

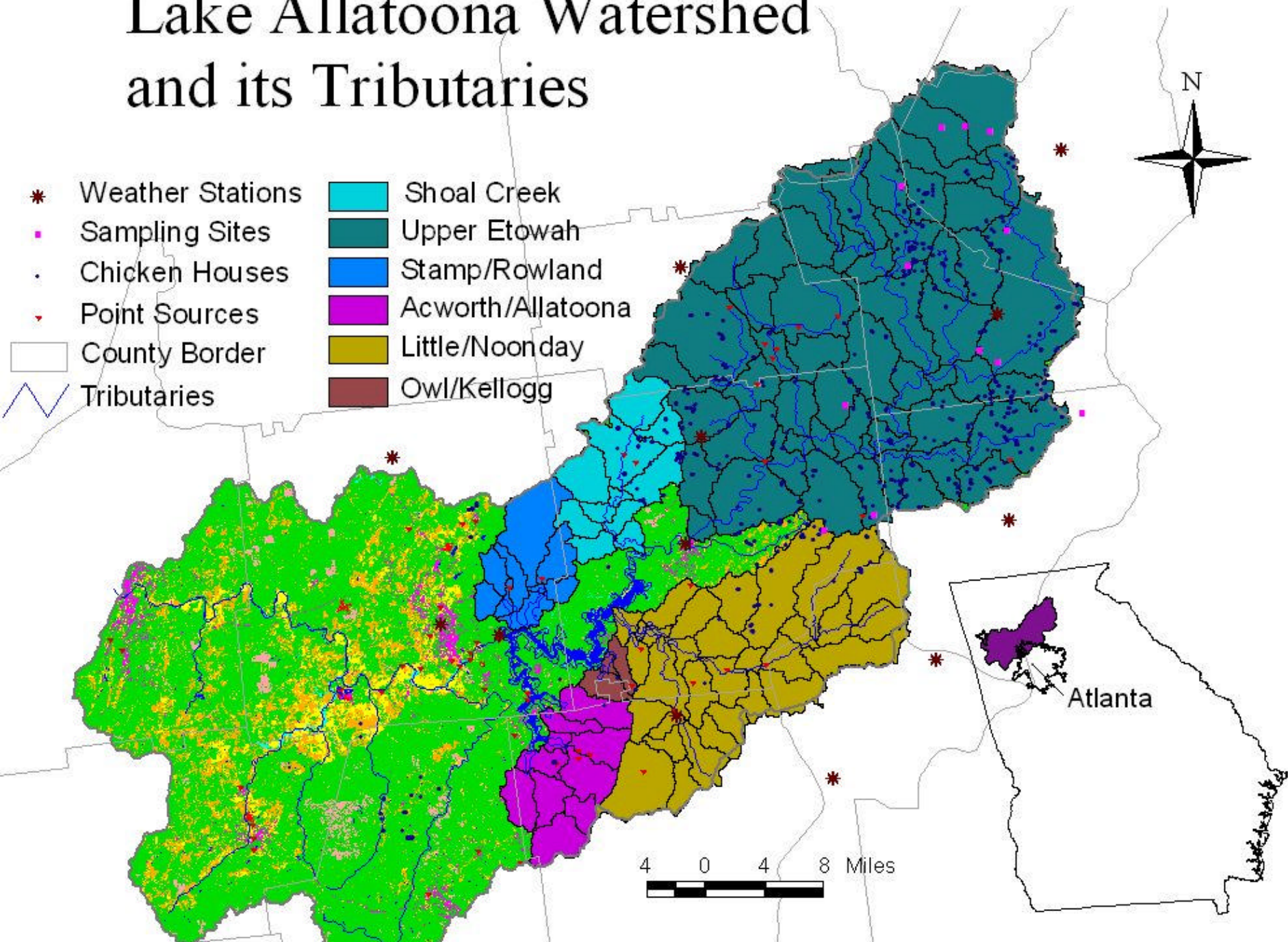
**Phosphorus and Sediment Delivery  
from Streams Draining Poultry  
Operations in the Upper Etowah River  
Basin, Georgia**

**J.J. Romeis, C.R. Jackson, D.E. Radcliffe,  
M.L. Risse, and J. Bryant**

**The University of Georgia**

**USDA CSREES #GEO-2003-04944**

# Lake Allatoona Watershed and its Tributaries



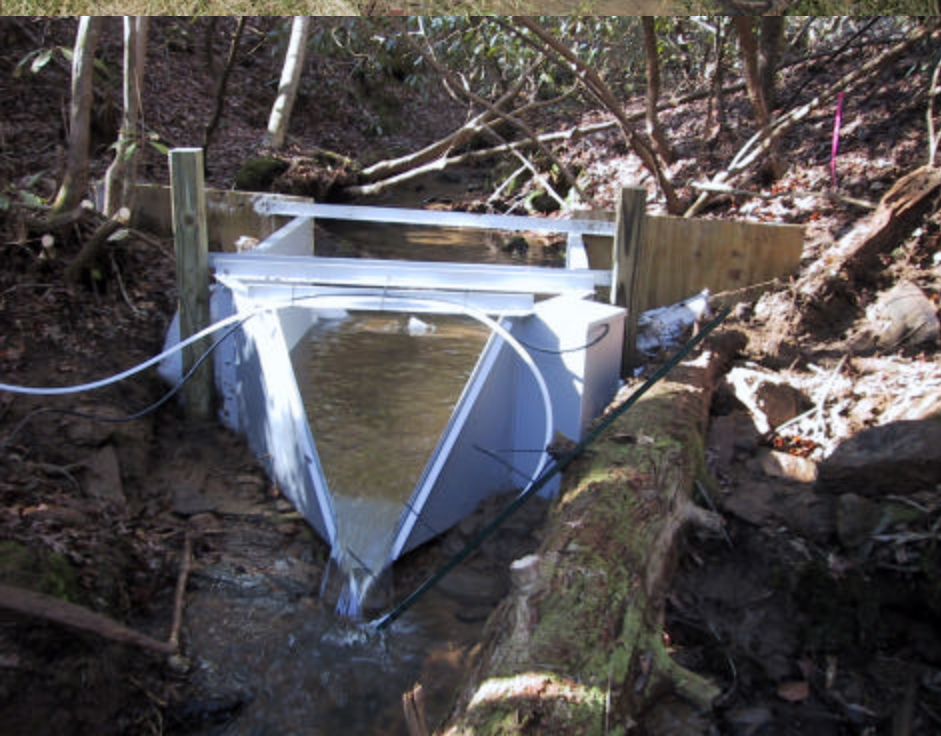
# Monitoring Study Objectives

- 1) Estimate P loads and export coefficients from agricultural and forested watersheds within upper Etowah River basin
  
  - 2) Use results for
    - a) Watershed-scale modeling
    - b) Relation to P indices
    - c) BMP identification
- Explore pollution trading opportunities

# Site Characteristics

Site Number	Land Use	Area (ha)	Number Poultry Houses in Watershed	Stream Buffer Present	Livestock Grazing		Pond in Watershed	Area-Weighted Soil Test P (lbs/acre)
					Type	Excluded from Channel		
1	FORS	44	na	na	na	na	Yes	6
2	FORS	28	na	na	na	na	No	6
3	FORS	31	na	na	na	na	No	7
4	AG	28	3	No	Cattle	No	No	51
5	AG	2.8	0	No	Cattle	No	No	371
6	AG	2.4	3	Partial	Cattle	Yes	No	266
7	AG	9.7	3	Yes	None --> Horses	Partial	No	68
8	AG	7.3	2	Partial	None	na	No	129
9	AG	11	9	No	Goats	Yes	Yes	103
10	AG	19	0	Partial	Cattle	No	No	101
11	AG	16	2	Partial	Cattle	No	Yes	195
12	AG	3.2	3	No	Sheep + Cattle	No	No	303

# **\*\*TYPICAL SITES\*\***



# **DATA COLLECTION METHODS**

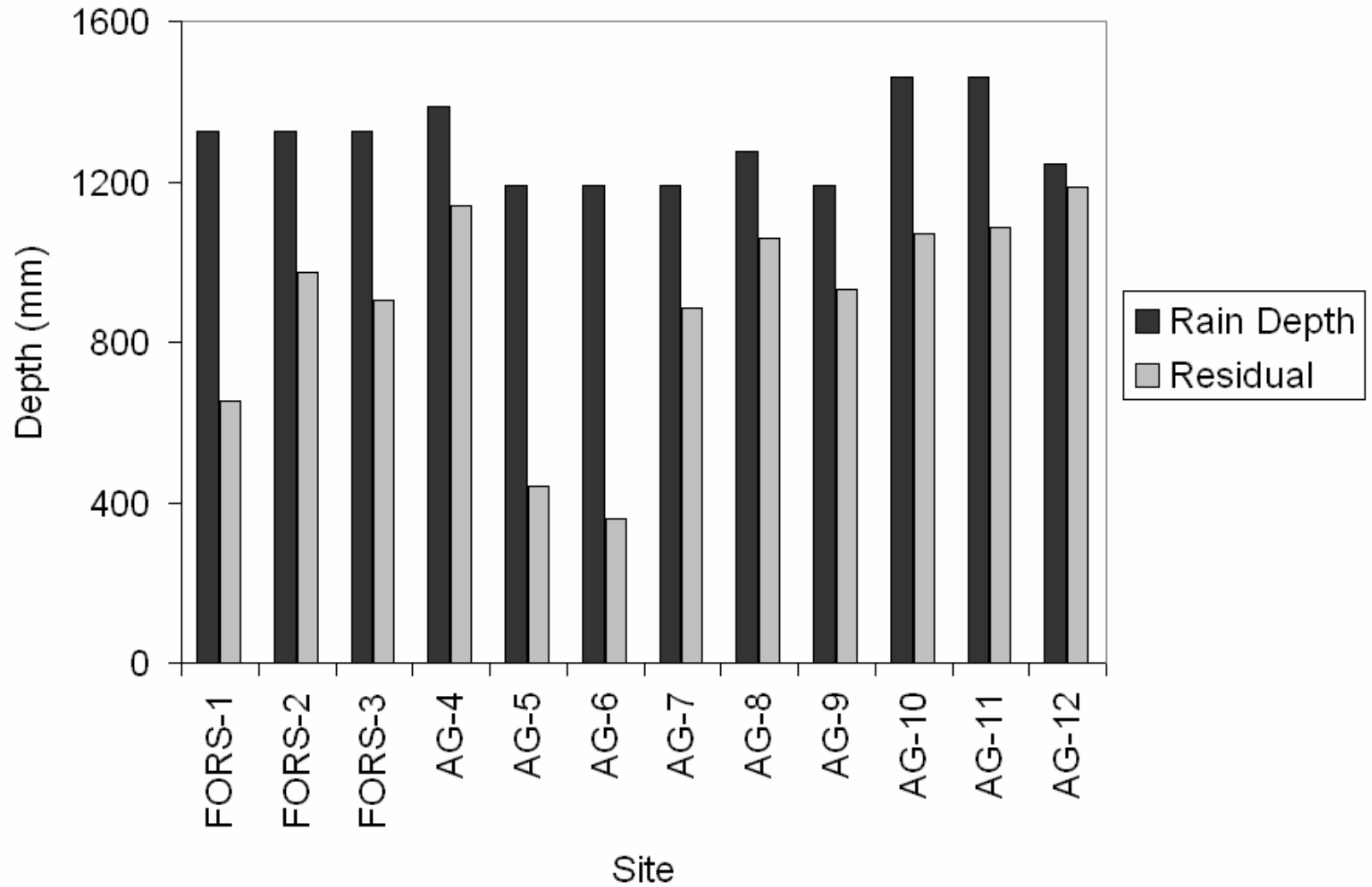
- **February 2005 → October 2006**
- **Hydrologic monitoring**
- **Water quality sampling**
- **Laboratory analyses**
- **Soil sampling**

# PRELIMINARY RESULTS

- Hydrology
- TP + TSS
- Relationships between TP and STP
- Early view of load estimation

# Rainfall and Residual by Site

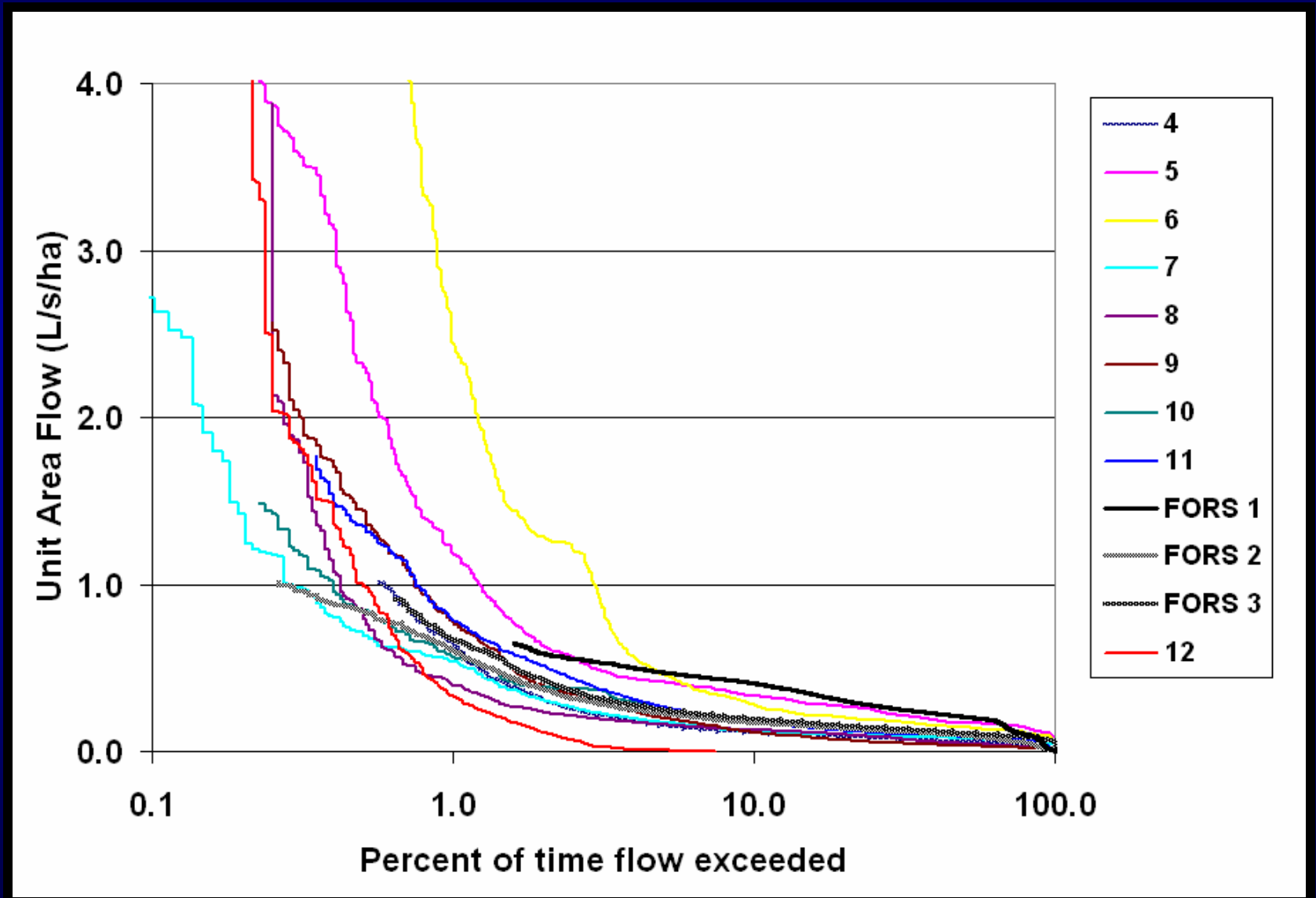
05/01/2005 – 04/30/3006



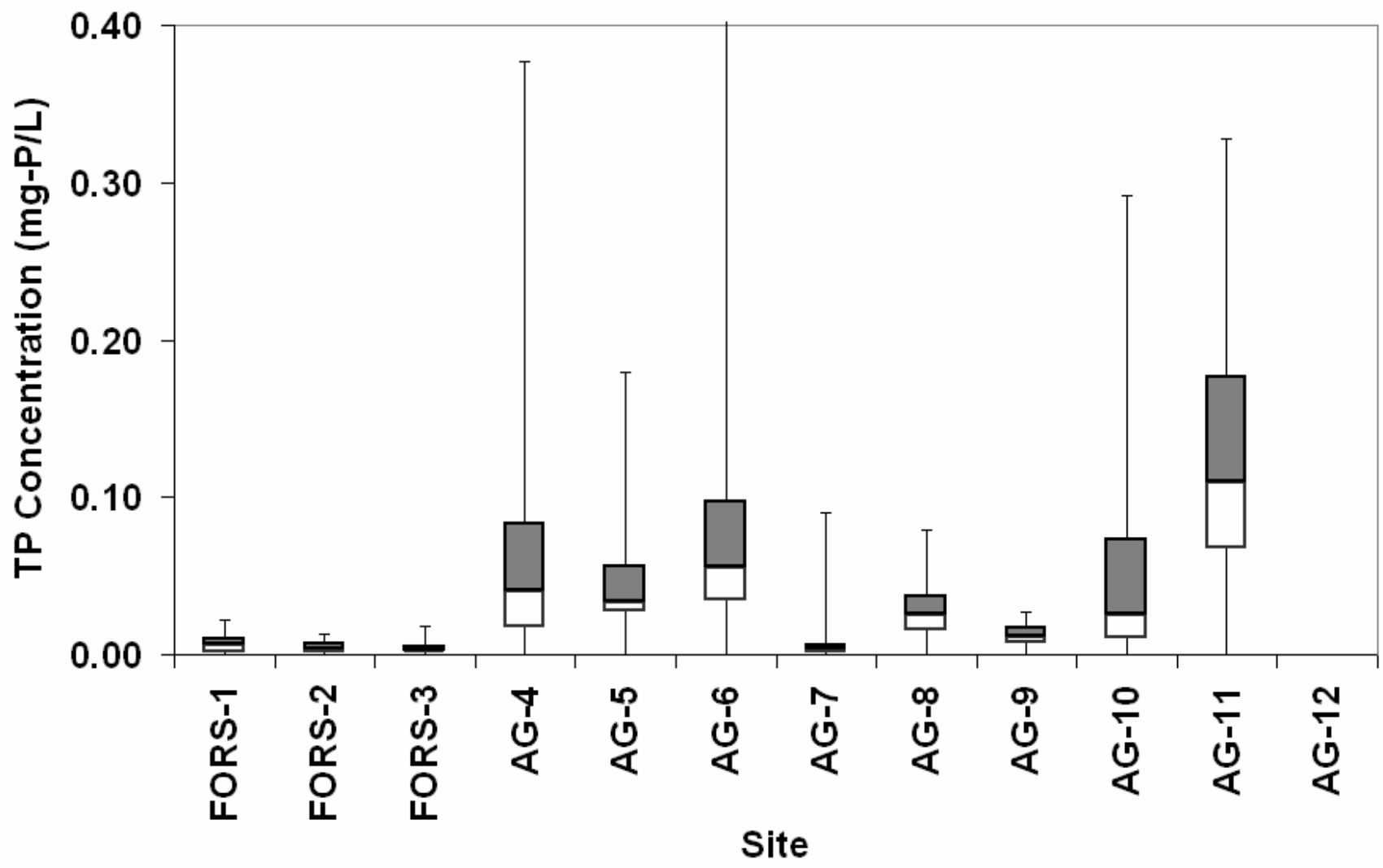


# Flow Duration Curves by Site

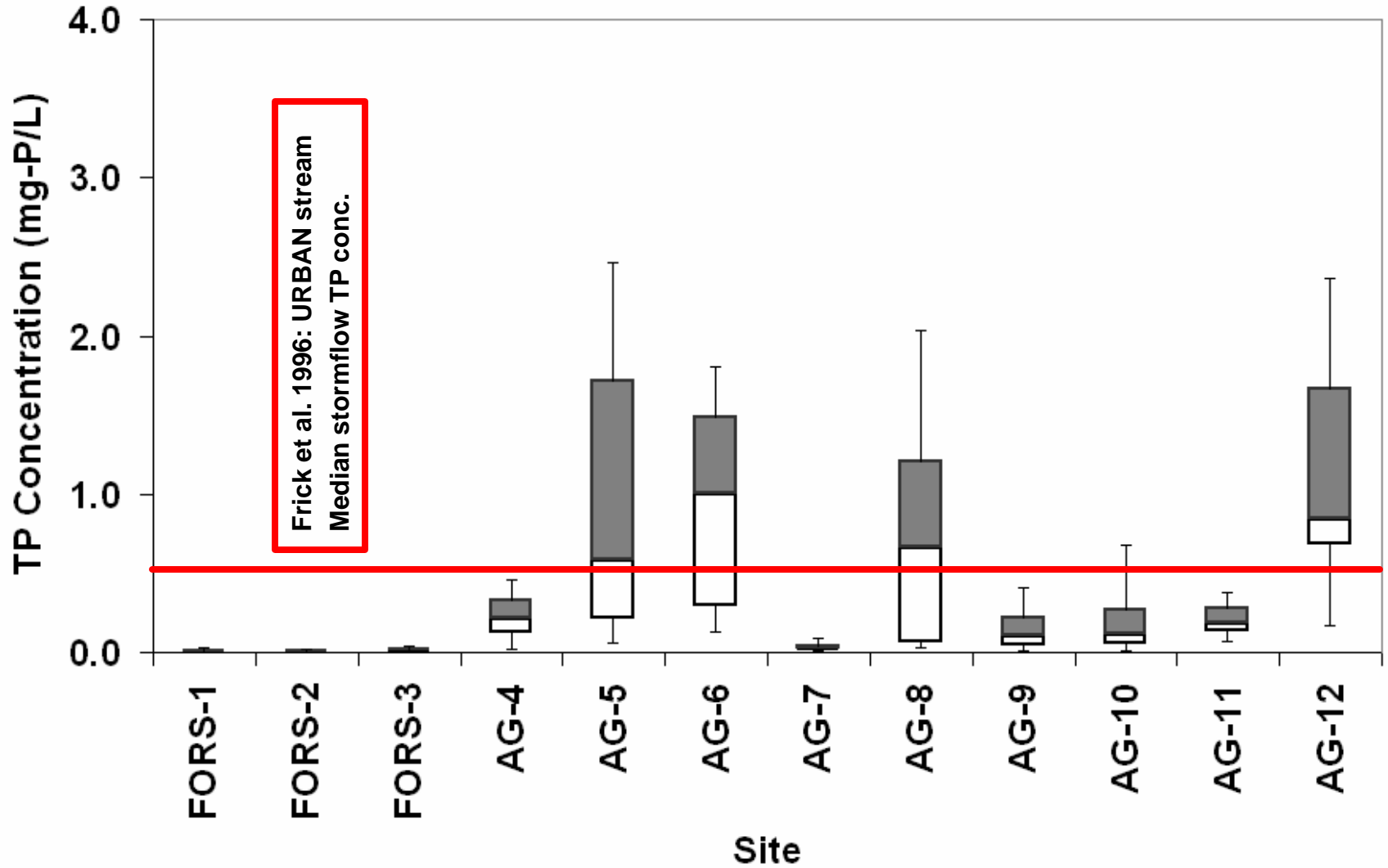
05/01/2005 – 04/30/3006



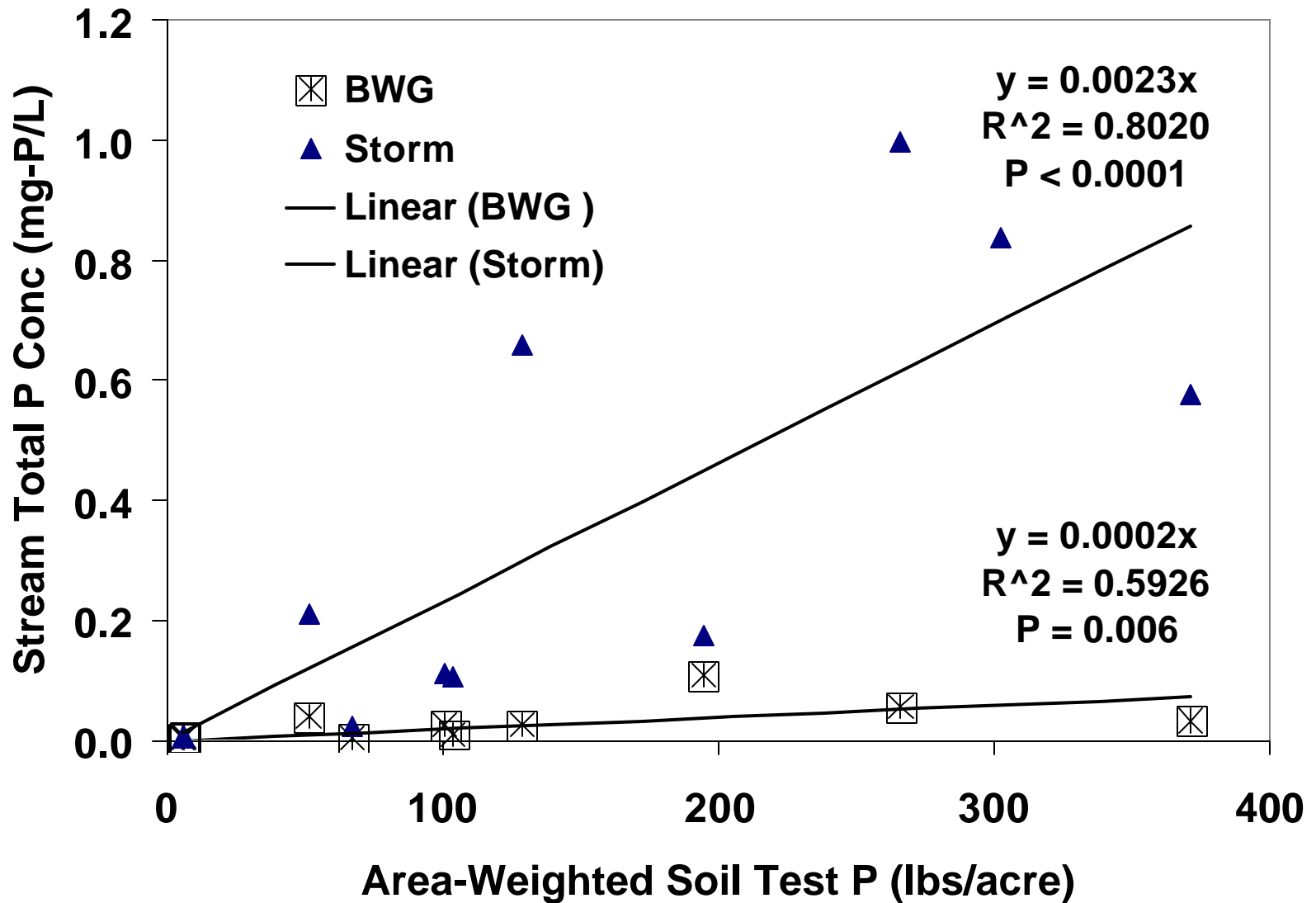
# Total Phosphorus--Biweekly Grab Samples



# Total Phosphorus--Storm Samples



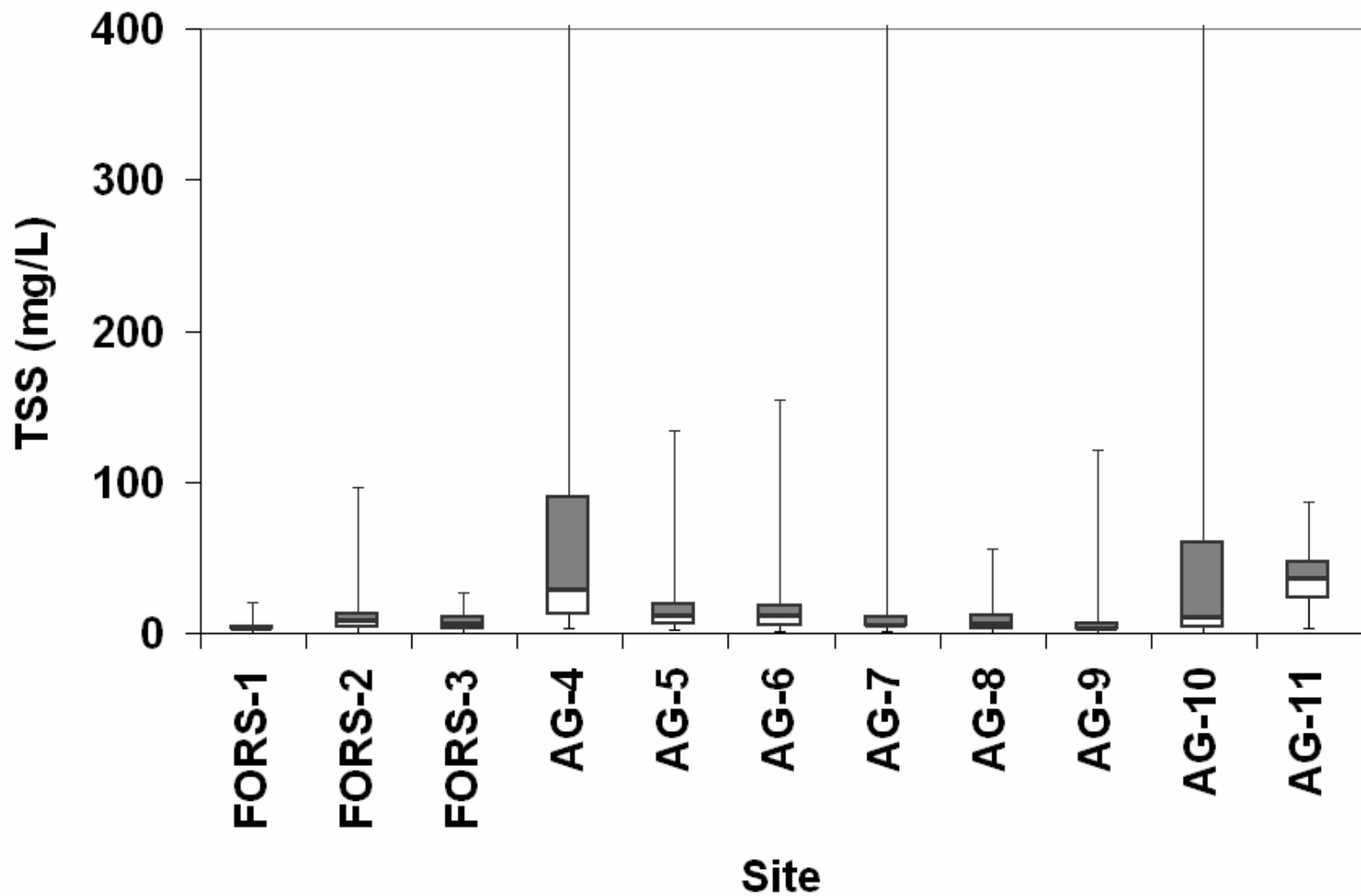
# Median BWG + Storm TP vs. Area-Weighted STP



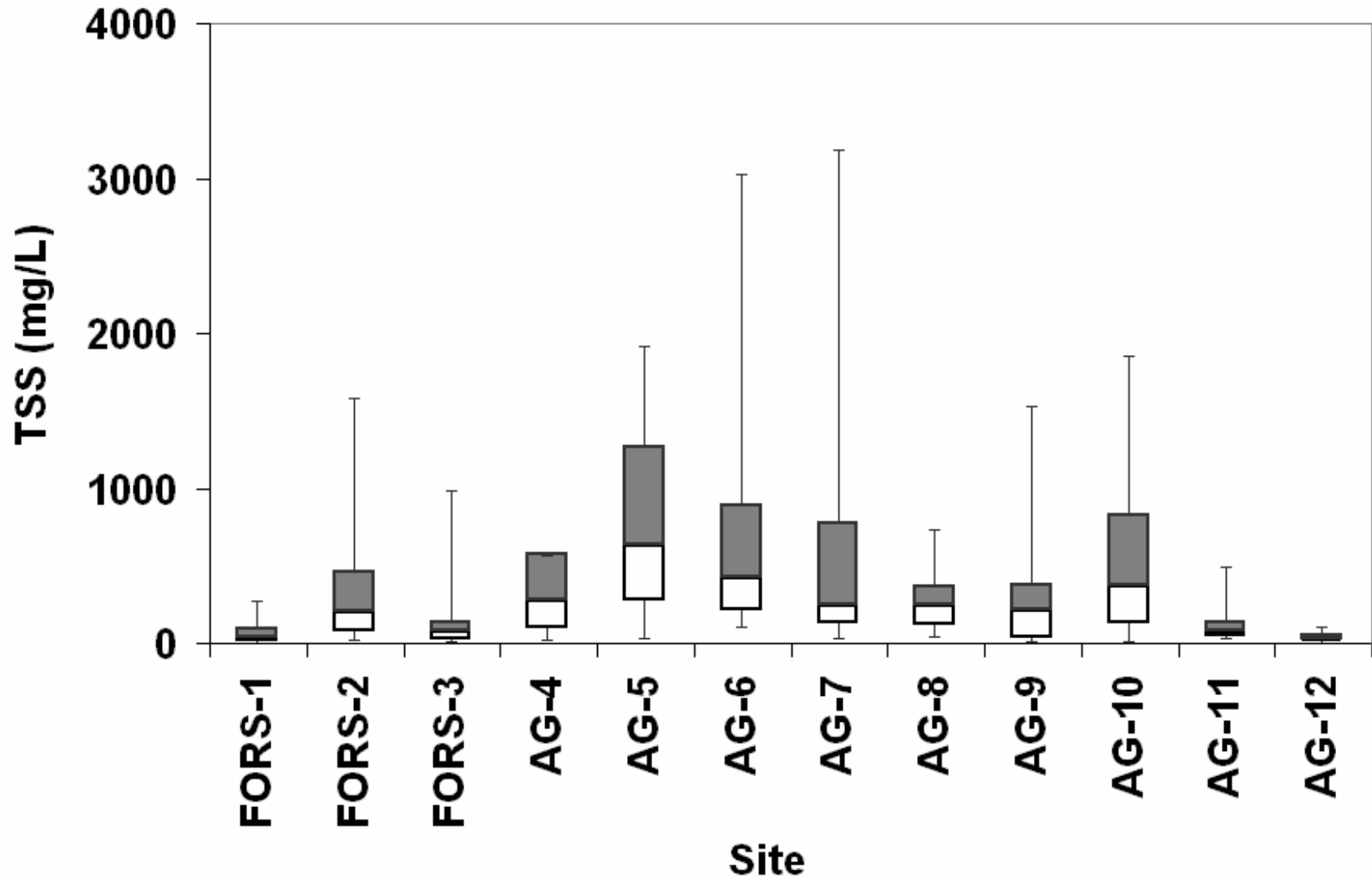
# Total P results

- **BWG samples**
  - Median AG 10X higher than FORS median
  - 33X difference in median within AG sites
- **Storm samples**
  - Median AG 50X higher than FORS median
  - 44X difference in median within AG sites
- **Apparent correlation between STP and baseflow and stormflow**

# TSS—Biweekly Grab Samples



# TSS—Storm Samples

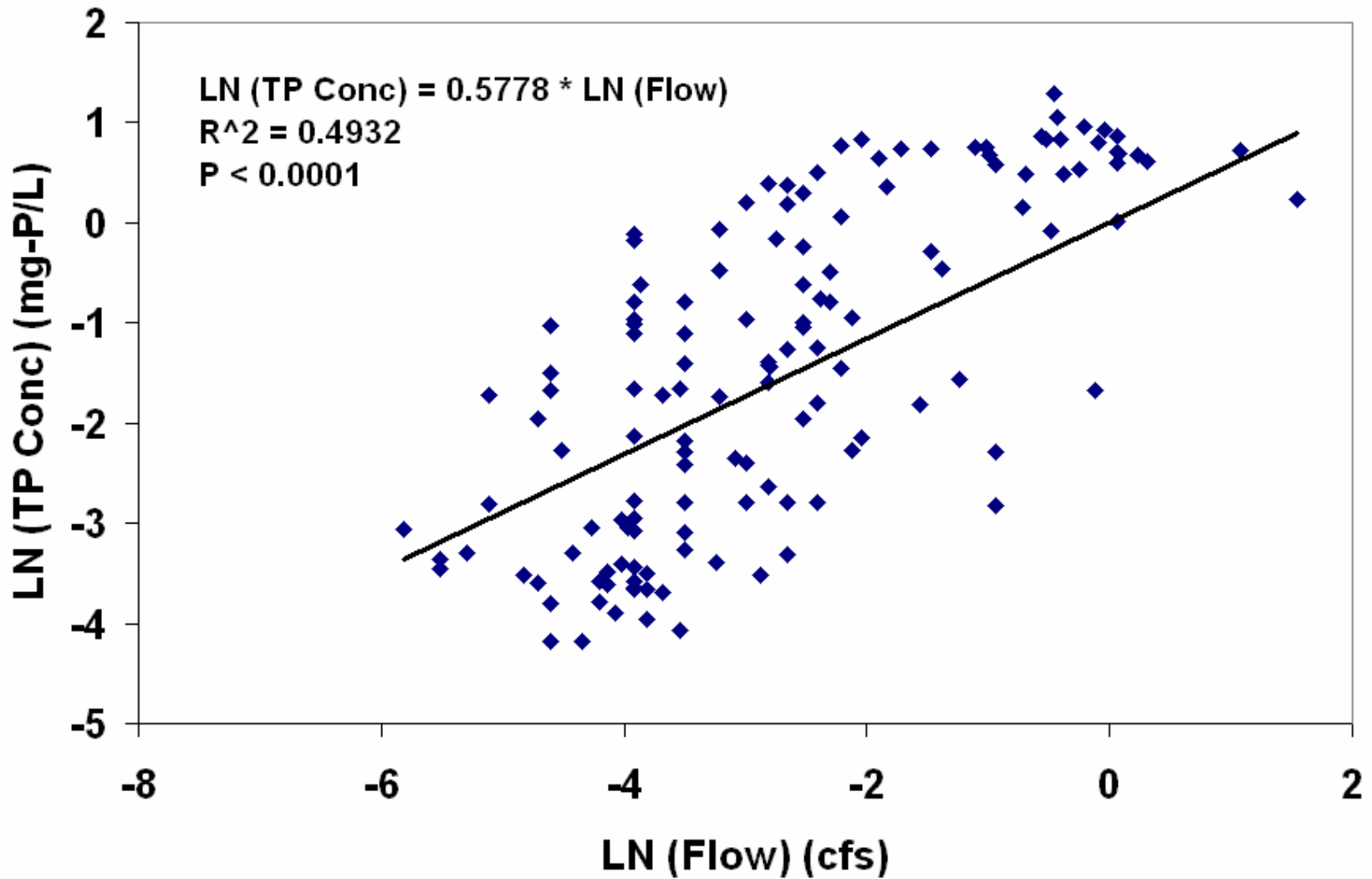


# TSS results

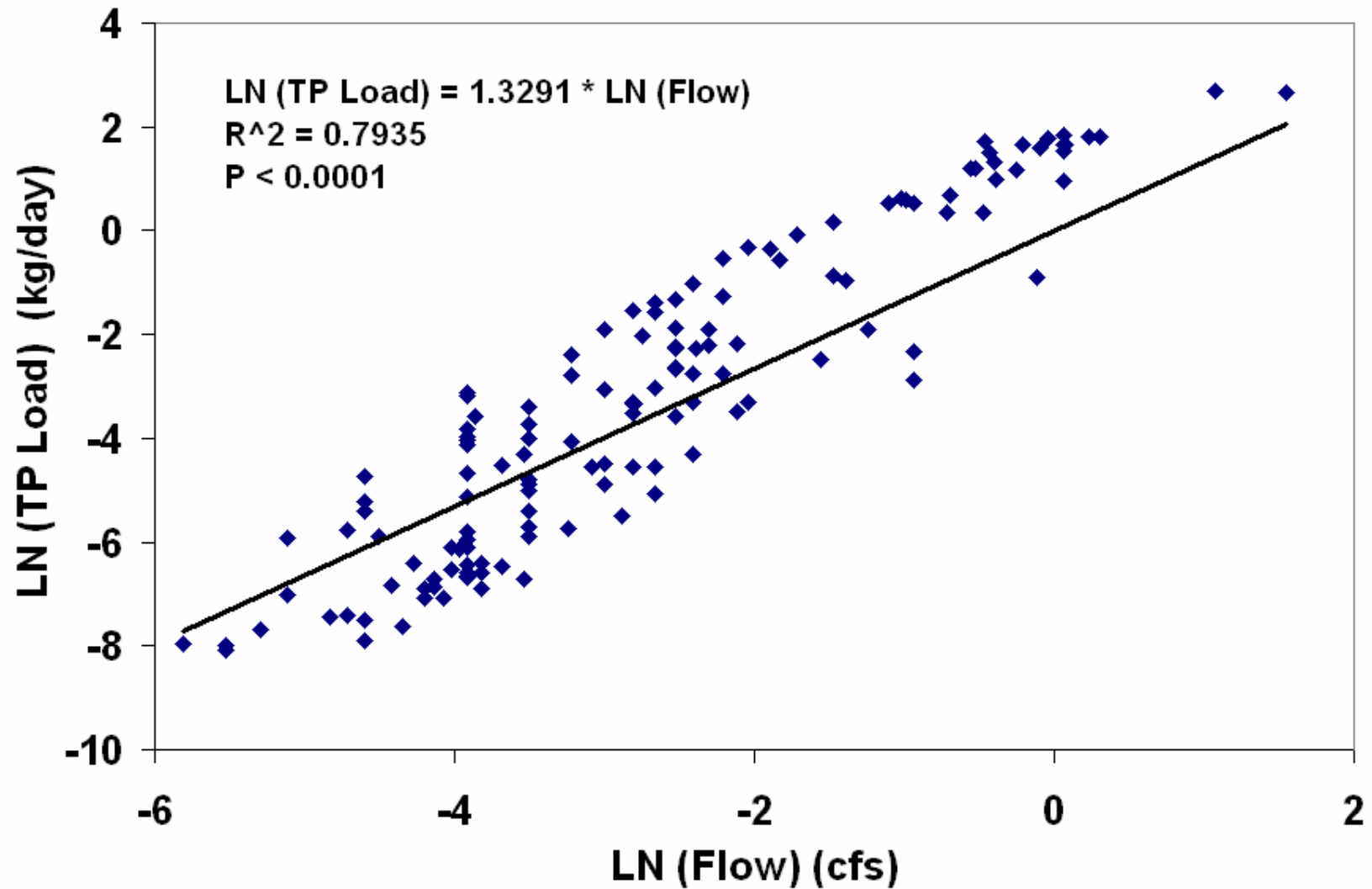
- **BWG samples**
  - Median AG 2X higher than FORS median
  - 15X difference in median within AG sites
- **Storm samples**
  - Median AG 3X higher than FORS median
  - 26X difference in median within AG sites



# Site 5: TP Concentration vs. Flow



# Site 5: TP Load vs. Flow



# SUMMARY

- **Wide range in hydrologic and water quality conditions observed**
  - Between and within land uses
  - Larger differences for TP (vs. TSS)
  - Correlations between TP and STP in baseflow and stormflow
- **TP load estimation**
  - Flow is critical variable
  - Regression-based method may be suitable
  - May be supported by other data

# **SUMMARY**

- **Implications of variability among sites**
  - Suggests potential for water quality improvement
  - Aids identification of BMPs
  - Important for pollution trading

## **Future work**

- 1) Data analysis → Load estimation**
  - 2) Relate measured values to site conditions (incl. BMPs) and P indices**
  - 3) SHPS study**
- +**
- 4) Hydrologic pathways of P transfer**
  - 5) Critical P source areas**

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