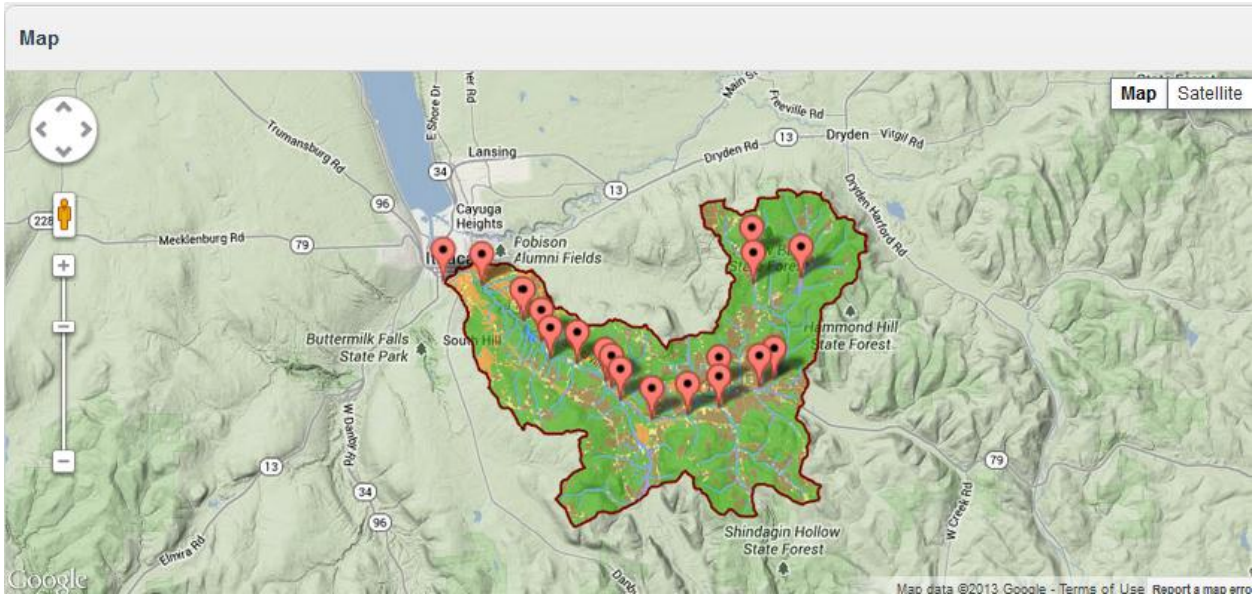
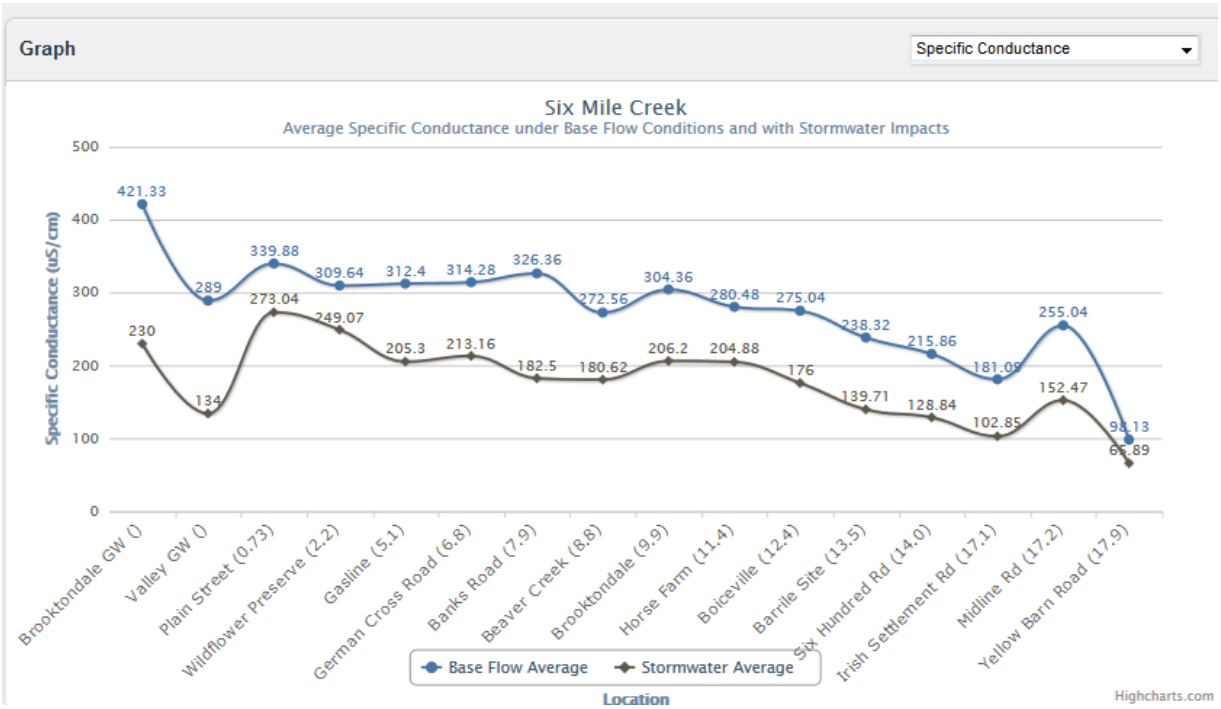

Six Mile Creek:
CSI monitoring data & sediment loads

Six Mile Creek Watershed: 46.4 mi^2 ; 74.5% Forested



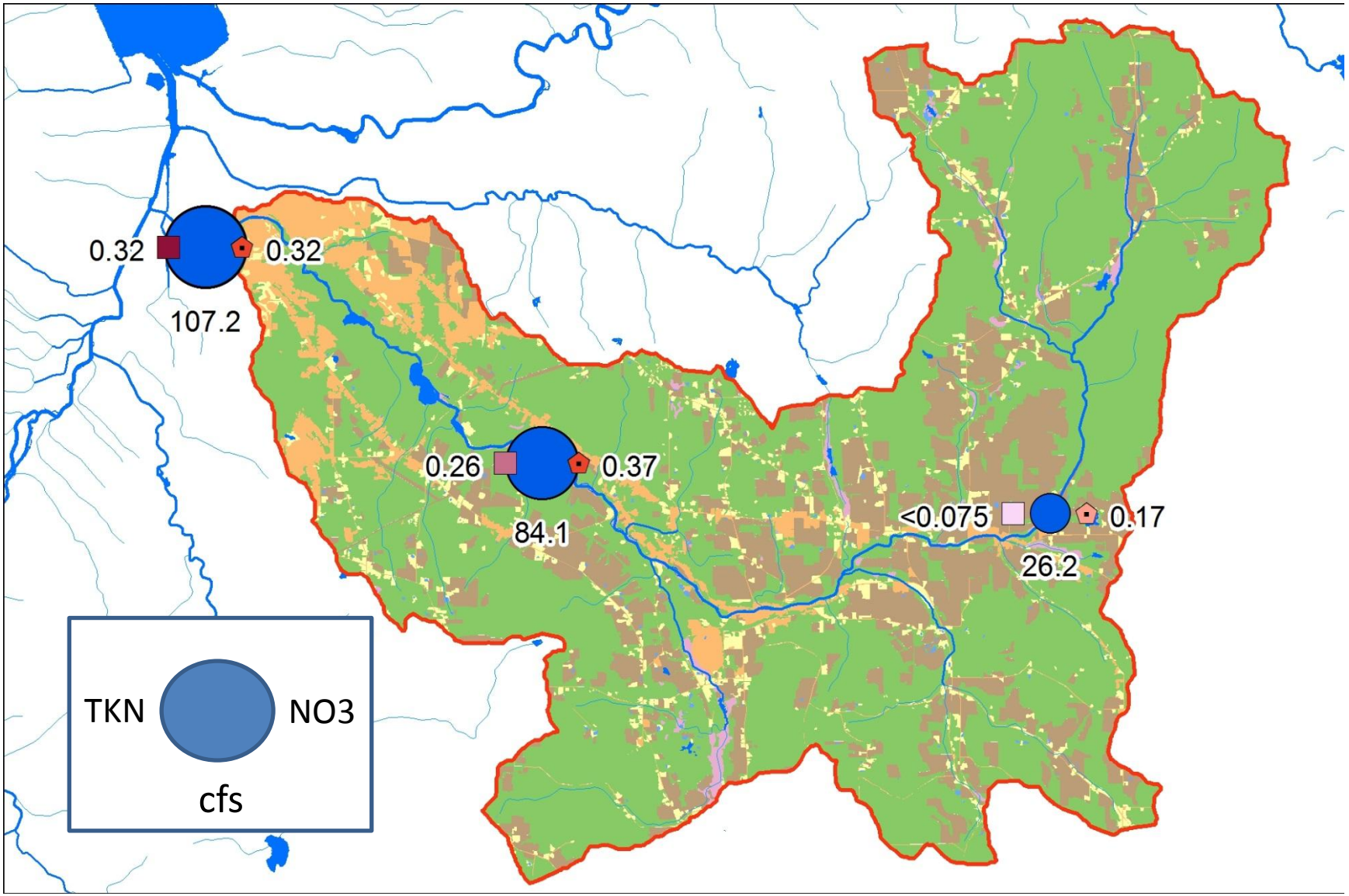
http://www.communityscience.org/database/monitoringsets/5



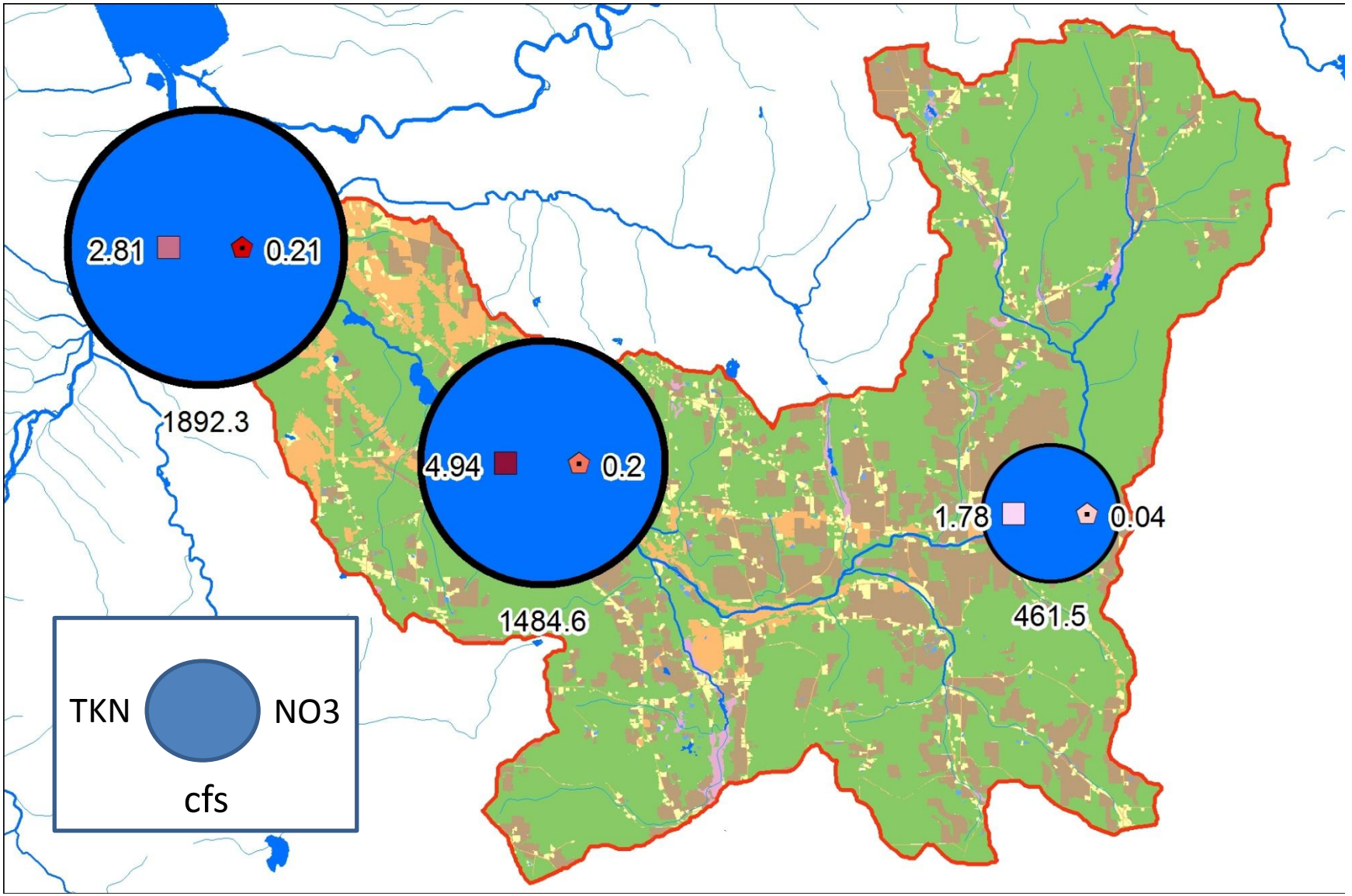
Very quick context

- SIXMILE CREEK: A MANAGEMENT OVERVIEW
  - Based on 2007 6mi Creek Status Report
    - Dan Karig, Todd Miller, Kate Hackett, Roxanna Johnston
  - Six Mile Creek ecosystem is fairly healthy.
  - Largest problem in Six Mile Creek is the high load of suspended sediment, predominantly from Brooktondale downstream to the dams
  - Lower concentrations of nitrate/nitrogen and dissolved phosphorus than watersheds with more agricultural activity
  - Pathogen (E. coli) levels are usually low but at times exceed some DEC standards

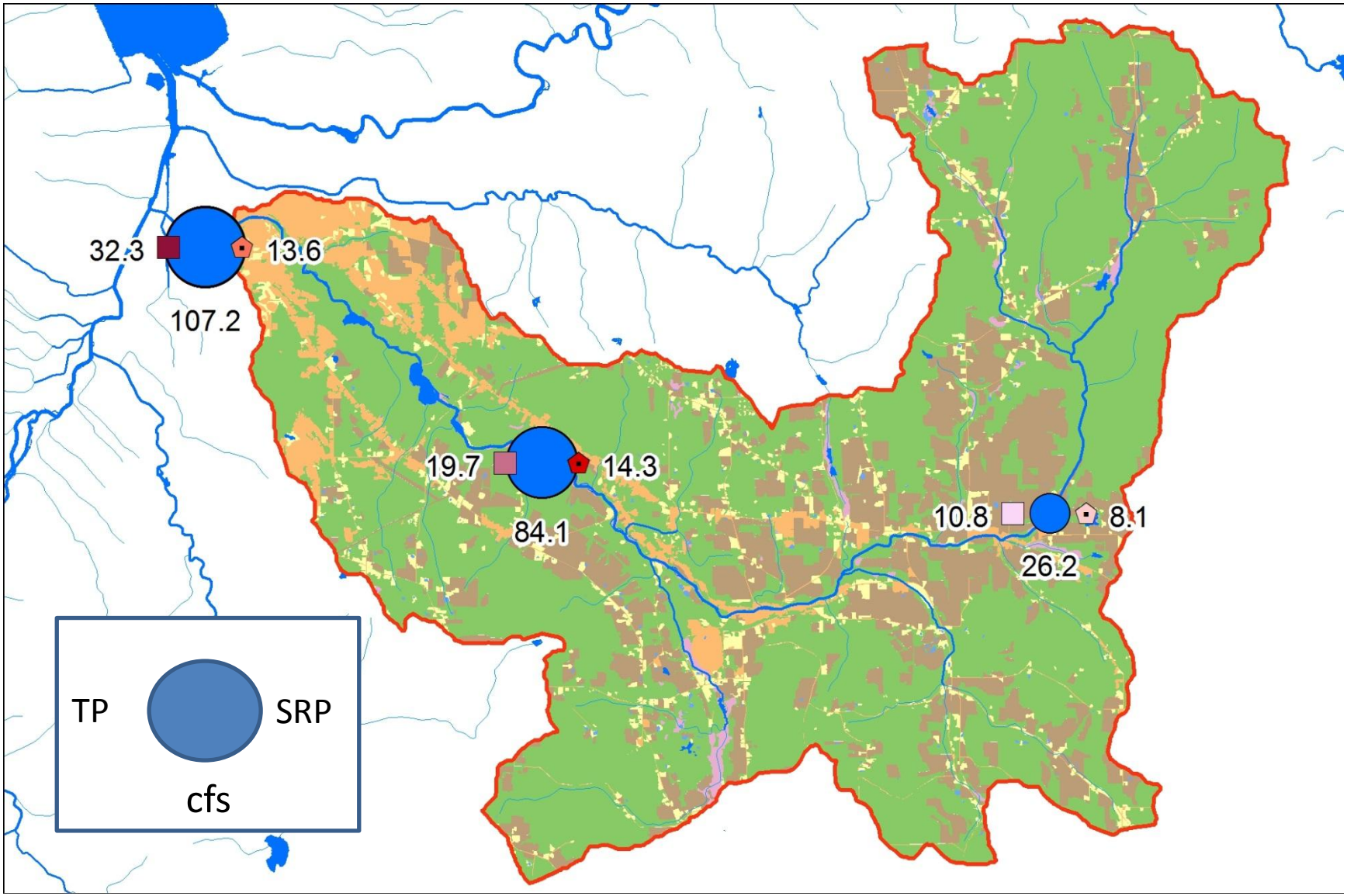
Nitrate and TKN concentrations
Base flow - 9/22/2004



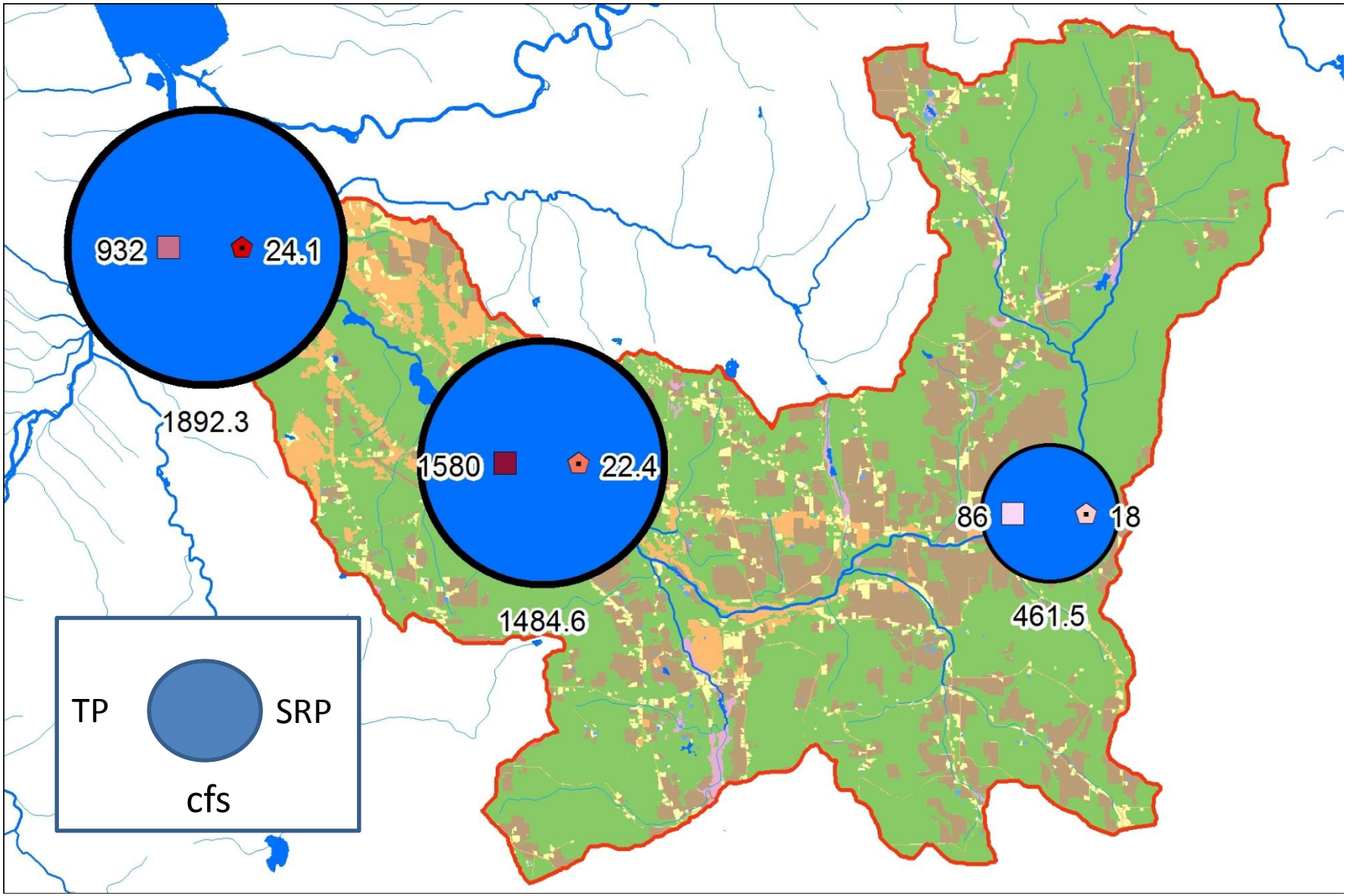
Nitrate and TKN concentrations
Stormwater - 6/27/2006



Total Phosphorus and SRP concentrations
Base flow - 9/22/2004



Total Phosphorus and SRP concentrations Stormwater - 6/27/2006



E. Coli:
EPA Recreational Water Quality Criteria (2012)

- Intended as guidance to states
- Geometric mean (GM)
- Statistical threshold value (STV)
  - no more than 25% of samples can exceed the STV*
  - should not be exceeded by more than 10% of samples taken^

CRITERIA ELEMENTS	**Recommendation 1** Estimated Illness Rate 36/1,000		**Recommendation 2** Estimated Illness Rate 32/1,000	
Indicator	GM (cfu/100 mL)	STV (cfu/100 mL)	GM (cfu/100 mL)	STV (cfu/100 mL)
Enterococci (marine & fresh)	35	130	30	110
E. coli (fresh)	126	410	100	320

* http://water.epa.gov/scitech/swguidance/standards/criteria/health/recreation/upload/summary20111.pdf

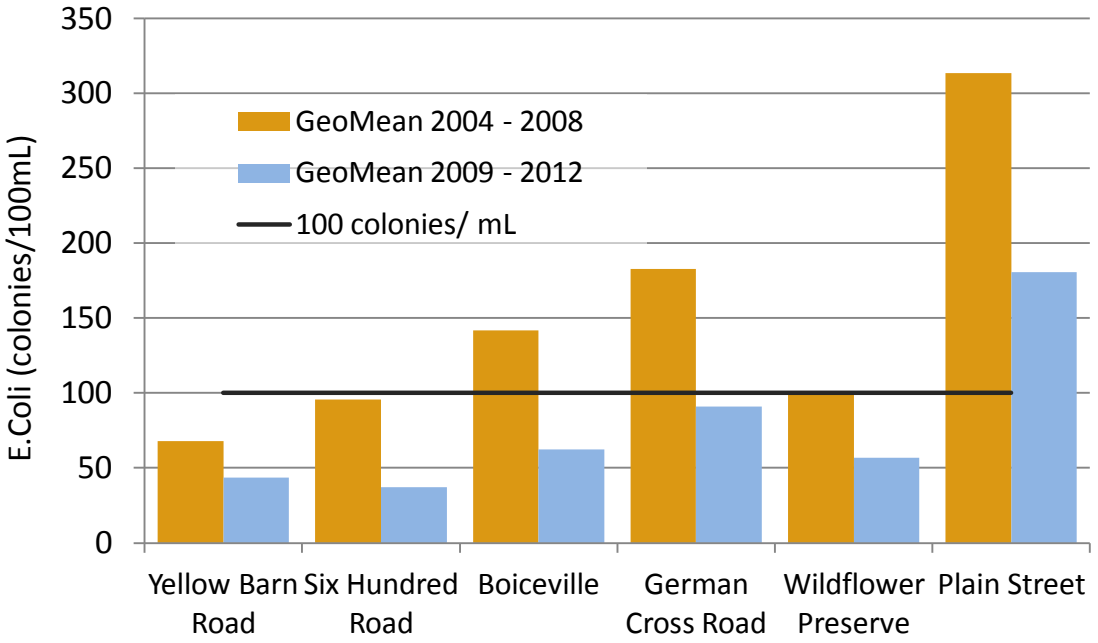
^ http://water.epa.gov/scitech/swguidance/standards/criteria/health/recreation/upload/factsheet2012.pdf

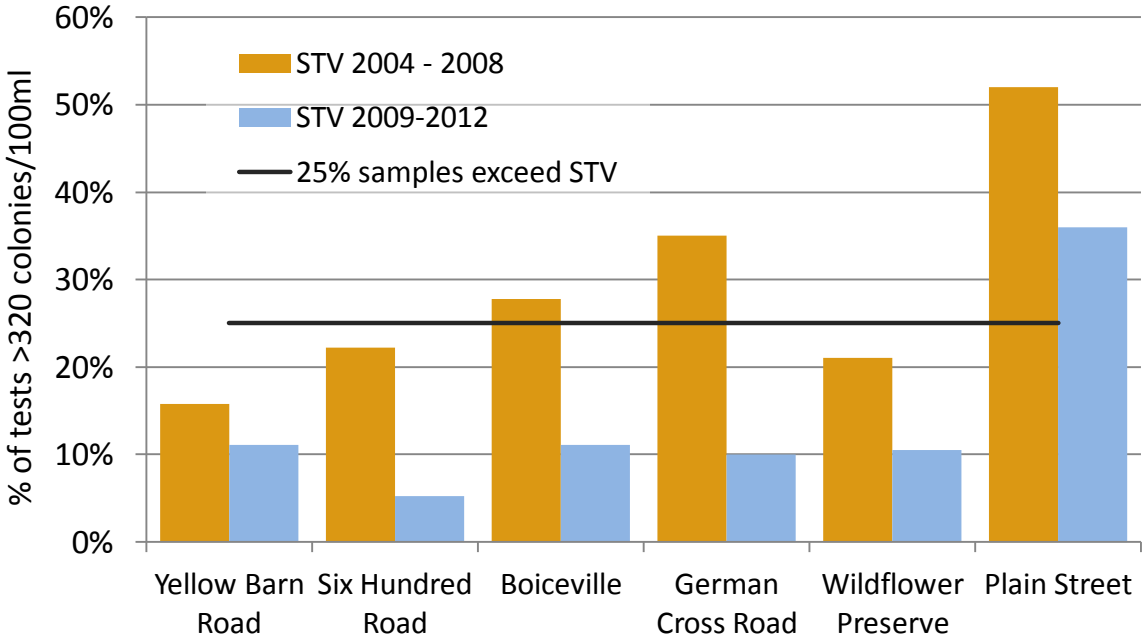
E. Coli in Six Mile Creek

GeoMeans and percent of samples that exceed an STV value of 320 (colonies/ mL)

Comparison between two time periods:

- 2004 – 2008
- 2009 – 2012





LOAD ESTIMATOR (LOADEST)

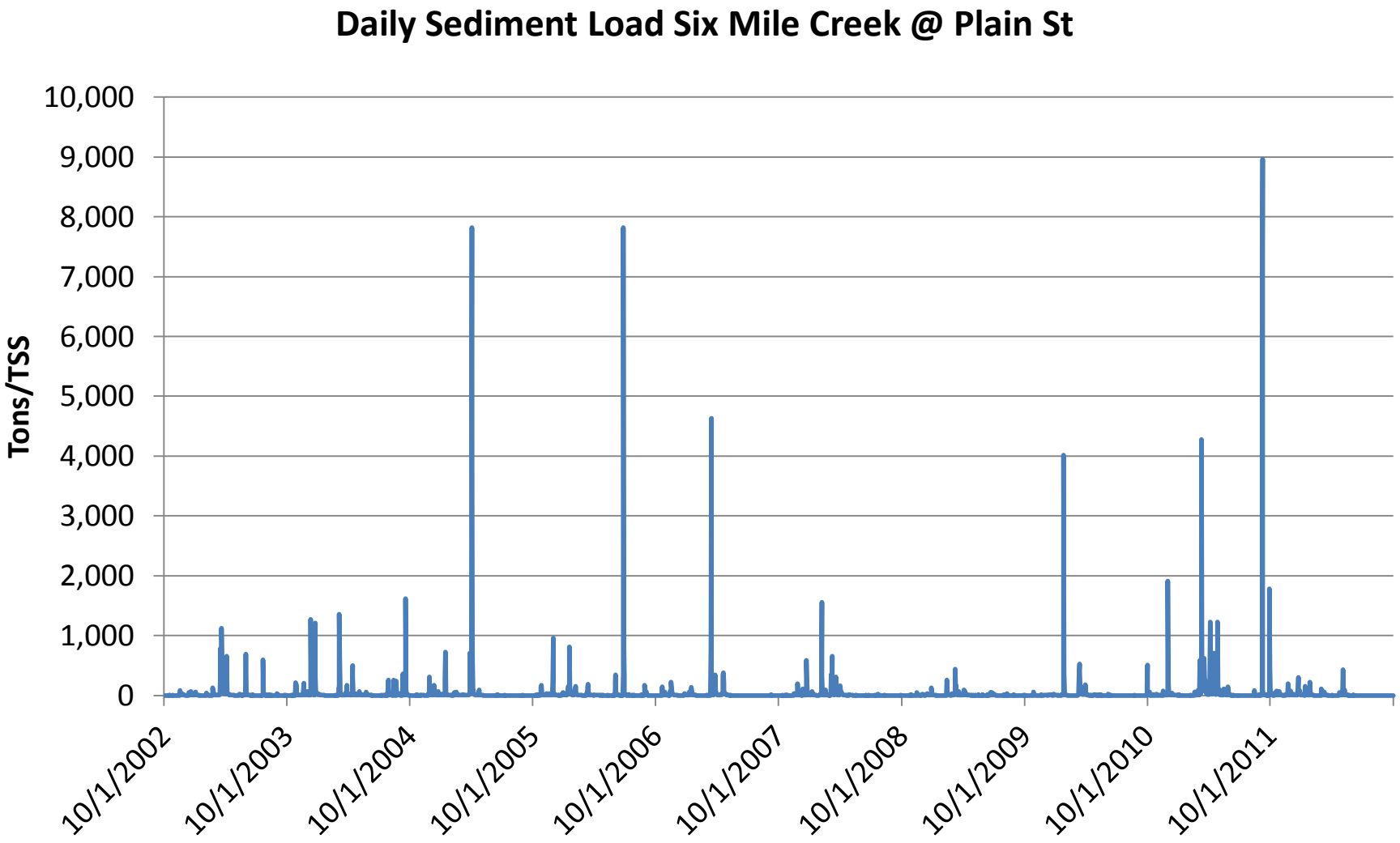
- 1st Step: Model Formation. Regression models. Based on streamflow and time.
- 2nd Step: Model Calibration. Compare observed and estimated measurements
- 3rd Step: Load Estimation.

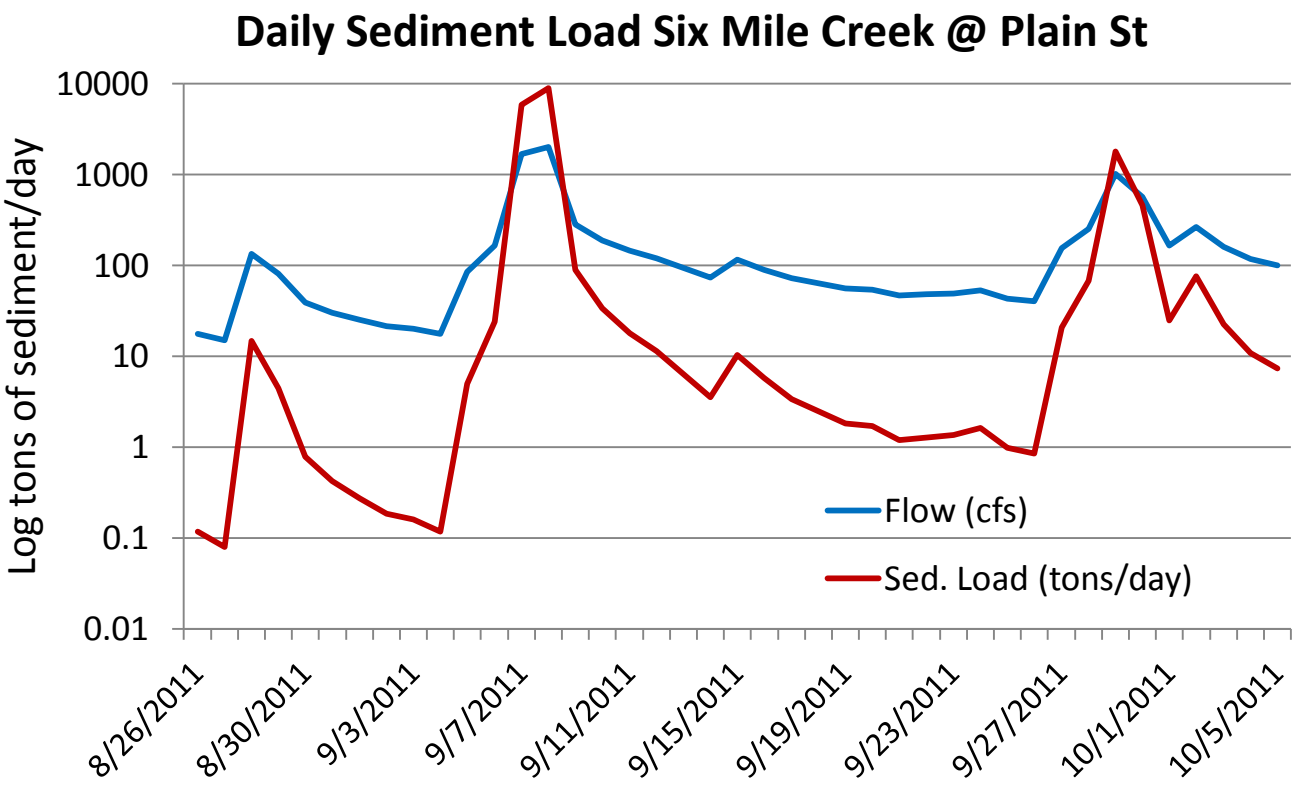
USGS
science for a changing world

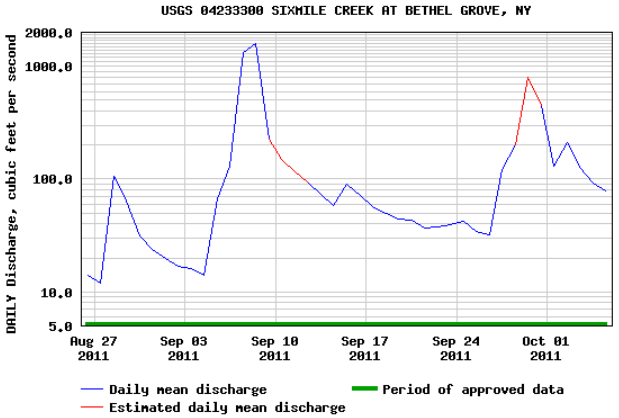
Suspended Sediment

- Total Suspended Solids (TSS) are solids in water that can be trapped by a filter
- TSS can include a wide variety of material, such as silt, decaying plant and animal matter, industrial wastes, and sewage.
- According to Griffiths and Walton (1978), the upper tolerance level for suspended sediment is between 80-100 mg/l for fish
- Six Mile Creek is classified by NYDEC as Class A – drinking water after chlorination and filtration.

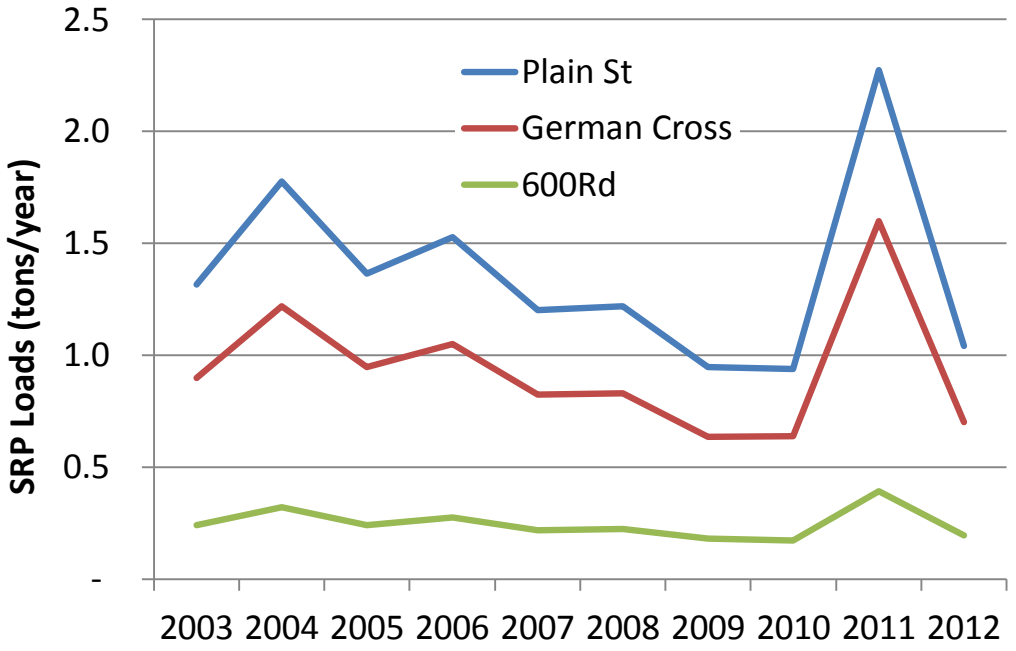
Sediment Loading occurs primarily during high flow events



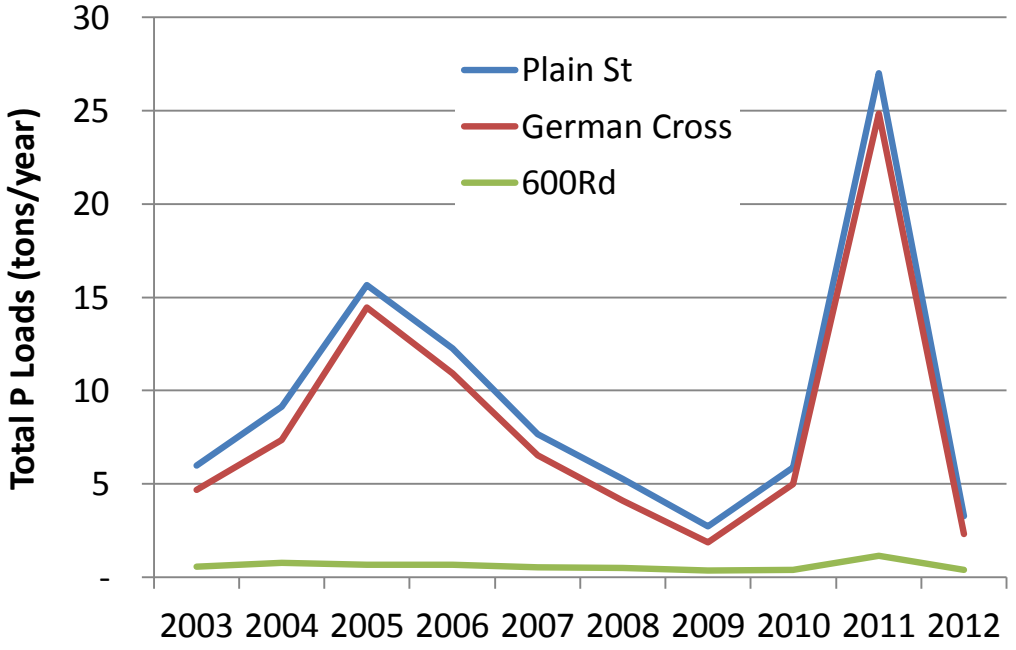

Daily Sediment Load Six Mile Creek @ Plain St
Log tons of sediment/day
10000
1000
100
10
1
0.1
0.01
Flow (cfs)
Sed. Load (tons/day)
8/26/2011
8/30/2011
9/3/2011
9/7/2011
9/11/2011
9/15/2011
9/19/2011
9/23/2011
9/27/2011
10/1/2011
10/5/2011


USGS 04233300 SIXMILE CREEK AT BETHEL GROVE, NY
DAILY Discharge, cubic feet per second
2000.0
1000.0
100.0
10.0
5.0
Aug 27 2011
Sep 03 2011
Sep 10 2011
Sep 17 2011
Sep 24 2011
Oct 01 2011
Daily mean discharge
Estimated daily mean discharge
Period of approved data

Soluble Phosphorus Loads



Total Phosphorus Loads



Initial Estimate of Suspended Sediment Loads in Lower Inlet (numbers in tons/yr)

year	Upstream Buttermilk	Buttermilk Mouth	Sum	Cherry/ Tabor St	% diff
2010	4,962	260	5,222	4,710	-10.9%
2011	54,130	1,193	55,323	57,261	3.4%
2012	3,473	269	3,741	3,339	-12.0%

Year	Six Mile	Cascadilla	Inlet	Total	% Six Mile
2010	7,640	715	4,710	13,065	58.5%
2011	35,841	2,358	57,261	95,460	37.5%
2012	3,949	684	3,339	7,972	49.5%

Inlet Dredging

Converting tons/year into cubic yards of sediment per year:

Estimate	Year	inlet	six mile
Loadest	2010	7,027	4,109
Loadest	2011	51,345	19,278
Loadest	2012	4,288	2,124
GWLF model (1987)	Average	4,167	426

How long would it take to generate 660,000 cubic yards of material, if all sediment stayed in the lower Inlet?

At 2010 levels:	94 years
At 2011 levels:	13 years
At 2012 levels:	154 years

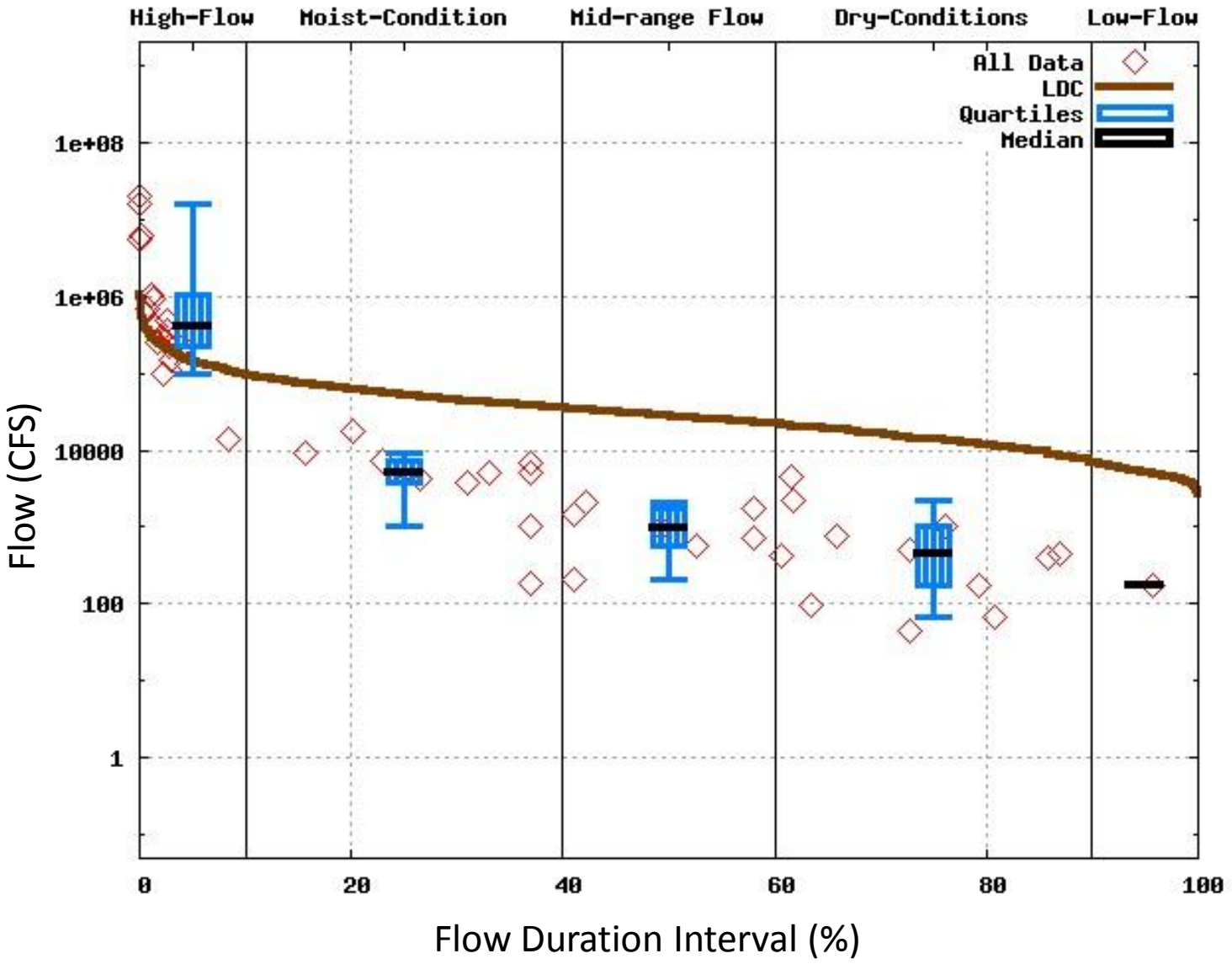
http://www.ecologicllc.com/ithacadredging.html

Conclusions

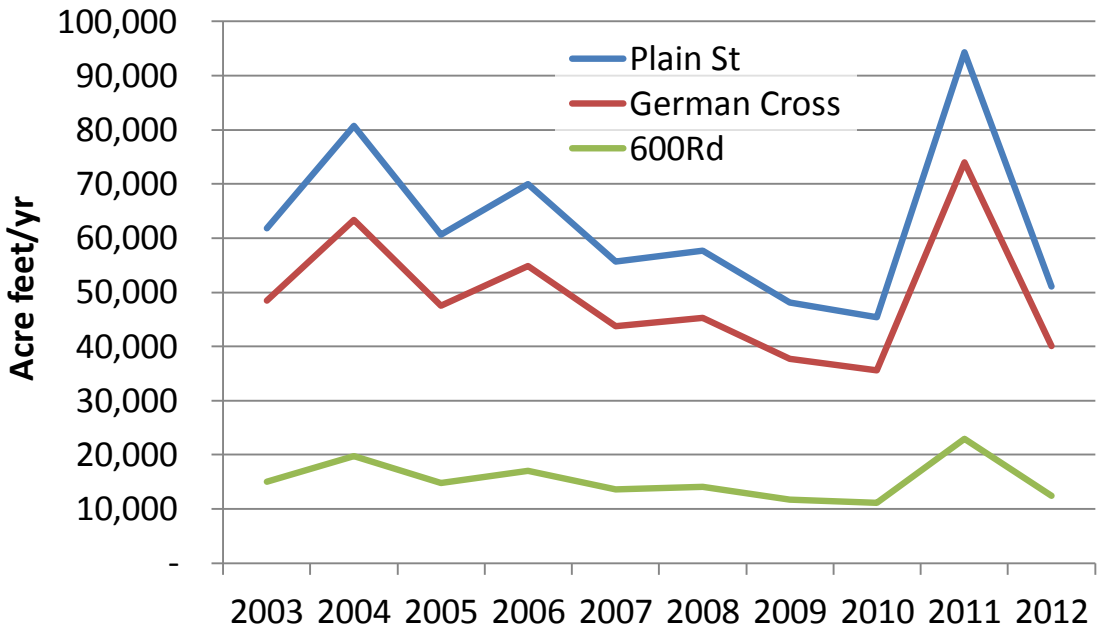
- CSI has **8022** data items for Six Mile Creek
  - 850 new data items/year
  - Allows for the analysis of bacteria, sediment and nutrients
- Data indicates no degradation of water quality in Six Mile Creek since 2007 Karig report
  - E. Coli trend looks good for (illegal) swimmers
- Policy issues related to sediment
  - Frequency of Inlet Dredging
  - Upstream actions to reduce sediment loading to Inlet

Load Duration Curve for Six Mile Creek – Plain St

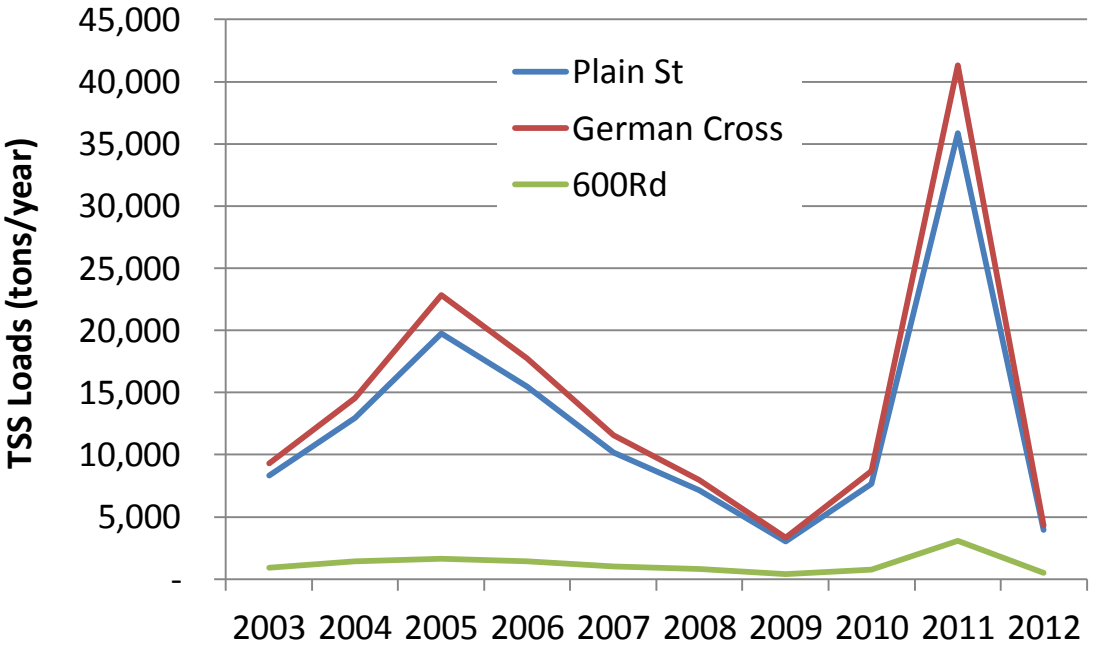
WY2003-WY2012



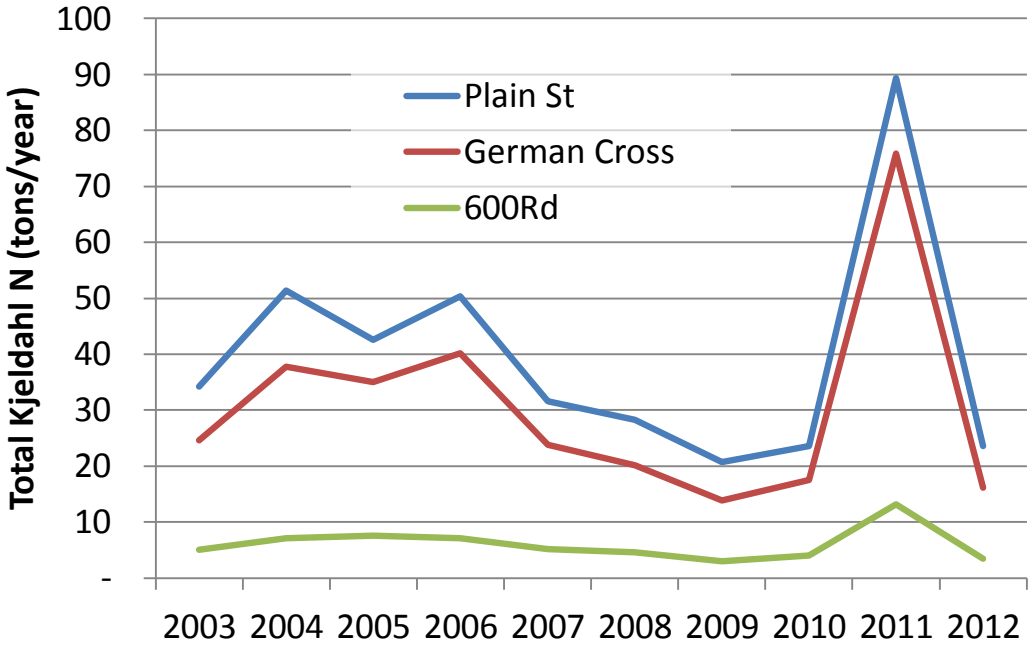
Stream flow in Six Mile Creek



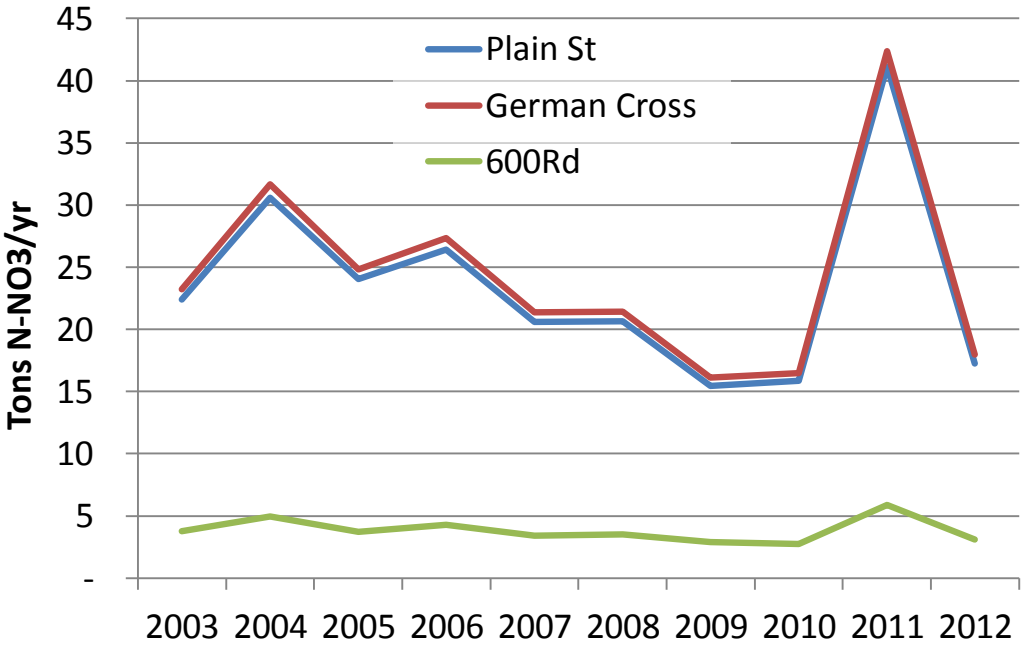
Sediment Loads (TSS) Six Mile Creek



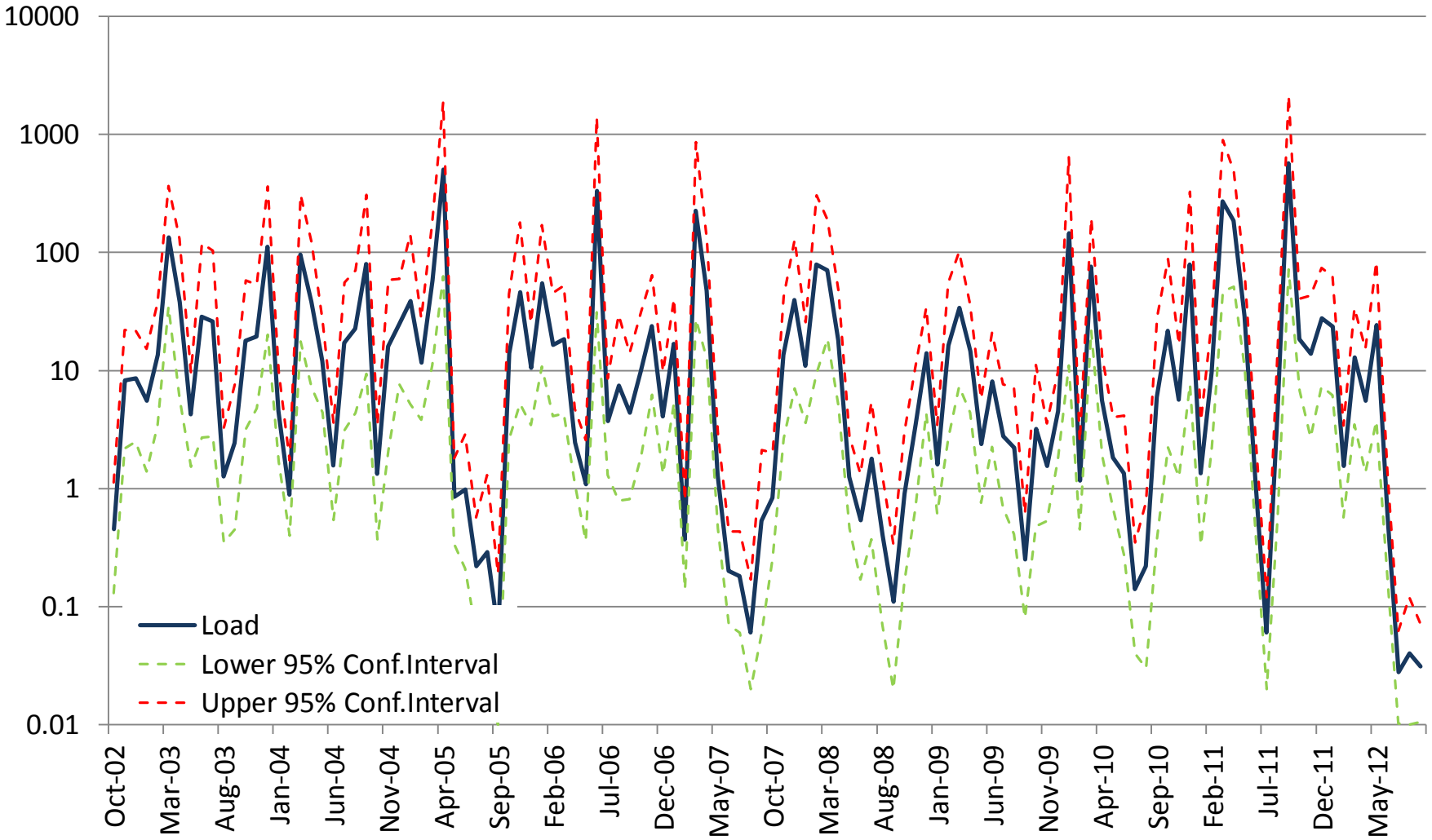
Total Kjeldahl N Loads



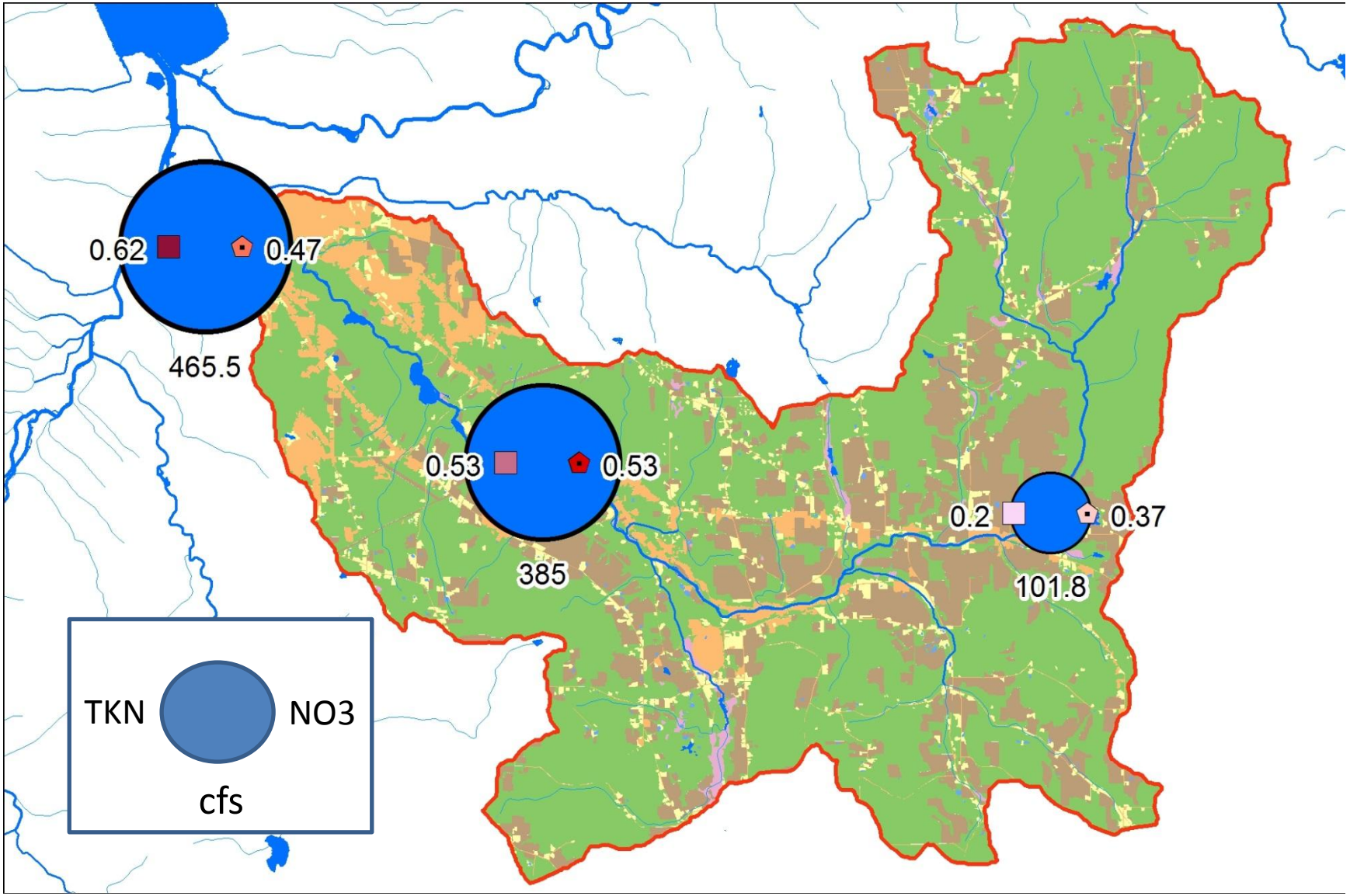
Total Nitrate Loads



Average Monthly Sediment Loads @ Plain St with 95% confidence intervals



Nitrate and TKN concentrations 3/29/2005



Total Phosphorus and SRP concentrations 3/29/2005