





## Evaluating Suspended-Sediment Dynamics and Turbidity in the Upper Esopus Creek Watershed: A Comprehensive Study

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## A few questions this presentation will address:

- Which tributaries are the greatest sources of suspended-sediment and turbidity?
- What geologic sources produce the most suspended-sediment and turbidity?
- Can suspended-sediment loads from tributary streams be decreased with sediment and turbidity reduction projects?



### **Upper Esopus Sub-basin Scale Monitoring Sites**

### **Primary Sites**

### (streamflow, SSC, SSL, turbidity)

- 1. Esopus Creek @ Coldbrook
- 2. Little Beaver Kill
- 3. Beaver Kill
- 4. Stony Clove Creek
- 5. Woodland Valley Creek
- 6. Esopus Creek @ Allaben
- 7. Birch Creek
- 8. Esopus Creek @ Oliverea

### Secondary Sites

### (turbidity only)

- 9. Broadstreet Hollow Brook
- 10. Bushnellsville Creek



### **Stony Clove Reach Scale Monitoring Sites**

#### **6 Primary Sites**

#### (streamflow, SSC, SSL, turbidity)

- 1. Stony Clove Creek @ Chichester
- 2. Ox Clove @ Chichester
- 3. Warner Creek @ Chichester
- 4. Hollow Tree Brook @ Lanesville
- 5. Stony Clove Creek @ Lanesville
- 6. Myrtle Brook nr Lanesville

### 14 Secondary Sites In Red

#### (turbidity only)

 Sites chosen to bracket potential STRPs and specific geologic features





## Suspended-Sediment and Turbidity Monitoring Methods



### Repeated Geomorphic and Geologic Investigations NYCDEP and UCSWCD Staff



GPS-Based Stream Feature Inventories



Channel morphology surveys







Glacial stratigraphy investigations



## Which tributaries are the greatest sediment sources?



# Sediment Fingerprinting

Stony Clove Creek Watershed Turbidity/Suspended Sediment Study SS Source Fingerprinting Study: Stony Clove Watershed Sample Site Locations

> Samples analyzed for more than 40 parameters to develop a unique chemical signature for each geologic source.



Sample Locations

Pilot Study with Matthew Cashman, USGS Maryland WSC











### USGS



Turbidity may stay elevated for days to weeks after a high magnitude event when the stream is in contact with lacustrine material.





### Shallow Groundwater Source

## Sediment and Turbidity Reduction Projects

Mass Wasting of Lacustrine Material

🗕 Strea

# Warner Site 5 STRP

2013







Daily mean streamflow, in cubic feet per second

- Significant reductions in suspended-sediment
- 50% at Q90, 70% at Q50, and 80% at Q 10









- Significant decrease in slope and increase in intercept





- Significant increase in slope and decrease in intercept









# Summary

Woodland Creek is currently the greatest source of suspended-sediment to the upper Esopus Creek 2016-2018



**≥USGS** 

Sediment and turbidity reduction projects have been successful...so far



Geologic sources of suspended-sediment vary across the hydrograph and spatially during storm events





# Questions?



## **Bonus Bedload Slide!**

Physical bedload samples with Elwha at 2 sites





Active and passive tracers



### Hydrophones at 2 sites



