Stormwater Analysis for South Fork Palouse River TMDL

October 8, 2008

Note: All data in this presentation should be considered preliminary

Difficulties with Stormwater

- High variability in stormwater concentration, flow, and load
- Hard to catch storms
- Stormwater effects sometimes cannot be isolated

The EPA Letter

November 2002 memo from the Directors of Office of Wetlands, Oceans and Watersheds and of Wastewater Management to EPA Regions:

> " Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Storm Water Sources and NPDES Permit Requirements Based on those WLAs "

http://www.epa.gov/npdes/pubs/final-wwtmdl.pdf

Key Points of the Memo:

- NPDES-regulated storm water discharges ***must*** be addressed as WLAs, not as load allocations (LAs)
- Storm water discharges from sources not currently under permit ***may*** be addressed as LAs
- NPDES-regulated storm water discharges with multiple outfall points ***may*** be given a single categorical WLA when data are insufficient to assign individual WLAs
- Stormwater WLAs and LAs are to be expressed in numeric form – although rough estimates are expected when data are limited

More Key Points of the Memo:

- EPA recommends that water quality based effluent limits for stormwater WLAs can be in the form of BMPs rather than numeric limits
- Specific compliance monitoring or performance measures for load reductions must be included in the permit

Likely Candidates for Stormwater WLAs

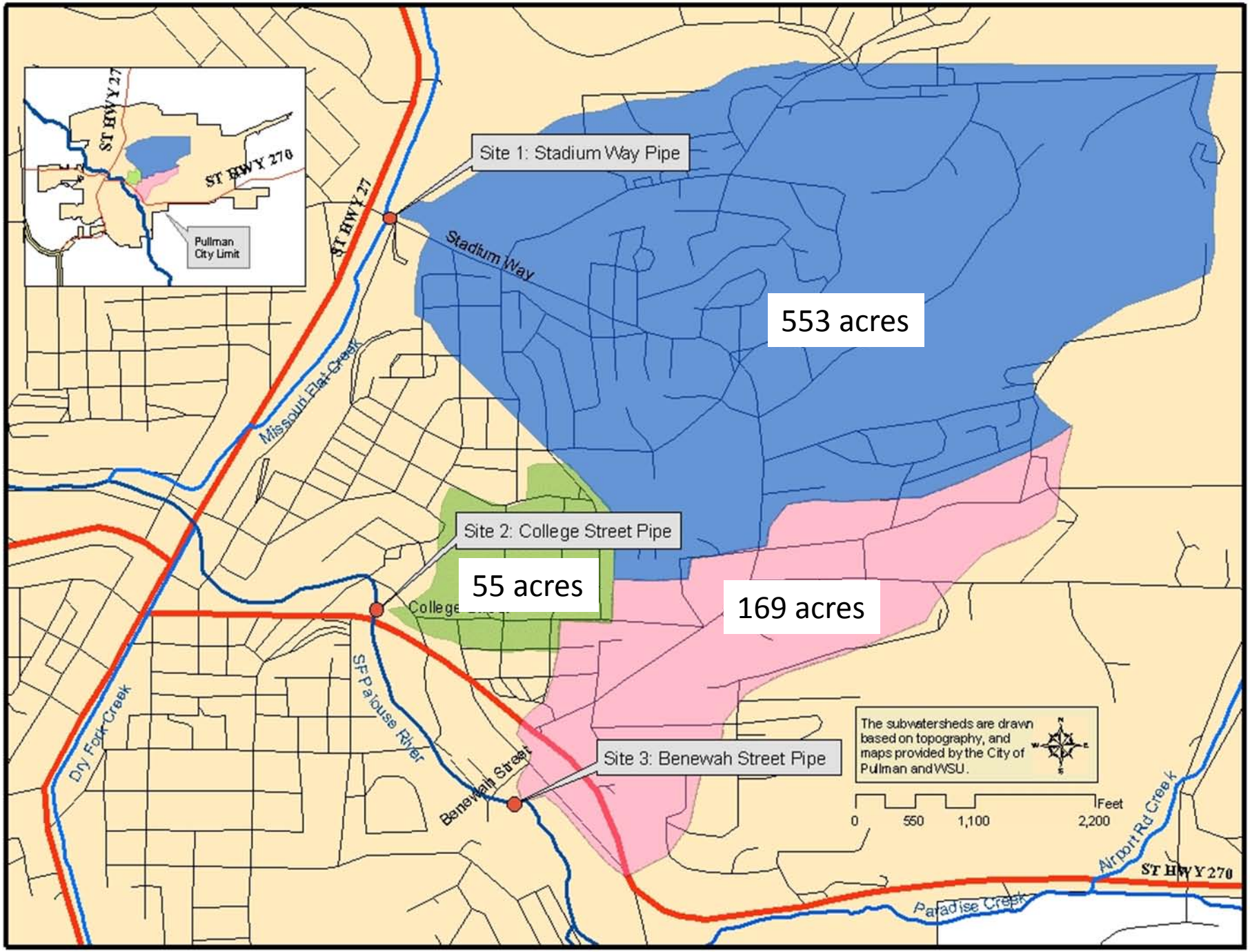
- Fecal coliform
- Metals
- Pesticides
- Phosphorus loading
- Dissolved oxygen from BOD/SOD loading

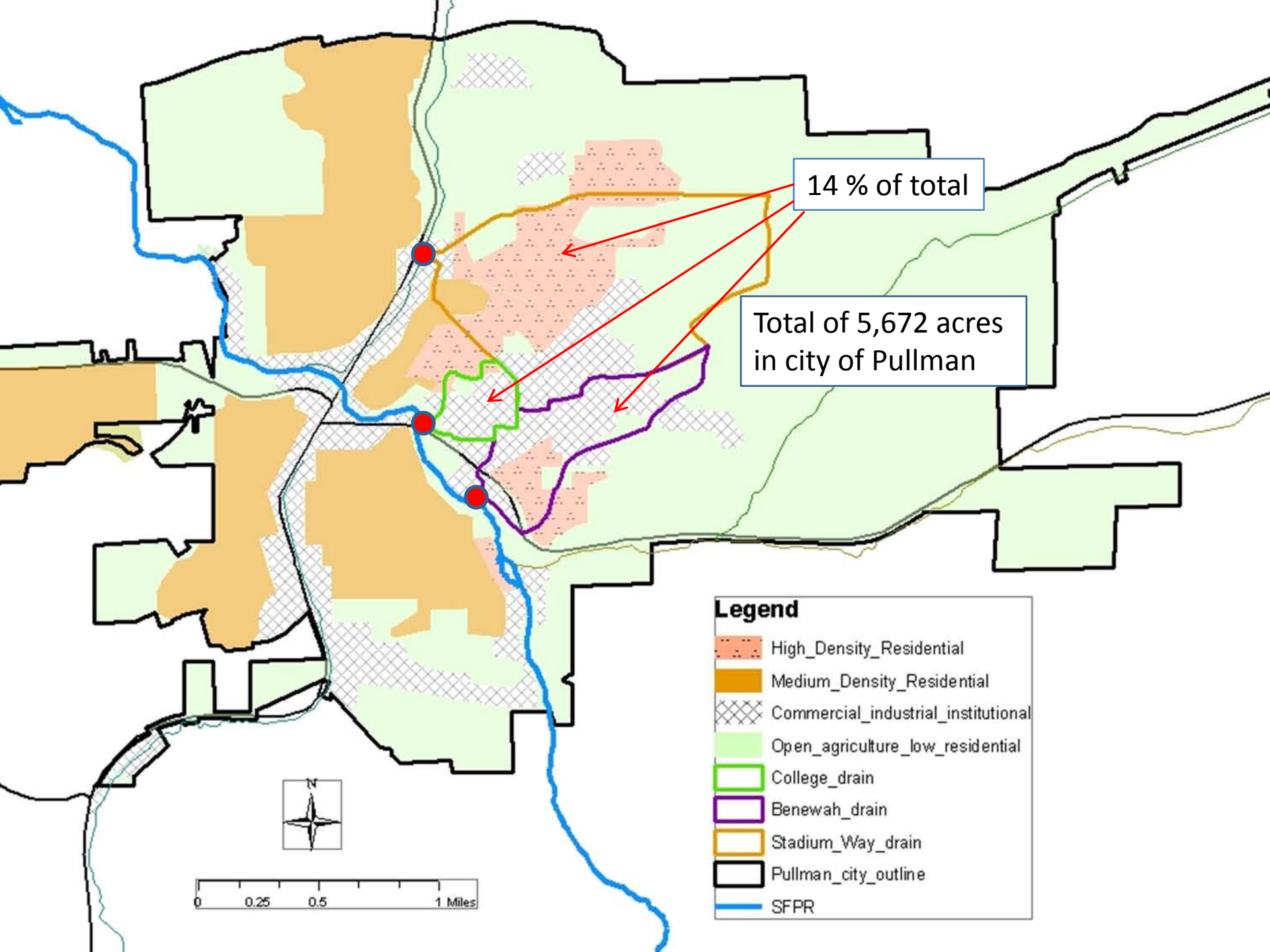
Pullman Stormwater Pilot Study for Pesticides, PCBs, and Fecal Coliform Bacteria, 2005-2006

October 2006

Publication No. 06-03-034

ECOLOGY


ST HWY 27
ST HWY 270
Pullman City Limit
Site 1: Stadium Way Pipe
Stadium Way
553 acres
Missouth Flat Creek
Site 2: College Street Pipe
55 acres
169 acres
College
SF Palouse River
Dry Fork Creek
Site 3: Benewah Street Pipe
Benewah Street
The subwatersheds are drawn based on topography, and maps provided by the City of Pullman and WSU.
0
550
1,100
2,200
Feet
Airport Rd Creek
ST HWY 270
Paradise Creek


14 % of total
Total of 5,672 acres in city of Pullman
Legend
High_Density_Residential
Medium_Density_Residential
Commercial_industrial_institutional
Open_agriculture_low_residential
College_drain
Benewah_drain
Stadium_Way_drain
Pullman_city_outline
SFPR
N
0
0.25
0.5
1 Miles

Some Recommendations from 2006 Pilot Study

- In light of the elevated concentrations of dieldrin and PCBs in Pullman stormwater and potential for adverse water quality impacts, Ecology, the City of Pullman, and WSU should work cooperatively to identify and clean up sources of these chemicals to the storm drain system. The Phase II permit contains several recommendations that are likely to improve Pullman's stormwater quality.

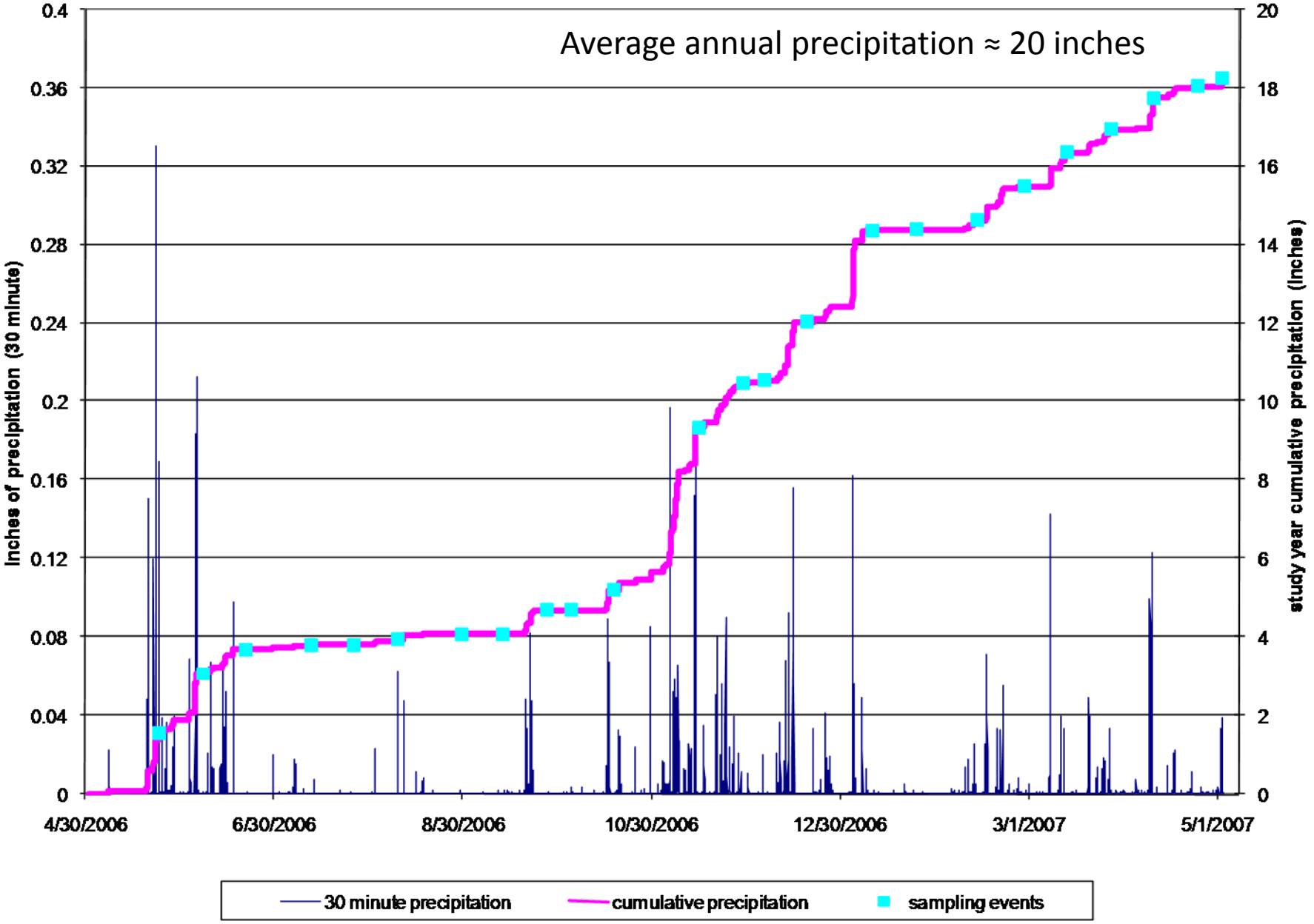
- The Benewah Street storm drain appeared to have higher dieldrin, PCB and fecal coliform concentrations in comparison to the other two stormwater sampling sites and would be a good candidate for further investigation.

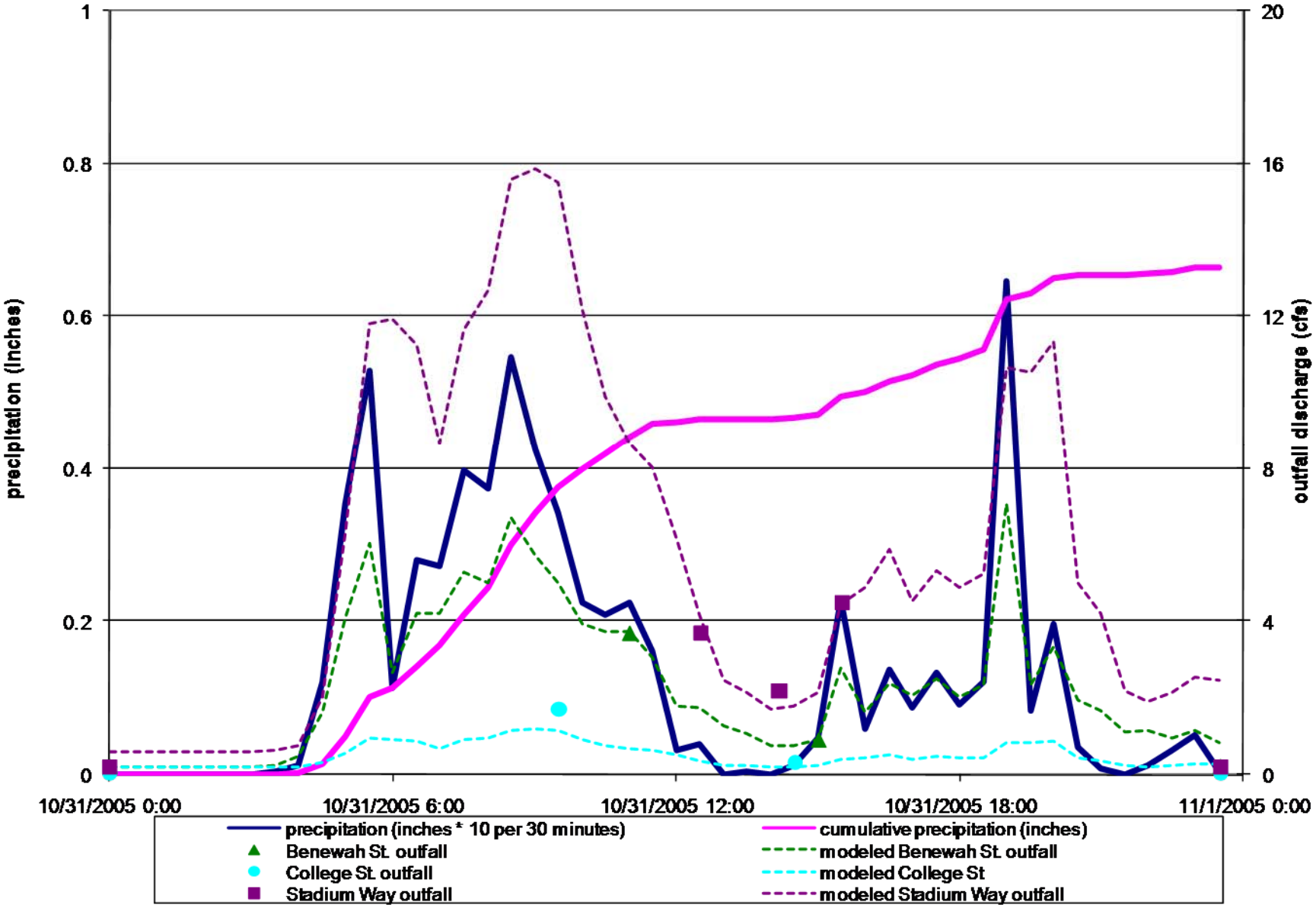
- High variability in fecal coliform concentrations in Pullman's storm drain discharges should be examined over the course of a calendar year to provide data in non-storm related time periods and flows.

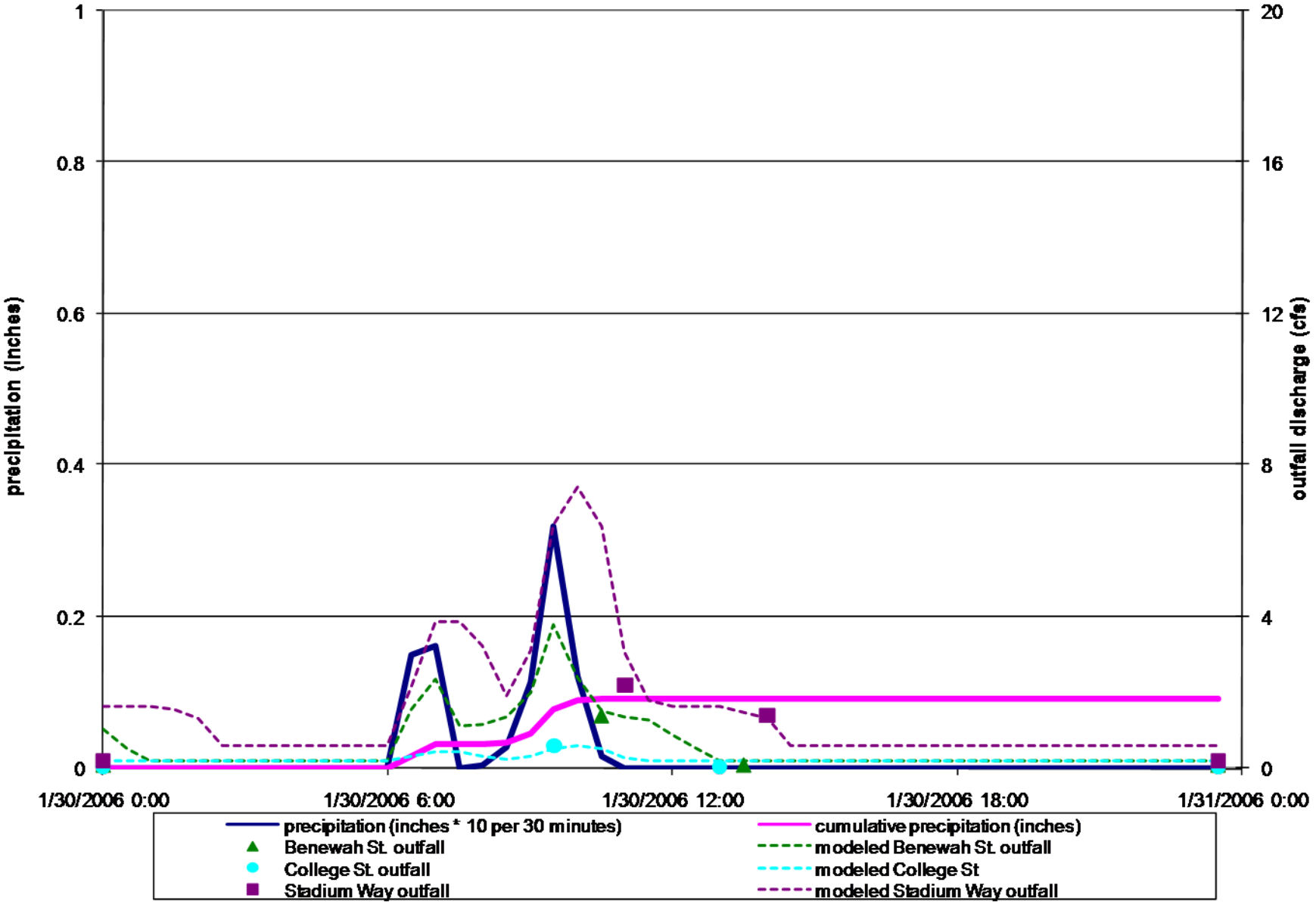
- The timing of the highest concentrations in the toxic samples was mixed; therefore future studies should not emphasize one end of the storm over another.

<u>storm event criteria for sampling</u>

defined as a minimum 0.1 inches of rainfall in a 24-hour period preceded by no more than trace rainfall in the previous 24 hours


Average annual precipitation ≈ 20 inches
Inches of precipitation (30 minute)
study year cumulative precipitation (inches)
0.4
0.36
0.32
0.28
0.24
0.2
0.16
0.12
0.08
0.04
0
20
18
16
14
12
10
8
6
4
2
0
4/30/2006
6/30/2006
8/30/2006
10/30/2006
12/30/2006
3/1/2007
5/1/2007
30 minute precipitation
cumulative precipitation
sampling events


1
0.8
0.6
0.4
0.2
0
precipitation (inches)
20
16
12
8
4
0
outfall discharge (cfs)
10/31/2005 0:00
10/31/2005 6:00
10/31/2005 12:00
10/31/2005 18:00
11/1/2005 0:00
precipitation (inches * 10 per 30 minutes)
cumulative precipitation (inches)
Benewah St. outfall
modeled Benewah St. outfall
College St. outfall
modeled College St
Stadium Way outfall
modeled Stadium Way outfall


precipitation (inches)
outfall discharge (cfs)
1
0.8
0.6
0.4
0.2
0
20
16
12
8
4
0
1/30/2006 0:00
1/30/2006 6:00
1/30/2006 12:00
1/30/2006 18:00
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precipitation (inches * 10 per 30 minutes)
cumulative precipitation (inches)
Benewah St. outfall
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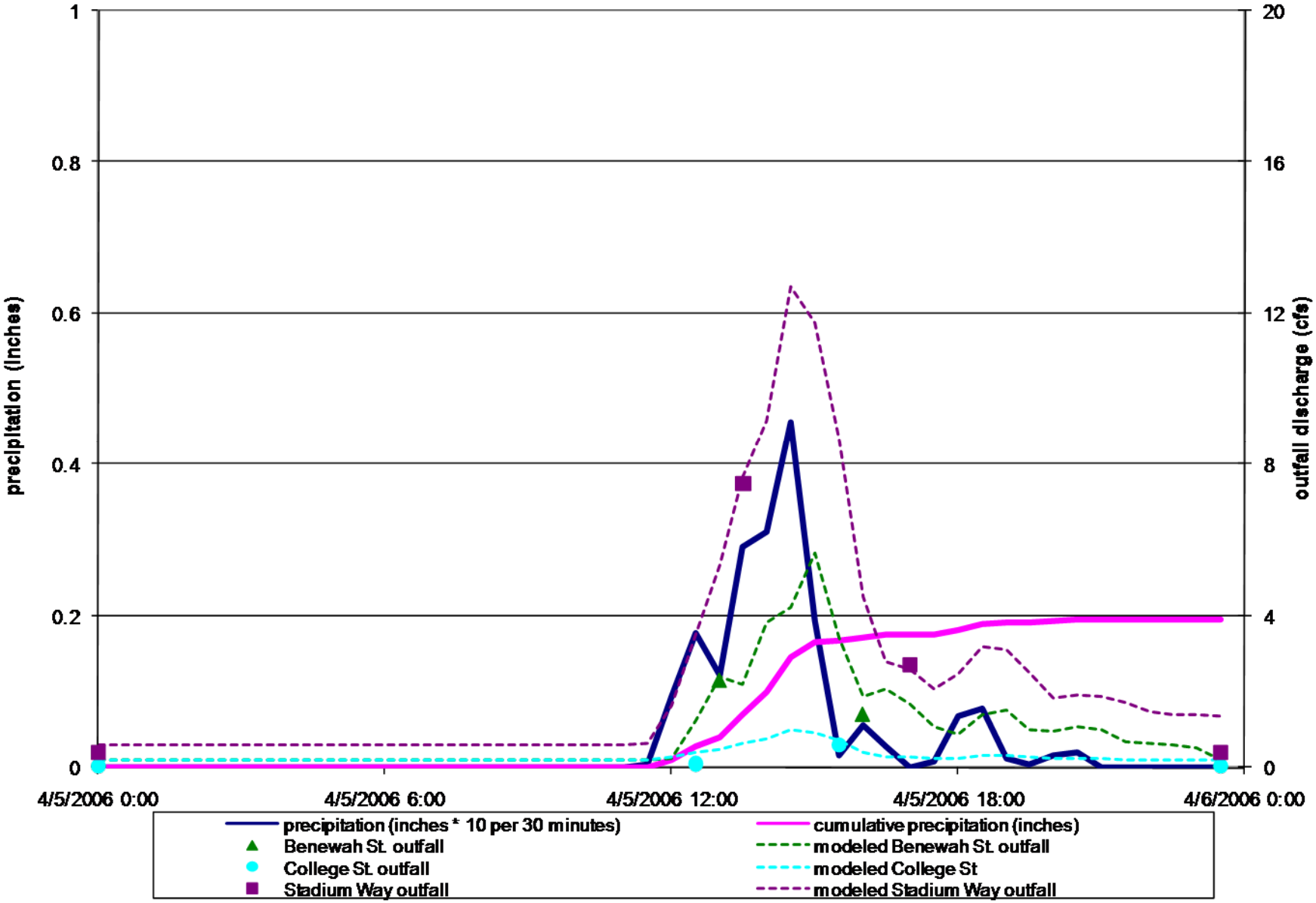
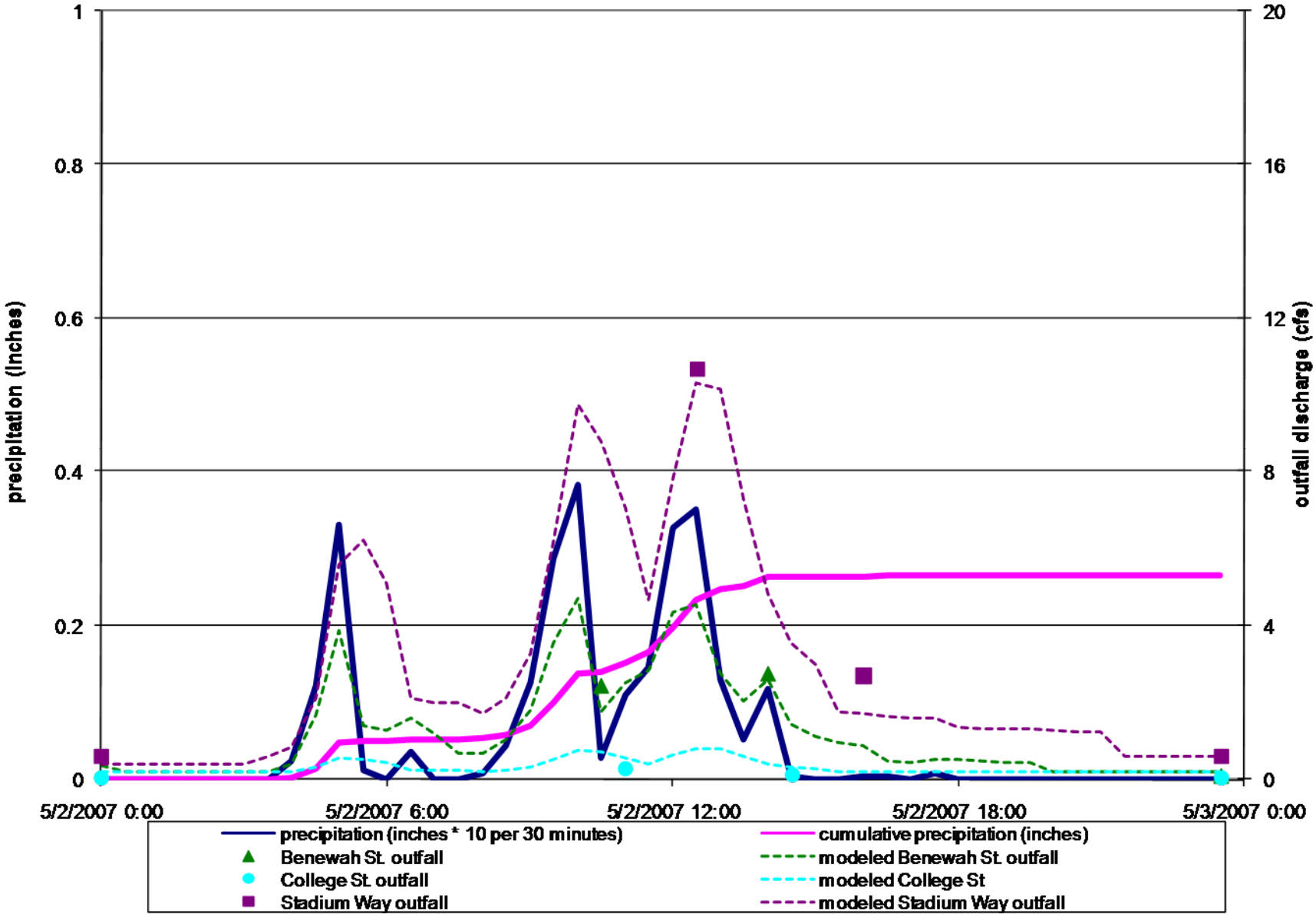
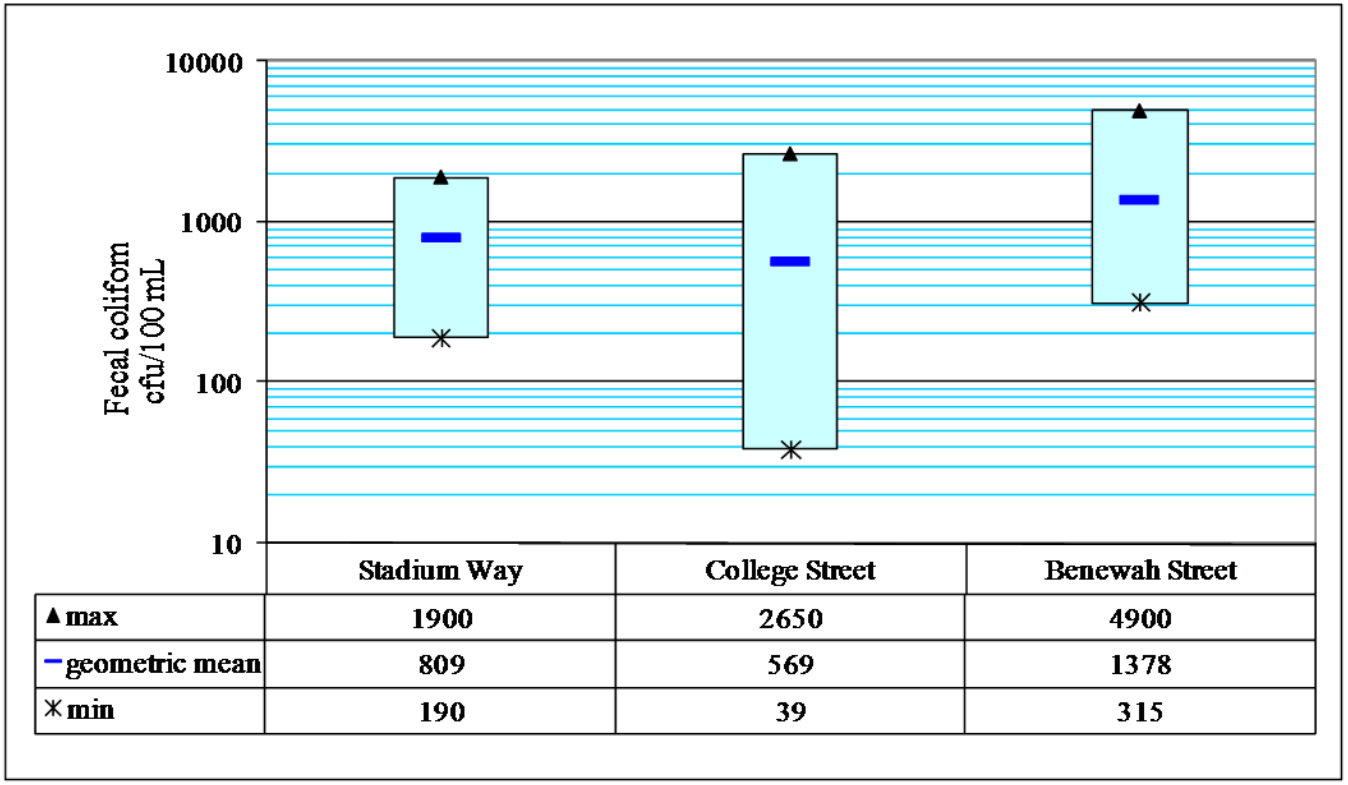
Stadium Way outfall
modeled Stadium Way outfall


precipitation (inches)
outfall discharge (cfs)
1
0.8
0.6
0.4
0.2
0
20
16
12
8
4
0
4/5/2006 0:00
4/5/2006 6:00
4/5/2006 12:00
4/5/2006 18:00
4/6/2006 0:00
precipitation (inches * 10 per 30 minutes)
cumulative precipitation (inches)
Benewah St. outfall
modeled Benewah St. outfall
College St. outfall
modeled College St
Stadium Way outfall
modeled Stadium Way outfall

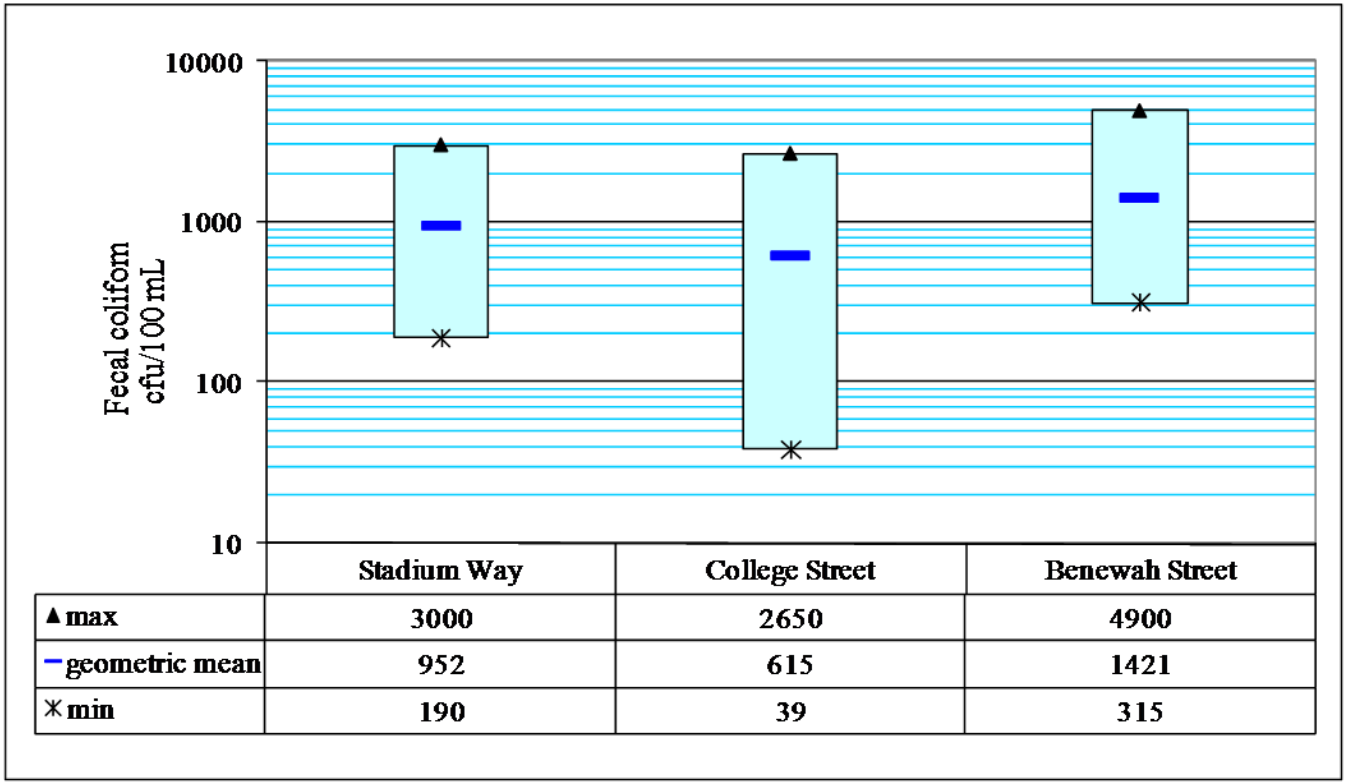

precipitation (inches)
outfall discharge (cfs)
1
0.8
0.6
0.4
0.2
0
20
16
12
8
4
0
5/2/2007 0:00
5/2/2007 6:00
5/2/2007 12:00
5/2/2007 18:00
5/3/2007 0:00
precipitation (inches * 10 per 30 minutes)
cumulative precipitation (inches)
Benewah St. outfall
modeled Benewah St. outfall
College St. outfall
modeled College St
Stadium Way outfall
modeled Stadium Way outfall

2006 Pilot Study FC Bacteria concentrations



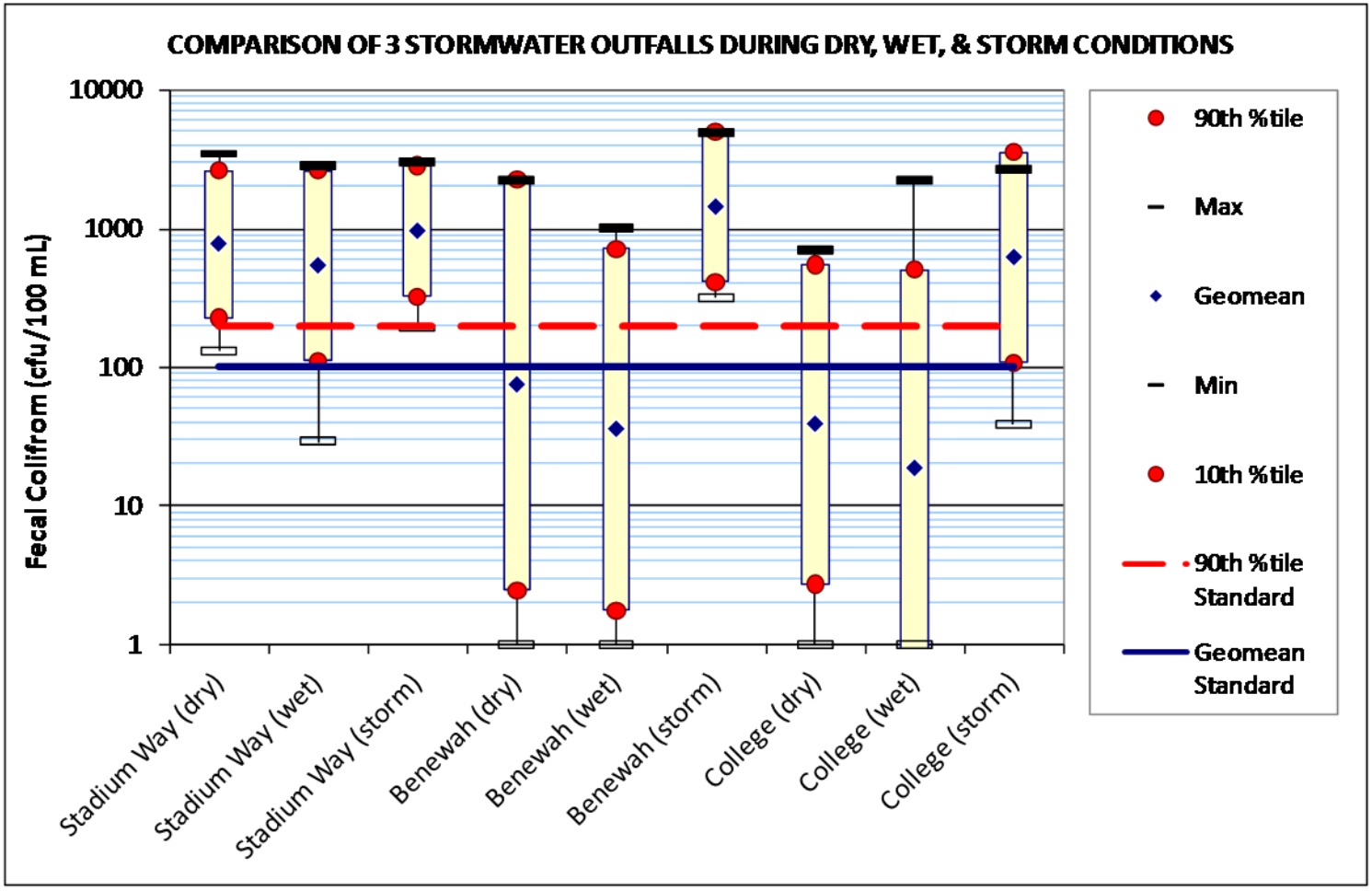
	Stadium Way	College Street	Benewah Street
▲max	1900	2650	4900
– geometric mean	809	569	1378
✳ min	190	39	315

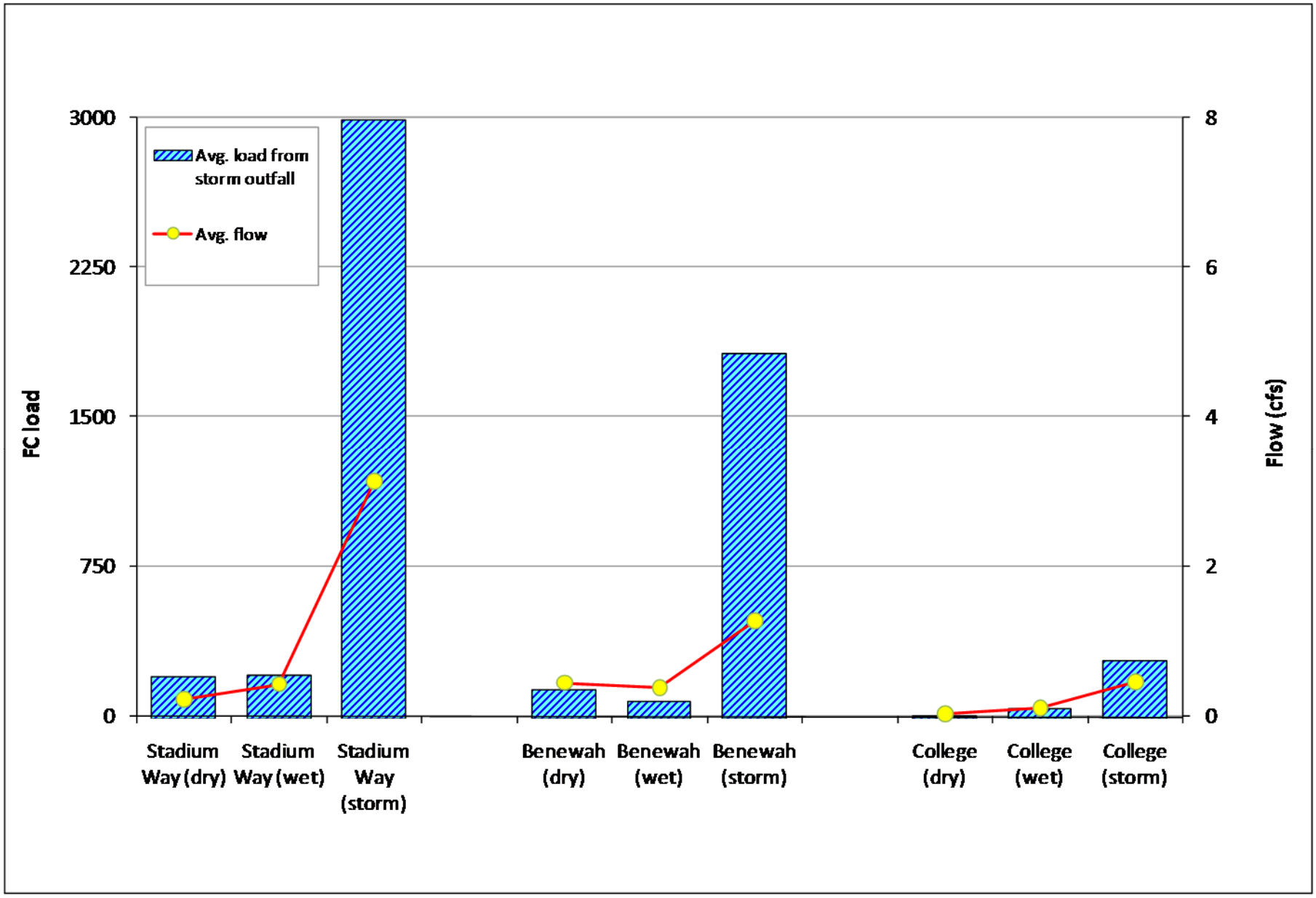
2006 Pilot Study and May 2007 TMDL Storm Sampling



	Stadium Way	College Street	Benewah Street
▲max	3000	2650	4900
– geometric mean	952	615	1421
✳min	190	39	315

Station ID	Total # of Samples	Min	10th %tile	Geomean	90th %tile	Max	% Samples > 200 cfu/100 mL	TARGET % REDUCTION*
	DRY SEASON							
MissSD120 (Stadium Way)	11	130	229	769	2587	3450	91%	**92%**
SFPRWSU1 (Benewah St)	11	1	2.5	74	2216	2200	45%	**91%**
SFPRWSU2 (College St)	11	1	2.8	39	544	700	27%	**63%**
	WET SEASON							
MissSD120 (Stadium Way)	11	29	111	536	2594	2800	91%	**92%**
SFPRWSU1 (Benewah St)	11	1	2	36	709	1000	18%	**72%**
SFPRWSU2 (College St)	12	1	1	19	507	2200	17%	**61%**
	STORMWATER							
MissSD120 (Stadium Way)	8	190	323	952	2807	3000	88%	**93%**
SFPRWSU1 (Benewah St)	8	315	414	1421	4880	4900	100%	**96%**
SFPRWSU2 (College St)	8	39	108	615	3506	2650	88%	**94%**


COMPARISON OF 3 STORMWATER OUTFALLS DURING DRY, WET, & STORM CONDITIONS
Fecal Colifrom (cfu/100 mL)
10000
1000
100
10
1
Stadium Way (dry)
Stadium Way (wet)
Stadium Way (storm)
Benewah (dry)
Benewah (wet)
Benewah (storm)
College (dry)
College (wet)
College (storm)
90th %tile
Max
Geomean
Min
10th %tile
90th %tile Standard
Geomean Standard


3000
2250
1500
750
0
FC load
8
6
4
2
0
Flow (cfs)
Avg. load from storm outfall
Avg. flow
Stadium Way (dry)
Stadium Way (wet)
Stadium Way (storm)
Benewah (dry)
Benewah (wet)
Benewah (storm)
College (dry)
College (wet)
College (storm)