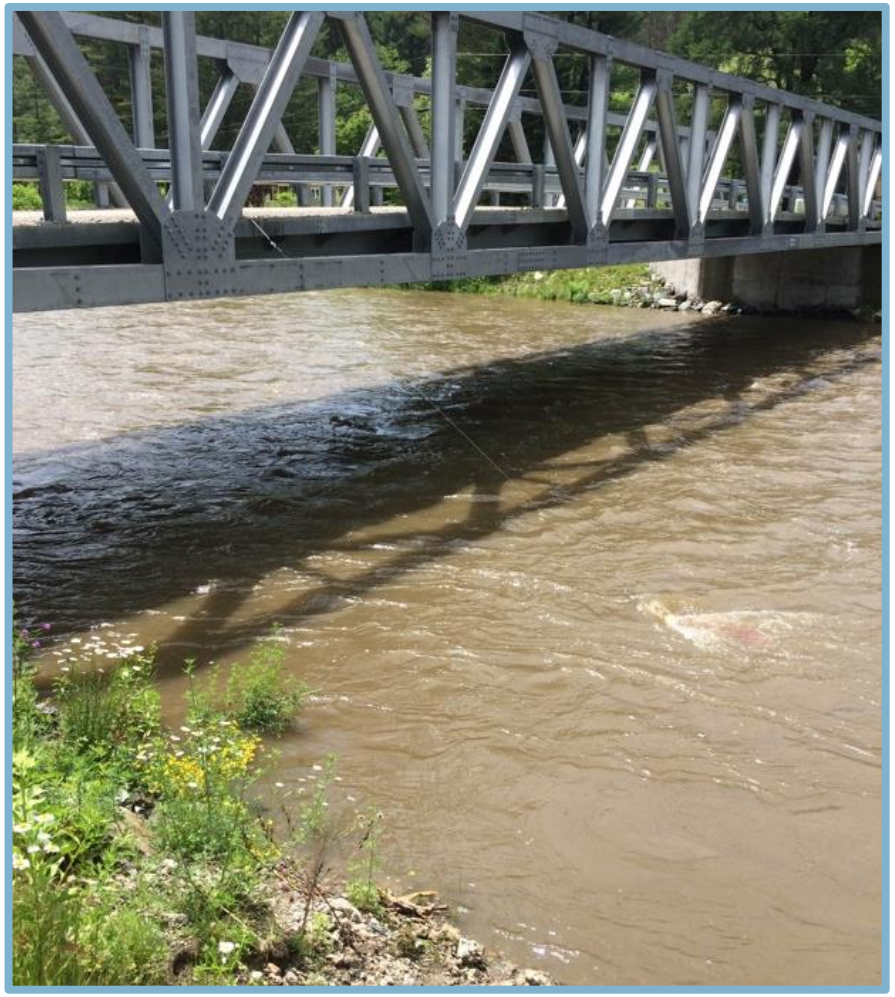
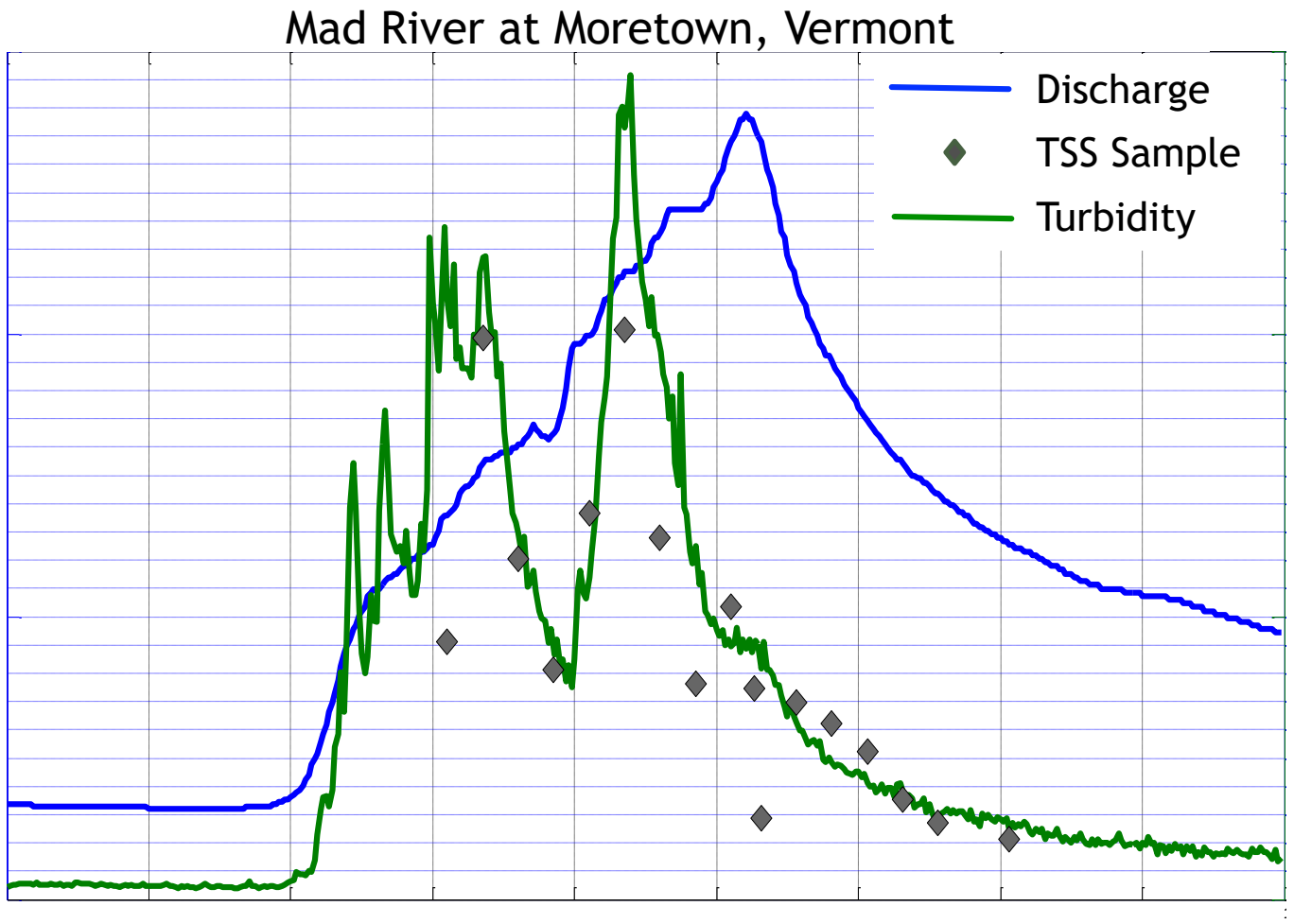
STREAMBANK EROSION AND PREDICTION OF SUSPENDED SEDIMENT FLUX

SCOTT HAMSHAW | FEBRUARY 6, 2016

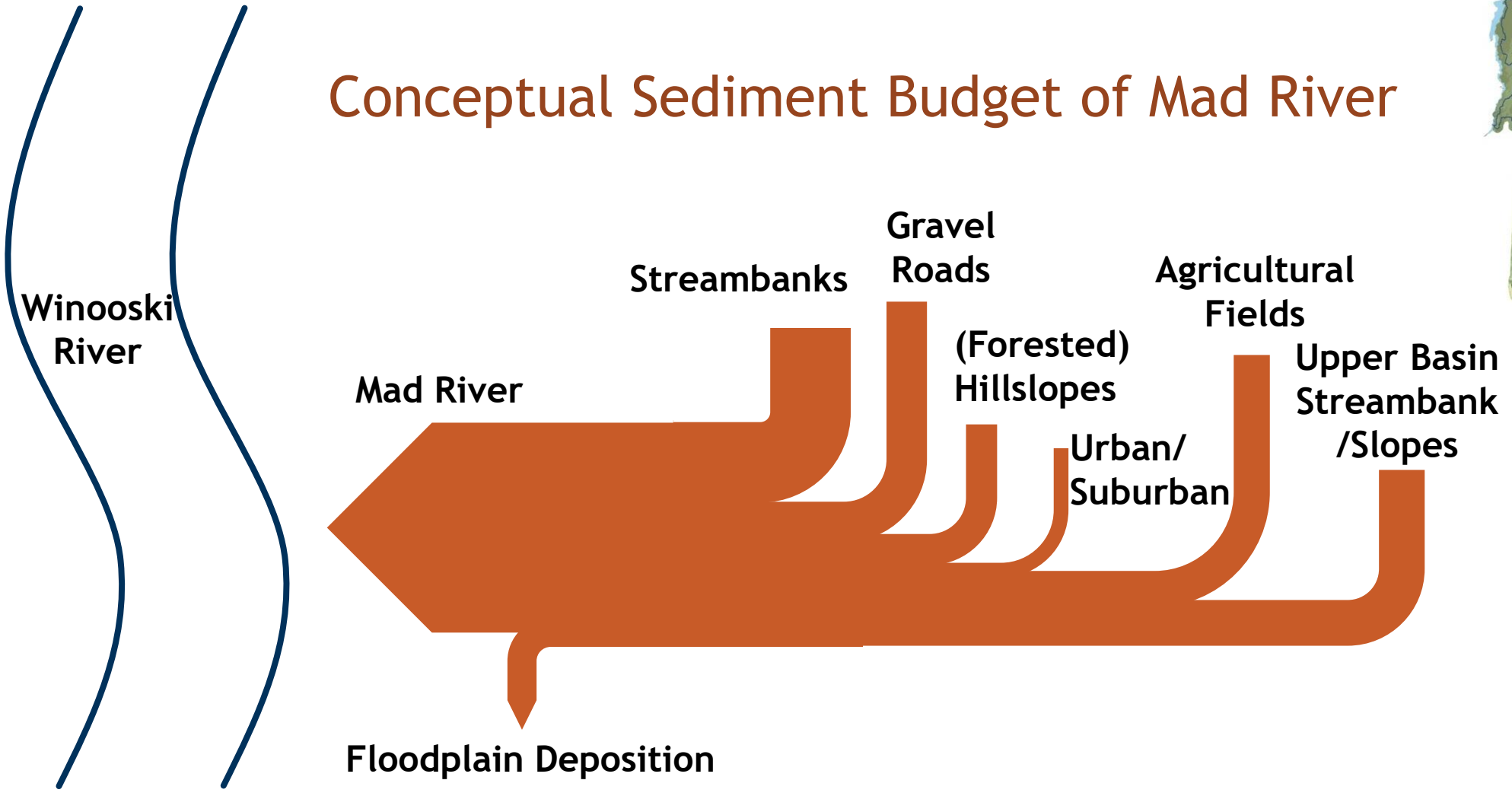
MOTIVATION:
CHALLENGES IN SEDIMENT STUDIES





CONTEXT:
ESTIMATE QUANTITIES AND SOURCES OF SEDIMENT FLUX

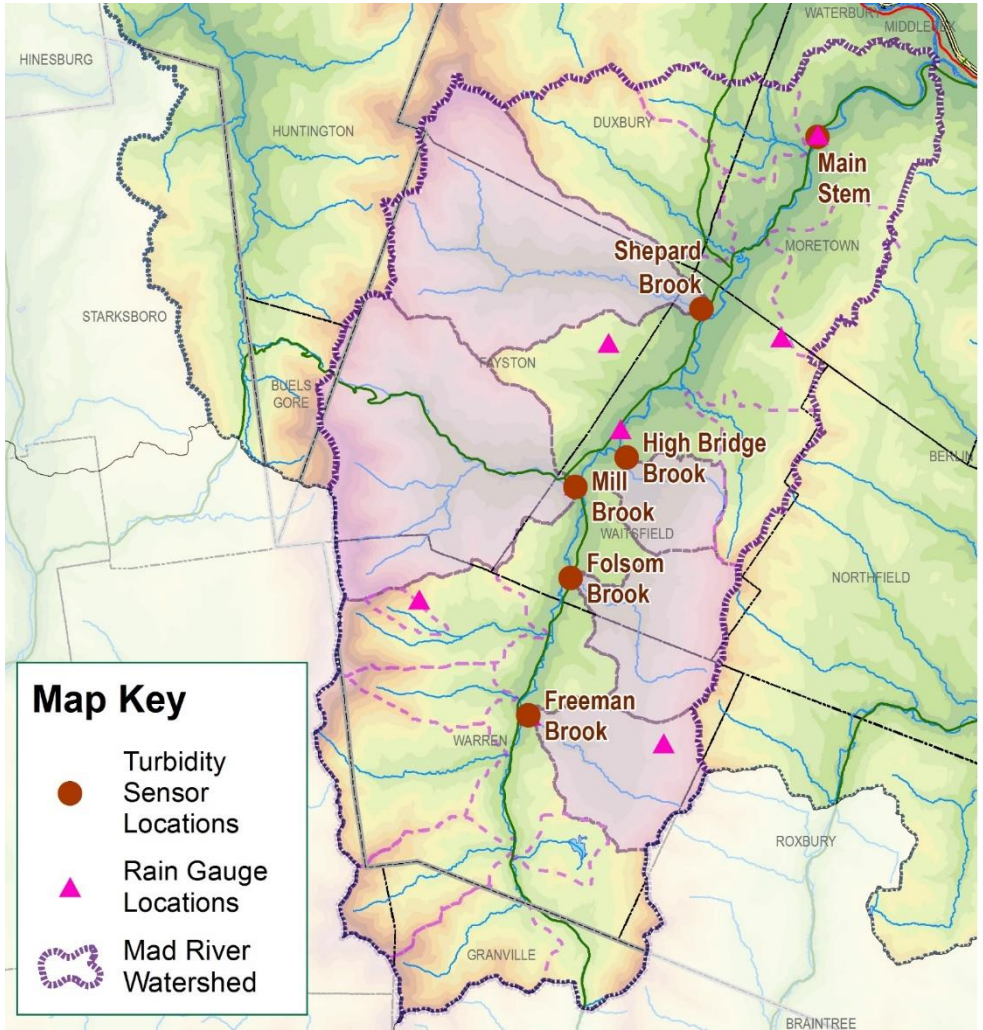
Conceptual Sediment Budget of Mad River



THREE YEARS OF SEDIMENT MONITORING IN MAD RIVER WATERSHED

- Turbidity sensors to capture near real-time sediment concentration

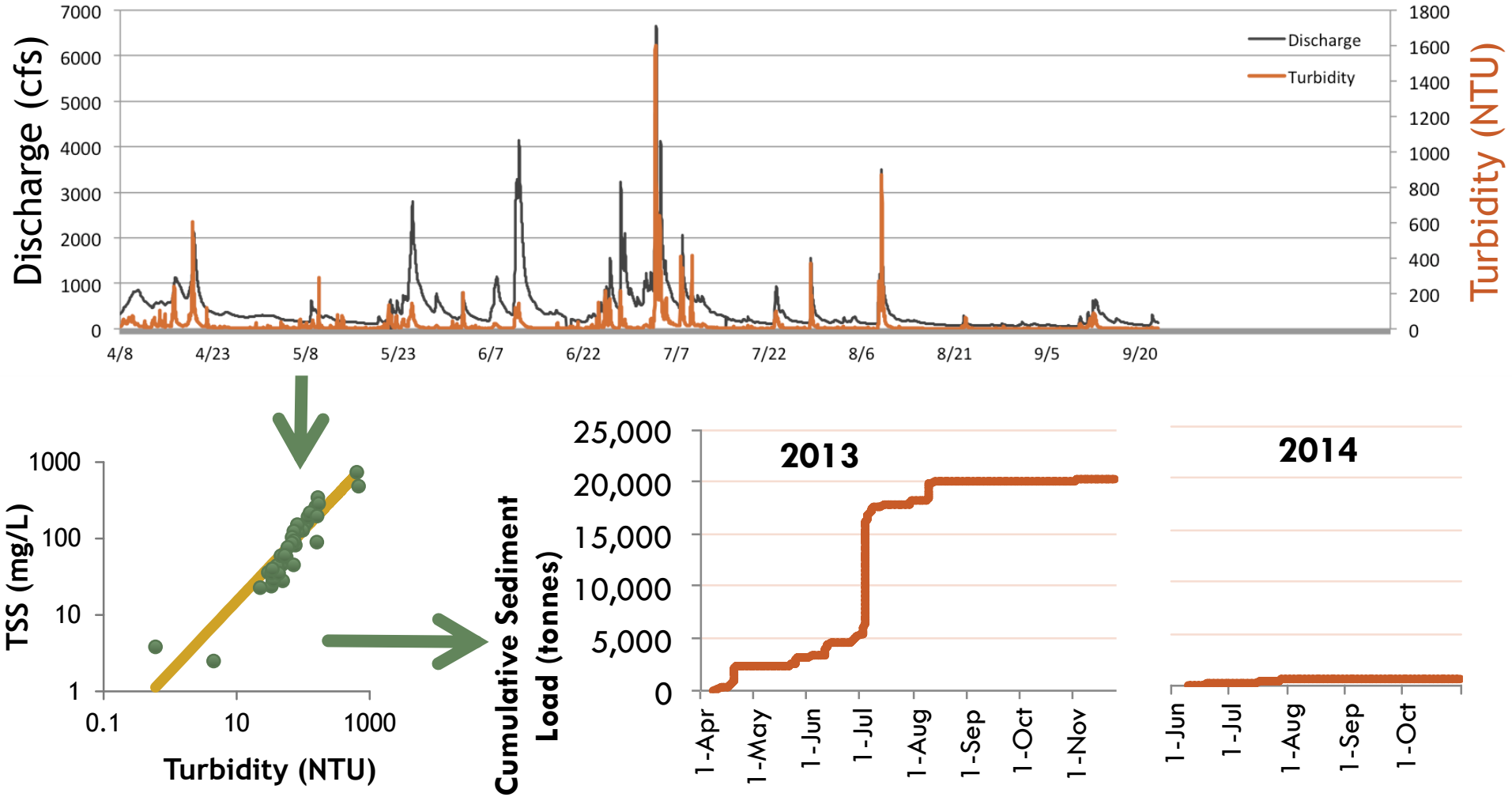
- Coordination with RACC River ISCO sampling efforts and team



SEDIMENT MONITORING SITES

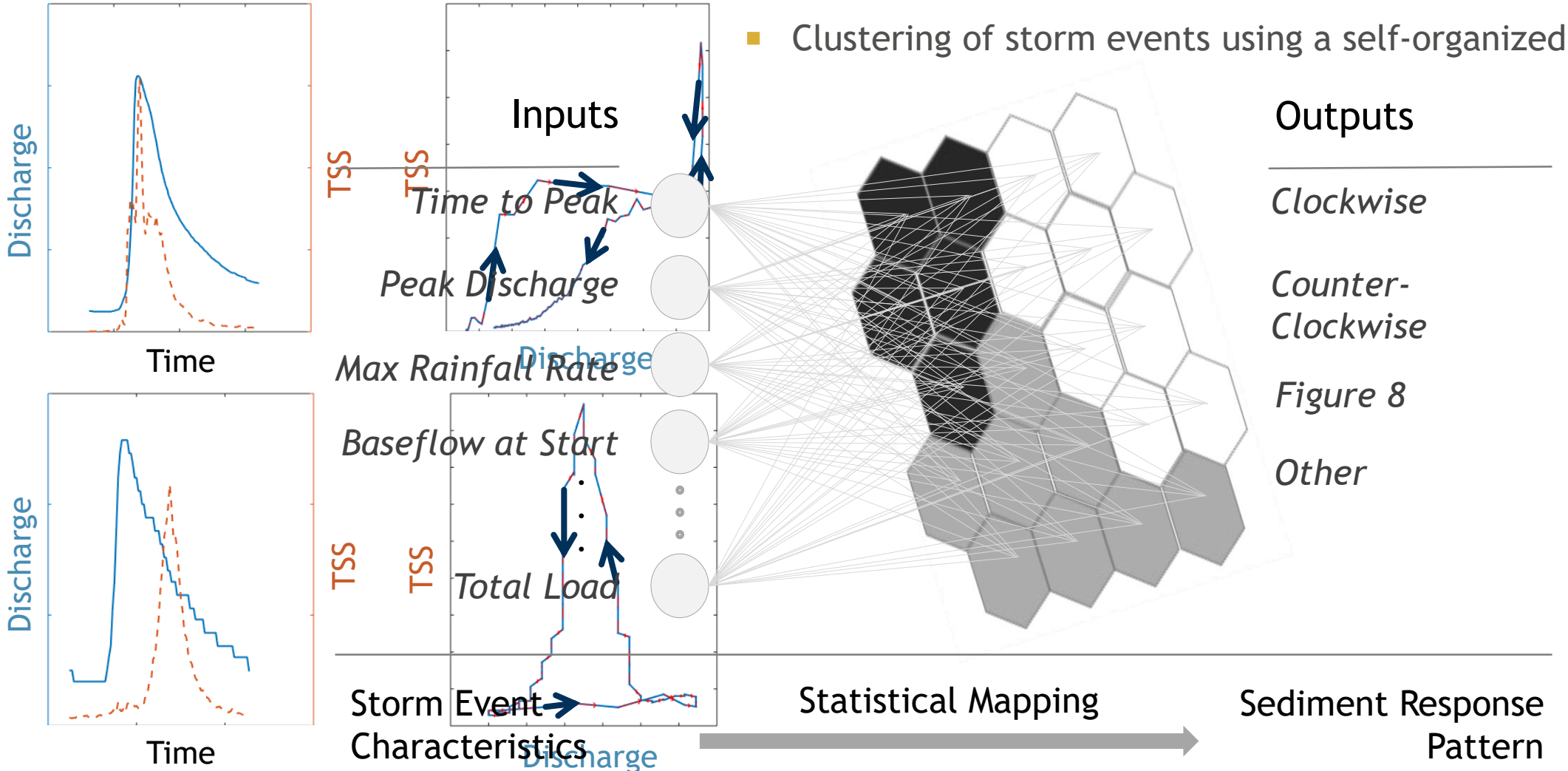
0 4 8 km

SEDIMENT LOAD ESTIMATION



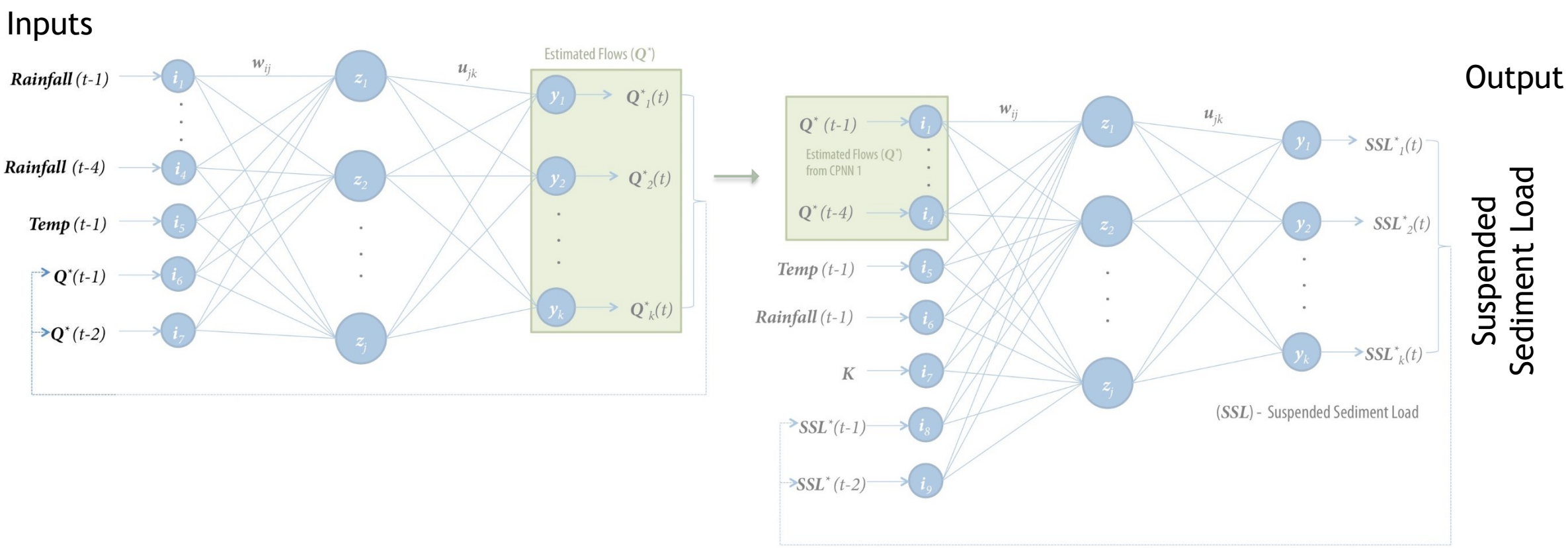
CHARACTERIZING SEDIMENT RESPONSE DURING STORM EVENTS

- Clustering of storm events using a self-organized map

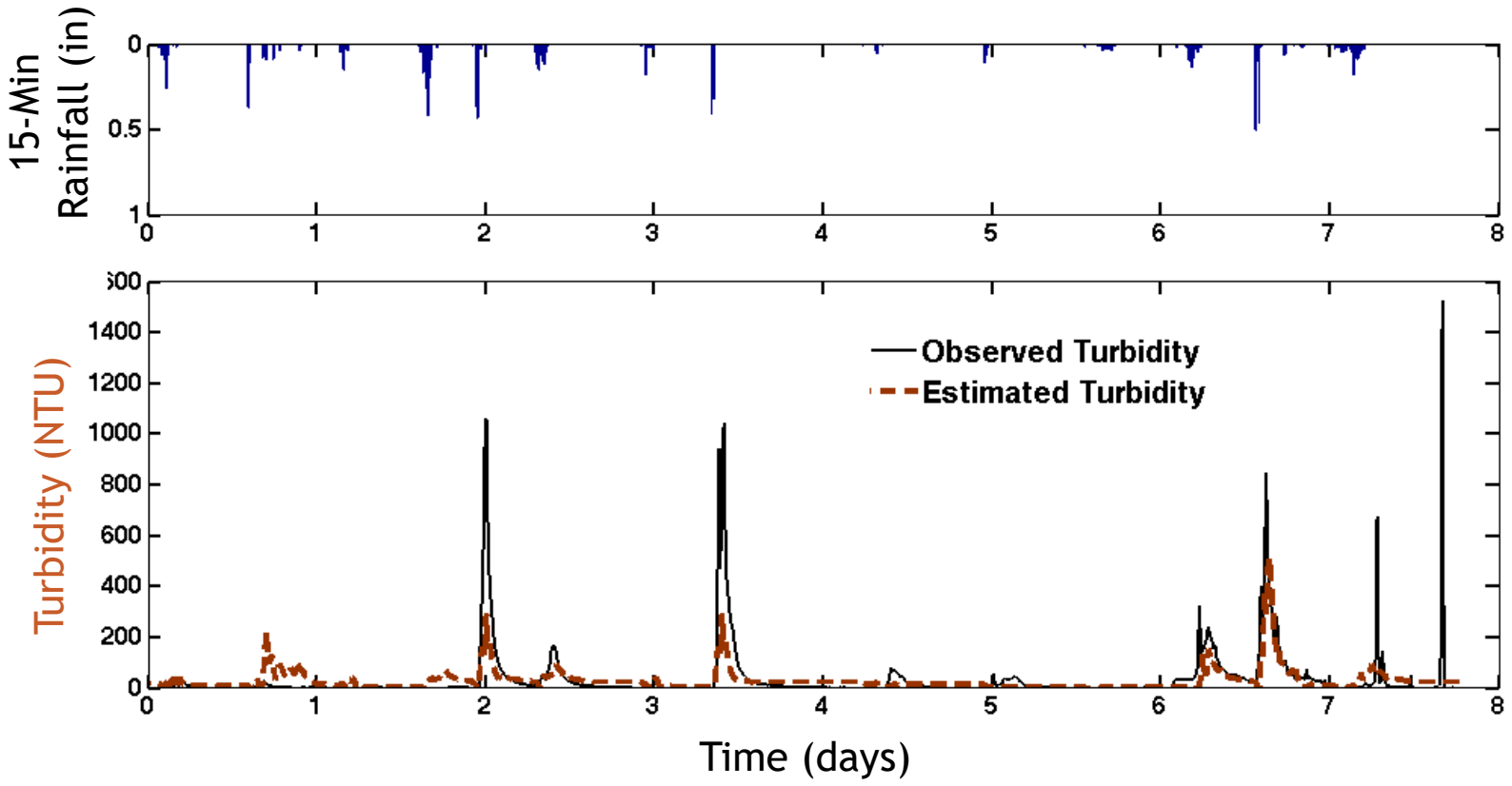


PREDICTION OF SUSPENDED SEDIMENT LOAD

- Hierarchical ANN model uses predicted streamflows as an input to predict sediment load



FORECASTING SUSPENDED SEDIMENT LOAD



- Test predictions in other similar watersheds
- Utilize future climate simulations of meteorological data

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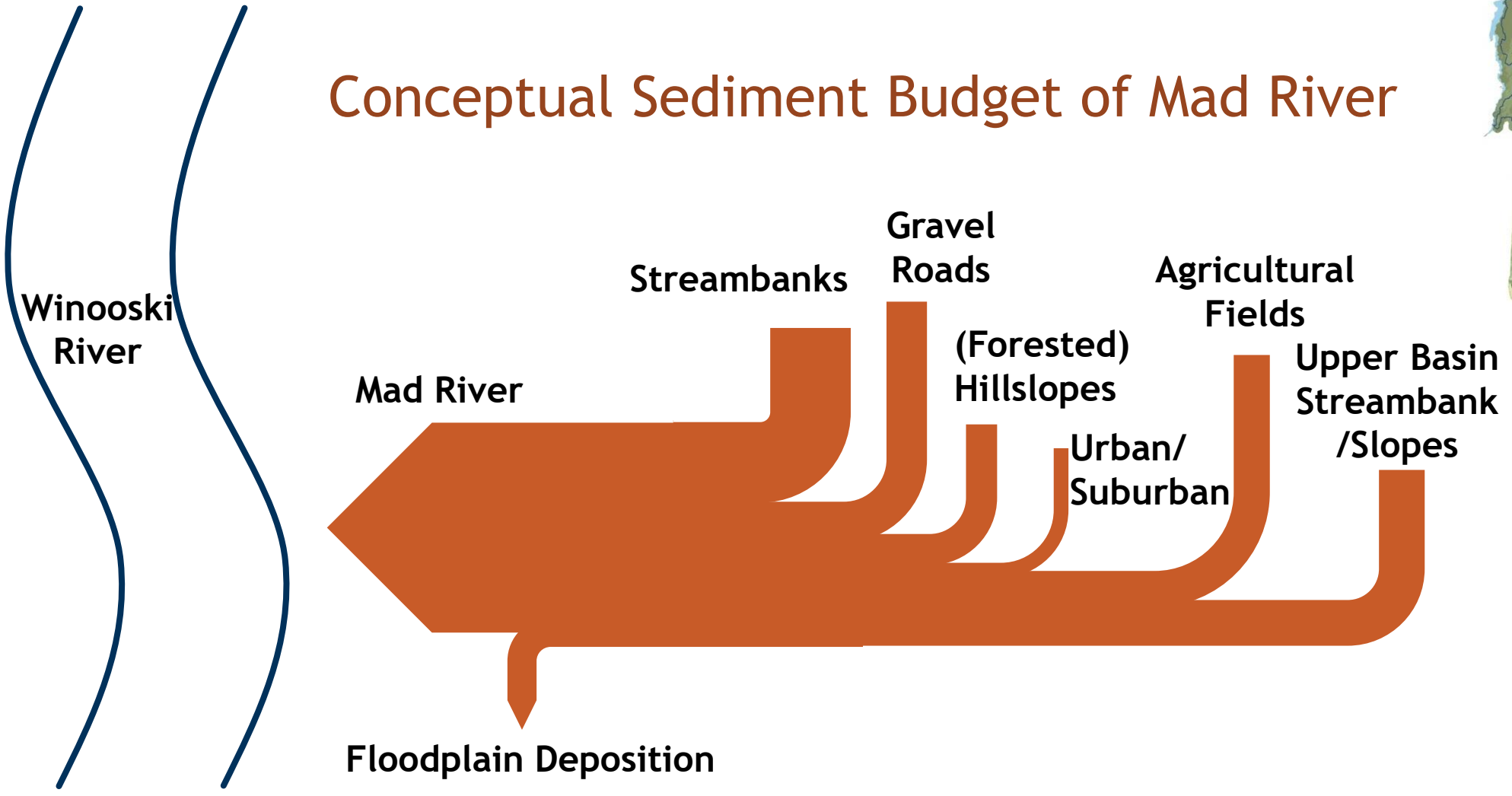
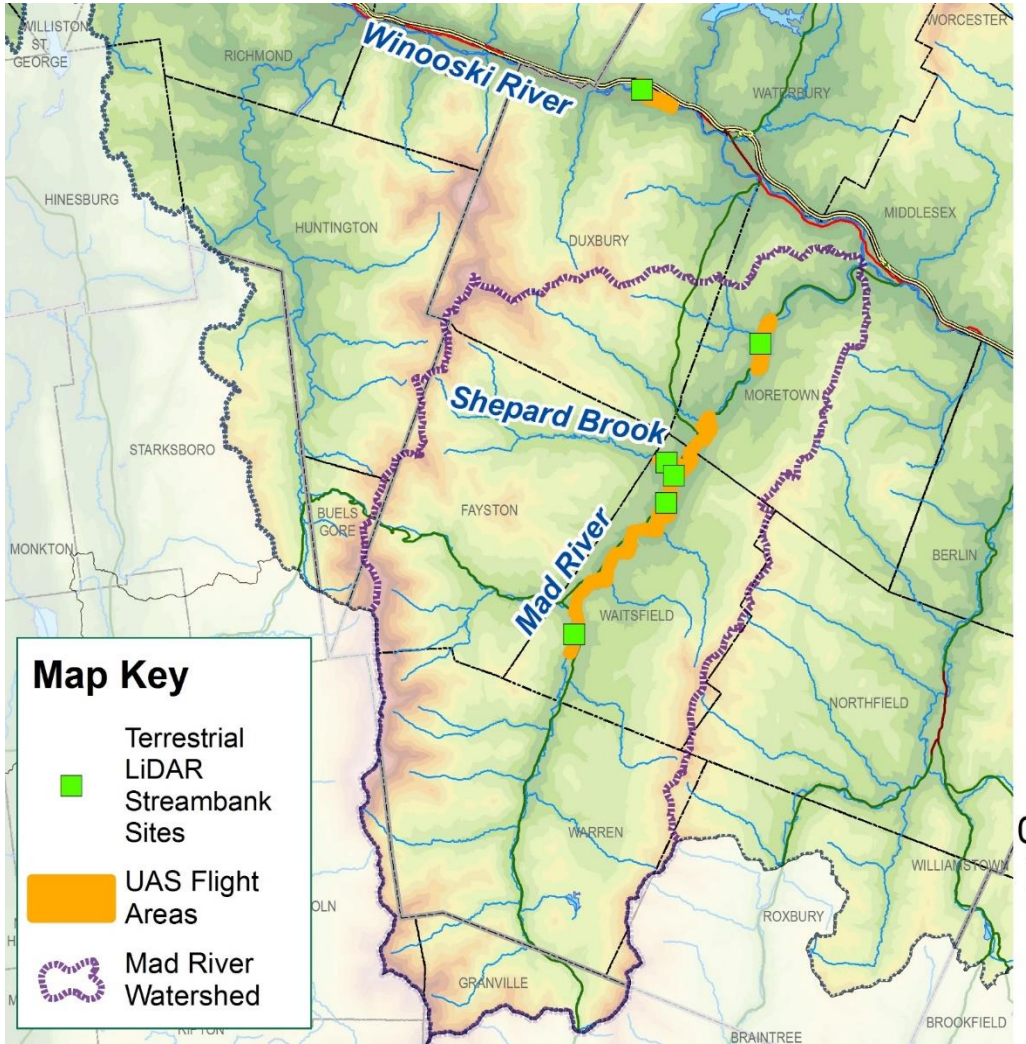


OVER 20 KM OF RIVER CORRIDOR FLOWN WITH UAS

- SenseFly eBee Unmanned Aircraft System (UAS) used

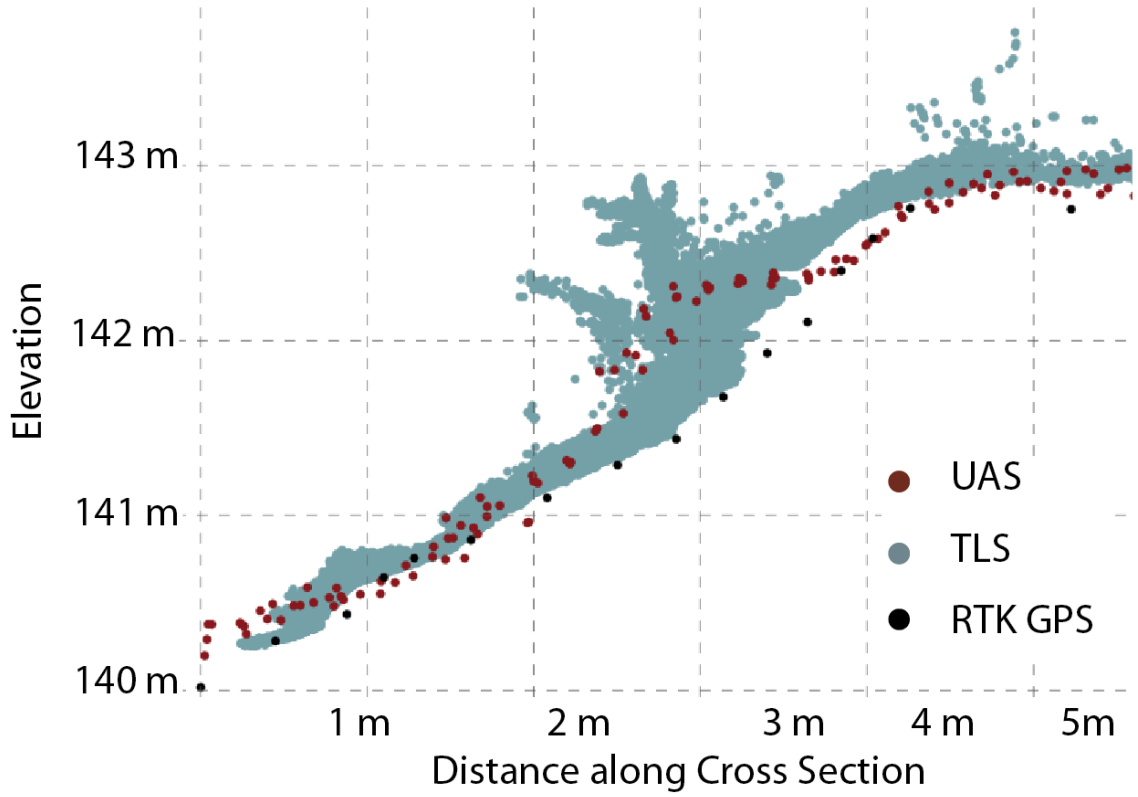
- Six comparison sites with terrestrial LiDAR

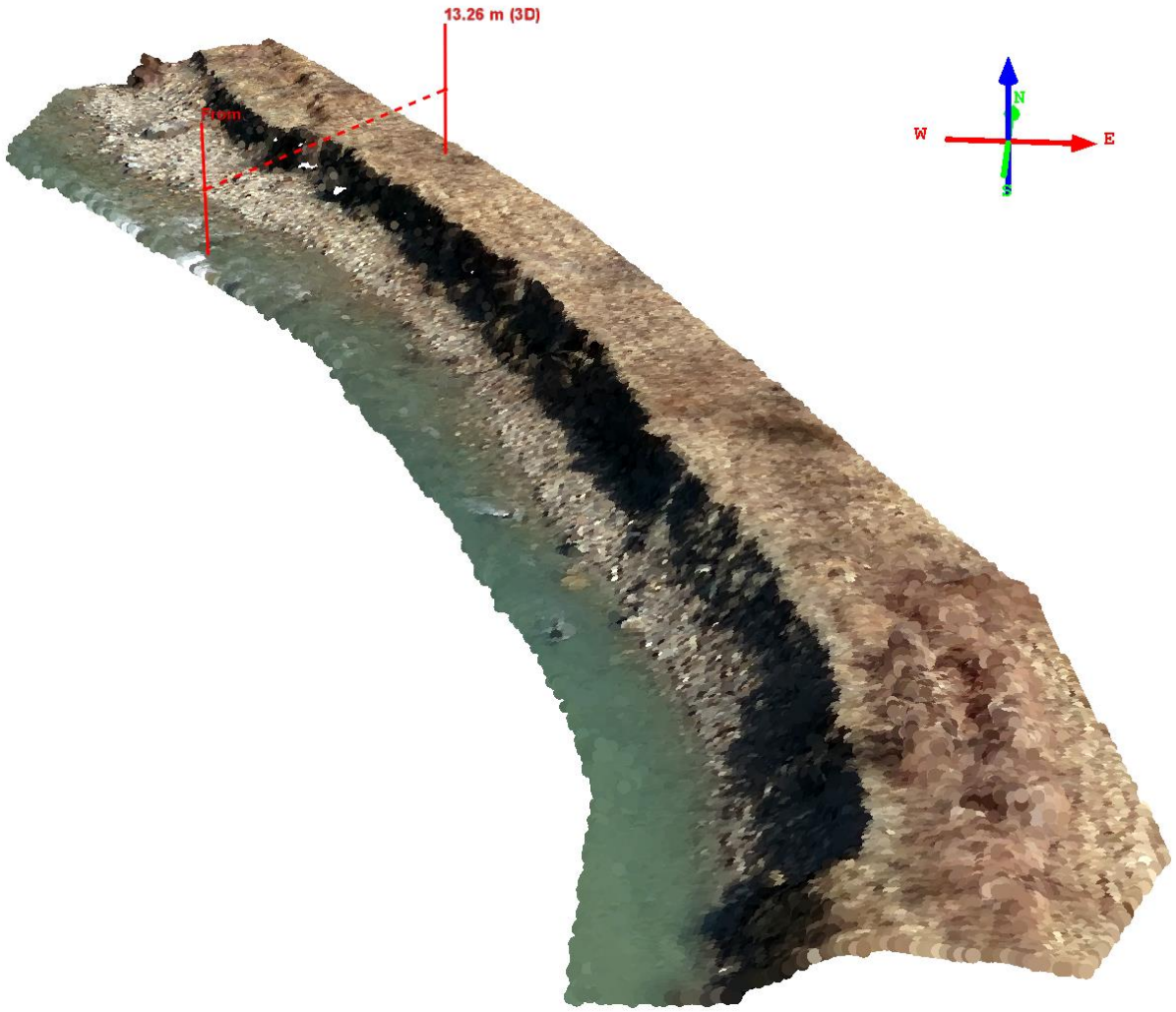


UAS-LIDAR SITES

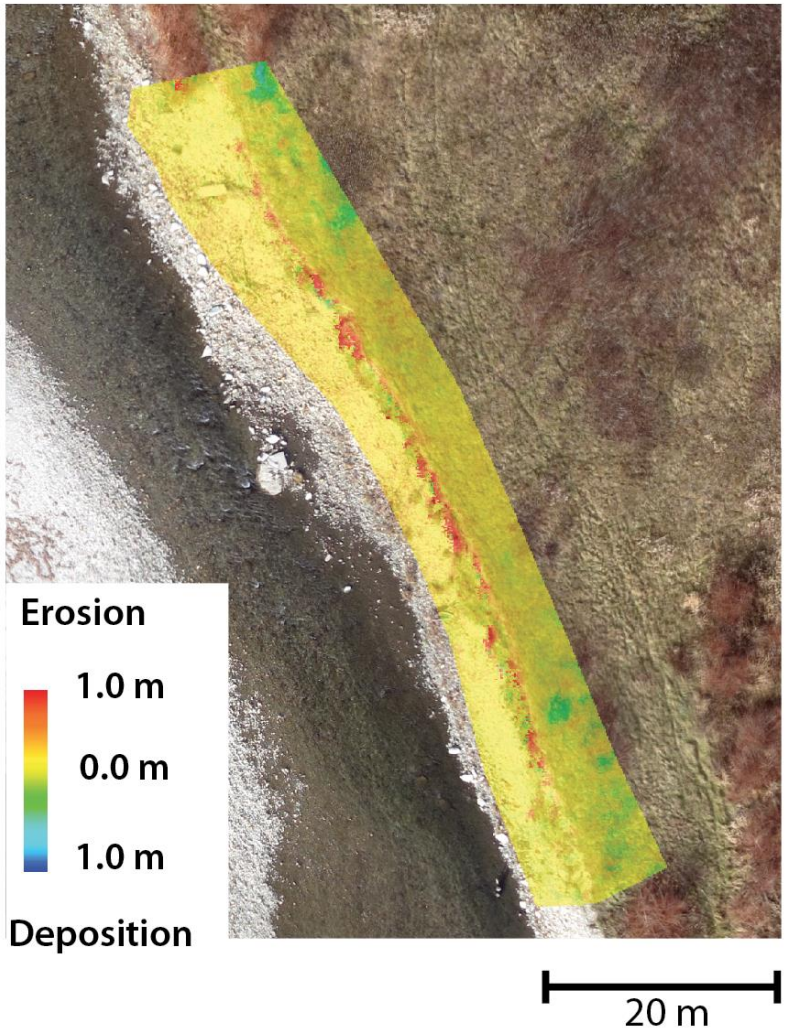
0 5 10 km

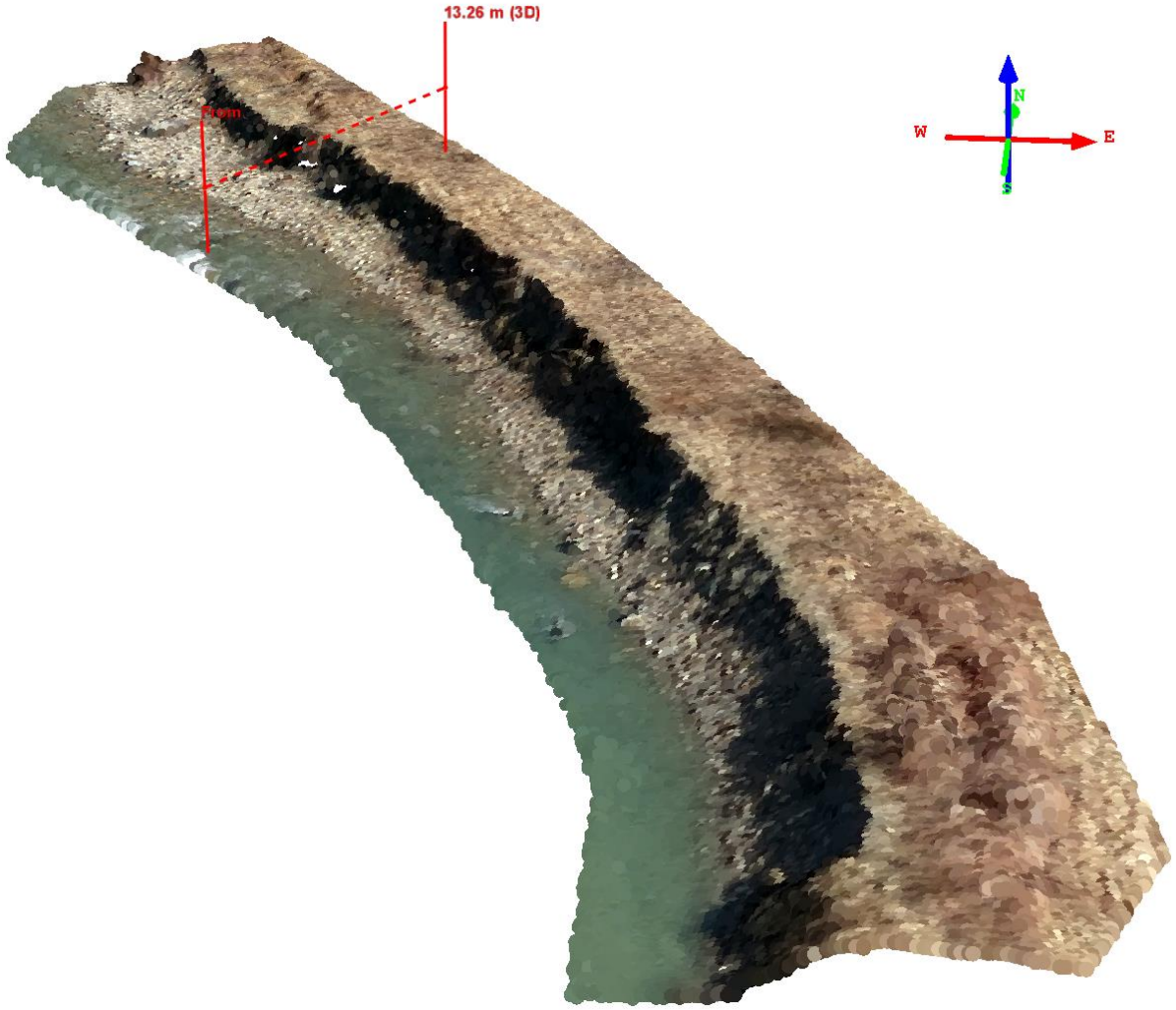
MEASUREMENT OF BANK SURFACES USING AN UAS: ACCURACY ASSESSMENT





MEASUREMENT OF BANK SURFACES USING AN UAS: CHANGE DETECTION





PUBLICATIONS

- Hamshaw, S.D., Dewoolkar, M., Rizzo, D.M., O'Neil-Dunne, J., Frolik, J., Bryce, T., Engel, T. (2016). Quantifying streambank erosion: a comparative study using an unmanned aerial system (UAS) and a terrestrial laser scanner, *Earth Surface Processes and Landforms* (In Process)
- **Expected Publications:**
  - Recurrent Counterpropagation Neural Network for Predicting Suspended Sediment Load in Ungauged Catchments, to be submitted to *Journal of Hydrology*
  - Classification and Prediction of Event-Based Suspended Sediment Flux using Artificial Neural Networks, to be submitted to *Hydrological Processes*
  - Sediment yields and storm event dynamics in the Mad River watershed, to be submitted to *Journal of Hydrology Regional Studies*

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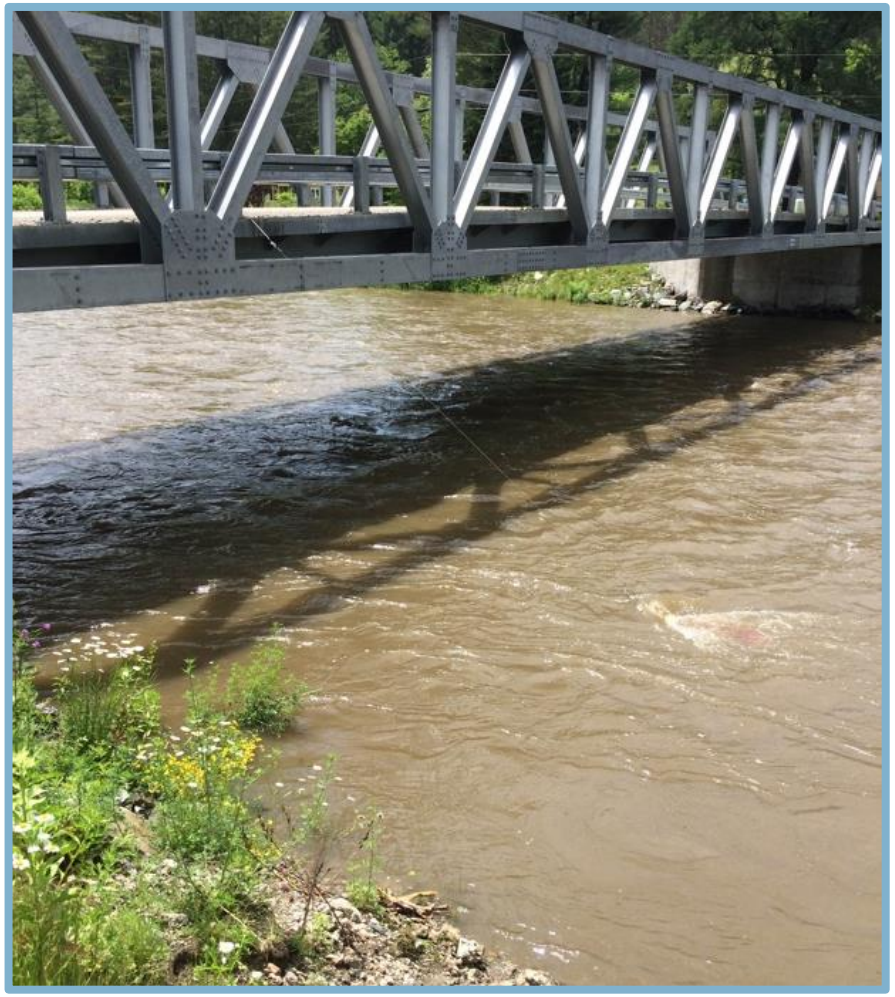

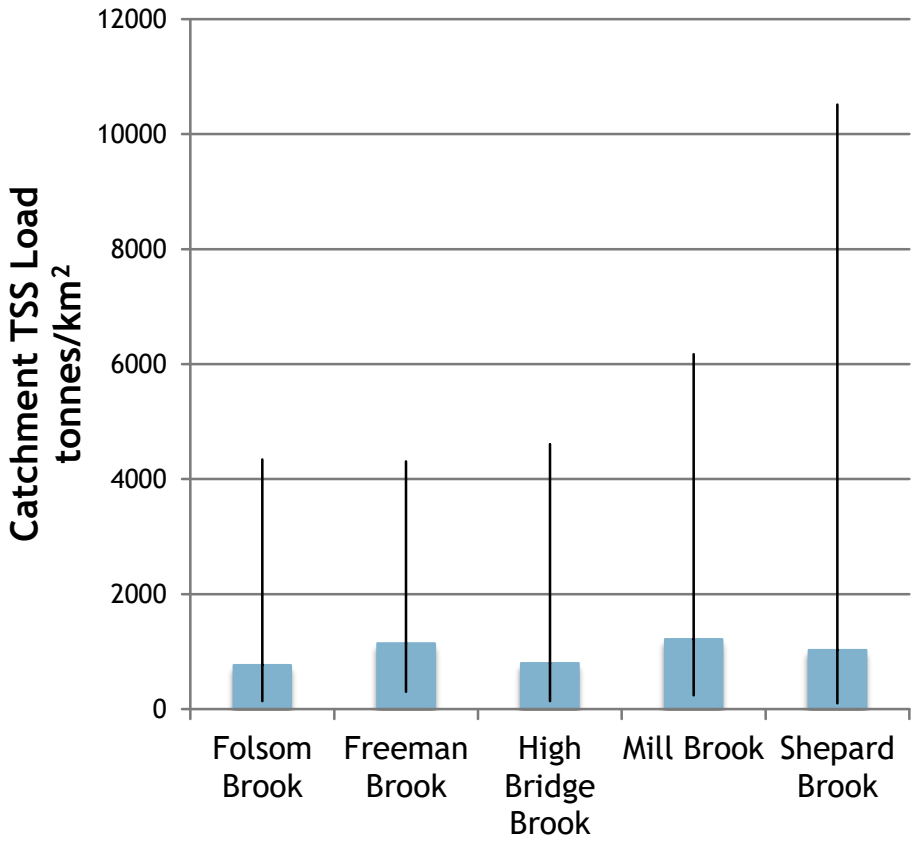

Eric Smeltzer (unpublished 2013) Estimates of annual sediment loads for Mad River tributaries.