Water Chemistry Sampling at Trust Fund Sites

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Standard Monitoring Requirements

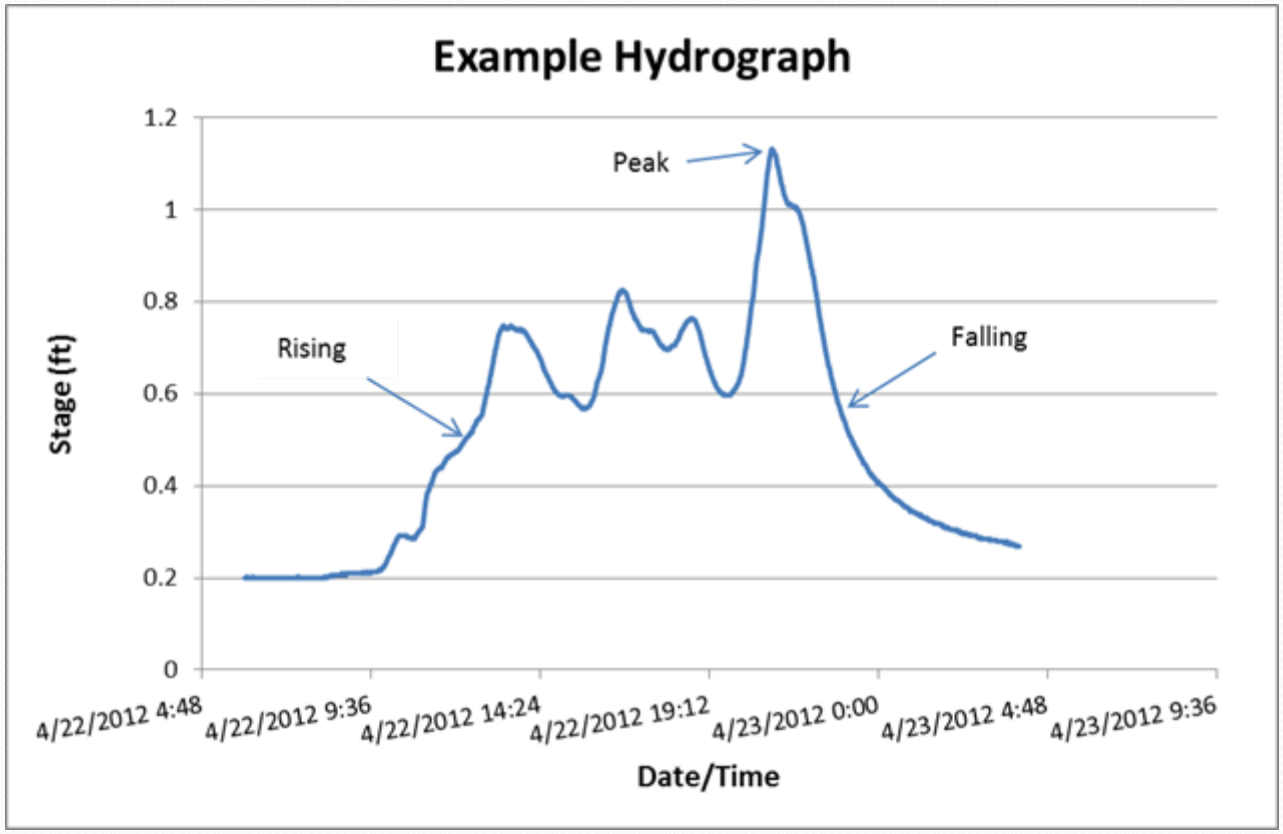
- Water chemistry data collection protocols
  - Representative and comparable samples
- Required parameters for analysis
  - Trust Fund project data are comparable
- Minimum detection limits
  - Changes in concentration data can be distinguished
  - Assure that detection limits are lower than reference values for MD streams

Standard Collection Protocols

- Sampling of rising, peak, and falling limbs
  - All parts of storm sampled
  - Water chemistry changes over the course of a storm
  - More data are better
  - Calculation of load is more accurate when all parts of storm represented

Limb	Discharge Volume (CF)	Concentration (mg/L)			
		TKN	Total P	TSS	Nitrate+ Nitrite
Rising	57,330	0.7	0.12	8	1.7
Peak	151,311	0.8	0.27	69	1.3
Falling	87,353	< 0.5	0.17	9	1.2

Storm Hydrograph



Trust Fund Standard Parameters

Parameter	Units	Target MDL
Total Dissolved Nitrogen	mg/L	0.034
Ammonia as N	mg/L	0.0016
Nitrite-N	mg/L	0.002
Nitrite & Nitrate-N	mg/L	0.003
Particulate Nitrogen as N	mg/L	0.003
Phosphate (PO_4)	mg/L	0.002
Total Dissolved Phosphorus	mg/L	0.006
Particulate Phosphorus as P	mg/L	0.0003
Total Suspended Solids	mg/L	0.8
Turbidity	NTU	1

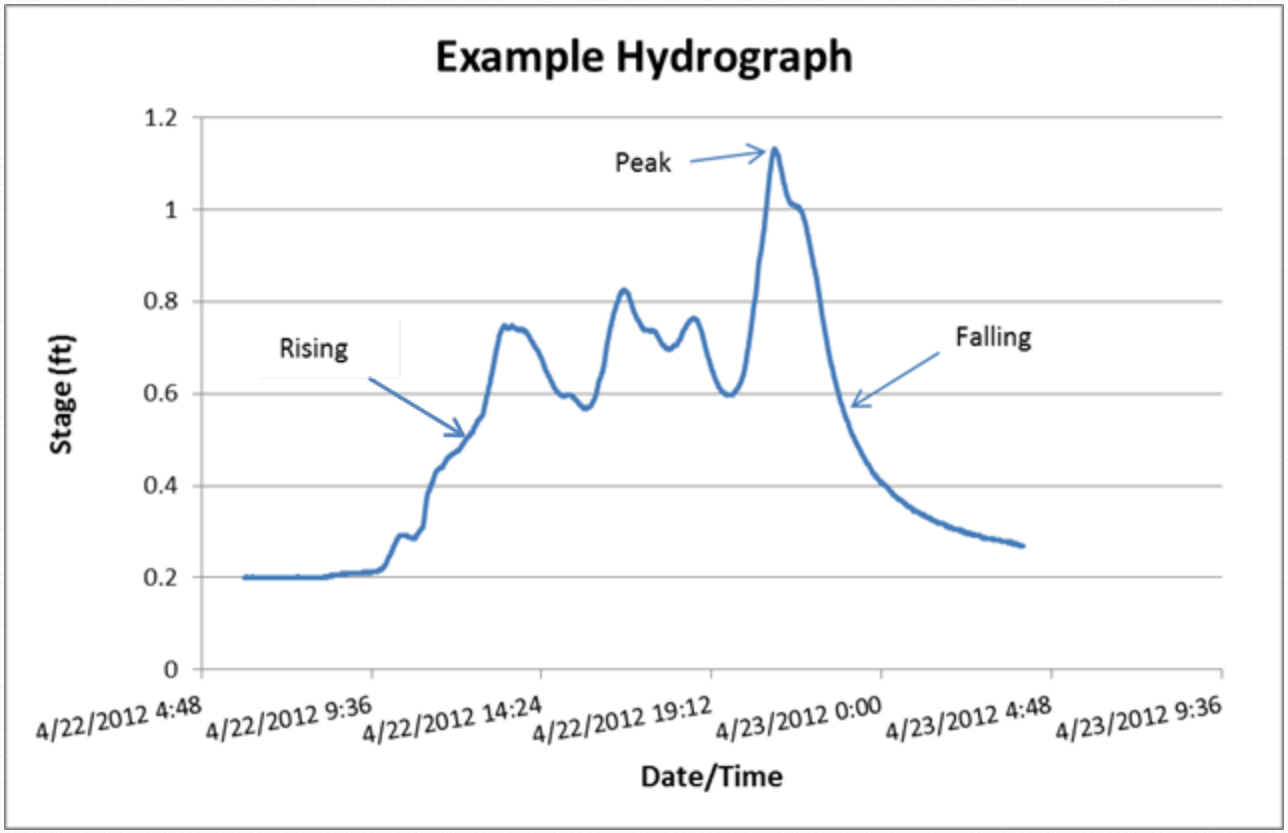
Eligible Storm Criteria

- 48 hours of antecedent dry time (< 0.05” of rain)
- > 0.1 inches of rain in 24 hours

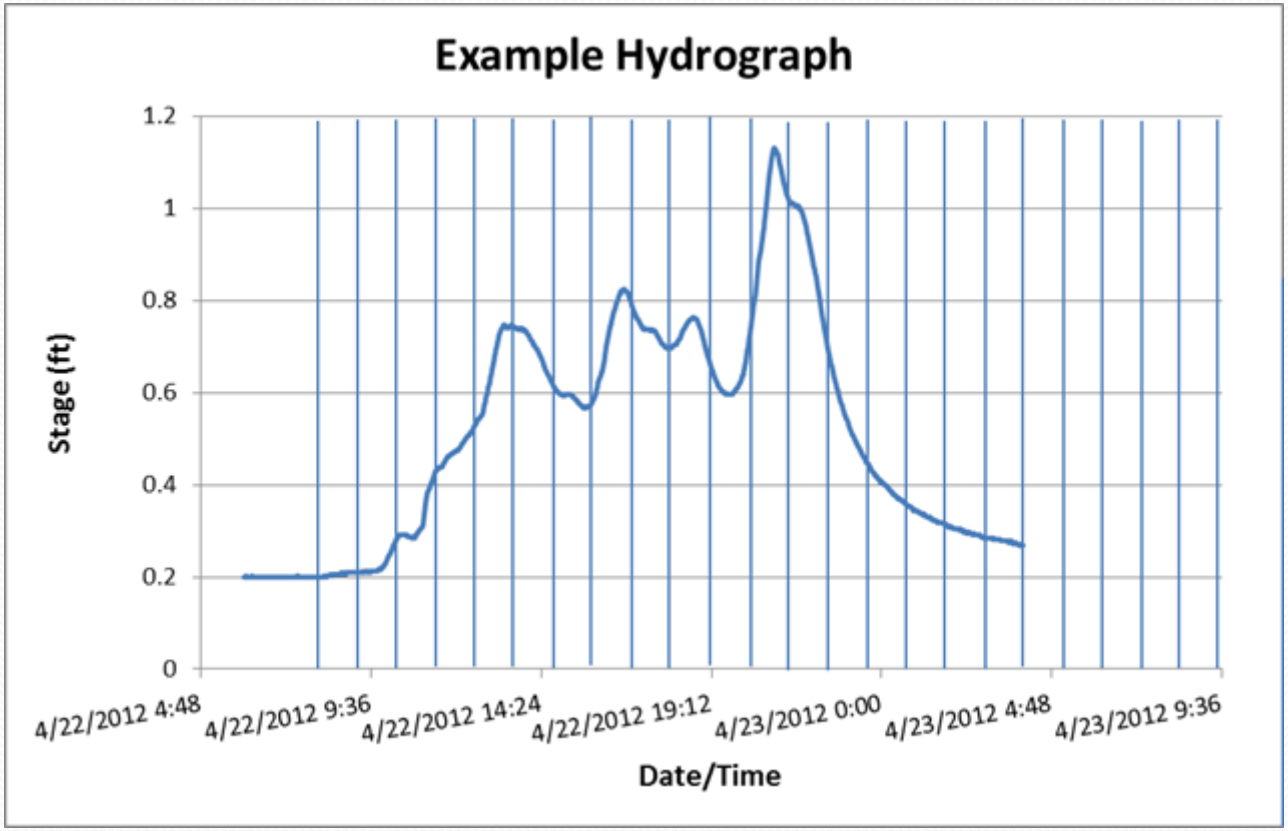
How to Sample?

- Portable automated sampler
  - increases flexibility for capturing storms
  - sample more of the storm
  - up-front equipment cost
  - risk of equipment failure or programming error
  - post storm processing
- Manual (grab) sampling
  - low equipment cost
  - need to staff station for storm entirety
  - sample less of the storm
  - sample and done

Storm Hydrograph

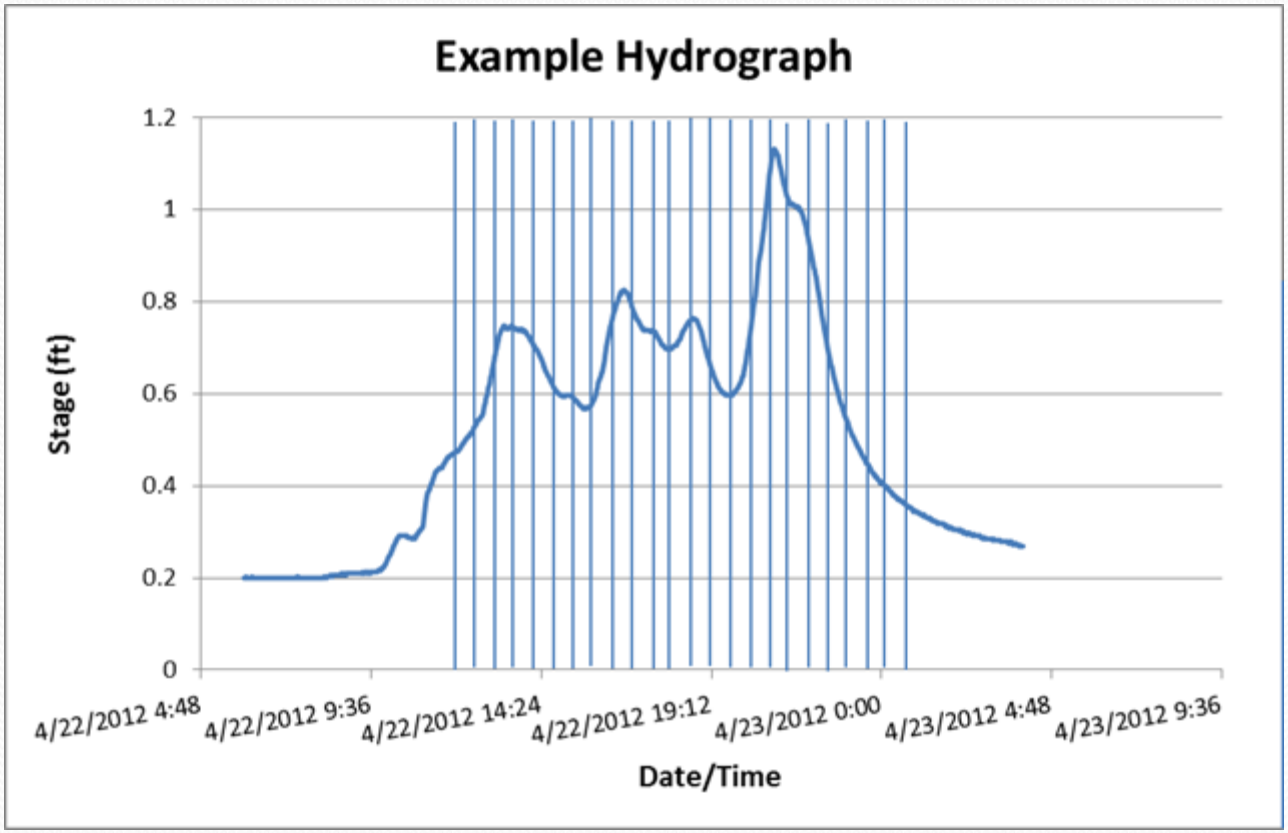


Storm Hydrograph



Automated Sampling ~ 1-hour interval

Storm Hydrograph



Automated Sampling ~ 30-minute interval (better)

Storm Monitoring 101

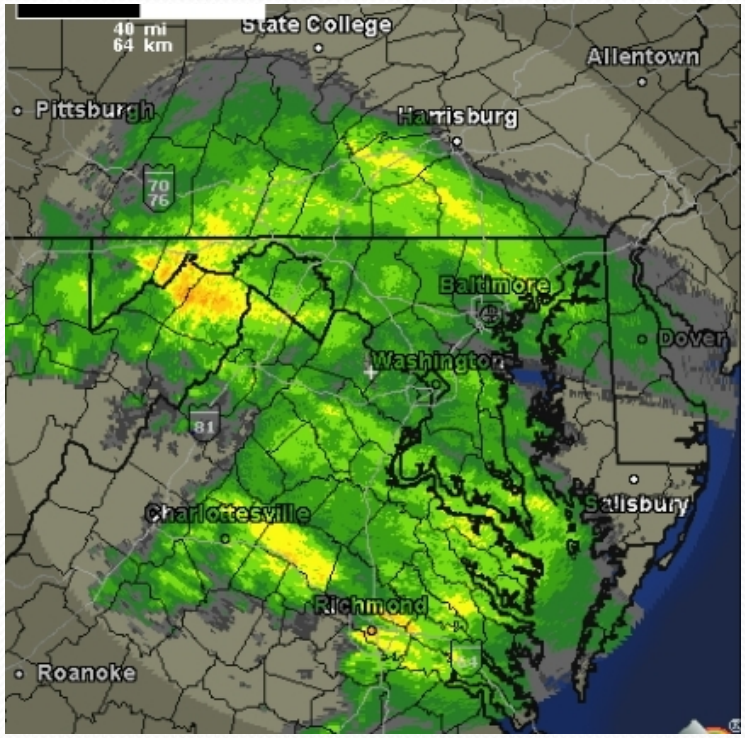
- Supplies list

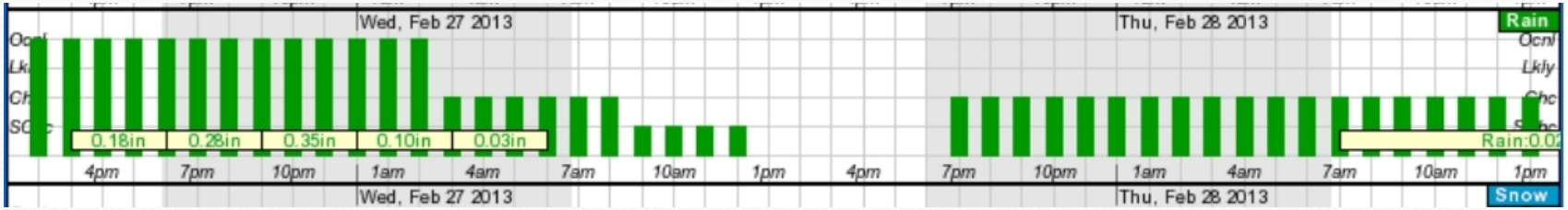
	manual	auto
project field notebook	•	•
flow loggers	•	•
bags of ice	•	•
chain of custody forms	•	•
sample bottles	•	•
automated samplers		•
roll of suction tubing		•
spare bubbler line		•
sampler batteries		•
1-liter sampler bottles		•
sampler bottle caps		•
cable ties		•
spare strainers		•

Storm Monitoring 101

- Deployment Procedure
  - Consult analytical lab for pickup schedule
  - Consult meteorological services
  - Use time-paced autosampler program*
  - Allow sufficient time for falling limb*
  - Check sampler battery charge*
  - Ice in sampler*
  - Connect suction tubing and level sensor*

* (automated)

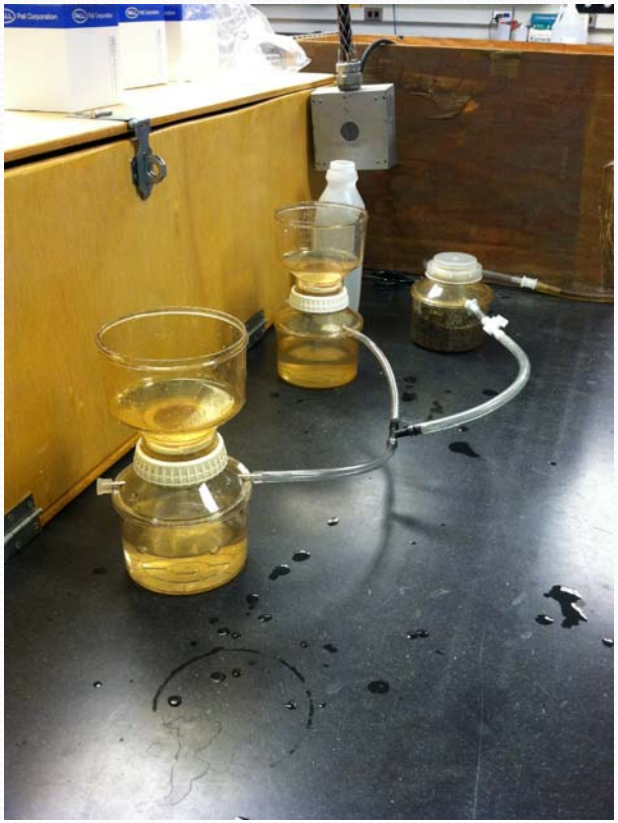




Storm Monitoring 101

- Retrieval Procedure
  - Check to be sure minimum rainfall criterion is satisfied
  - Check for filling of bottles*
  - Use spreadsheet or proprietary software to examine hydrograph*
  - Select discrete samples to represent rising, peak, and falling limbs of hydrograph*
  - Composite discrete samples*
  - Measure pH of composites
  - Filter sample as necessary
  - Submit samples to laboratory

* (automated)



Sample Handling and Preservation

- Stock sampler with ice
- Keep samples refrigerated or on ice
- Transfer samples to the laboratory within 24 hours of sampling cessation (falling limb captured)
- Chain of custody

Equipment Maintenance

- Check:
  - Tightness of connections (suction tubing to anchor point)
  - Suction and pump tubing integrity (holes? splits?)
  - Distributor arm (firmly attached, pump tubing not wobbly)
  - Accurate level measurement on logger
  - Volume delivery calibration

Quality Control Samples

- Make up 20% of samples submitted to laboratory

Schedule of quality control sampling		
Flow Type	**Blank**	**Duplicate**
Baseflow, all stations	Distilled water	Duplicate sample
Stormflow, all stations	Distilled water run through automated sampler tubing using sampler pump	Not applicable*

Baseflow Monitoring Guidance

- 72 hours of antecedent dry time (< 0.05" of rain)
- Fixed sampling schedule
  - first week of the quarter
  - second week of the second month of the quarter
- Measure instream water quality parameters
  - temperature
  - pH
  - specific conductivity
  - dissolved oxygen
- Collect grab sample

Questions and Comments