

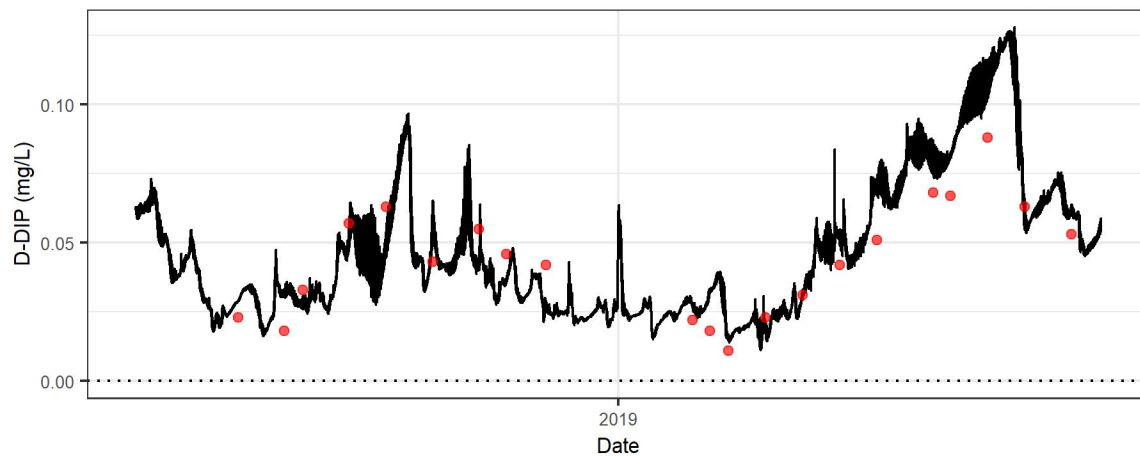
## Appendix F: Model to Data Comparisons

### Appendix F-3: Boat-run data (Time Series, 1-to-1, and CFD)

This appendix is in connection with Section 4.4.1 in the main report – Comparisons to DRBC Boat Run data. Model comparisons to Boat Run data were investigated using time series plots, 1-to-1 plots, cumulative frequency distributions, and statistical metrics for individual Boat Run stations. This appendix presents the comparisons at three stations within the urban area of the Delaware Estuary: Ben Franklin Bridge (RM 100.2), Paulsboro (RM 87.9), and Marcus Hook (RM 78.1).

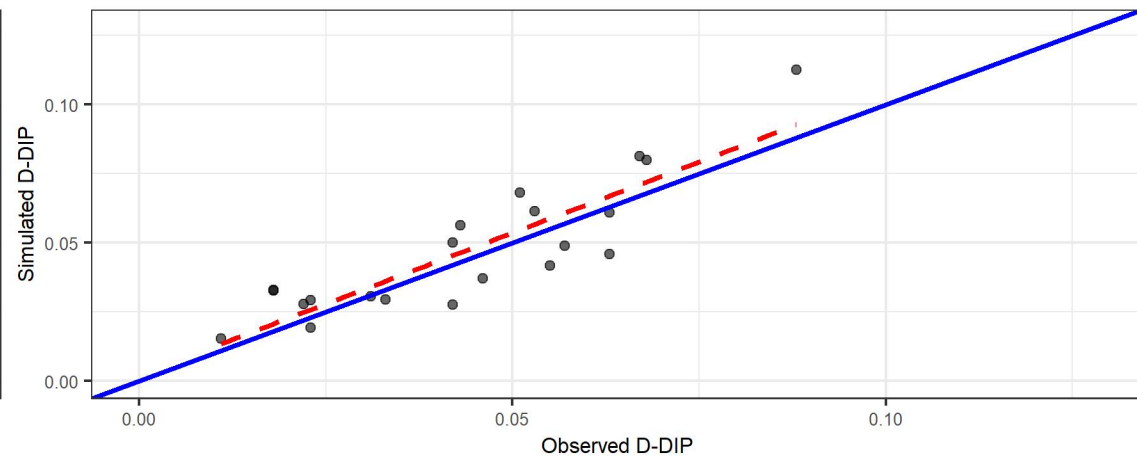
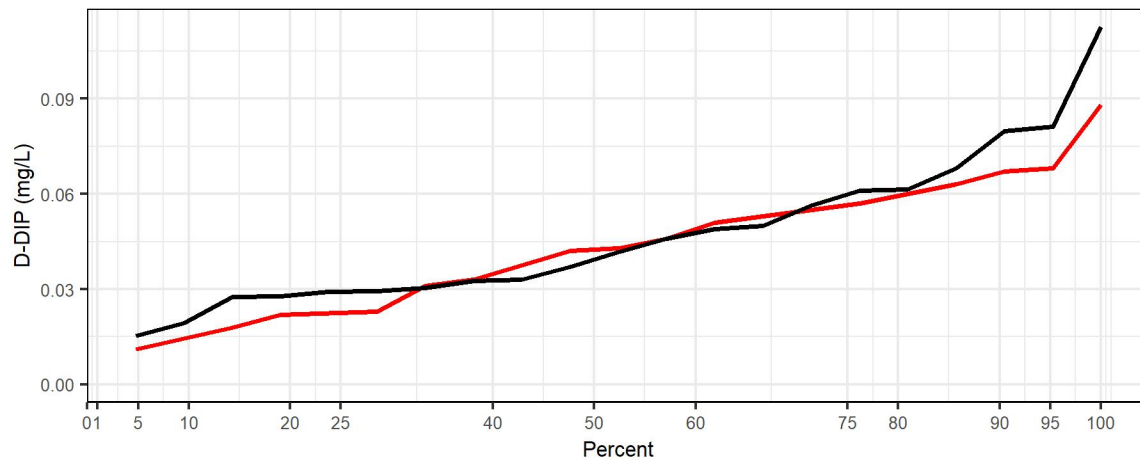
# Benjamin Franklin Bridge (RM 100.2)

Parameter: D-DIP



Remark Code    ● Accepted

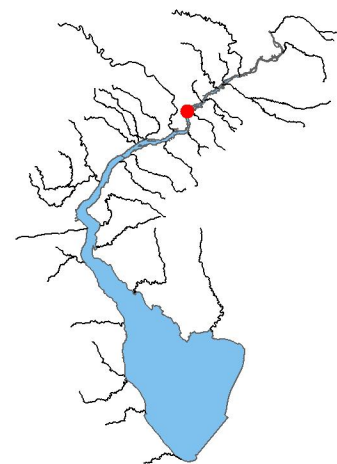
— Obs    — Sim



— 1:1    - - Linear Regression

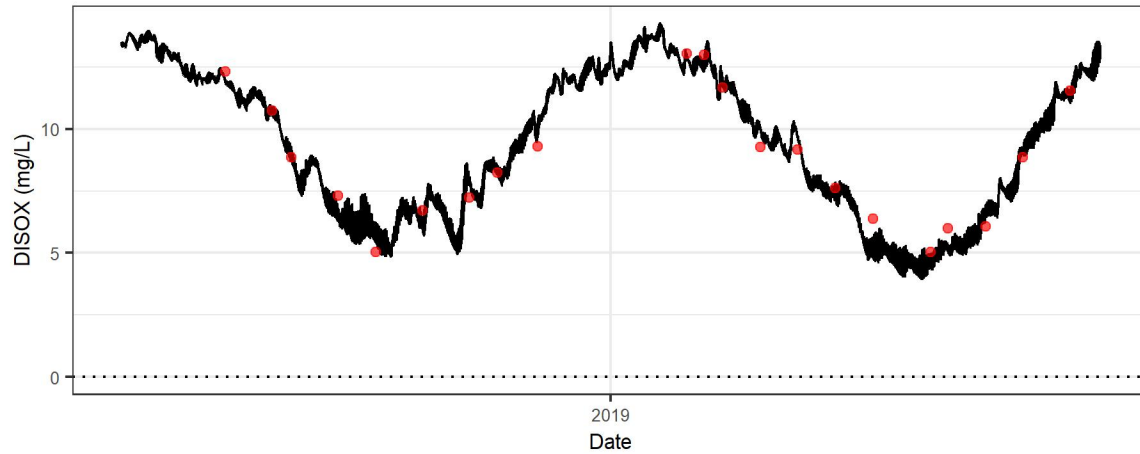
Dataset	10%	20%	50%	80%	90%	Average
OBS	0.02	0.02	0.04	0.06	0.07	0.044
SIM	0.03	0.03	0.04	0.06	0.08	0.047

GoF Metric	Value
Num Obs	21.0000
R2	0.7657
NSE	0.6465
RMSE	0.0118
NRMSE %	15.3000
d	0.9213



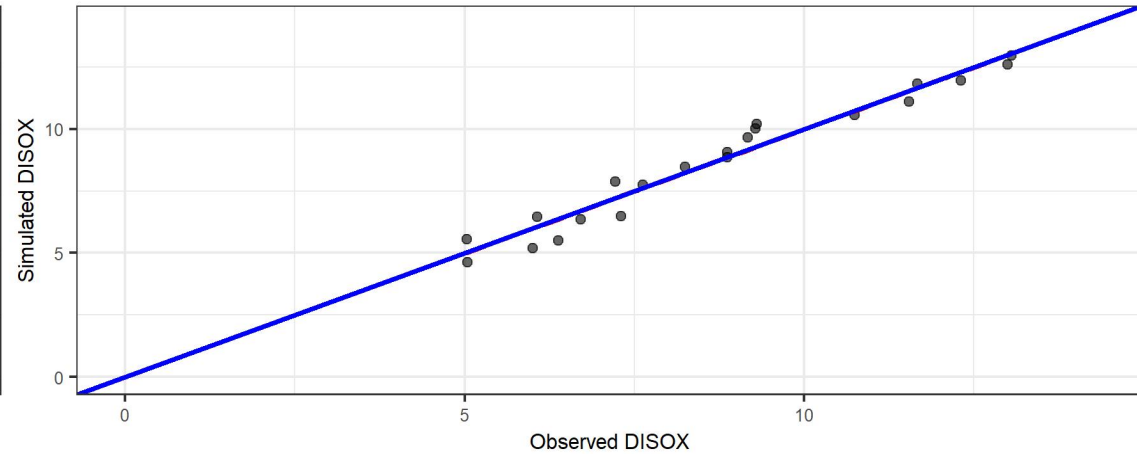
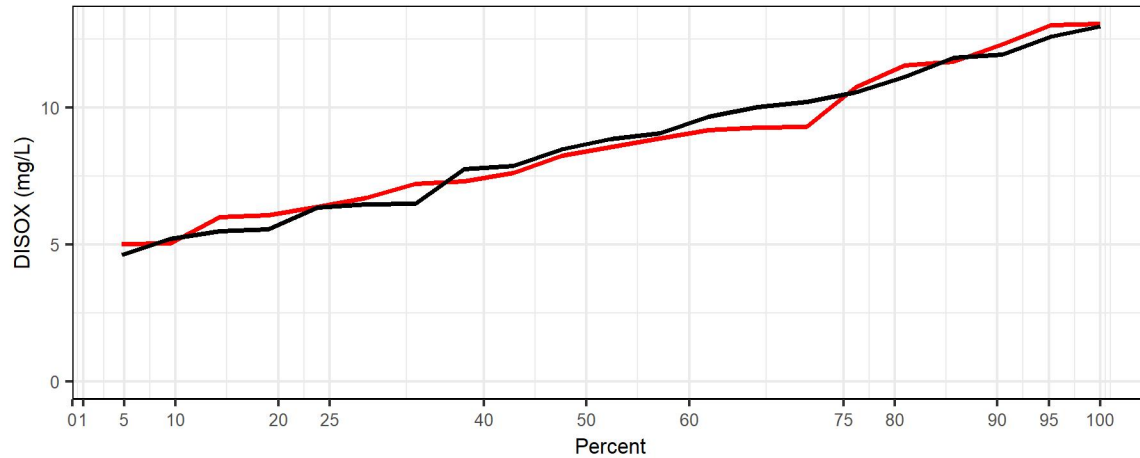
# Benjamin Franklin Bridge (RM 100.2)

Parameter: DISOX



Remark Code • Accepted

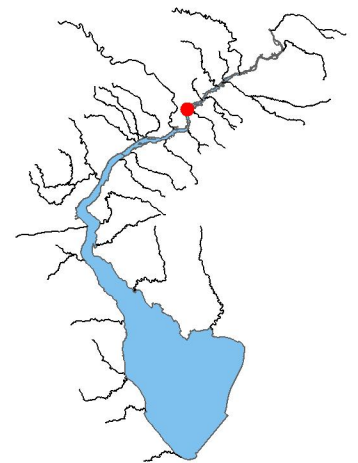
— Obs — Sim



— 1:1 - - Linear Regression

Dataset	10%	20%	50%	80%	90%	Average
OBS	6.0	6.38	8.87	11.55	12.31	8.735
SIM	5.5	6.35	8.86	11.11	11.94	8.720

GoF Metric	Value
Num Obs	21.0000
R2	0.9588
NSE	0.9569
RMSE	0.5132
NRMSE %	6.4000
d	0.9893



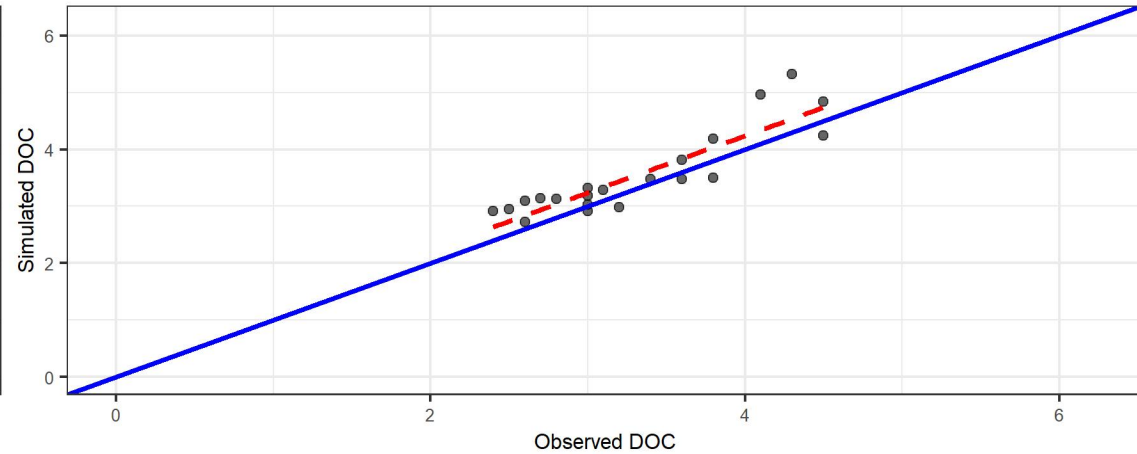
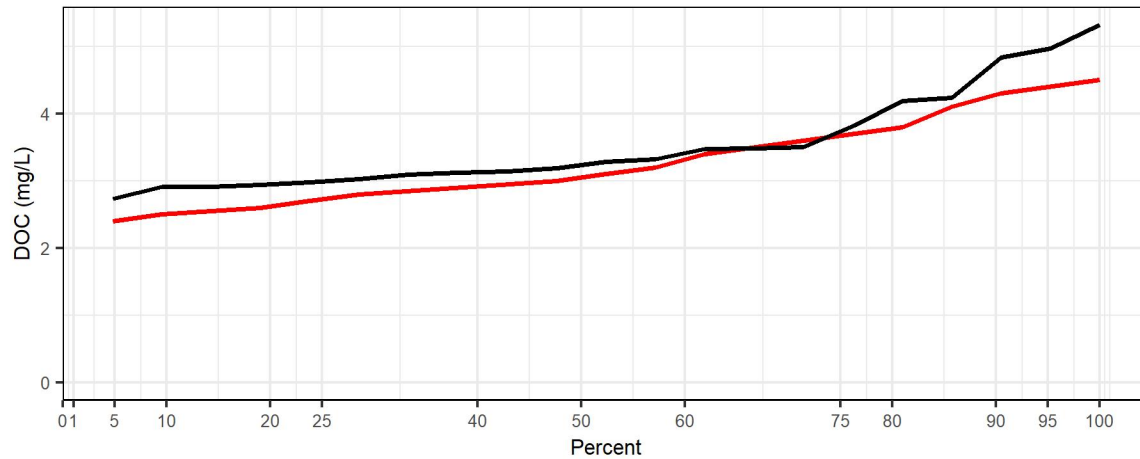
# Benjamin Franklin Bridge (RM 100.2)

Parameter: DOC



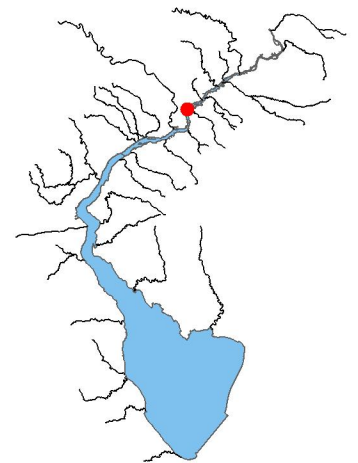
Remark Code • Accepted

— Obs — Sim



Dataset	10%	20%	50%	80%	90%	Average
OBS	2.60	2.70	3.10	3.80	4.30	3.310
SIM	2.91	2.98	3.29	4.19	4.84	3.547

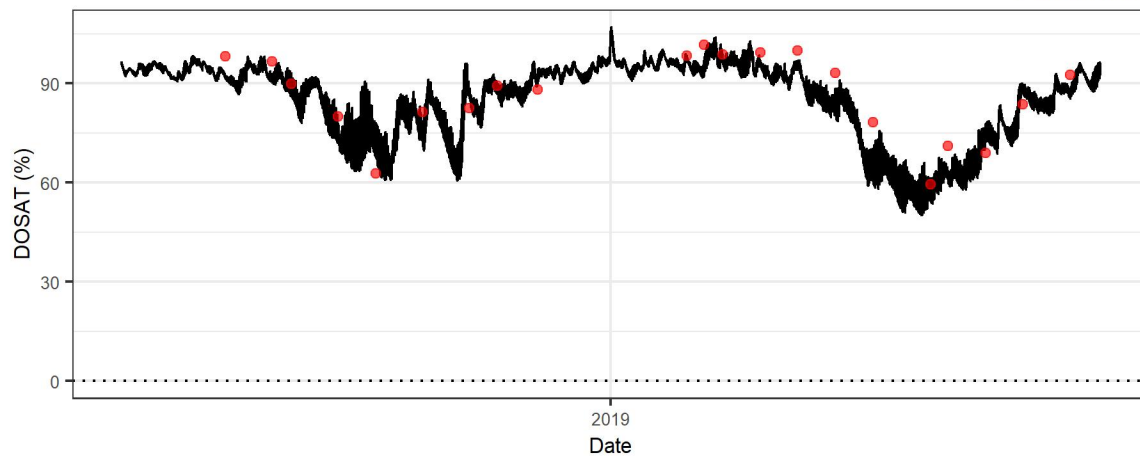
GoF Metric	Value
Num Obs	21.0000
R2	0.7873
NSE	0.5924
RMSE	0.4099
NRMSE %	19.5000
d	0.9076





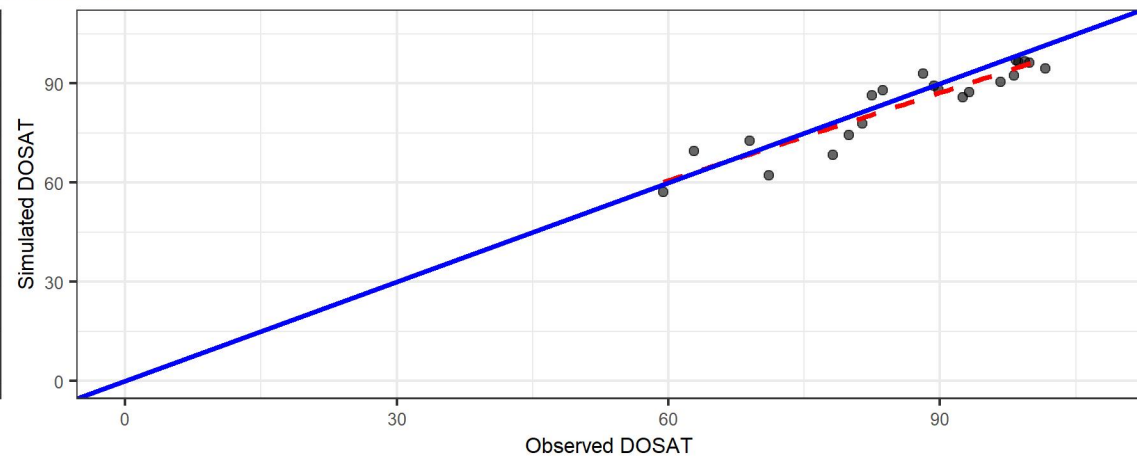
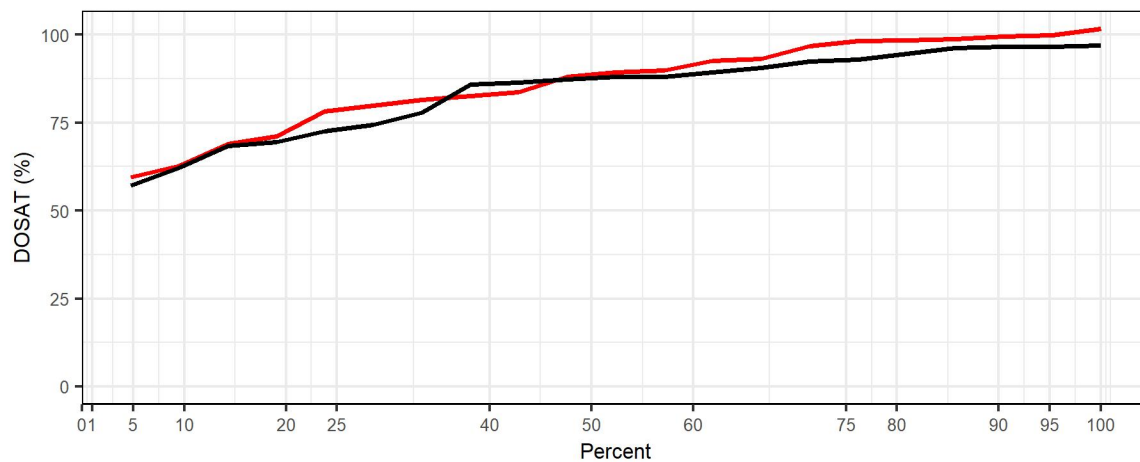
# Benjamin Franklin Bridge (RM 100.2)

Parameter: DOSAT



Remark Code • Accepted

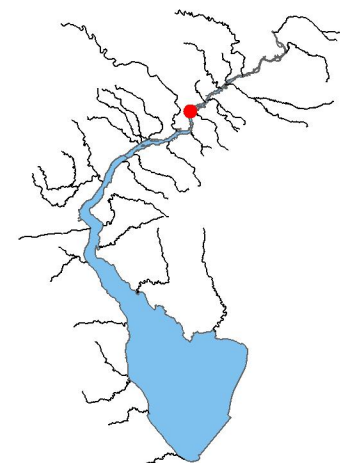
— Obs — Sim



— 1:1 - - Linear Regression

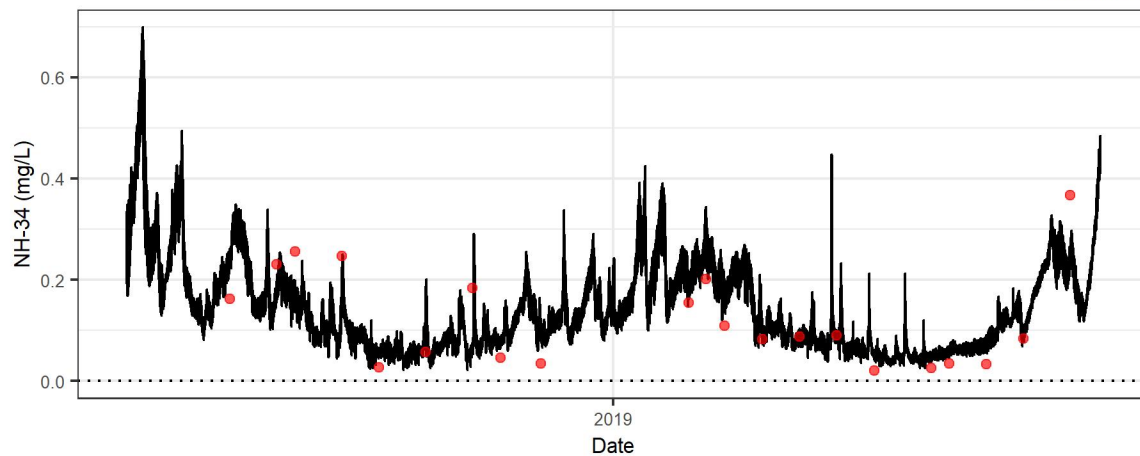
Dataset	10%	20%	50%	80%	90%	Average
OBS	69.00	78.20	89.3	98.40	99.4	86.371
SIM	68.38	72.65	88.0	94.59	96.5	83.976

GoF Metric	Value
Num Obs	21.0000
R2	0.8599
NSE	0.8216
RMSE	5.2206
NRMSE %	12.4000
d	0.9522



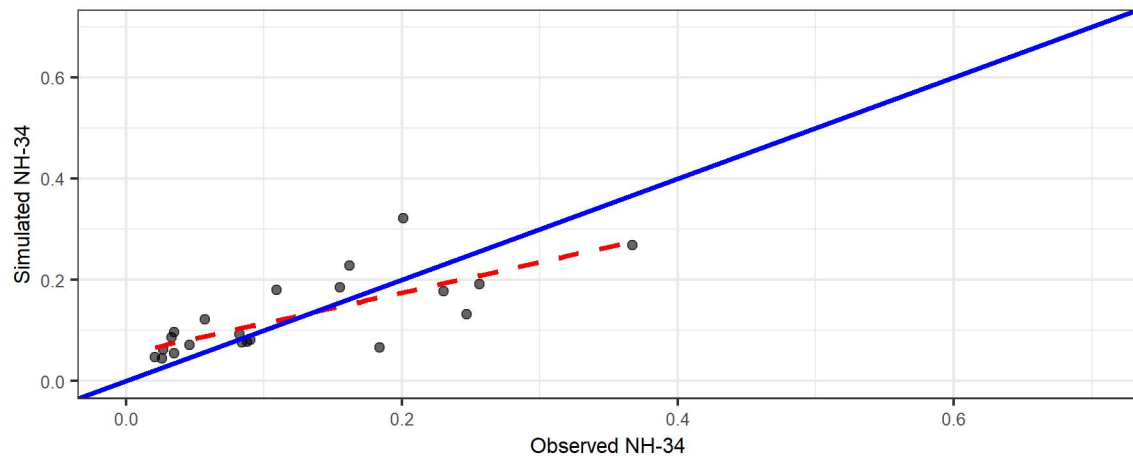
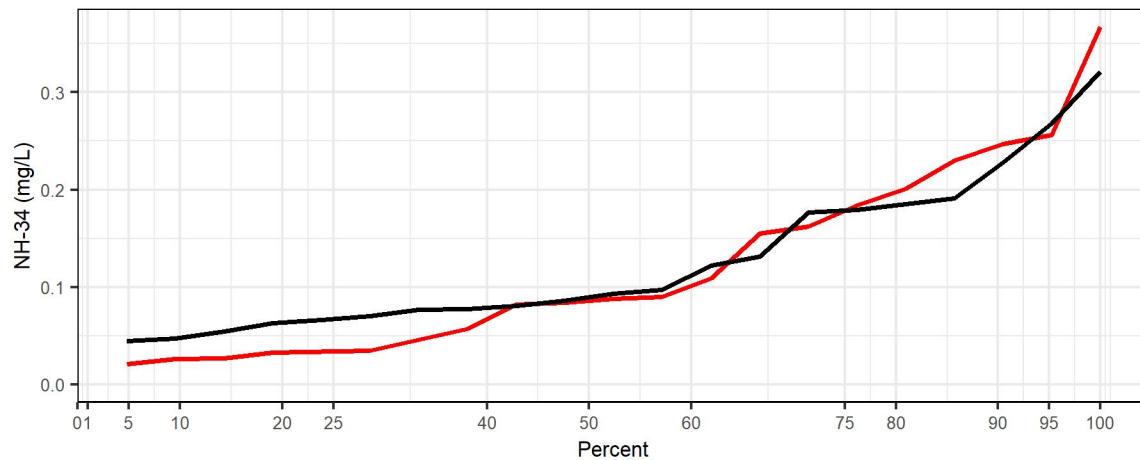
# Benjamin Franklin Bridge (RM 100.2)

Parameter: NH-34



Remark Code • Accepted

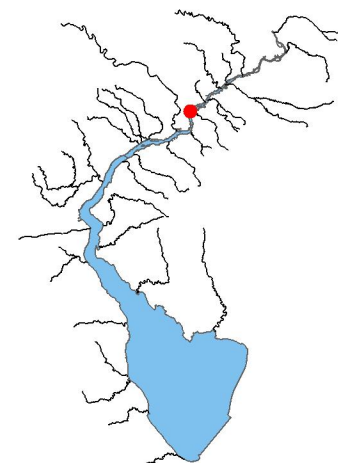
— Obs — Sim



— 1:1 - - Linear Regression

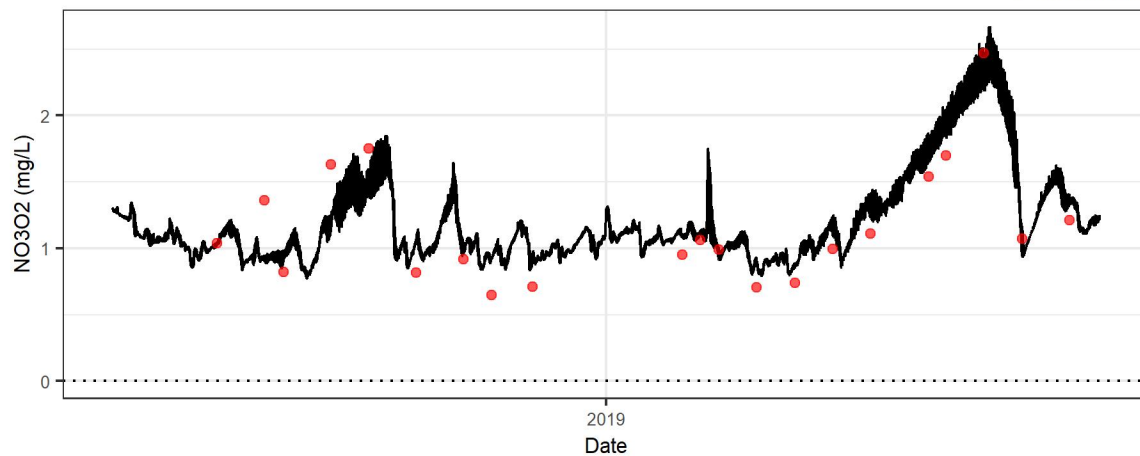
Dataset	10%	20%	50%	80%	90%	Average
OBS	0.03	0.04	0.09	0.20	0.25	0.121
SIM	0.05	0.07	0.09	0.19	0.23	0.127

GoF Metric	Value
Num Obs	21.0000
R2	0.5571
NSE	0.5492
RMSE	0.0630
NRMSE %	18.2000
d	0.8475



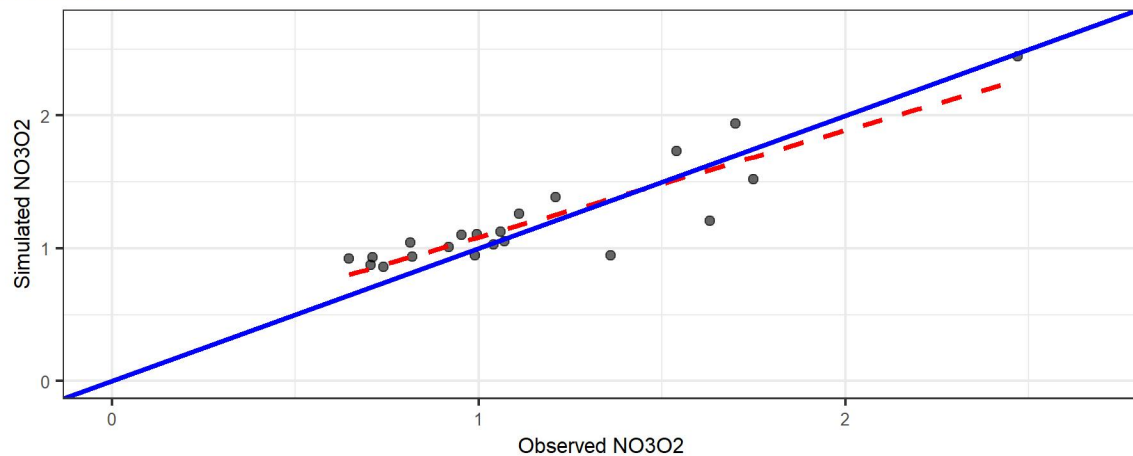
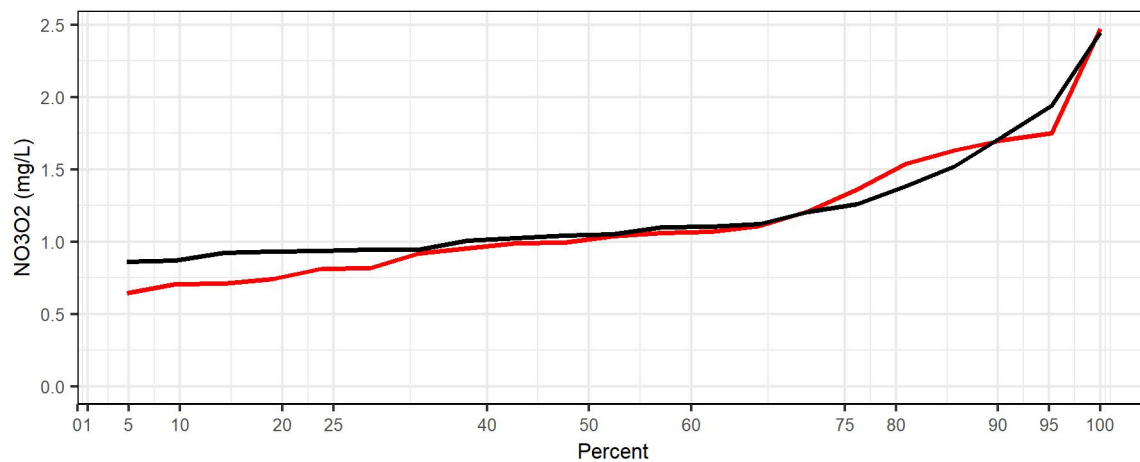
# Benjamin Franklin Bridge (RM 100.2)

Parameter: NO3O2



Remark Code • Accepted

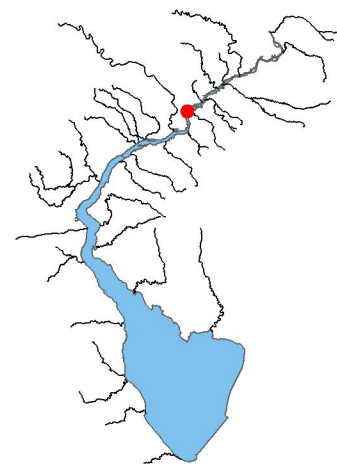
— Obs — Sim



— 1:1 - - Linear Regression

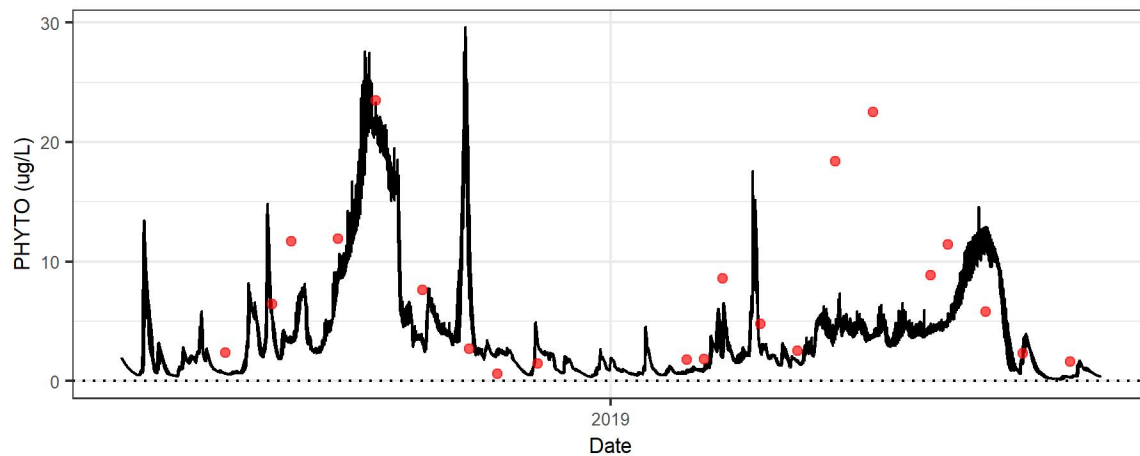
Dataset	10%	20%	50%	80%	90%	Average
OBS	0.71	0.81	1.04	1.54	1.70	1.154
SIM	0.92	0.94	1.05	1.38	1.73	1.208

GoF Metric	Value
Num Obs	21.0000
R2	0.8085
NSE	0.7933
RMSE	0.1994
NRMSE %	10.9000
d	0.9404



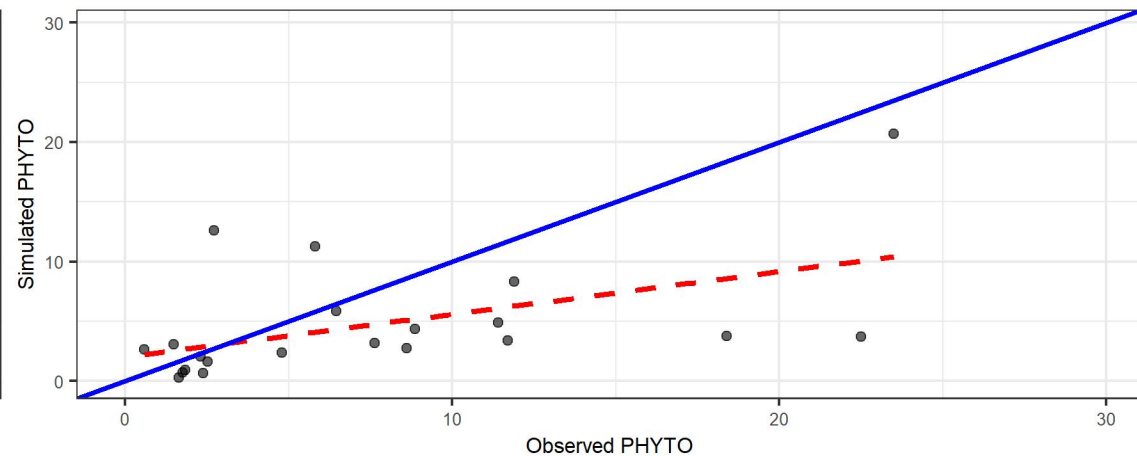
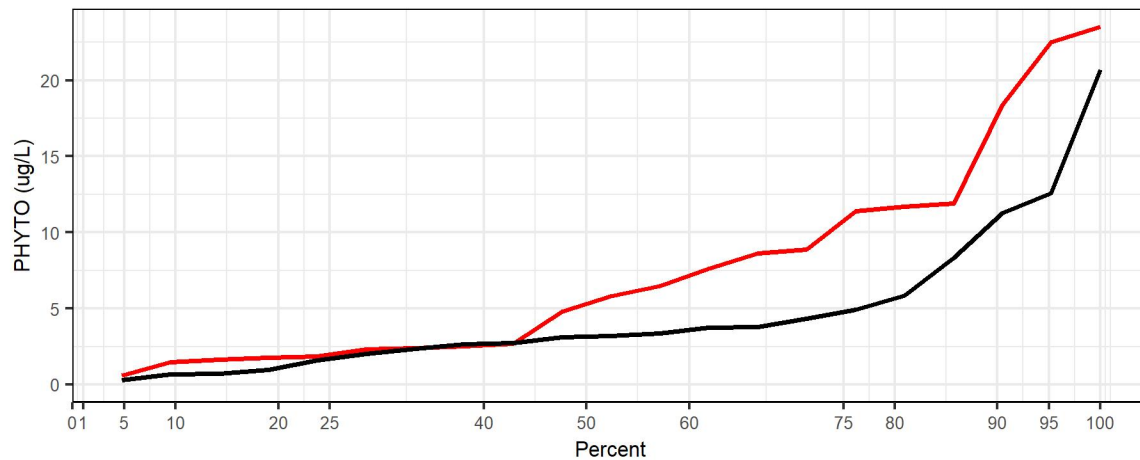
# Benjamin Franklin Bridge (RM 100.2)

Parameter: PHYTO



Remark Code    ● Accepted

— Obs    — Sim



**Dataset**   **10%**   **20%**   **50%**   **80%**   **90%**   **Average**

OBS    1.64   1.83   5.81   11.70   18.40   7.561

SIM    0.70   1.61   3.20   5.83   11.25   4.718

**GoF Metric**   **Value**

Num Obs    21.0000

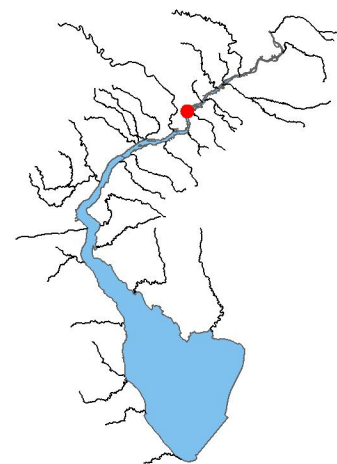
R2    0.2531

NSE    0.0318

RMSE    6.6205

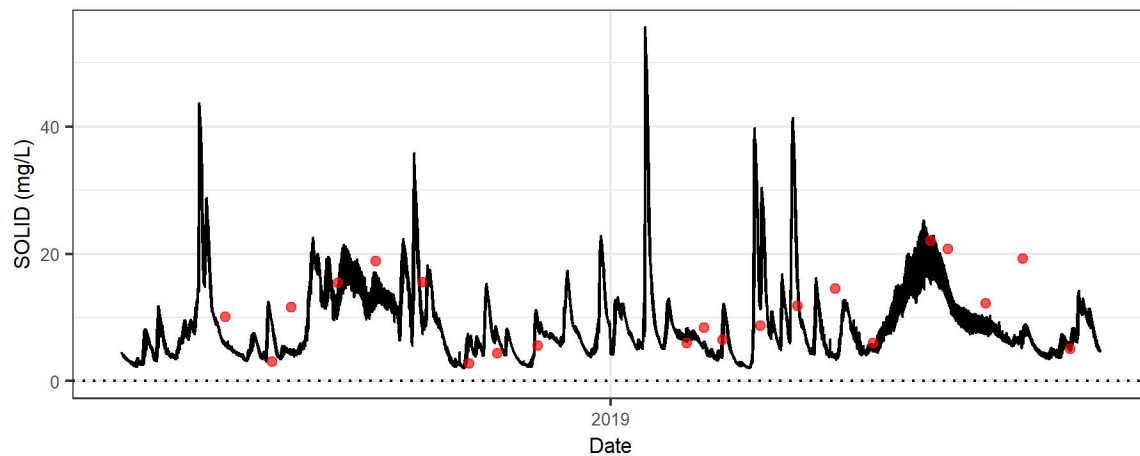
NRMSE %    28.9000

d    0.6873



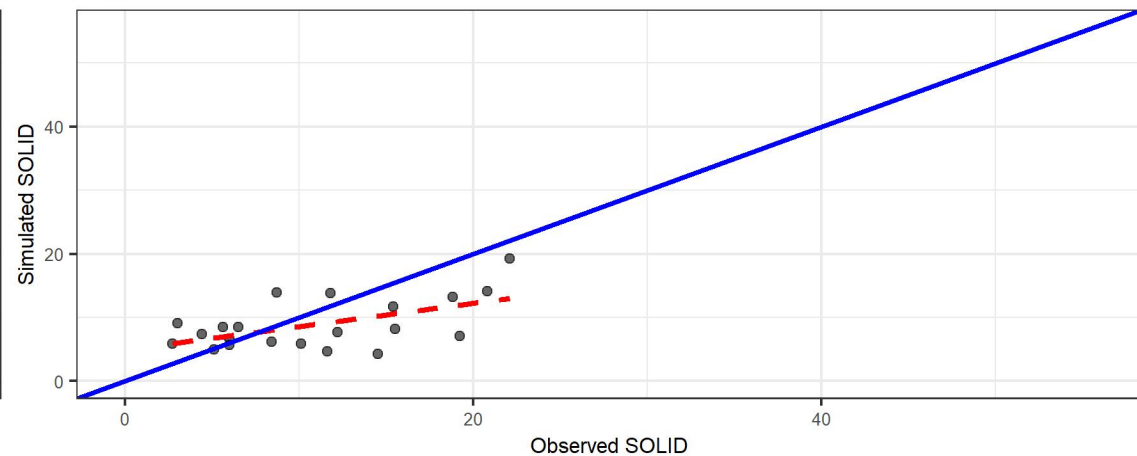
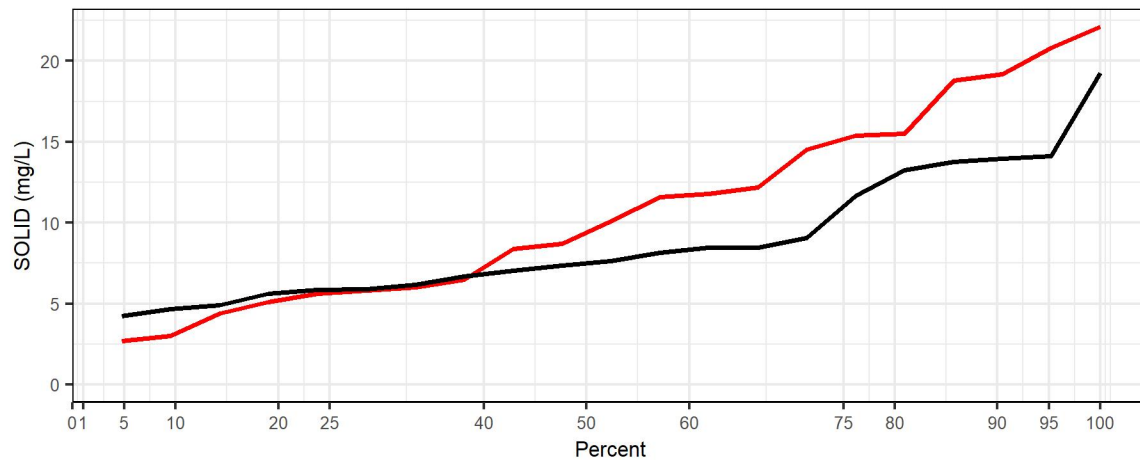
# Benjamin Franklin Bridge (RM 100.2)

Parameter: SOLID



Remark Code • Accepted

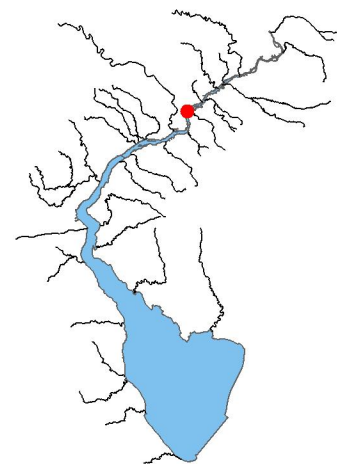
— Obs — Sim



— 1:1 - - Linear Regression

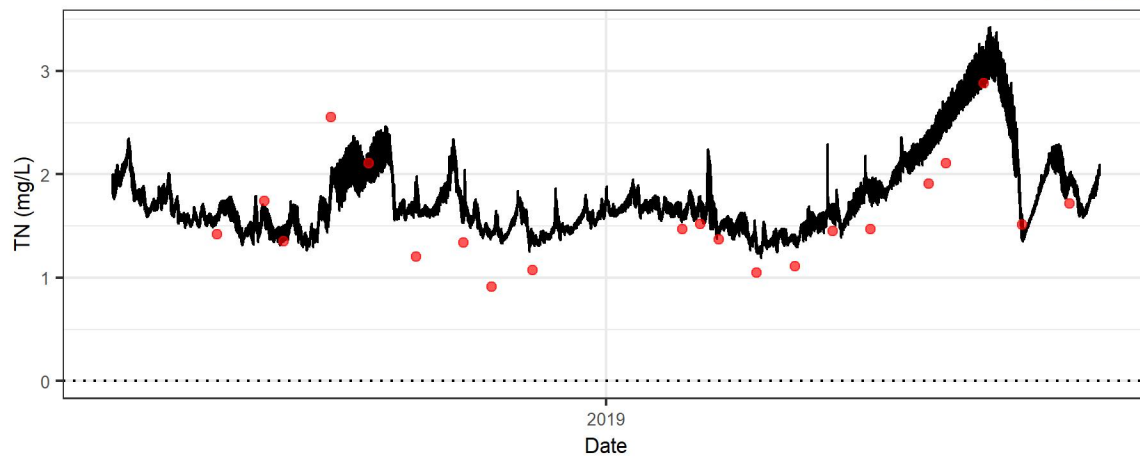
Dataset	10%	20%	50%	80%	90%	Average
OBS	4.40	5.60	10.10	15.50	19.20	10.876
SIM	4.91	5.87	7.65	13.24	13.96	8.869

GoF Metric	Value
Num Obs	21.0000
R2	0.3070
NSE	0.1791
RMSE	5.3229
NRMSE %	27.4000
d	0.7012



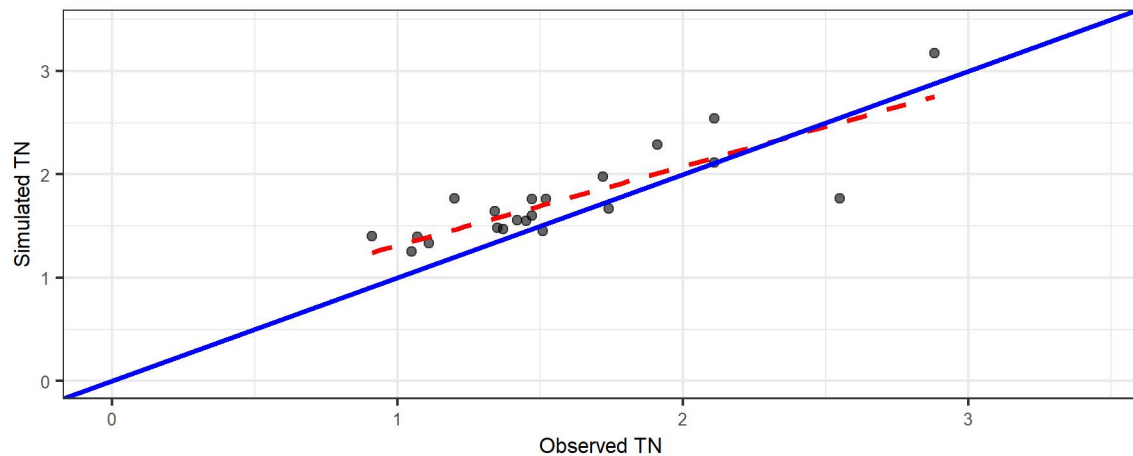
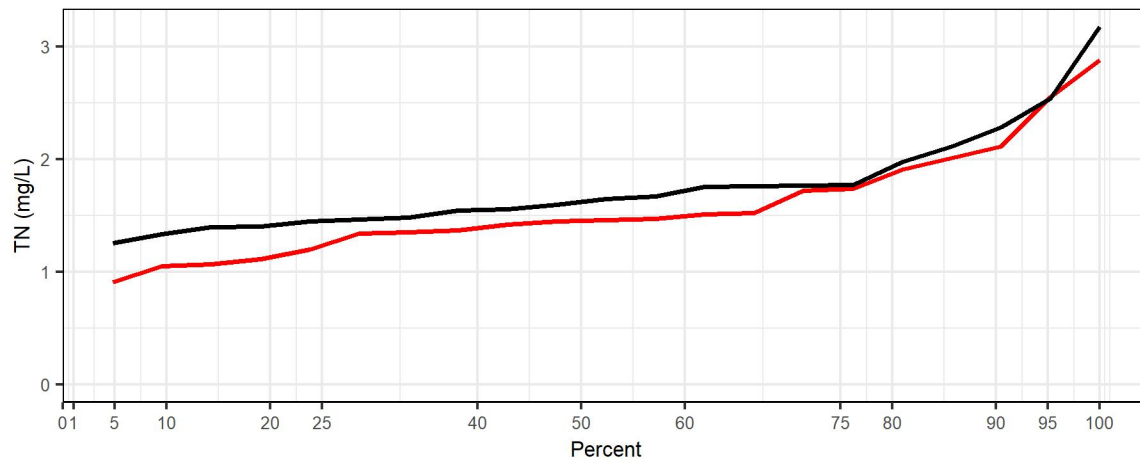
# Benjamin Franklin Bridge (RM 100.2)

Parameter: TN



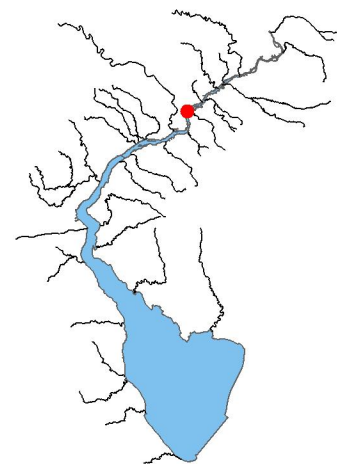
Remark Code • Accepted

— Obs — Sim



Dataset	10%	20%	50%	80%	90%	Average
OBS	1.07	1.20	1.47	1.91	2.11	1.584
SIM	1.40	1.45	1.65	1.98	2.28	1.759

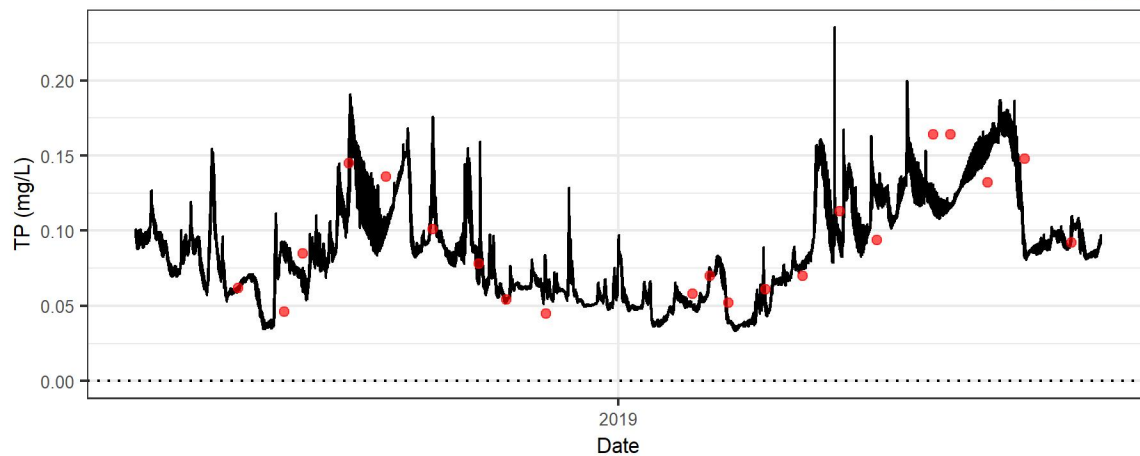
GoF Metric	Value
Num Obs	21.0000
R2	0.6984
NSE	0.5609
RMSE	0.3211
NRMSE %	16.3000
d	0.8780





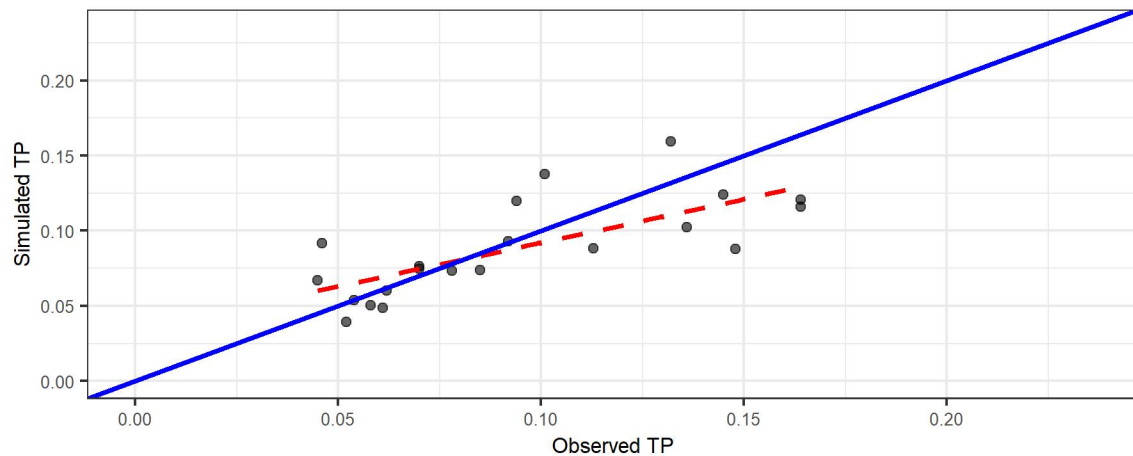
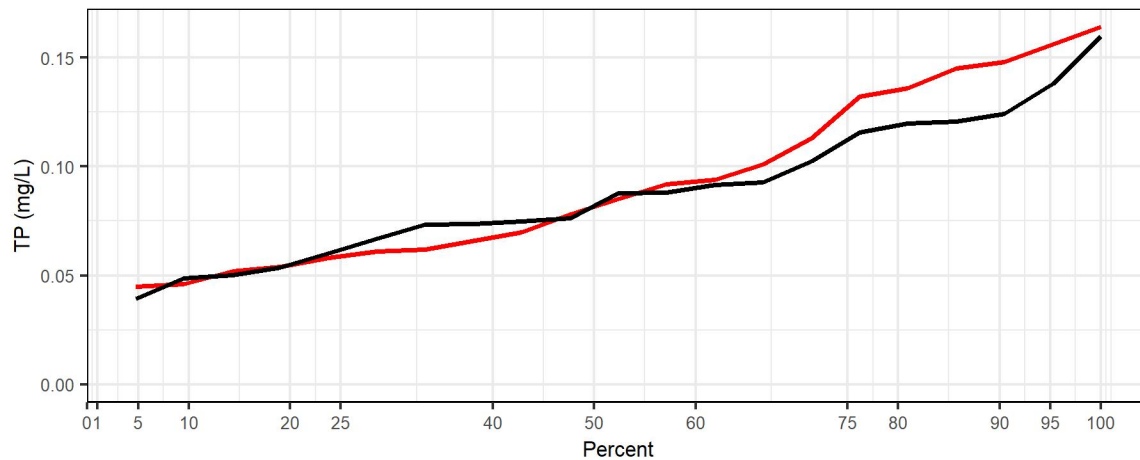
# Benjamin Franklin Bridge (RM 100.2)

Parameter: TP



Remark Code    ● Accepted

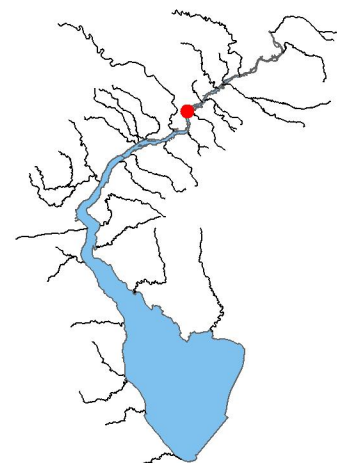
— Obs    — Sim



— 1:1    - - Linear Regression

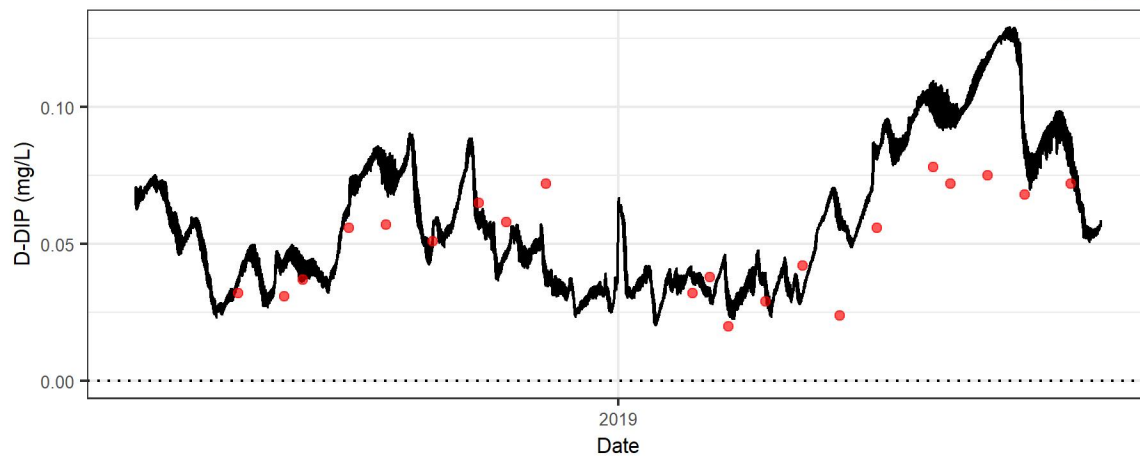
Dataset	10%	20%	50%	80%	90%	Average
OBS	0.05	0.06	0.09	0.14	0.15	0.094
SIM	0.05	0.06	0.09	0.12	0.12	0.088

GoF Metric	Value
Num Obs	21.0000
R2	0.5246
NSE	0.4996
RMSE	0.0276
NRMSE %	23.2000
d	0.8261



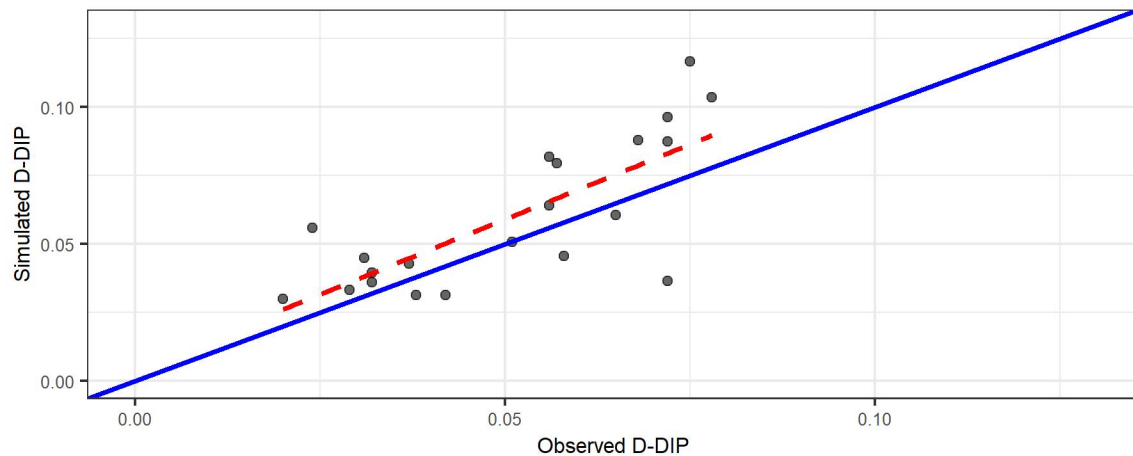
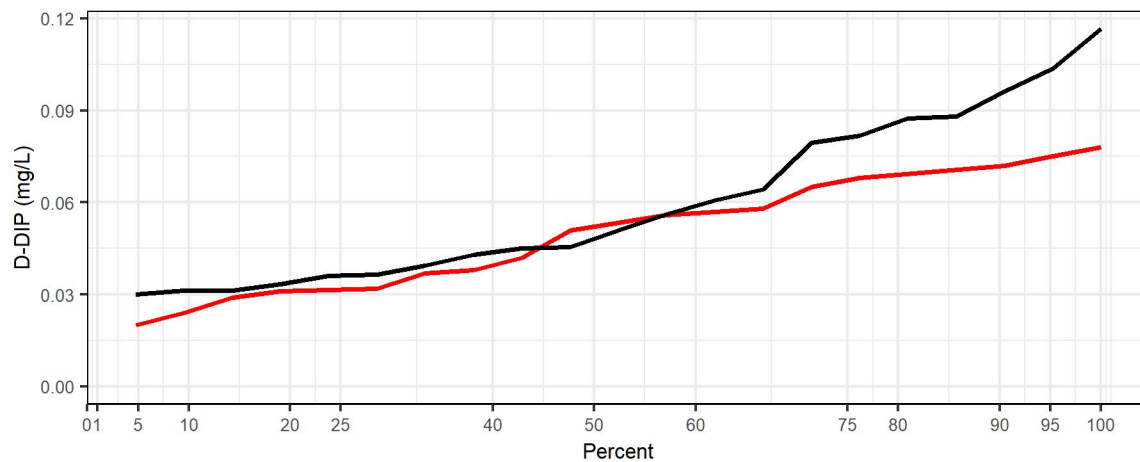
# Paulsboro (RM 87.9)

Parameter: D-DIP



Remark Code    ● Accepted

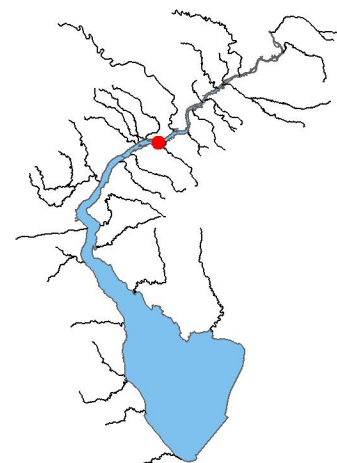
— Obs    — Sim



— 1:1    - - Linear Regression

Dataset	10%	20%	50%	80%	90%	Average
OBS	0.03	0.03	0.06	0.07	0.07	0.051
SIM	0.03	0.04	0.05	0.09	0.10	0.060

GoF Metric	Value
Num Obs	21.0000
R2	0.5794
NSE	-0.1283
RMSE	0.0194
NRMSE %	33.4000
d	0.8049

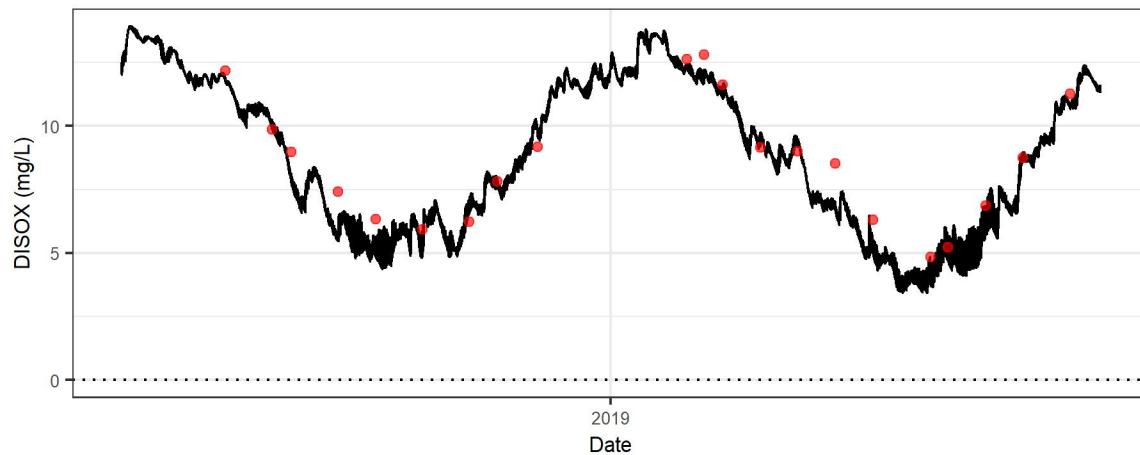


(Calib Station: 31DELRBC-WQX-332052; WASP Seg: 1087)



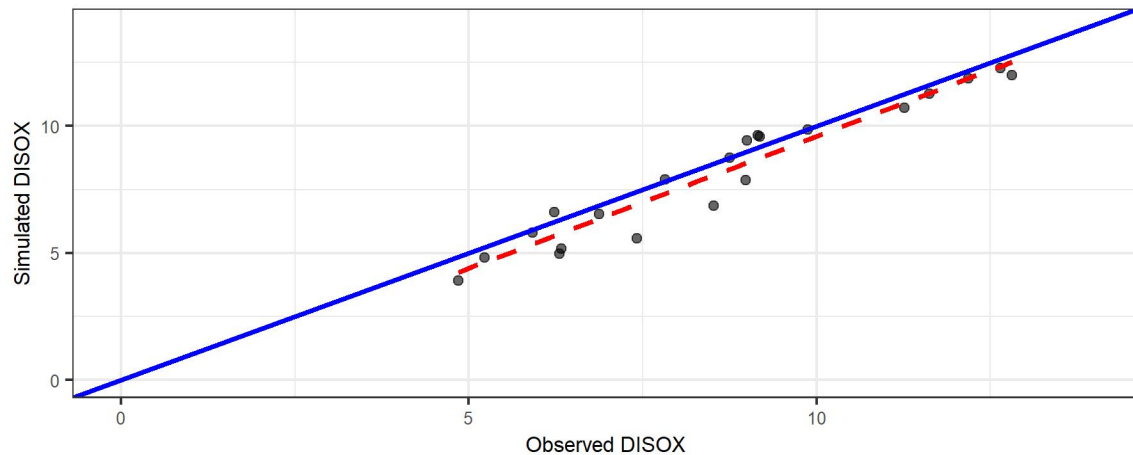
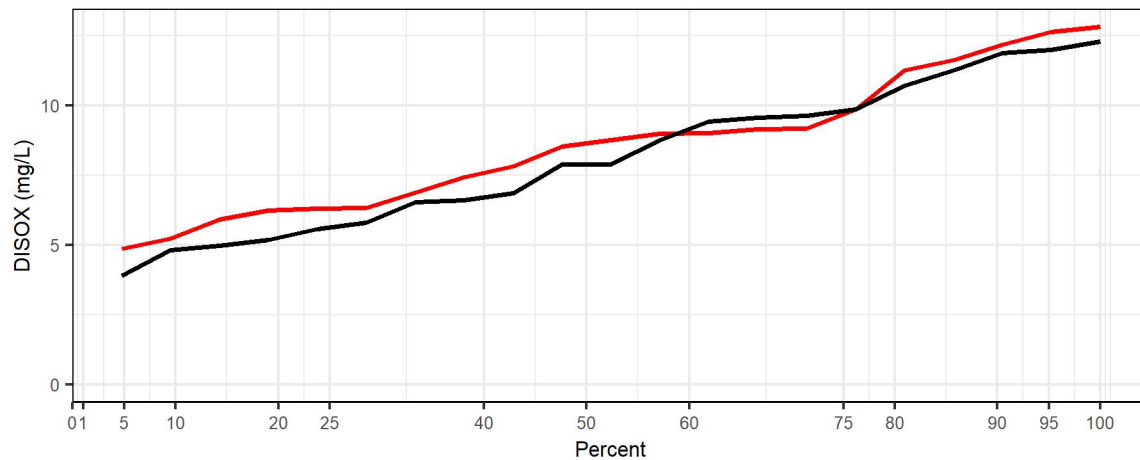
# Paulsboro (RM 87.9)

Parameter: DISOX



Remark Code • Accepted

— Obs — Sim



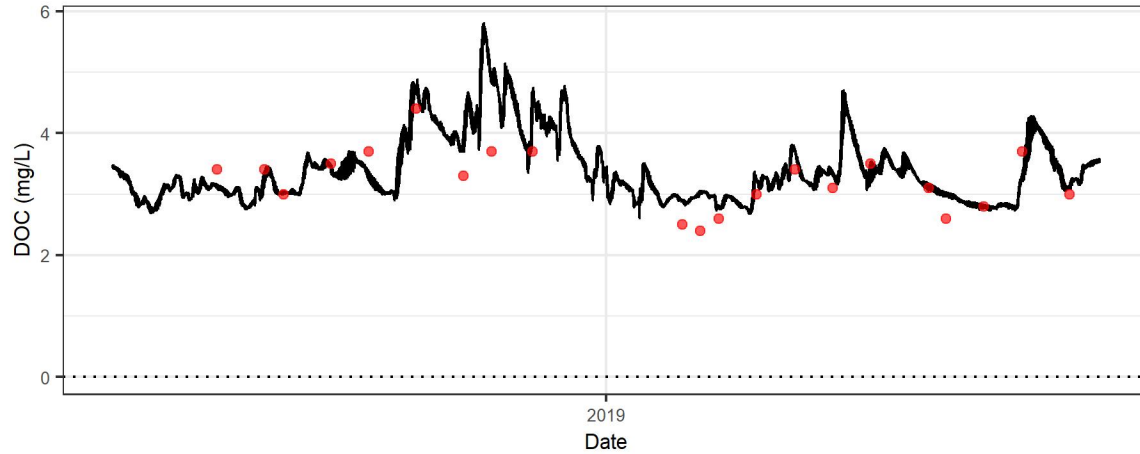
Dataset	10%	20%	50%	80%	90%	Average
OBS	5.92	6.30	8.75	11.26	12.18	8.616
SIM	4.97	5.58	7.88	10.71	11.87	8.160

GoF Metric	Value
Num Obs	21.0000
R2	0.9340
NSE	0.8854
RMSE	0.8068
NRMSE %	10.1000
d	0.9732



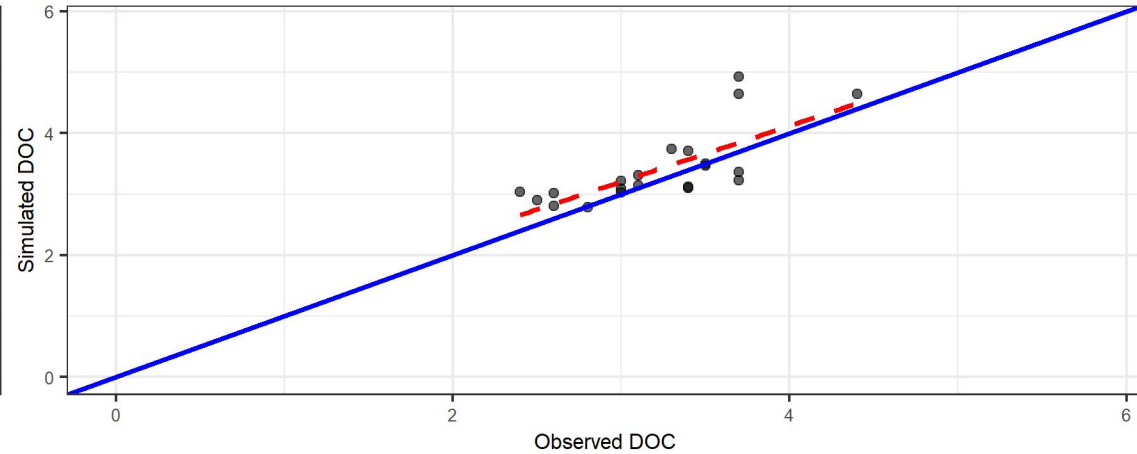
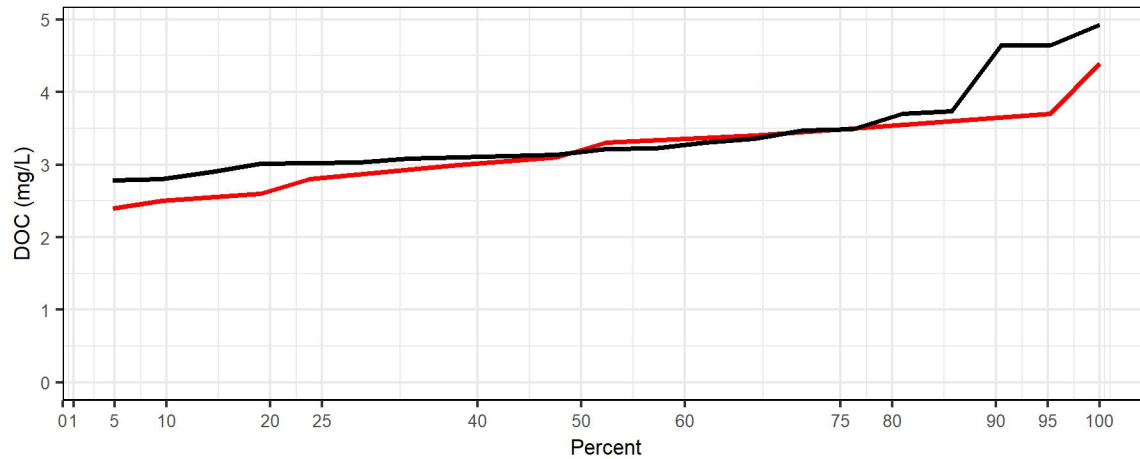
# Paulsboro (RM 87.9)

Parameter: DOC



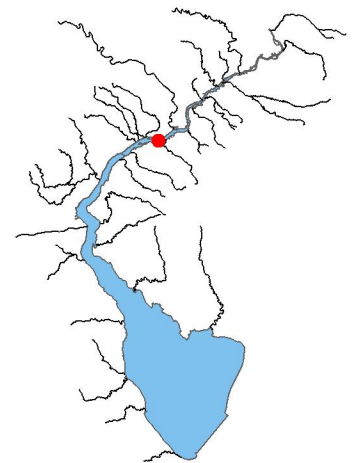
Remark Code • Accepted

— Obs — Sim



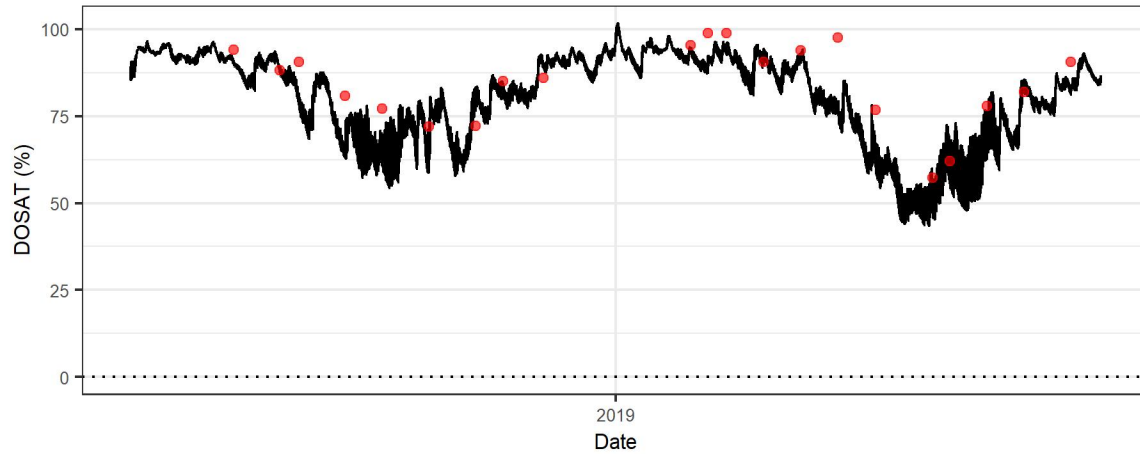
Dataset	10%	20%	50%	80%	90%	Average
OBS	2.6	2.80	3.30	3.7	3.70	3.229
SIM	2.9	3.02	3.21	3.7	4.64	3.416

GoF Metric	Value
Num Obs	21.0000
R2	0.5509
NSE	0.1592
RMSE	0.4422
NRMSE %	22.1000
d	0.8149



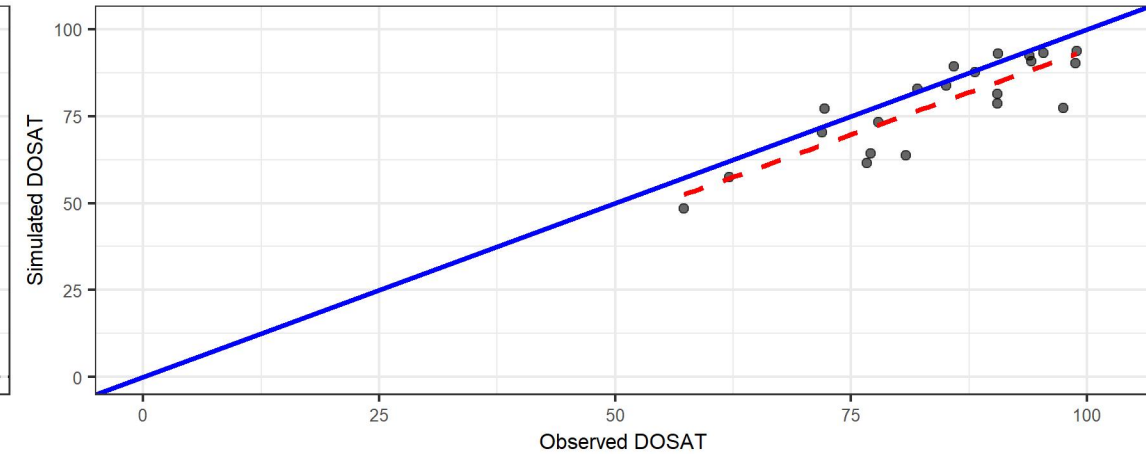
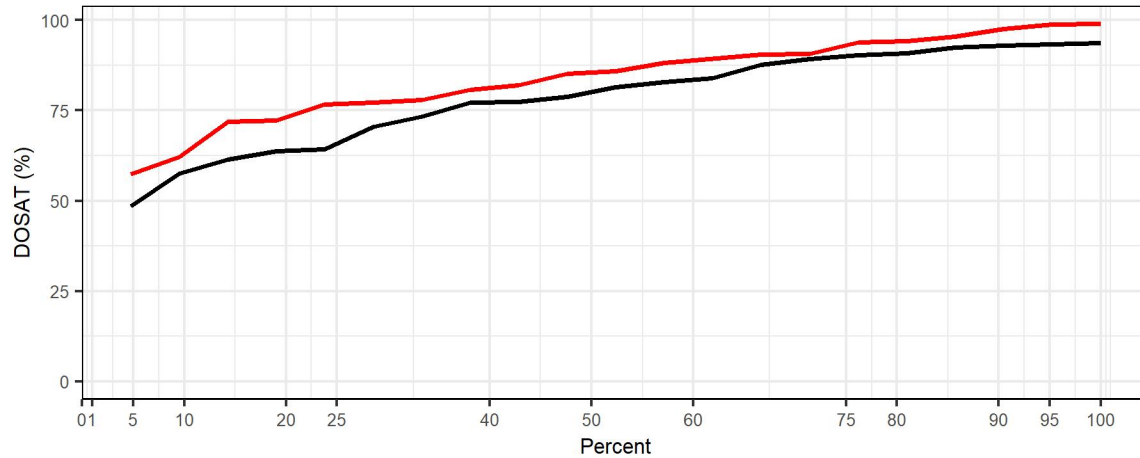
# Paulsboro (RM 87.9)

Parameter: DOSAT



Remark Code • Accepted

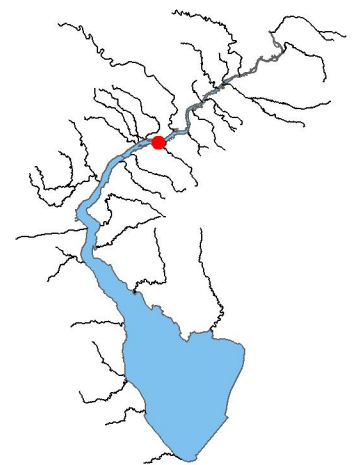
— Obs — Sim



— 1:1 - - Linear Regression

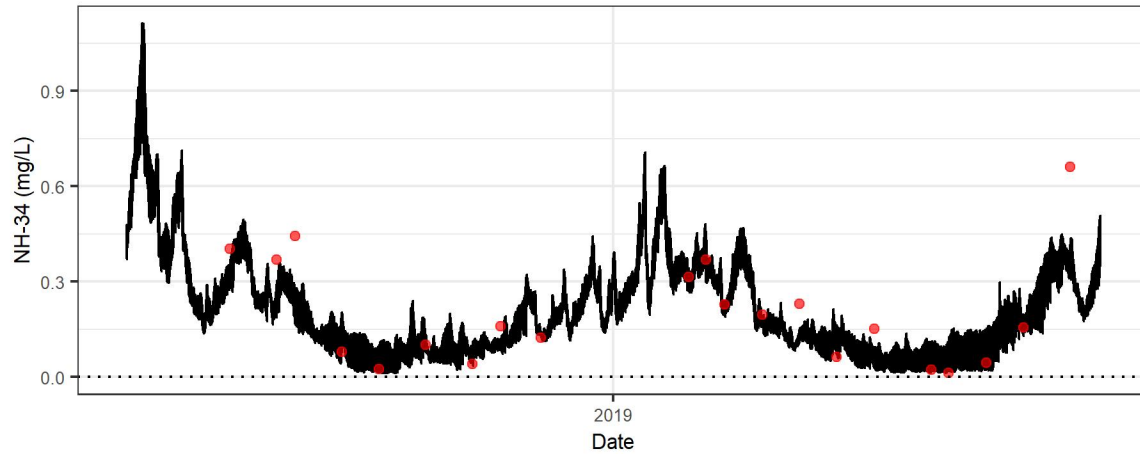
Dataset	10%	20%	50%	80%	90%	Average
OBS	71.90	76.70	85.9	94.1	97.50	84.157
SIM	61.49	64.29	81.4	90.8	92.91	78.599

GoF Metric	Value
Num Obs	21.0000
R2	0.7321
NSE	0.4147
RMSE	8.7273
NRMSE %	21.0000
d	0.8753



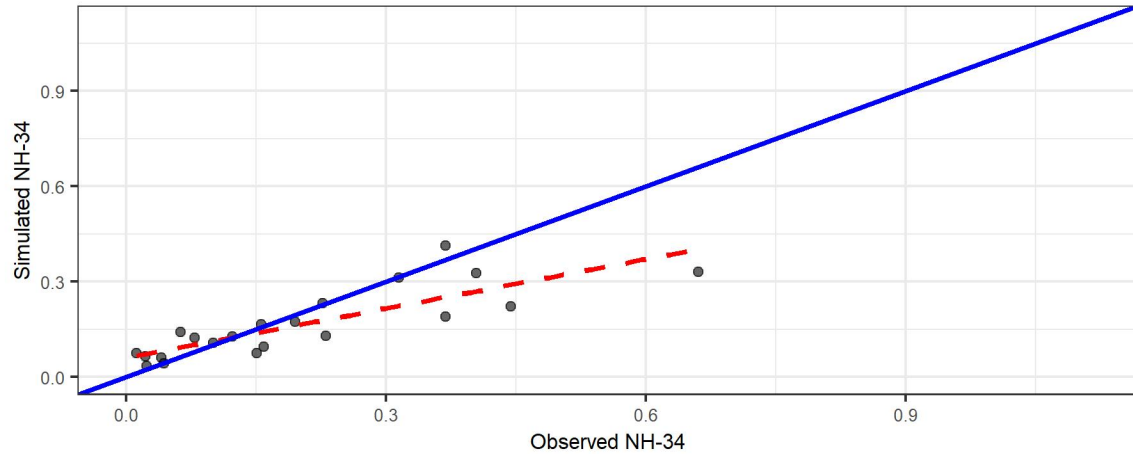
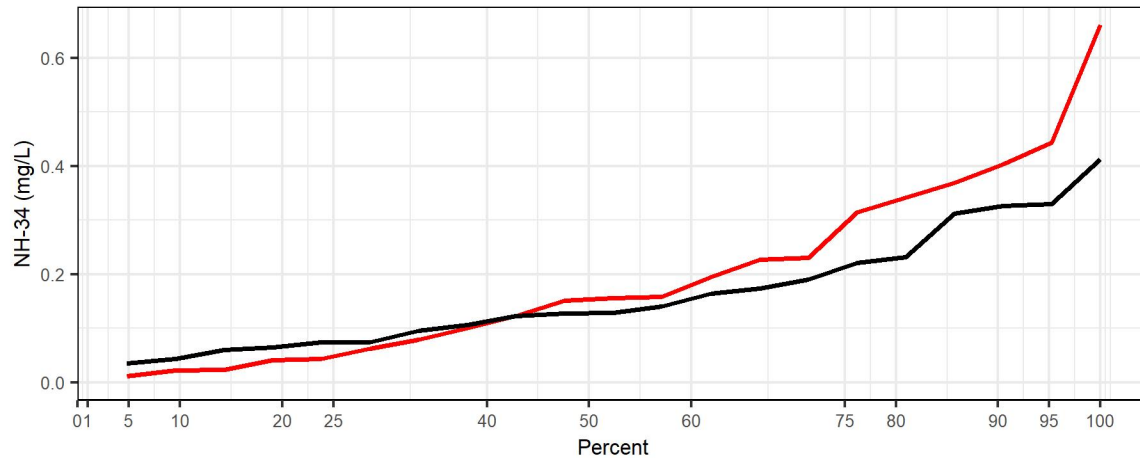
# Paulsboro (RM 87.9)

Parameter: NH-34



Remark Code • Accepted

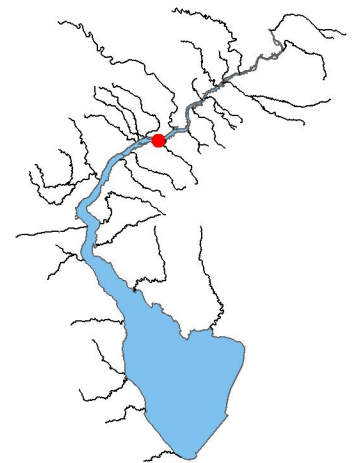
— Obs — Sim



— 1:1 - - Linear Regression

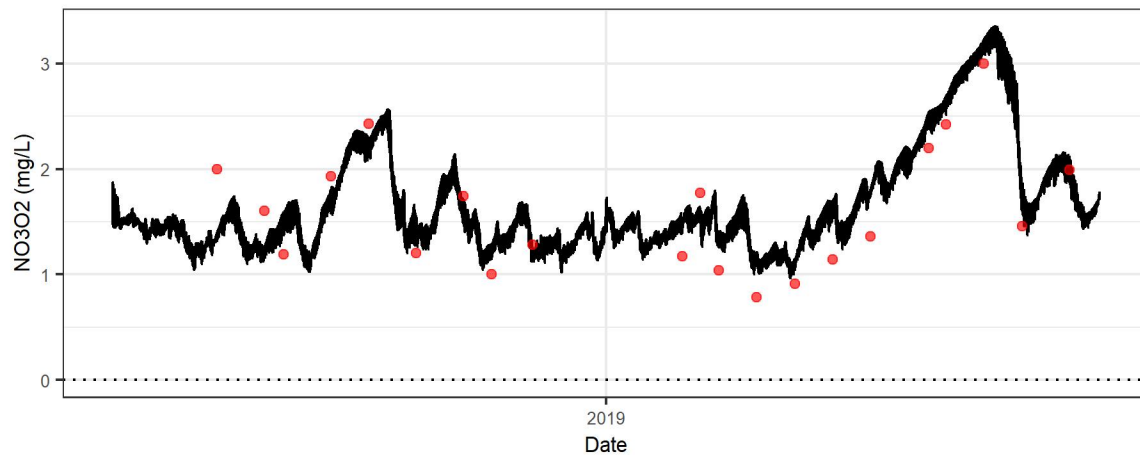
Dataset	10%	20%	50%	80%	90%	Average
OBS	0.02	0.04	0.16	0.37	0.40	0.200
SIM	0.06	0.07	0.13	0.23	0.33	0.164

GoF Metric	Value
Num Obs	21.0000
R2	0.6925
NSE	0.6026
RMSE	0.1055
NRMSE %	16.3000
d	0.8403



Paulsboro (RM 87.9)

Parameter: NO3O2



Remark Code



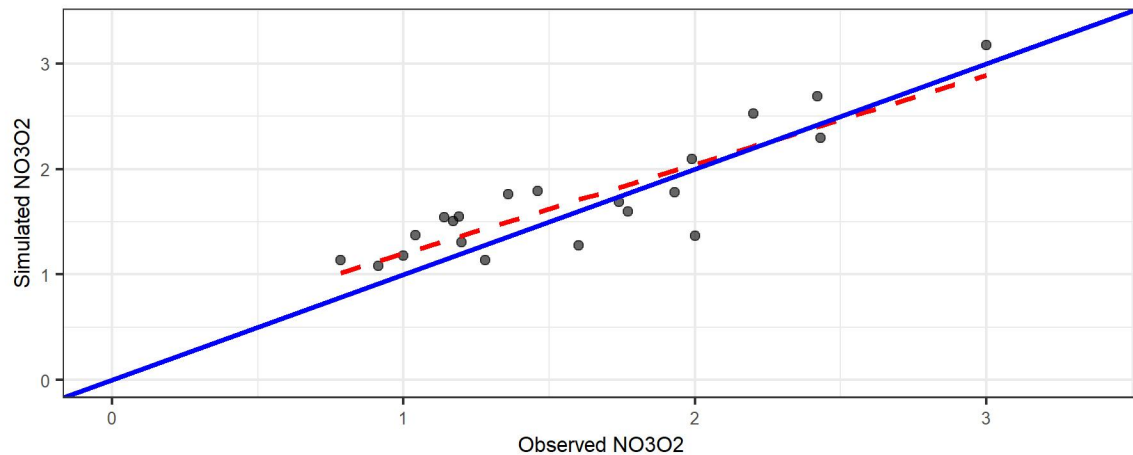
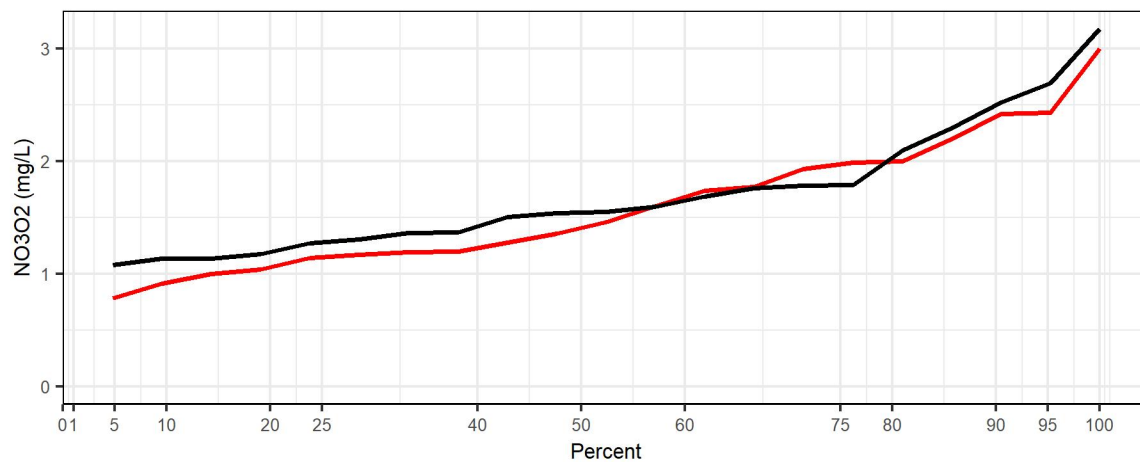
Accepted



Obs



Sim



Dataset	10%	20%	50%	80%	90%	Average
---------	-----	-----	-----	-----	-----	---------

OBS	1.00	1.14	1.46	2.00	2.42	1.601
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SIM	1.14	1.27	1.55	2.09	2.52	1.707
-----	------	------	------	------	------	-------

GoF Metric	Value
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Num Obs	21.0000
---------	---------

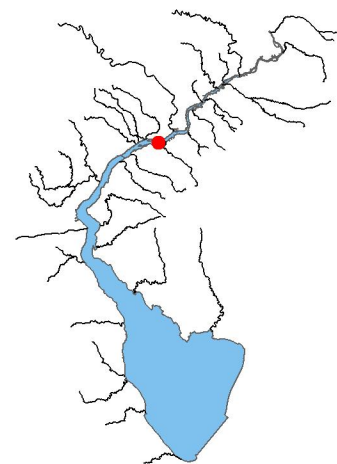
R2	0.7787
----	--------

NSE	0.7388
-----	--------

RMSE	0.2922
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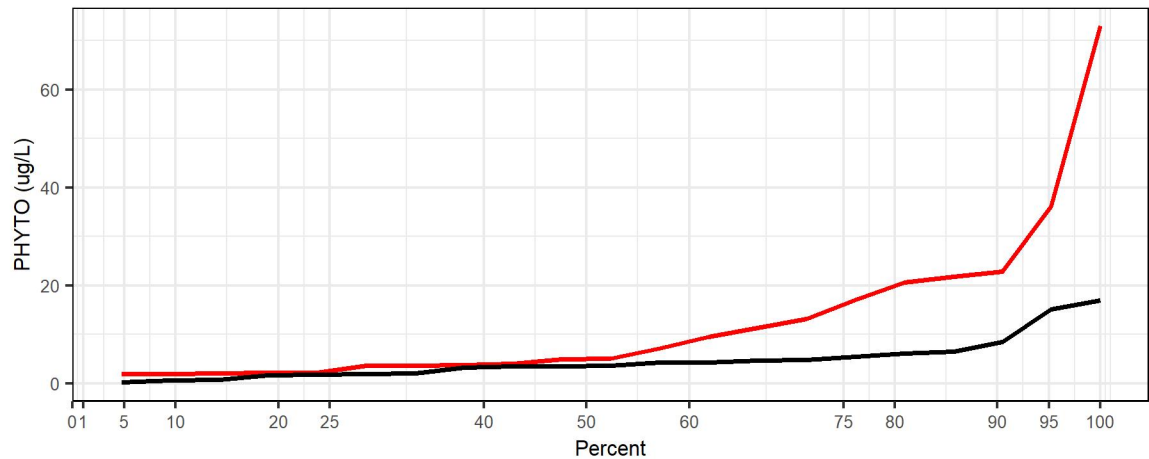
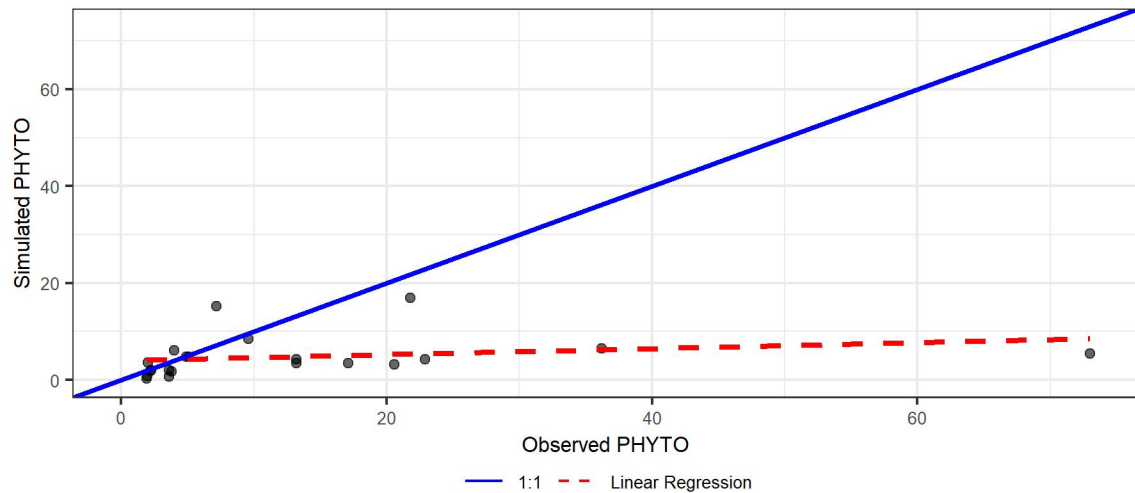
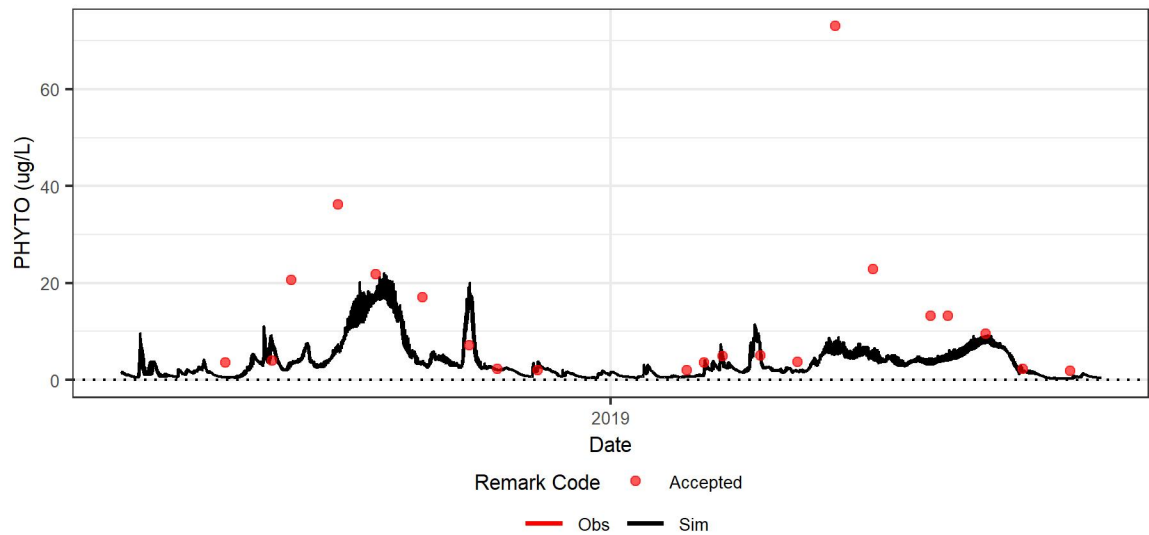
NRMSE %	13.2000
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d	0.9301
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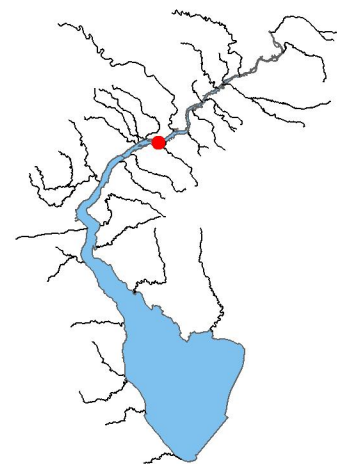
(Calib Station: 31DELRBC-WQX-332052; WASP Seg: 1087)

Paulsboro (RM 87.9)  
Parameter: PHYTO



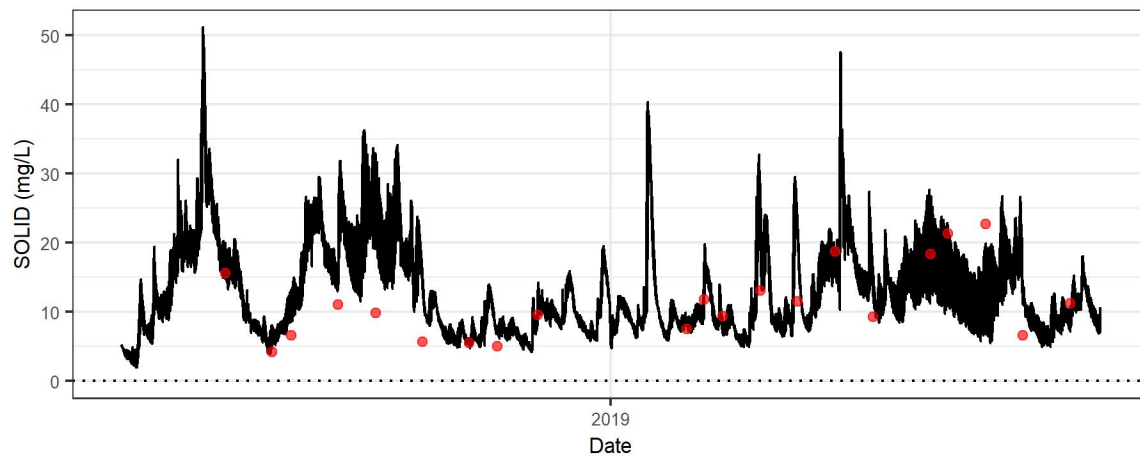
Dataset	10%	20%	50%	80%	90%	Average
OBS	2.04	2.27	5.11	20.60	22.90	12.867
SIM	0.77	1.88	3.61	6.14	8.53	4.765

GoF Metric	Value
Num Obs	21.0000
R2	0.0569
NSE	-0.1941
RMSE	17.6842
NRMSE %	24.9000
d	0.4129



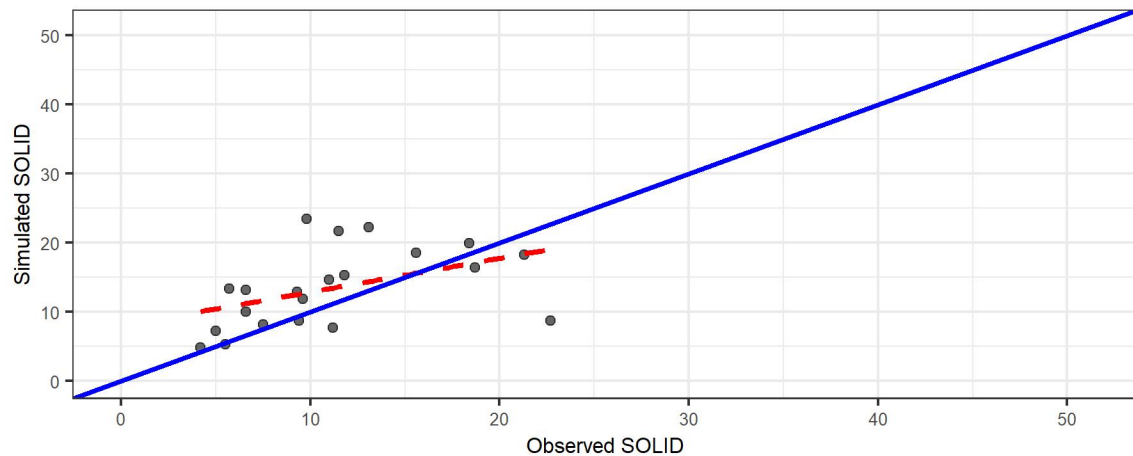
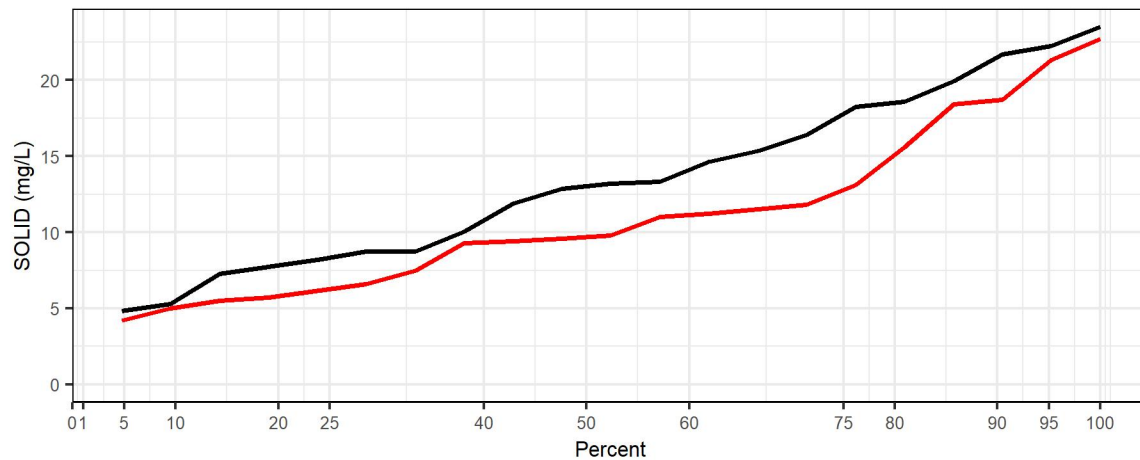
# Paulsboro (RM 87.9)

Parameter: SOLID



Remark Code    • Accepted

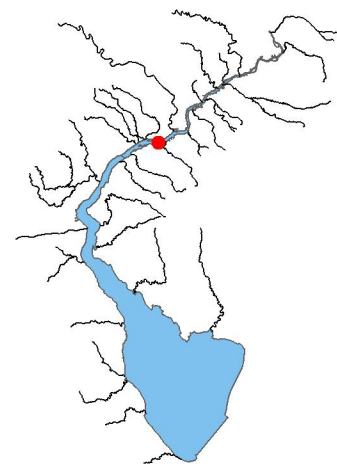
— Obs    — Sim



— 1:1    - - Linear Regression

Dataset	10%	20%	50%	80%	90%	Average
OBS	5.50	6.60	9.80	15.60	18.70	11.167
SIM	7.28	8.18	13.21	18.58	21.69	13.454

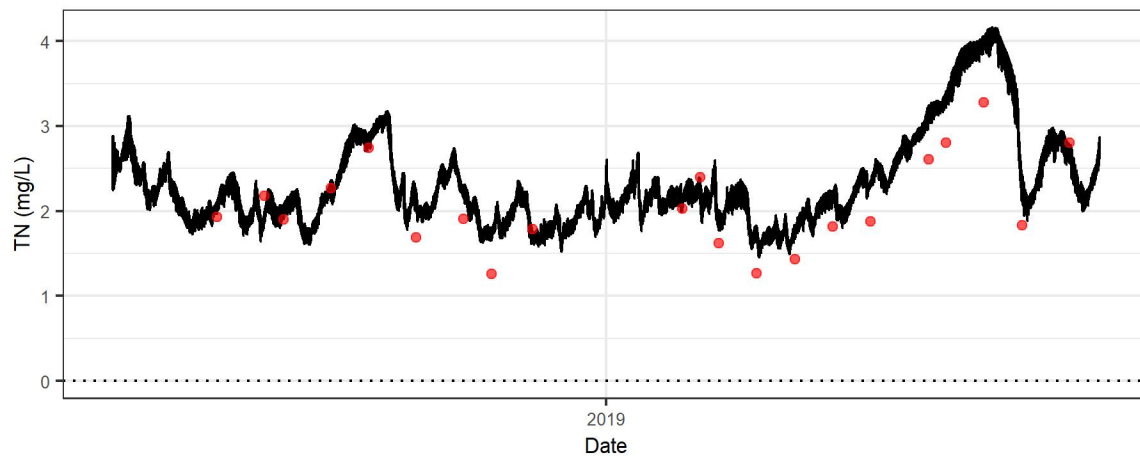
GoF Metric	Value
Num Obs	21.0000
R2	0.2148
NSE	-0.3230
RMSE	6.0621
NRMSE %	32.8000
d	0.6486





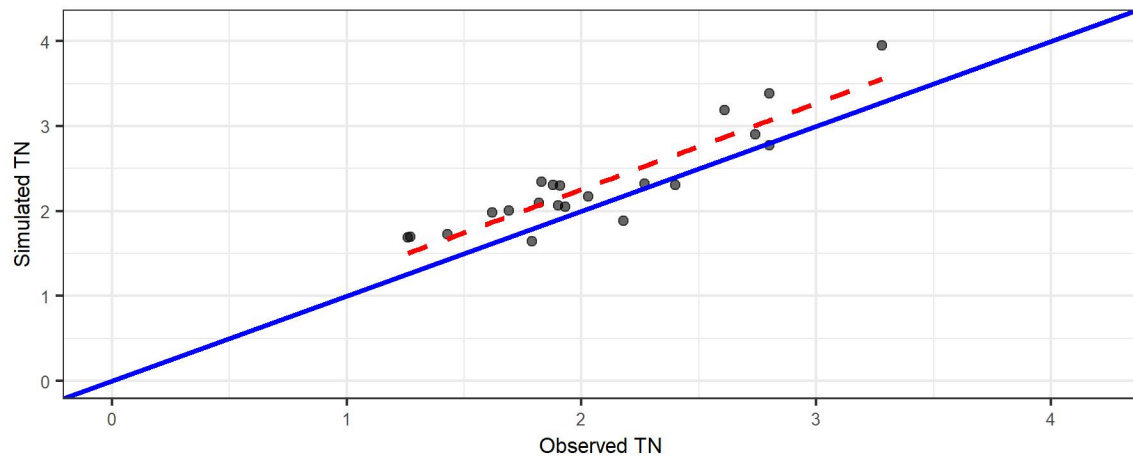
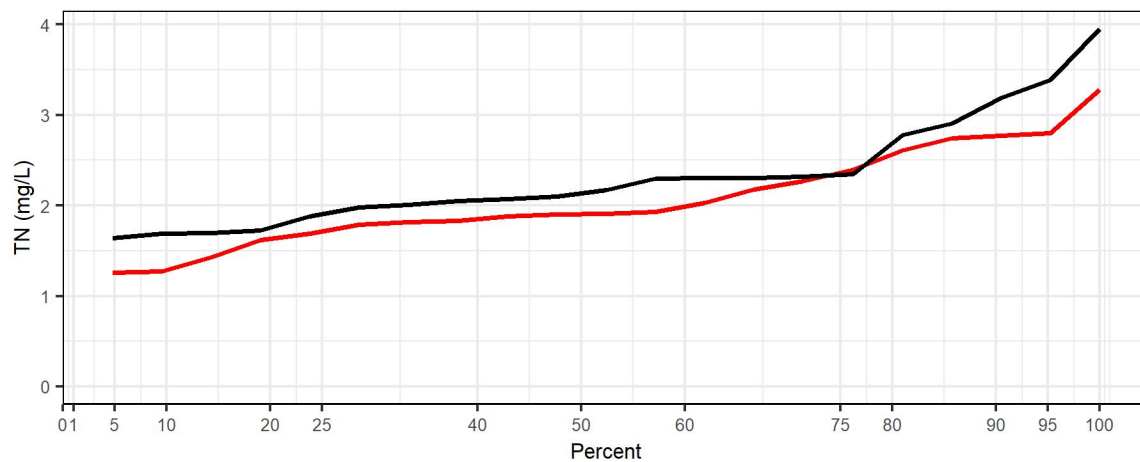
# Paulsboro (RM 87.9)

Parameter: TN



Remark Code • Accepted

— Obs — Sim



— 1:1 - - Linear Regression

Dataset	10%	20%	50%	80%	90%	Average
OBS	1.43	1.69	1.91	2.61	2.80	2.069
SIM	1.70	1.88	2.17	2.78	3.19	2.324

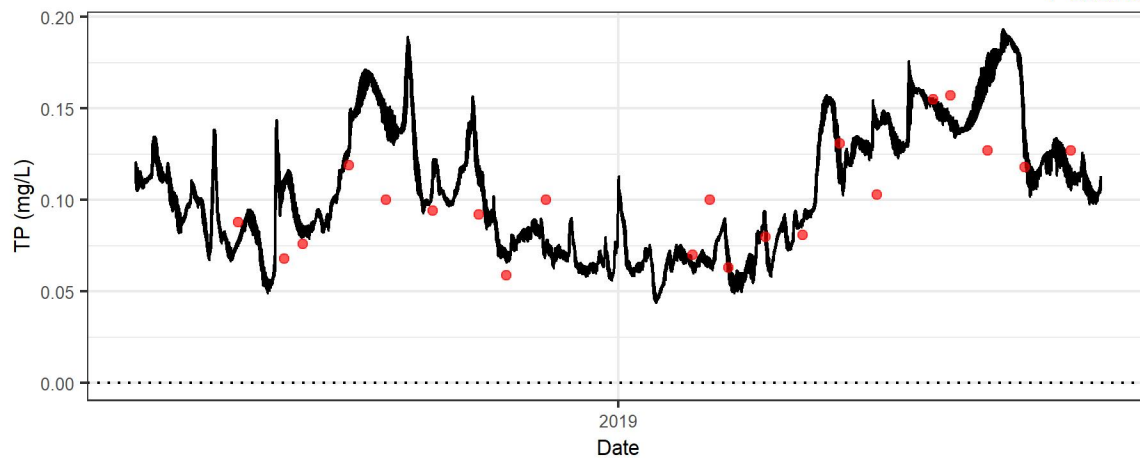
GoF Metric	Value
Num Obs	21.0000
R2	0.8174
NSE	0.5337
RMSE	0.3587
NRMSE %	17.8000
d	0.8998





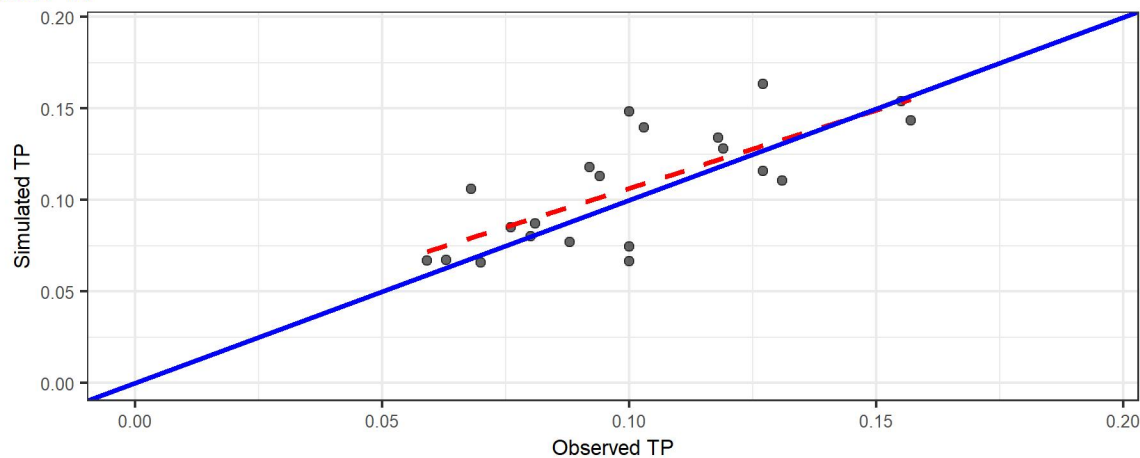
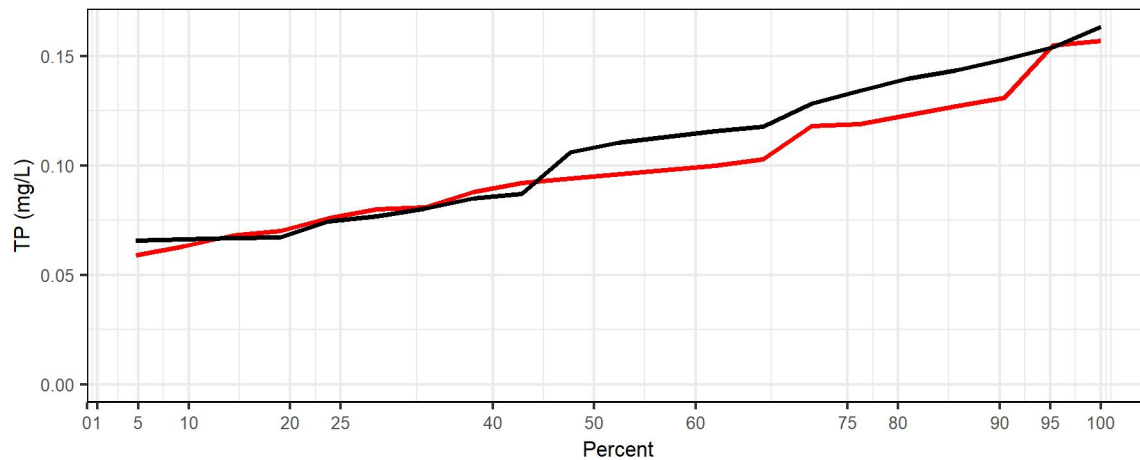
# Paulsboro (RM 87.9)

Parameter: TP



Remark Code    ● Accepted

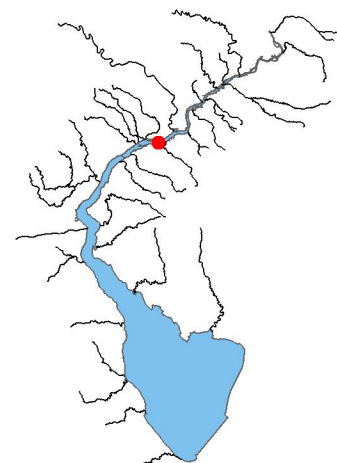
— Obs — Sim



— 1:1 — Linear Regression

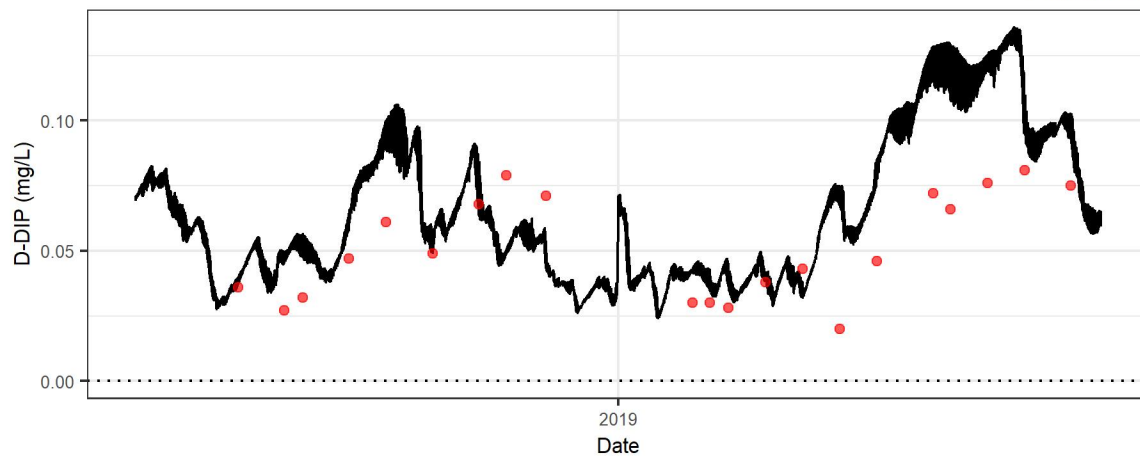
Dataset	10%	20%	50%	80%	90%	Average
OBS	0.07	0.08	0.10	0.13	0.13	0.100
SIM	0.07	0.07	0.11	0.14	0.15	0.107

GoF Metric	Value
Num Obs	21.0000
R2	0.5505
NSE	0.3294
RMSE	0.0226
NRMSE %	23.0000
d	0.8398



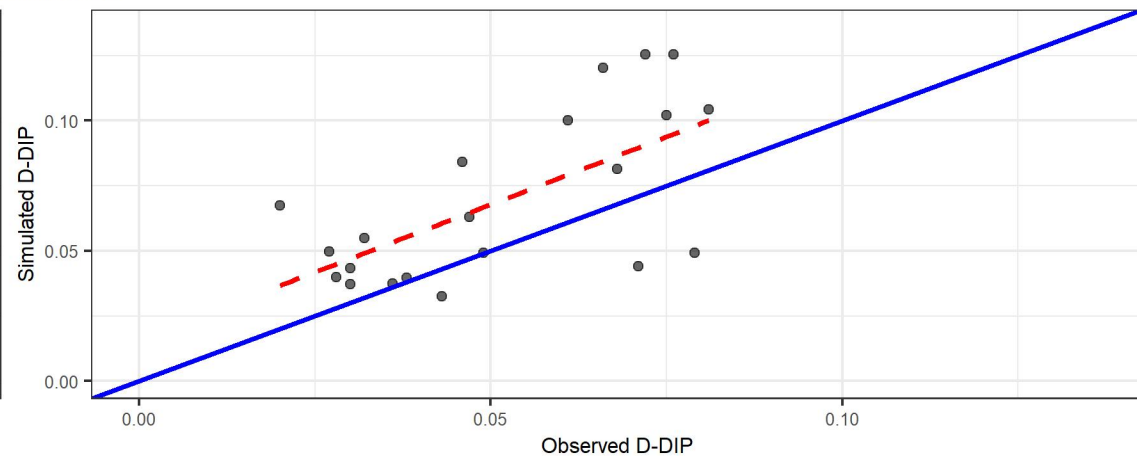
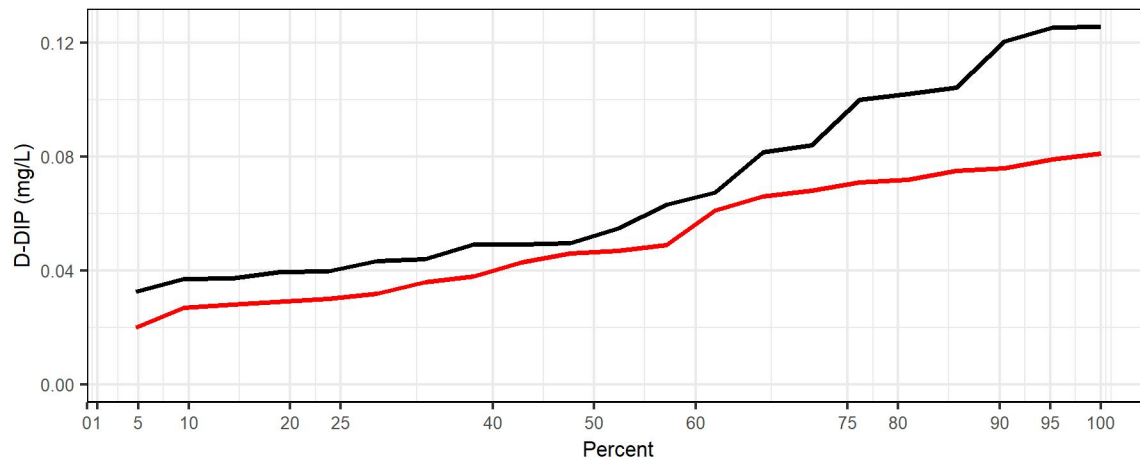
# Marcus Hook (RM 78.1)

Parameter: D-DIP



Remark Code    ● Accepted

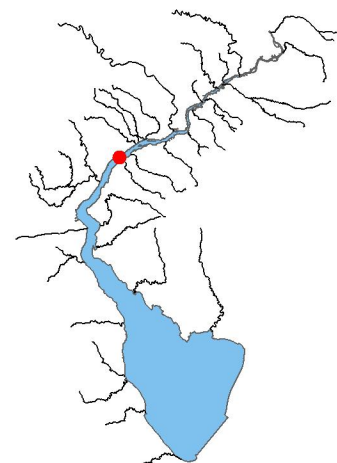
— Obs    — Sim



— 1:1    - - Linear Regression

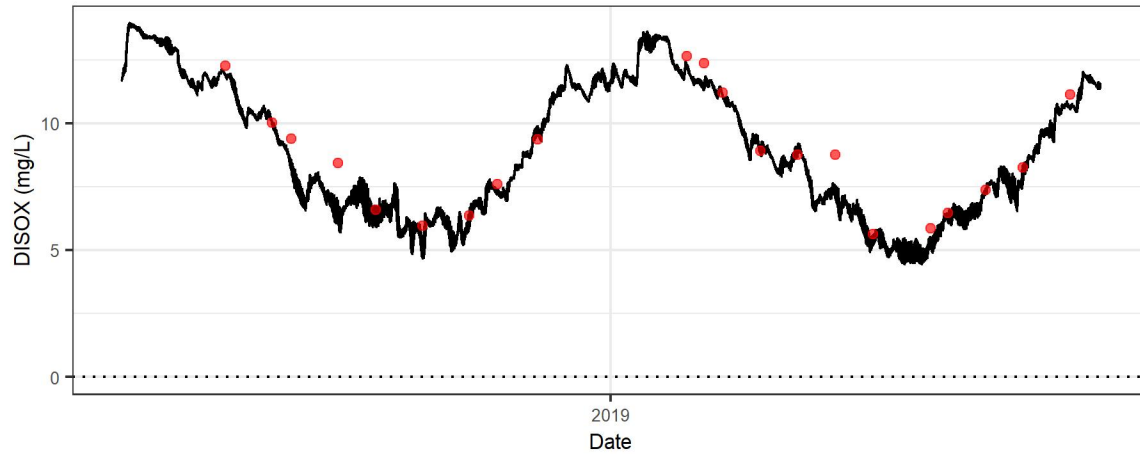
Dataset	10%	20%	50%	80%	90%	Average
OBS	0.03	0.03	0.05	0.07	0.08	0.051
SIM	0.04	0.04	0.05	0.10	0.12	0.069

GoF Metric	Value
Num Obs	21.0000
R2	0.4318
NSE	-1.2463
RMSE	0.0295
NRMSE %	48.4000
d	0.6742



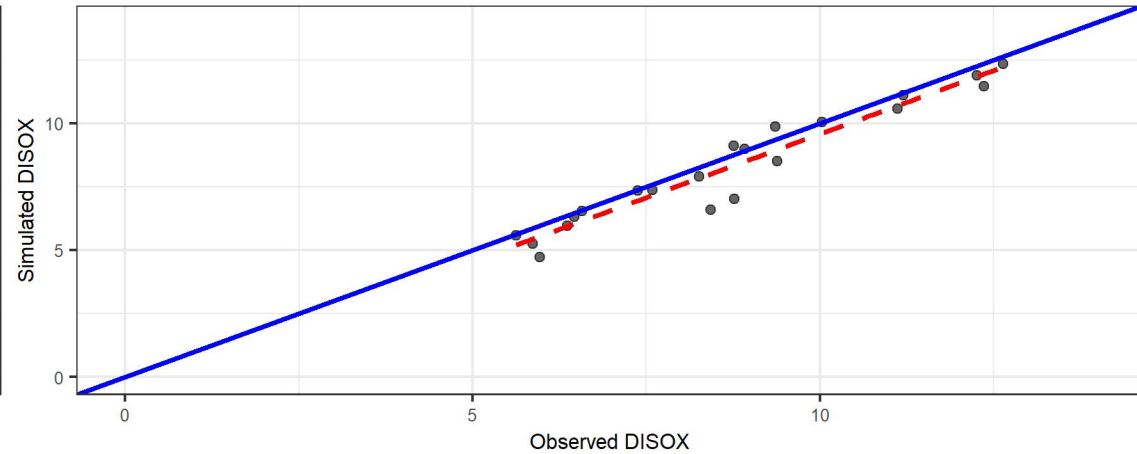
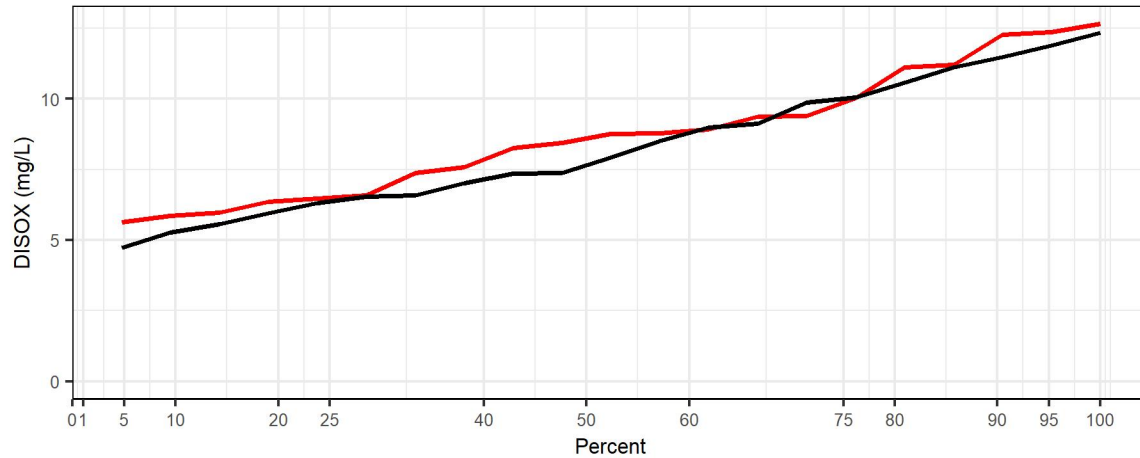
# Marcus Hook (RM 78.1)

Parameter: DISOX



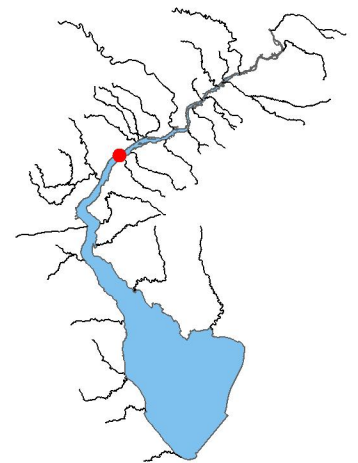
Remark Code • Accepted

— Obs — Sim



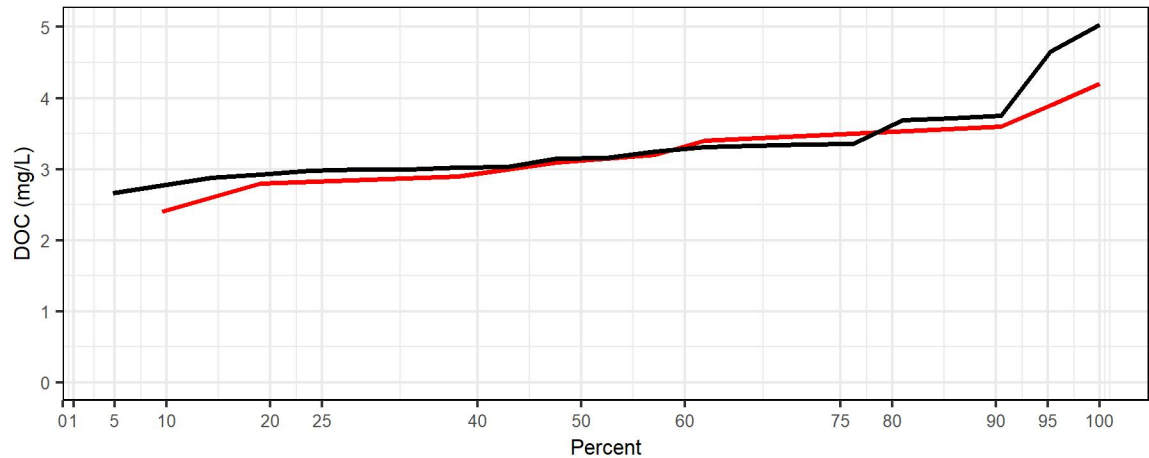
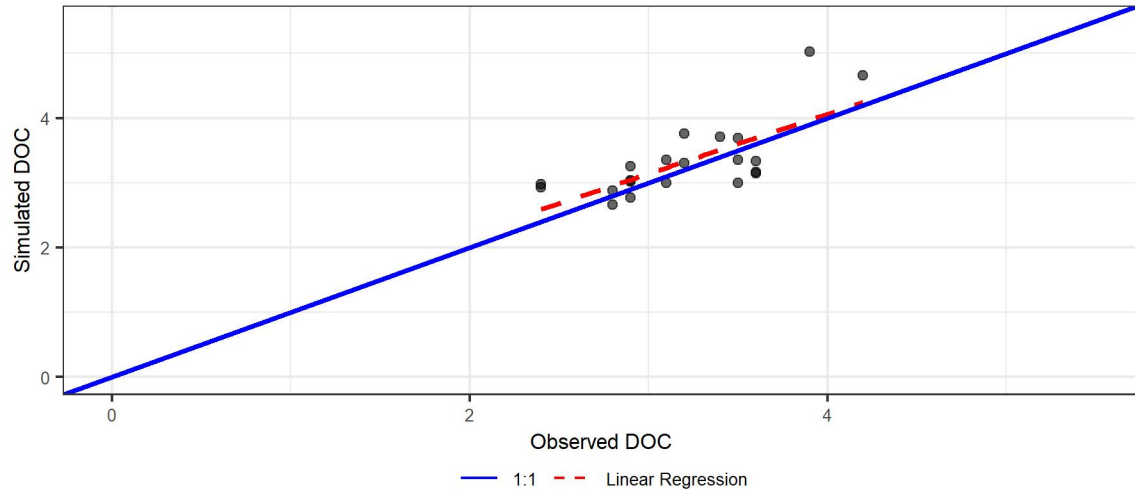
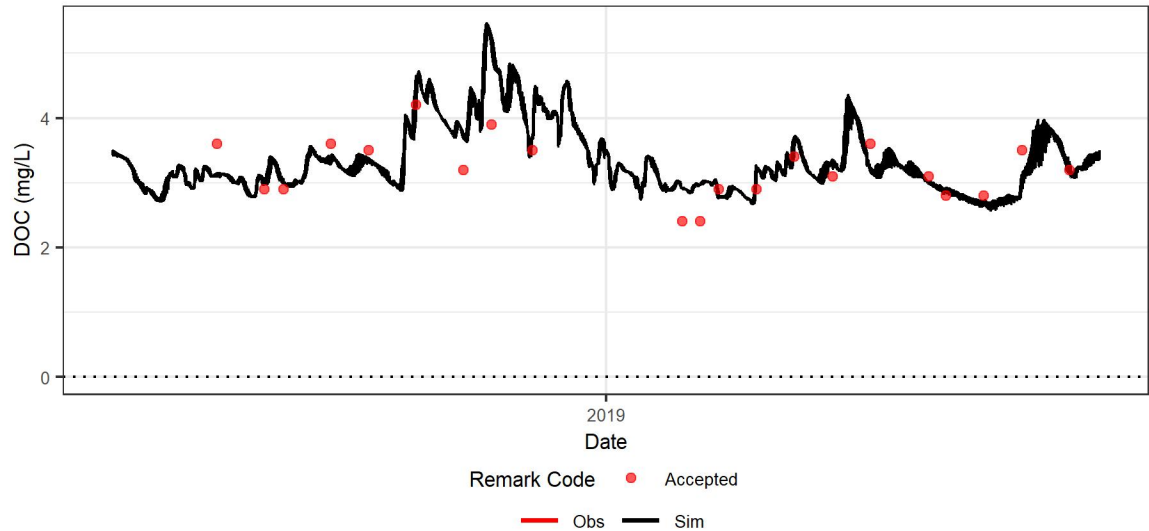
Dataset	10%	20%	50%	80%	90%	Average
OBS	5.97	6.47	8.76	11.12	12.26	8.731
SIM	5.57	6.31	7.91	10.57	11.46	8.306

GoF Metric	Value
Num Obs	21.0000
R2	0.9301
NSE	0.8865
RMSE	0.7331
NRMSE %	10.5000
d	0.9725



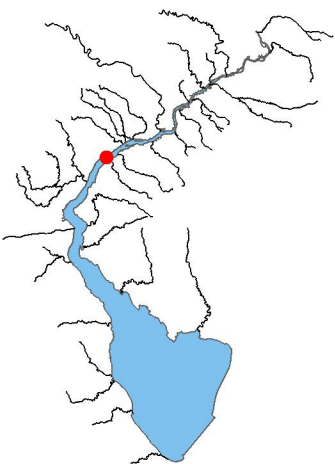
Marcus Hook (RM 78.1)

Parameter: DOC



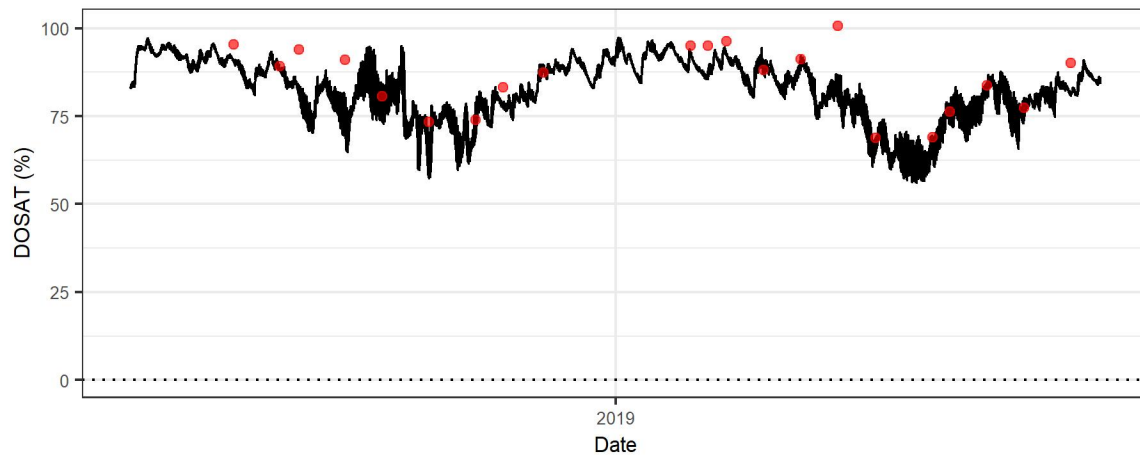
Dataset	10%	20%	50%	80%	90%	Average
OBS	2.80	2.90	3.20	3.60	3.60	3.210
SIM	2.88	2.98	3.16	3.69	3.76	3.335

GoF Metric	Value
Num Obs	21.0000
R2	0.5296
NSE	0.1630
RMSE	0.4120
NRMSE %	22.9000
d	0.8201



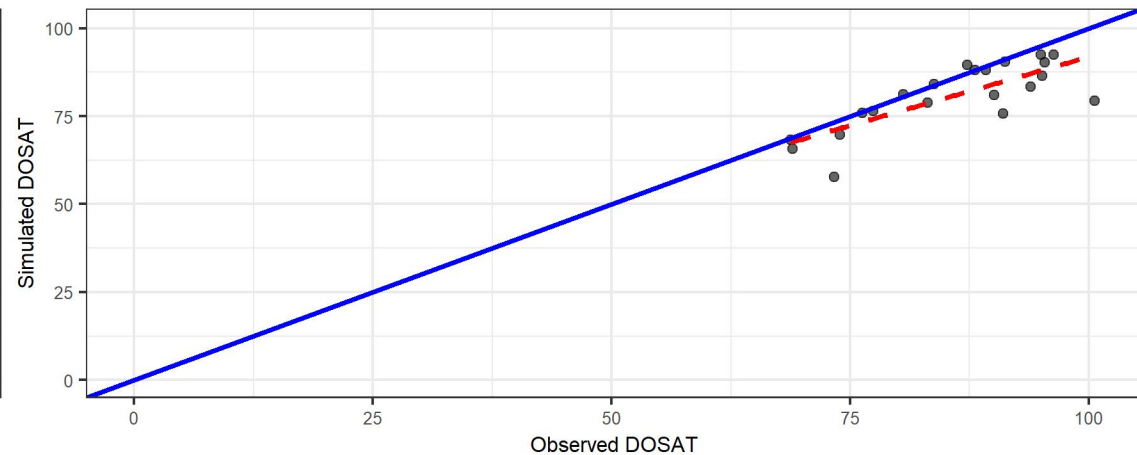
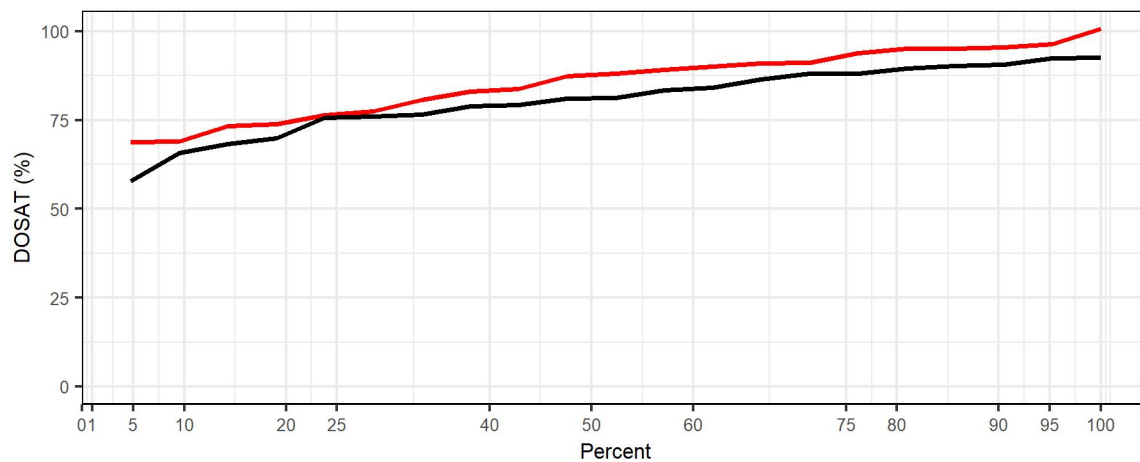
# Marcus Hook (RM 78.1)

Parameter: DOSAT



Remark Code • Accepted

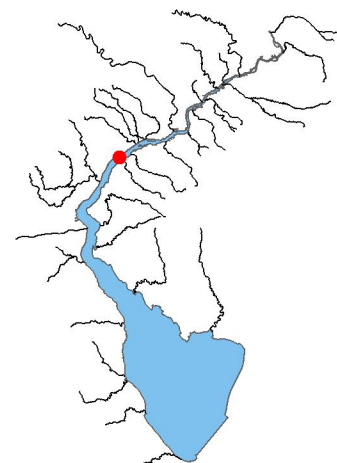
— Obs — Sim



— 1:1 - - Linear Regression

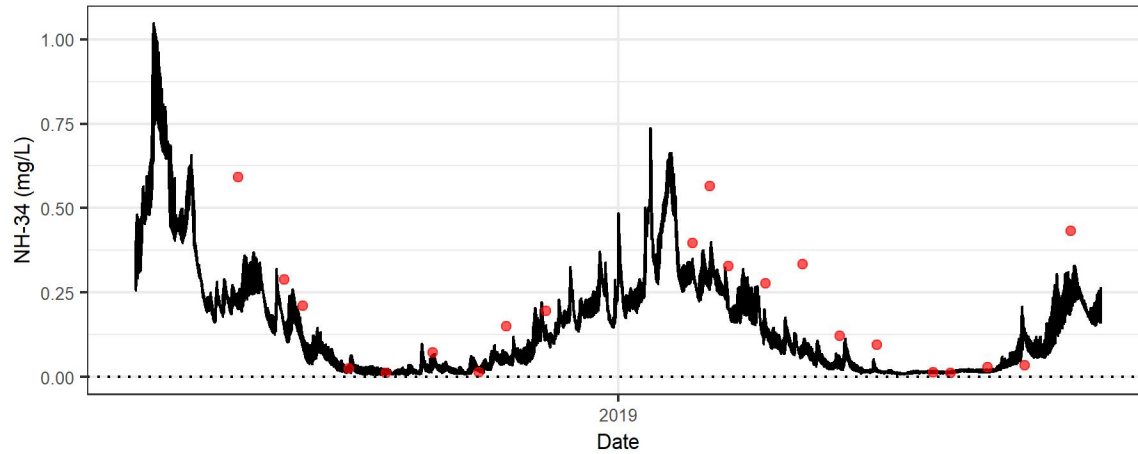
Dataset	10%	20%	50%	80%	90%	Average
OBS	73.30	76.30	88.10	95.00	95.40	85.686
SIM	68.25	75.68	81.24	89.53	90.52	80.747

GoF Metric	Value
Num Obs	21.0000
R2	0.6137
NSE	0.2879
RMSE	7.8560
NRMSE %	24.7000
d	0.8320



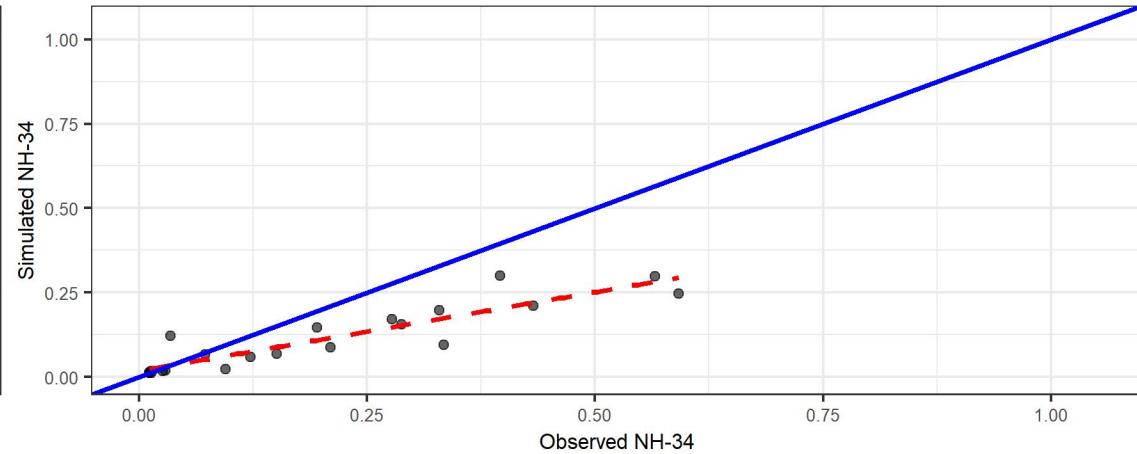
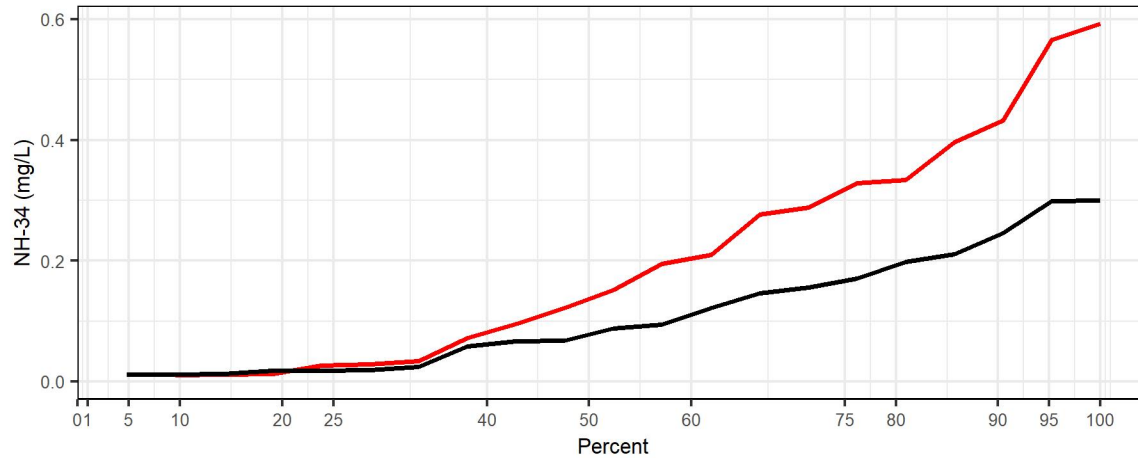
# Marcus Hook (RM 78.1)

Parameter: NH-34



Remark Code    ● Accepted

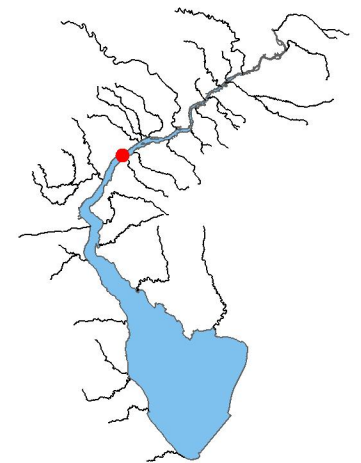
— Obs    — Sim



— 1:1    - - Linear Regression

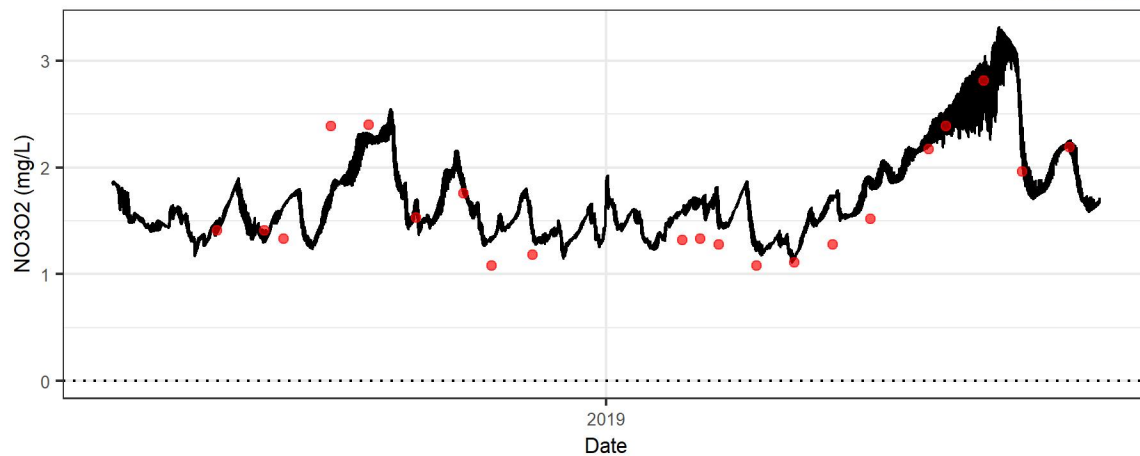
Dataset	10%	20%	50%	80%	90%	Average
OBS	0.01	0.03	0.15	0.33	0.43	0.200
SIM	0.01	0.02	0.09	0.20	0.25	0.112

GoF Metric	Value
Num Obs	21.0000
R2	0.8215
NSE	0.4319
RMSE	0.1369
NRMSE %	23.6000
d	0.7781



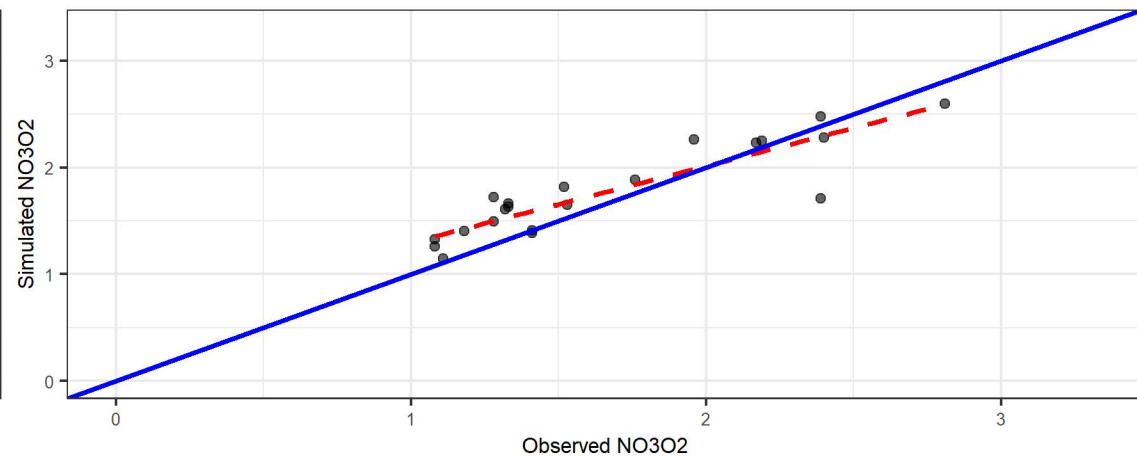
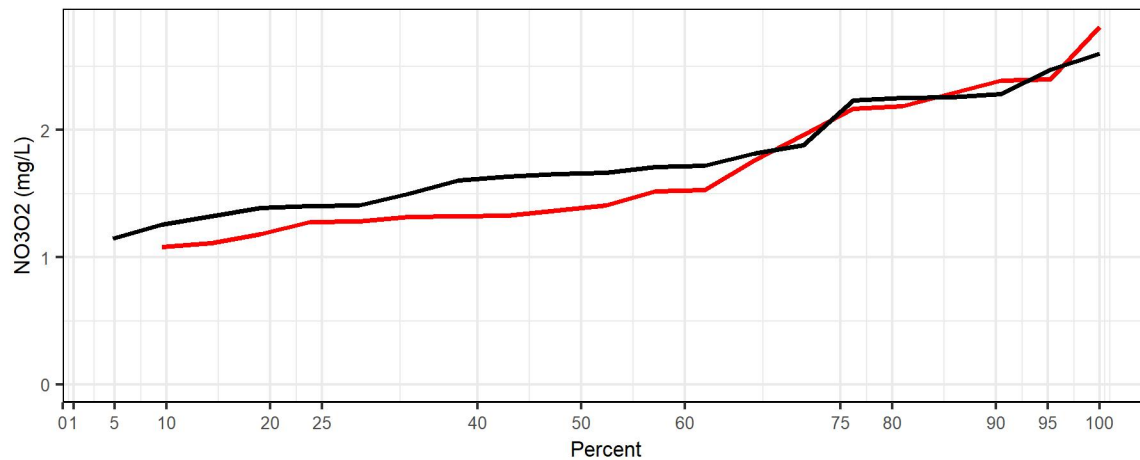
# Marcus Hook (RM 78.1)

Parameter: NO3O2



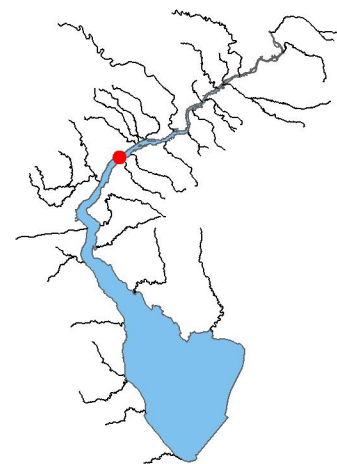
Remark Code • Accepted

— Obs — Sim



Dataset	10%	20%	50%	80%	90%	Average
OBS	1.11	1.28	1.41	2.19	2.39	1.663
SIM	1.32	1.40	1.66	2.25	2.28	1.772

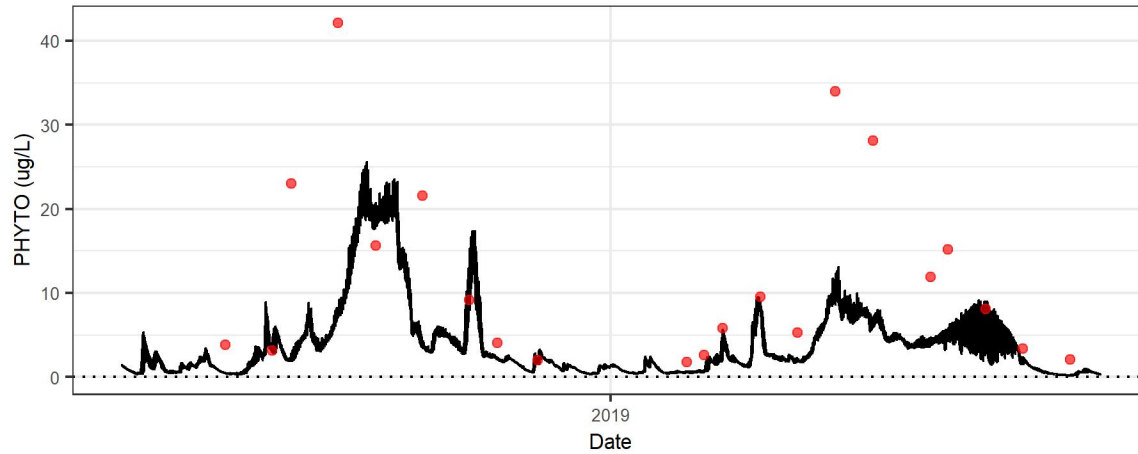
GoF Metric	Value
Num Obs	21.0000
R2	0.7991
NSE	0.7458
RMSE	0.2596
NRMSE %	15.0000
d	0.9192





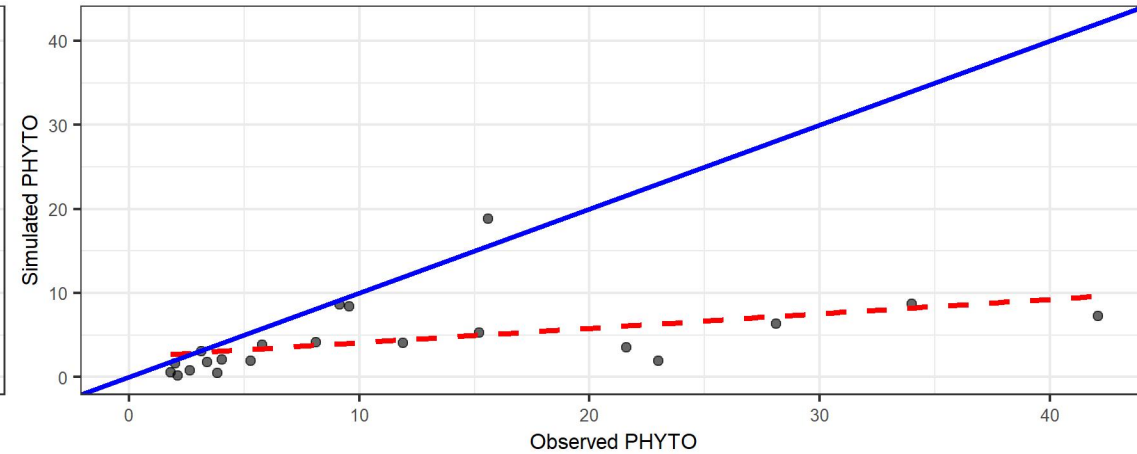
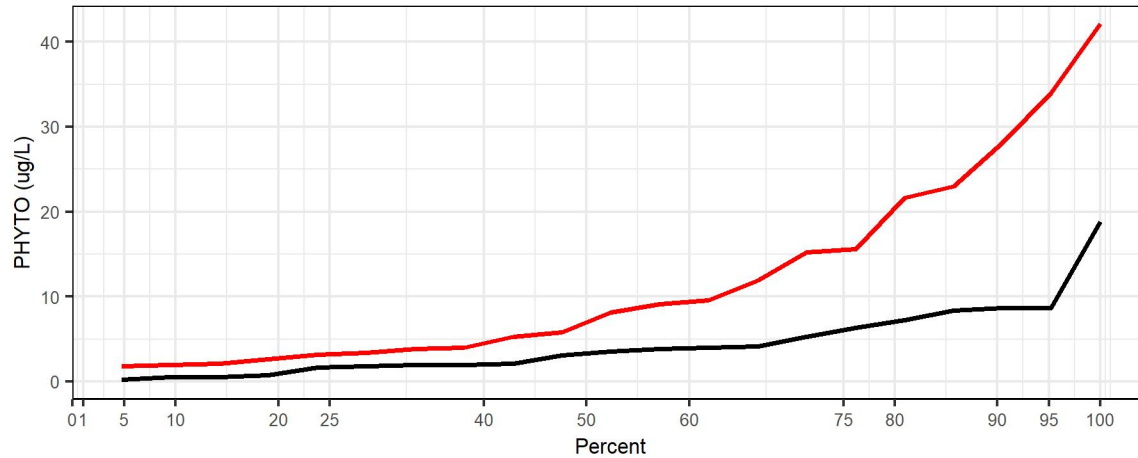
# Marcus Hook (RM 78.1)

Parameter: PHYTO



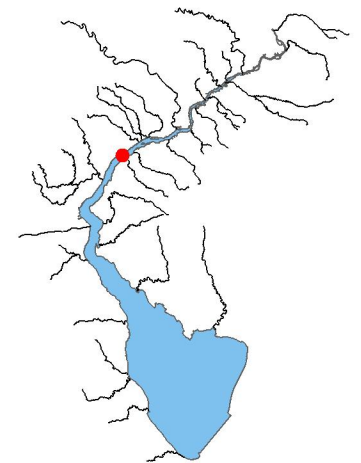
Remark Code • Accepted

— Obs — Sim



Dataset	10%	20%	50%	80%	90%	Average
OBS	2.11	3.14	8.11	21.60	28.10	12.013
SIM	0.55	1.64	3.53	7.23	8.65	4.445

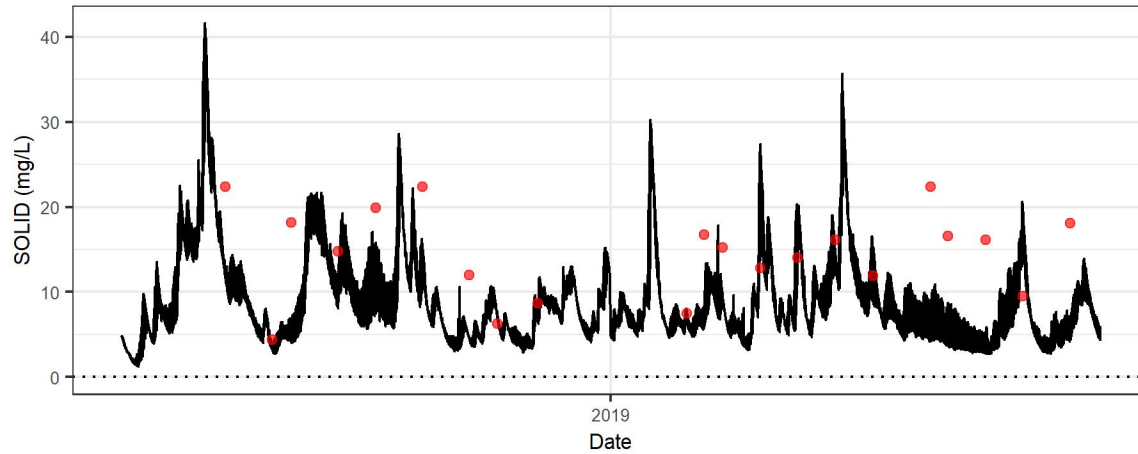
GoF Metric	Value
Num Obs	21.0000
R2	0.2116
NSE	-0.2464
RMSE	12.5924
NRMSE %	31.2000
d	0.5404





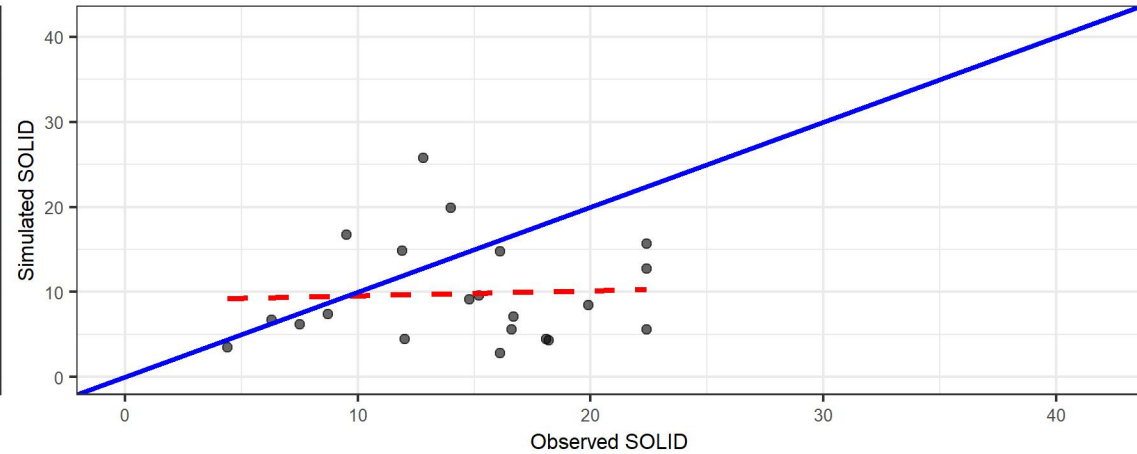
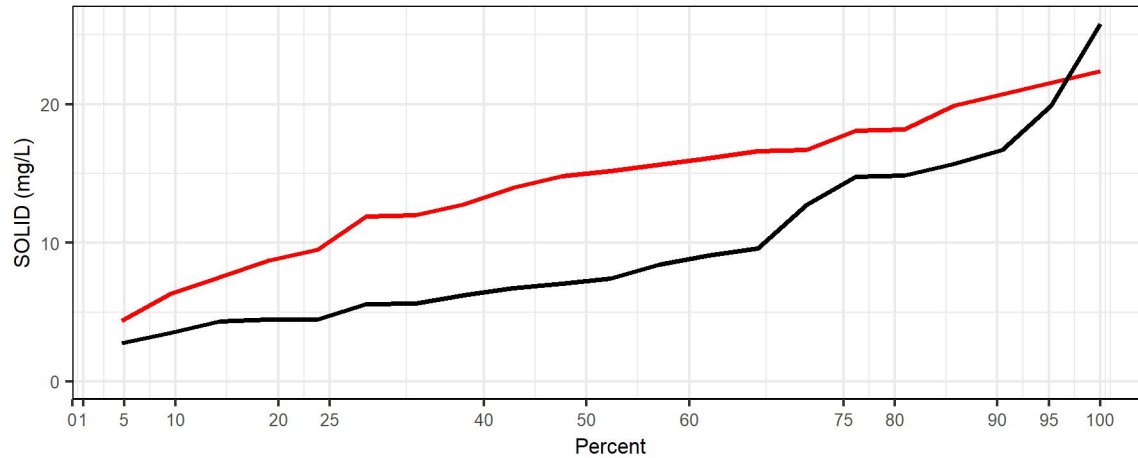
# Marcus Hook (RM 78.1)

Parameter: SOLID



Remark Code • Accepted

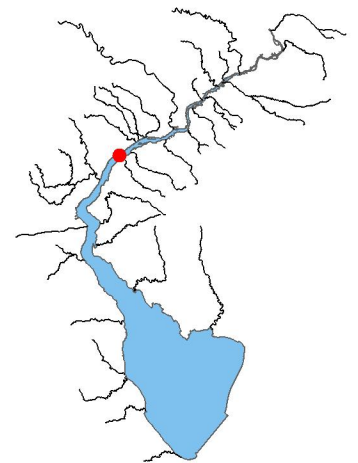
— Obs — Sim



— 1:1 - - Linear Regression

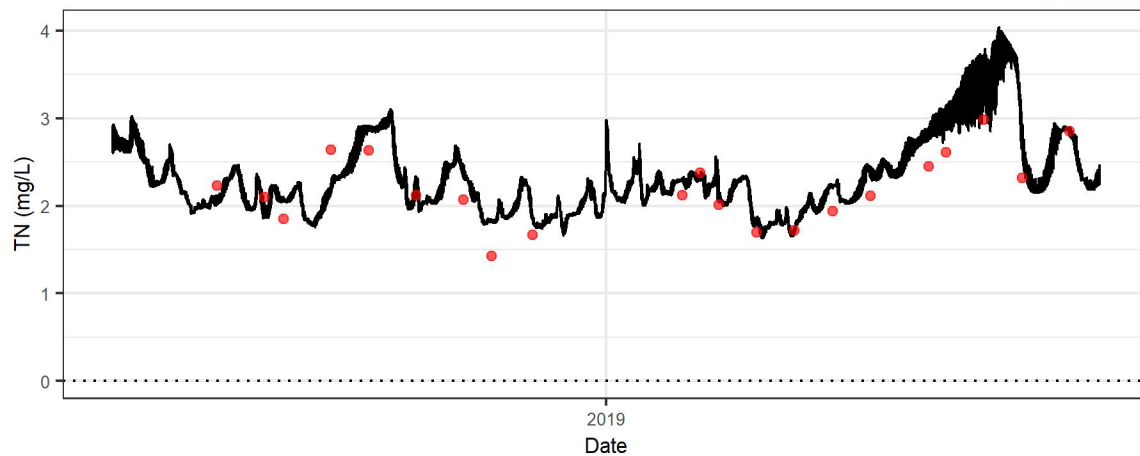
Dataset	10%	20%	50%	80%	90%	Average
OBS	7.50	9.50	15.20	18.20	22.40	14.571
SIM	4.32	4.47	7.43	14.85	16.72	9.799

GoF Metric	Value
Num Obs	21.0000
R2	0.0025
NSE	-2.1088
RMSE	9.0309
NRMSE %	50.2000
d	0.4225



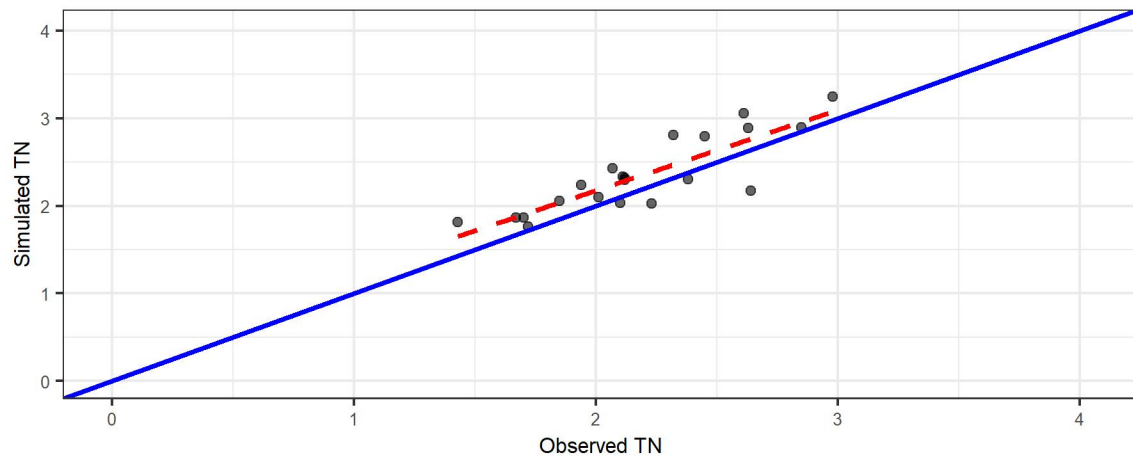
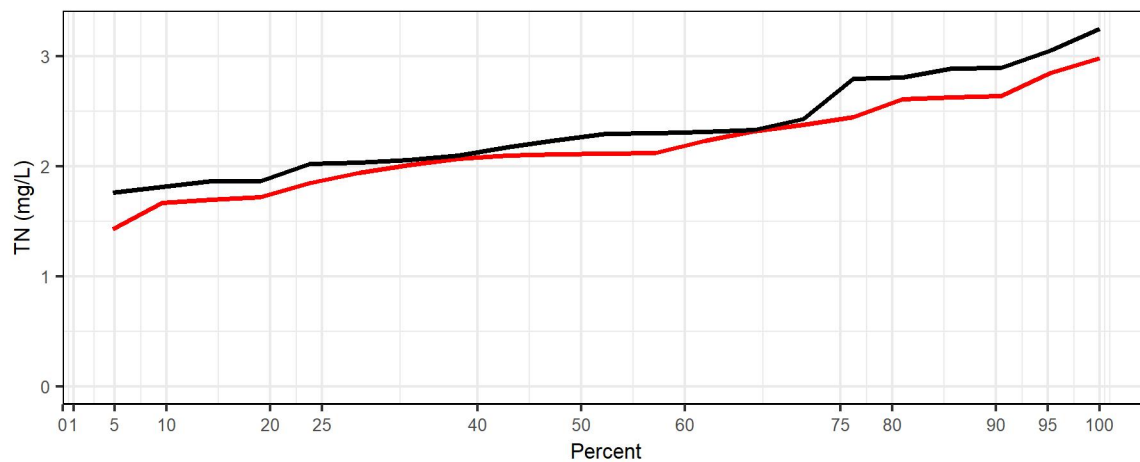
# Marcus Hook (RM 78.1)

Parameter: TN



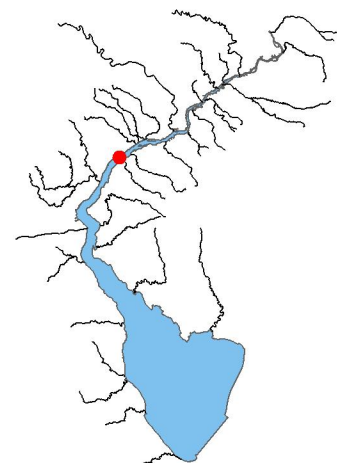
Remark Code • Accepted

— Obs — Sim



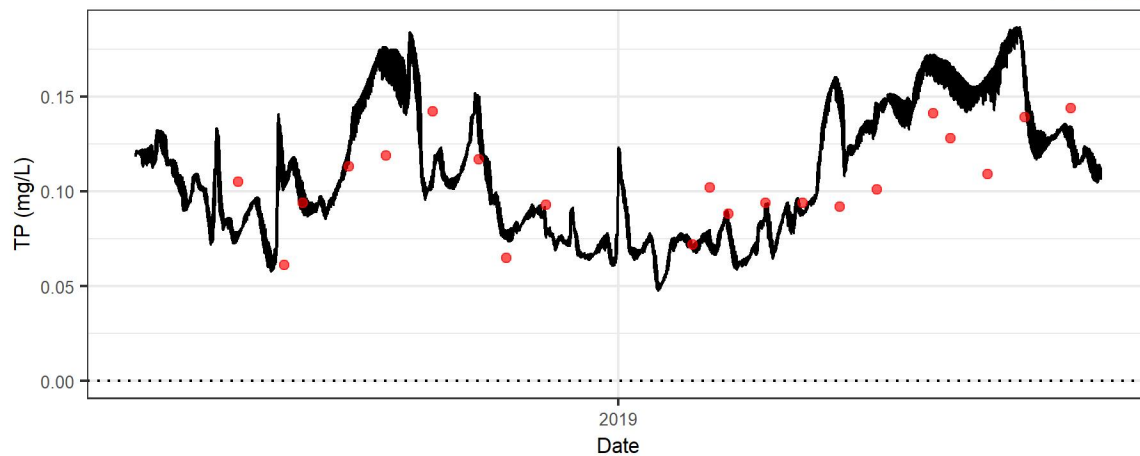
Dataset	10%	20%	50%	80%	90%	Average
OBS	1.70	1.85	2.12	2.61	2.64	2.187
SIM	1.87	2.02	2.30	2.81	2.90	2.348

GoF Metric	Value
Num Obs	21.0000
R2	0.7345
NSE	0.5248
RMSE	0.2738
NRMSE %	17.7000
d	0.8883



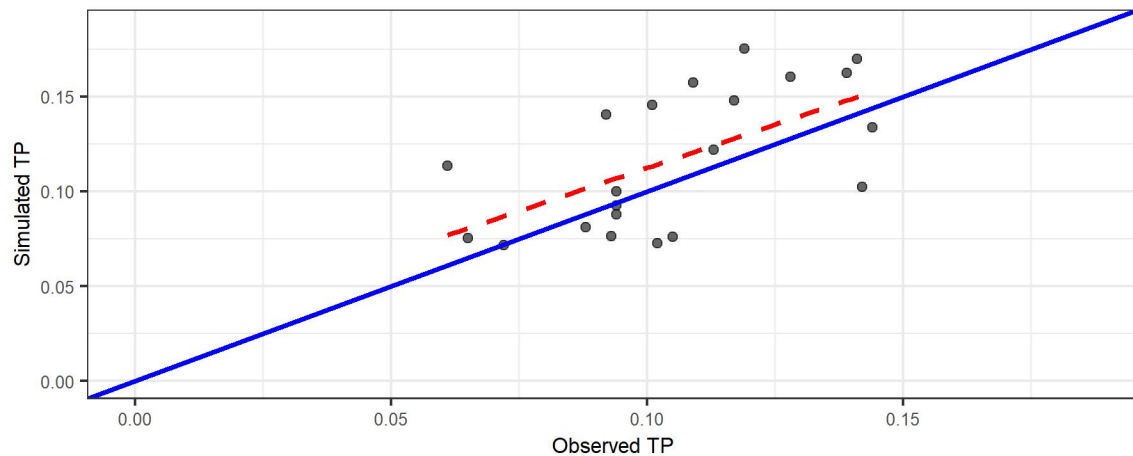
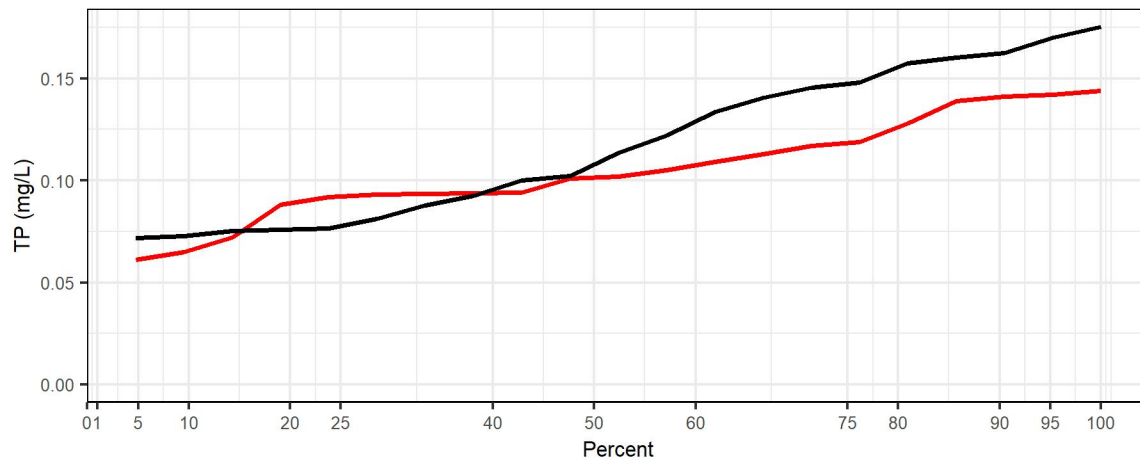
# Marcus Hook (RM 78.1)

Parameter: TP



Remark Code    ● Accepted

— Obs — Sim



— 1:1 - - Linear Regression

Dataset	10%	20%	50%	80%	90%	Average
OBS	0.07	0.09	0.10	0.13	0.14	0.105
SIM	0.08	0.08	0.11	0.16	0.16	0.117

GoF Metric	Value
Num Obs	21.0000
R2	0.3693
NSE	-0.6779
RMSE	0.0308
NRMSE %	37.2000
d	0.7055

