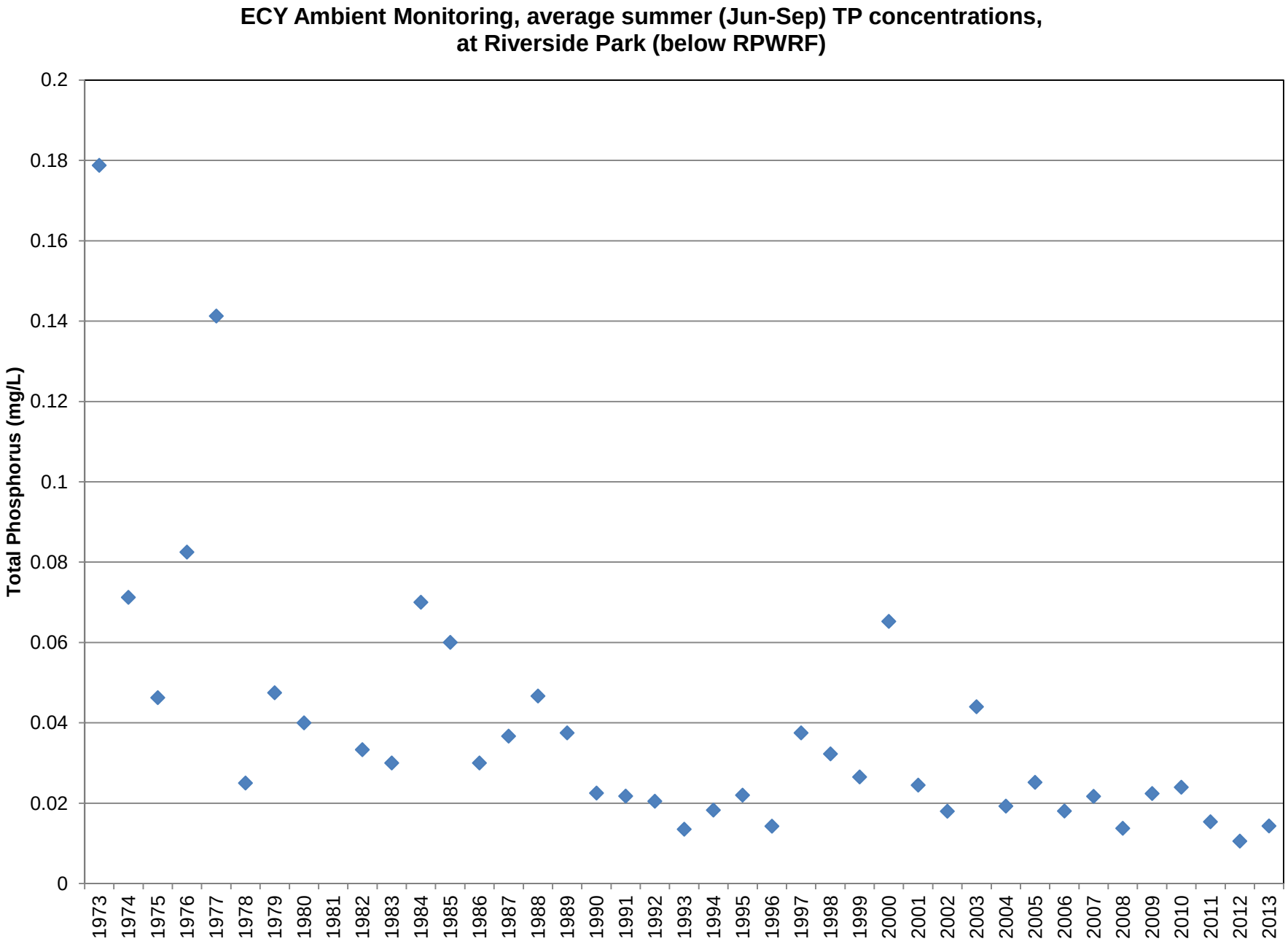
Spokane River
Total Phosphorus Trends

Ben Brattebo, P.E.
Spokane County Utilities Division
April 15, 2014


ECY Ambient Monitoring, average summer (Jun-Sep) TP concentrations,
at Riverside Park (below RPWRF)
Total Phosphorus (mg/L)
0.2
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
1973
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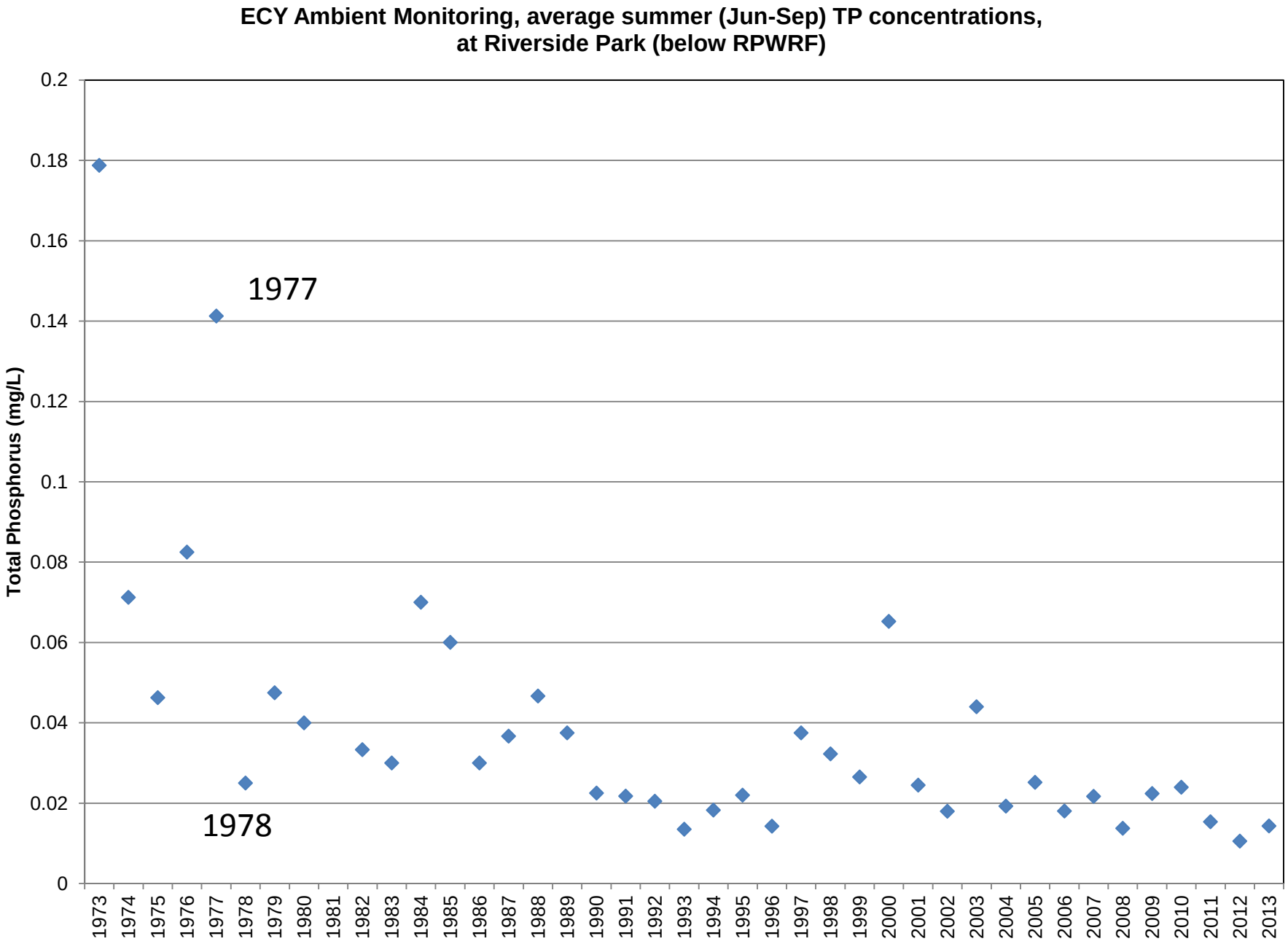
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0.1
0.08
0.06
0.04
0.02
0
1977
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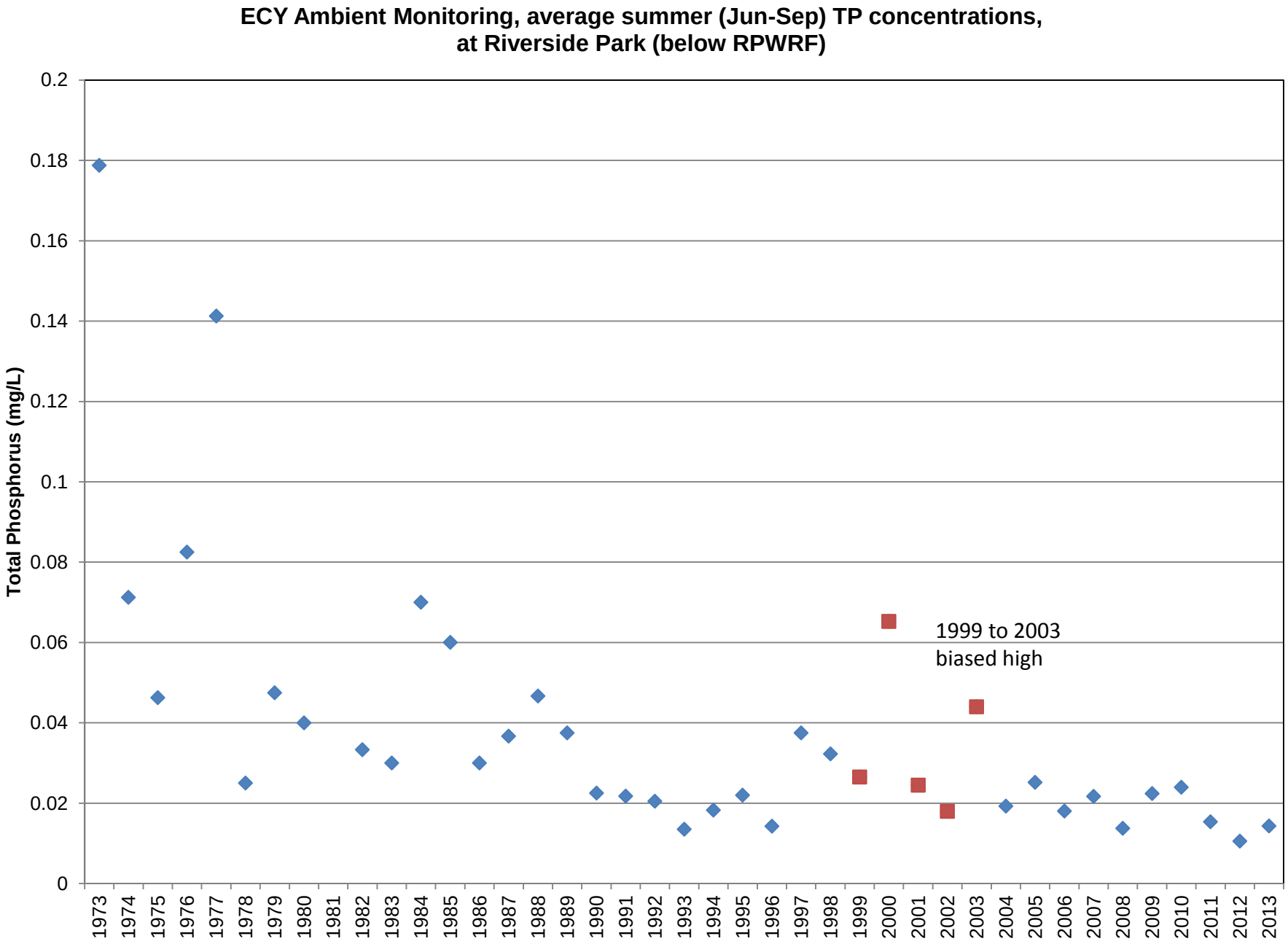
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0
1999 to 2003
biased high
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
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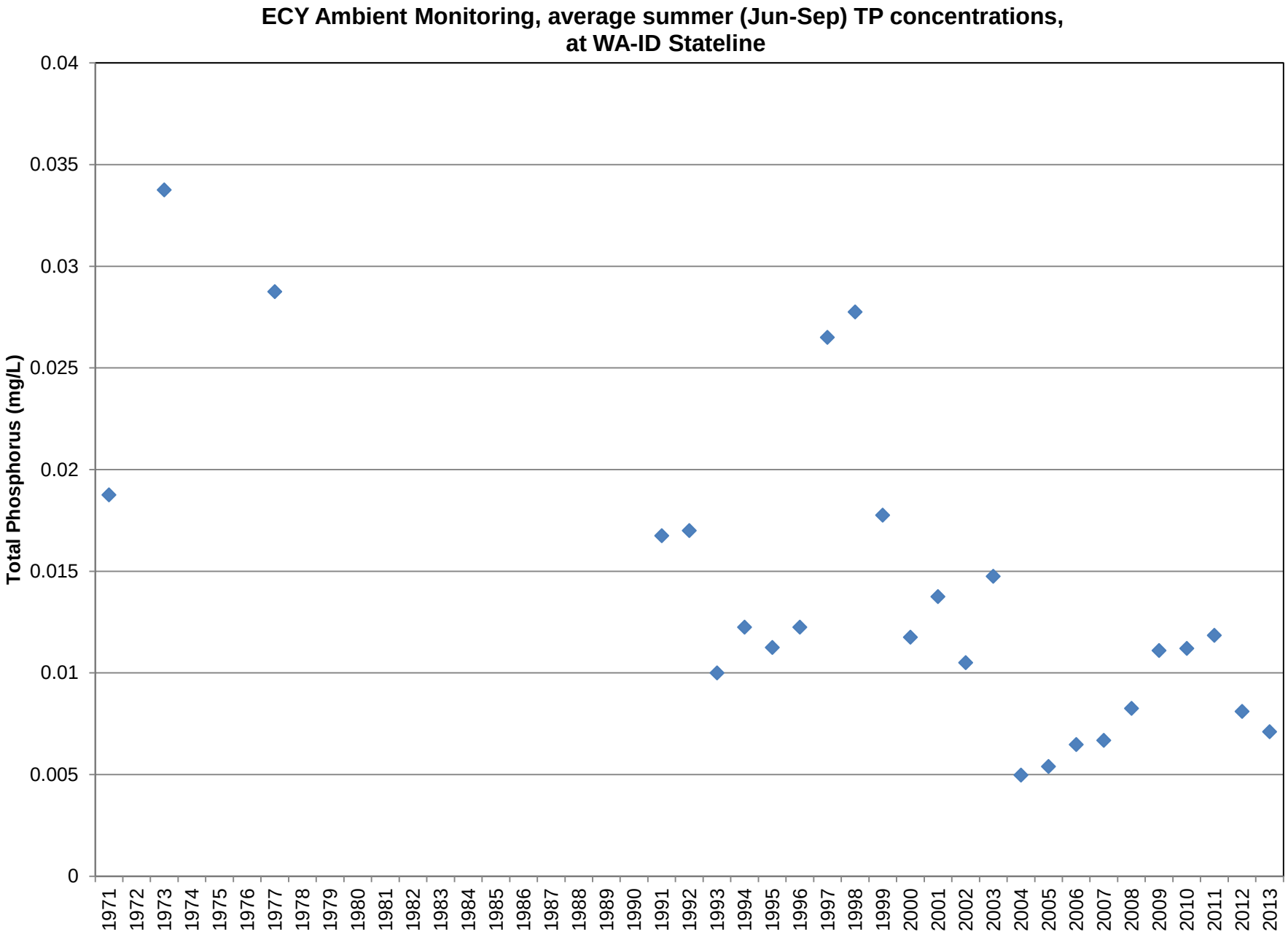
ECY Ambient Monitoring, average summer (Jun-Sep) TP concentrations,
at WA-ID Stateline
Total Phosphorus (mg/L)
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
1971
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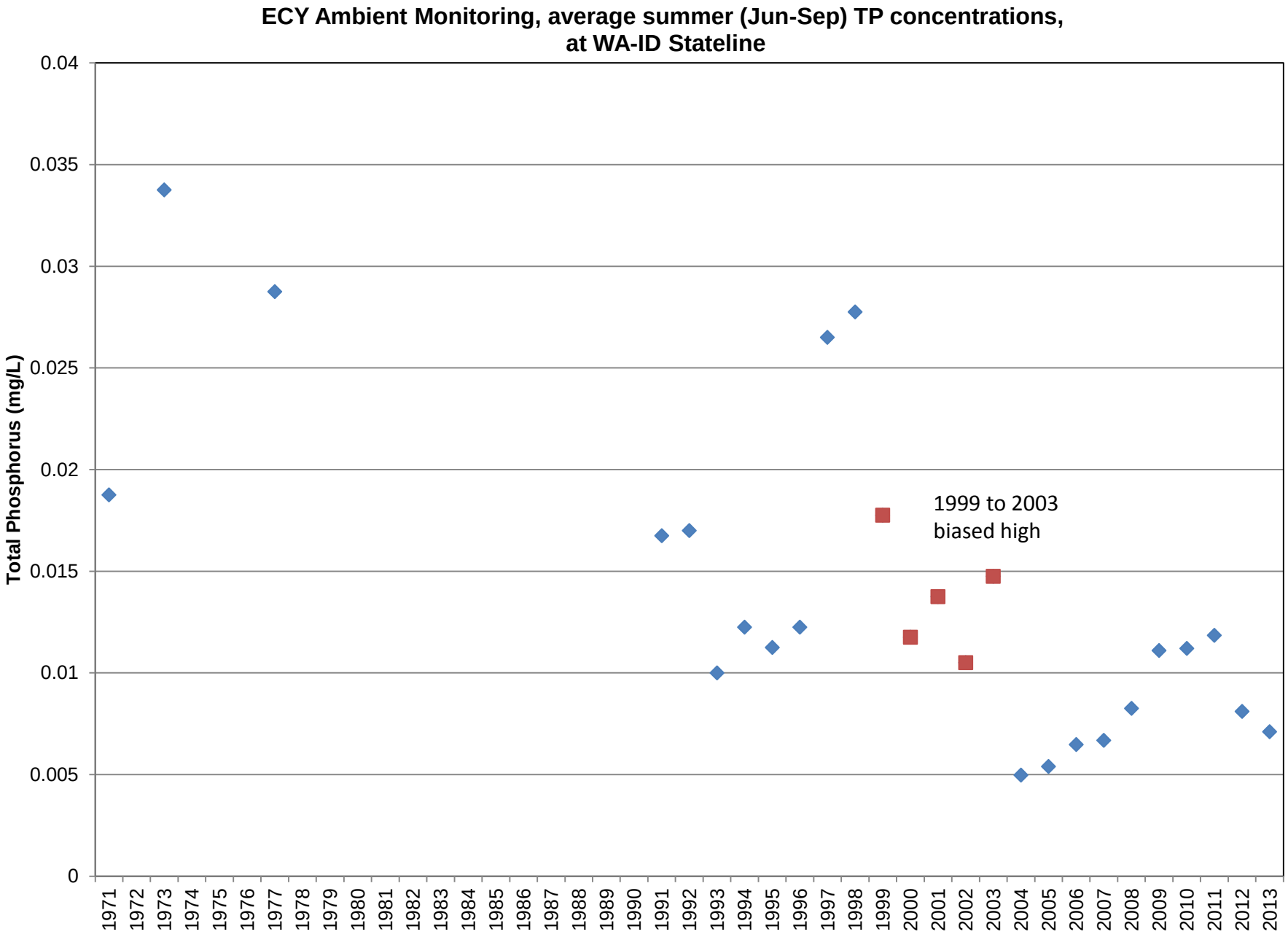
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Phosphorus Data Quality

- Feb 1999: Manchester Laboratory switched from manual to inline digestion for total phosphorus. In early 2003, during the course of evaluating a different method for phosphorus analysis, Manchester Laboratory discovered that the in-line method contained a high bias (4 to 20 ppb). Trend analyses of total phosphorus data should be interpreted carefully if results collected between Feb 1999 and Sept 2003 are included.

River and Stream Ambient Monitoring Report for Water Year 2011, Ecology, June 2012

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2013 Sampling by Spokane County

- Spokane River upstream and downstream of the SCRWRF outfall
- Approx. 0.8 miles upstream of Greene St Bridge
  - Nutrients and metals, 10x per year, starting in 2013
  - Just upstream of Greene St

Downstream of outfall	Total P, mg/L
27-Feb-13	0.010
20-Mar-13	0.011
17-Apr-13	0.008
5-Jun-13	0.006
26-Jun-13	0.006
24-Jul-13	0.004
21-Aug-13	0.004
18-Sep-13	0.004
16-Oct-13	0.004
13-Nov-13	0.004

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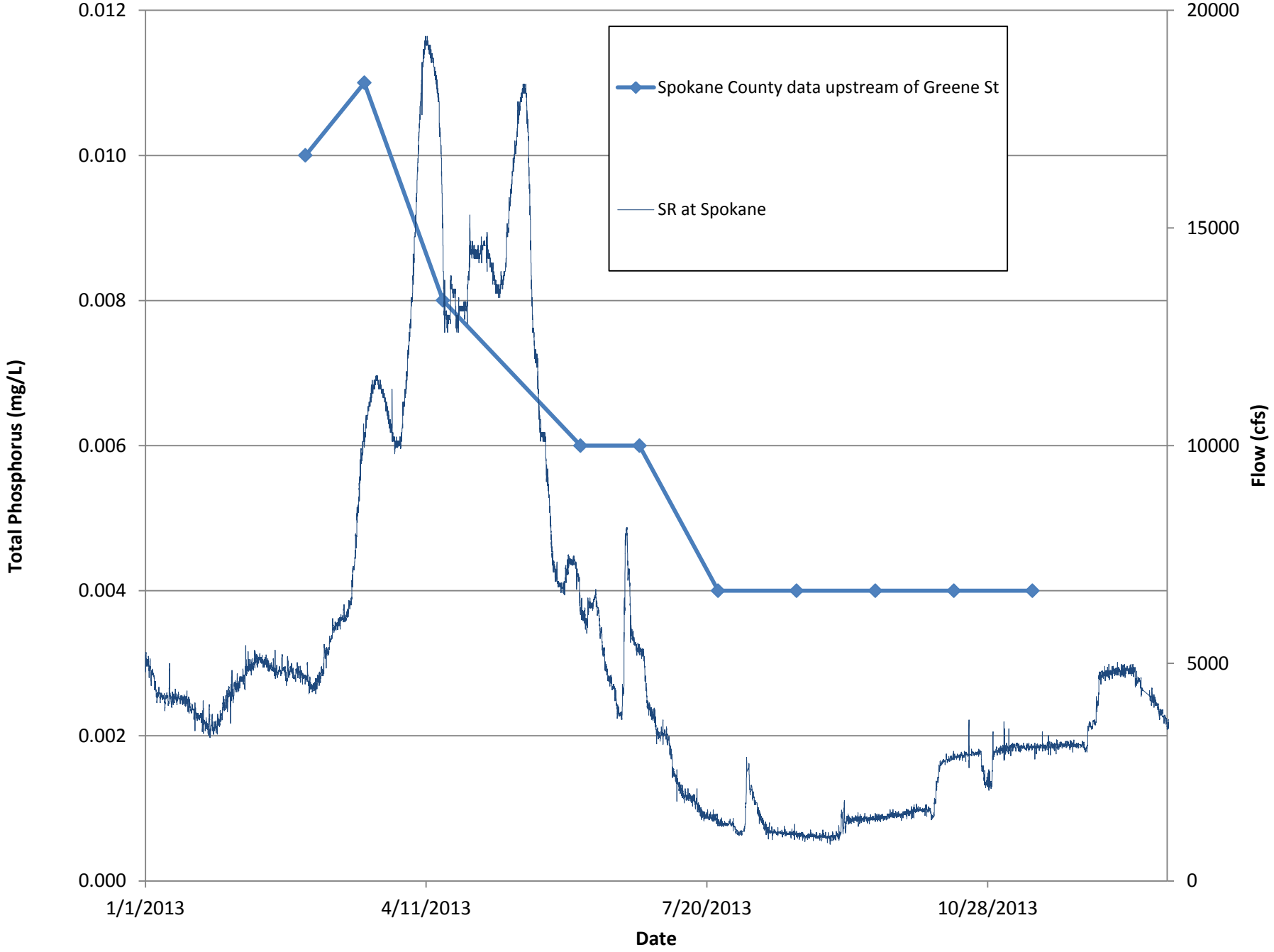
13-Nov-13	0.004

Average summer concentration (June through September): 0.0045 mg/L


0.012
0.010
0.008
0.006
0.004
0.002
0.000
Total Phosphorus (mg/L)
20000
15000
10000
5000
0
Flow (cfs)
1/1/2013
4/11/2013
7/20/2013
10/28/2013
Date
Spokane County data upstream of Greene St
SR at Spokane

Comparison with TP Data from 2000 data collection

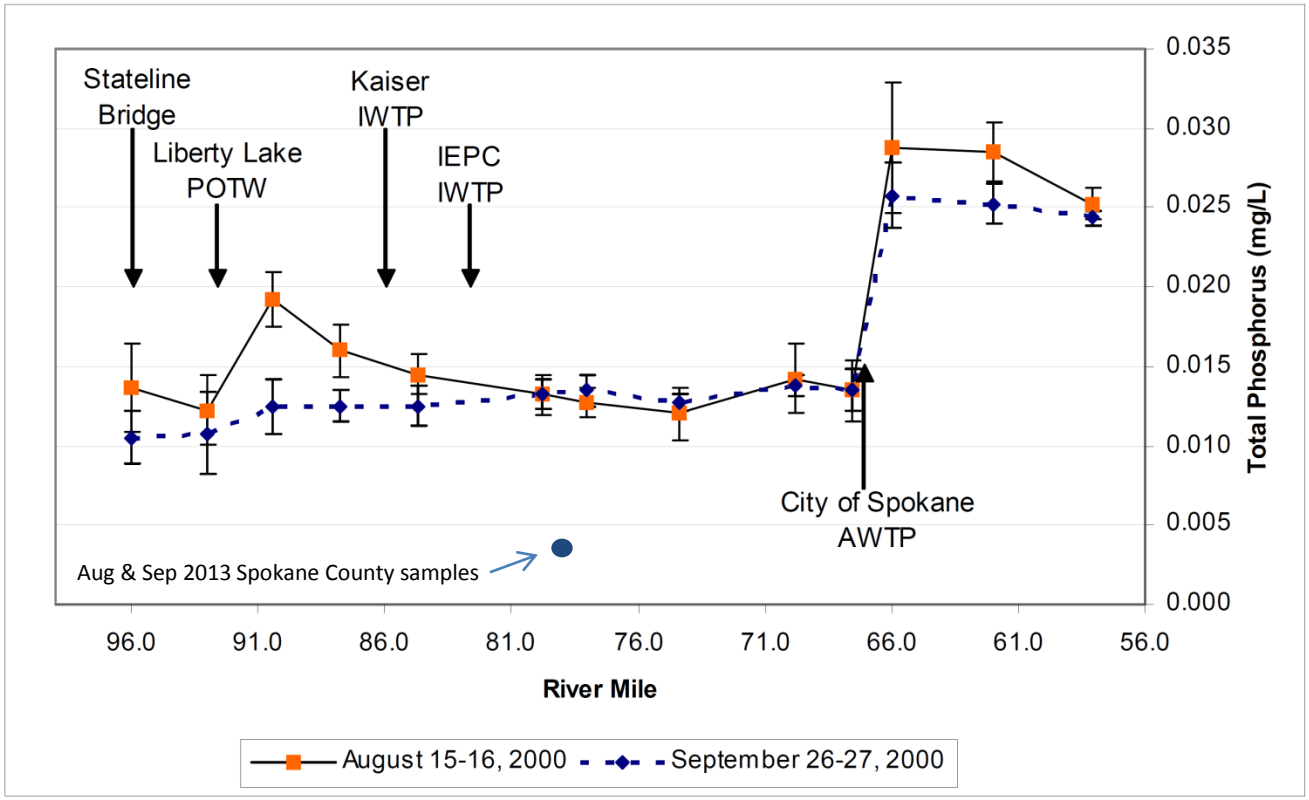
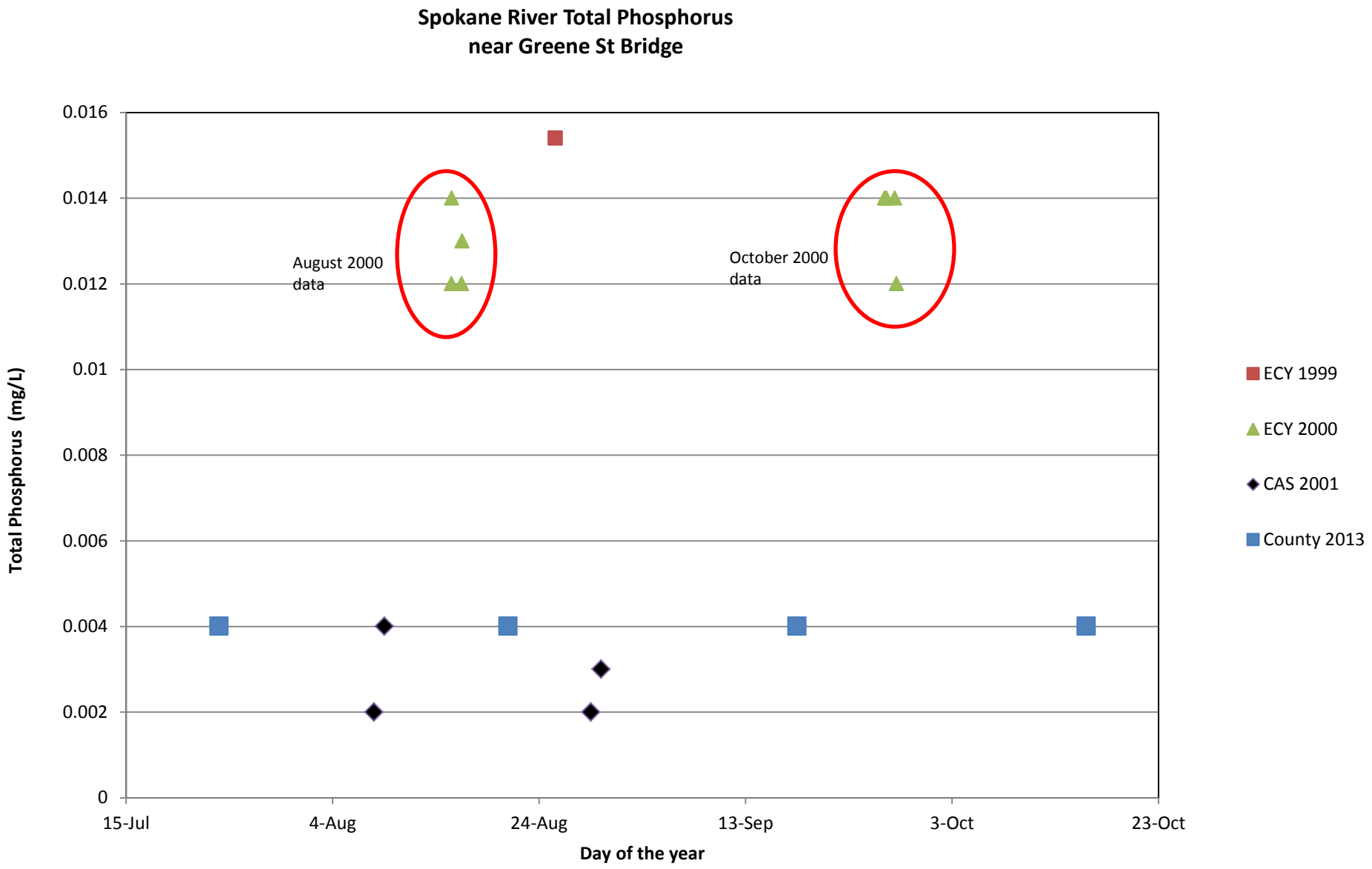


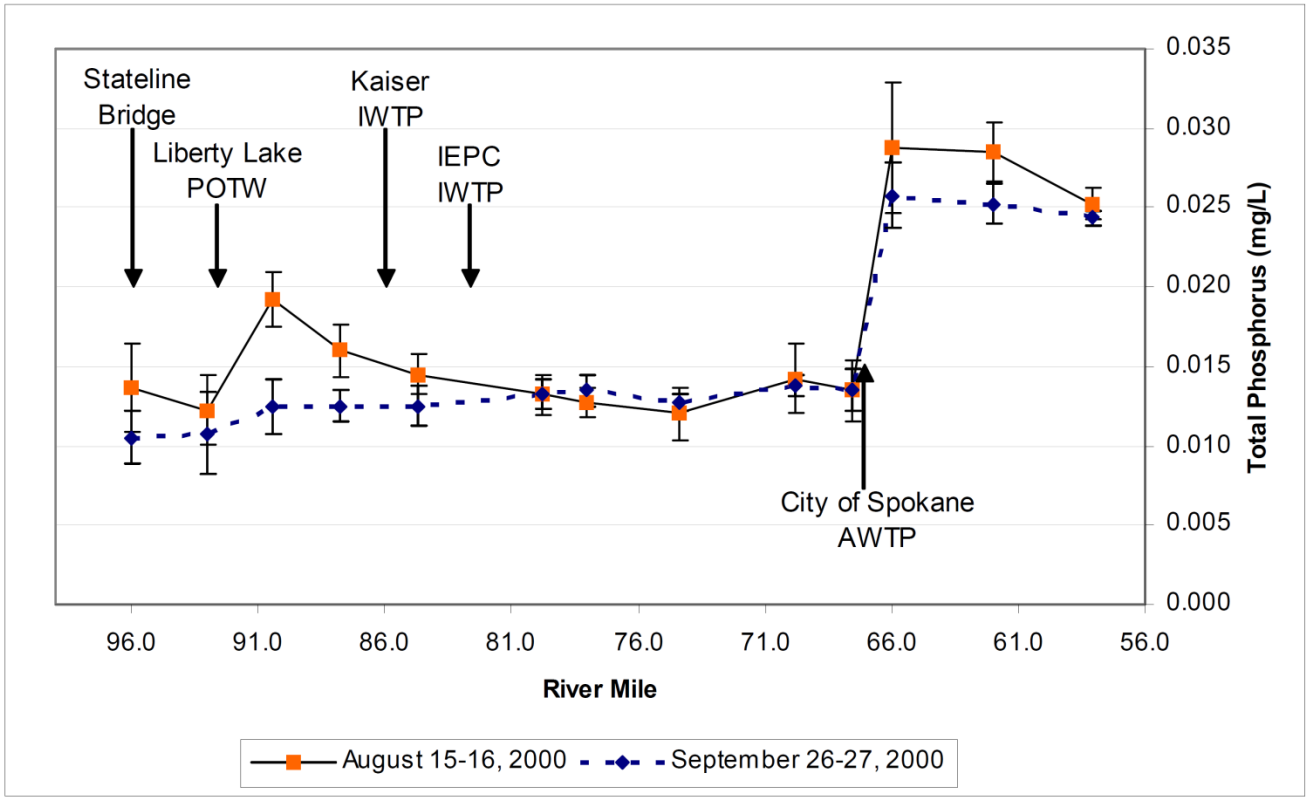
Figure 10. Average total phosphorus concentrations data (n = 4) ± standard deviation by RM for Ecology river surveys conducted on August 15-16 and September 26-27, 2000.

Cusimano, 2004, Spokane River and Lake Spokane (Long Lake) Pollutant Loading Assessment for Protecting Dissolved Oxygen



Note: CAS data at 0.002 mg/l were ND. All CAS data were below laboratory reporting limit

DO TMDL 2000 data collection



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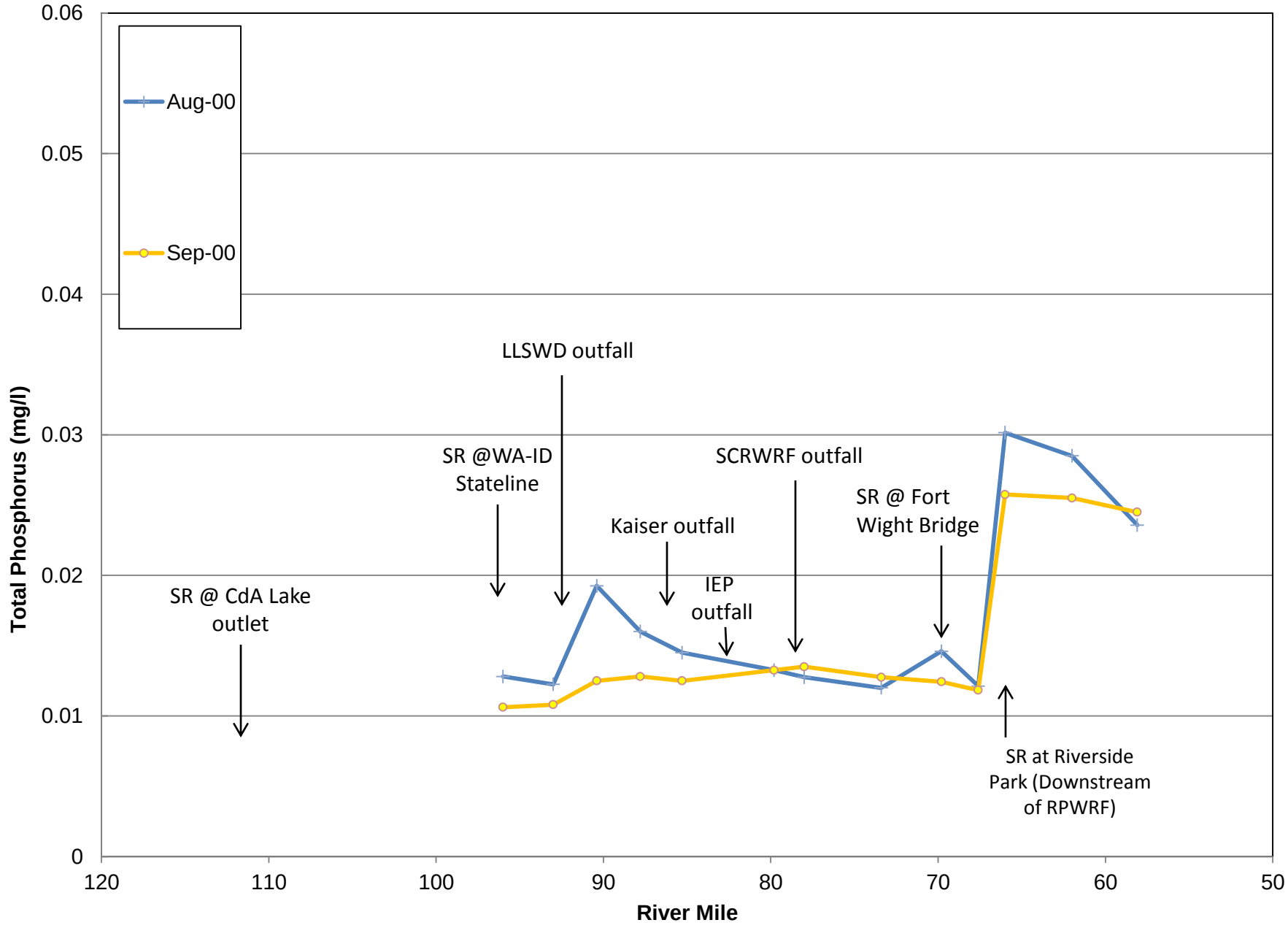
ECY Spokane River Longitudinal Total Phosphorus Samples CdA outlet to Nine Mile Bridge



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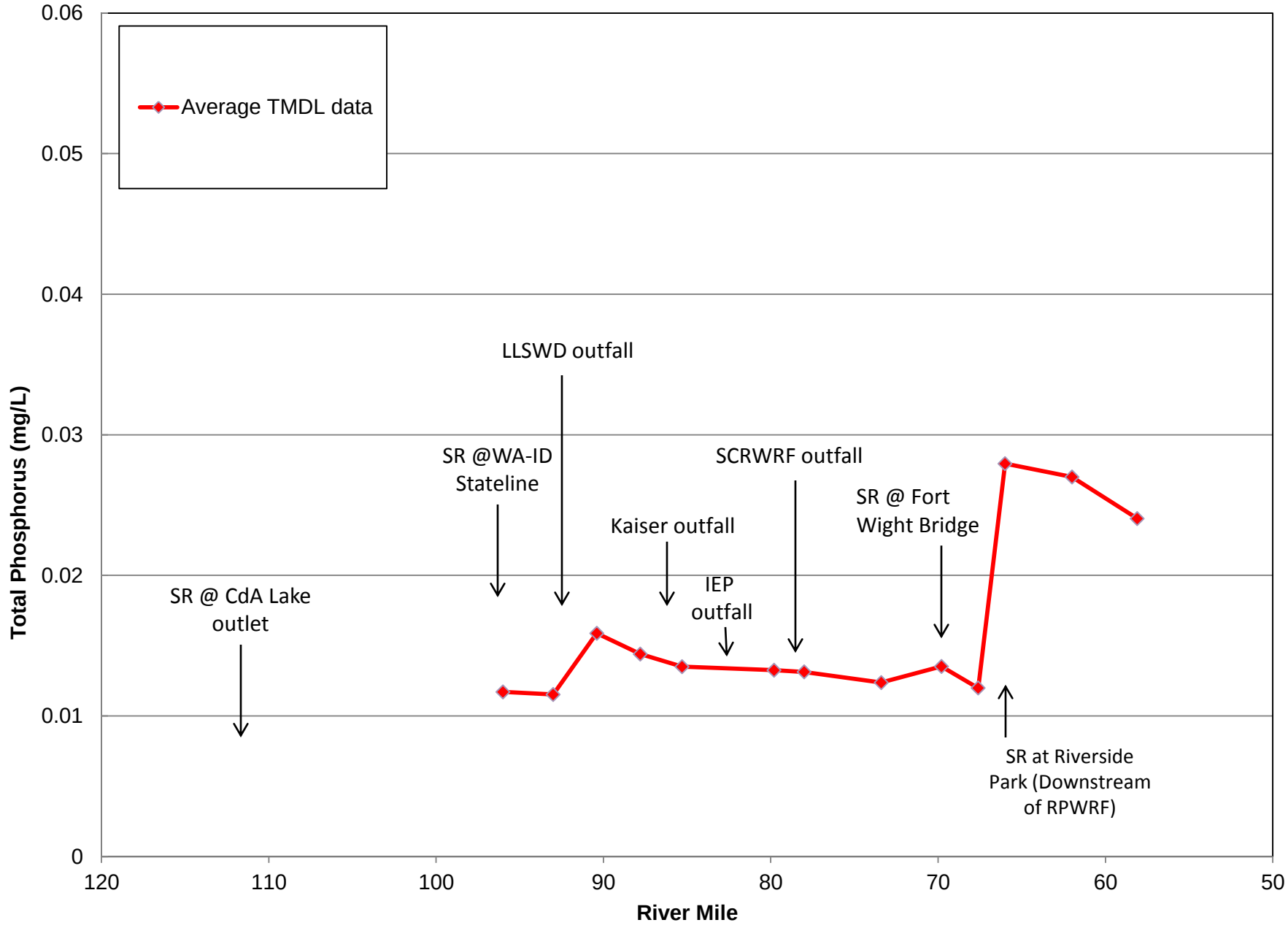

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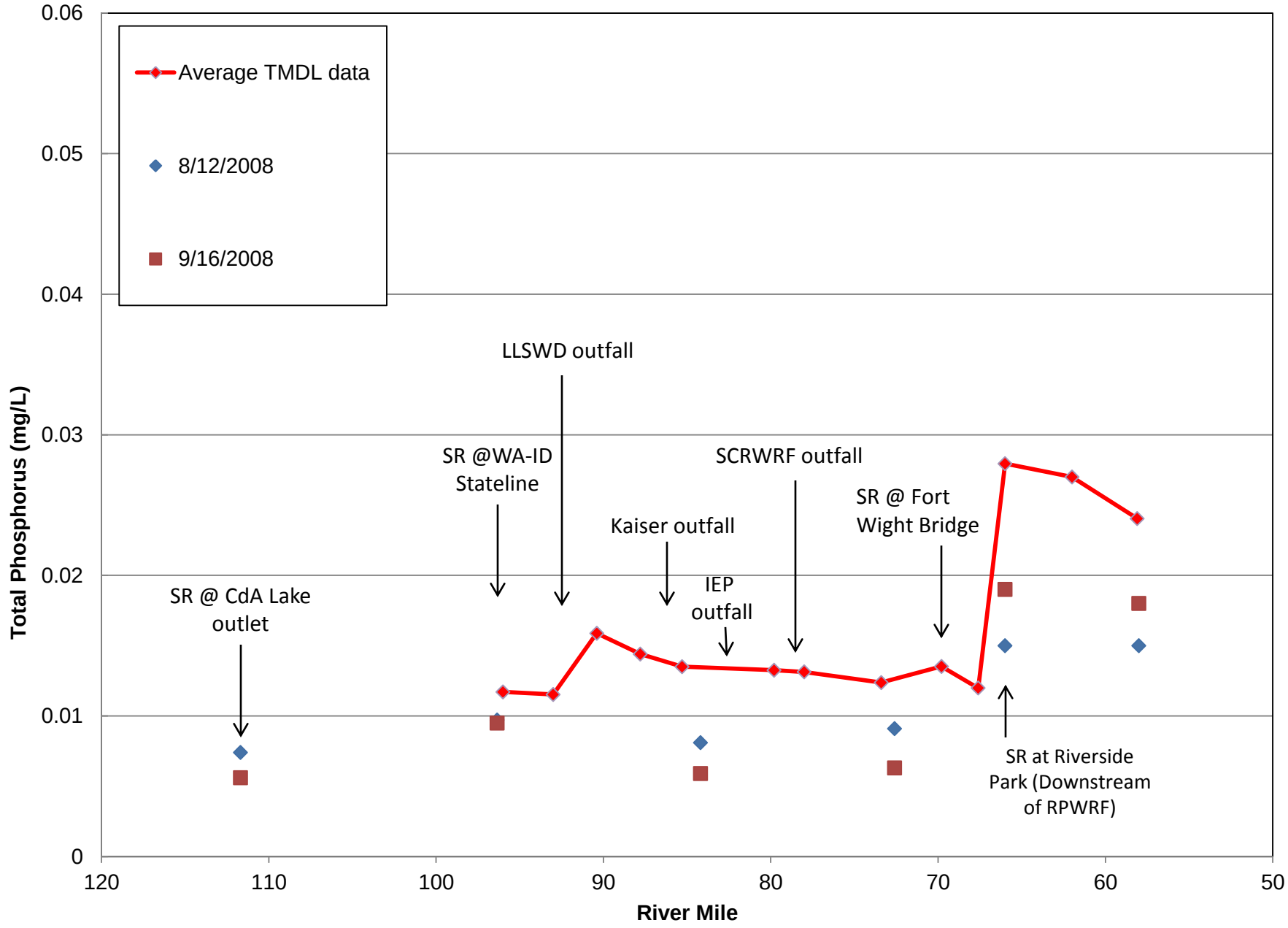

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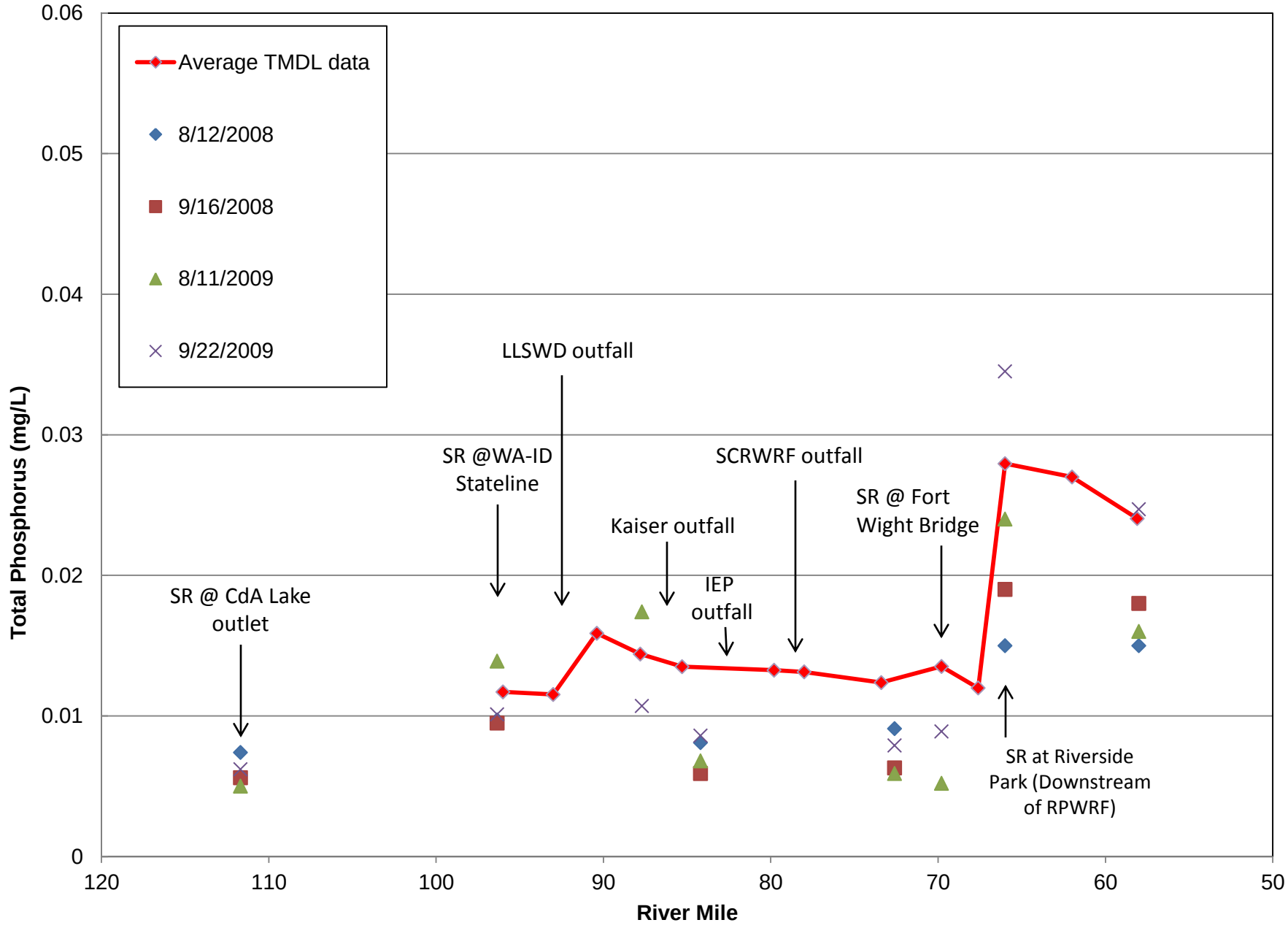

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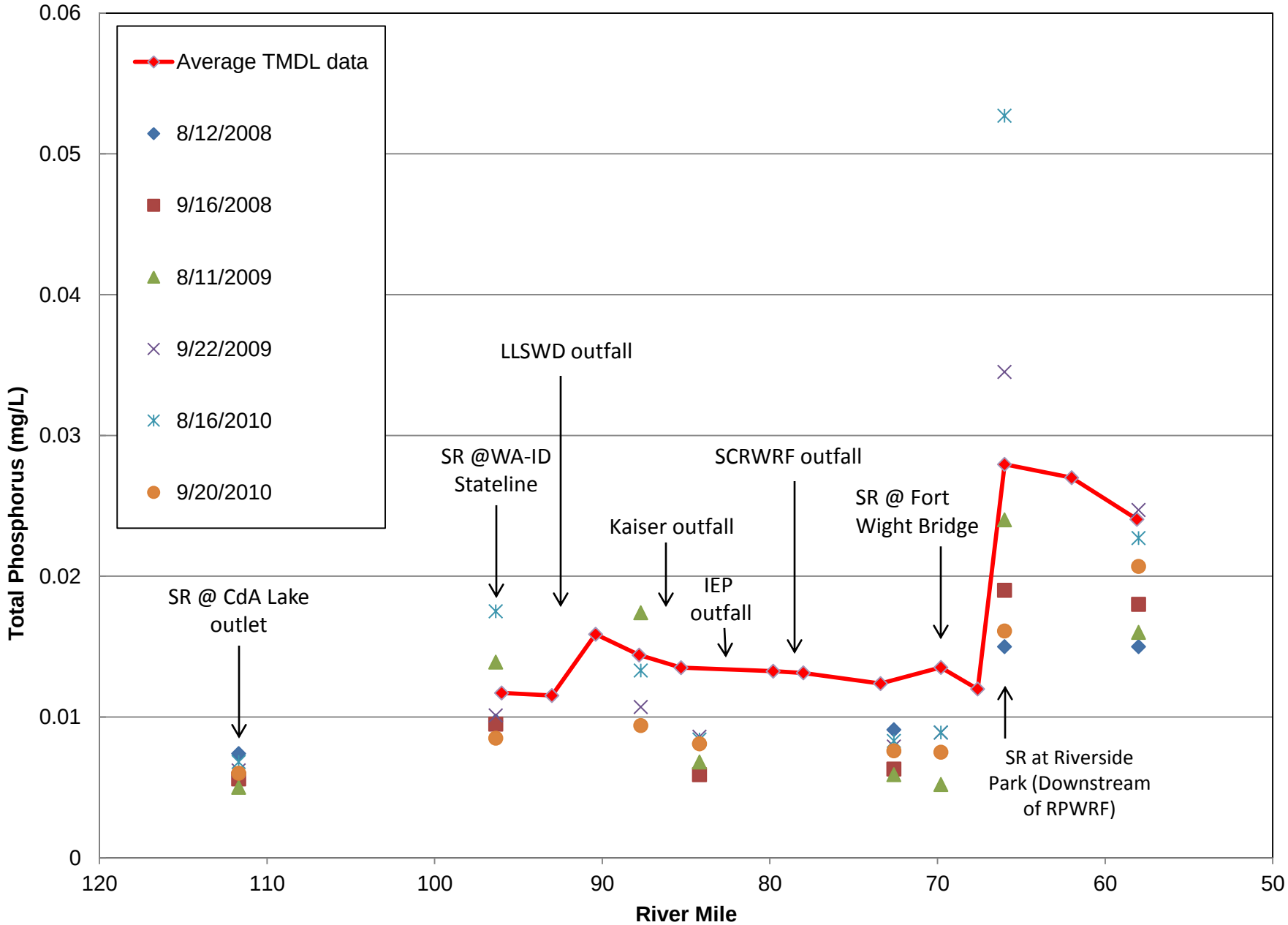

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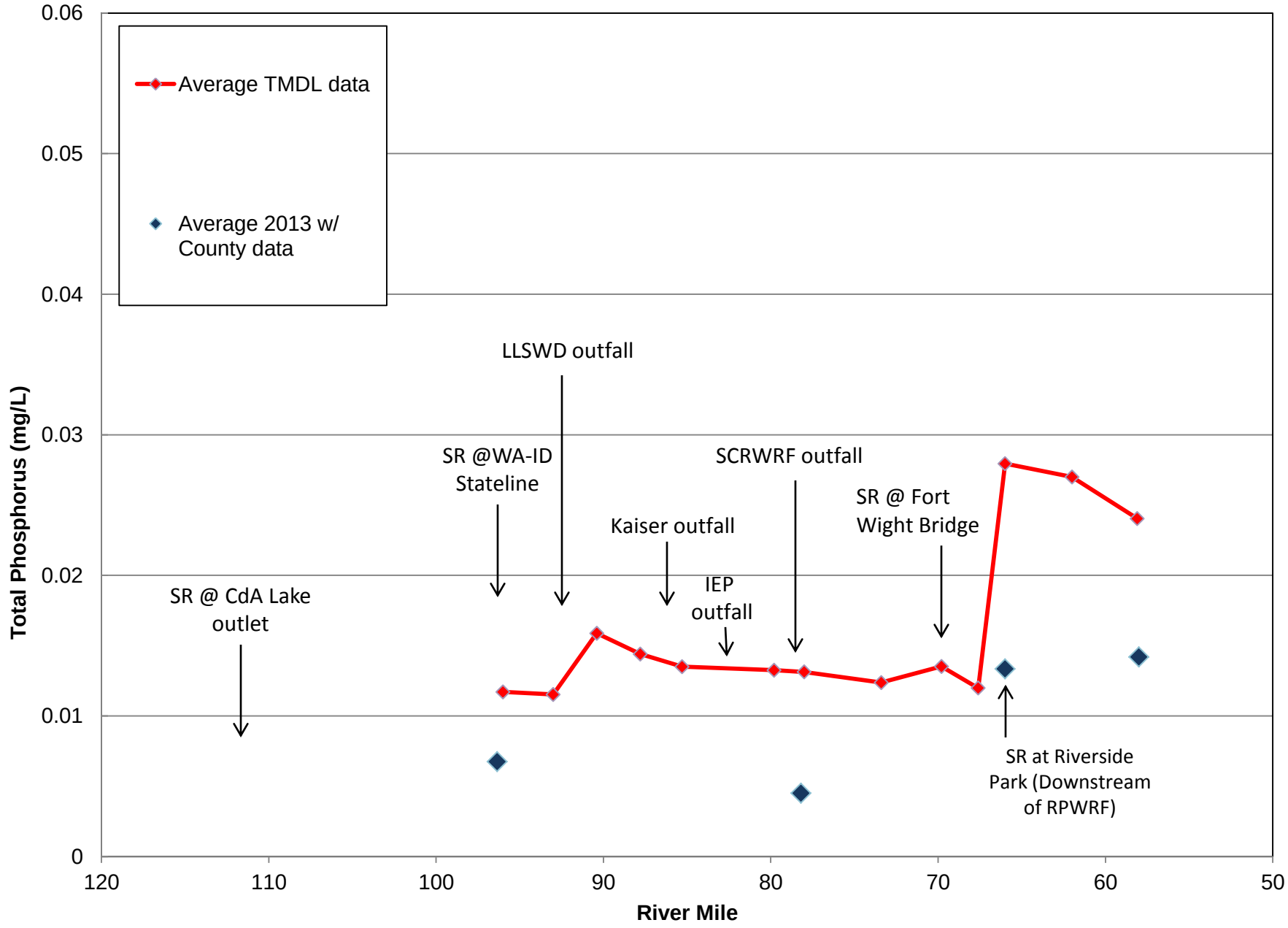
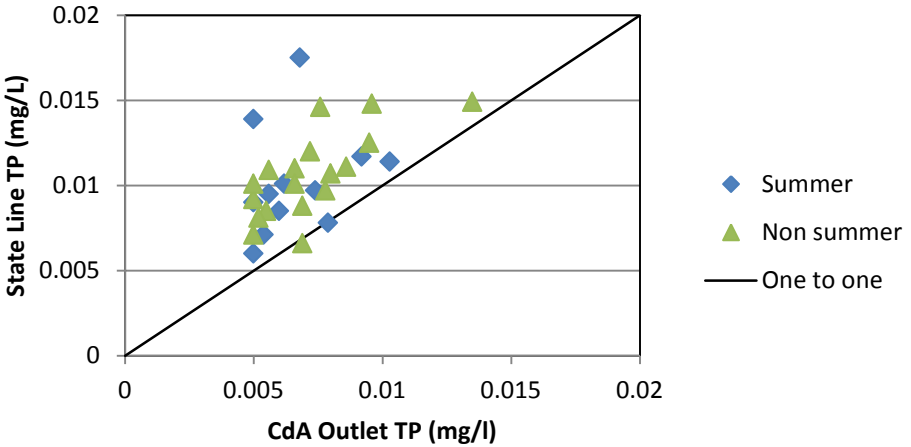


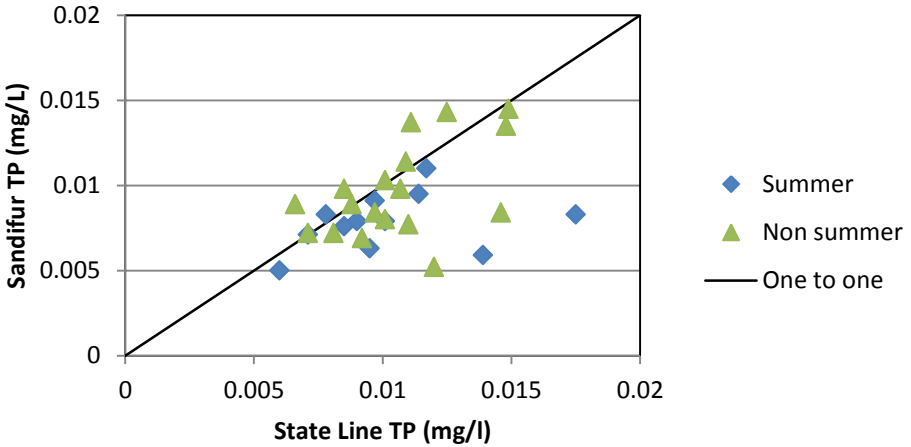
Apr 2008 thru Sep 2010

(summer=June thru Sep)

CdA Outlet versus State Line



State Line versus Sandifur



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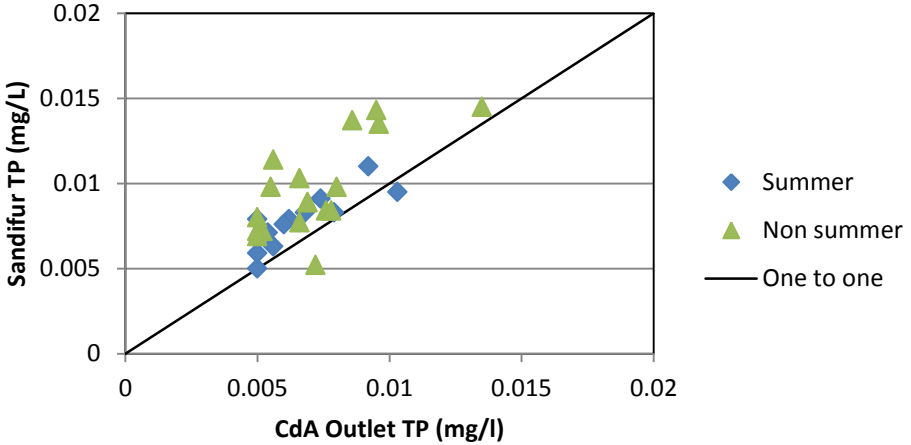

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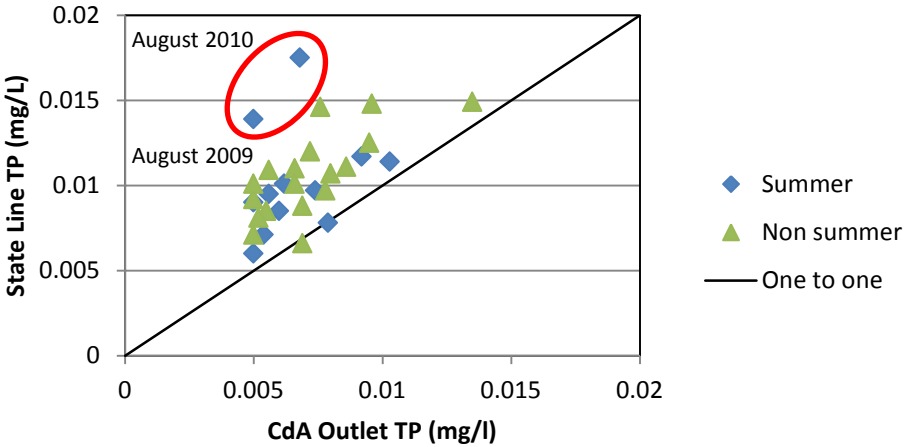

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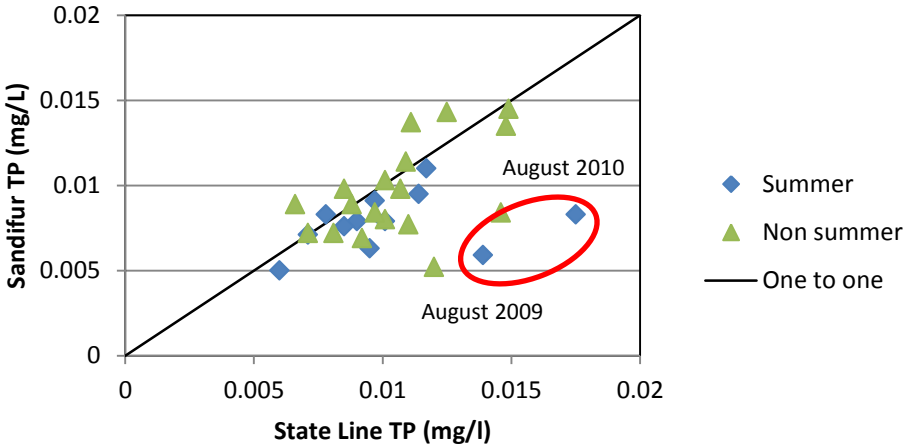

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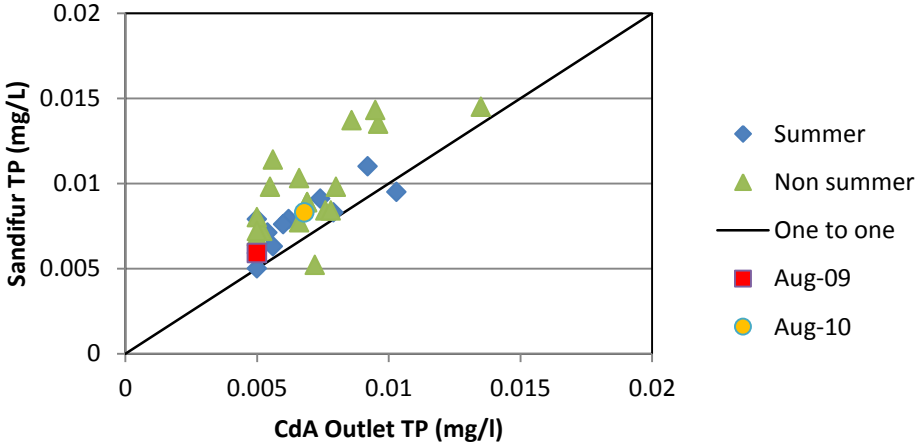

Observations

- Summer phosphorus concentrations in the Spokane River have declined since the 1970s
- Recent summer phosphorus concentrations in the Spokane River are relatively low
  - Average TP Concentration at Fort Wright Bridge, Aug & Sep (2009 and 2010): **0.0076 mg/l**
- TP concentrations generally rise from CdA Lake to State Line & then decrease through City of Spokane before rising after RPWRF outfall
  - Groundwater exchange a key factor in decline
- Regional efforts to reduce phosphorus loads may be having a beneficial impact