Comparison Study of Sampling Methods Susquehanna and Conestoga Rivers

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Goal

- Evaluate if past sampling methods have biased SSC compared with standardized USGS sampling methods employed elsewhere

Approach

- Conduct side-by-sampling using traditional and standardized methods during a storm event at:
- Susquehanna River at Marietta PA
- Conestoga River at Conestoga PA

Approach

- Determine an appropriate location in the channel using turbidity and velocity
- Position two teams side-by-side
  - Team 1 – "traditional" grab sampling equipment
  - Team 2 - USGS DH-95 sampler using a hand crane
  - During rising, crest, and falling limbs:
    - Collect samples in triplicate every 30 to 60 minutes for SSC (1 sand-fine split)
    - Measure velocity and turbidity in-situ and in samples
    - Collect selected samples (30 minute intervals) for total phosphorous

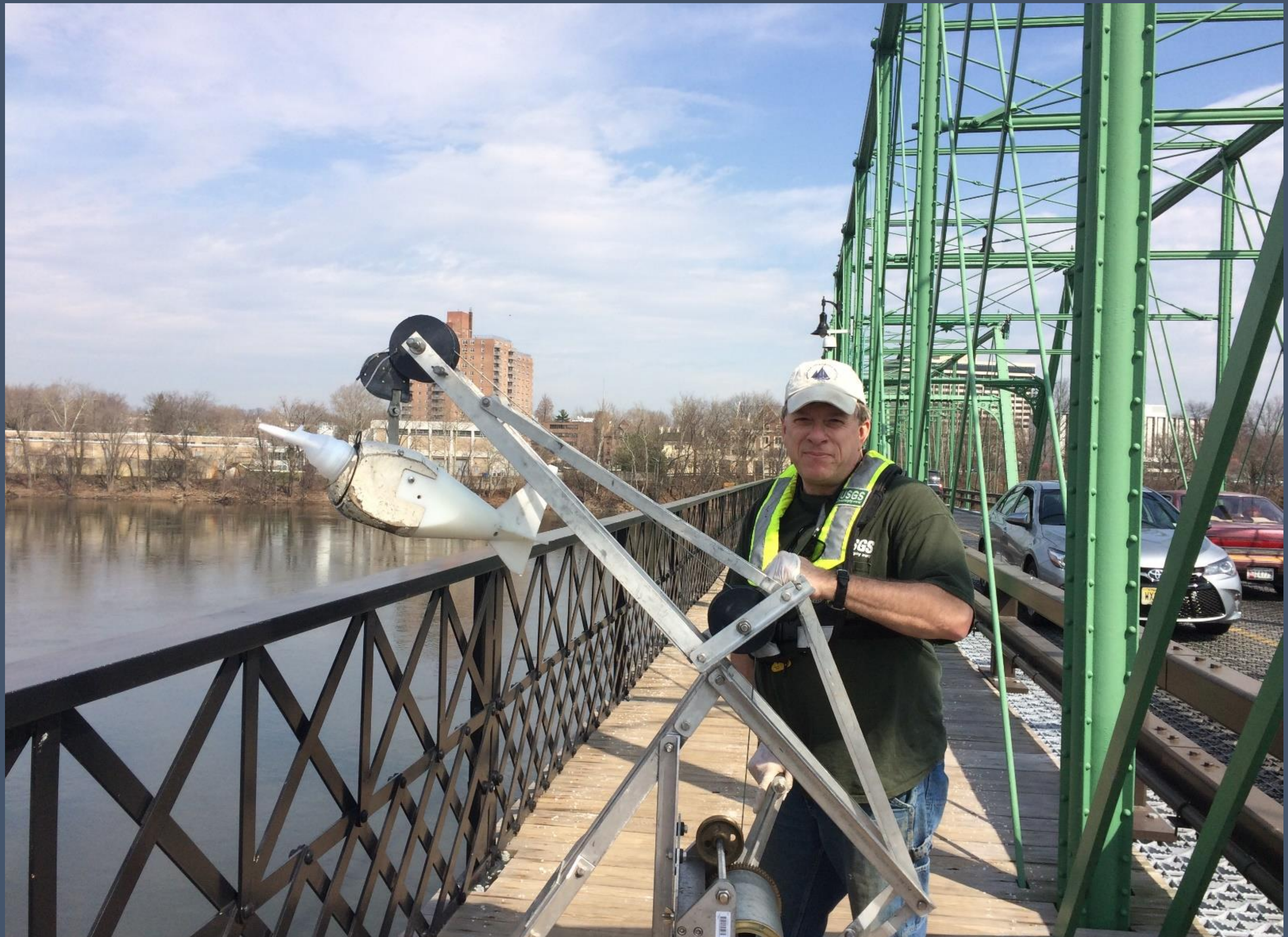
Approach (continued)

- Sampling team meeting
- Inspection of sites, ID suitable locations, practice setup and use of equipment if needed
- Prepare sampling equipment – have everything ready
- Storm’s a coming – let’s go!

- Hopefully, 1st storm will be a winner, but be prepared for a second storm if needed

USGS DH-59 sampler

Correct nozzle for velocity
Correct transit rate
Possibility of using an electric reel



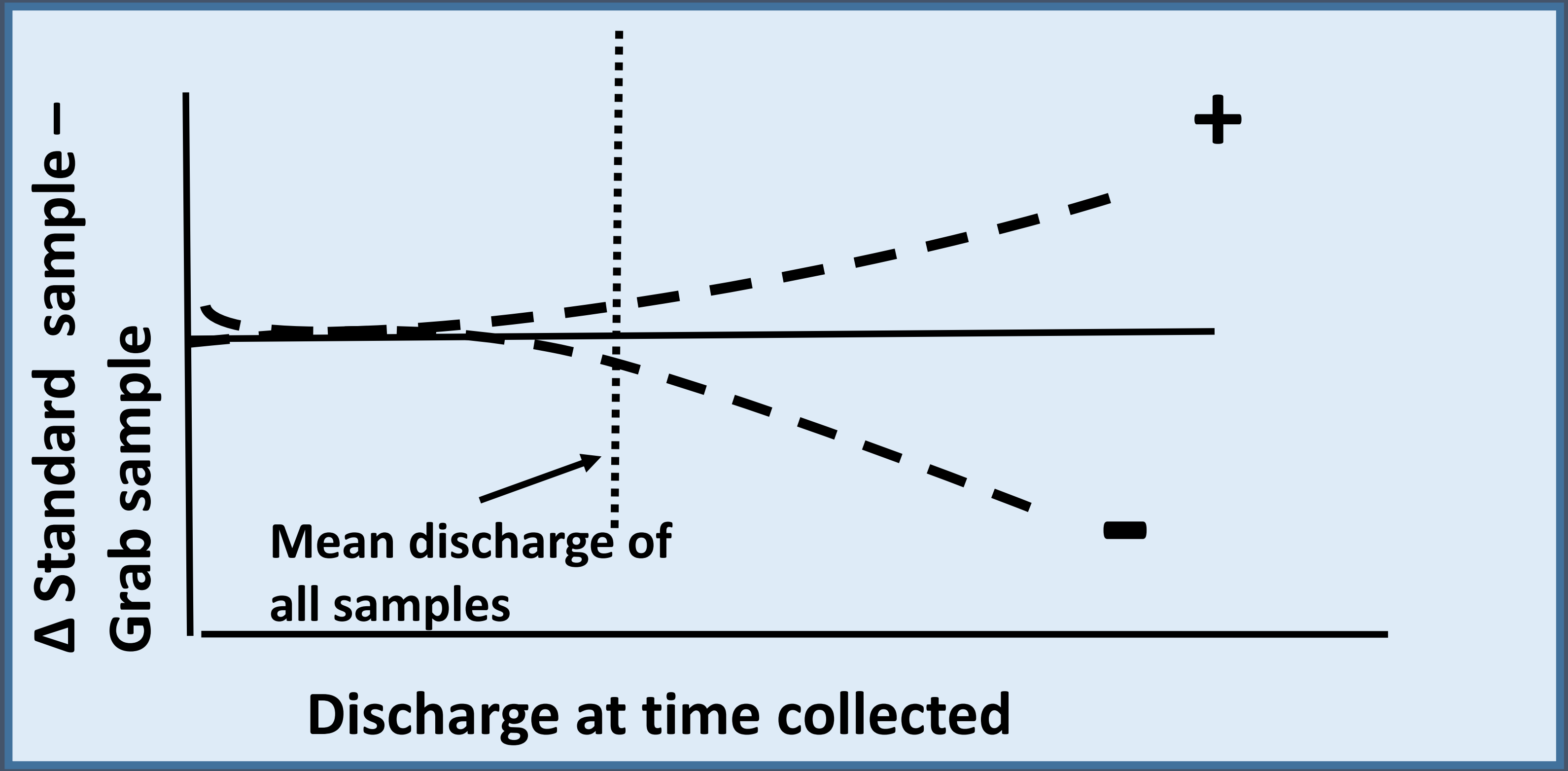
Measure discharge velocity with ADCP and turbidity while samples are collected

Considerations

- How large a storm should we sample ? Should cover the range of Q in historic data
- Need a storm that begins early in the day
  - Susquehanna typically shows slow rise 1-3 days, cresting after 24 hours
  - Conestoga typically crests within 24 hours
  - Need to begin early in morning
  - Stay prepared to initiate sampling
  - Depending upon situation, teams may stay overnight in area
  - Plan for two events – in case first try fails to live up to expectations

Original Plan -

- Review existing data for sites – what is know about sampling conditions and river response
- Try to ensure that storm flow covers as much of the historic data as possible



Choosing Storm – Based on Profile of Historic Data Set

(no longer a consideration, but interesting)

- Reviewed existing data (1985 to 2016) for suspended sediment and total P
- Categorized SSC and tP data on the basis of:
  - Discharge
  - Stage
  - Flow regime

    Slowly rising, rising, cresting, falling, slowly falling, and steady flow

    Steady flow further separated into low and high Q

Prepared statistics and plots showing what is known regarding the historic data set

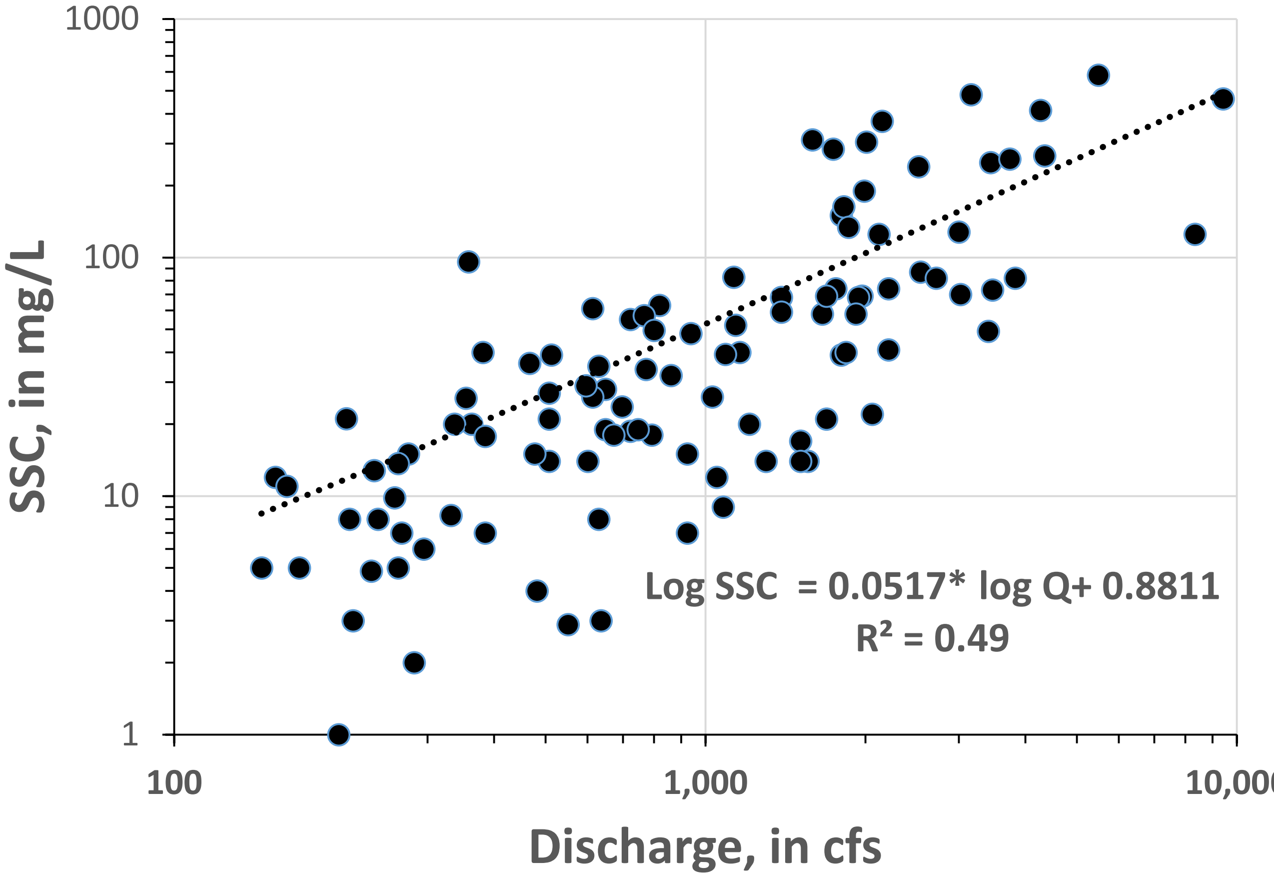
Conestoga River

Discharge at time of sampling
2007 to 2016, in CFS

	ALL SAMPLES	FALLING Q	RISING Q	STEADY Q
#	235	88	33	69
Maximum	11,700	9,430	10,100	1,280
Minimum	146	146	235	242
Median	1,297	1,620	2,367	533

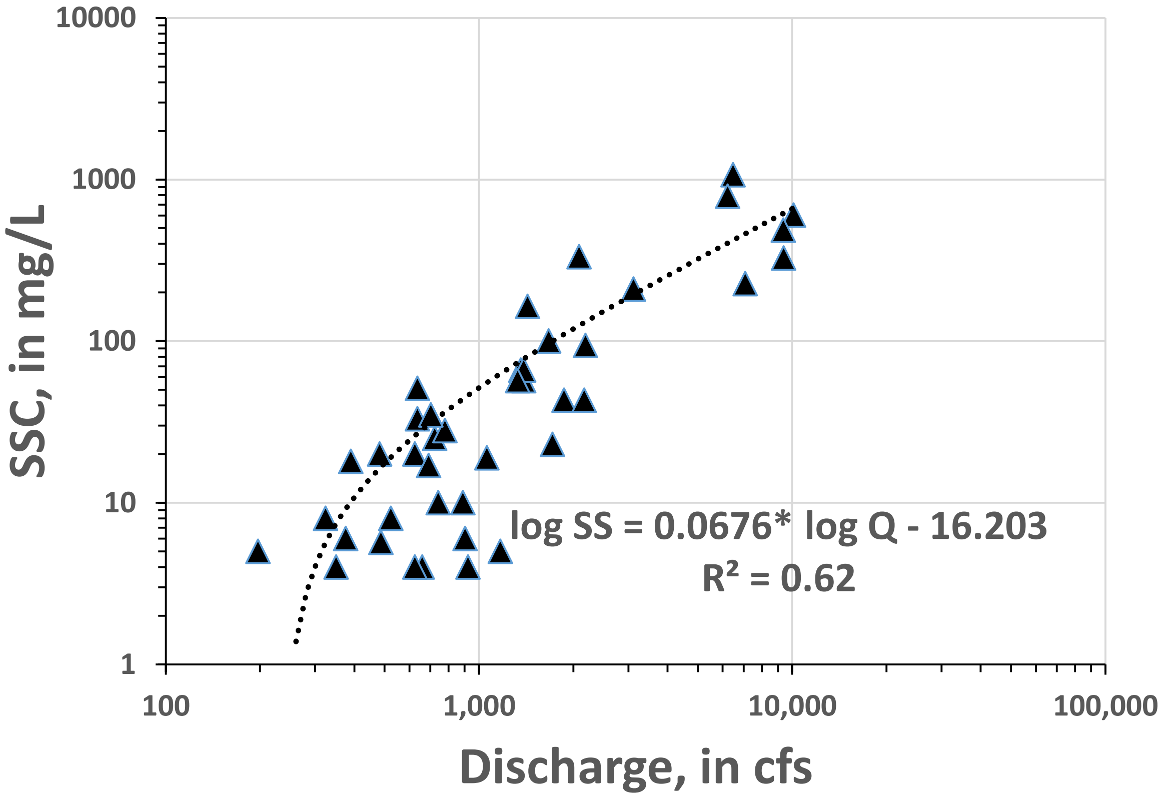
Only 2 samples collected during high crest

9/30/10	9.6 ft	10,600 cfs
5/ 1 /14	10.2 ft	11,700 cfs



Conastoga River at Conastoga, PA.
Falling and slowly falling flow

Conastoga River at Conastoga, PA.
Rising and slowly rising conditions



Conestoga River Suspended Sediment

2007 to 2015 data, values in mg/L

	Rising	Slowly rising	Cresting	Falling	Slowly falling	Steady
Count	32	10	2	81	27	58
Maximum	1,070	51	1,320	582	40	394
Minimum	4.0	4.0	396	2.9	1.0	1.0
Average	155	15	--	95	13	19
Std deviation	252	16	--	121	9.6	51
Log Mean	48	11	--	49	9.3	9.4

Conestoga River Total Phosphorous

2007 to 2016 data, in mg/L

	Rising	Slowly rising	Cresting	Falling	Slowly falling	Steady
count	34	11	2	87	31	68
Maximum	1.55	0.245	1.49	0.979	0.349	0.933
Minimum	0.087	0.036	0.821	0.021	0.052	0.034
Average	0.384	0.111	--	0.315	0.175	0.138
Std Deviation	0.359	0.064	--	0.202	0.077	0.122
Log mean	0.282	0.095	--	0.261	0.158	0.112