

Effects of a Stream Restoration on Uptake of Nitrogen, Phosphorus, and Suspended Solids

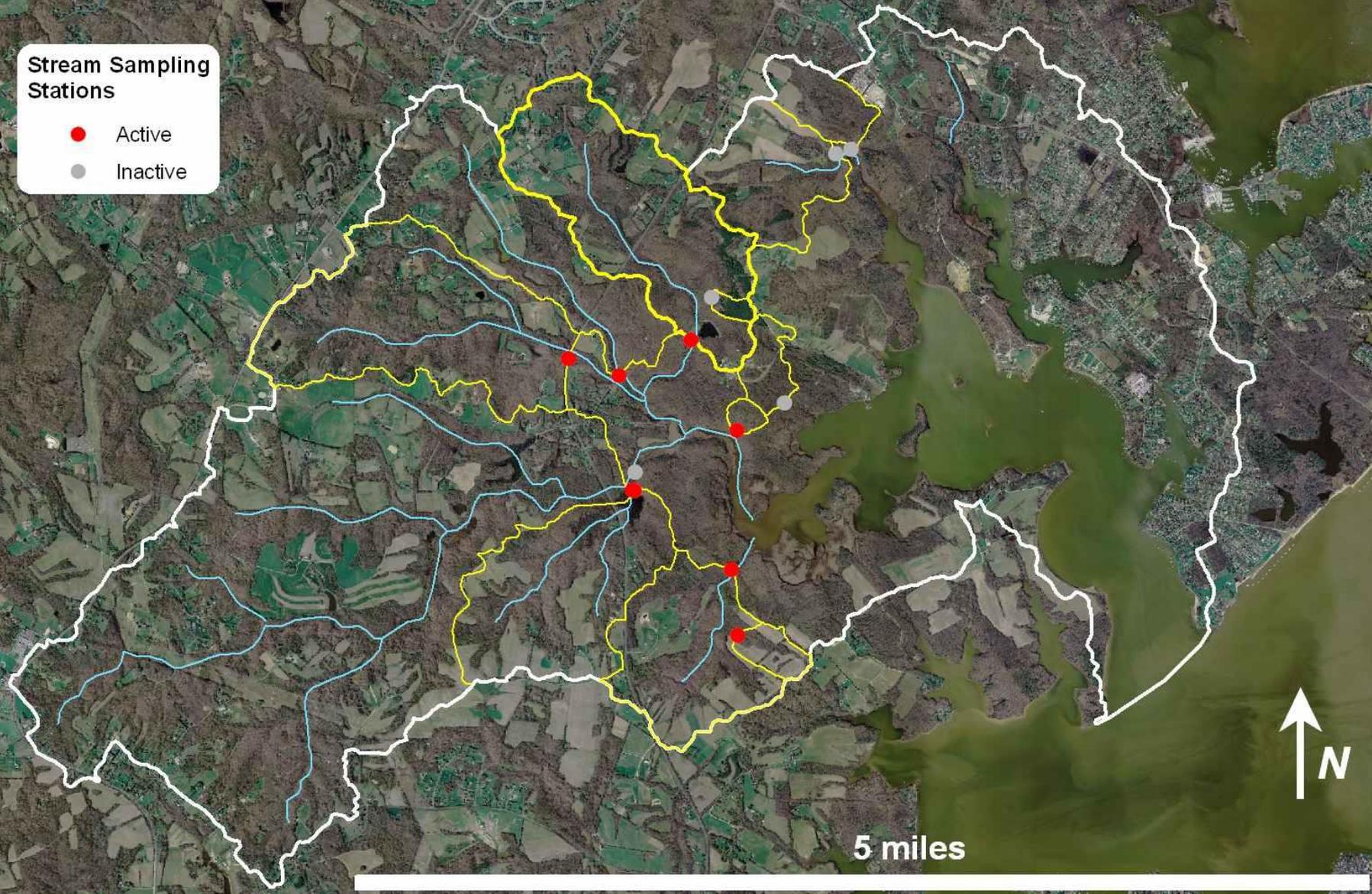


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Rhode River Stream Sampling Stations and Watershed Boundaries

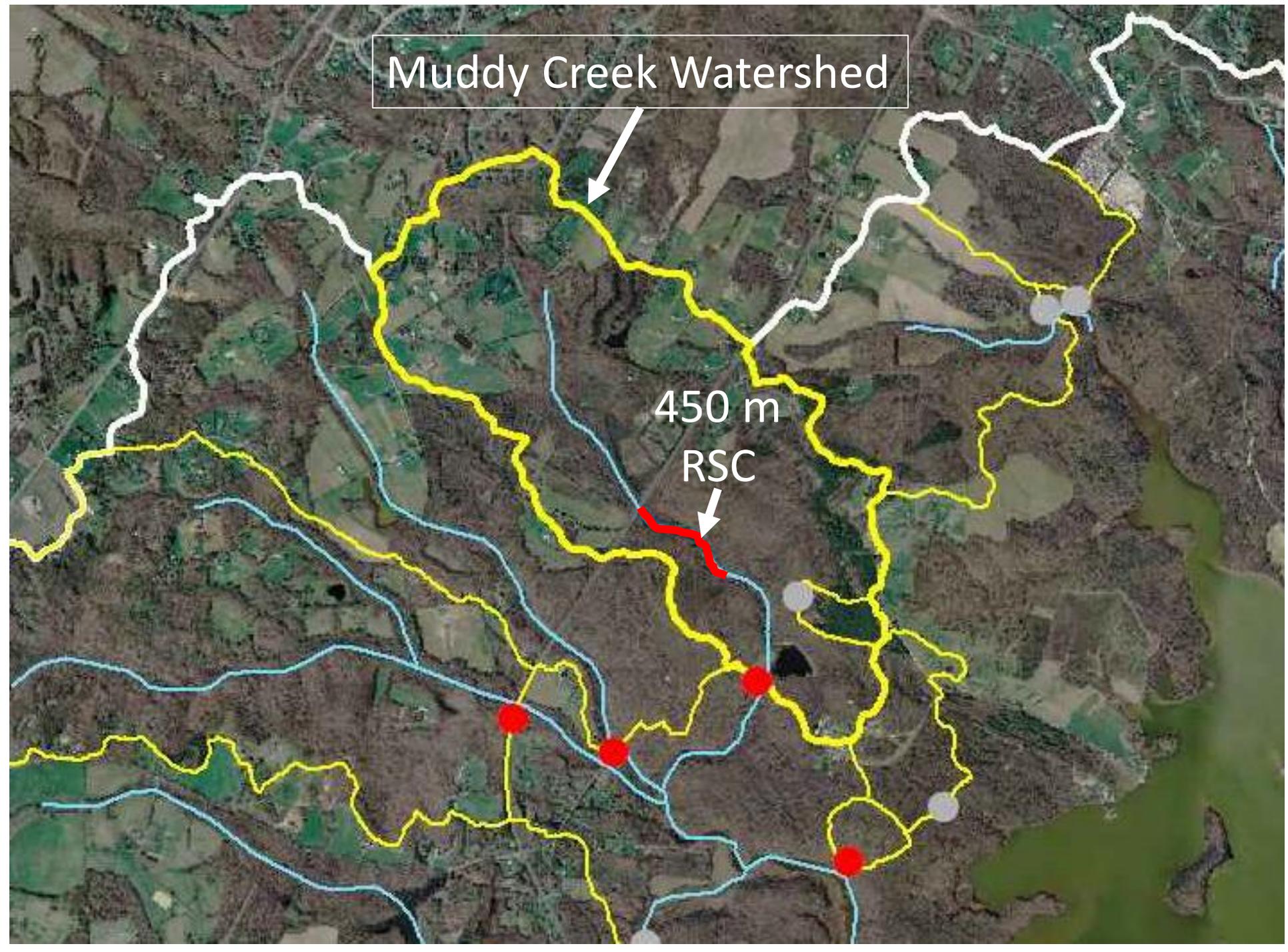
Stream Sampling Stations

- Active
- Inactive



Muddy Creek Watershed

450 m
RSC



Muddy Creek Restoration



Before...



Sand Plus
Woodchips

...During

Installing weir at outlet of Muddy Creek RSC

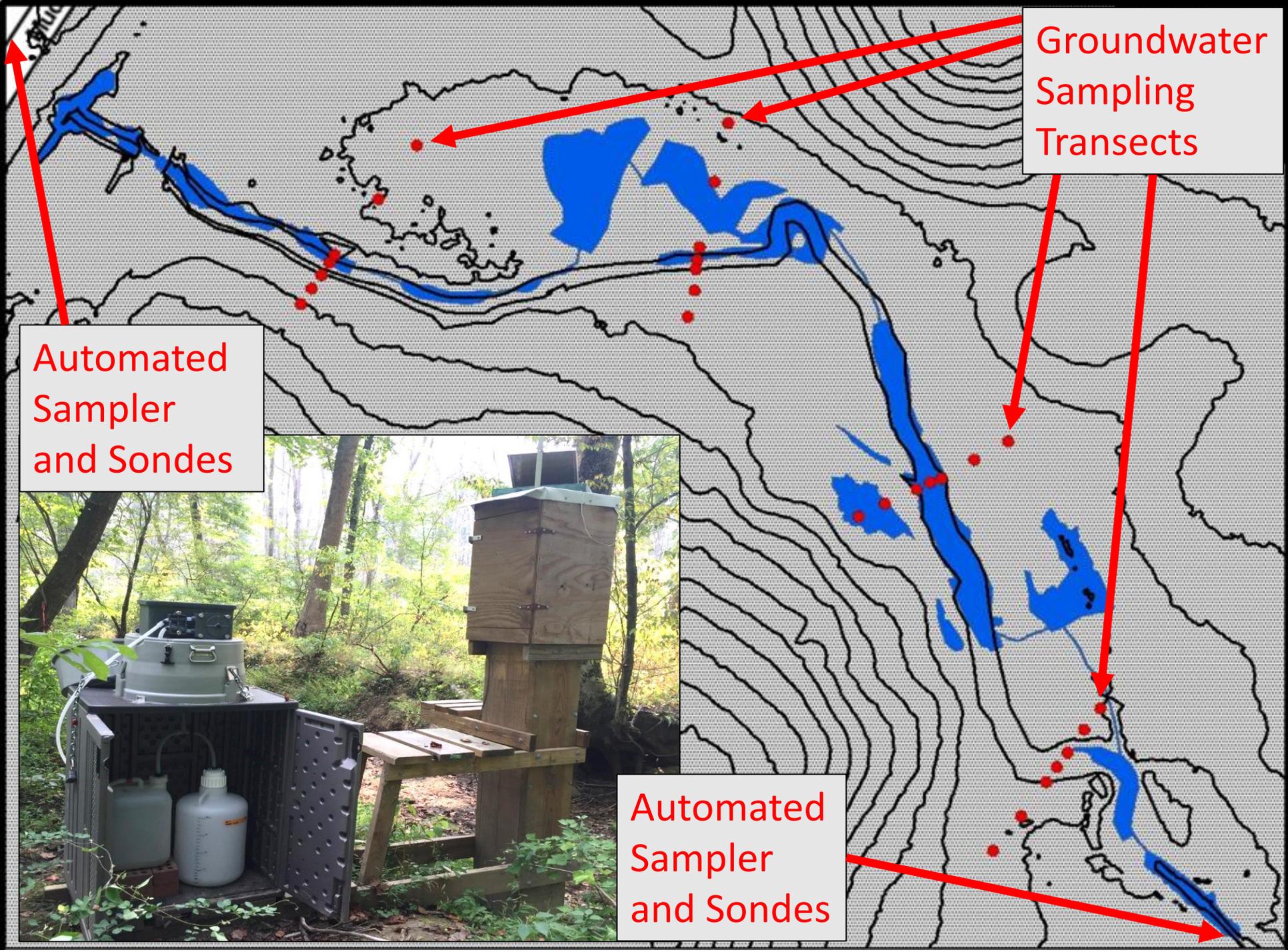


A Riffle Restored in Muddy Creek



A Pool Restored in Muddy Creek



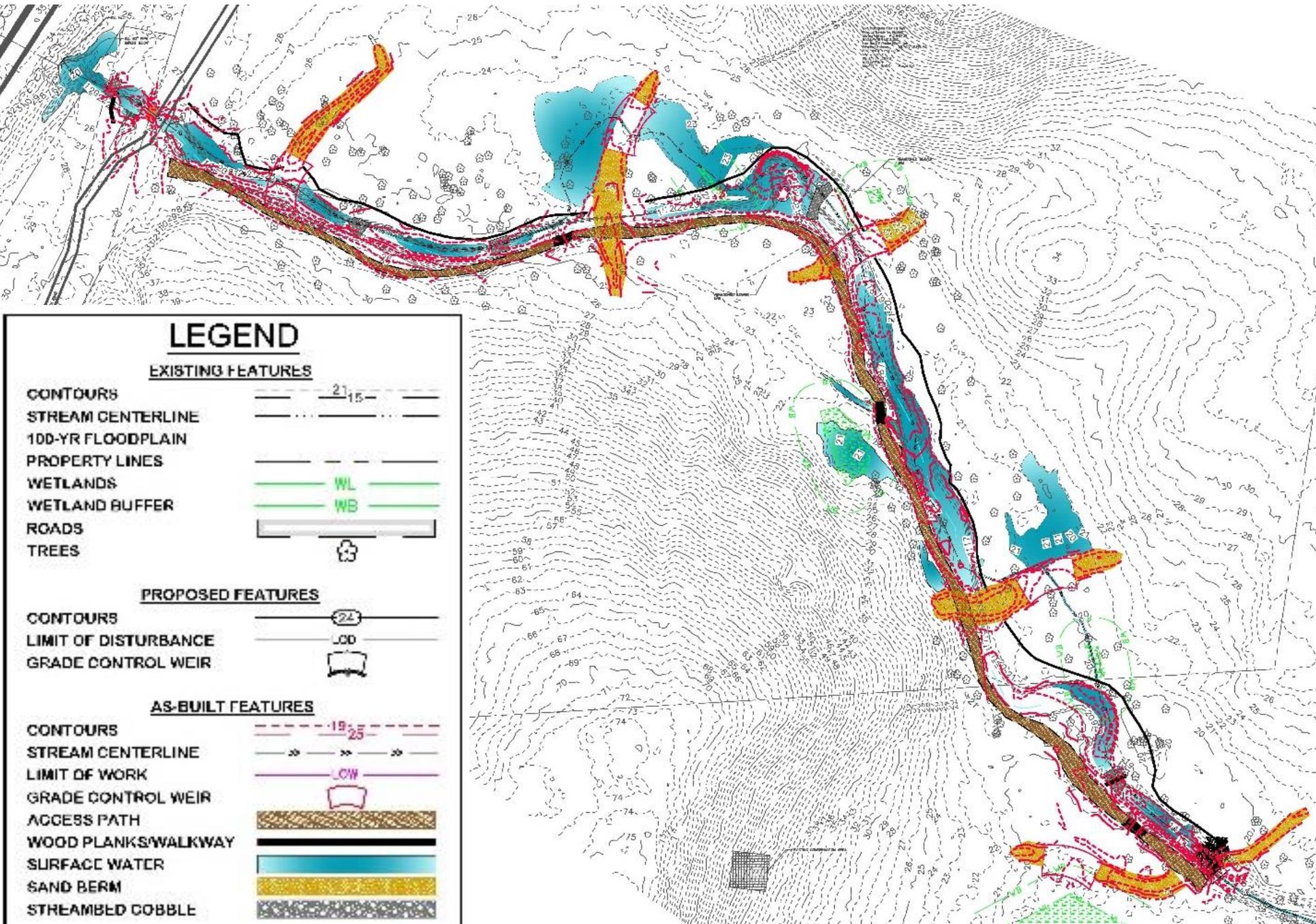


Groundwater
Sampling
Transects

Automated
Sampler
and Sondes

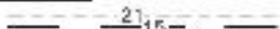


Automated
Sampler
and Sondes



LEGEND

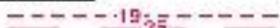
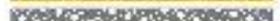
EXISTING FEATURES

- CONTOURS  21.15
- STREAM CENTERLINE 
- 100-YR FLOODPLAIN 
- PROPERTY LINES 
- WETLANDS  WL
- WETLAND BUFFER  WB
- ROADS 
- TREES 

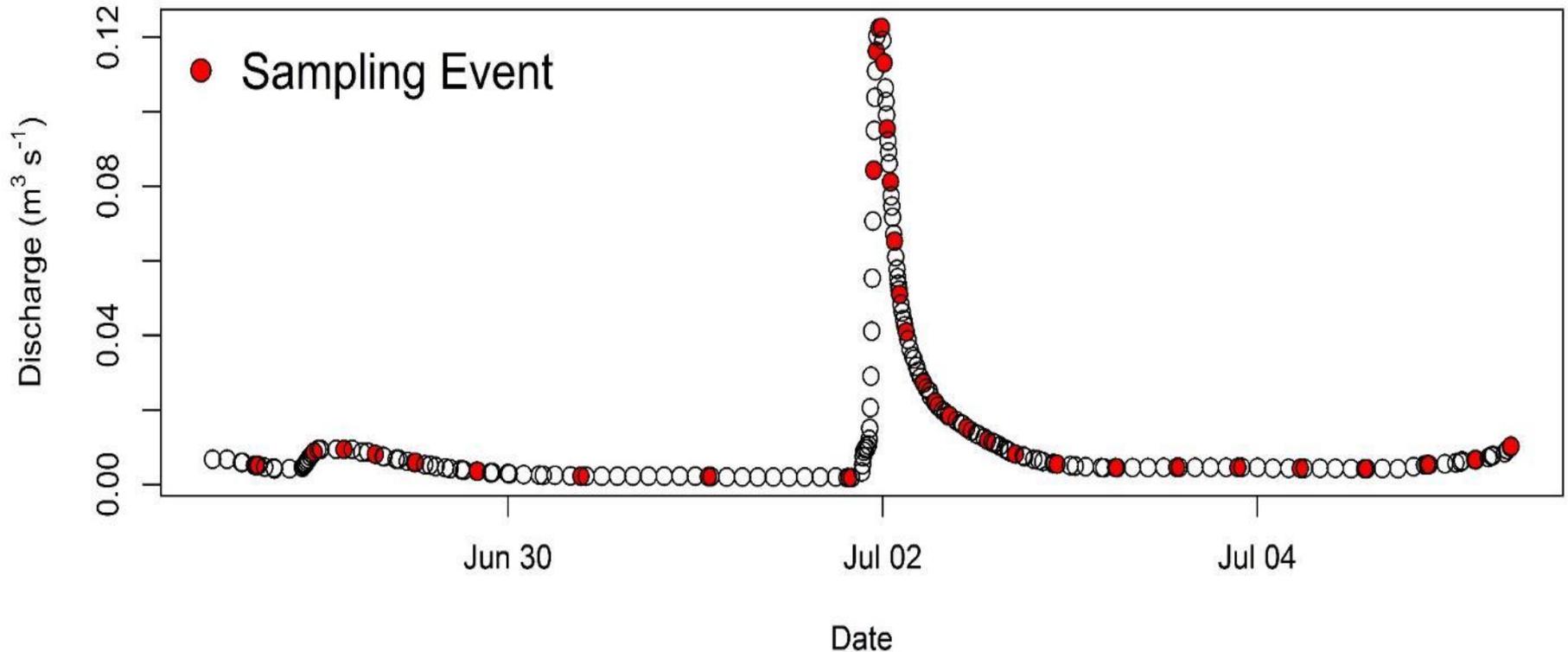
PROPOSED FEATURES

- CONTOURS  24
- LIMIT OF DISTURBANCE  LD
- GRADE CONTROL WEIR 

AS-BUILT FEATURES

- CONTOURS  19.25
- STREAM CENTERLINE 
- LIMIT OF WORK  LW
- GRADE CONTROL WEIR 
- ACCESS PATH 
- WOOD PLANKS/WALKWAY 
- SURFACE WATER 
- SAND BERM 
- STREAMBED COBBLE 

Flow-Paced Sampling

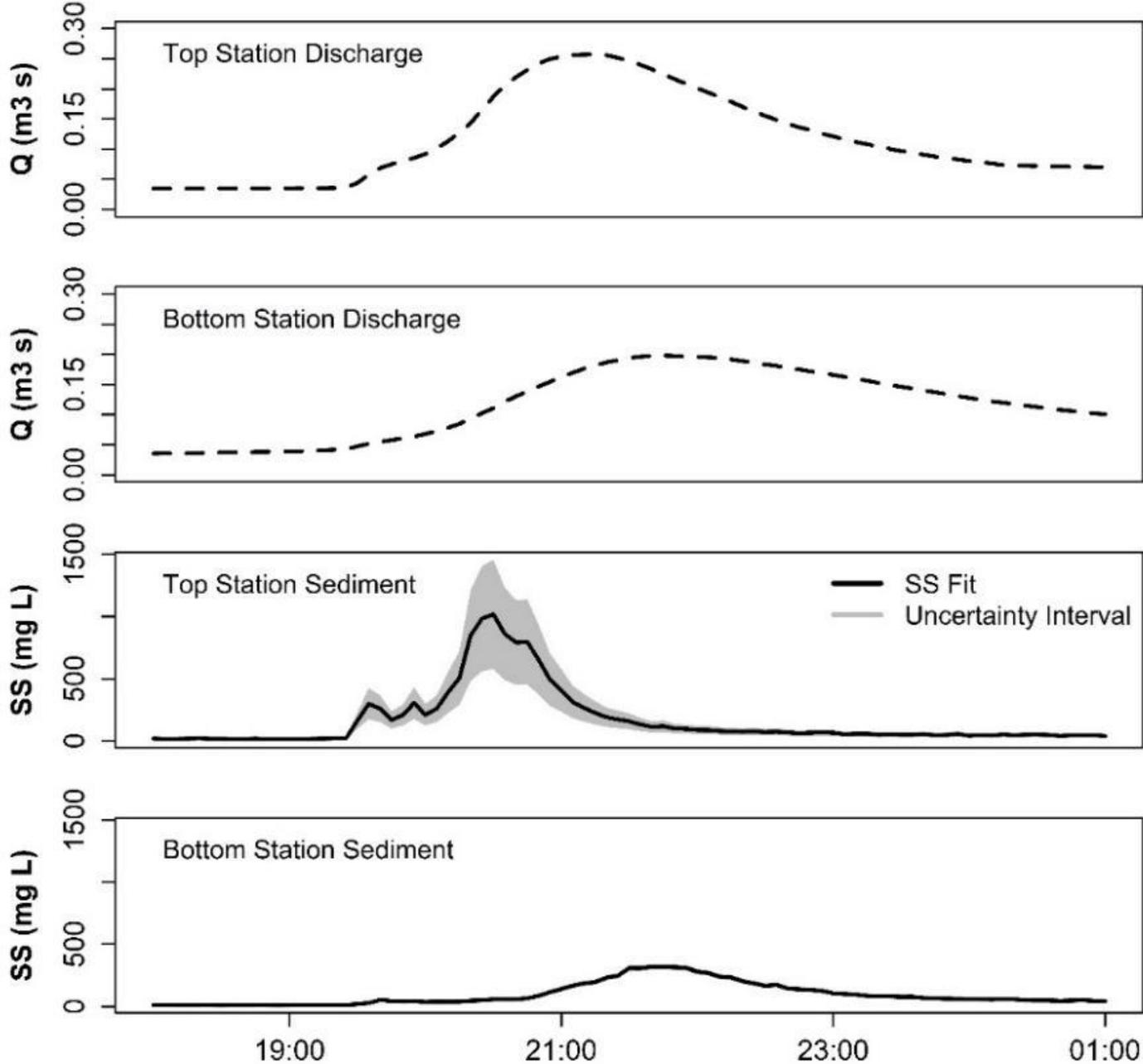


- Water samples composited for a weekly mean concentration.
- Concentration \times weekly water flow = Weekly load.

Sulfuric acid preservative for nutrients

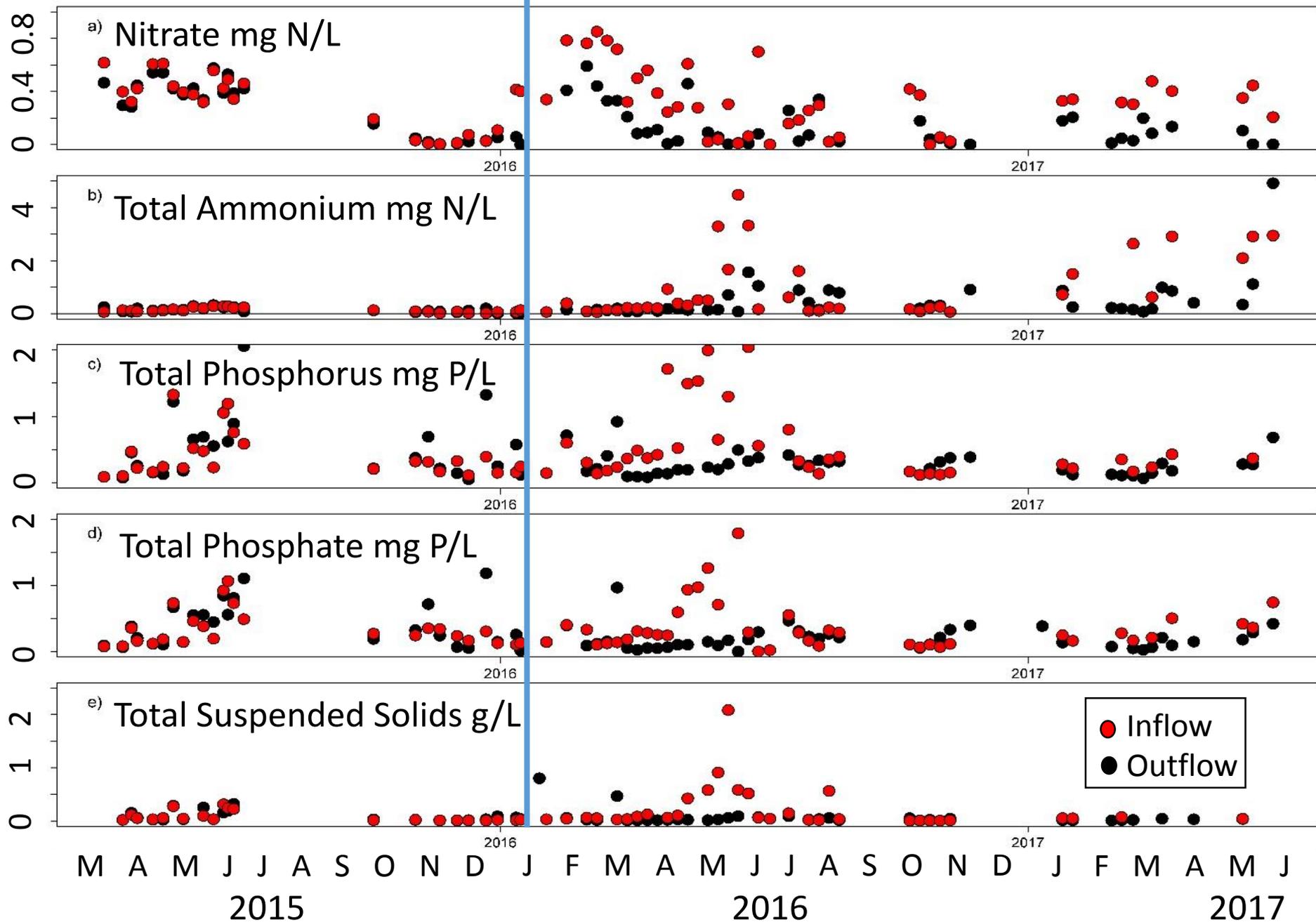
- Acid extracts particulate ammonium and phosphate
- No acid for total suspended solids

Storm flow, February 24, 2016



Before...

After Restoration



Calculating Retention

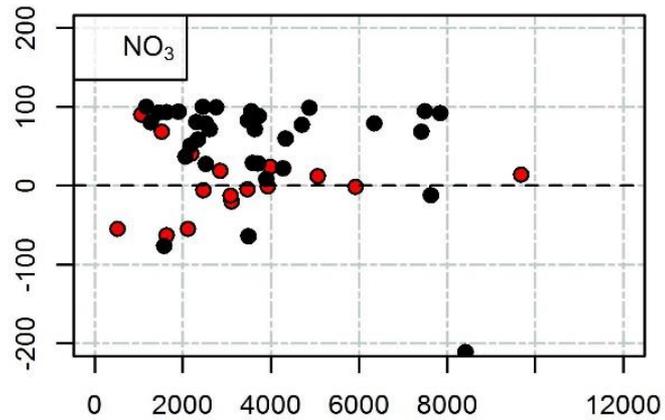
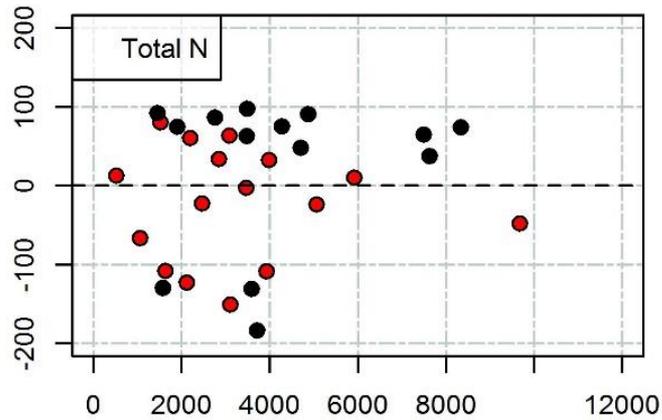
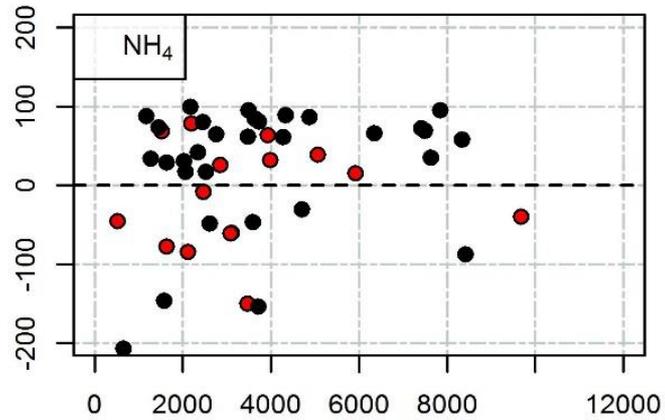
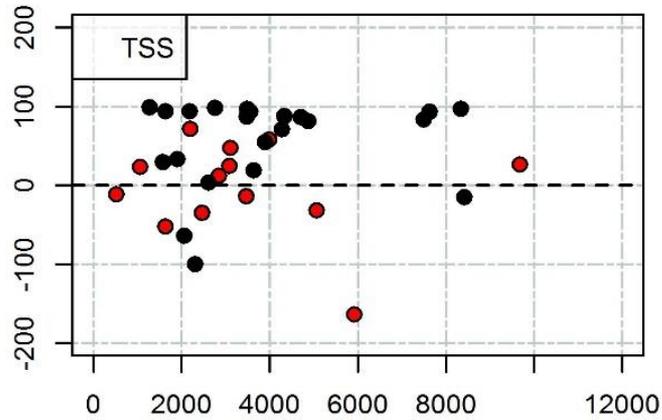
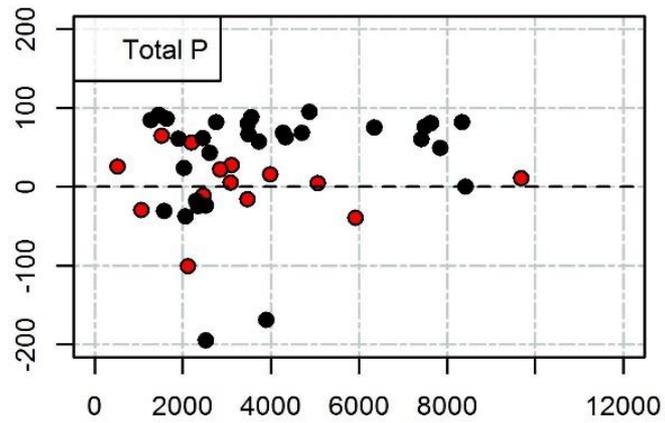
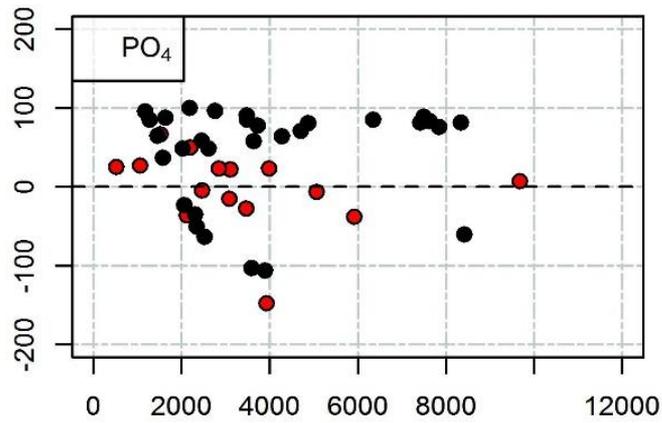
Concentration X Water Flow = Load

Load in – load out = amount retained

Percentage retained = (amount retained / load in) X 100

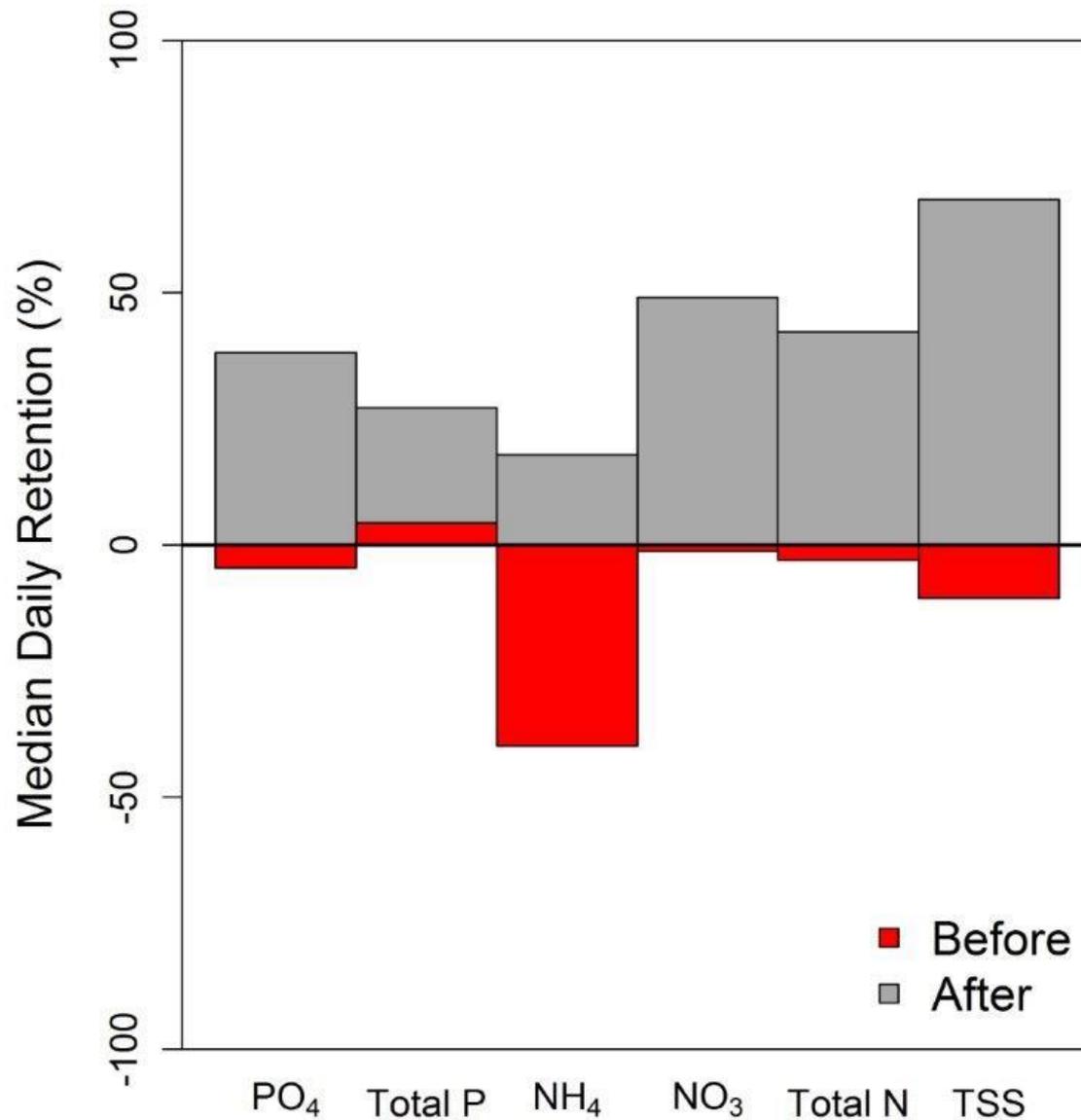


Percentage Load Reduction



Flow per Sampling Interval (m³)

Percentage of Inflow Retained Before and After Restoration

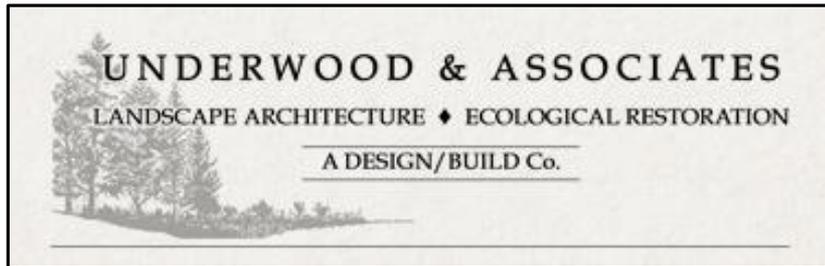


Data updated 11/21/2017

Summary

- The restoration reconnected the stream to its floodplain.
- Flow diversions created pools on the flood plain.
- The pools may alter flow of suspended particles through the restored reach.
- Concentrations and loads of nitrogen, phosphorus, and suspended solids were reduced after the restoration.
- Load reduction efficiencies were usually $>30\%$ and were not affected by water flow rate.

We thank these organizations for support:



Rathmann Family Foundation

