Quantifying Sediment and Phosphorus Loading from Streambank Erosion using LiDAR Scanning

Hanna Anderson
University of Vermont

NSF

VERMONT EPSCoR

Vermont EPSCoR CWDD Center for Workforce Development & Diversity AT SAINT MICHAEL'S COLLEGE

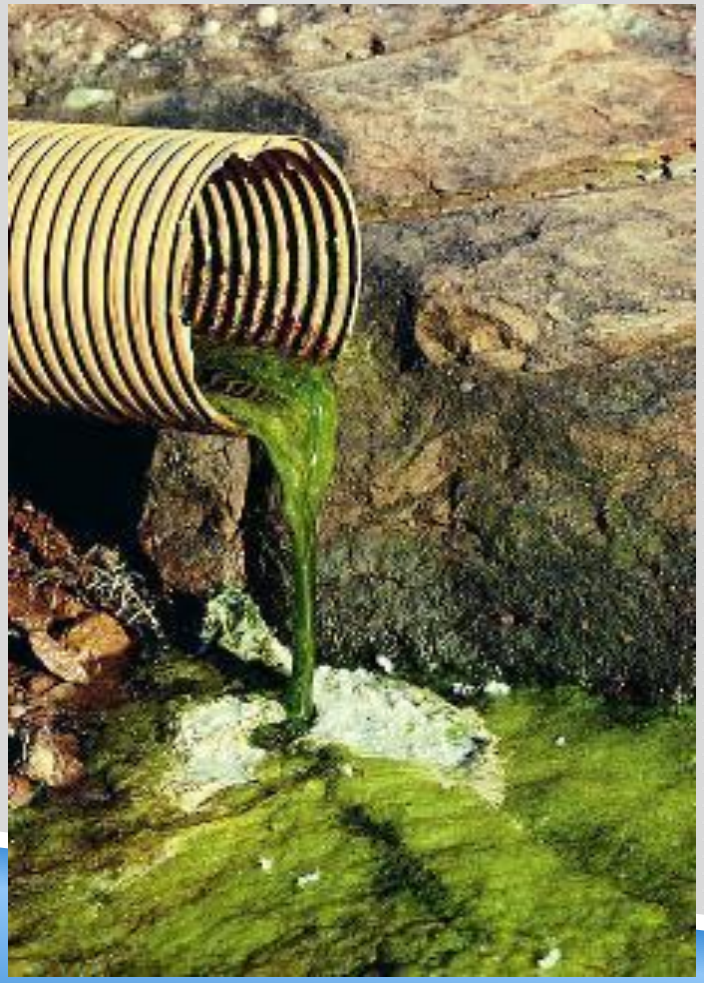
RACC Research on Adaptation to Climate Change

Sediment Plume from Otter Creek entering Lake Champlain after Hurricane Irene

Courtesy of Bill Howland, Lake Champlain Basin Program

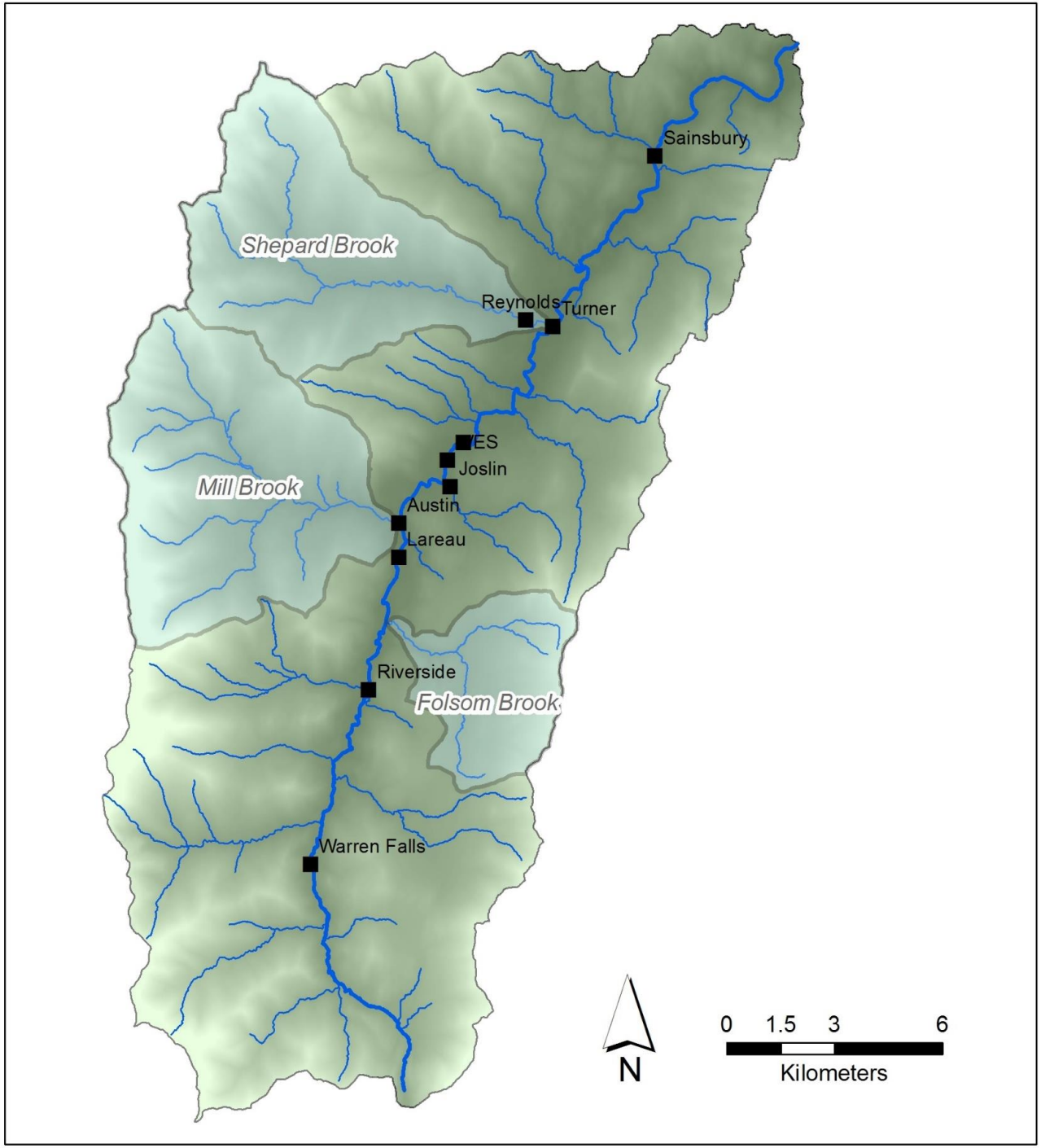
Sources of Nutrients

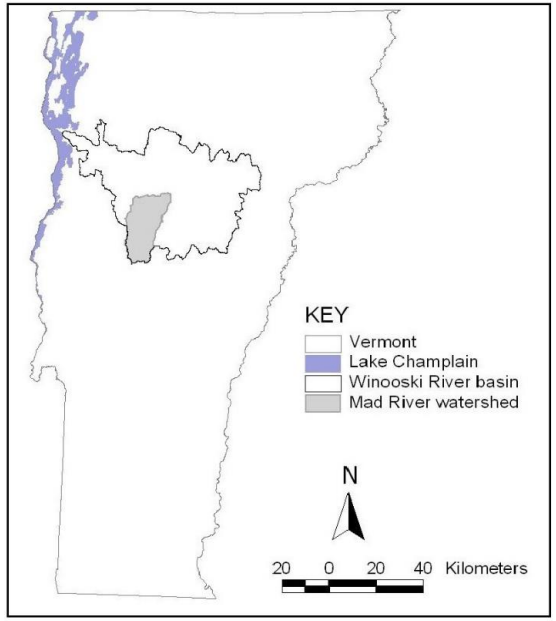
Point Source



Non-Point Source

Images courtesy of Chuck Becker and Become Ecologically Friendly





Legend

■ Streambank

Maps courtesy of Kristen Underwood

3D Terrestrial Laser Scanner

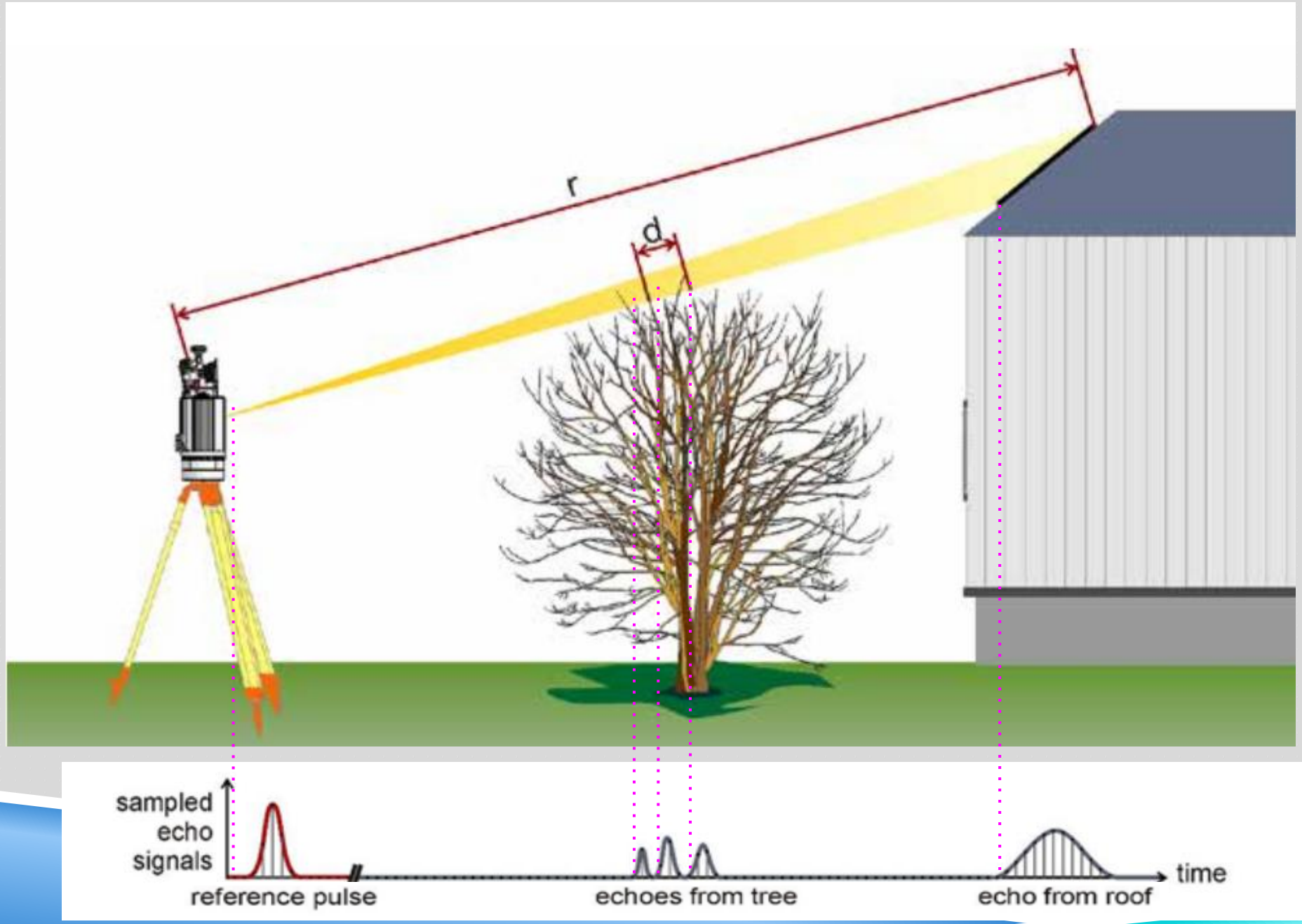
LiDAR: Light detection and Ranging

- Infrared laser beam
- Rotating mirror
- GPS receiver and camera

Technical System

- Echo Digitization
- Ranges up to 1400m
- High resolution with <0.1 cm accuracy

Image courtesy of Kristen Underwood



Images courtesy of RIEGL

Research Progress

Multiple scans throughout the summers

- Permanent tie points

Analyze 3D point clouds

- Volume calculations
- Estimate sediment and phosphorus loadings

Next Steps

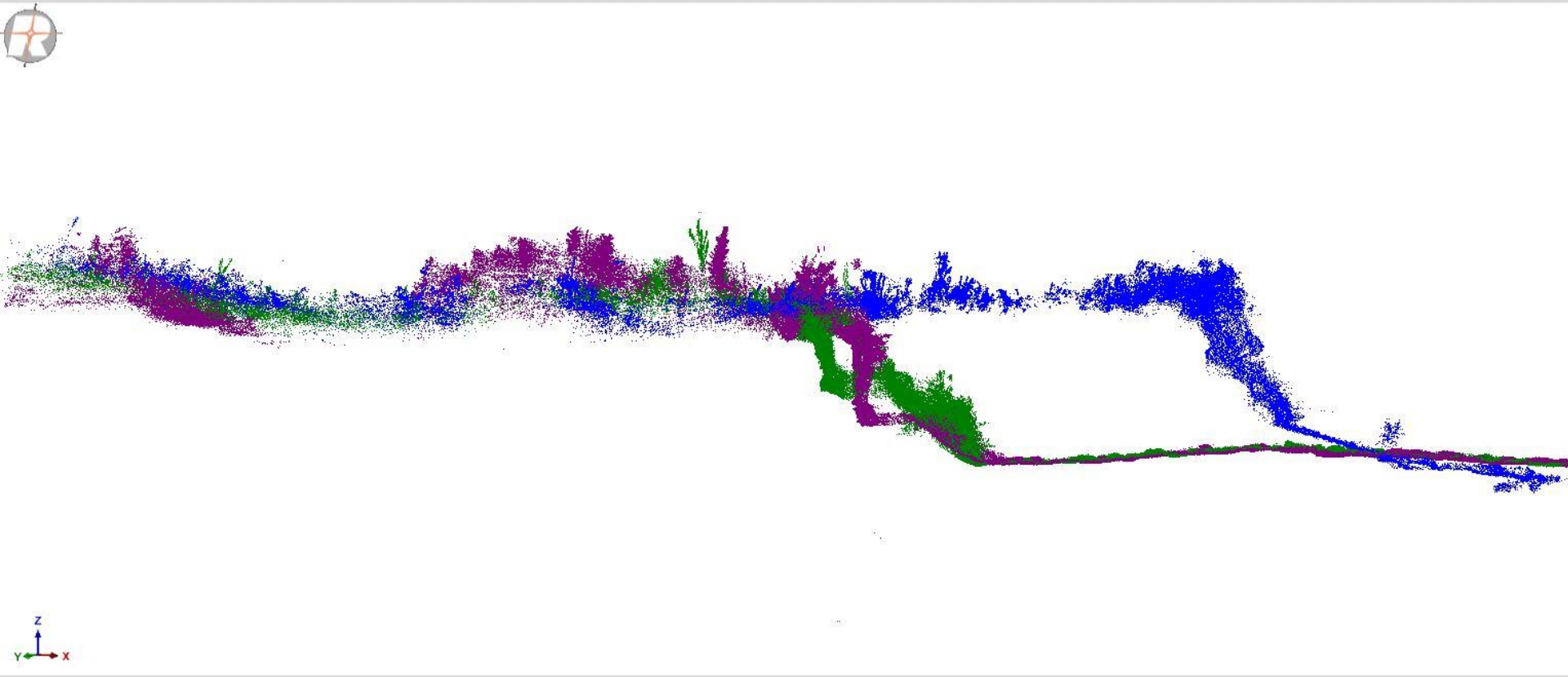
- Calibrate hydrological models of the watershed

LiDAR Results

Streambank prior to July 3-4, 2013 storm

Streambank after the July 3-4, 2013 storm

Side Profile



- Blue scan on June 20, 2013
- Purple scan on July 31, 2013
- Green scan on June 04, 2014

The Big Picture

- Combine data
  - Streambank monitoring
  - In-stream monitoring
- Refine the average sediment and phosphorus loading estimates from bank erosion
- Calibrate hydrological models of the watershed

QUESTIONS?

I would like to thank Scott Hamshaw, Kristen Underwood, Jody Stryker, Dr. Mandar Dewoolkar, Dr. Donna Rizzo, and Dr. Arne Bomblies for their continued support.