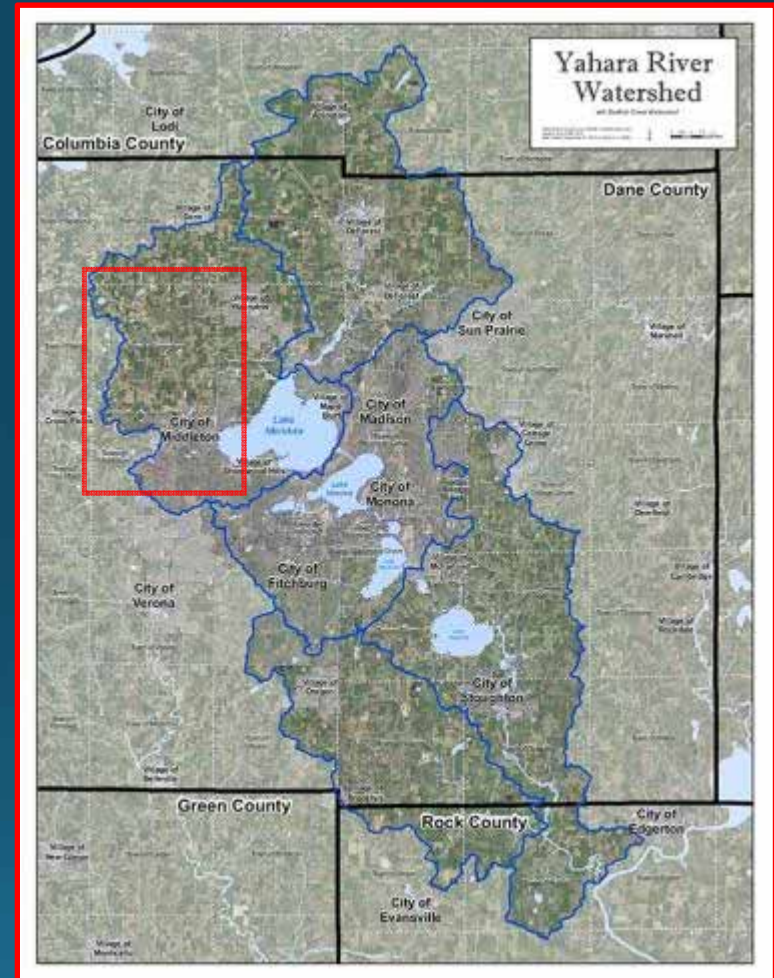


# Volunteer Monitoring to Evaluate Improvements in Quality of Agricultural Runoff from Installation of Conservation Practices



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# Location of Pheasant Branch Conservancy





# Pheasant Branch Conservancy



## Dairy farm and cropland upstream from Conservancy (2005)





# Tributary from Balzer Rd and past farm



# Manure application prior to snowmelt 3/11/2007





# Snowmelt runoff 3/11/2007



## Early spring runoff event in ephemeral tributary





## Sedimentation ponds installed 2003



# New Farm Management Plan and Facilities (2009)

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- Dredged and deepened Conservancy sedimentation ponds

## Through Dane County LCD assistance, on-farm:

- Constructed Grassed waterway and planted stream buffers
- Installed berms and diverted surface runoff around the farmstead and manure storage areas
- Downsized dairy herd from 500+ head to ~350
- New nutrient management plan allows only manure from 65 head to be applied on this farm annually. No manure to be spread on farm when the ground is frozen or snow covered
- Planted more hay in cropping rotation



# Installed farm practices in fall 2009



## OBJECTIVE OF STUDY:

Evaluate effectiveness of the recently dredged ponds and combined conservation practices in reducing sediment and nutrient concentrations entering Pheasant Branch Marsh

# ACKNOWLEDGMENTS

- Friends of Pheasant Branch
  - Obtained grants and conducted volunteer monitoring
- WDNR river grants
- Wis. Water Action Volunteers Monitoring Program

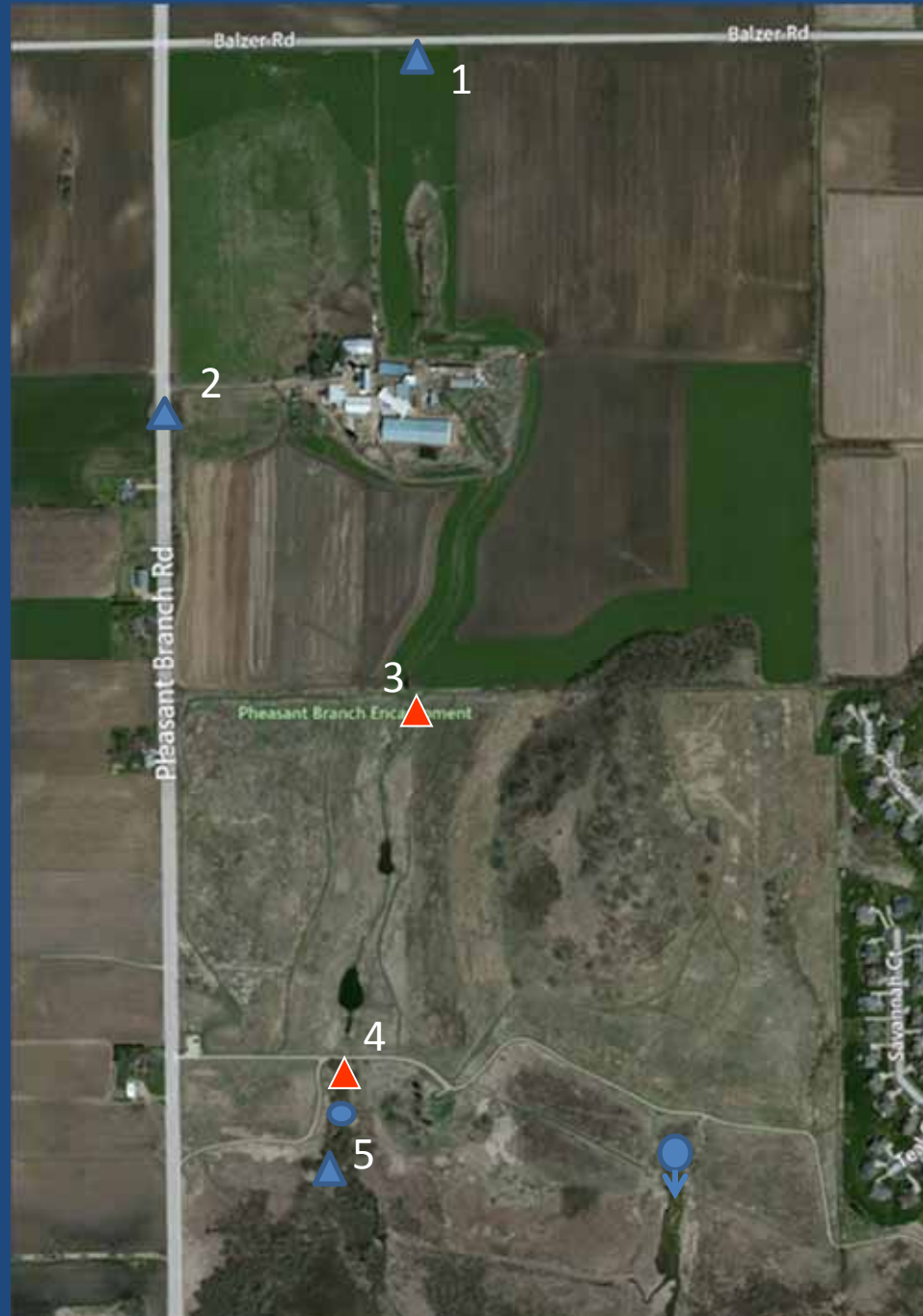


# Tributary drainage area and sampling sites



## Sampling sites

- ▲ 2003-06, 2010-12
- ▲ 2010-12
- Springs





## Siphon sampler used in tributary 2003-06



## Runoff at upper site, 5/24/2006 event





# Sample analysis

- Total suspended solids
- TKN (Ammonia +Organic Nitrogen)
- $\text{NO}_2 + \text{NO}_3$ -Nitrogen
- Total Phosphorus



Analyses by State Laboratory of Hygiene, Madison, Wis.

## Sampling history 2003-06

2003 (normal)	2004 (wet)	2006 (normal)
# events—7	# events—6	# events—12
#events sampled—6	#events sampled—5	#events sampled—6

Event = measurable flow > 0.25 cfs at lower site (4).

Flows estimated at time of sampling.

\*At least 2 events occurred in early spring 2005 before monitoring started; none for the remainder of the year

## Sampling history 2010-12

2010* (wet)	2011 (normal)	2012** (dry)
# events—6	# events—5	# events—2
#events sampled—4	#events sampled—3	#events sampled—1

\*Beginning in March 2010

\*\* Through September 2012



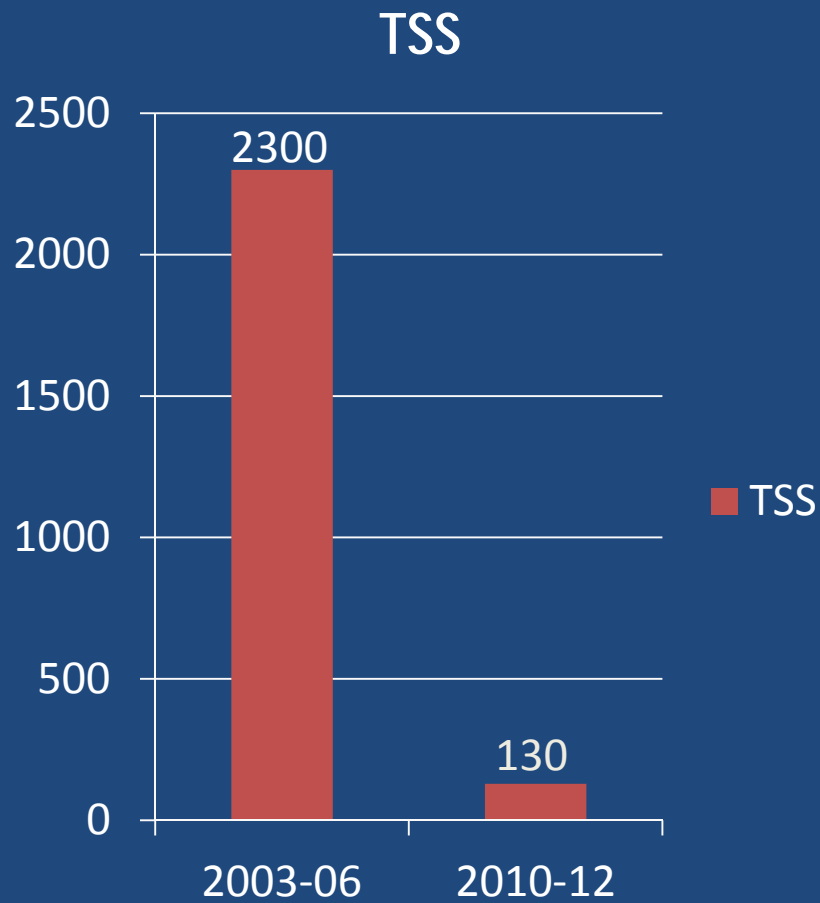
## Results 2003-06 mean concentrations in mg/L

	TSS	TKN	NO <sub>3</sub> -N	TP
Before sediment ponds (n=3)				
Upper site	3450	59.9	.088	17.6
Lower site	1500	76.8	.061	20.8
After sediment ponds (n=13)				
Upper site (Site 3)	2300 68-10500	46.9 24.6-98.5	1.3 0.0 – 4.6	14.2 2.2 – 37.7
Lower site (Site 4)	800 77-1700	23.7 8.1-31.2	0.5 0.0 – 2.0	8.3 0.7 – 12.3
	<b>-65%</b>	<b>-49%</b>		<b>-41%</b>

## Results 2010-12 mean concentrations in mg/L

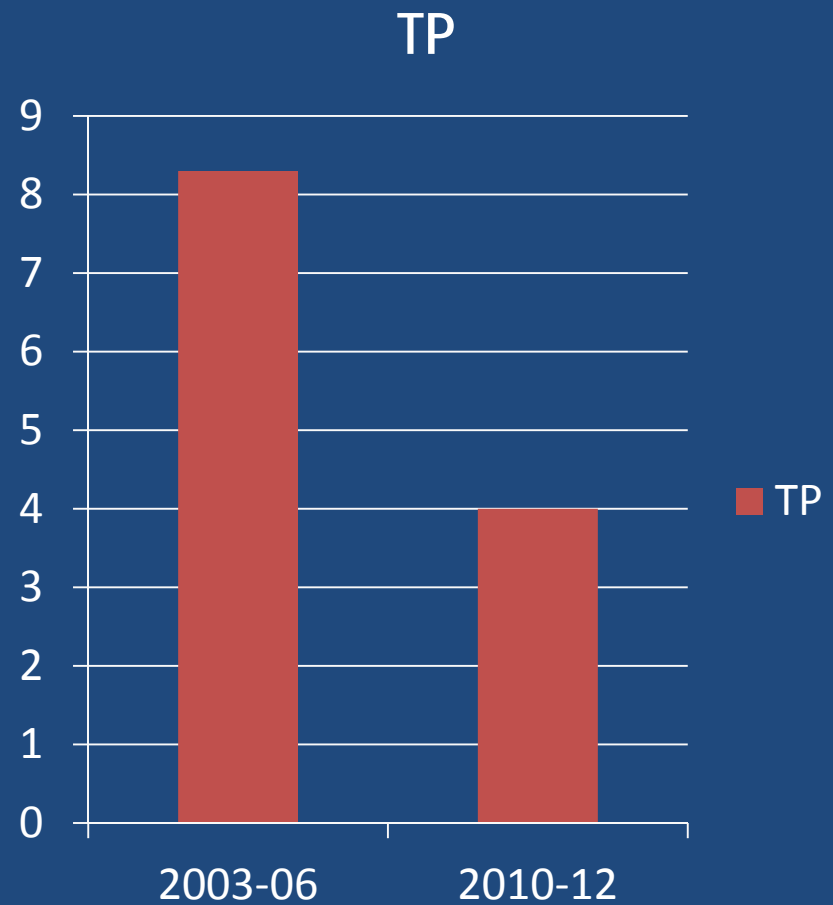
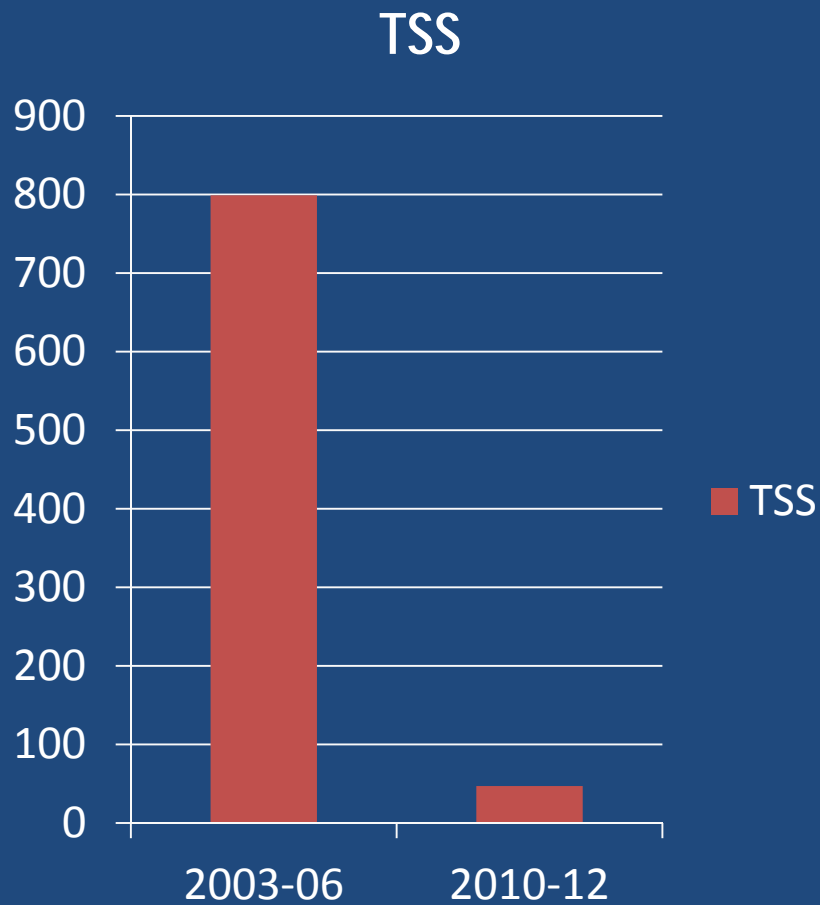
	TSS	TKN	NO <sub>3</sub> -N	TP
Site 1 (n=2)	1205	6.4	4.93	2.14
Site 2 (n=2)	460	4.3	3.62	1.18
Site 3 (n=8)	129 65-396	22.1 12.8-39.8	0.65 0.0 – 4.89	9.2 4.7 – 14.1
Site 4 (n=8)	47 26-100	8.6 4.7-16.7	1.0 0.0 – 4.6	4.0 2.4 – 8.3
Site 5 (n=5)	49 6-130	7.7 0.6-12.9	2.7 1.5 – 5.3	3.2 0.17 – 8.3
Site 3- Site 4	-62%	-61%	+46%	-54%

# Site 3 (Upper) differences between time periods (effects of farm practices)





# Site 4 (Lower) differences between time periods (includes effects of sediment ponds)



# Conclusions

- Farm practices and sedimentation ponds greatly decreased TSS concentrations
- Total nitrogen and phosphorus concentrations decreased less, but made progress toward reducing TP load to Lake Mendota and for Yahara WINS watershed project
- TP conc. were less directly related to suspended solids, indicating P is largely (50-60%) in dissolved form

# Conclusions

- Runoff from this small watershed still has high concentrations of nutrients entering Pheasant Branch Marsh exceeding TP goal, demonstrating difficulty of achieving NPS reductions
- Volunteer monitoring using grab sampling was valuable in evaluating this type of project



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