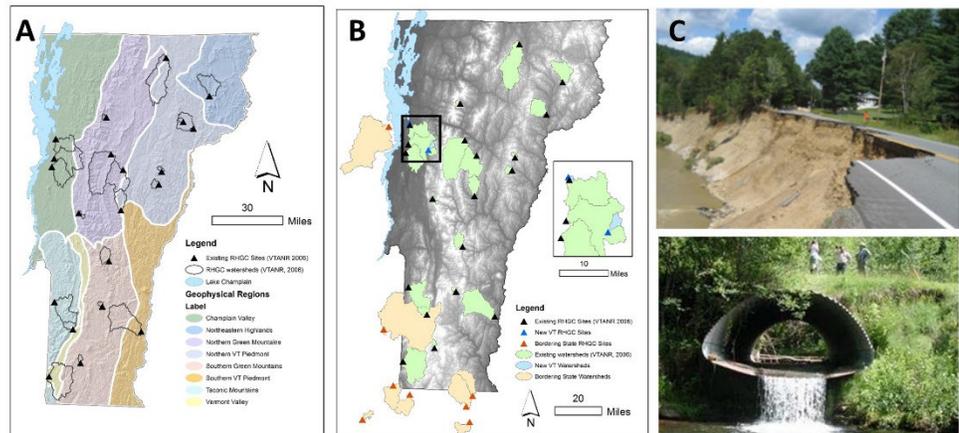


Figure 1: To complement the (A) 21 stations in Vermont upon which original regional hydraulic geometry curves were based, (B) 9 new observation sites have been identified to generate improved curves to support (C) flood recovery efforts along road embankments to restore river cross sections of sufficient width to convey bankfull flows, as well as improve sizing of crossing structures.

Methodology

We have identified 9 additional observation sites and a list of predictor variables, additional to drainage area, that may relate to the bankfull channel width, depth, cross-sectional area, and discharge – including, but not limited to main-channel slope, elevation, mean annual precipitation, mean annual runoff, mean annual snowfall, percent carbonate bedrock, percent basin storage (lakes, ponds, wetlands), and percent land cover.

Next Steps

Applying advanced statistical techniques (e.g., clustering, penalized logistic regression, multiple linear regression, Bayesian inference), we are developing and exploring additional predictor variables that may better refine regression estimates. Observation sites are being stratified by biogeophysical region, hydrologic landscape region, and hydrologic character of the watershed.

Potential Impacts and VTrans Benefits

Updated curves will support sizing of stream crossing structures as well as embankment design for roads and rails that share narrow valleys with rivers. Geomorphically-compatible structures will have greater resilience to extreme flood events and will support aquatic organism passage objectives.