A photograph of a riverbank. The foreground shows a sandy bank with a fallen log. The middle ground features a river with greenish water. The background is filled with trees and a clear sky. The text is overlaid on the top half of the image.

Year Three Review of Water Quality Monitoring on the Upper Strawberry River Project 07-1000

T.R. Brueggen¹ and J.L. Bouldin^{1,2}

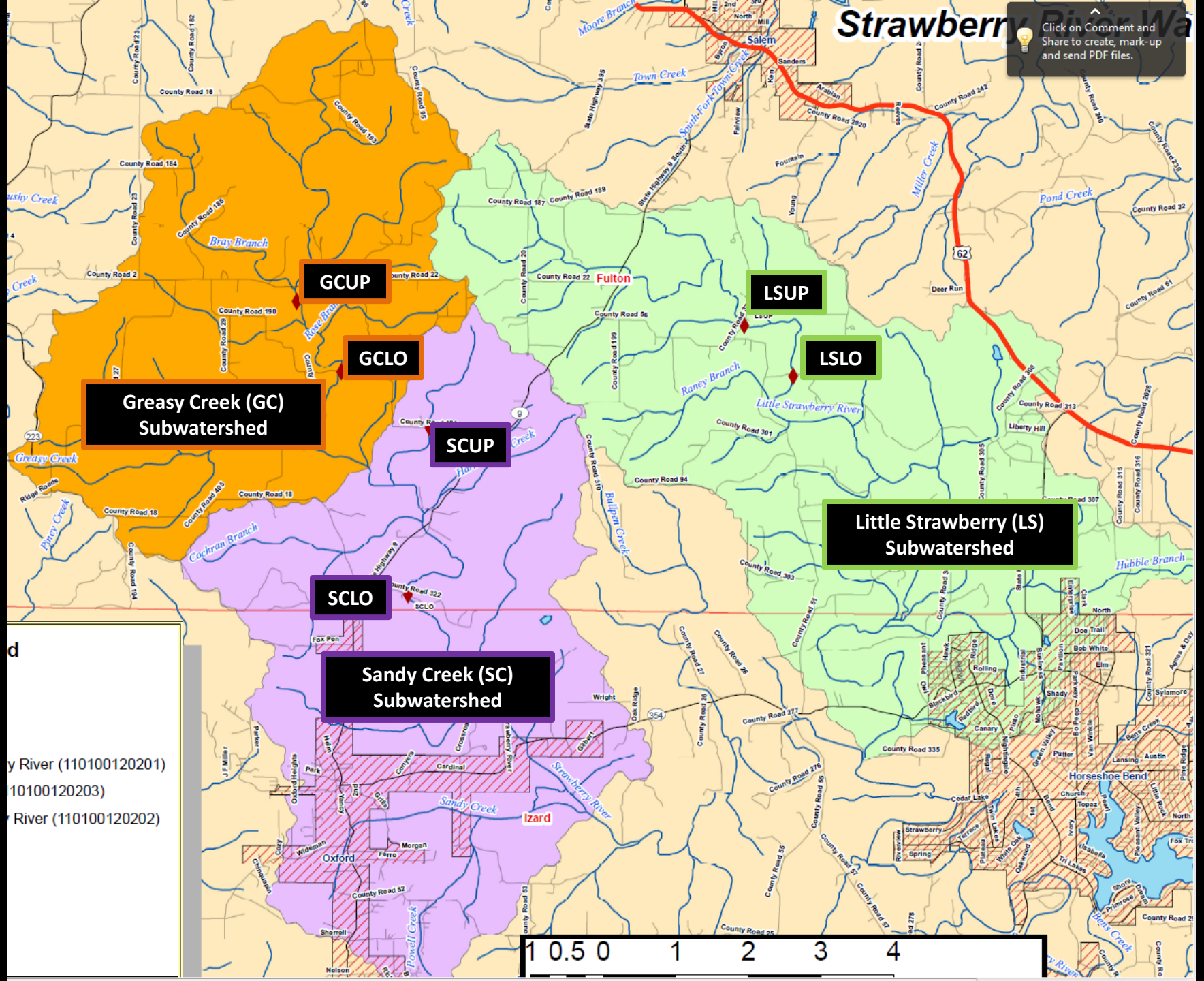
¹ *Environmental Sciences Graduate Program, Arkansas State University, State University, AR 72467*

² *Department of Biological Sciences, Arkansas State University, State University, AR 72467*

Overview

- Major headwater streams in the upper Strawberry River watershed
 - Little Strawberry (LS)
 - Sandy Creek (SC)
 - Greasy Creek (GC)
- Above and below BMP implementation
- Surface Water Quality Tests
 - Nutrients
 - Nitrites
 - Nitrates
 - Ortho-Phosphates
 - Total Suspended Solids





**Greasy Creek (GC)
Subwatershed**

GCUP

GCLO

SCUP

SCLO

**Sandy Creek (SC)
Subwatershed**

LSUP

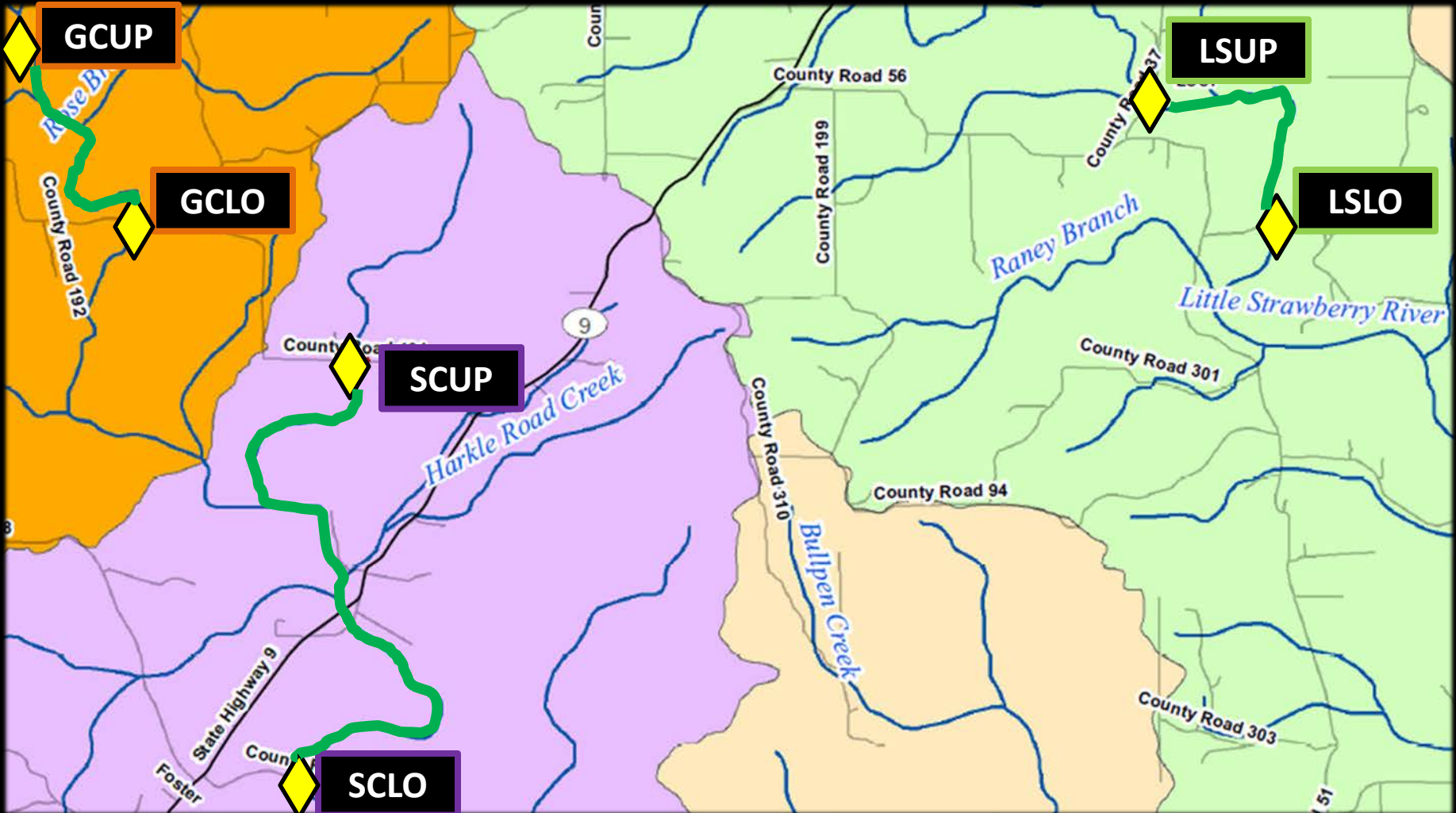
LSLO

**Little Strawberry (LS)
Subwatershed**

d
y River (110100120201)
10100120203)
River (110100120202)



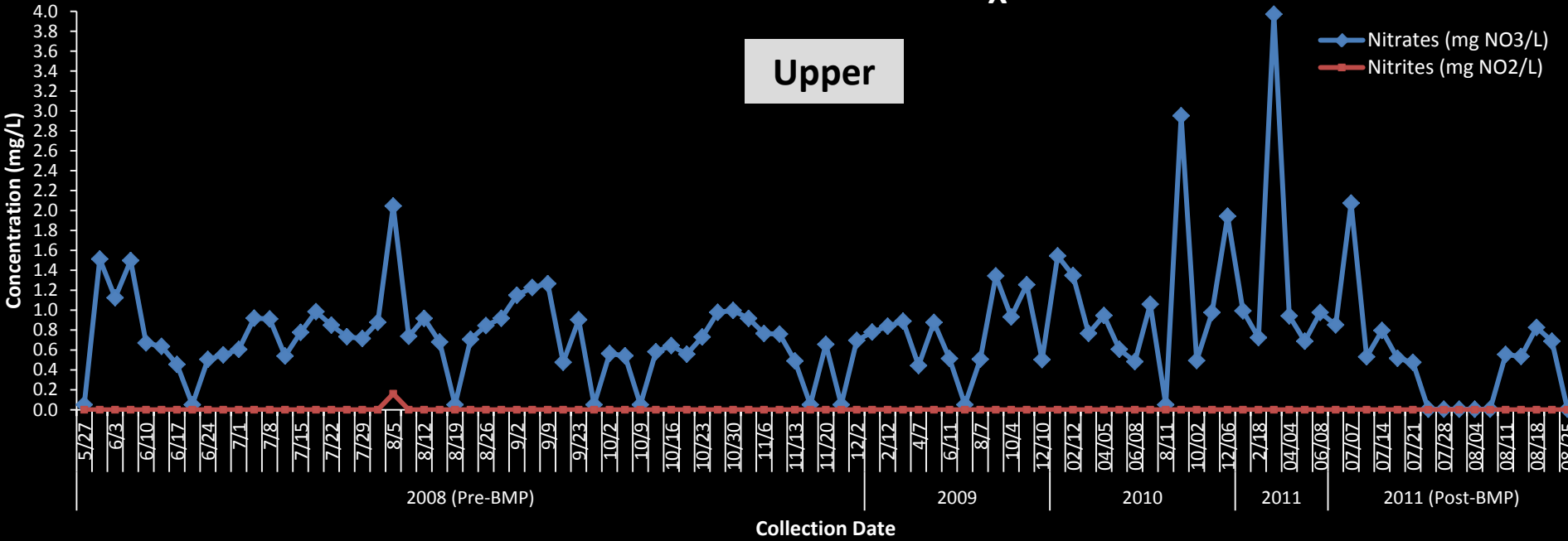
Sampling sites



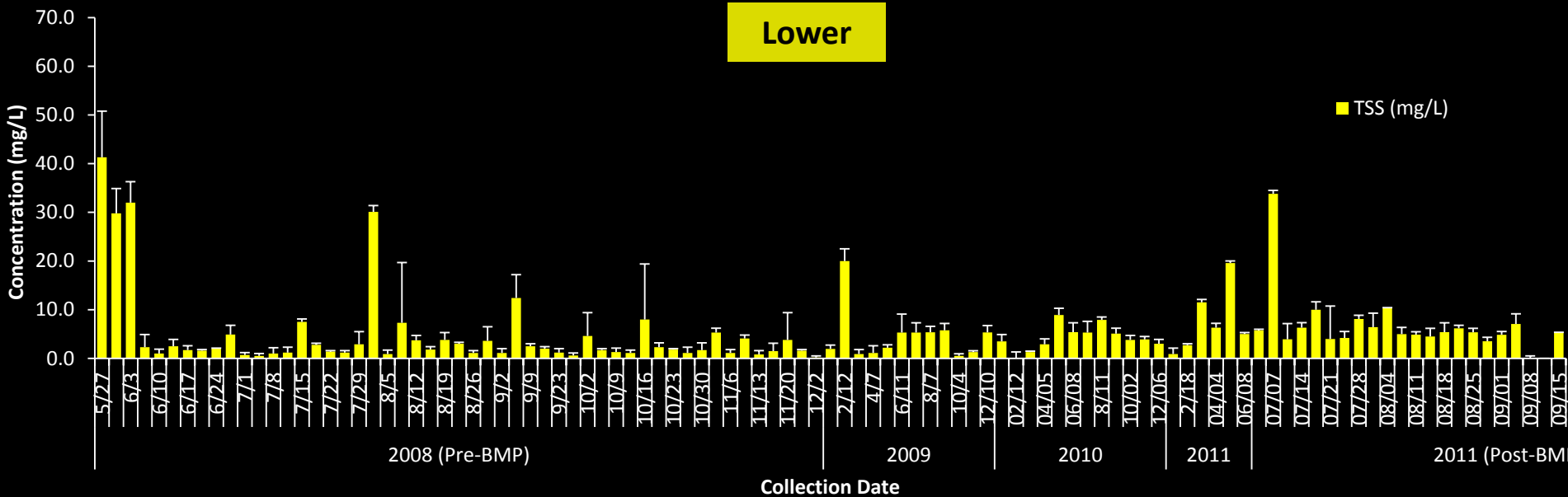
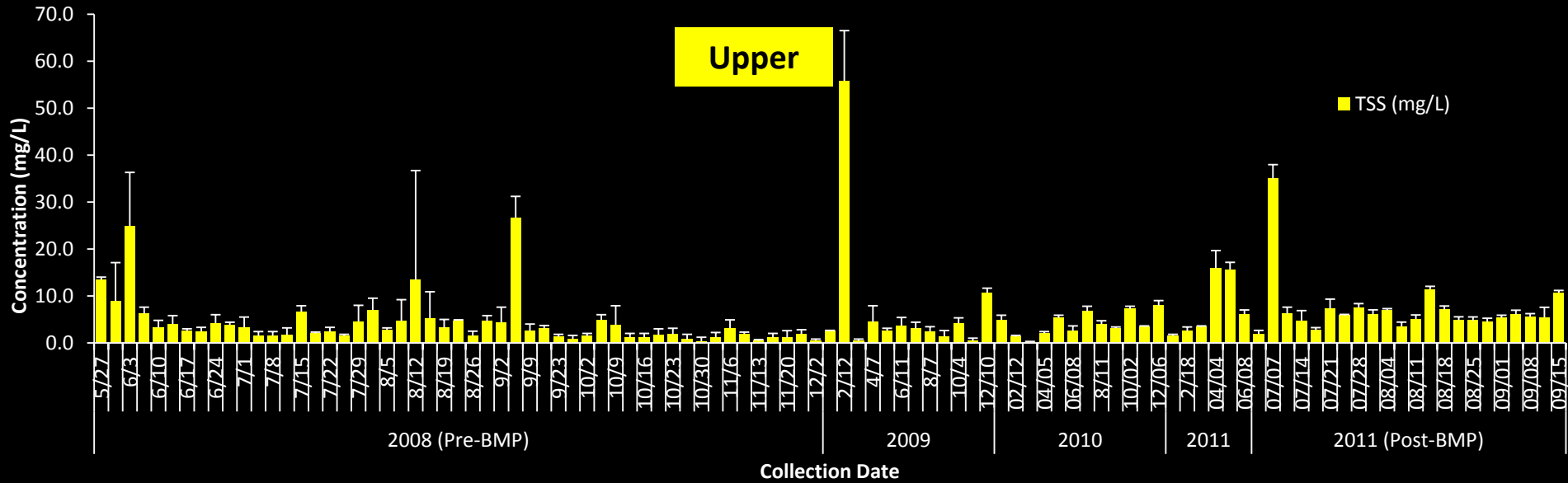
Little Strawberry (LS) NO_x Data

Upper

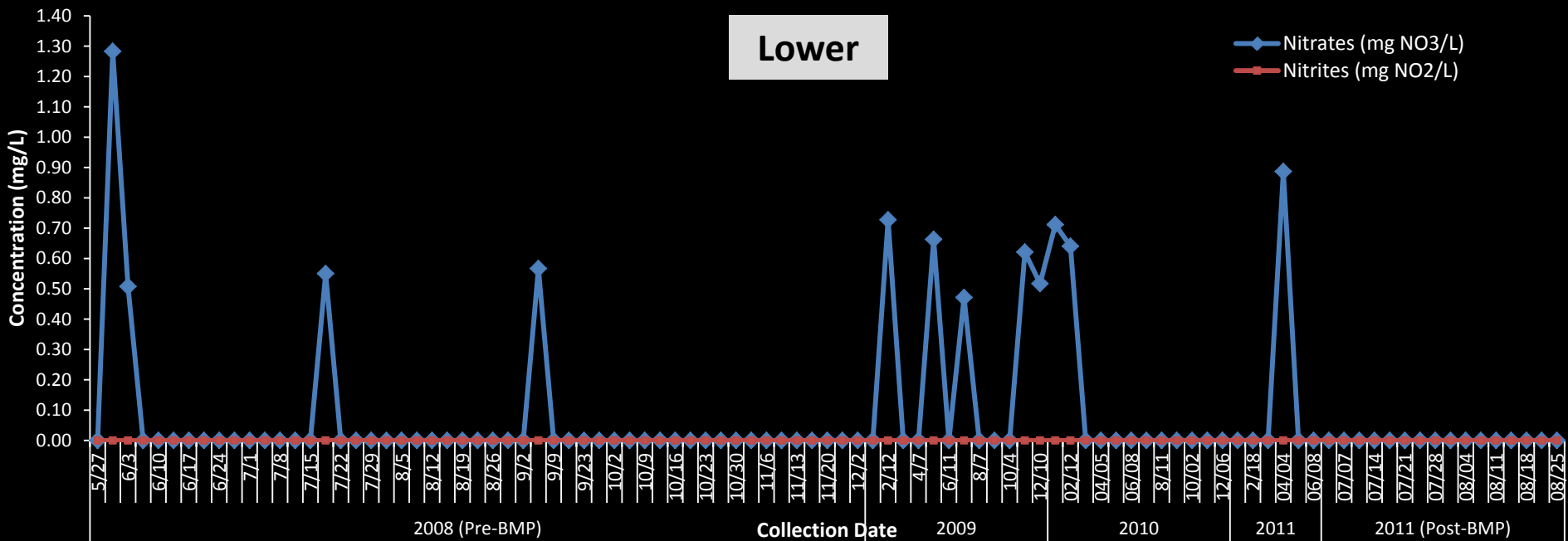
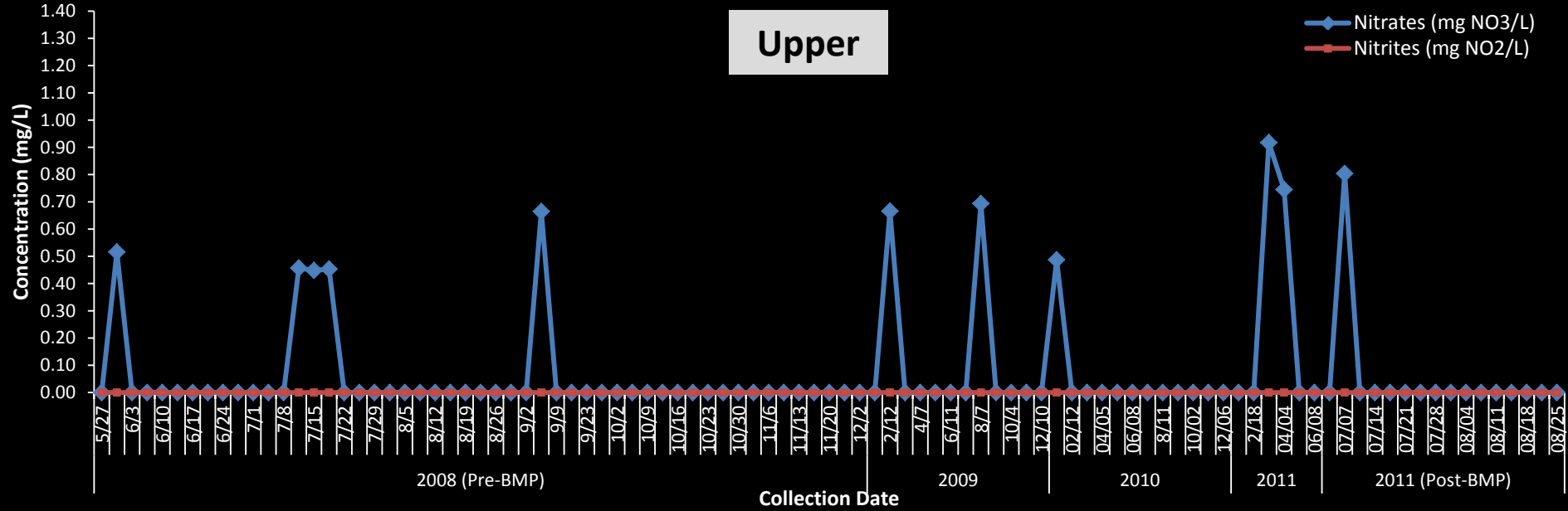
—◆— Nitrates (mg NO₃/L)
—■— Nitrites (mg NO₂/L)



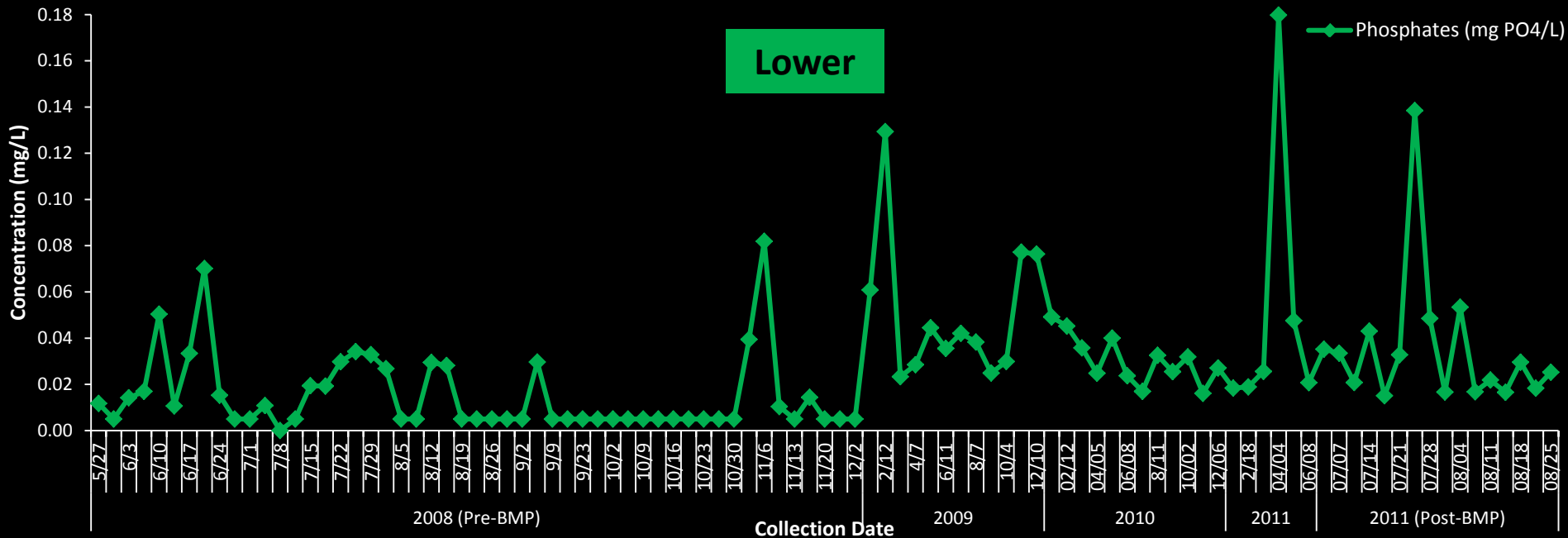
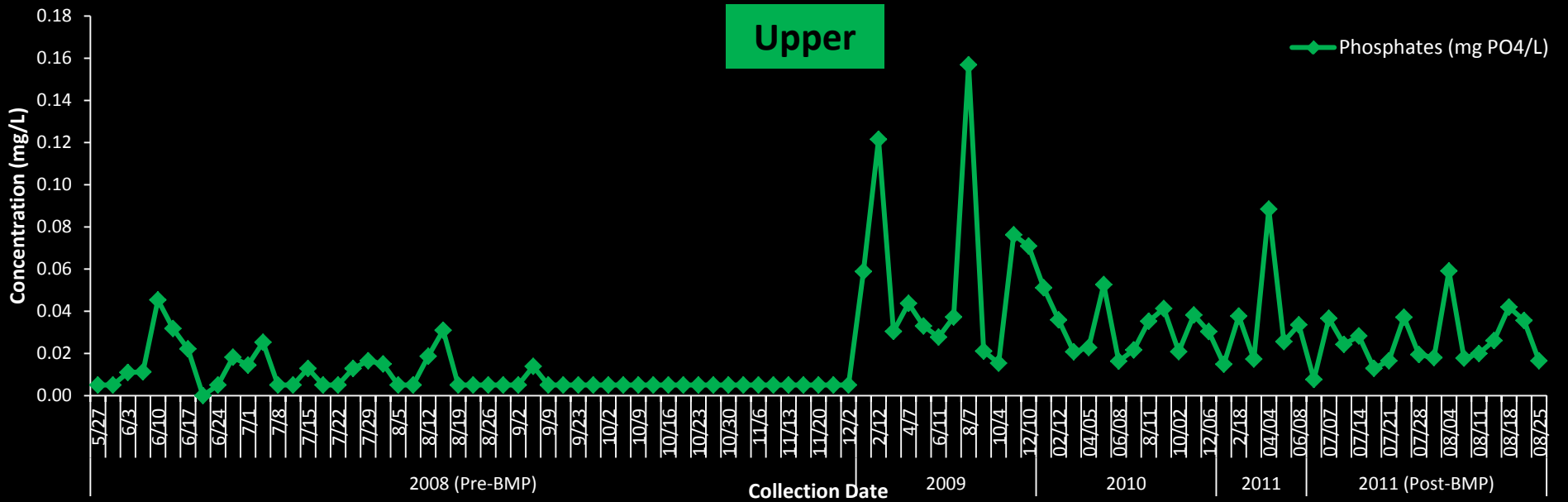
Little Strawberry Total Suspended Solid (TSS) Data



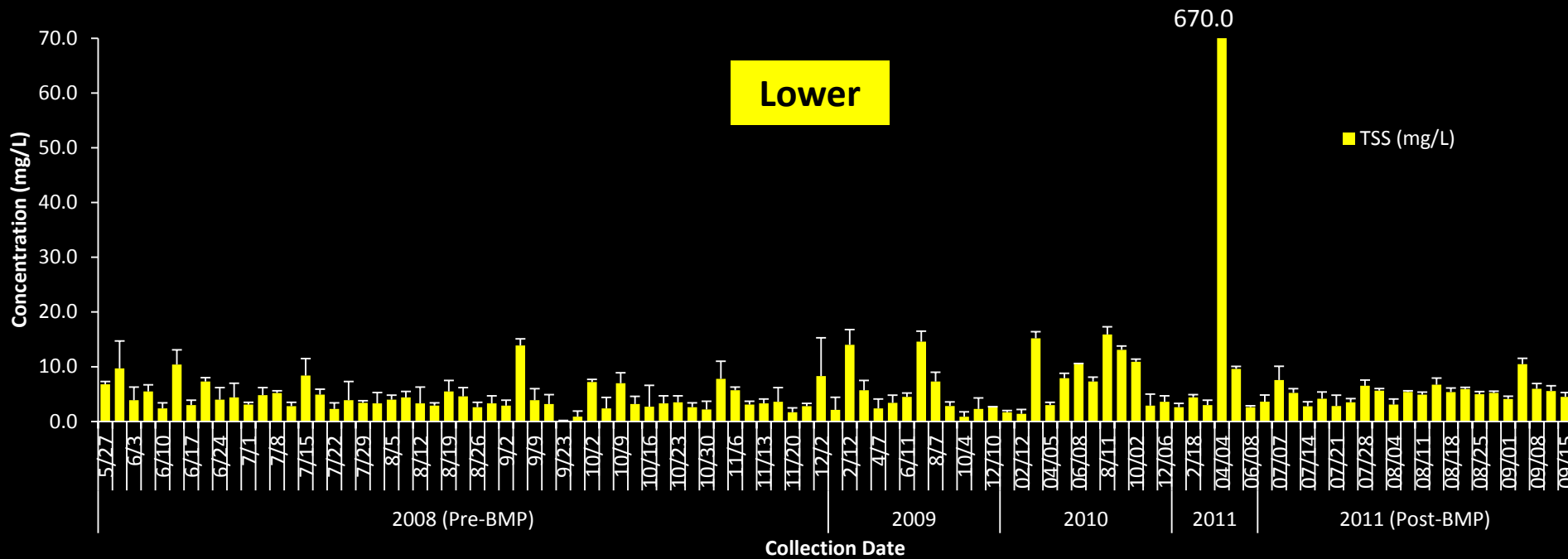
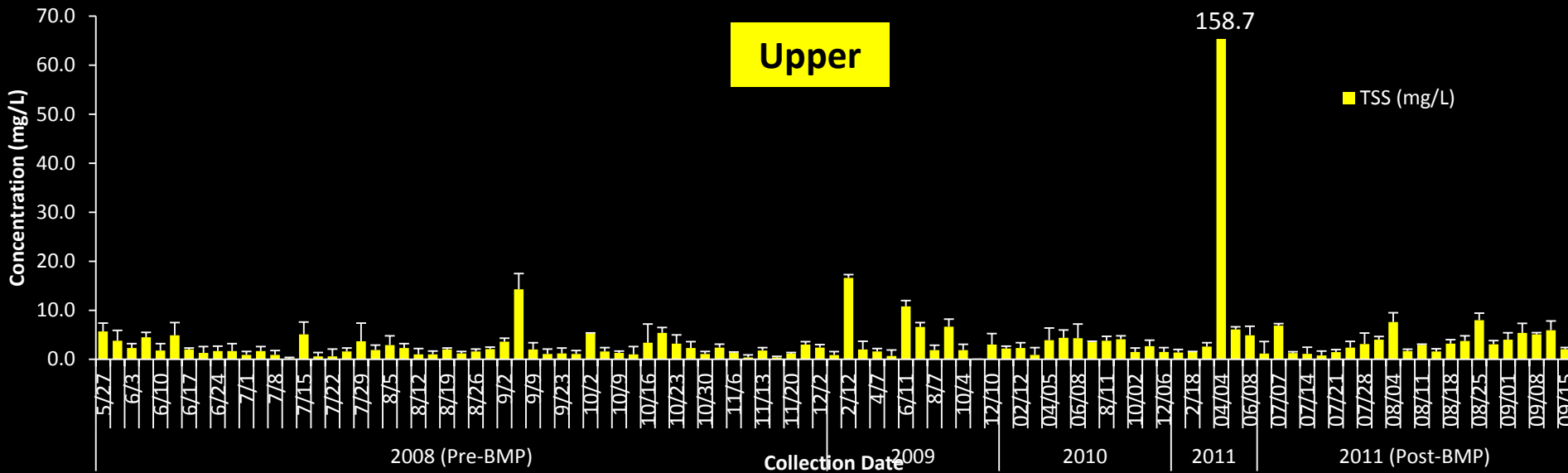
Greasy Creek (GC) NO_x Data



Greasy Creek (GC) Ortho-Phosphate Data



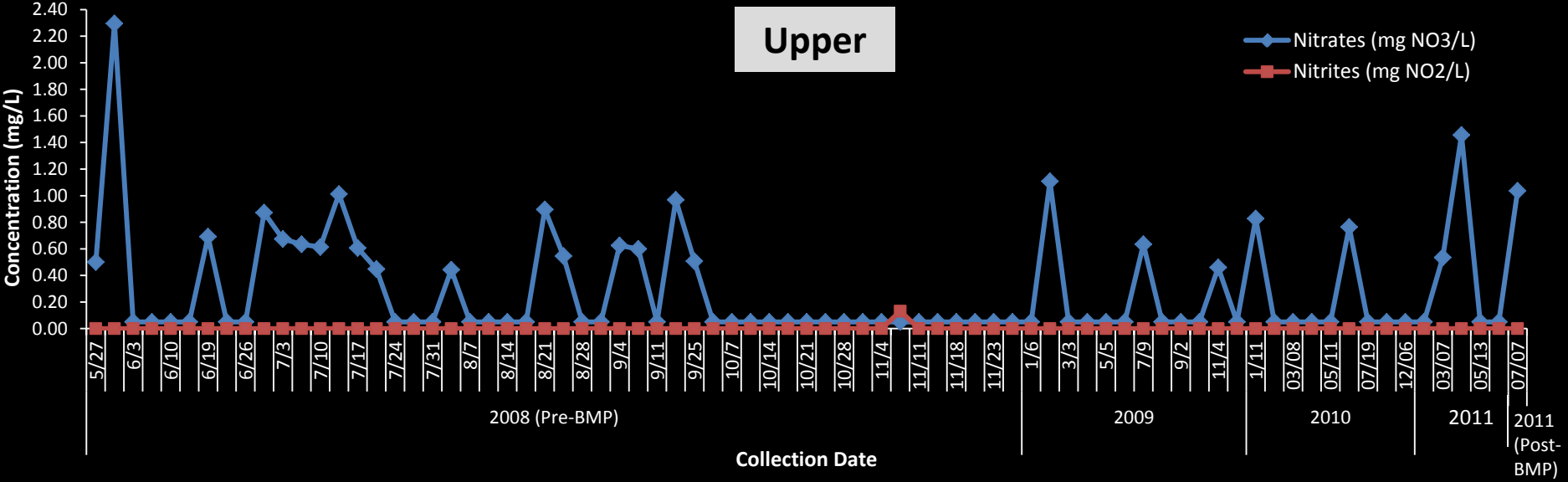
Greasy Creek (GC) Total Suspended Solid (TSS) Data



Sandy Creek (SC) NO_x Data

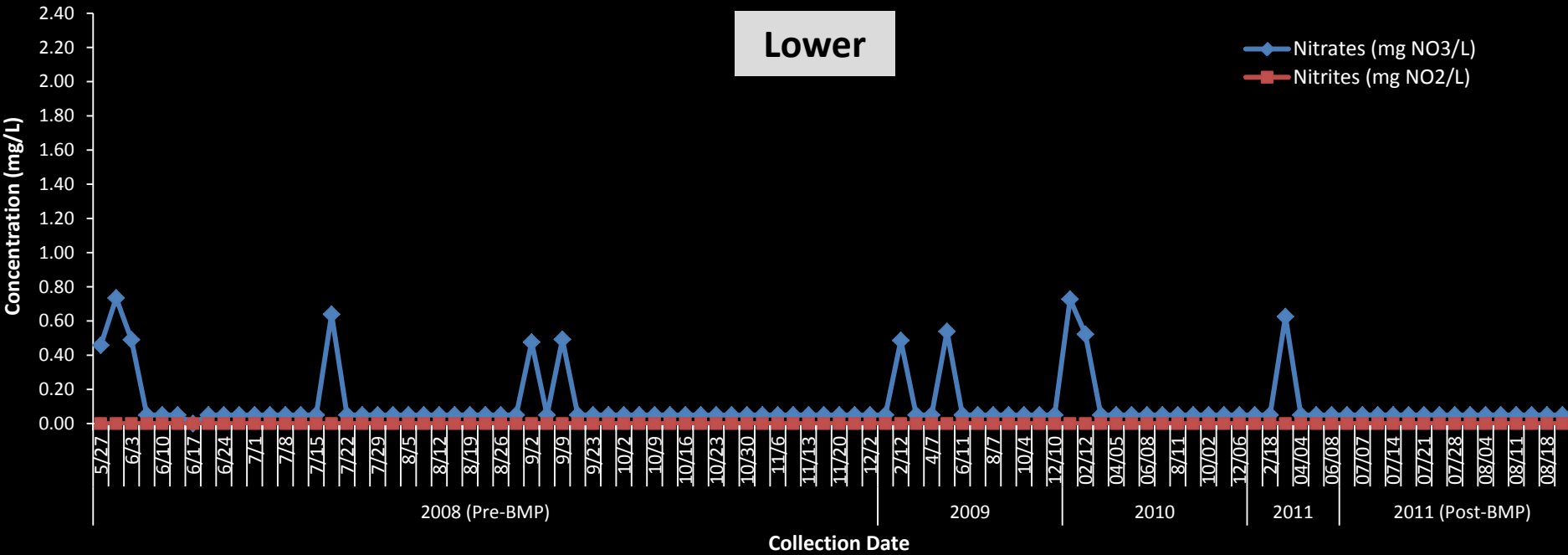
Upper

—◆— Nitrates (mg NO₃/L)
—■— Nitrites (mg NO₂/L)



Lower

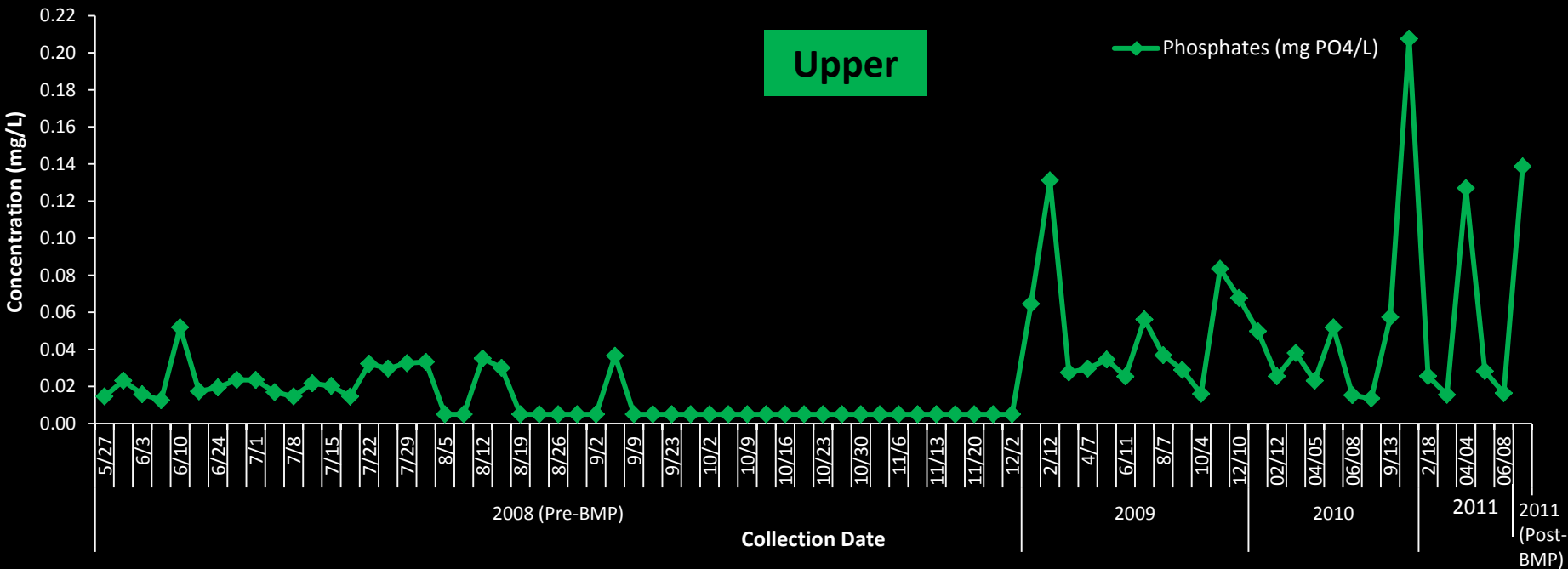
—◆— Nitrates (mg NO₃/L)
—■— Nitrites (mg NO₂/L)



Sandy Creek (SC) Ortho-Phosphate Data

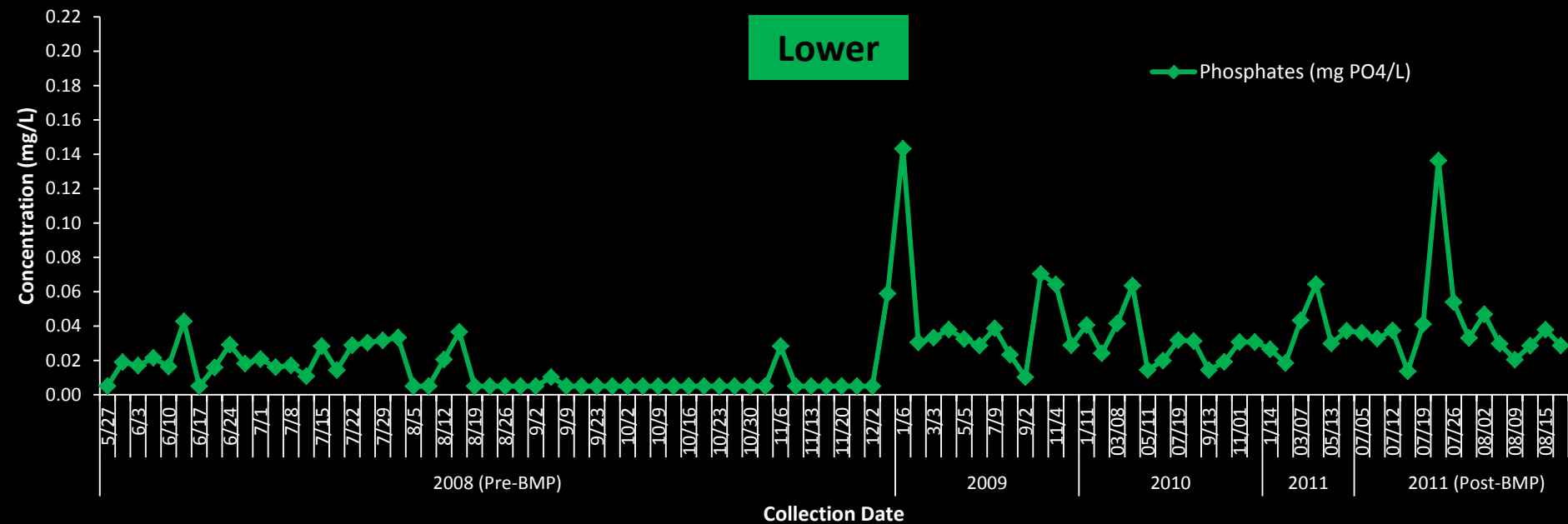
Upper

Phosphates (mg PO₄/L)

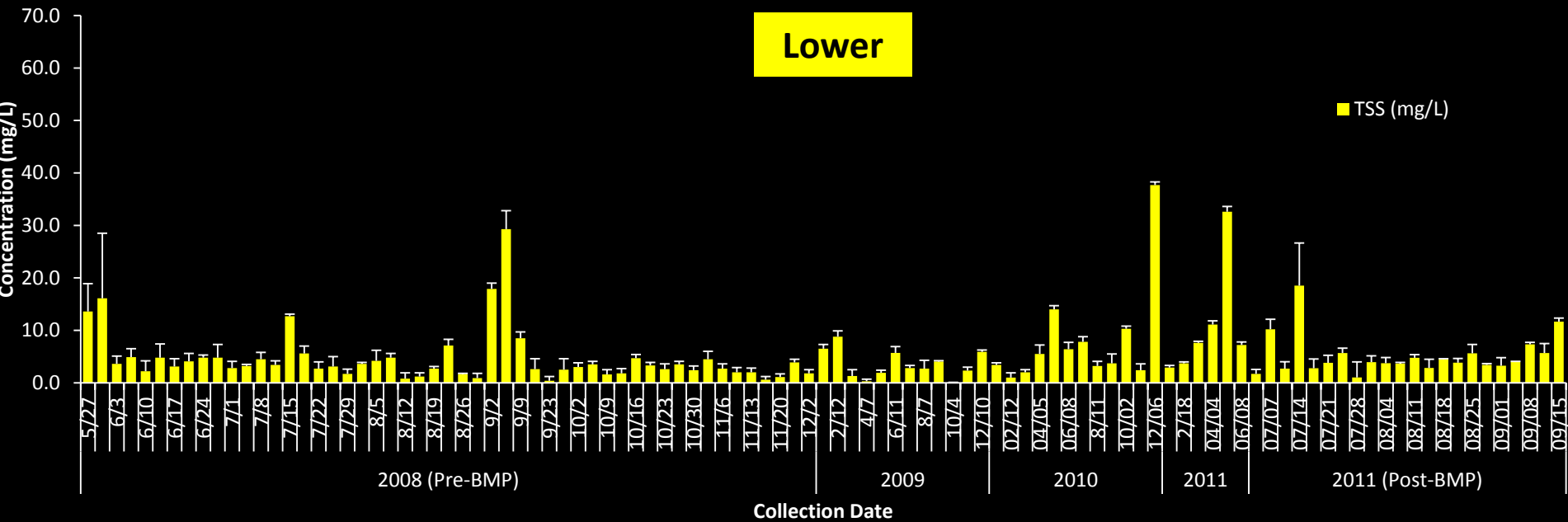
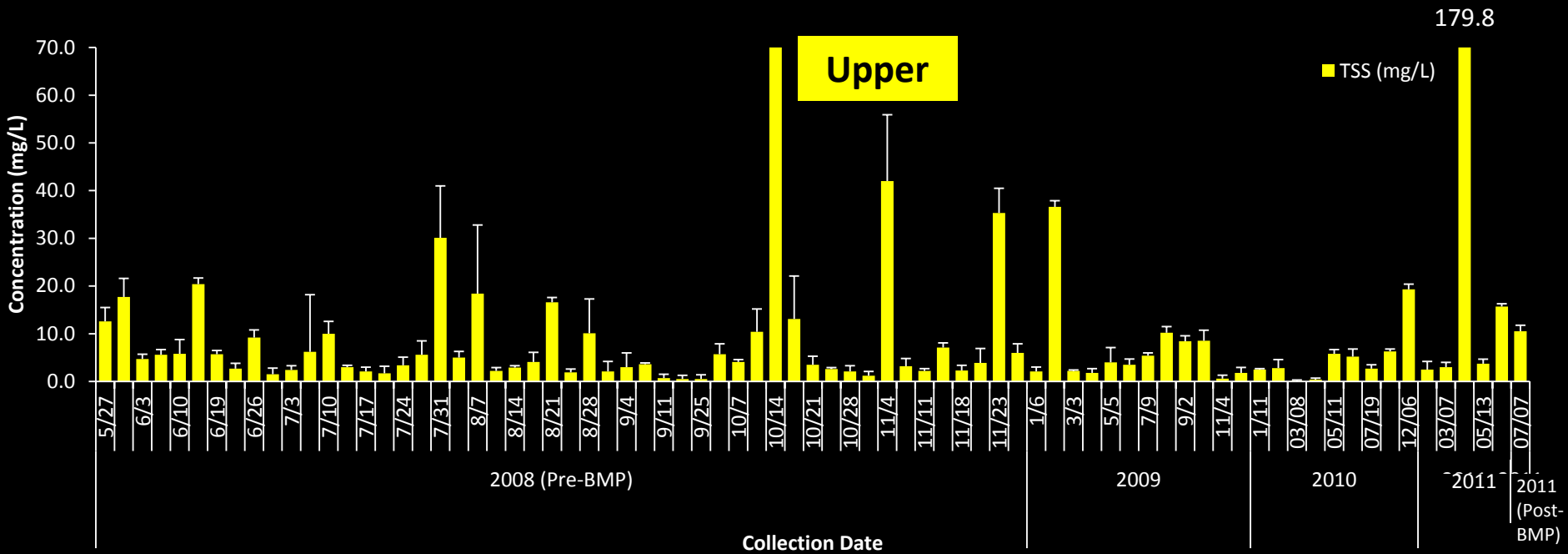


Lower

Phosphates (mg PO₄/L)



Sandy Creek (SC) Total Suspended Solid (TSS) Data



High and Mean Values: Pre-BMP 2008, 2009, 2010

Nitrate (mg/L)										
	Pre-BMP		2009		2010		2011 (Jan-June)		Post BMP (July-Aug 25)	
Site	High	Mean	High	Mean	High	Mean	High	Mean	High	Mean
LSUP	2.05	0.76	1.34	0.67	2.95	1.09	3.97	1.38	2.07	0.49
LSLO	2.37	0.56	0.90	0.58	1.18	0.43	1.34	0.57	1.26	0.13
GCUP	0.67	0.29	0.69	0.30	0.48	0.19	0.92	0.31	0.80	0.10
GCLO	1.28	0.29	0.73	0.34	0.71	0.24	0.89	0.19	BDL	BDL
SCUP	2.30	0.46	1.11	0.40	0.83	0.31	1.46	0.43	1.04	NA
SCLO	0.74	0.31	0.54	0.27	0.73	0.24	0.63	0.15	BDL	BDL

High and Mean Values: Pre-BMP 2008, 2009, 2010

Ortho-phosphate (mg/L)

Site	Pre-BMP		2009		2010		2011 (Jan-June)		Post BMP (July-Aug 25)	
	High	Mean	High	Mean	High	Mean	High	Mean	High	Mean
LSUP	0.18	0.04	0.11	0.05	0.09	0.05	0.14	0.05	0.48	0.06
LSLO	0.06	0.01	0.12	0.05	0.09	0.04	0.09	0.03	0.14	0.04
GCUP	0.05	0.02	0.08	0.02	0.05	0.03	0.09	0.04	0.06	0.03
GCLO	0.08	0.03	0.13	0.05	0.05	0.03	0.18	0.05	0.14	0.04
SCUP	0.05	0.03	0.13	0.05	0.21	0.05	0.13	0.04	0.14	NA
SCLO	0.04	0.02	0.14	0.05	0.06	0.03	0.06	0.04	0.14	0.04

High and Mean Values: Pre-BMP 2008, 2009, 2010

TSS (mg/L)										
	Pre-BMP		2009		2010		2011 (Jan-June)		Post BMP (July-Sept 15)	
Site	High	Mean	High	Mean	High	Mean	High	Mean	High	Mean
LSUP	26.6	4.2	55.8	7.6	7.9	4.0	15.9	7.5	35.0	7.2
LSLO	41.3	5.0	20.0	4.6	8.9	4.3	19.6	7.7	33.8	7.2
GCUP	14.3	2.4	16.6	4.4	4.4	2.9	158.7	29.2	8.0	3.5
GCLO	13.9	4.4	14.6	5.2	15.9	7.8	670.0	115.3	10.5	5.2
SCUP	71.4	8.8	36.6	7.1	19.3	5.0	179.8	41.0	10.5	NA
SCLO	29.3	4.6	8.8	3.5	37.7	8.1	32.6	10.9	18.5	5.2

Other Analyses

- Stream bank erosion
- Benthic macroinvertebrate survey
- *Escherichia coli*

Supported by 104-B Grant: AWRC and Arkansas State University



- Little Strawberry

- ≈2.74 stream km (1.7 miles) surveyed

- 5,480 m stream bank

- 2010 (light blue)

- 24 sites determined of severe or very severe erosion

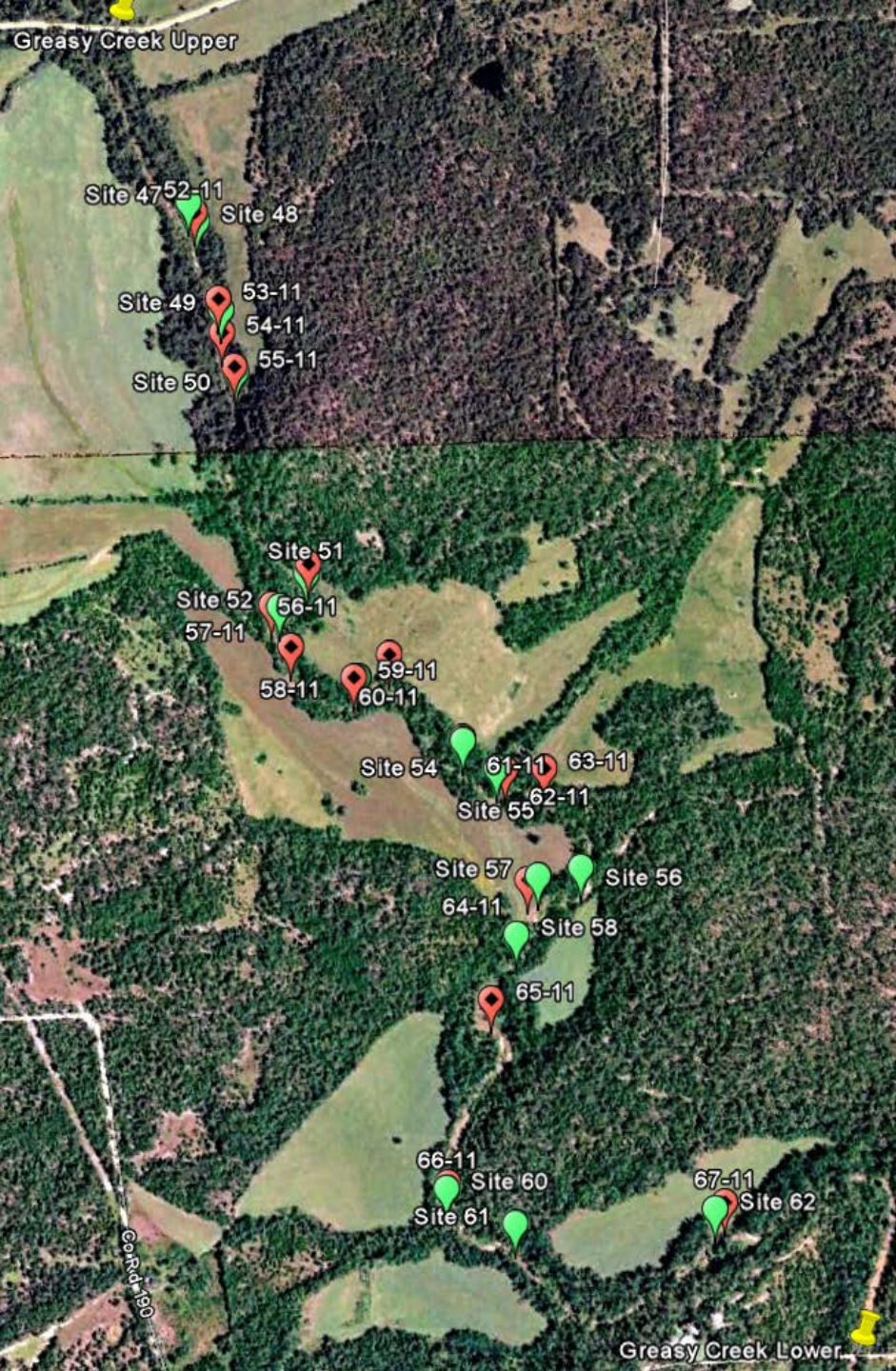
- 746 m stream bank

- 2011 (purple)

- 28 sites determined of severe or very severe erosion

- 995 m stream bank

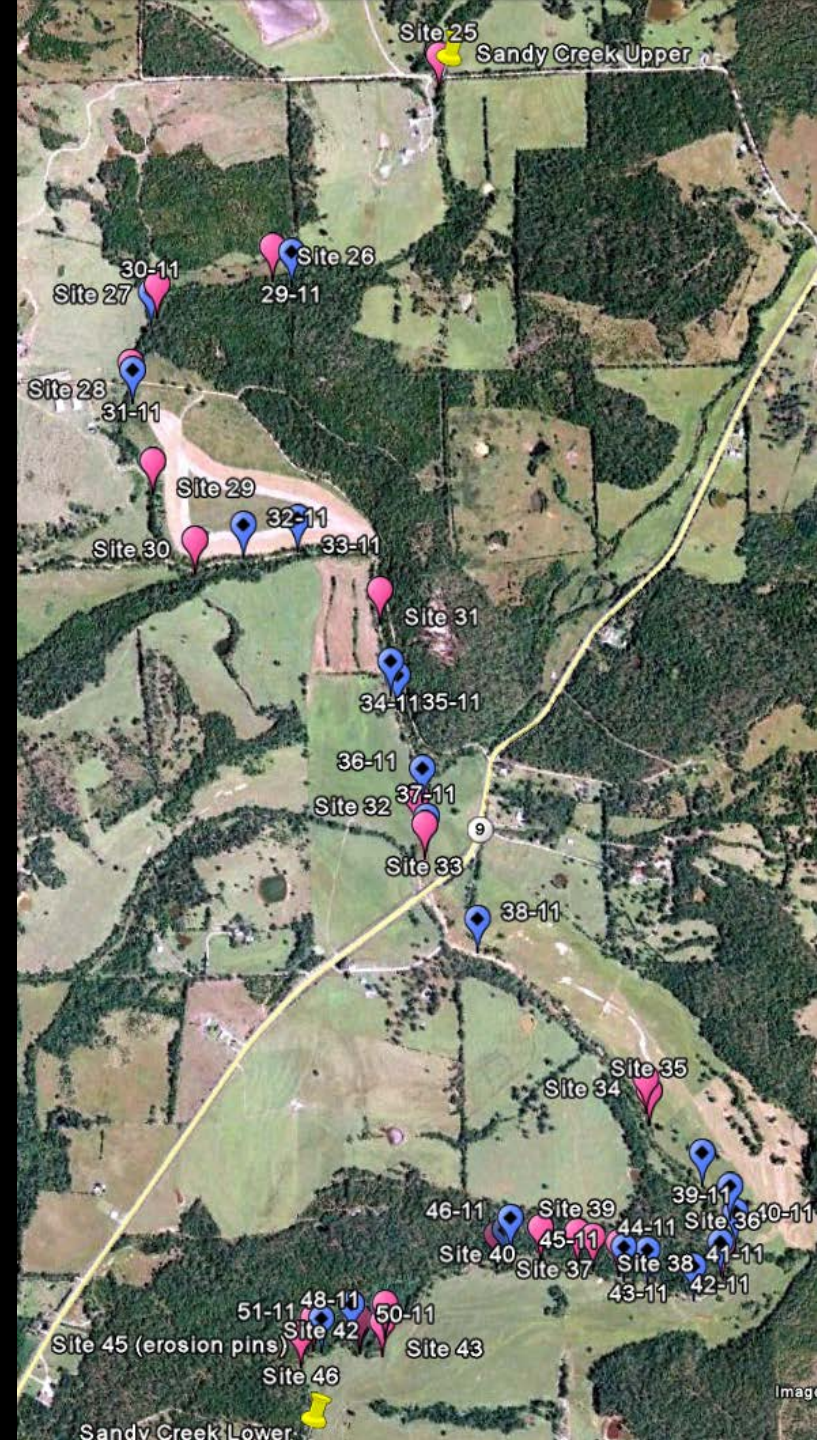




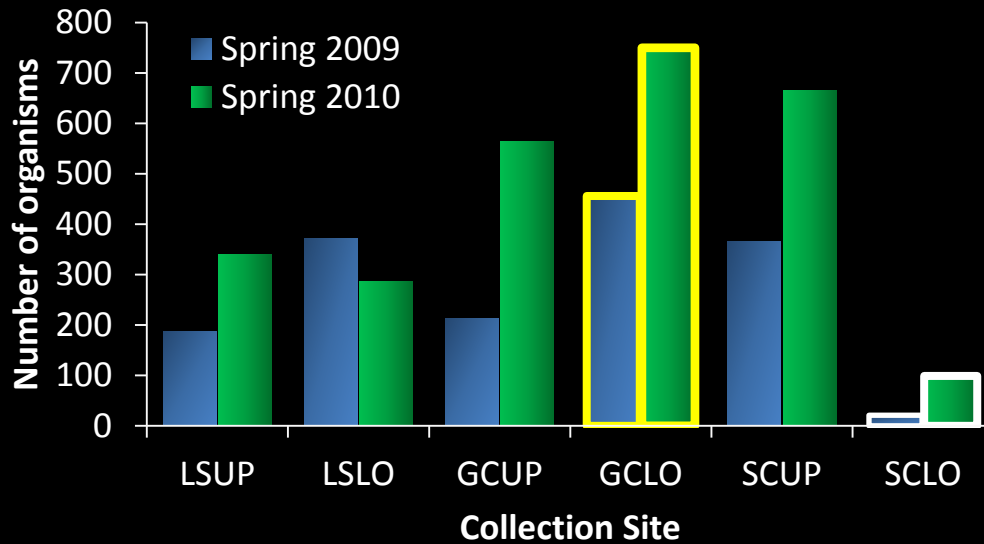
Greasy Creek

- ≈3.17 stream km (2.0 miles) surveyed
 - 6,340 m stream bank
- 2010 (green)
 - 16 sites determined of severe or very severe erosion
 - 500 m stream bank
- 2011 (red)
 - 16 sites determined of severe or very severe erosion
 - 575 m stream bank

- Sandy Creek
 - ≈6.63 stream km (4.1 miles) surveyed
 - 13,260 m stream bank
 - 2010 (pink)
 - 22 sites determined of severe or very severe erosion
 - 505 m stream bank
 - 2011 (blue)
 - 21 sites determined of severe or very severe erosion
 - 525 m stream bank

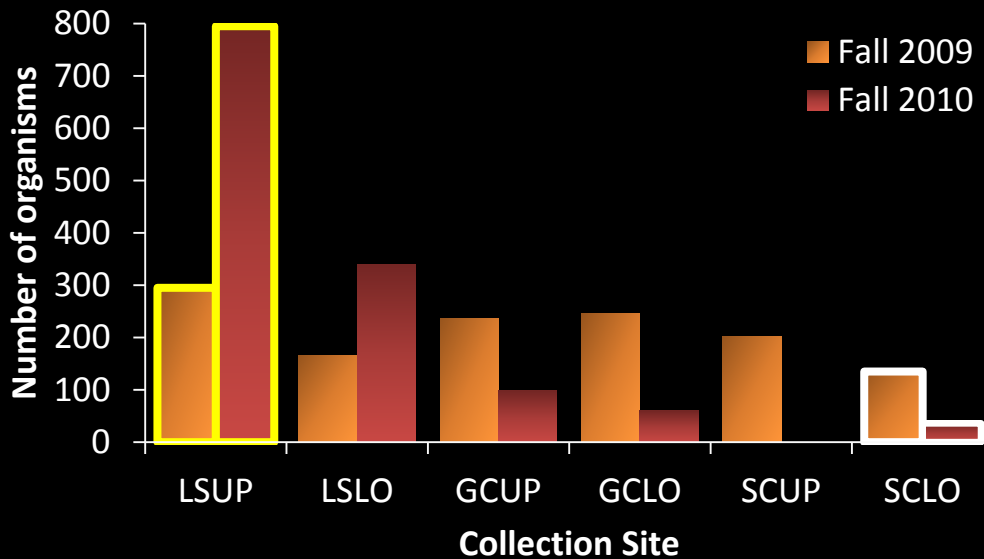


Benthic Macroinvertebrates Abundance



	Spring 2009	Spring 2010
High (yellow)	456	750*
Low (white)	21	99

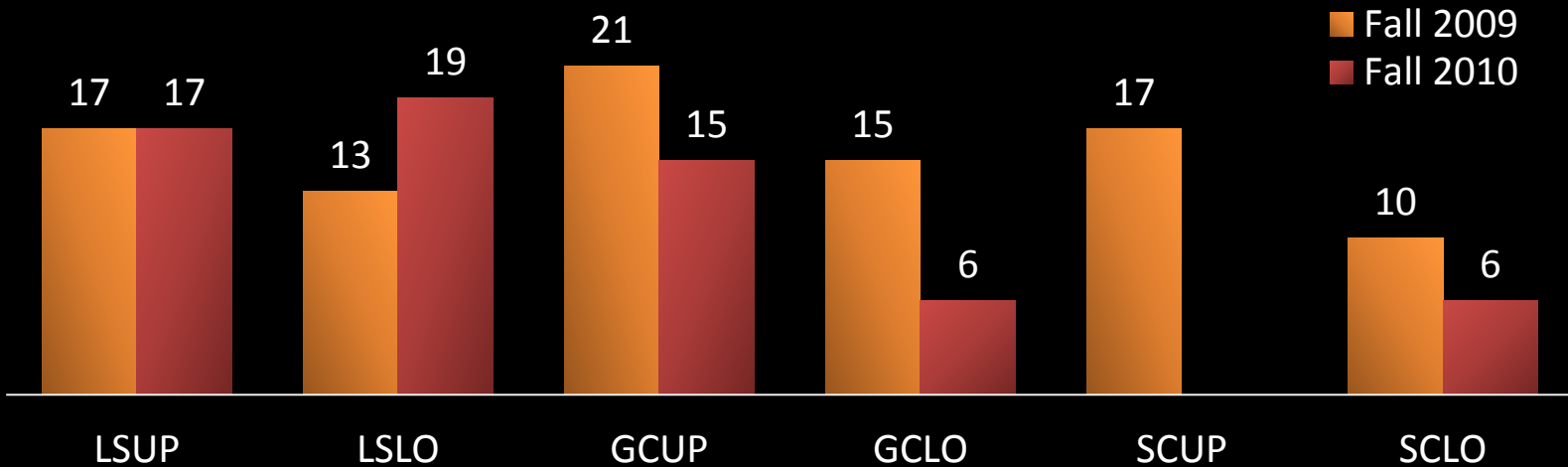
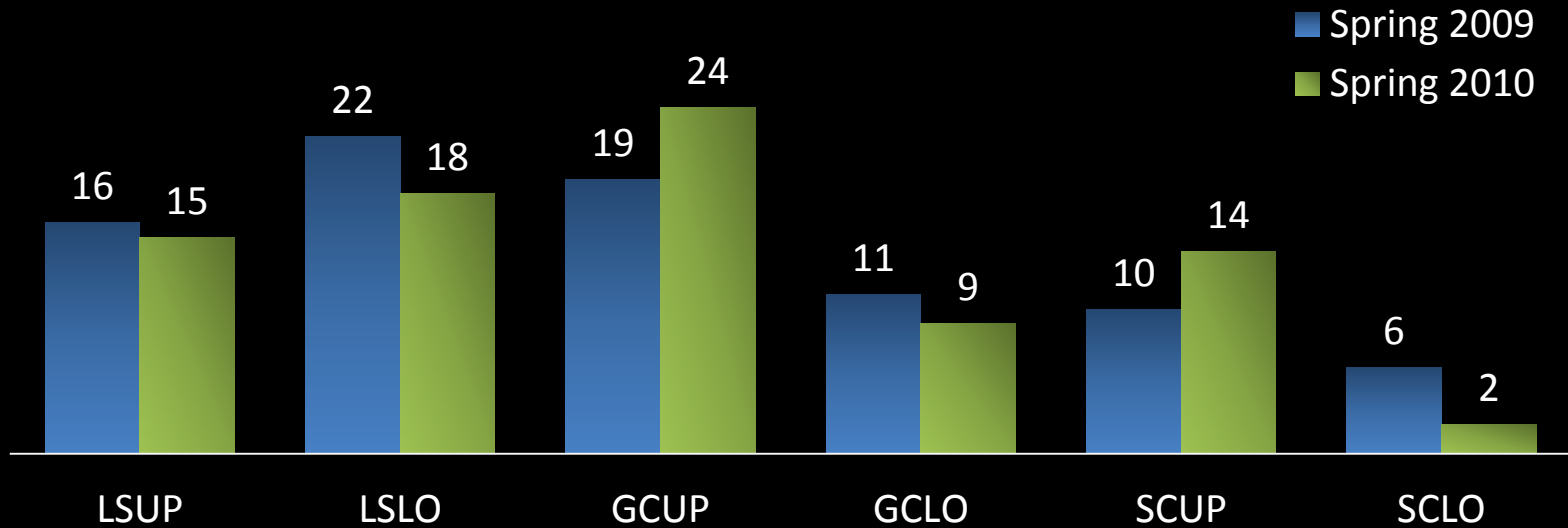
*704 Chironomidae



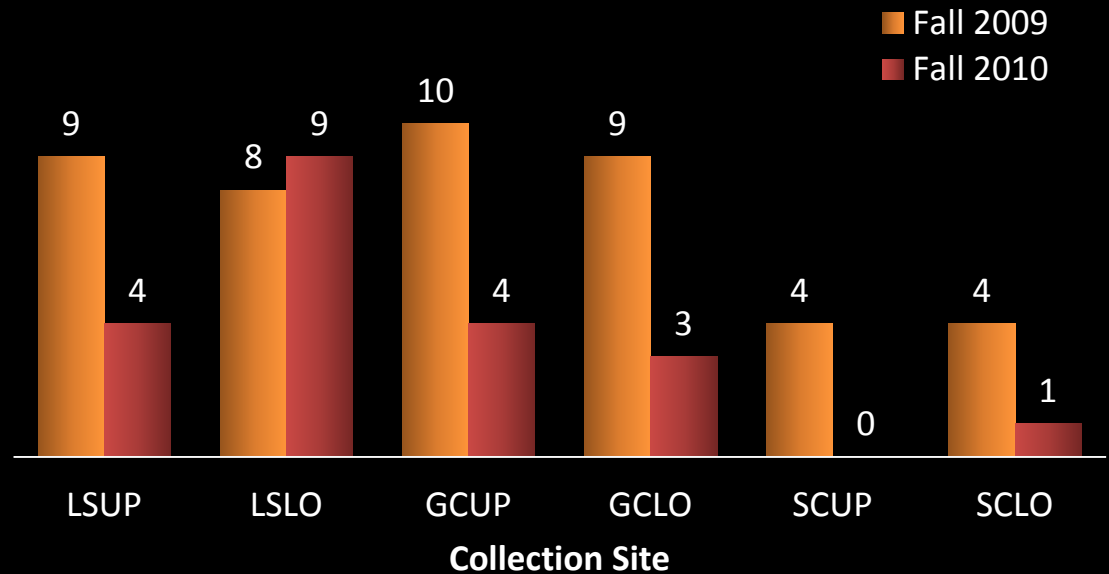
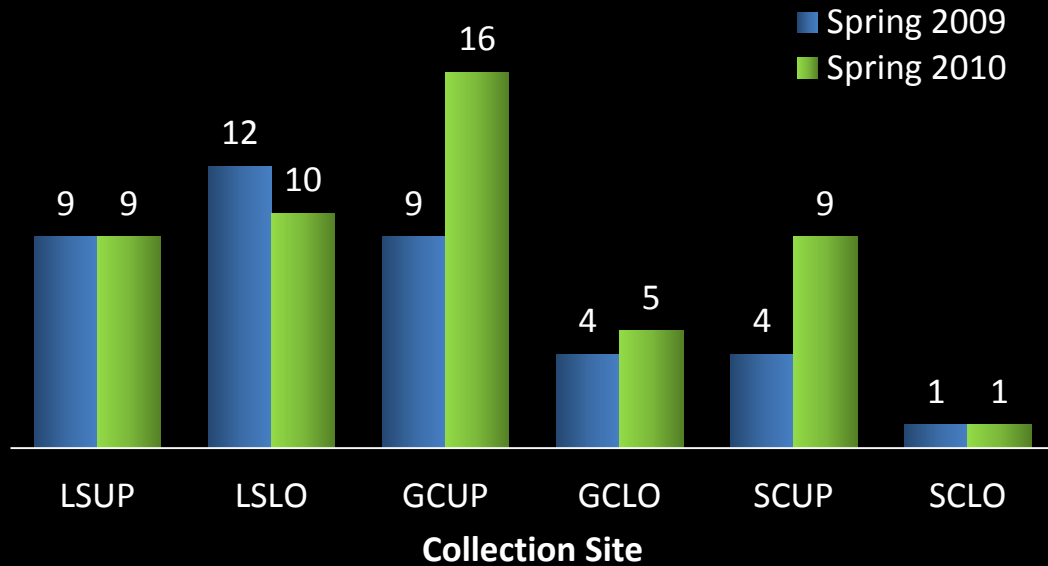
	Fall 2009	Fall 2010
High (yellow)	295	795*
Low (white)	135	36

*715 Chironomidae

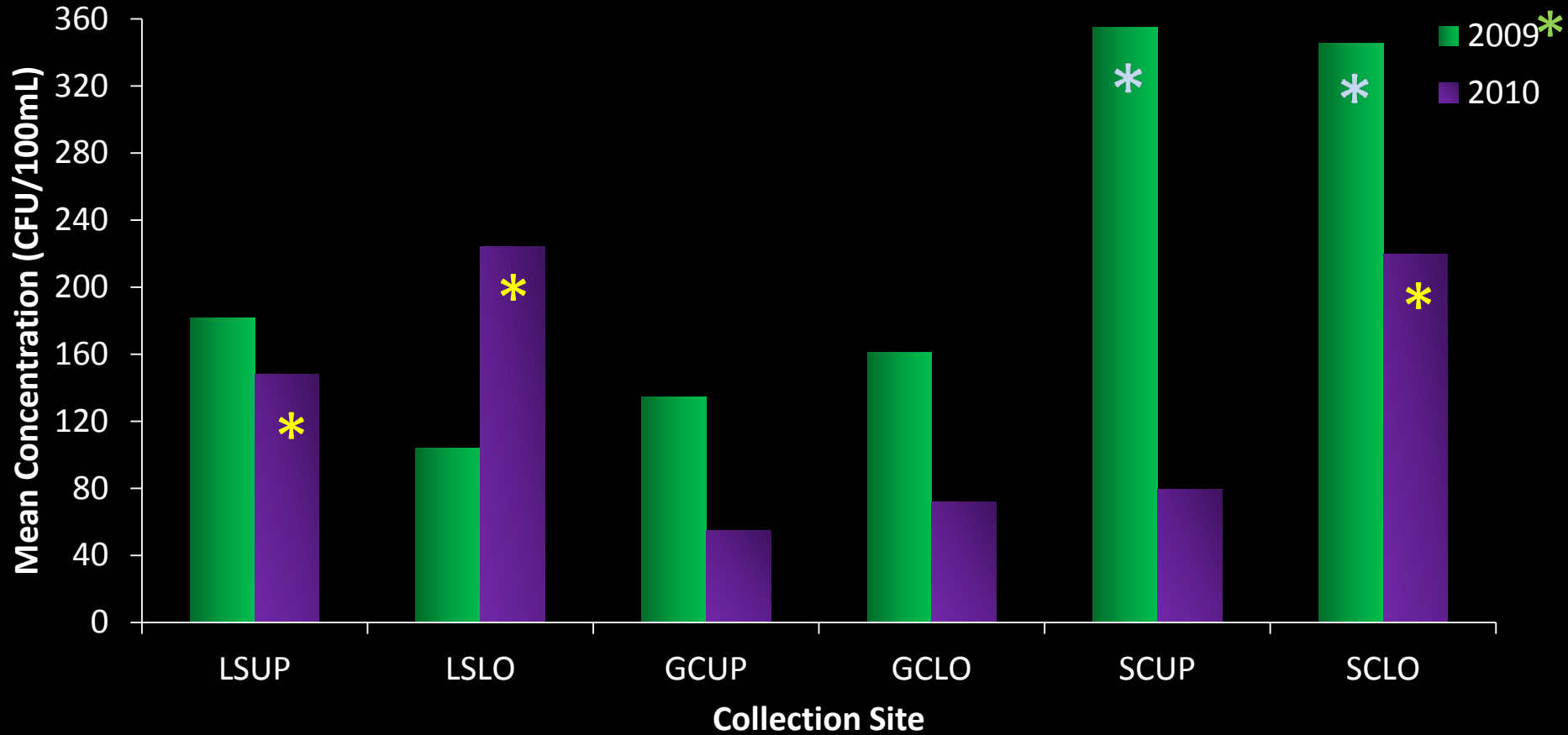
Family Richness



Ephemeroptera, Plecoptera and Trichoptera (EPT)



Escherichia coli



* No values for June, July, August 2009

* Samples exceeded 298 CFU/100mL maximum for single samples for ERW, ESW, and NSW

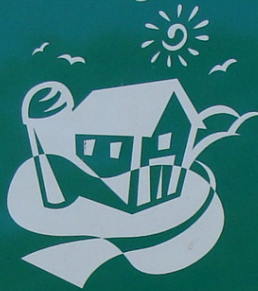
* Samples exceeded 1490 CFU/100mL max for single sample during the remainder of the year for ERW, ESW, and NSW

A group of five people, likely researchers or field workers, are standing in a natural setting near a stream. They are wearing various types of field gear, including hats, boots, and overalls. One person is holding a long-handled tool, possibly a shovel or a probe. The background shows a grassy area with trees and a clear sky. The overall scene suggests an outdoor field study or environmental monitoring activity.

Acknowledgments

- USEPA 319 Grant
- AWRC 104-B USGS Grant
- Fulton County Conservation District
- Arkansas State University (ASU)
Environmental Sciences Graduate Program
- All graduate and undergraduate ASU
Ecotoxicology Research Facility Workers

**Strawberry River
Sub Watershed
Project**



Arkansas Natural Resource Commission
Arkansas State University

**Fulton County
Conservation District**

870-895-3201 ext 3

Questions?