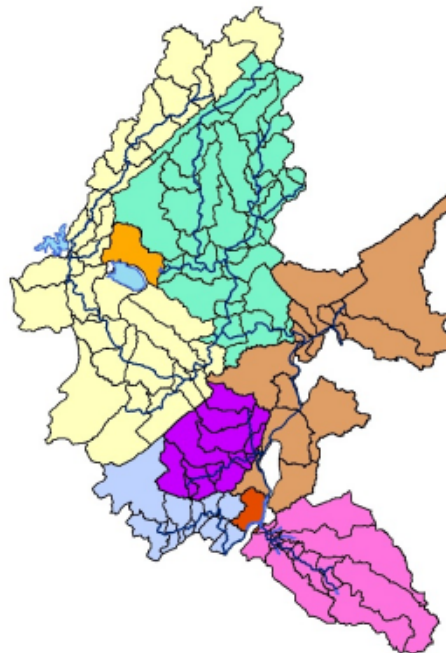




APPENDICES (K – T)  
PHASE II FINAL REPORT  
*RARITAN RIVER BASIN NUTRIENT TMDL STUDY  
WATERSHED MODEL AND TMDL CALCULATIONS*  
VOLUME 3 OF 3



PREPARED FOR:  
*RUTGERS UNIVERSITY NEW JERSEY ECOCOMPLEX*  
AND  
*NEW JERSEY DEP'T ENVIRONMENTAL PROTECTION  
DIVISION OF WATER MONITORING AND STANDARDS*

AUGUST 2013



APPENDICES (K – T)  
PHASE II FINAL REPORT

*RARITAN RIVER BASIN NUTRIENT TMDL STUDY  
WATERSHED MODEL AND TMDL CALCULATIONS*

*VOLUME 3 OF 3*

PREPARED FOR:

RUTGERS UNIVERSITY NEW JERSEY ECOCOMPLEX

AND

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION  
DIVISION OF WATER MONITORING AND STANDARDS

AUGUST 2013

## List of Appendices

Volume 2 of 3

### **Impairment Assessment**

- Appendix A: Watershed Impairment Designations
- Appendix B: Diurnal Monitoring Data for Lower Millstone River

### **Watershed Modeling**

- Appendix C: Hydrologic and Water Quality Integration Tool: HydroWAMIT
- Appendix D: Land Use Distribution Parameters
- Appendix E: Hydraulic Input Verification Plots
- Appendix F: Baseflow Concentrations Assigned to each Subwatershed
- Appendix G: Stream Temperature Input Verification Plots
- Appendix H: Local Parameter Maps
- Appendix I: TDS Simulation Graphs
- Appendix J: Hydrologic Model Calibration and Validation Graphs
- Appendix K: Water Quality Calibration Graphs
- Appendix L: Water Quality Validation Graphs
- Appendix M: Goodness-of-Fit Statistics and Graphs
- Appendix N: Erosion Vulnerability Index

Volume 3 of 3

### **TMDL Calculations**

- Appendix O: TMDL Evaluation Methodology for Headwater Lakes
- Appendix P: Summary of TMDL Condition
- Appendix Q: Summary of TMDL Outcomes
- Appendix R: TP TMDL Allocation Tables
- Appendix S: TSS TMDL Allocation Tables

### **Electronic Documentation**

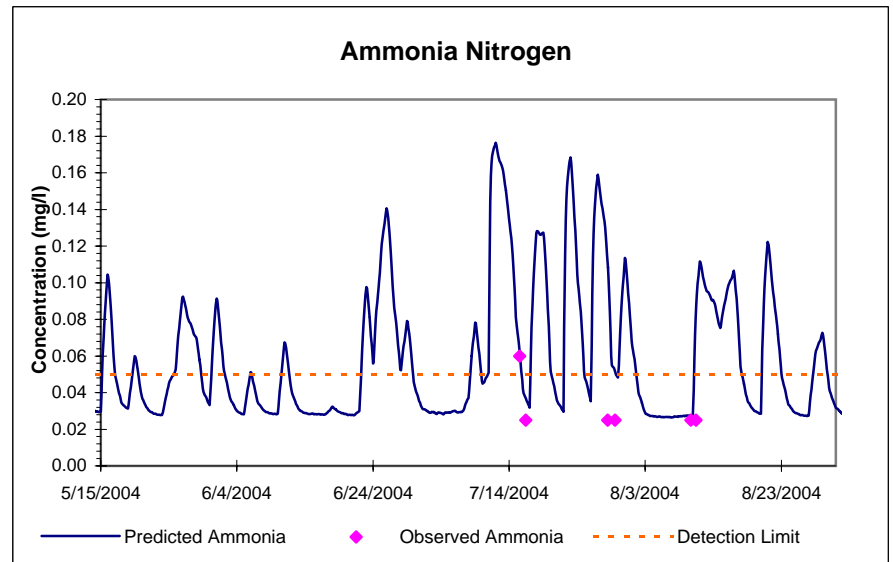
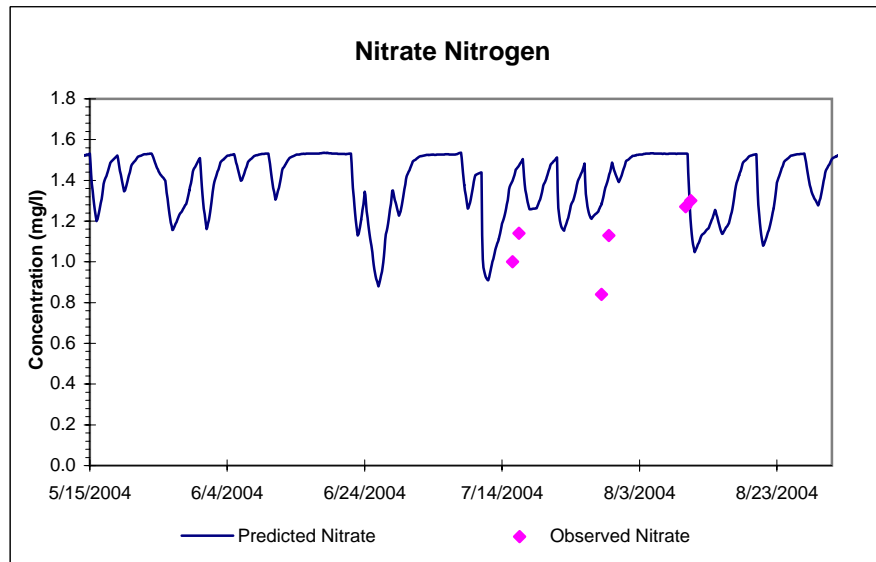
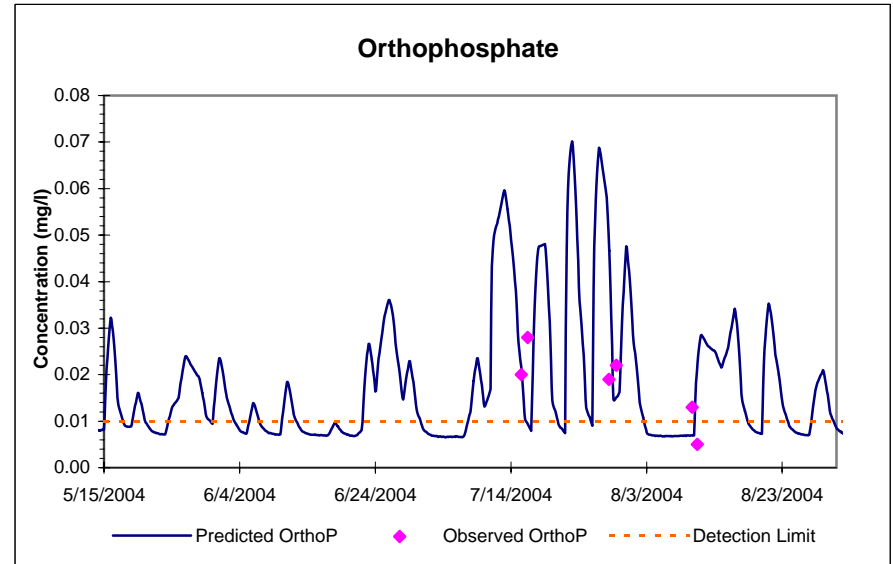
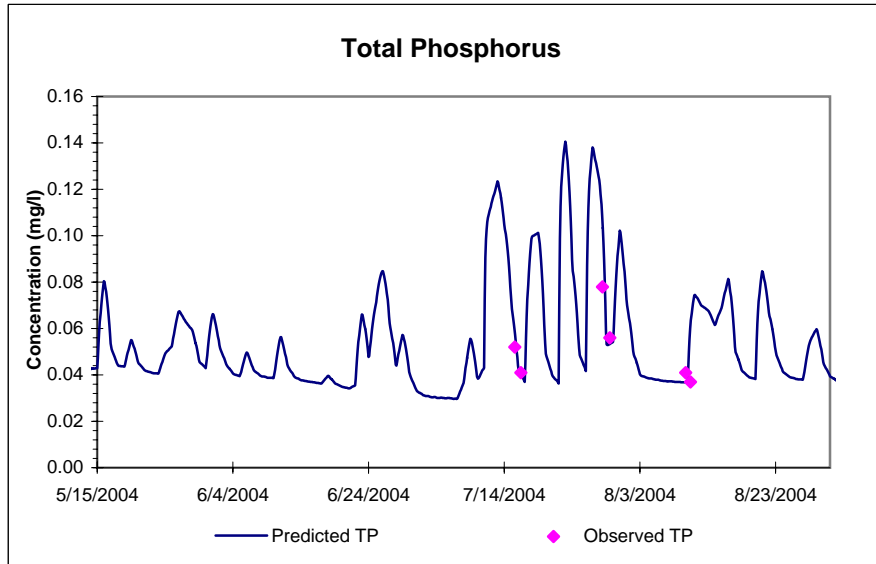
- Appendix T: Electronic Data CDs

## **APPENDIX K**

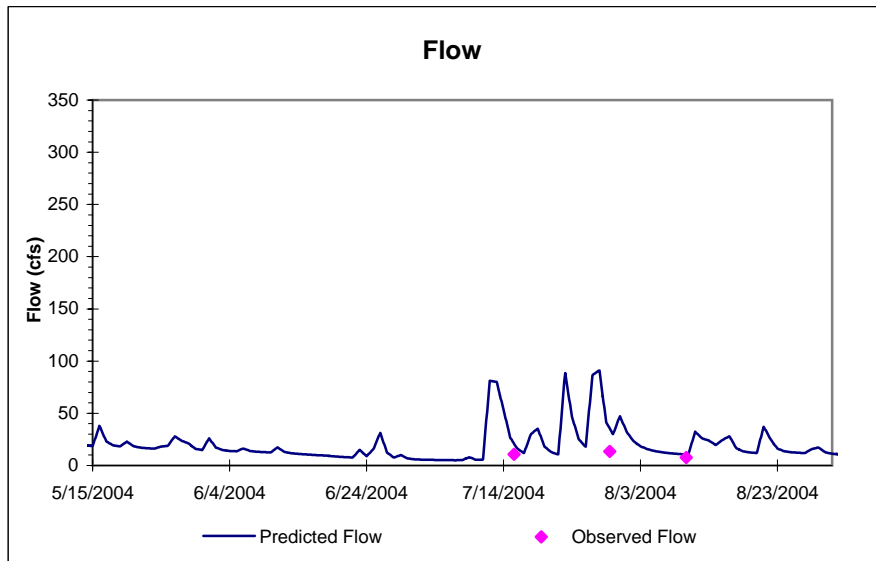
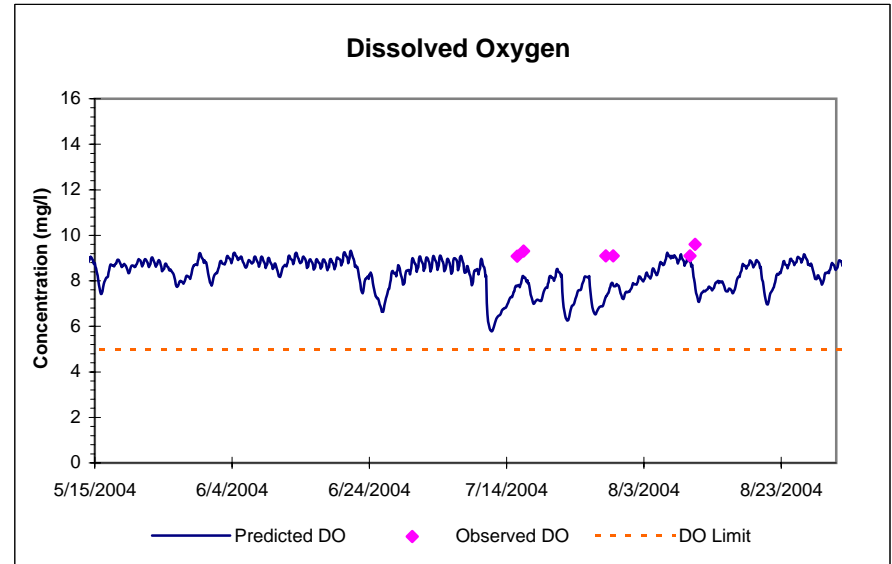
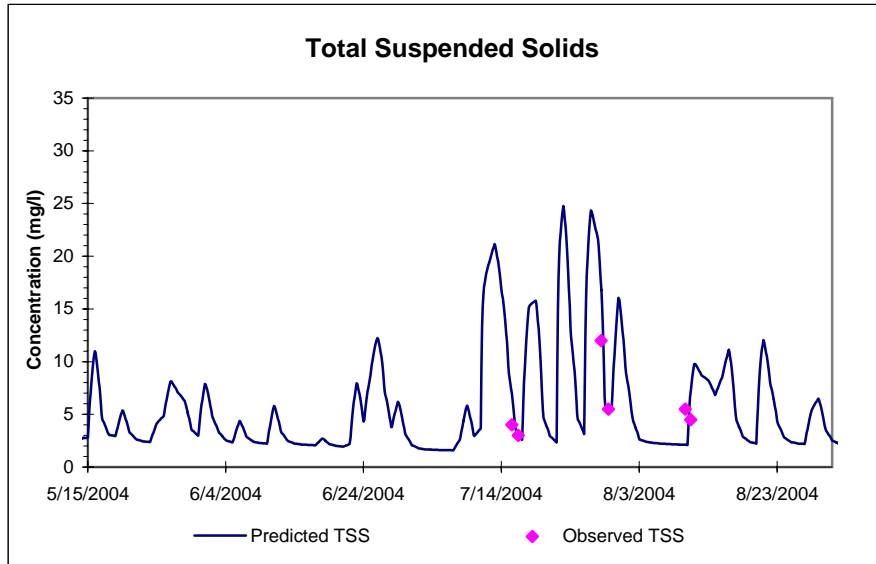
### Water Quality Model Calibration Graphs

North South Branch Raritan River Watershed Area Model  
Water Quality Model Calibration Graphs

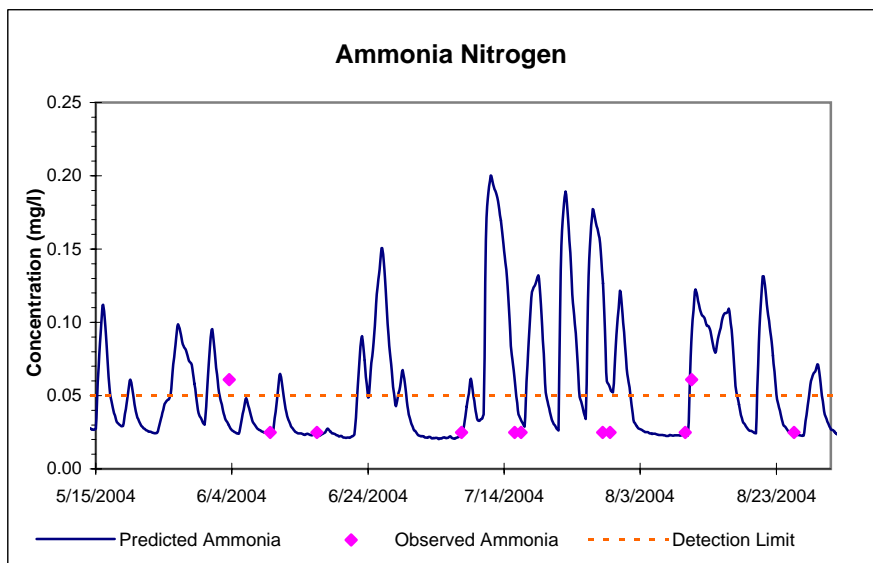
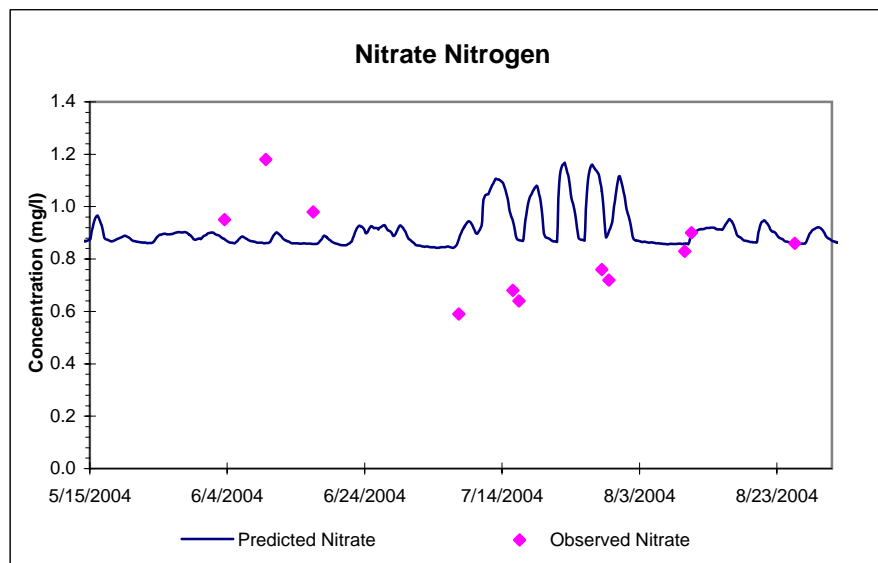
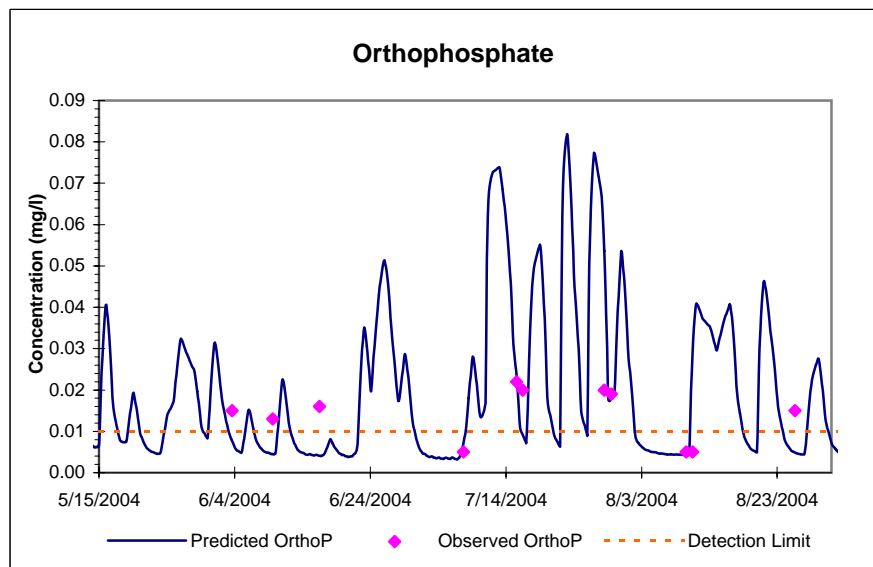
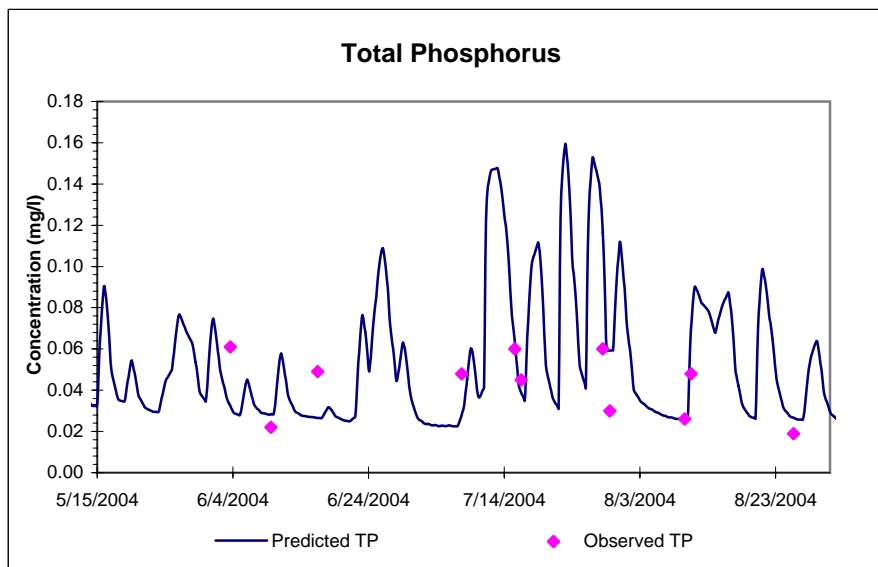
## South Branch Raritan River at Bartley-Drakestown Road in Mount Olive (SBRR1)



## South Branch Raritan River at Bartley-Drakestown Road in Mount Olive (SBRR1)

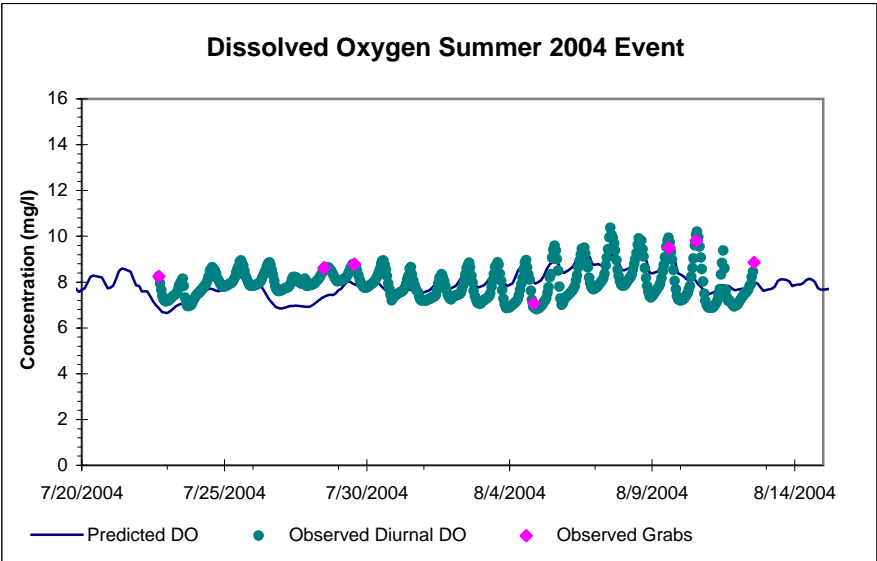
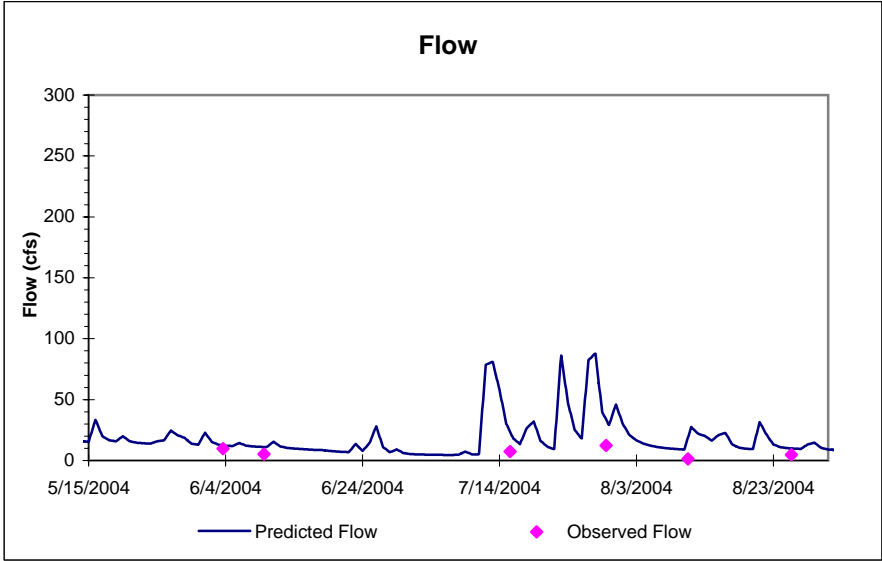
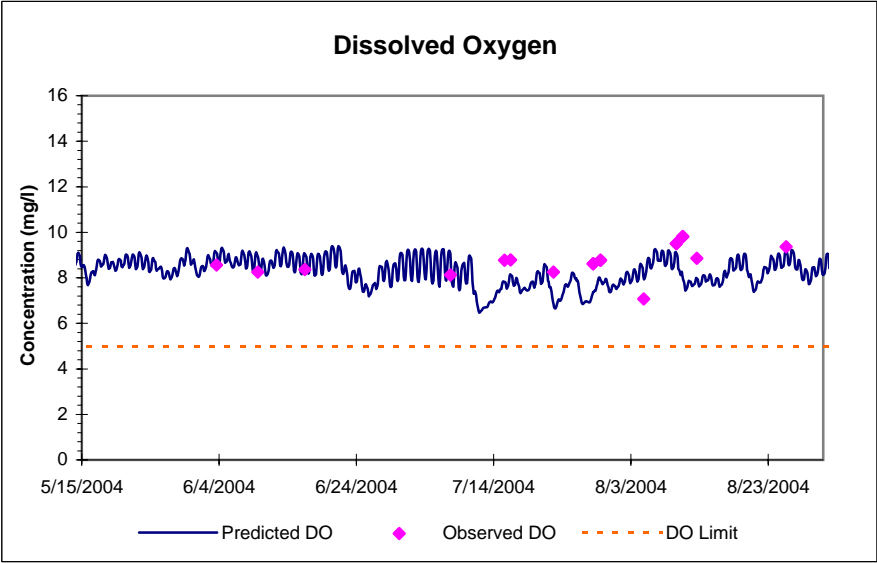
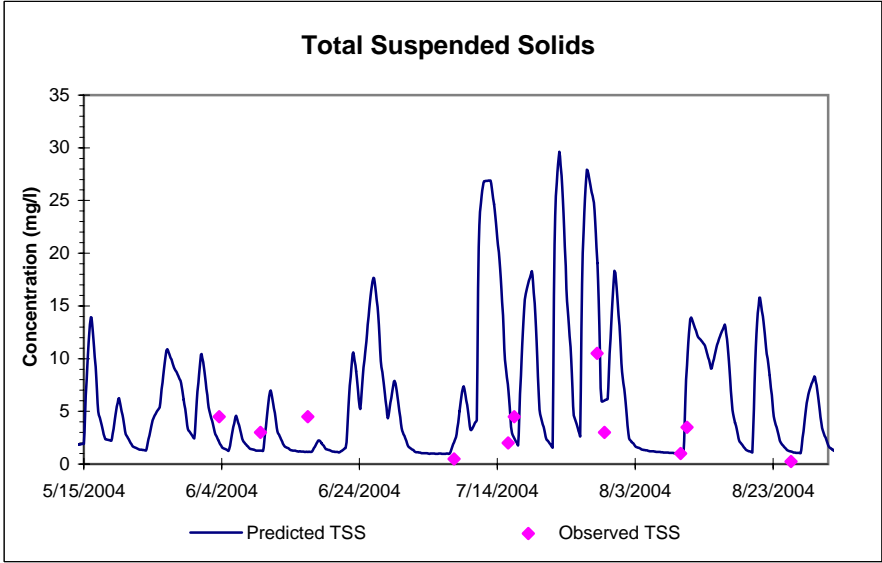


## Drakes Brook Upstream of Mt. Olive STP in Mount Olive (DkB1)

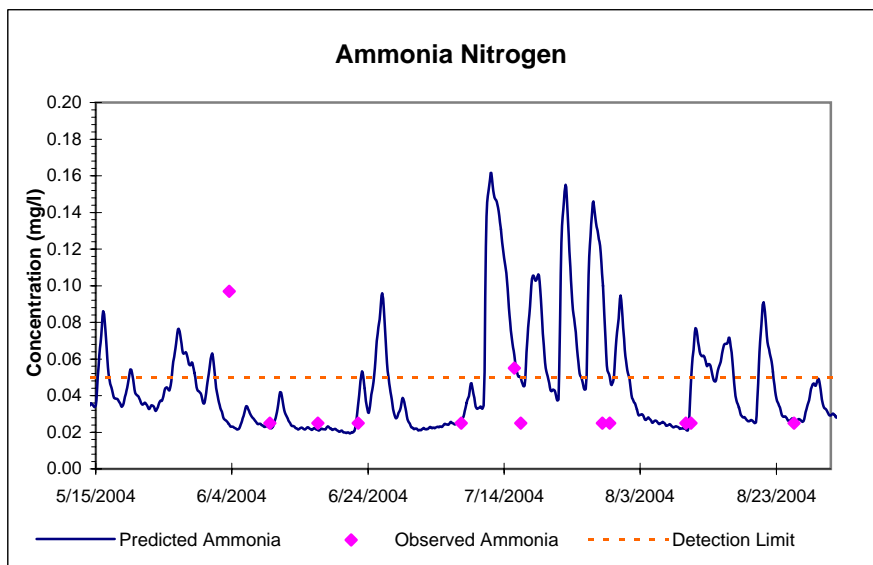
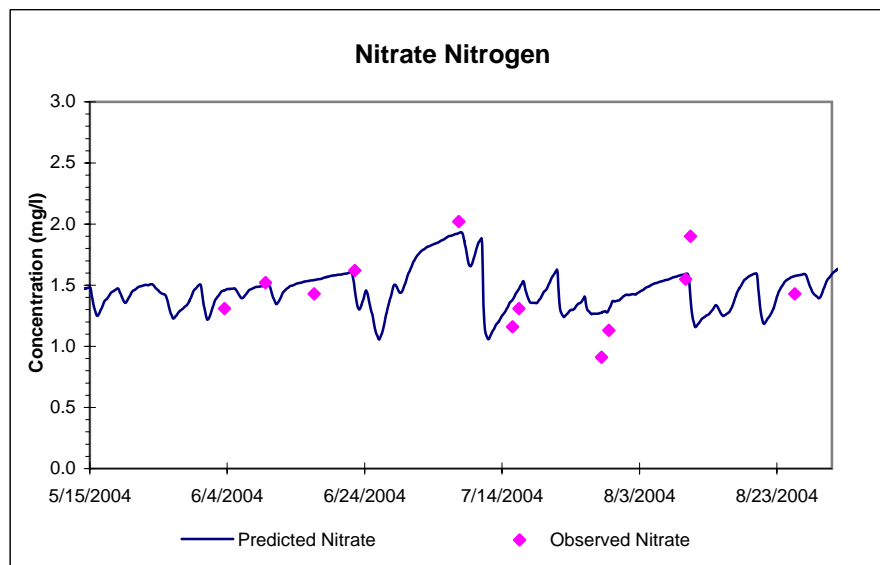
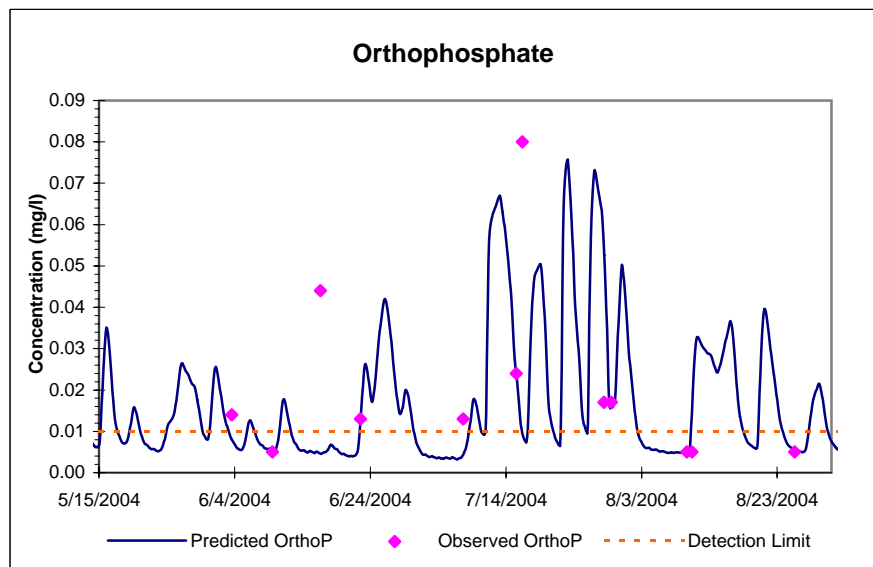
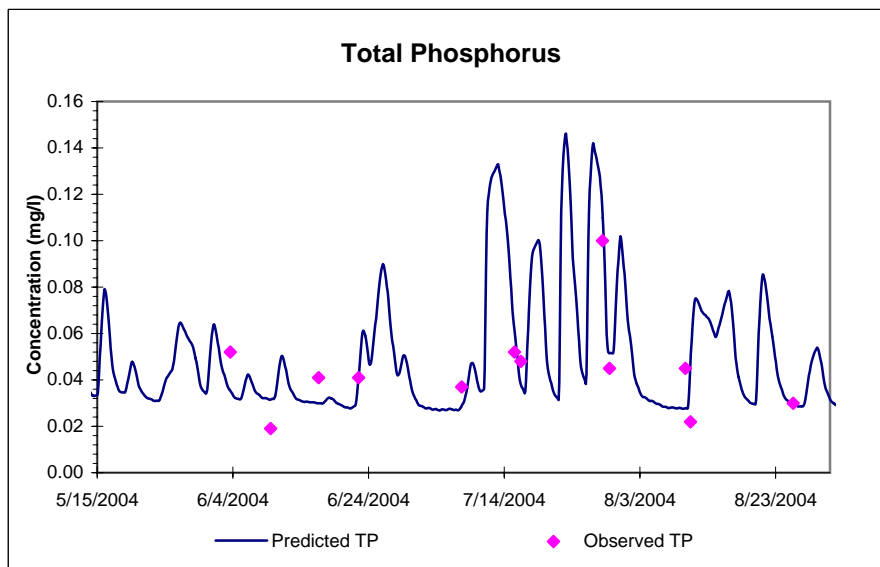




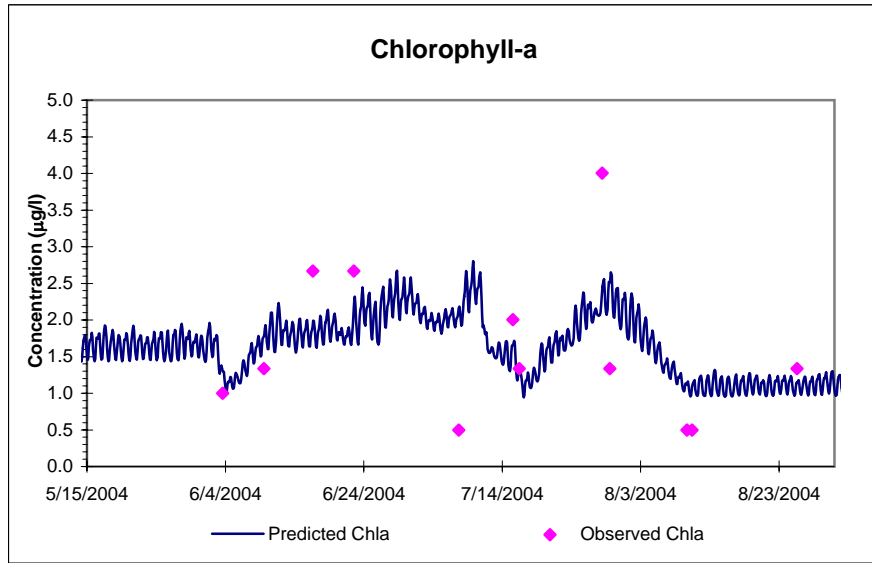
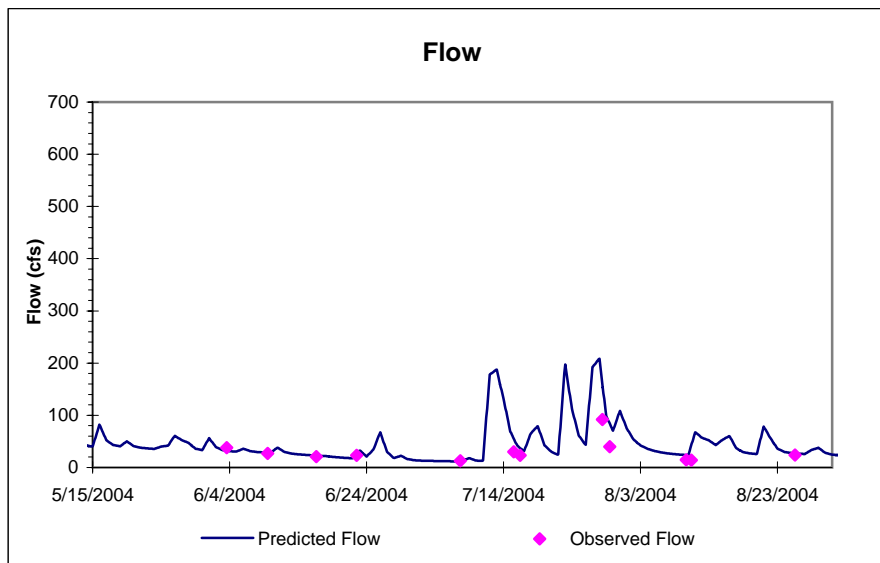
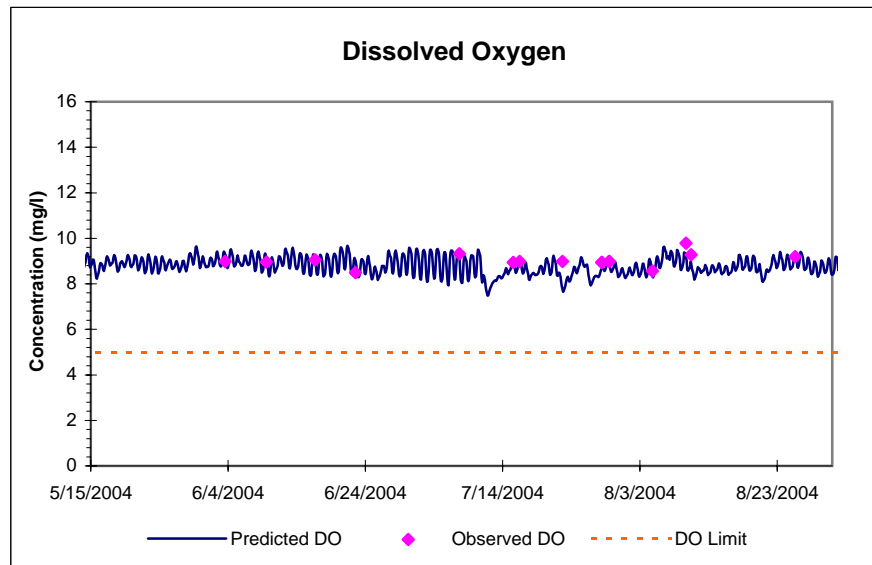
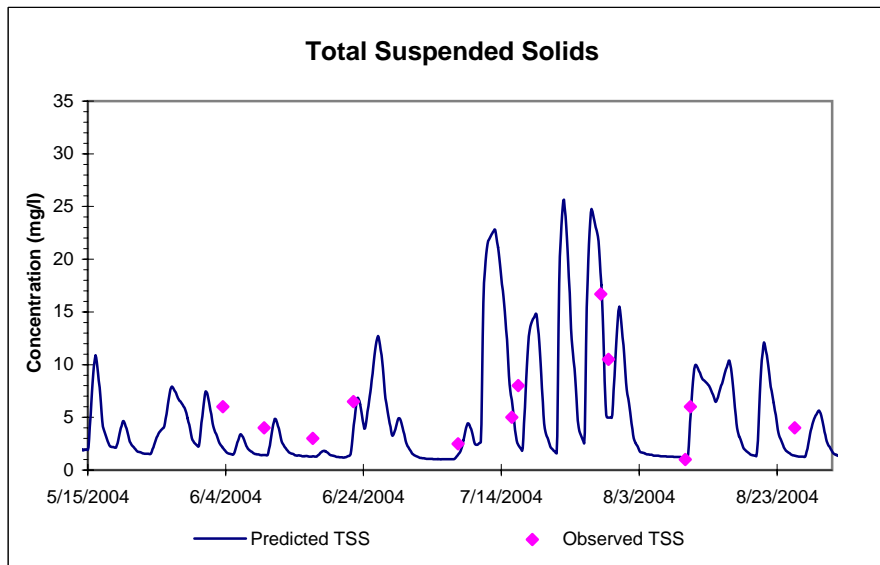
# Drakes Brook Upstream of Mt. Olive STP in Mount Olive (DkB1)



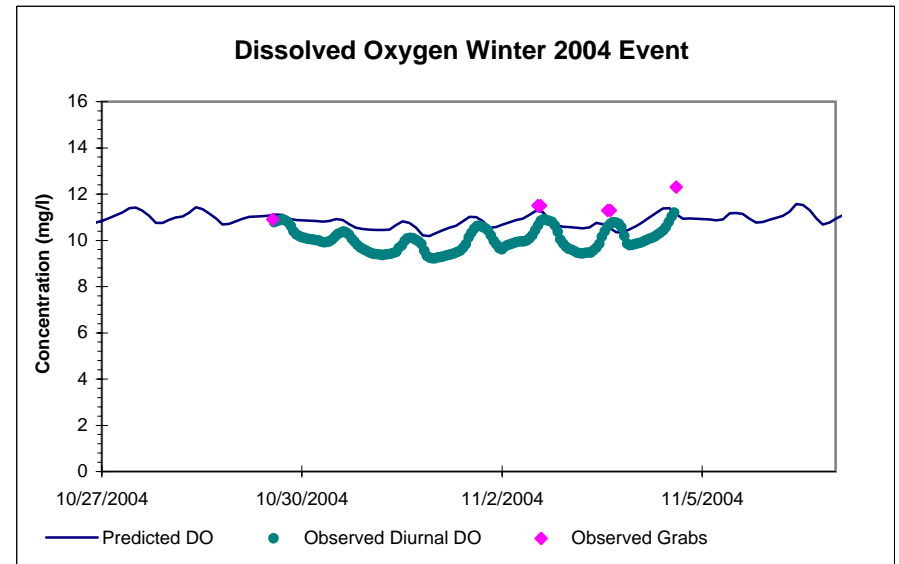
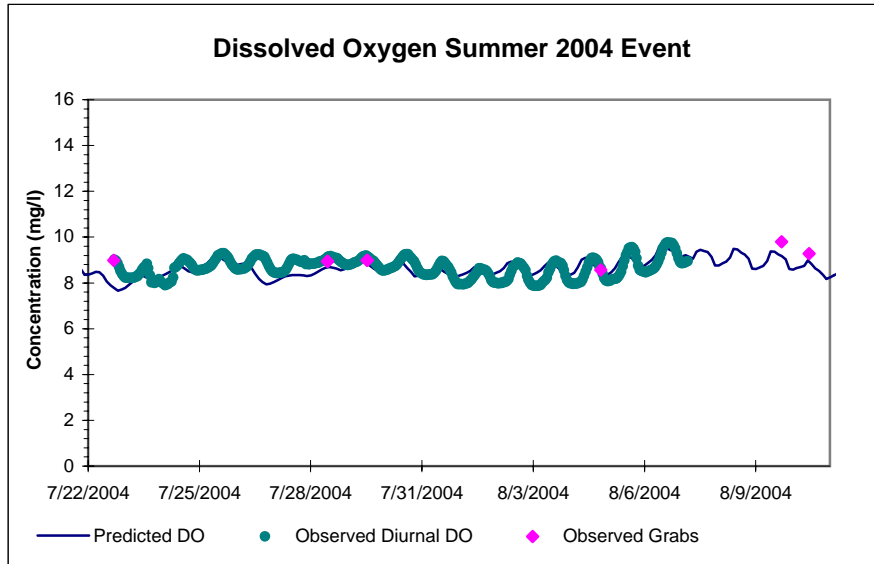
## South Branch Raritan River at Four Bridges (SBRR2, USGS 01396190)



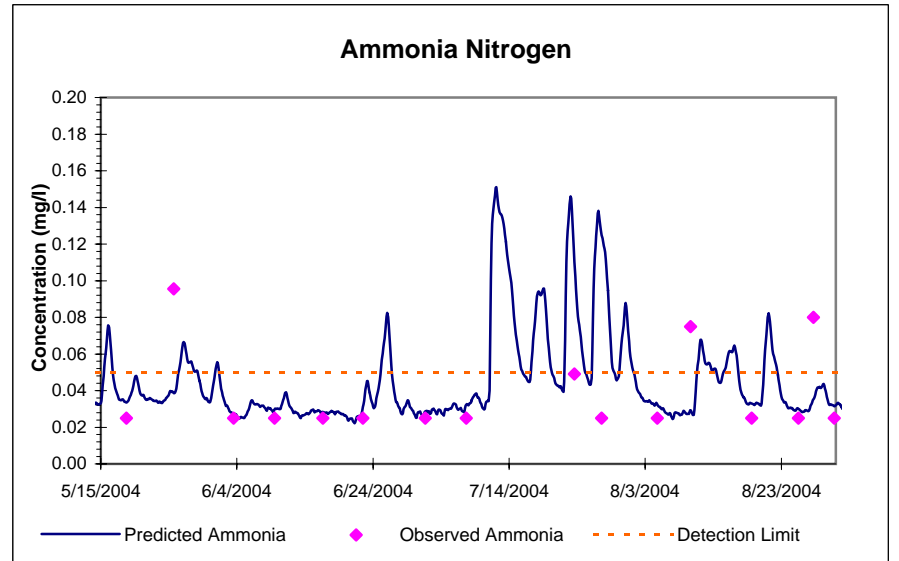
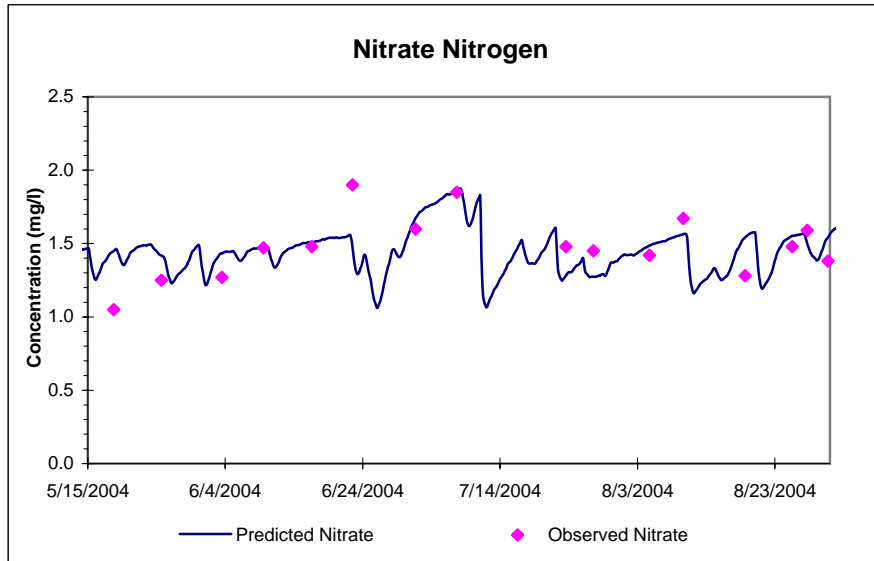
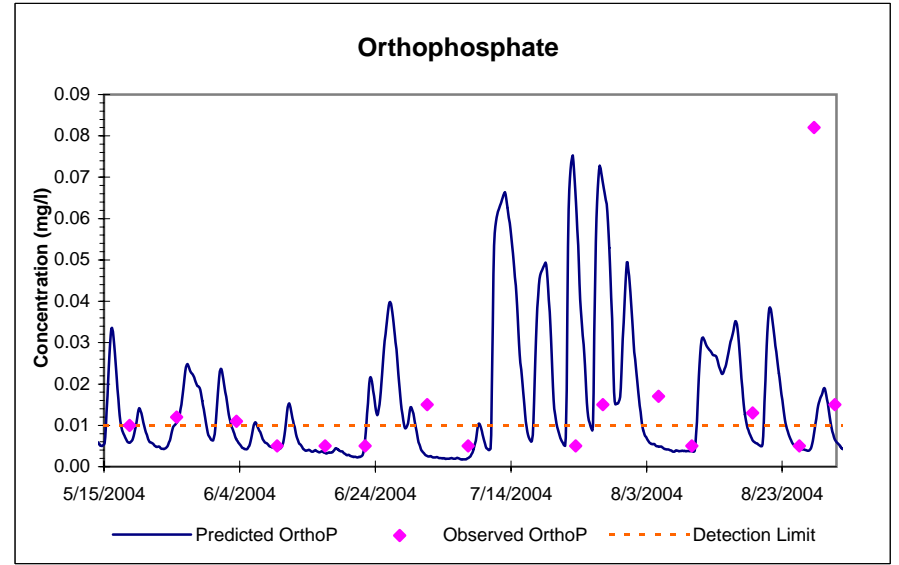
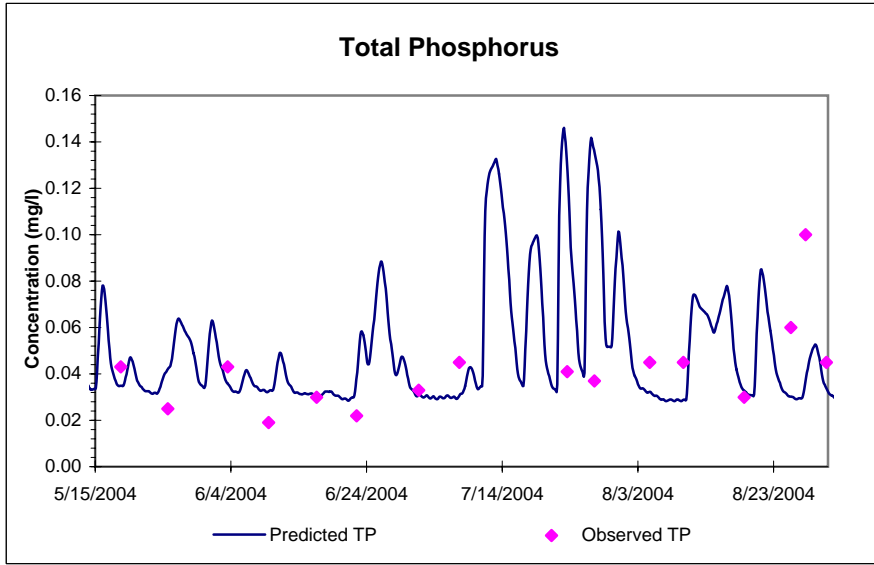
## South Branch Raritan River at Four Bridges (SBRR2, USGS 01396190)



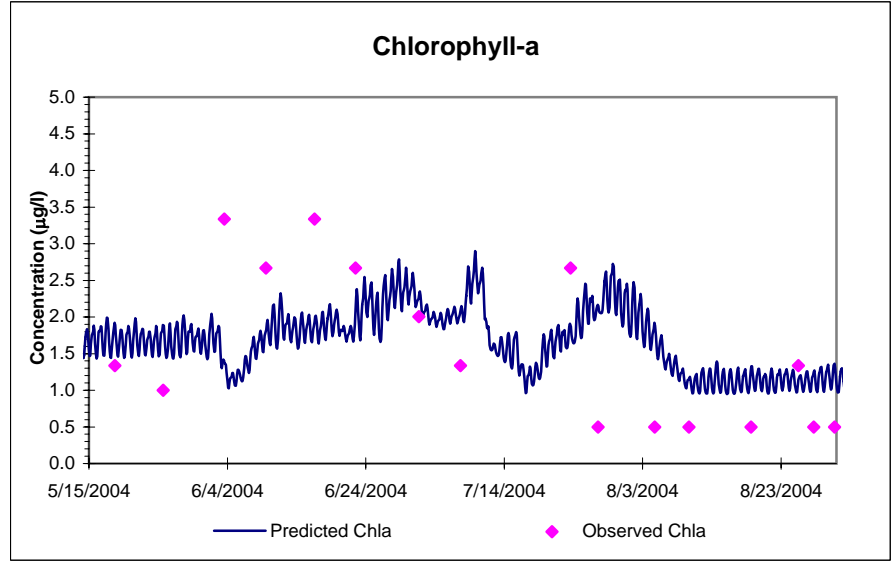
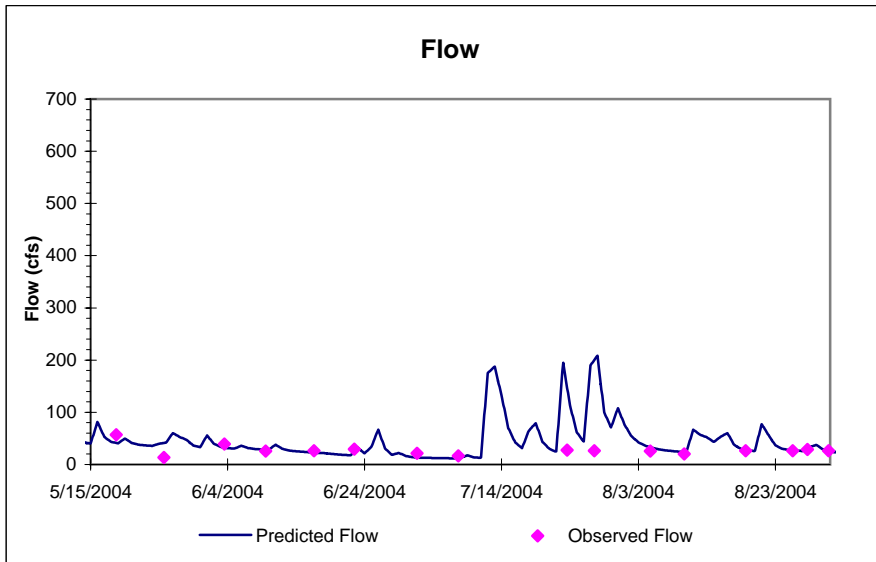
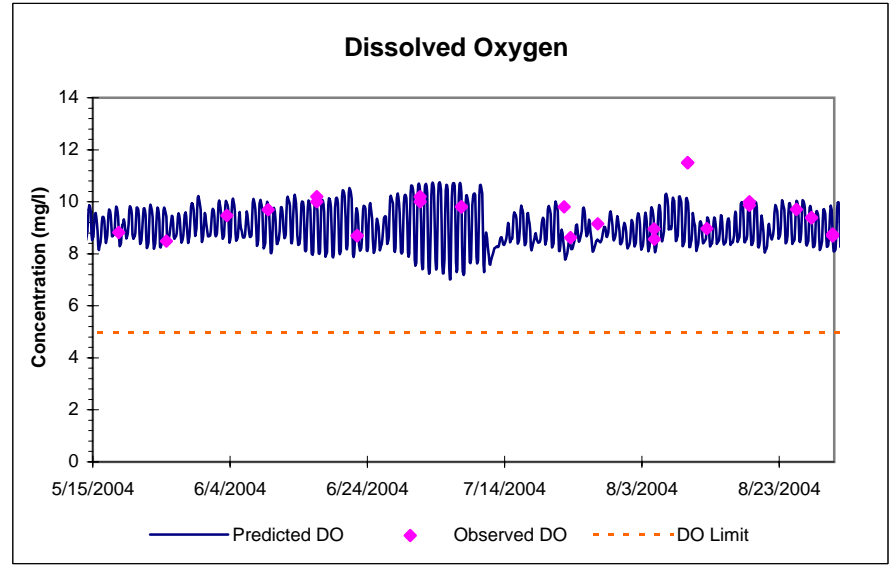
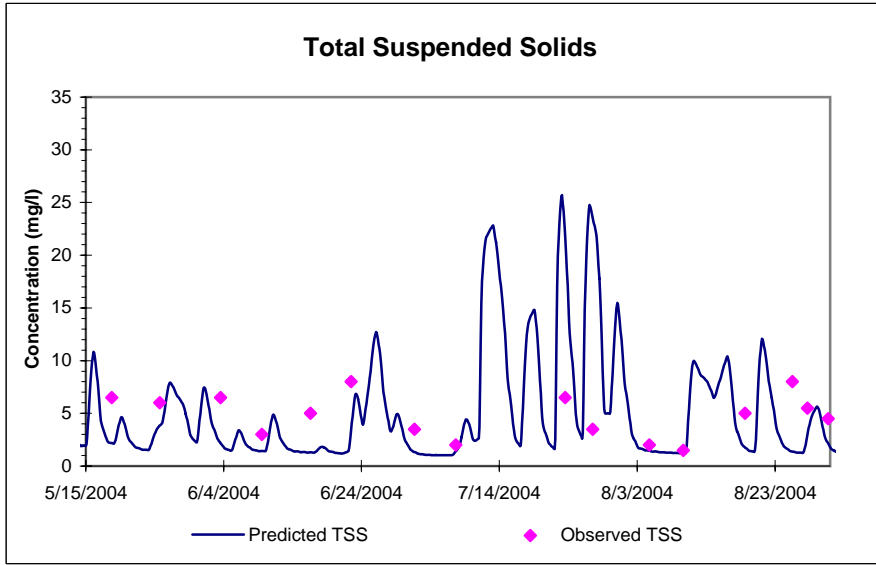
## South Branch Raritan River at Four Bridges (SBRR2, USGS 01396190)



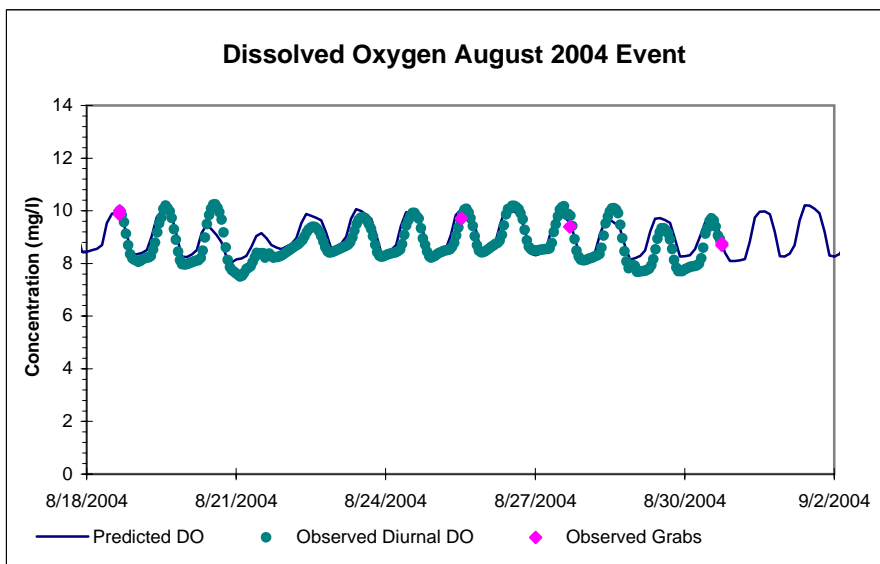
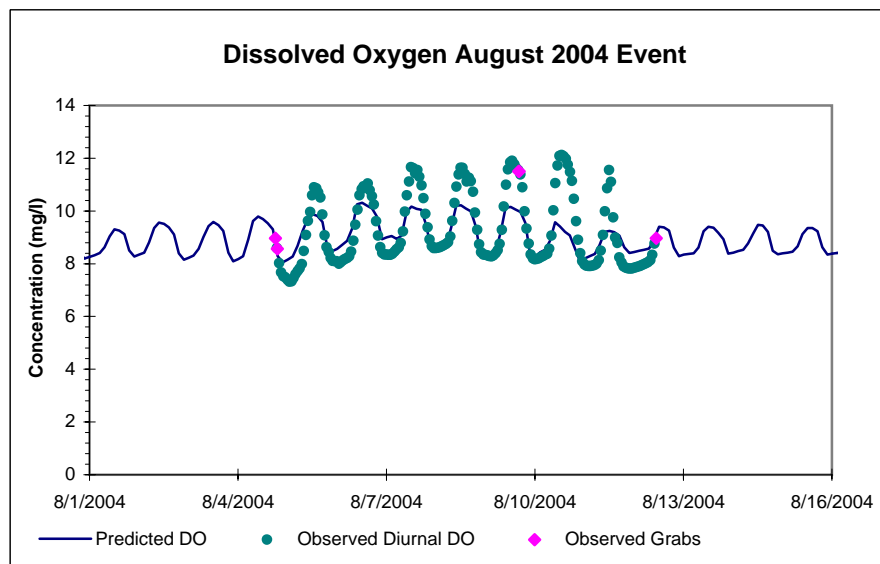
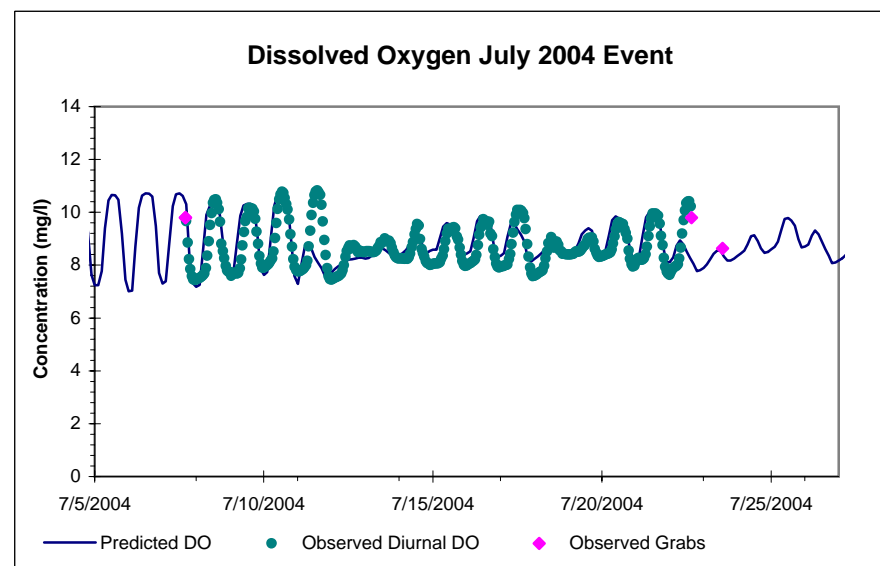
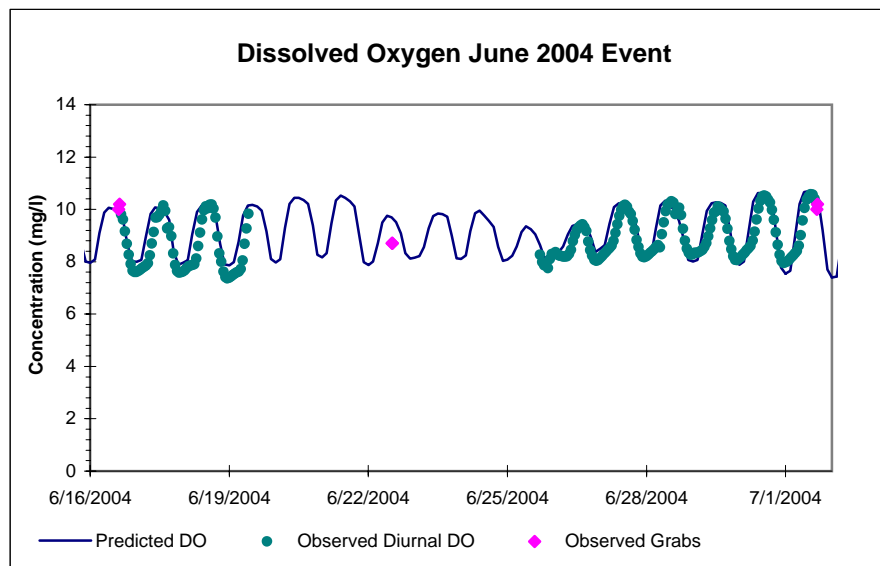
# South Branch Raritan River Upstream of Schooley's Mt. STP in Washington Twp. (SBR1)



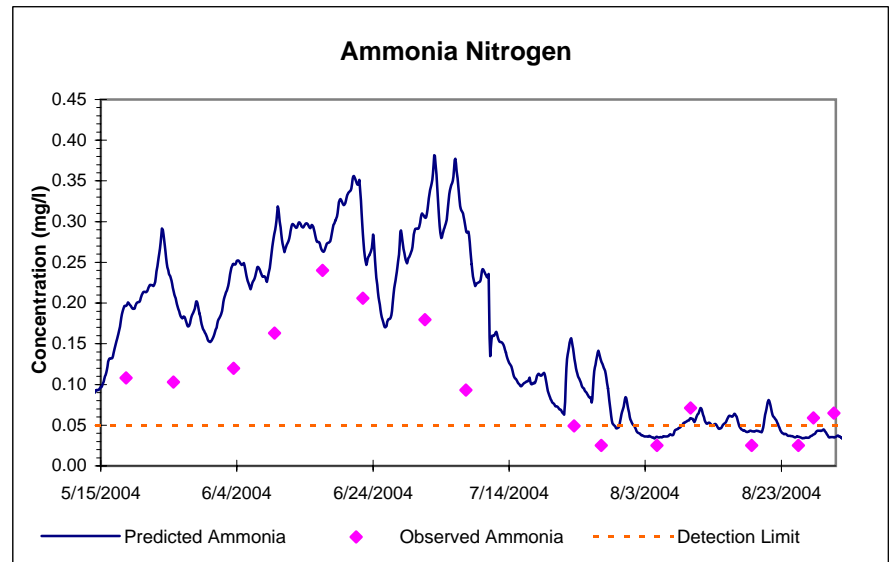
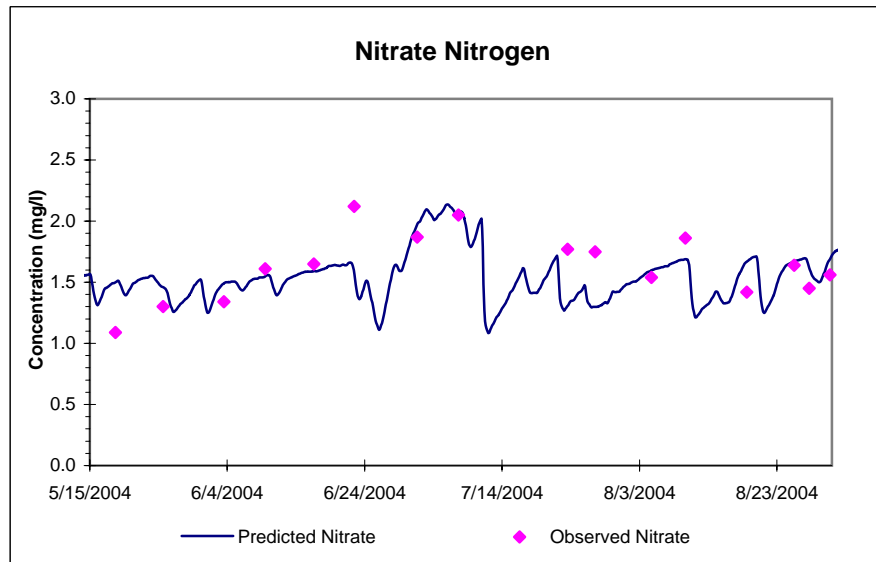
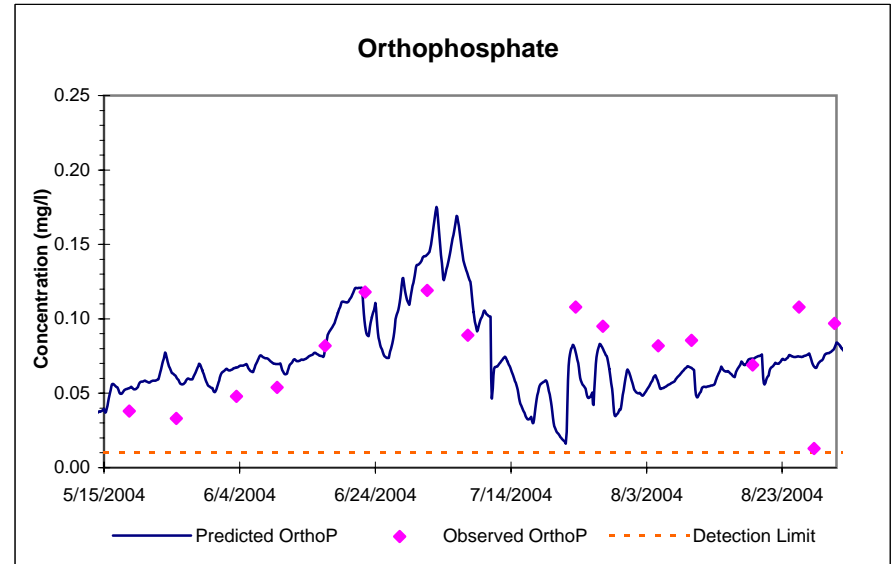
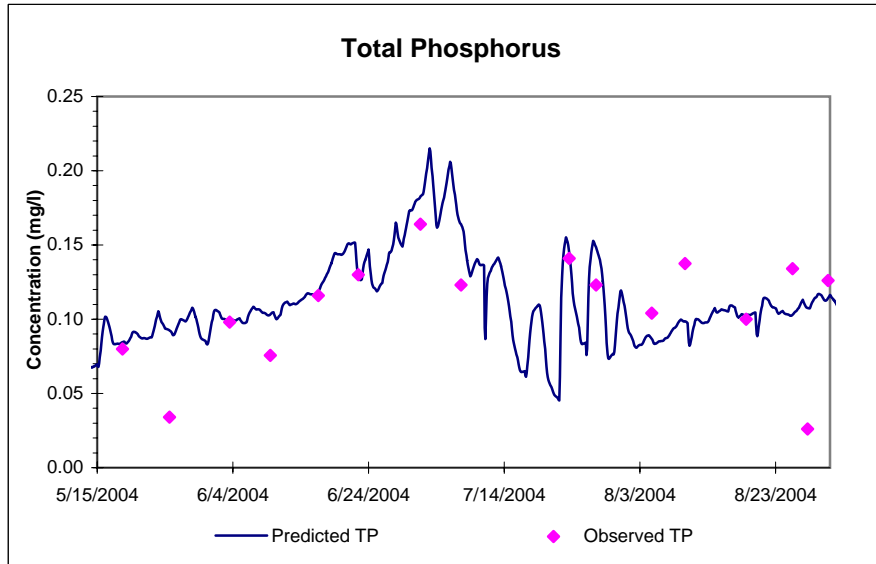
# South Branch Raritan River Upstream of Schooley's Mt. STP in Washington Twp. (SBR1)



## South Branch Raritan River Upstream of Schooley's Mt. STP in Washington Twp. (SBR1)

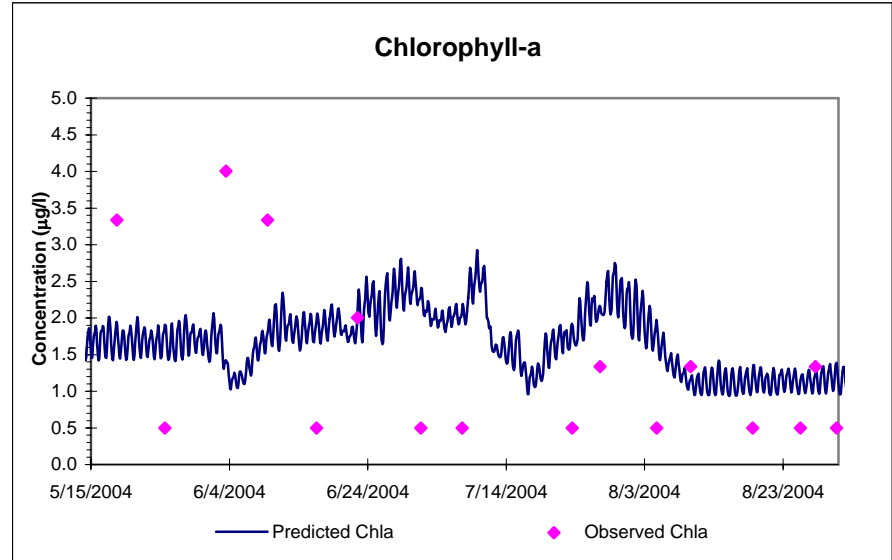
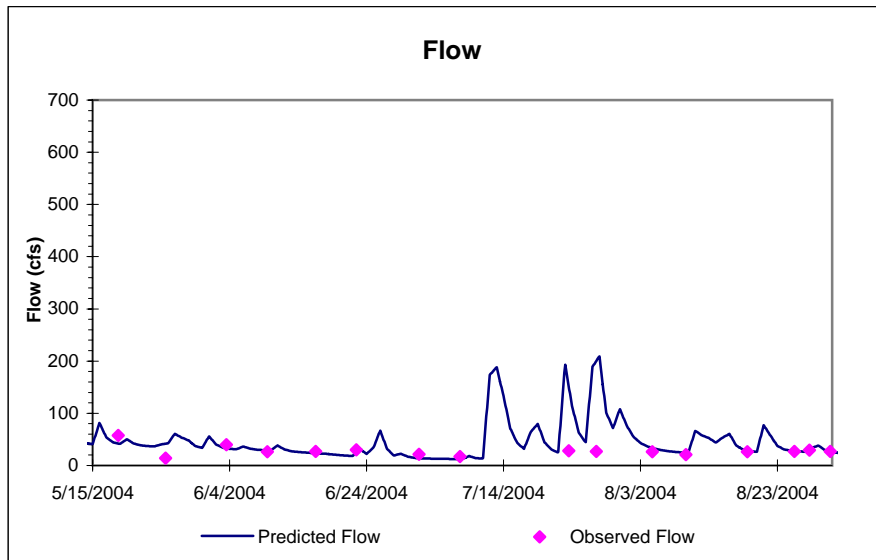
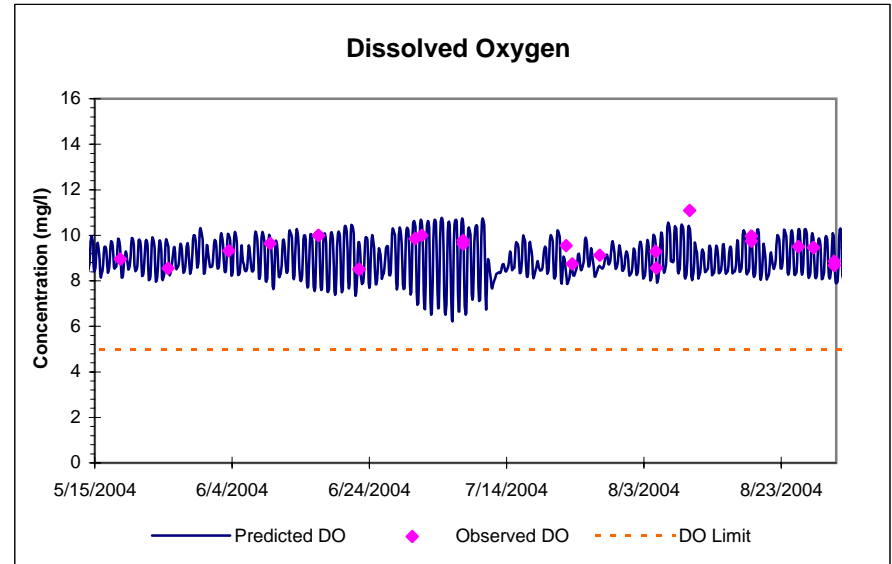
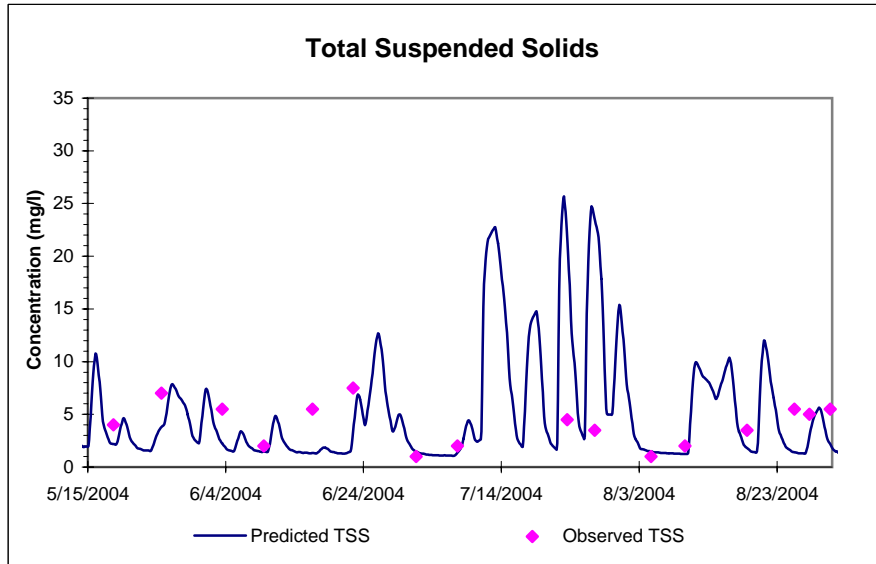


## South Branch Raritan River Downstream of Schooley's Mt. STP in Washington Twp. (SBR2)

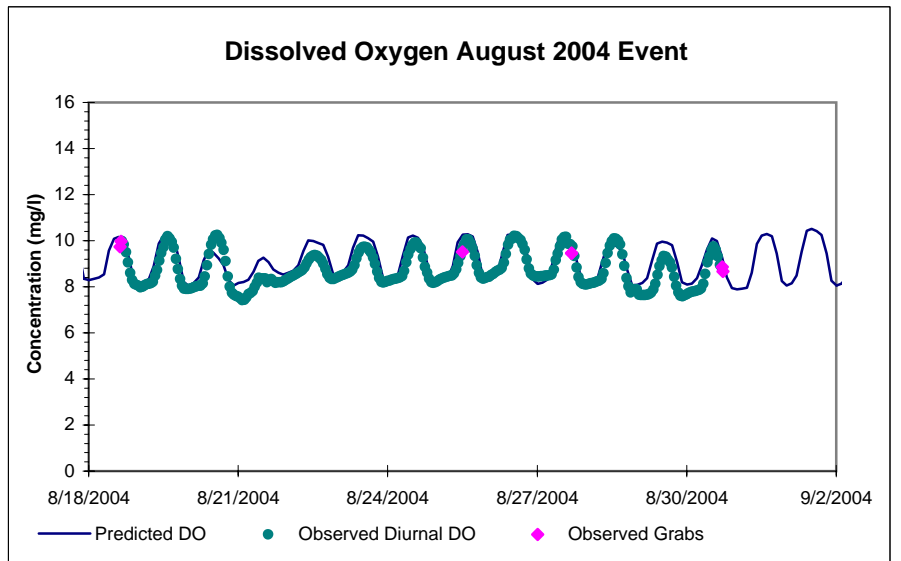
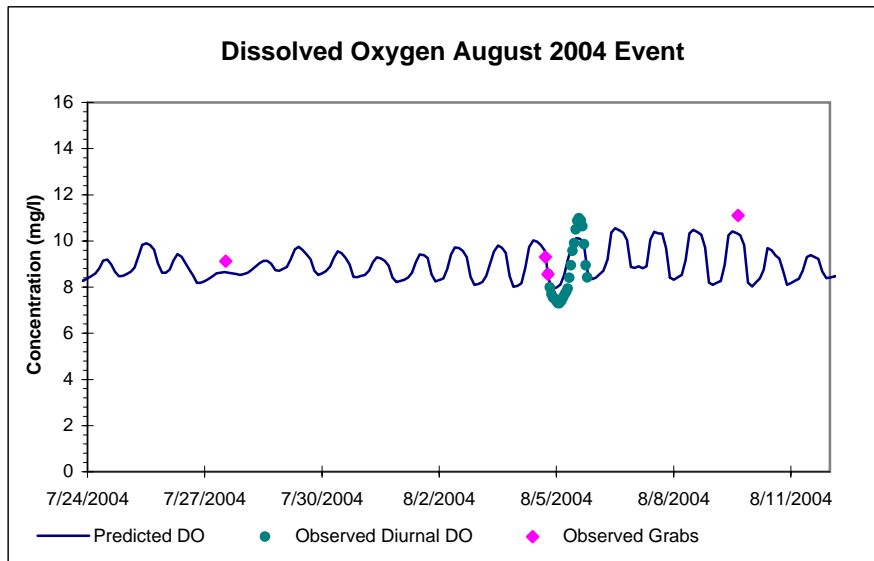
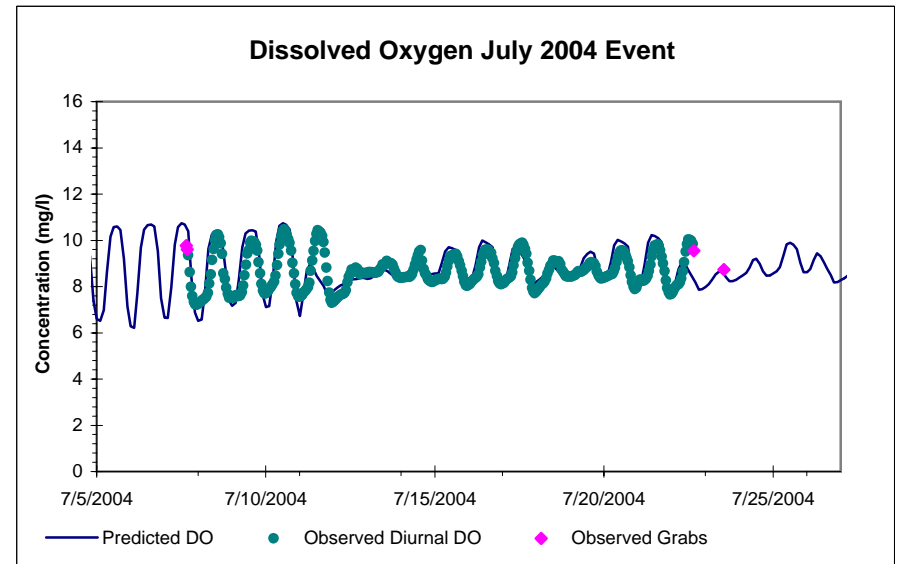
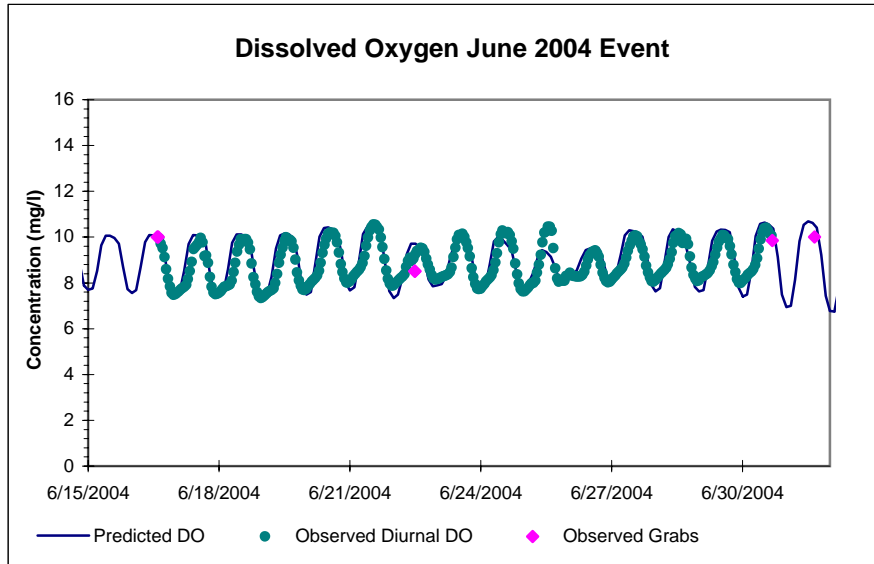




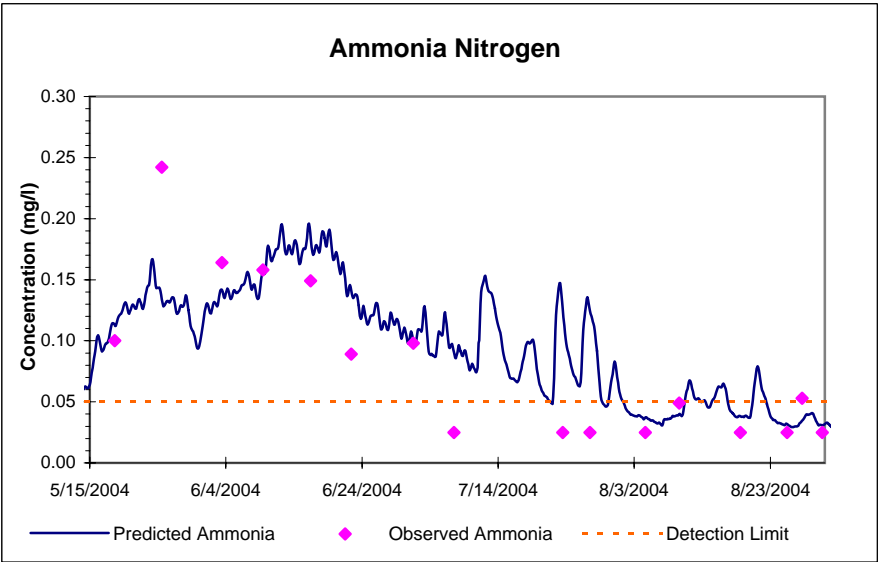
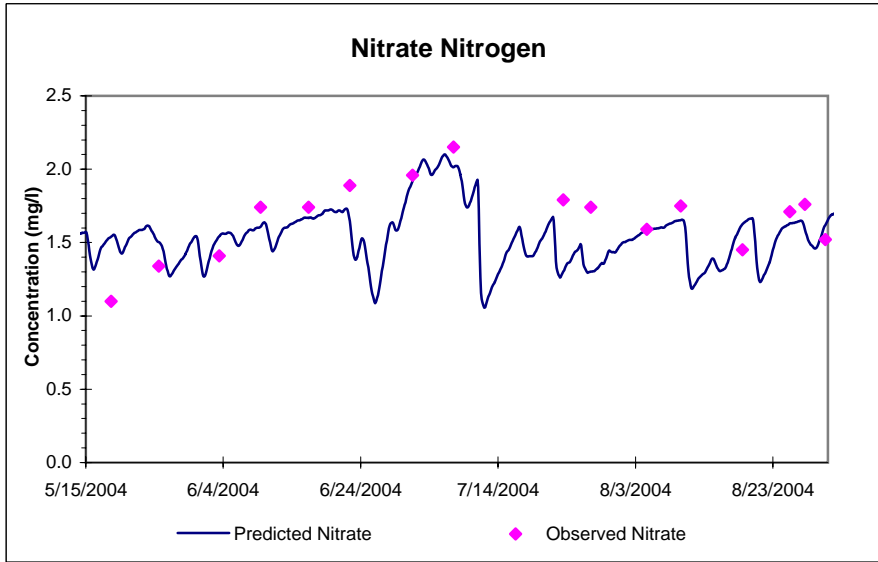
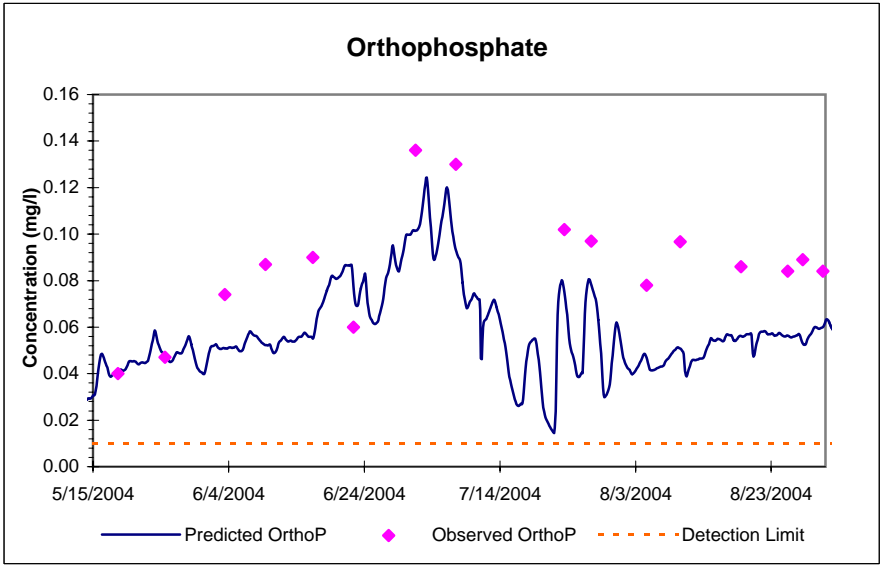
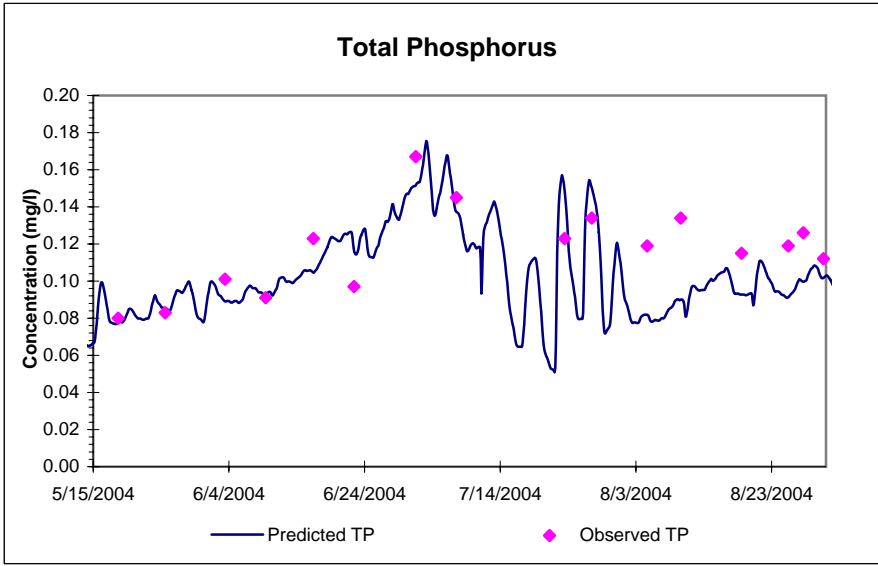
## South Branch Raritan River Downstream of Schooley's Mt. STP in Washington Twp. (SBR2)



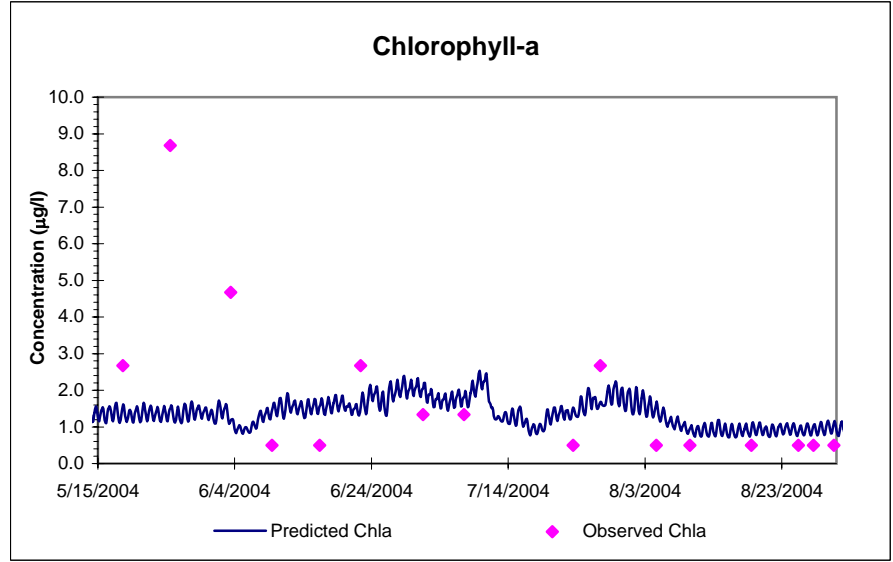
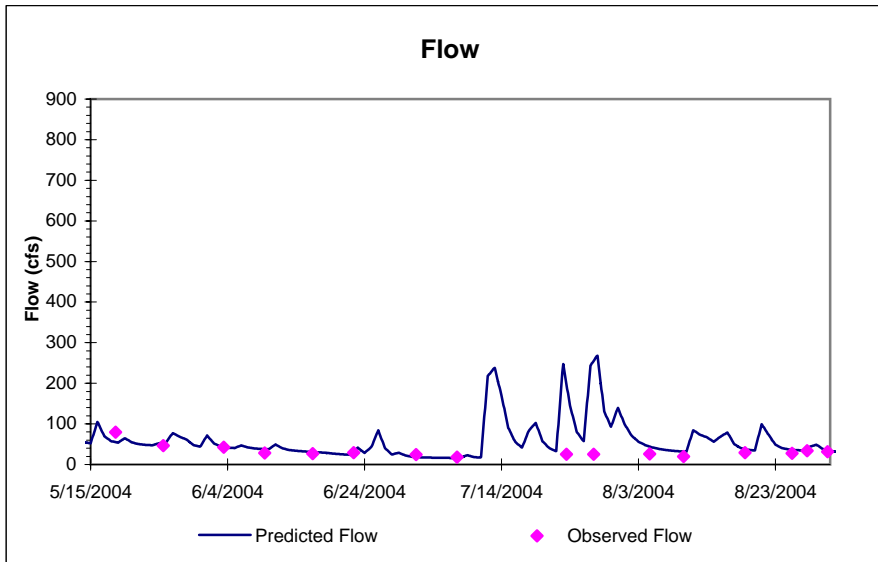
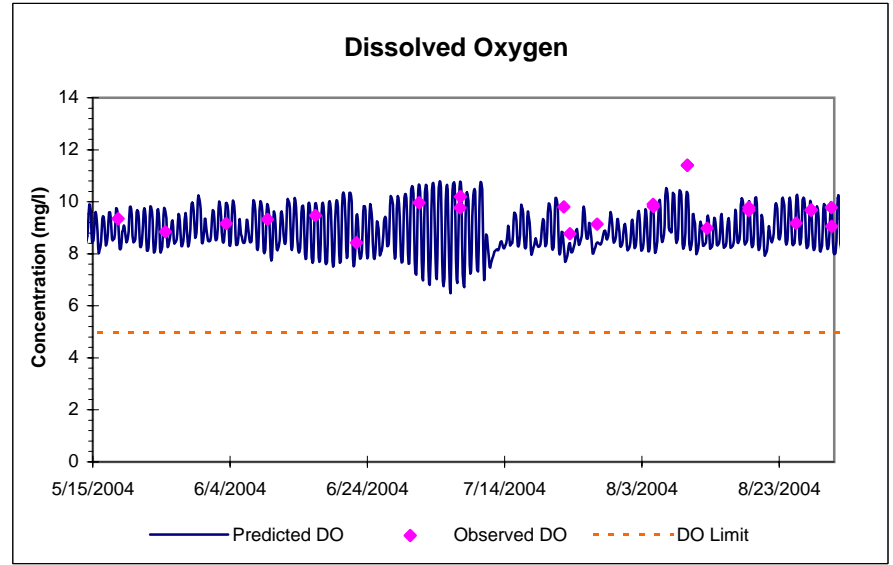
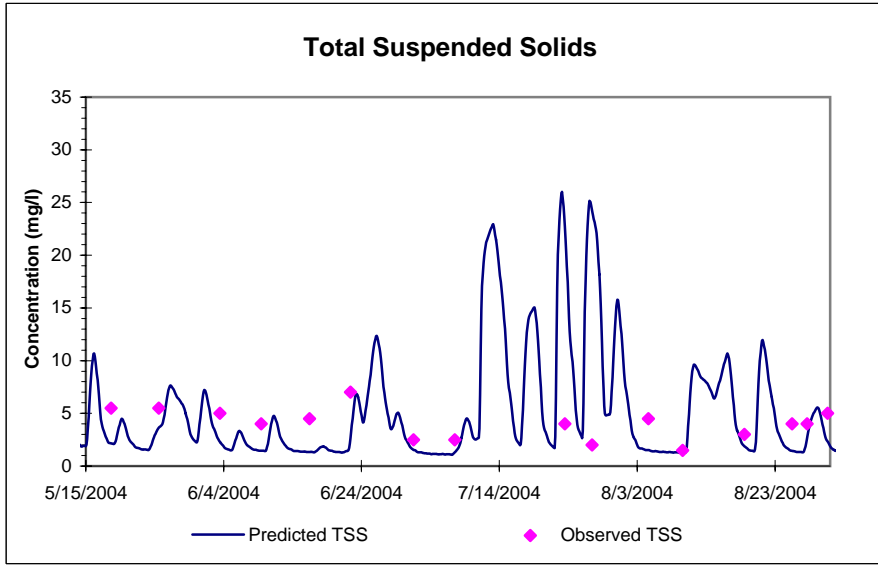
## South Branch Raritan River Downstream of Schooley's Mt. STP in Washington Twp. (SBR2)



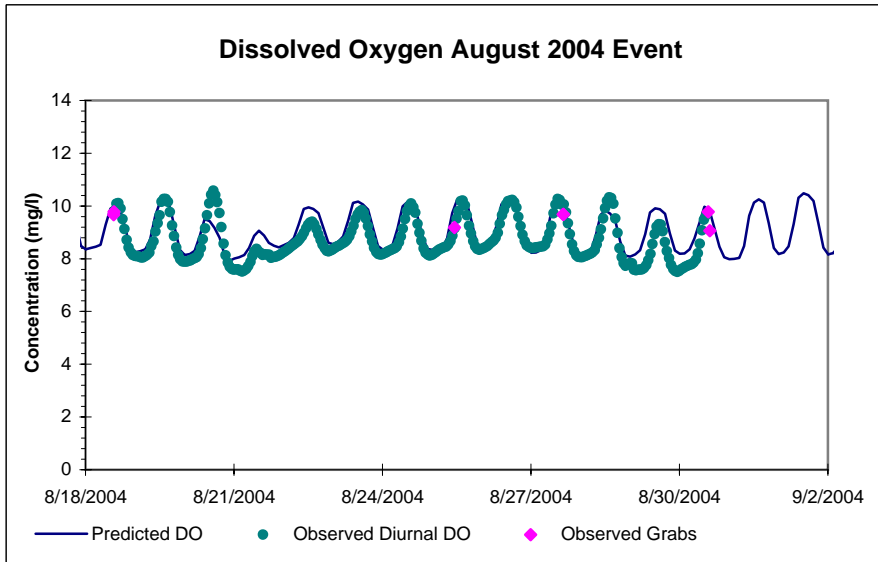
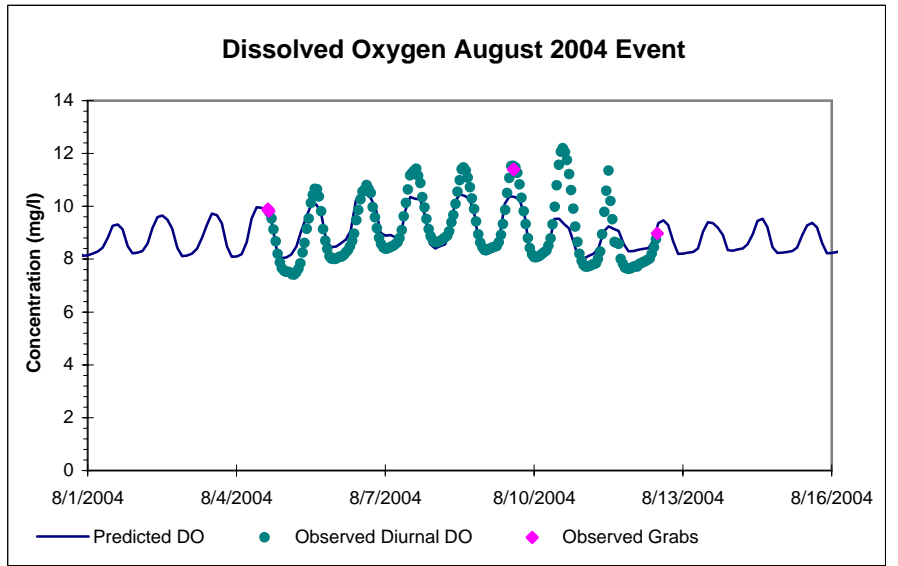
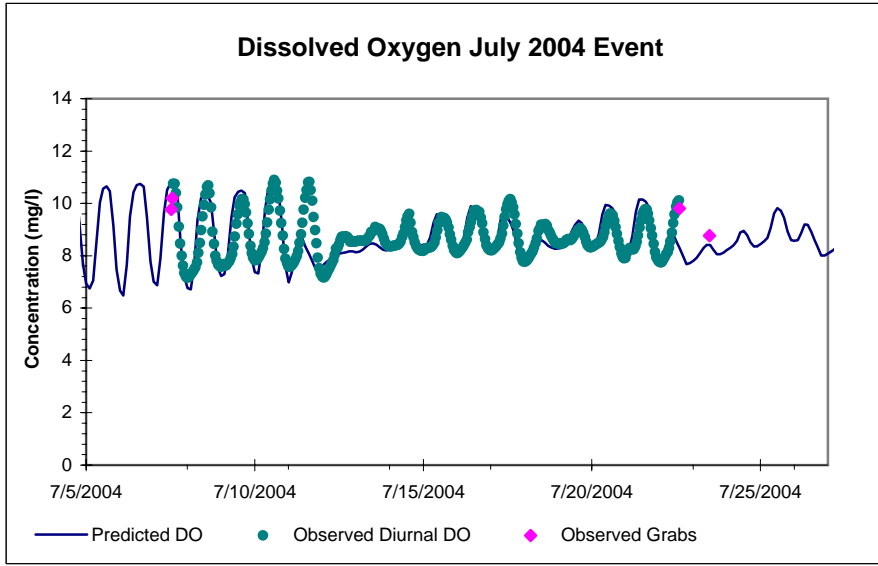
## South Branch Raritan River Downstream of Long Valley STP in Washington Twp. (SBR3)



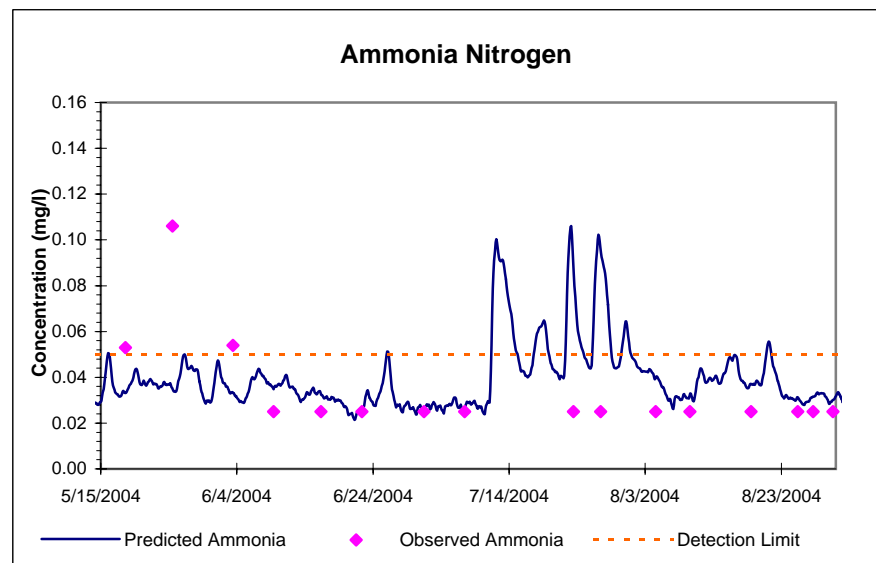
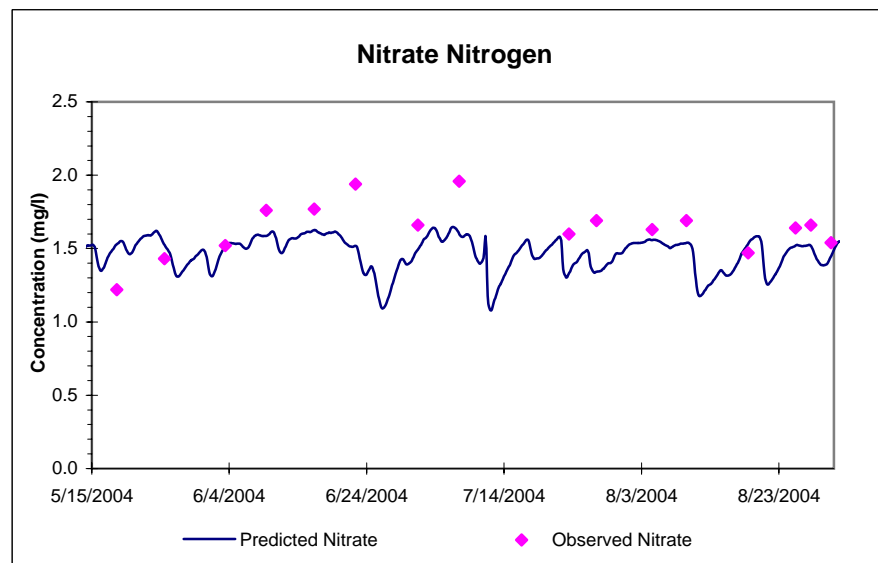
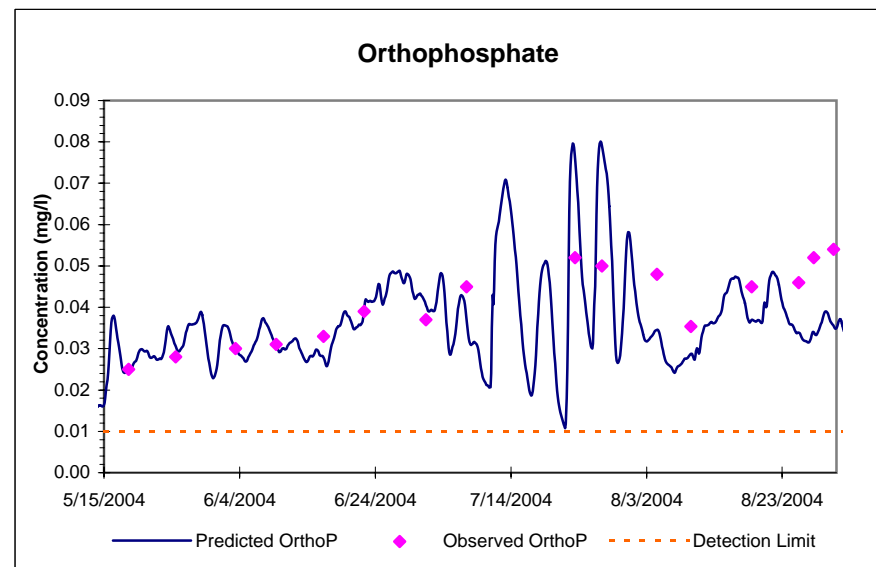
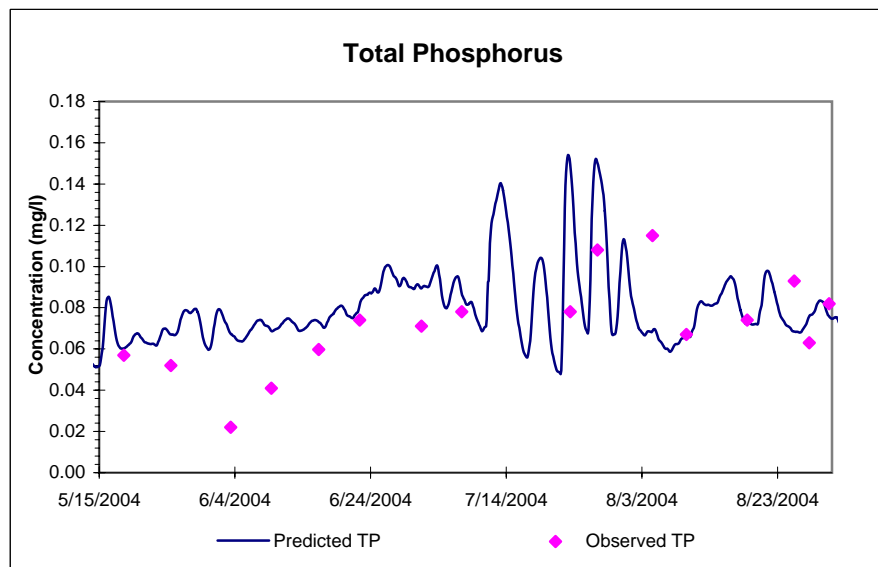
# South Branch Raritan River Downstream of Long Valley STP in Washington Twp. (SBR3)



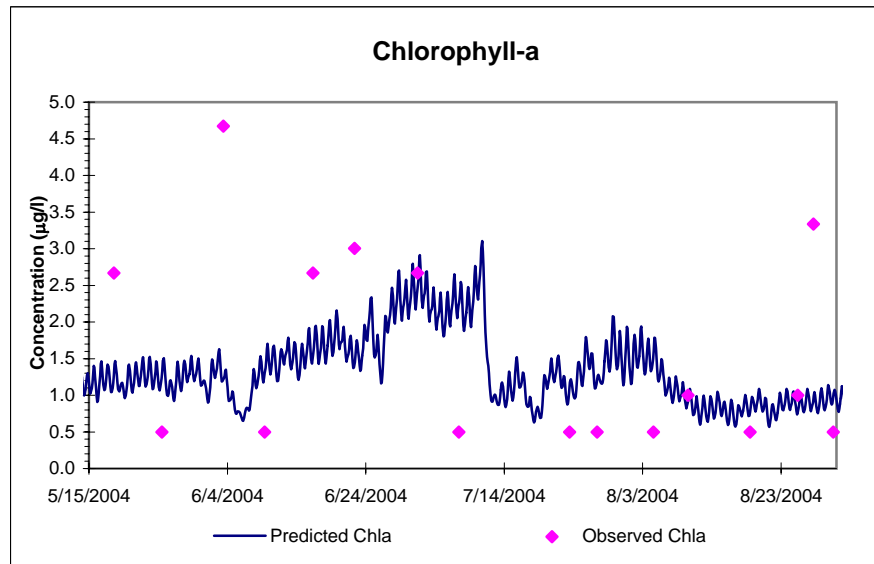
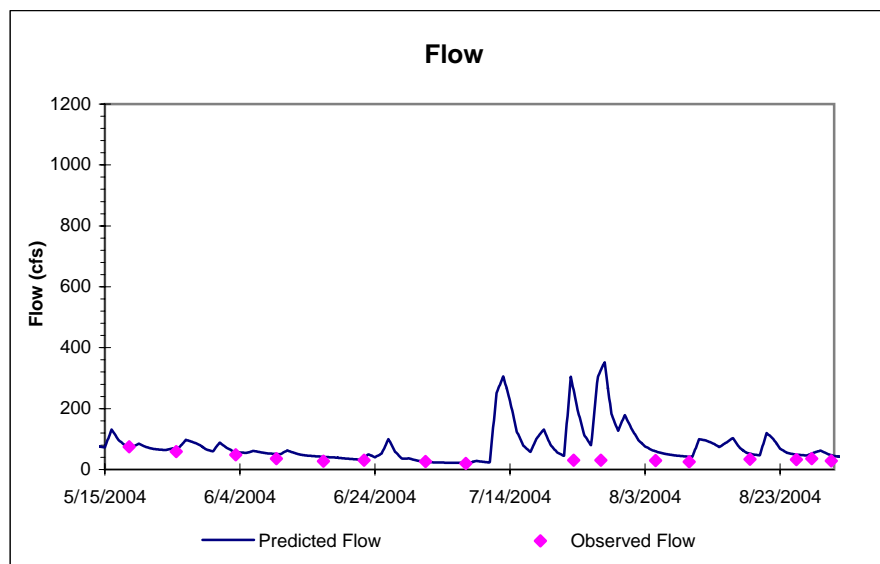
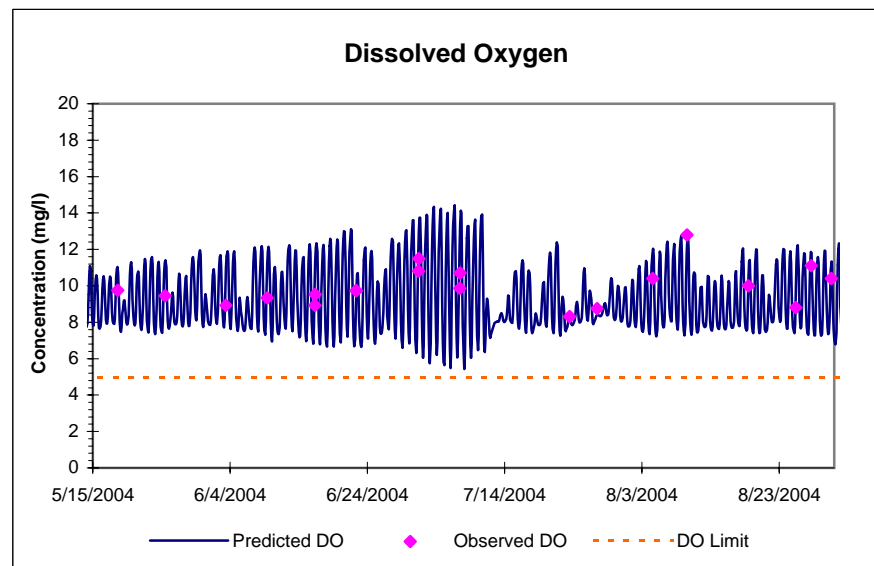
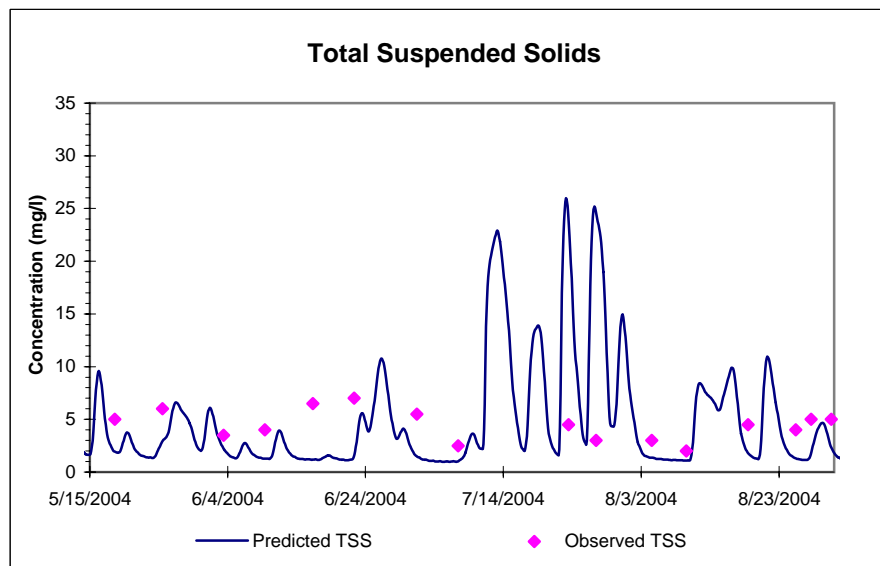
## South Branch Raritan River Downstream of Long Valley STP in Washington Twp. (SBR3)



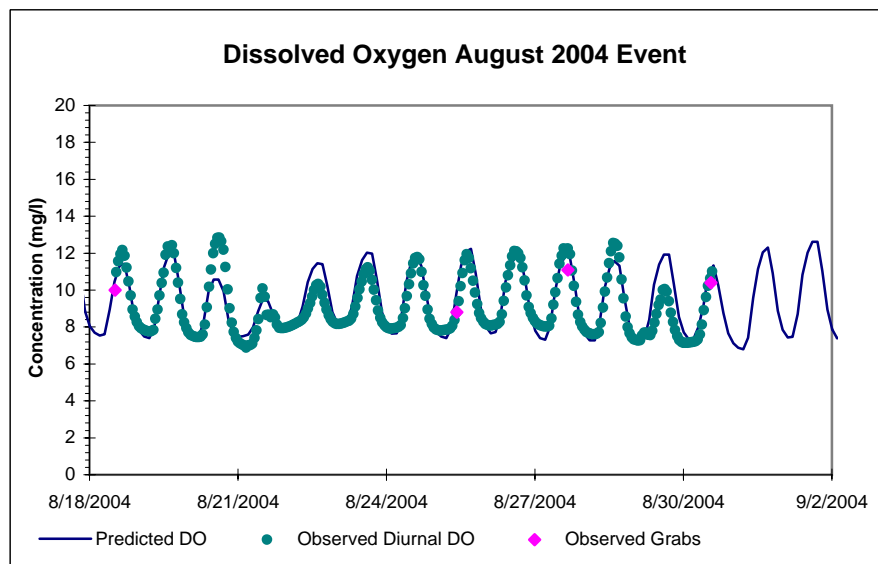
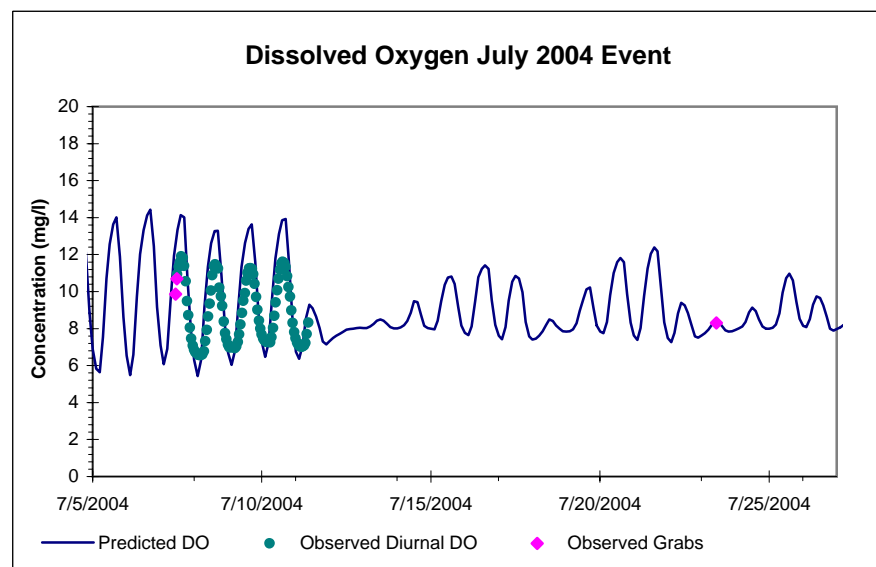
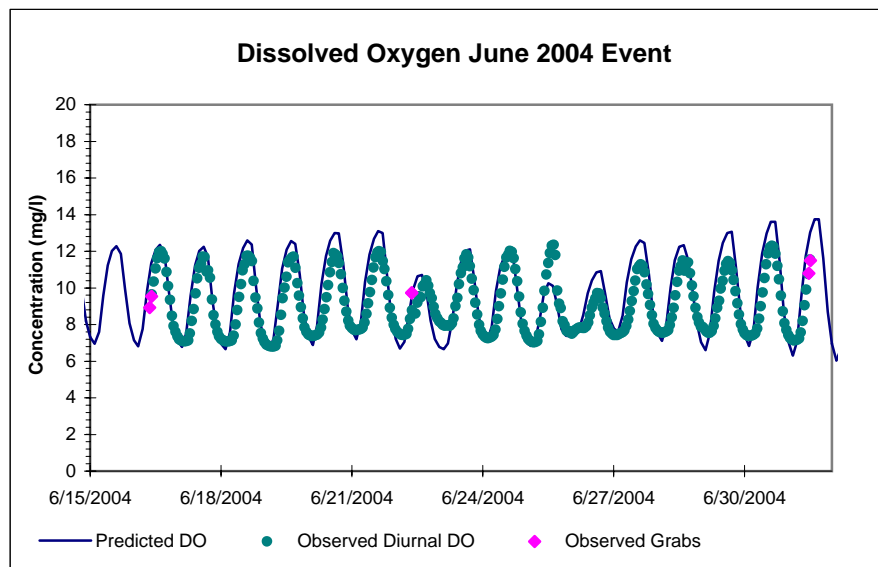
## South Branch Raritan River at Mill Rd. in Middle Valley (SBR4)



## South Branch Raritan River at Mill Rd. in Middle Valley (SBR4)

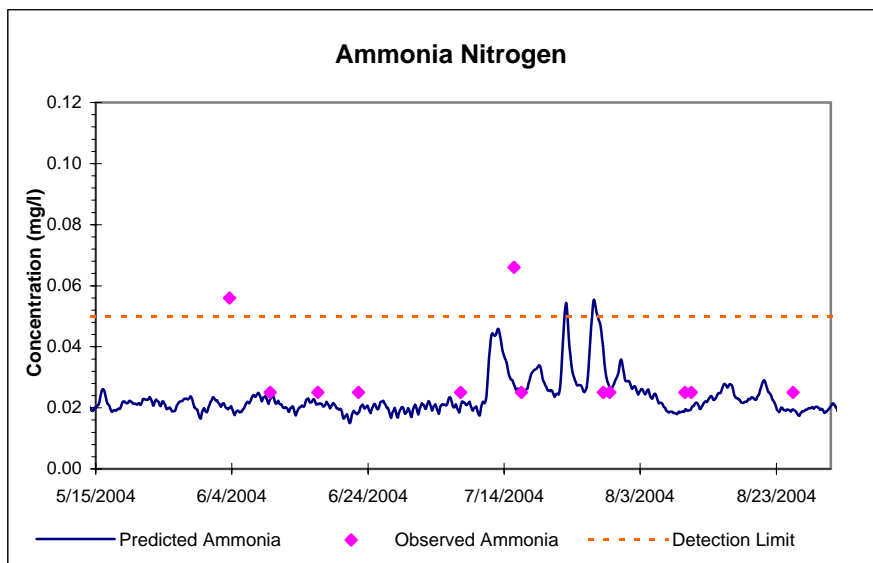
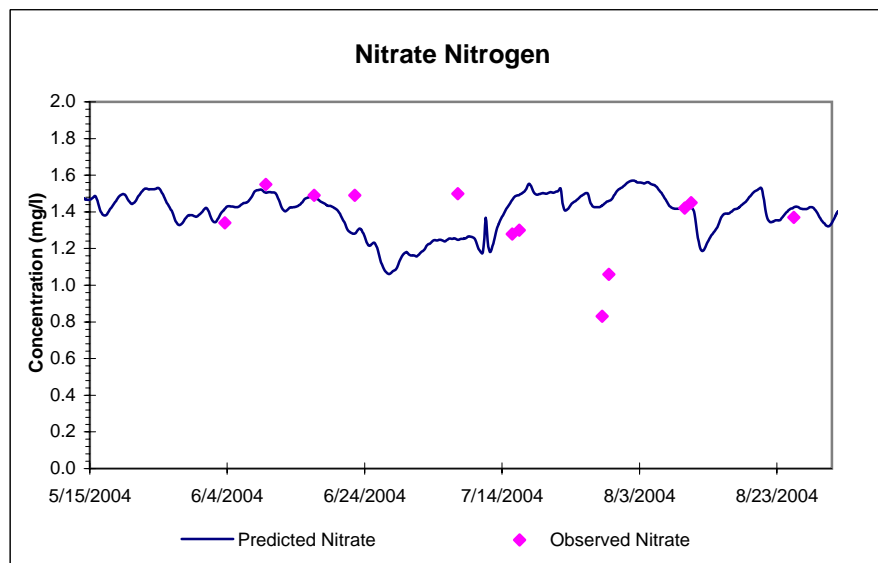
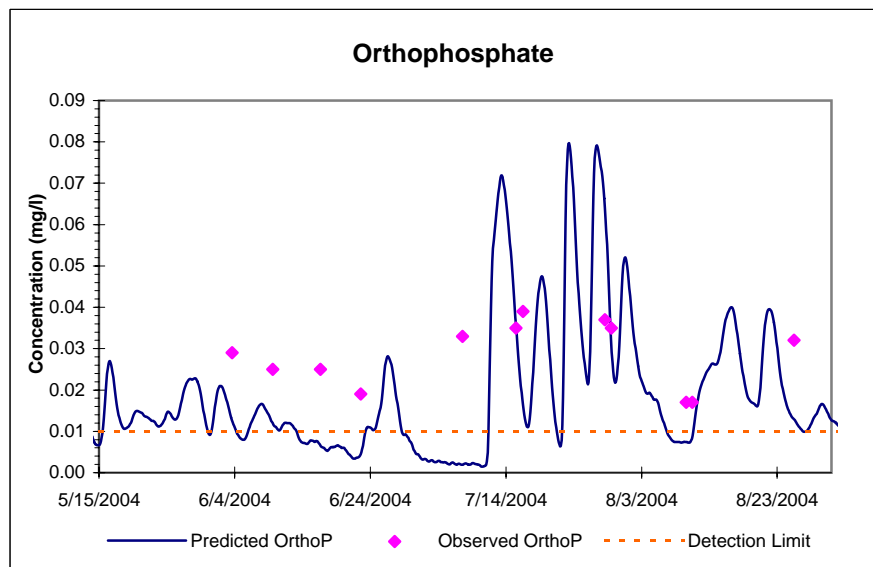
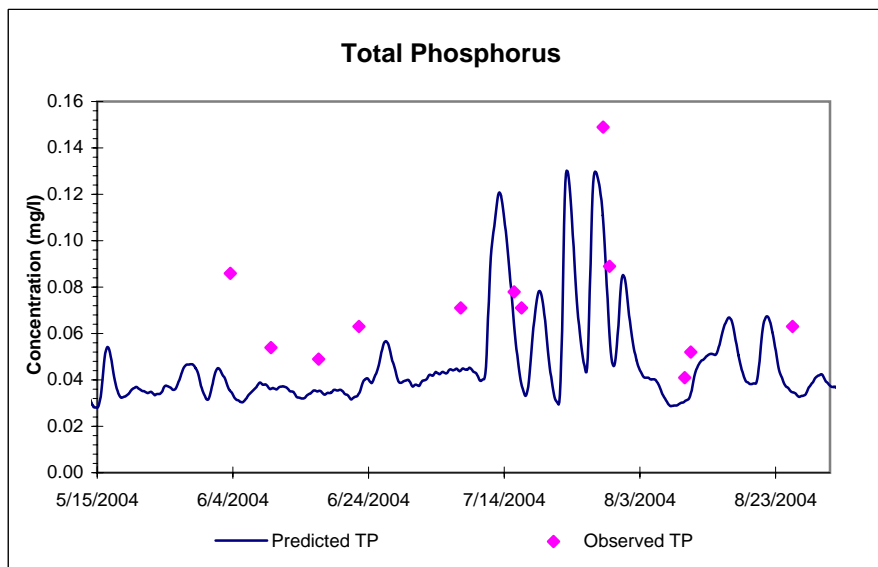


## South Branch Raritan River at Mill Rd. in Middle Valley (SBR4)

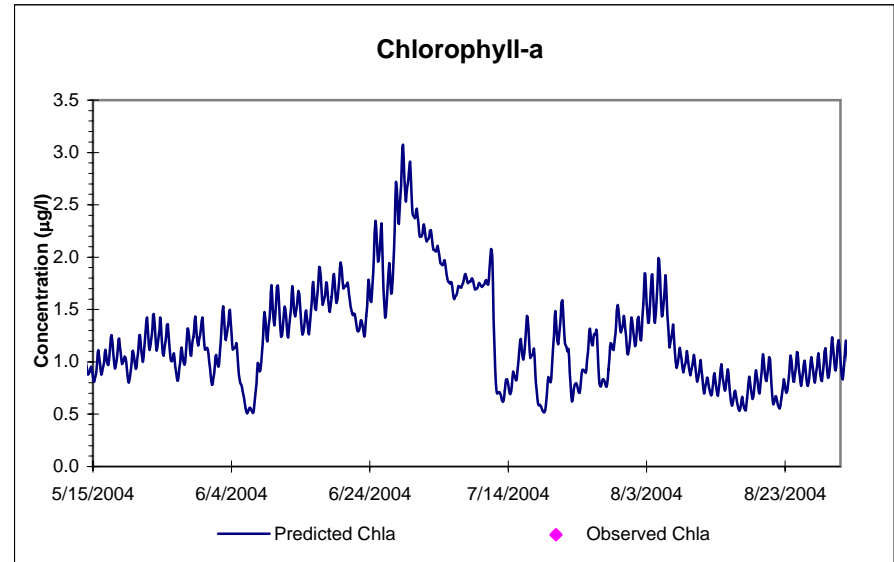
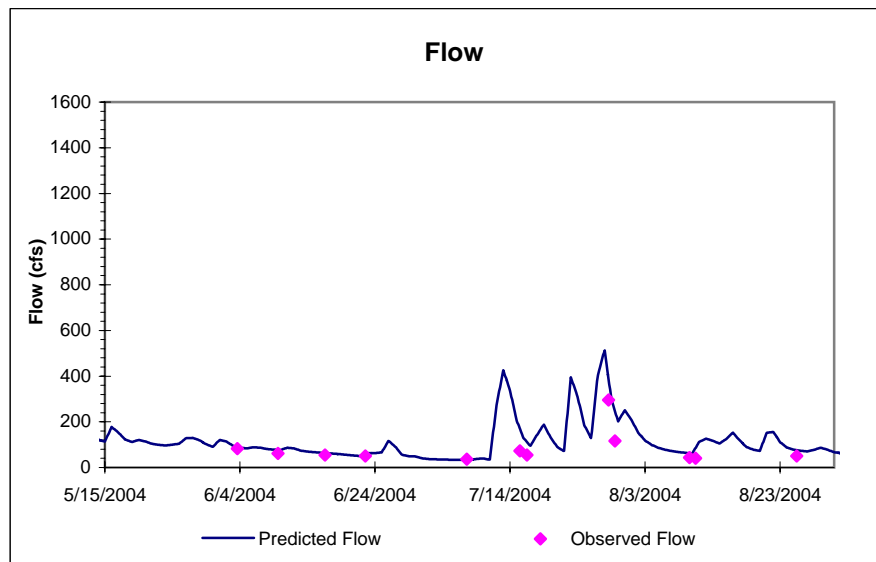
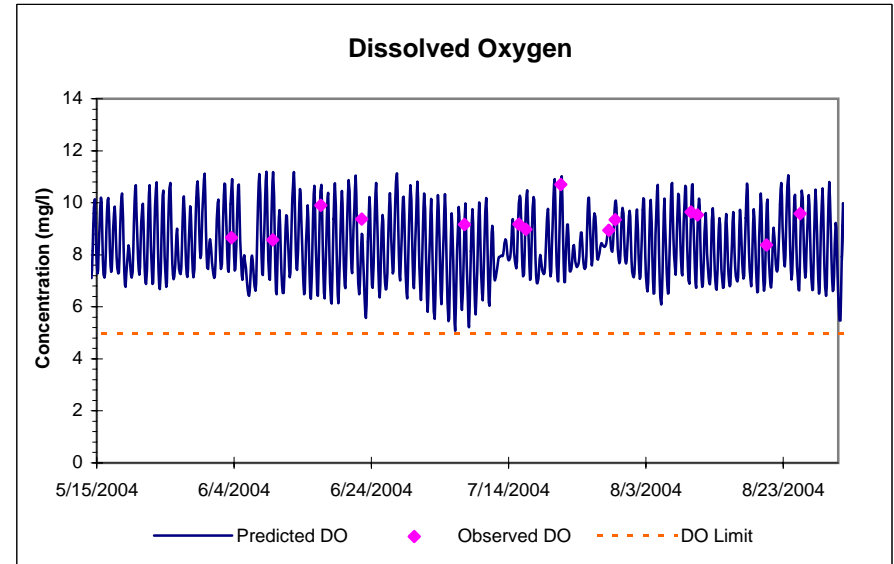
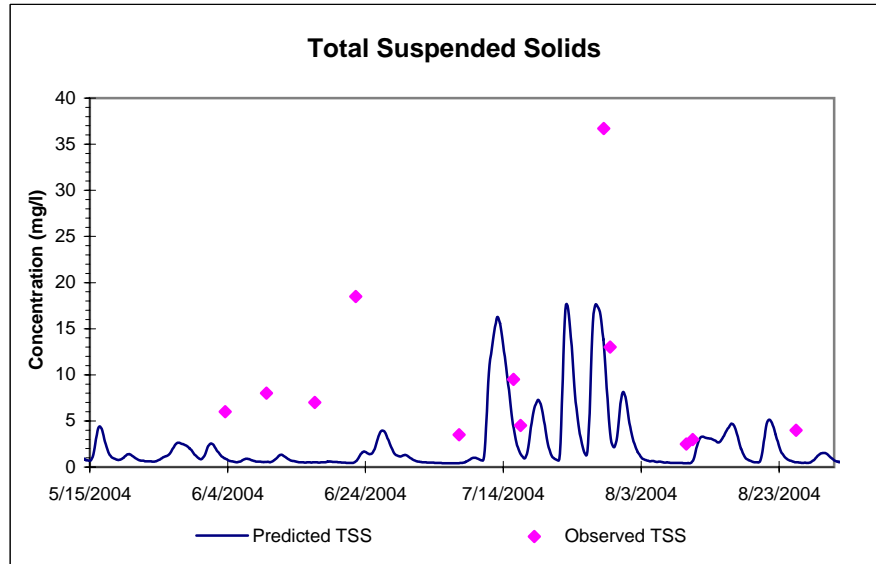




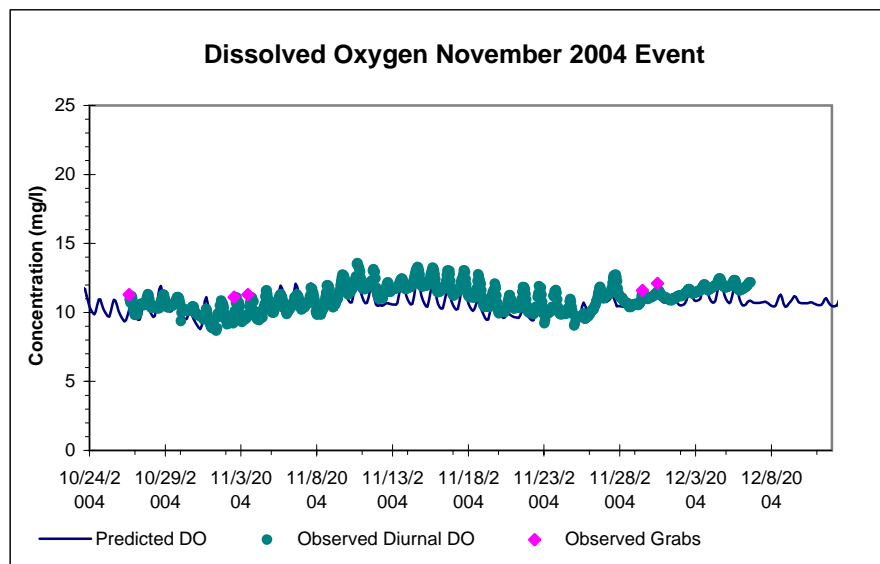
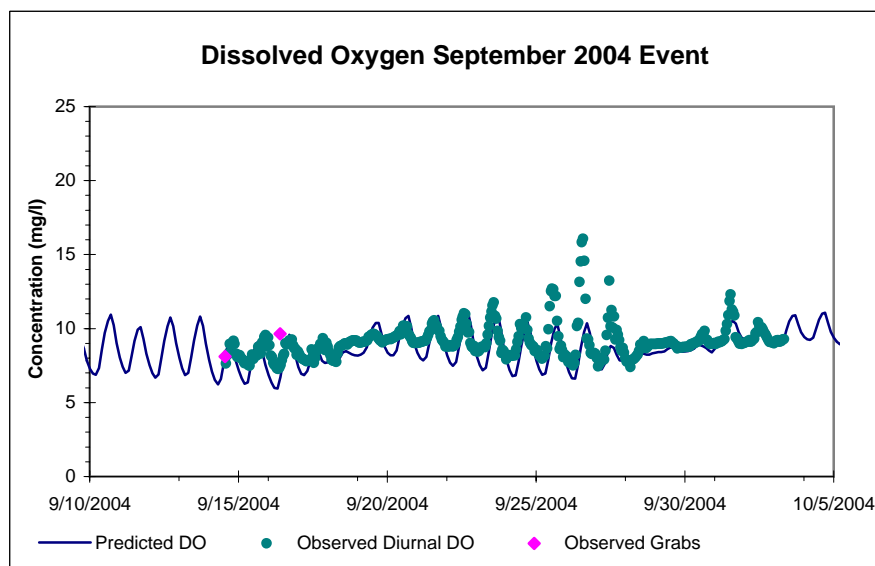
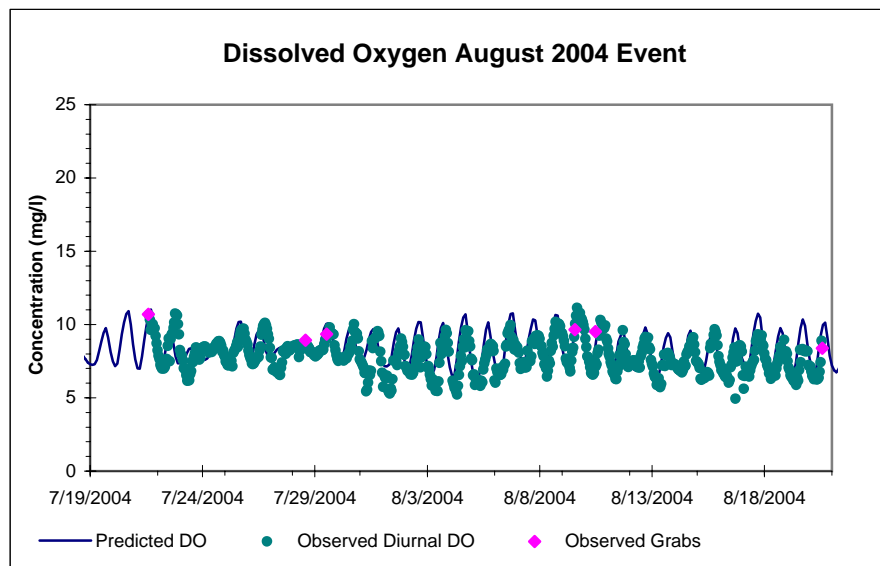
## South Branch Raritan River at Solitude Lake (SBRR3, USGS 01396500)



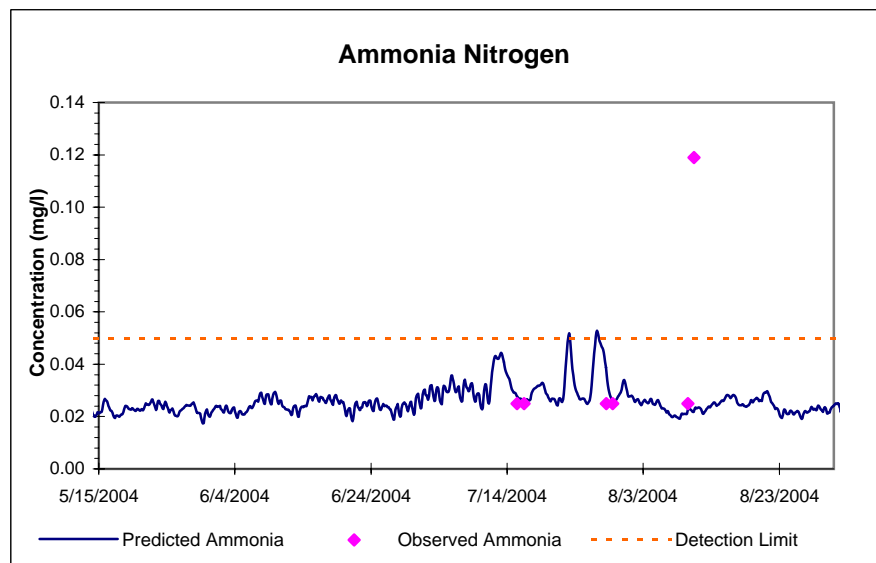
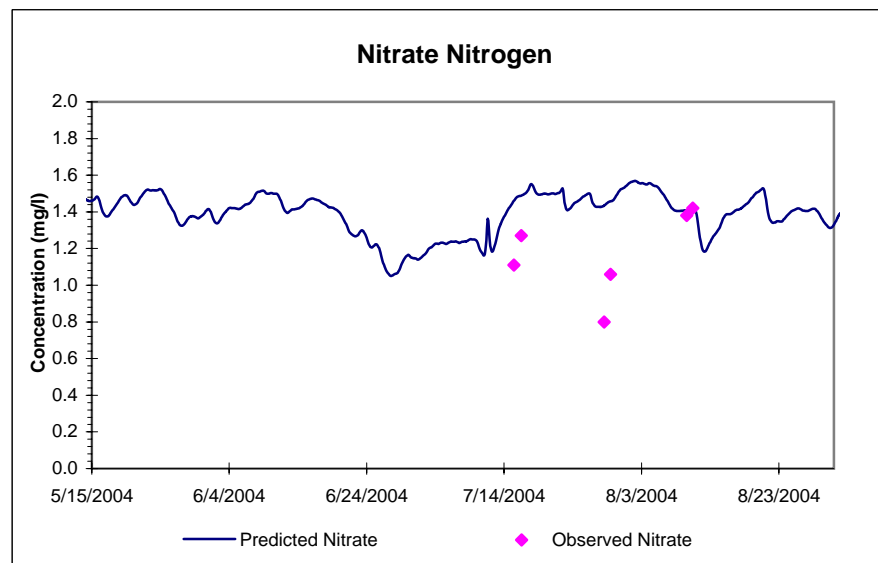
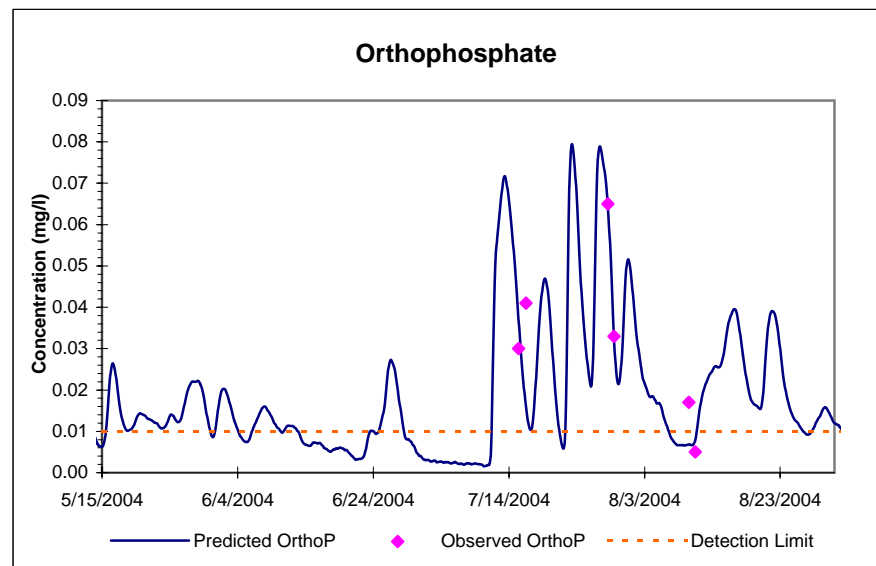
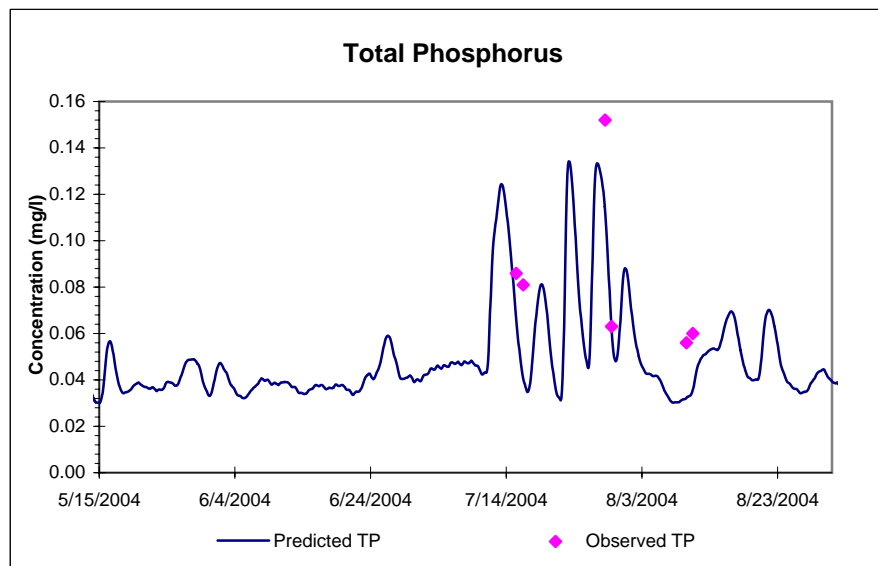
## South Branch Raritan River at Solitude Lake (SBRR3, USGS 01396500)



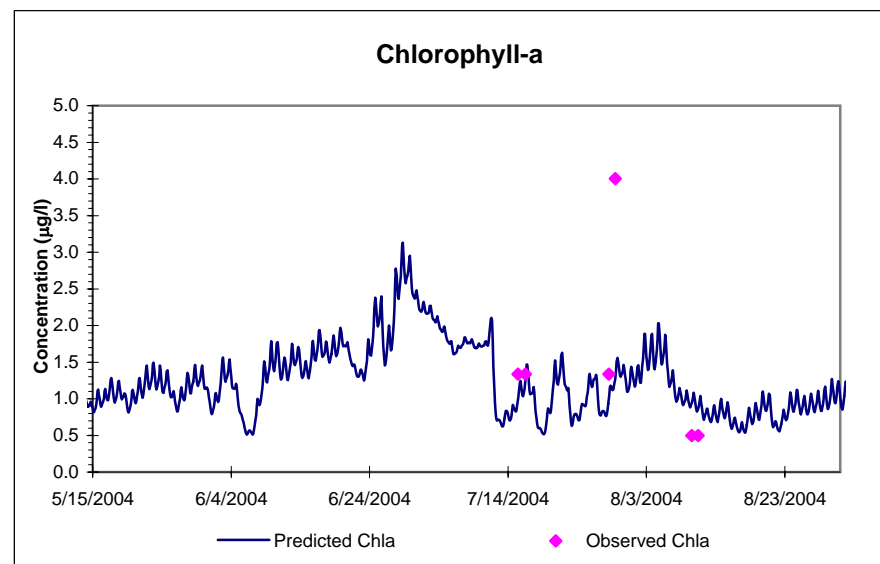
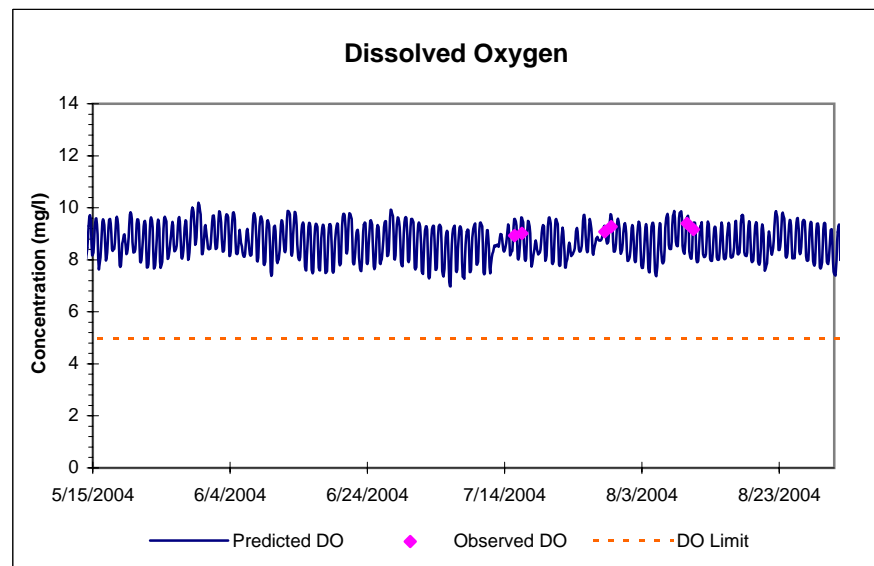
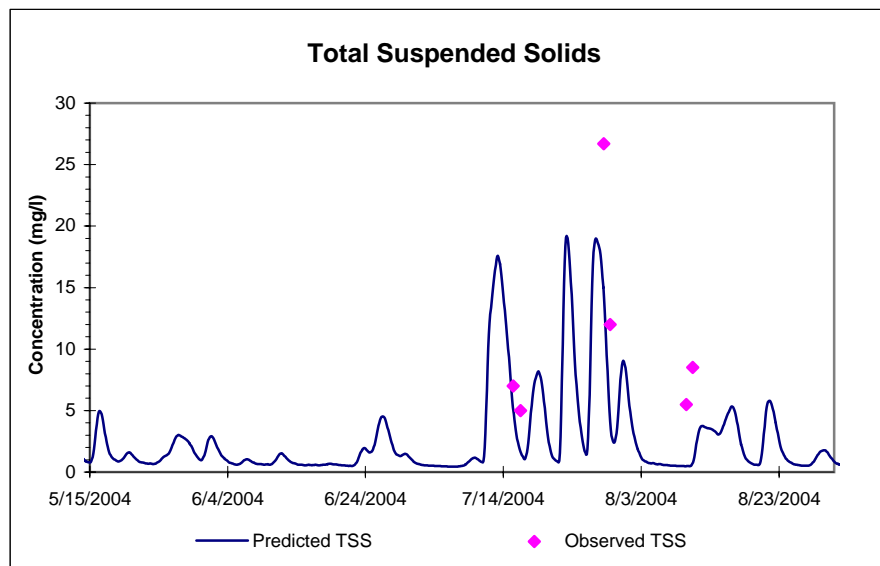
## South Branch Raritan River at Solitude Lake (SBRR3, USGS 01396500)



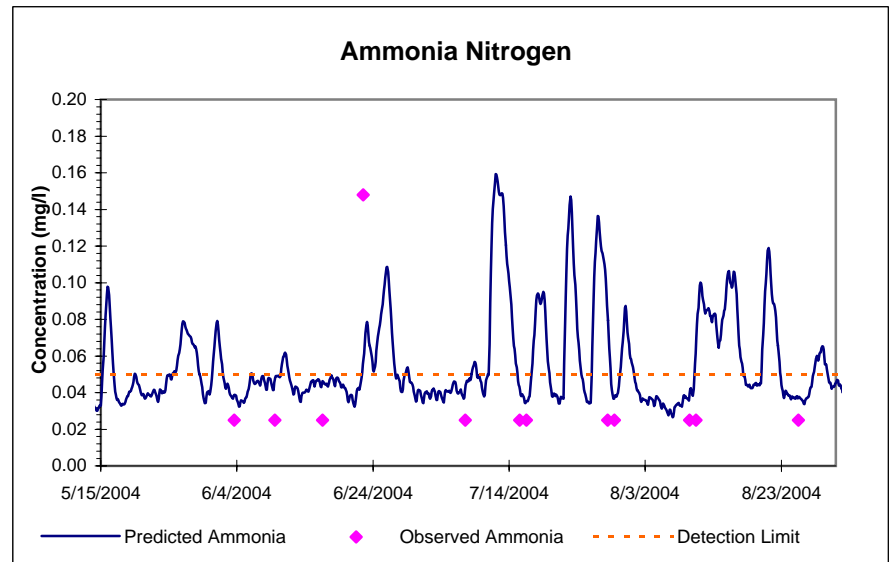
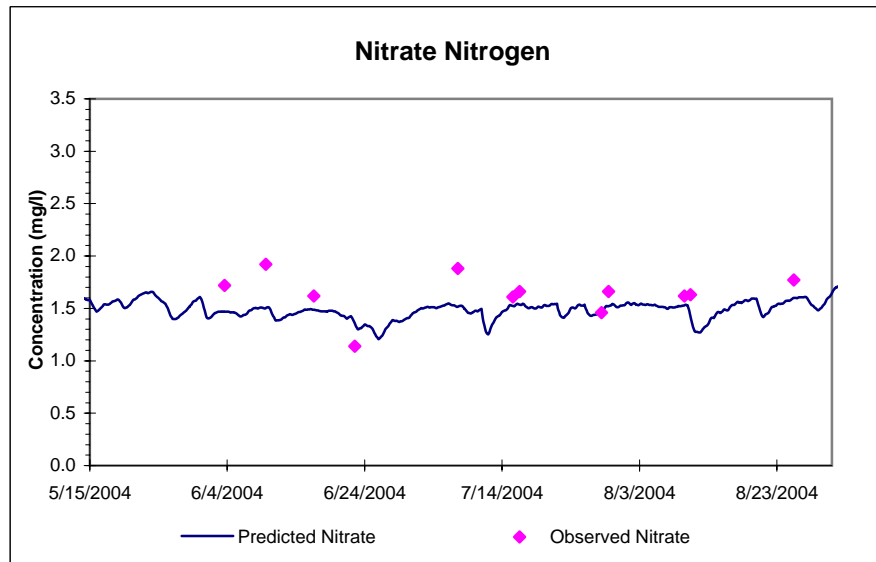
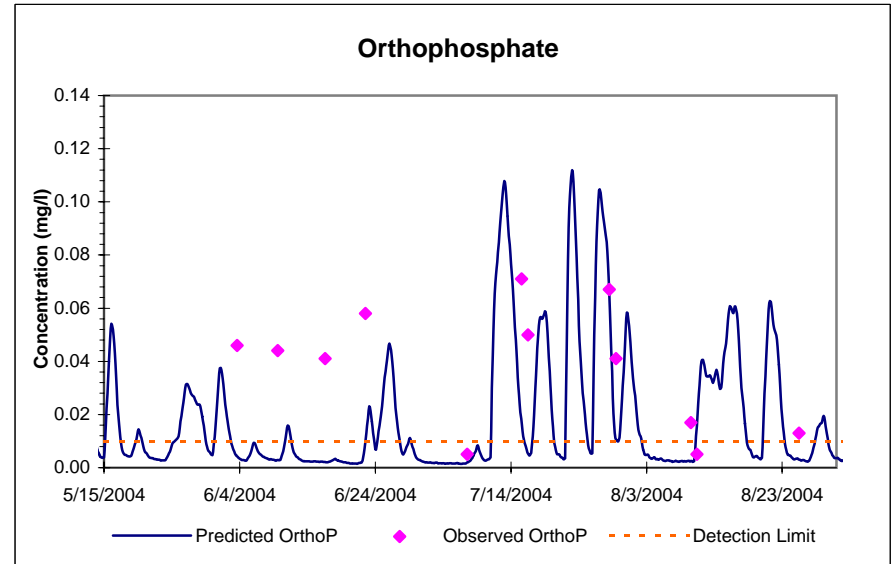
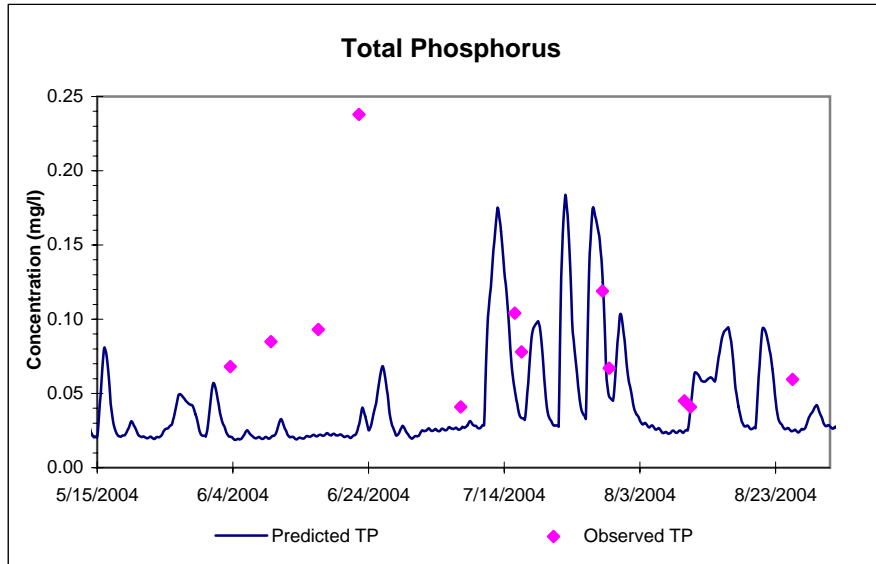
## South Branch Raritan River at Washington Ave in High Bridge (SBRR5)



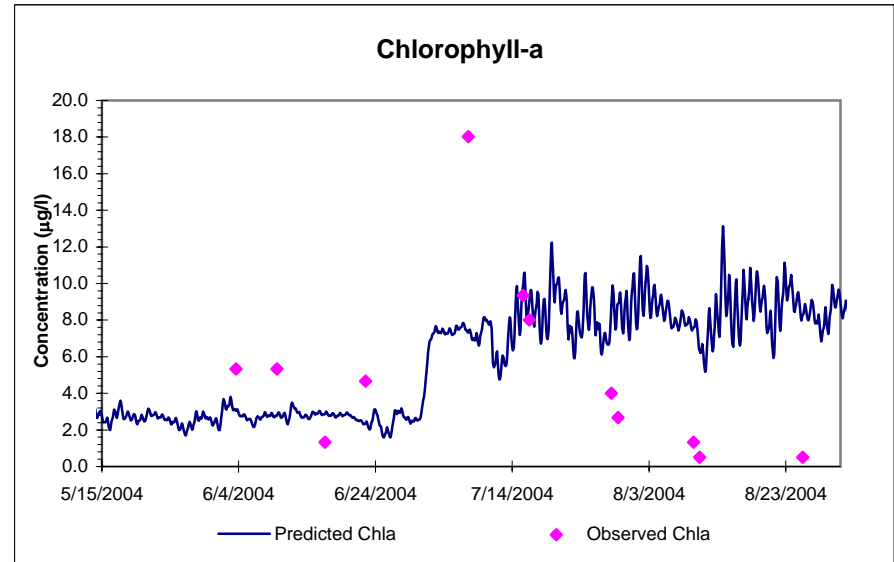
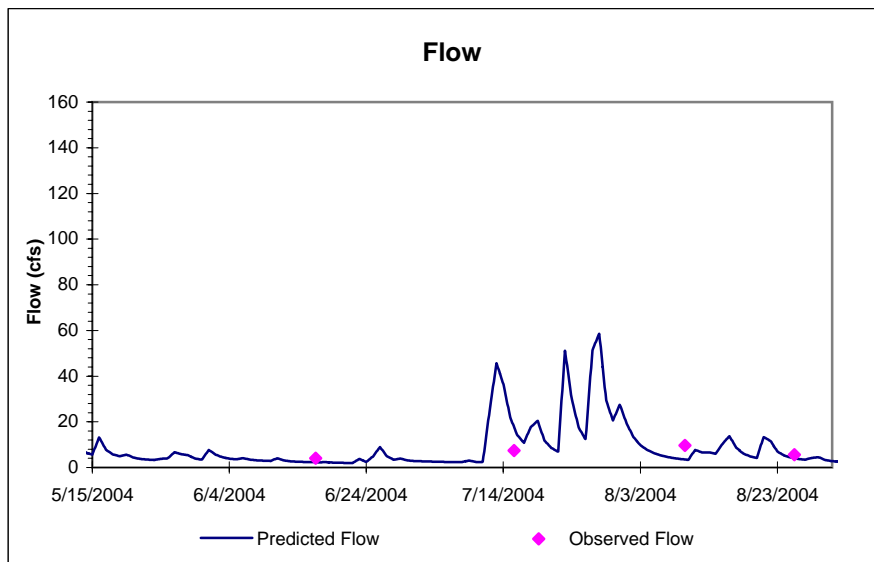
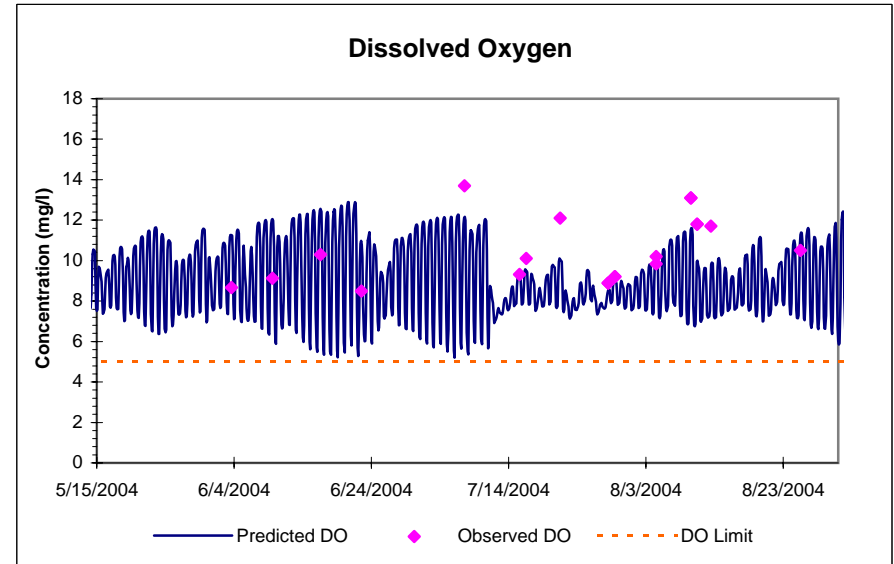
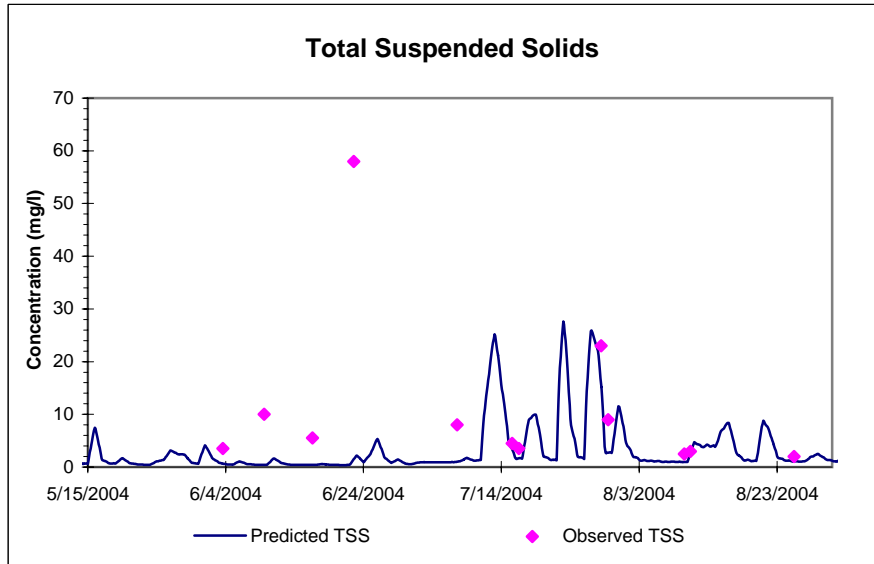
## South Branch Raritan River at Washington Ave in High Bridge (SBRR5)



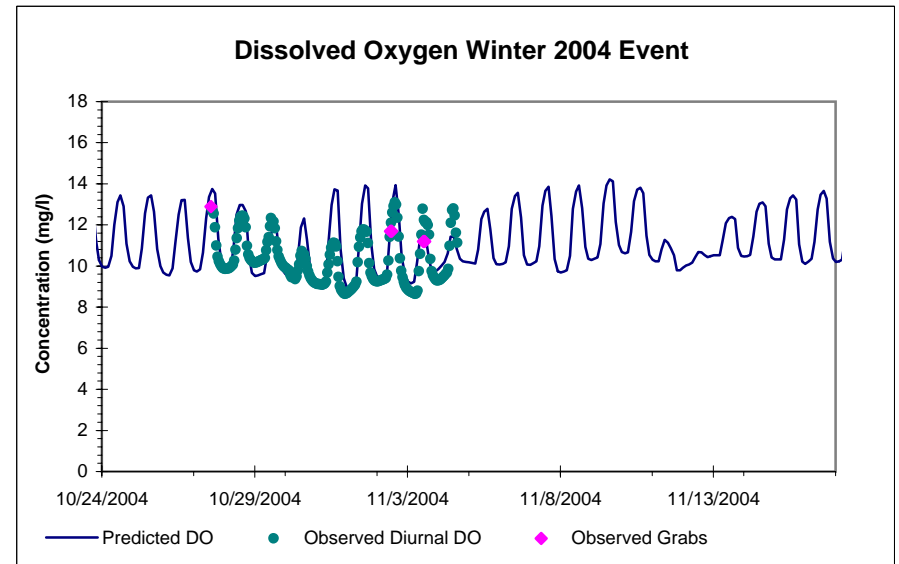
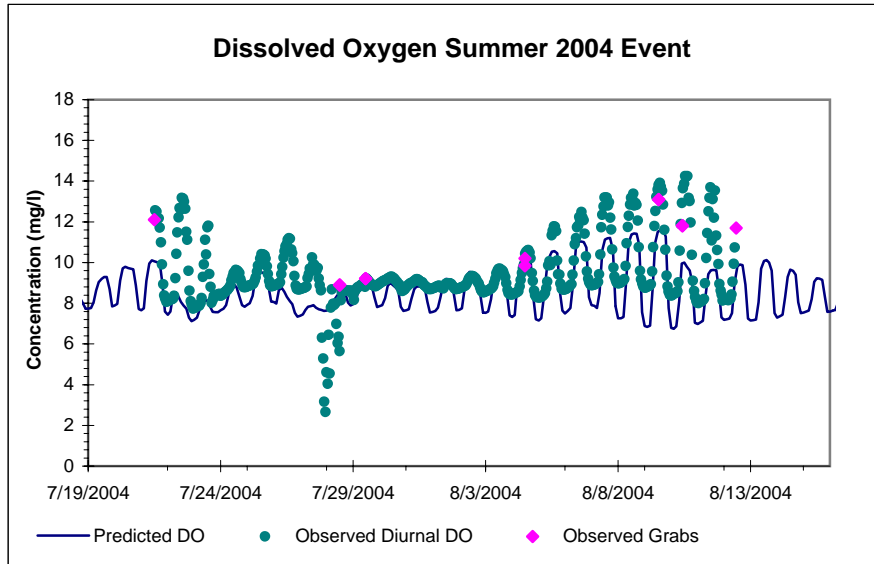
## Beaver Brook at Hamden Rd. in Clinton (BvB1)



## Beaver Brook at Hamden Rd. in Clinton (BvB1)

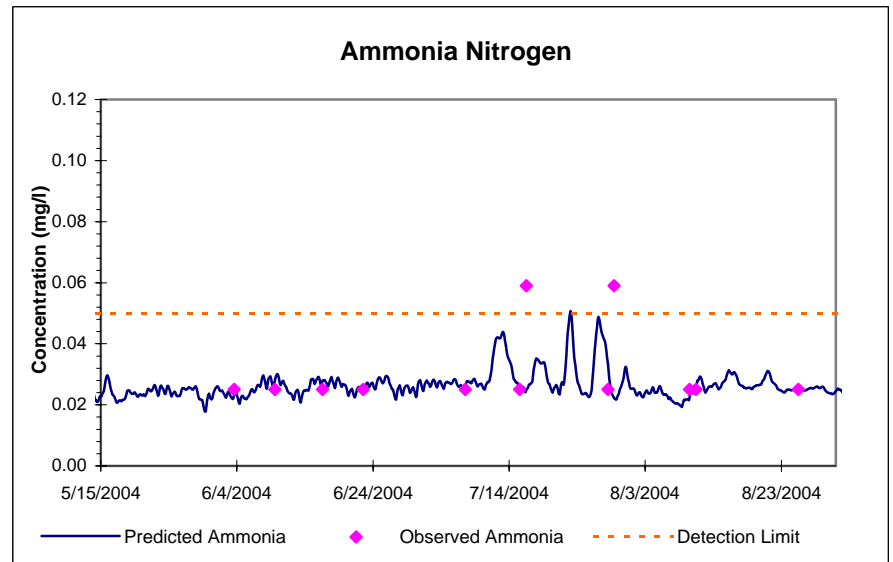
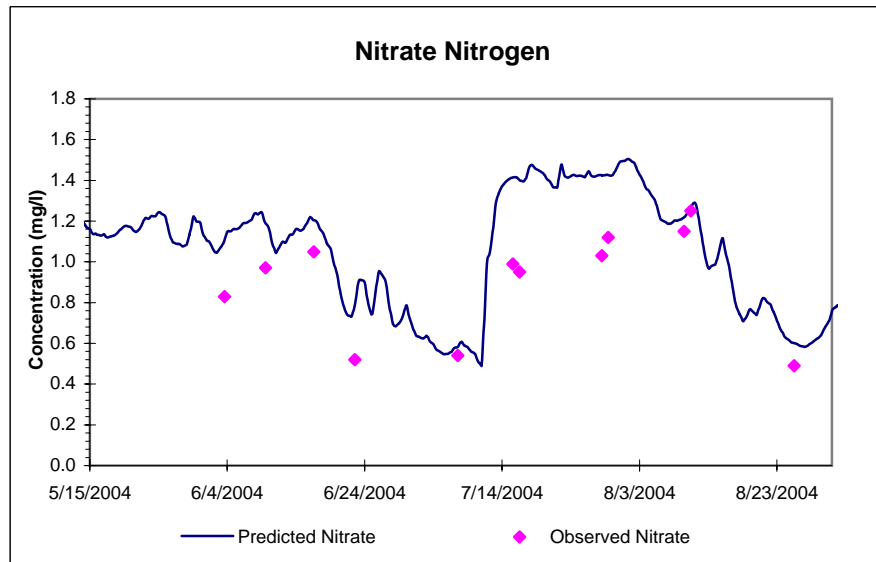
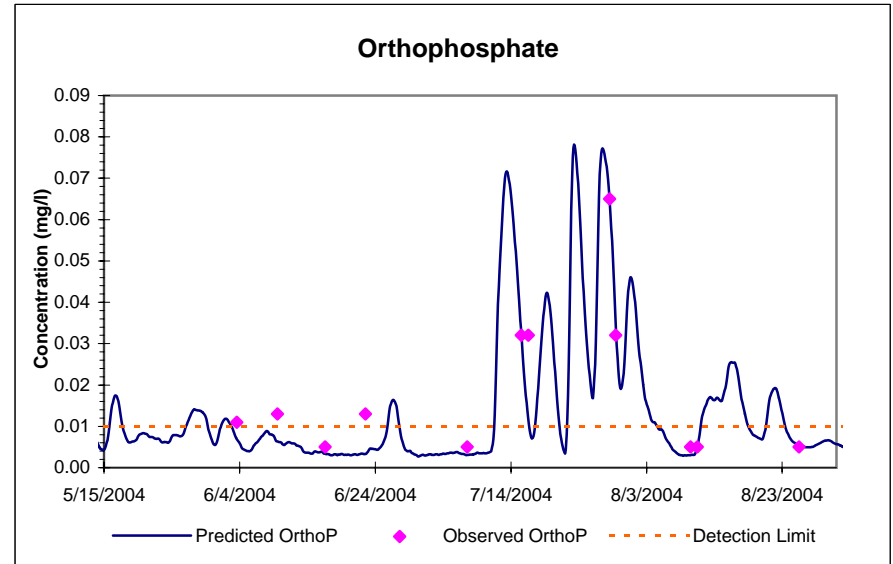
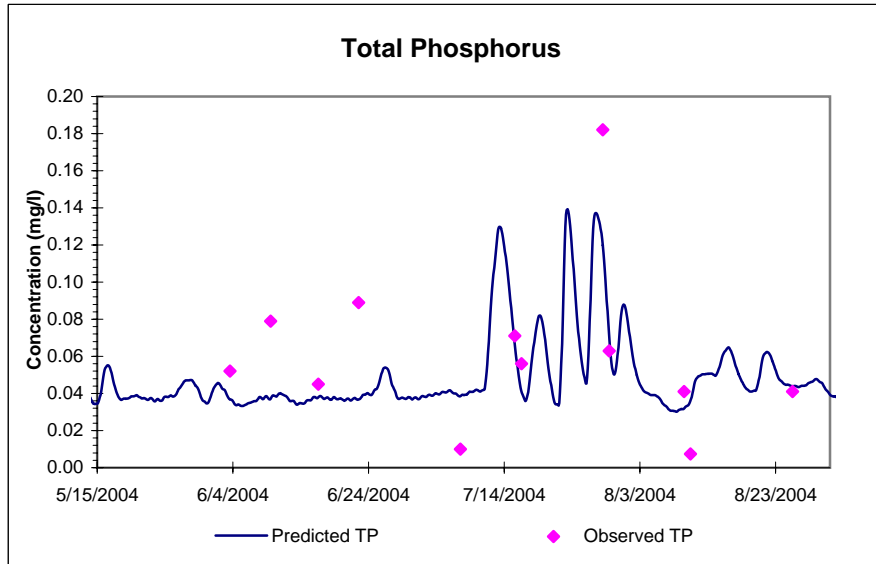


## Beaver Brook at Hamden Rd. in Clinton (BvB1)

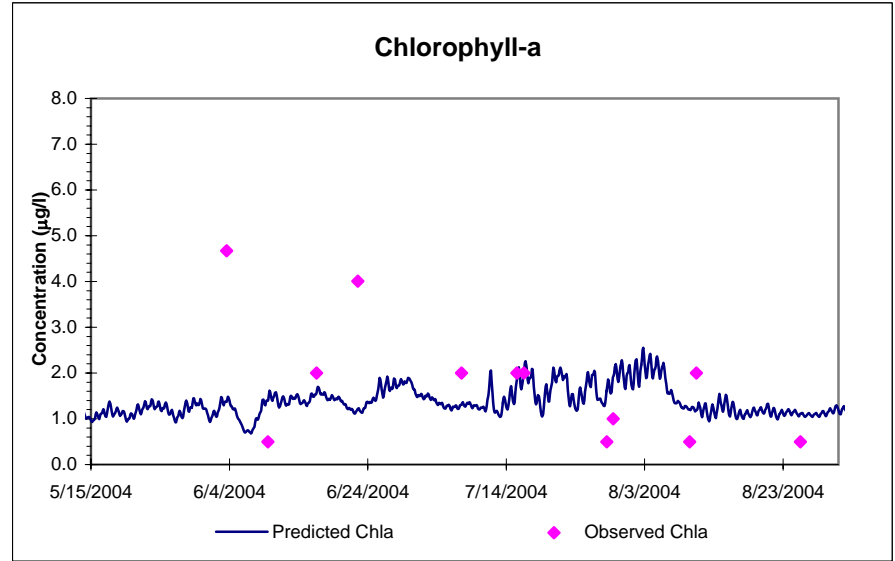
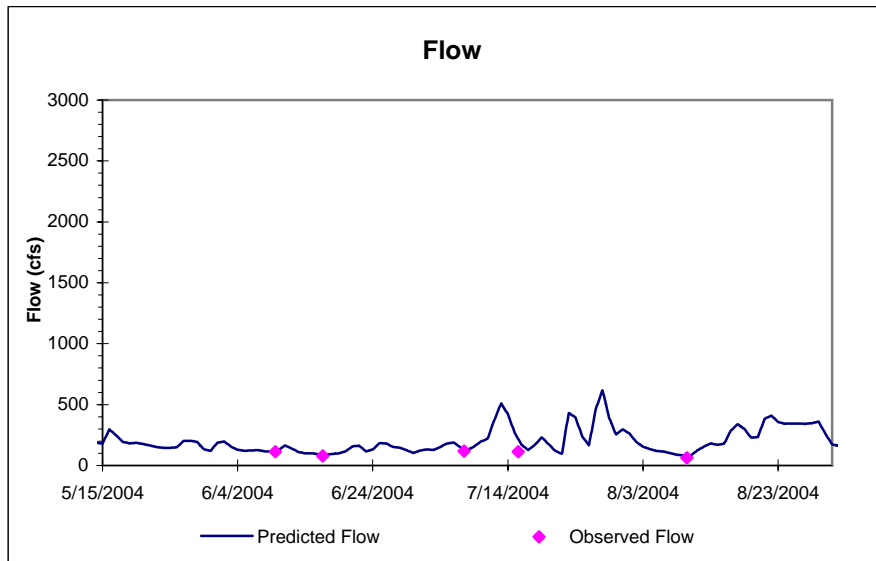
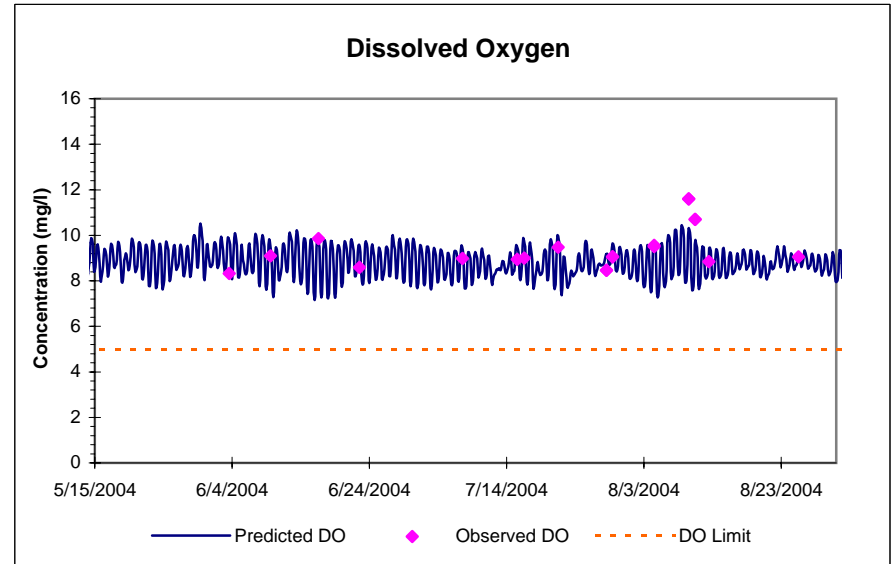
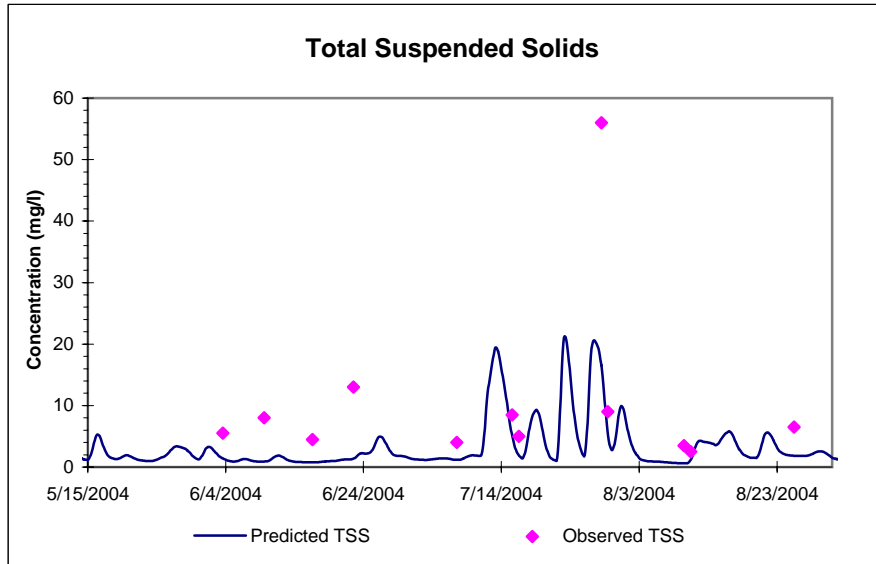




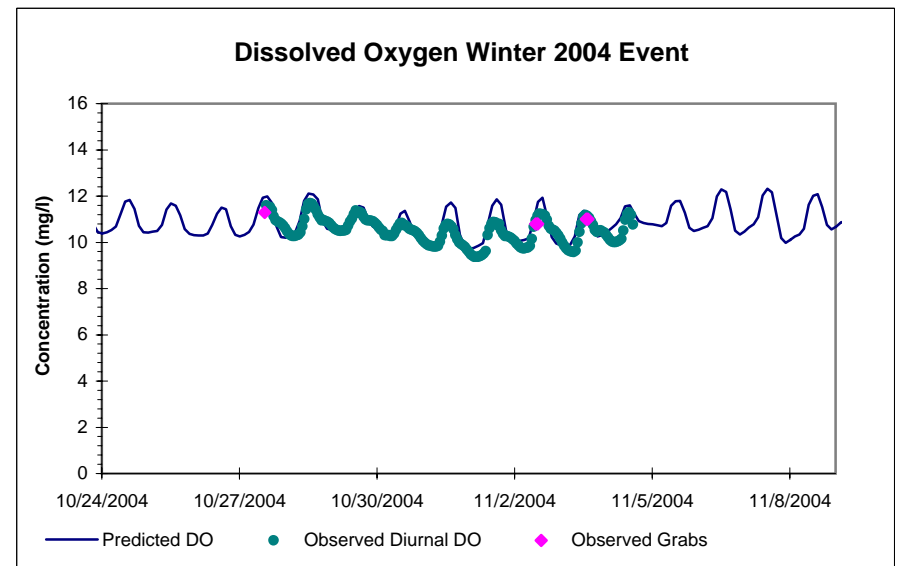
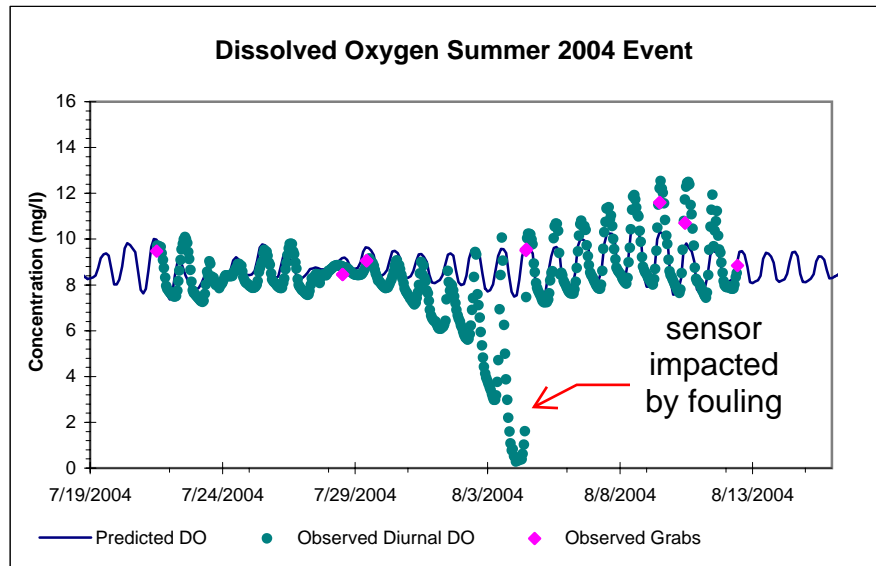
## South Branch Raritan River Upstream of Clinton WTP (SBRR6)



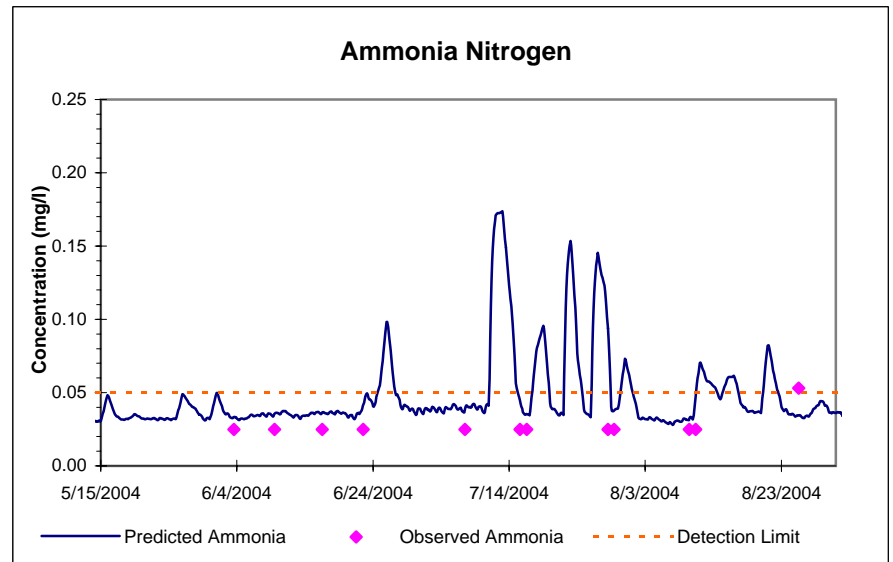
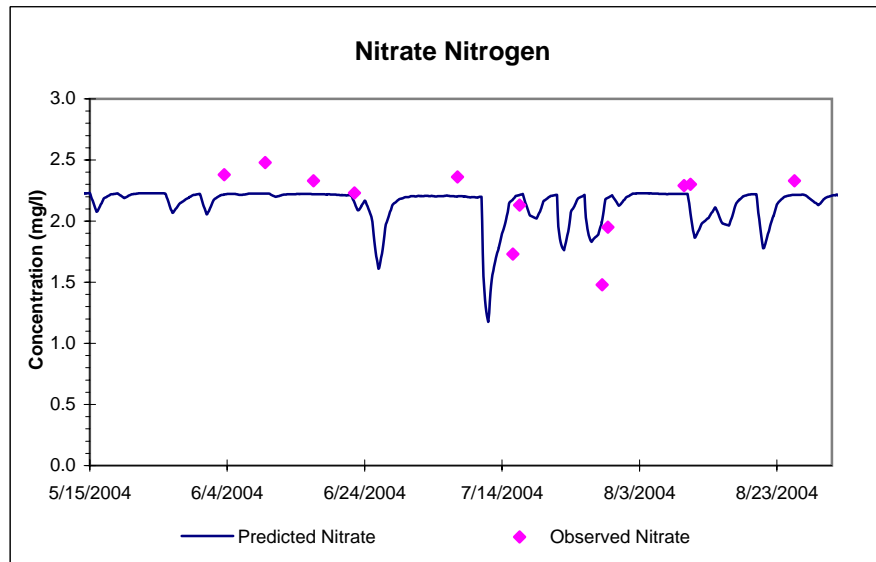
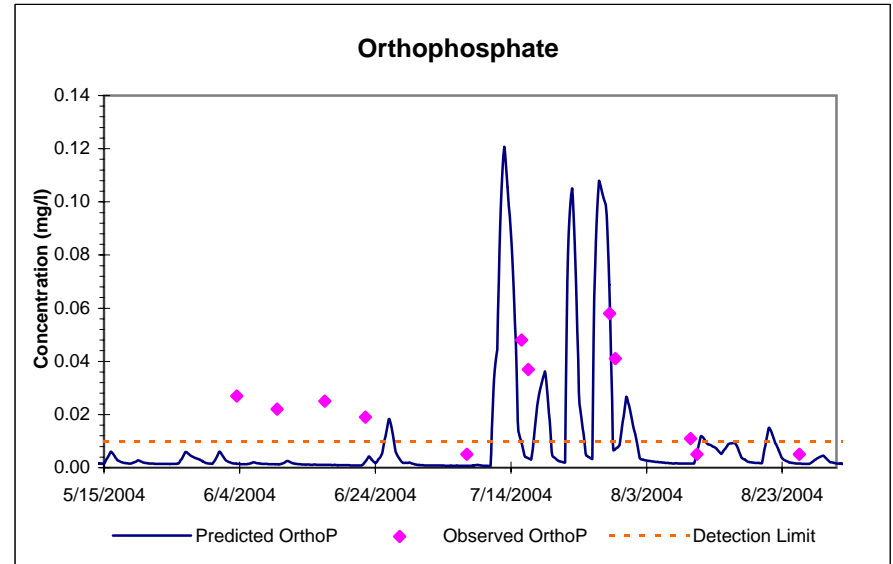
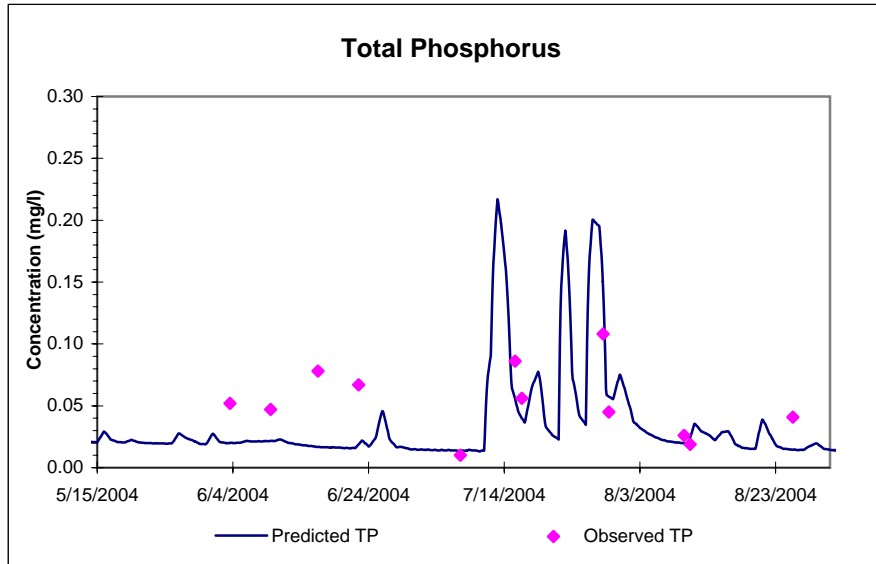
## South Branch Raritan River Upstream of Clinton WTP (SBRR6)



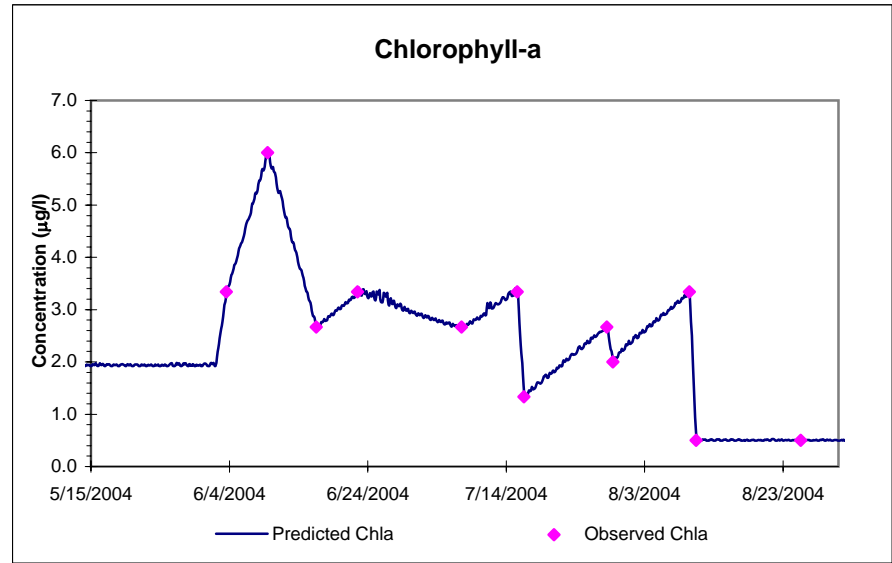
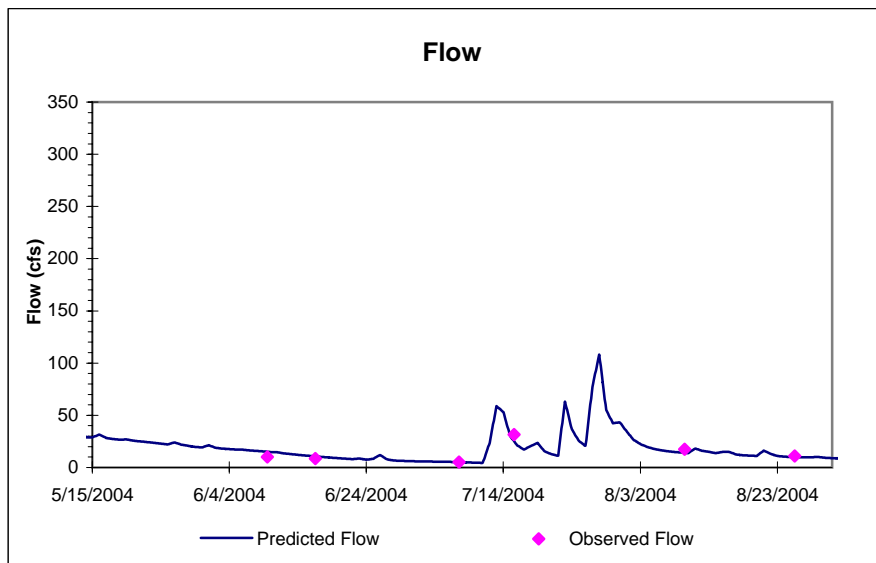
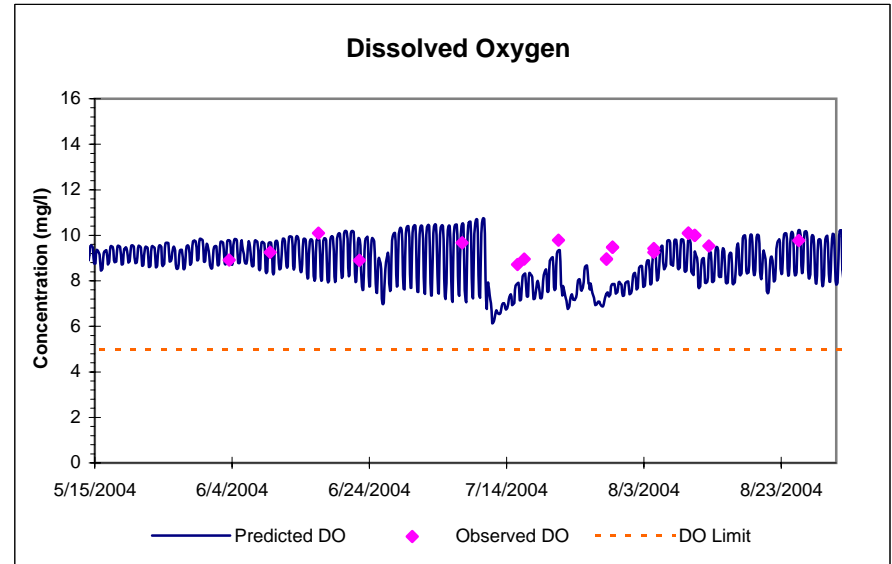
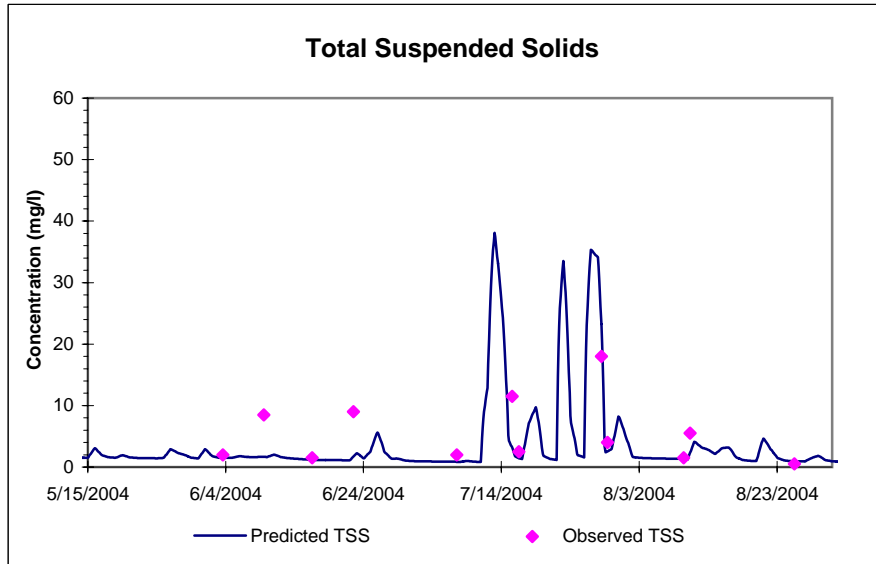
## South Branch Raritan River Upstream of Clinton WTP (SBRR6)



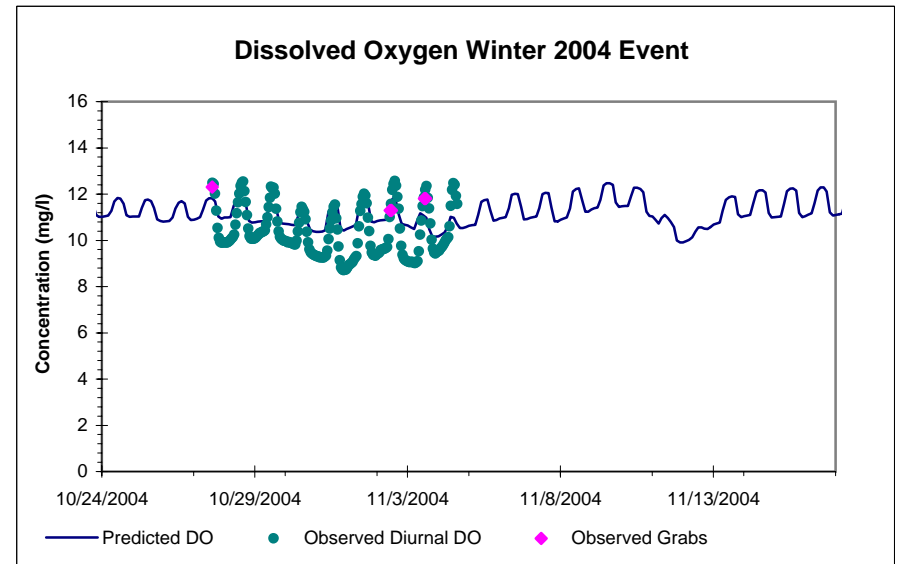
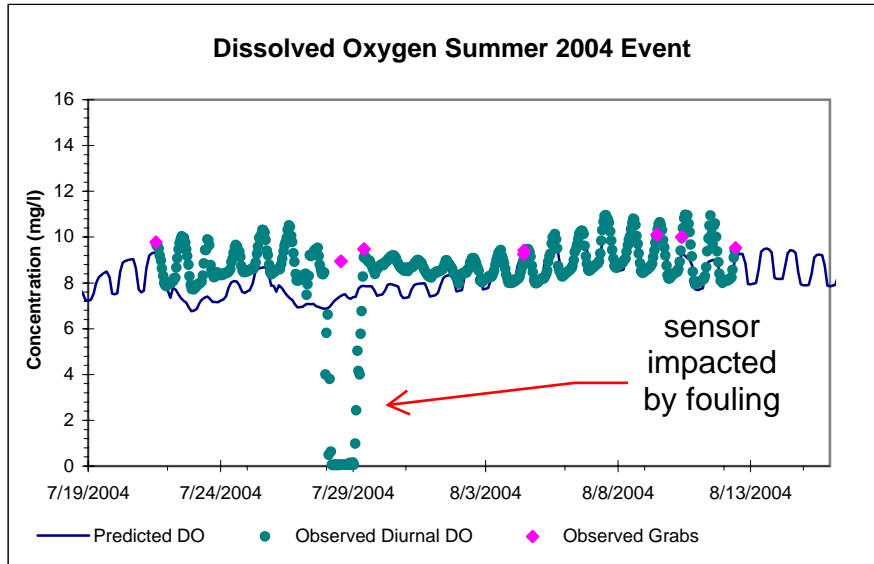
## Cakepoulin Creek at Lower Landsdown Rd. in Franklin Twp. (CC1)



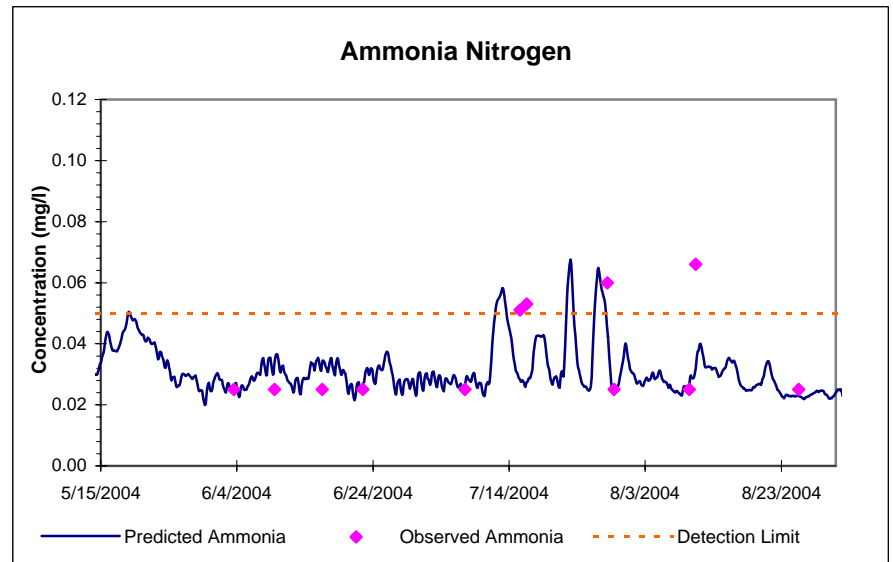
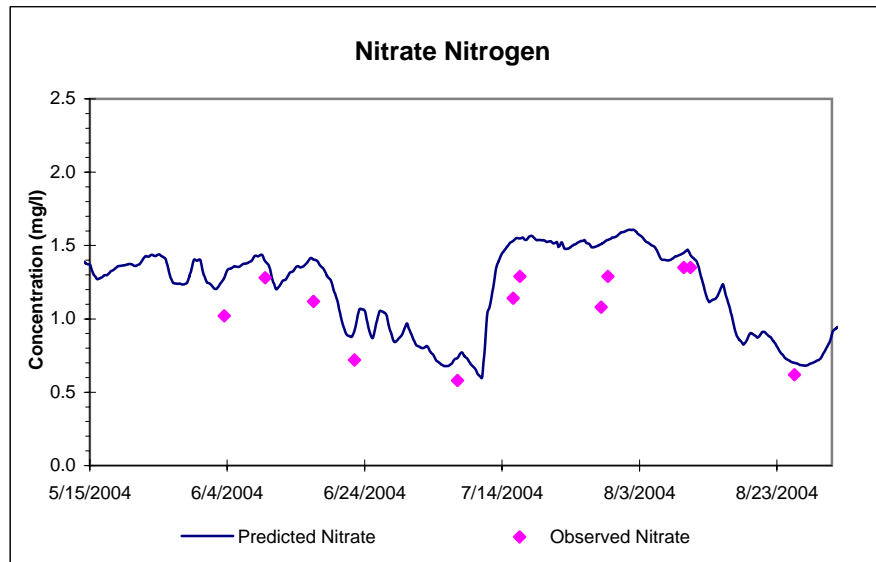
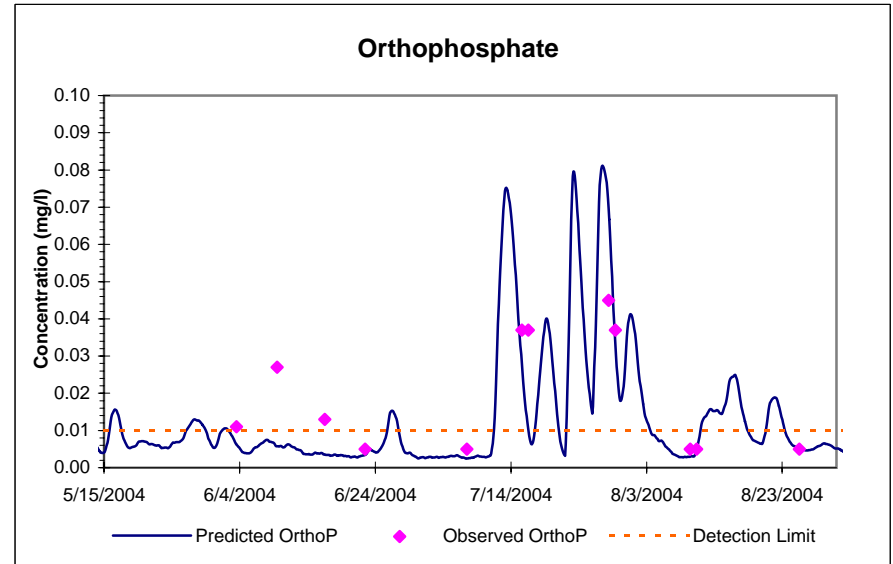
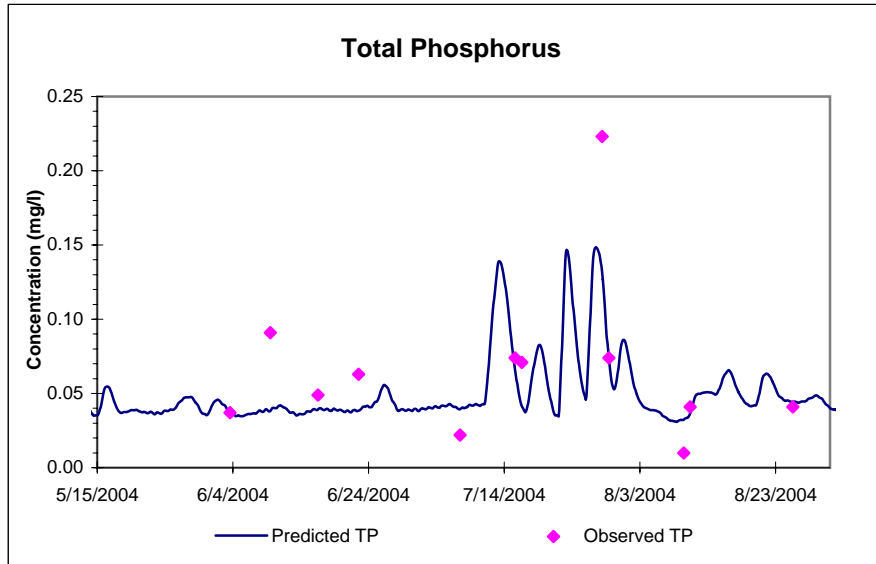
## Cakepoulin Creek at Lower Landsdown Rd. in Franklin Twp. (CC1)



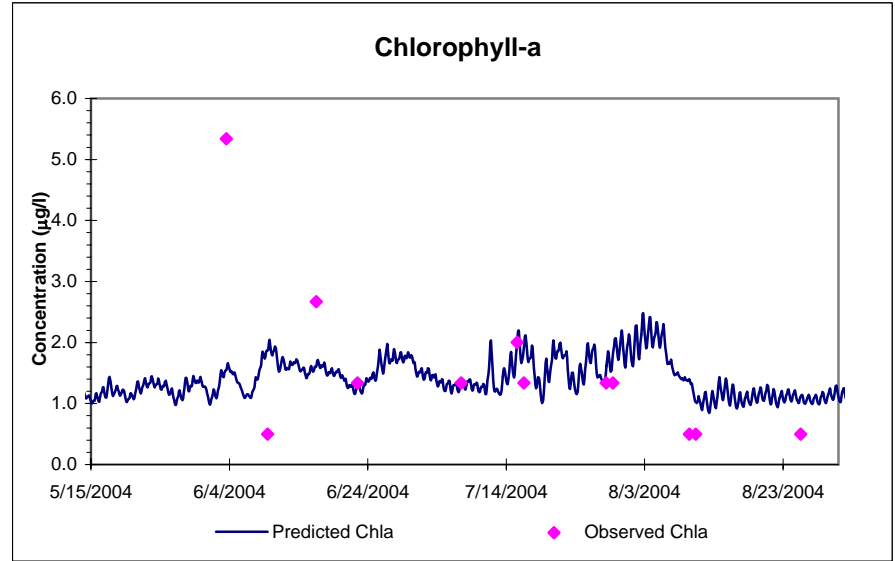
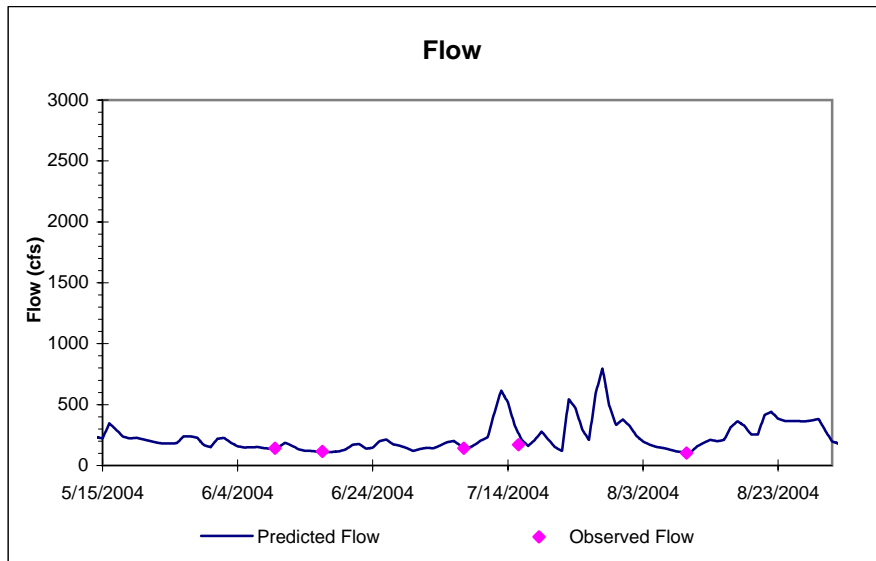
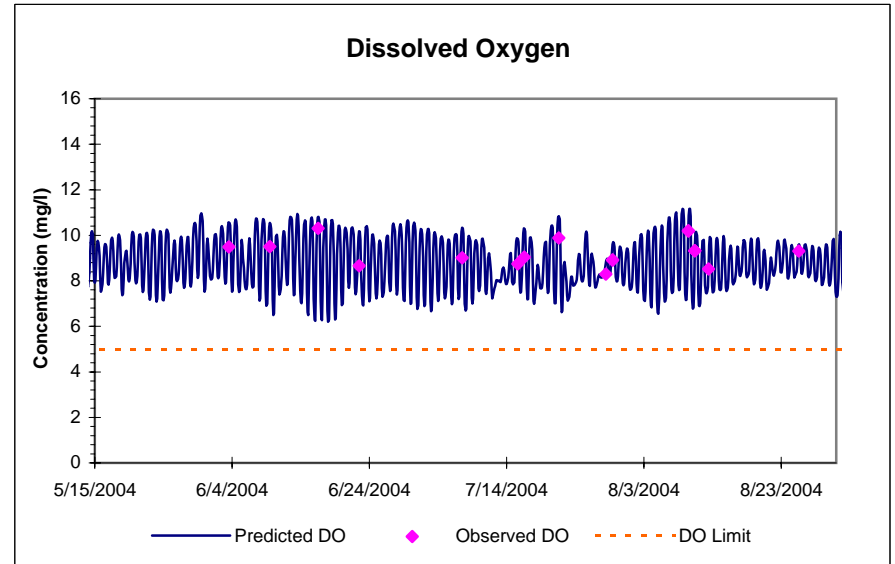
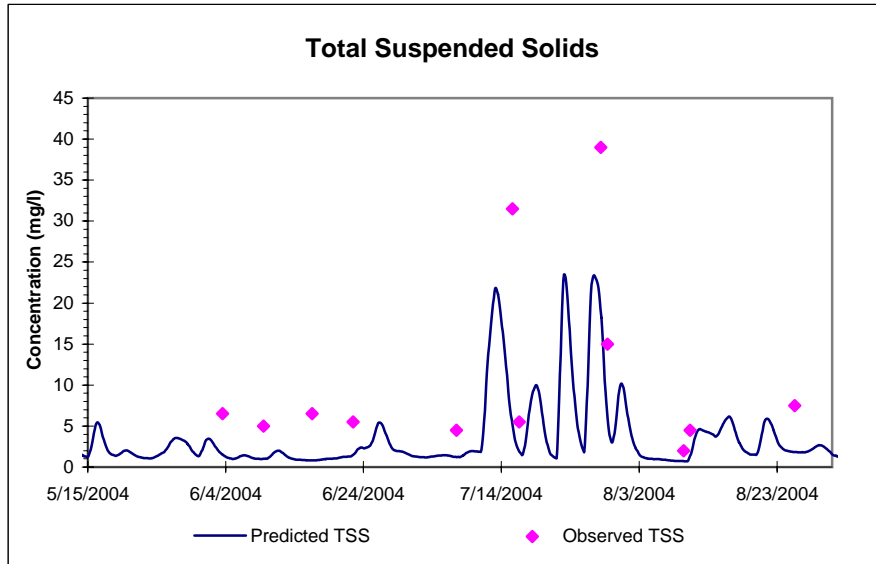
## Cakepoulin Creek at Lower Landsdown Rd. in Franklin Twp. (CC1)



## South Branch Raritan River at Hamden Rd. in Landsdown (SBRR7)

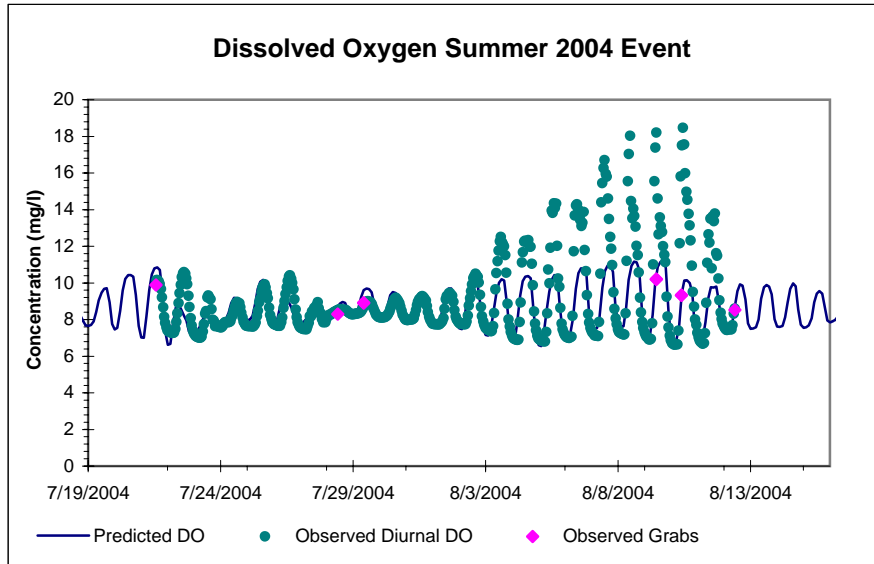


## South Branch Raritan River at Hamden Rd. in Landsdown (SBRR7)

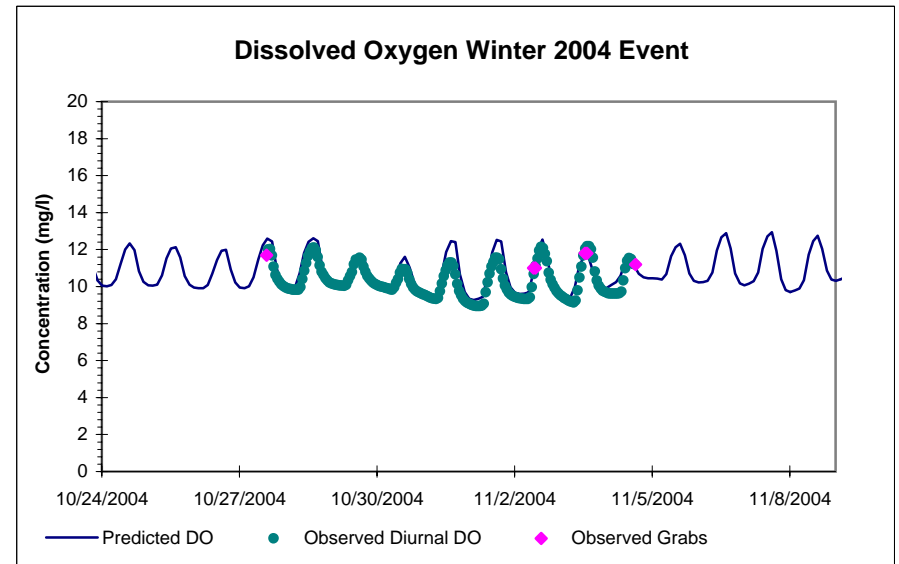




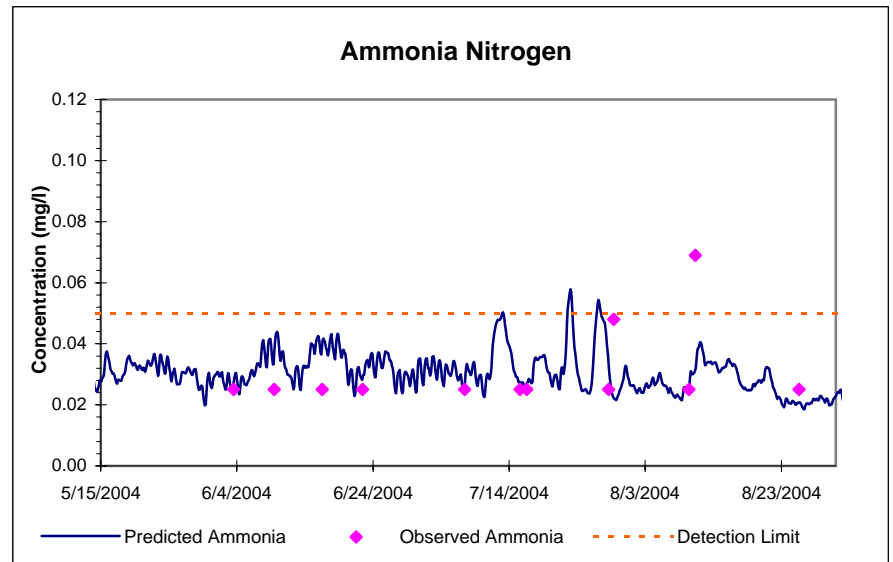
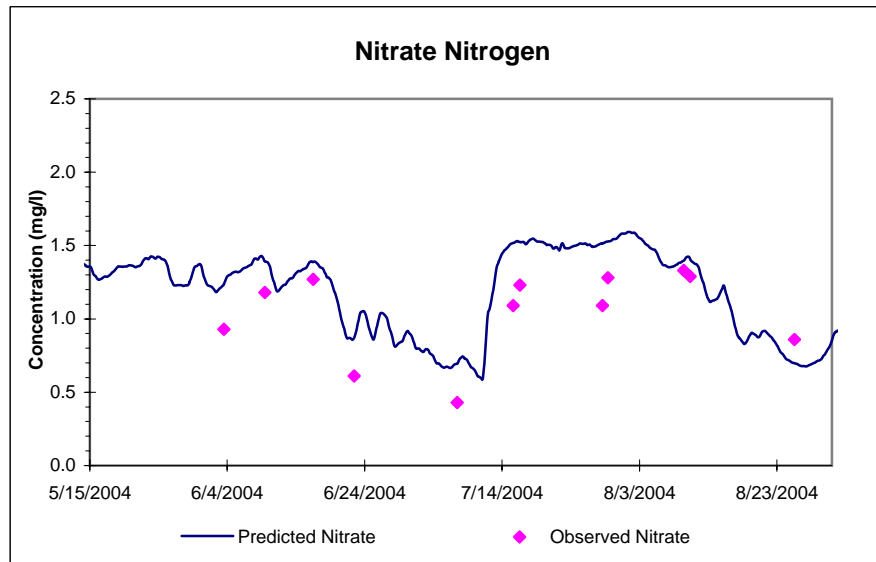
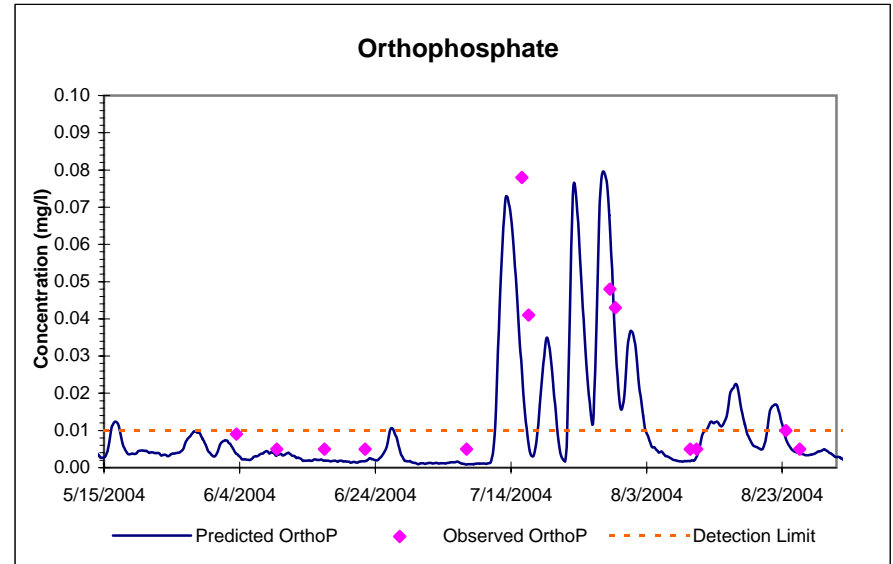
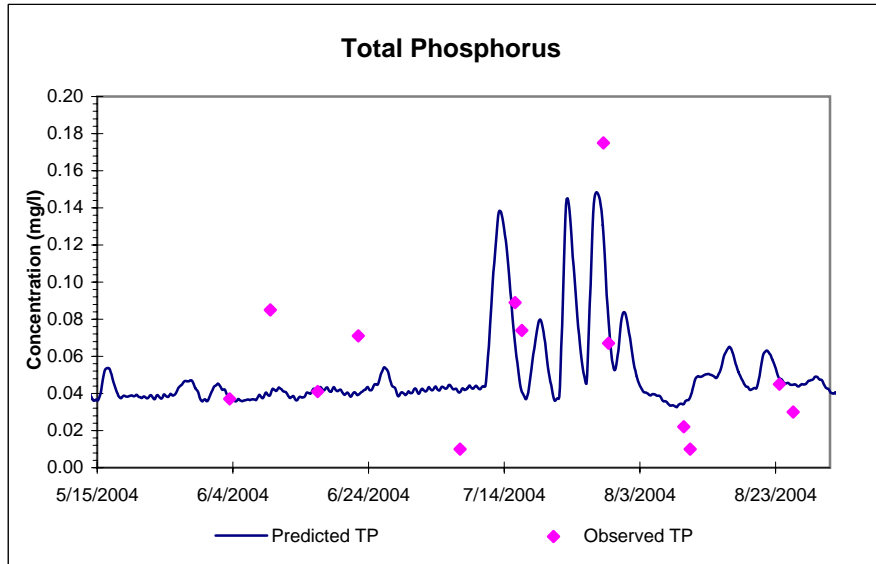
## South Branch Raritan River at Hamden Rd. in Landsdown (SBRR7)



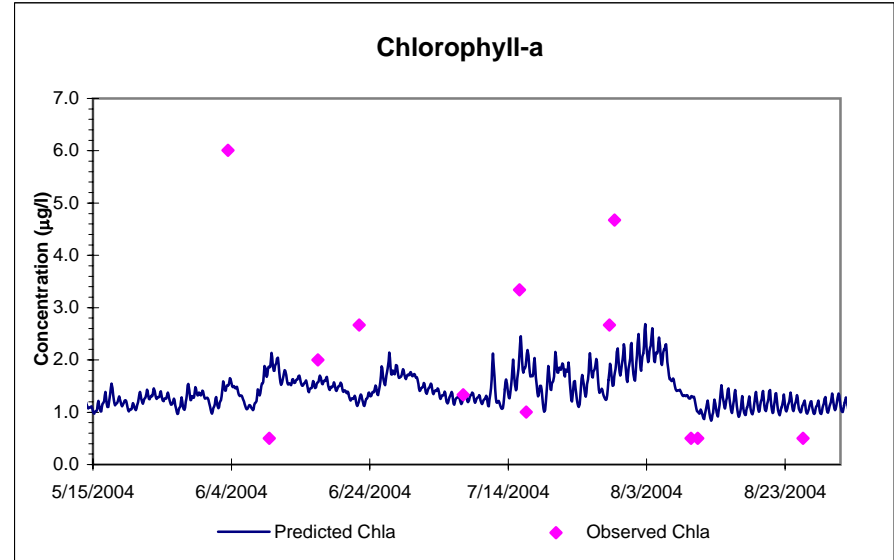
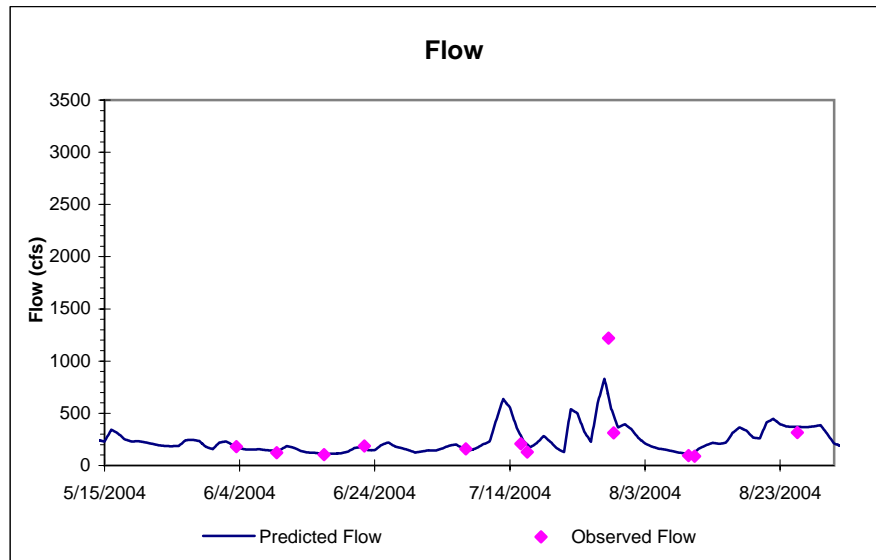
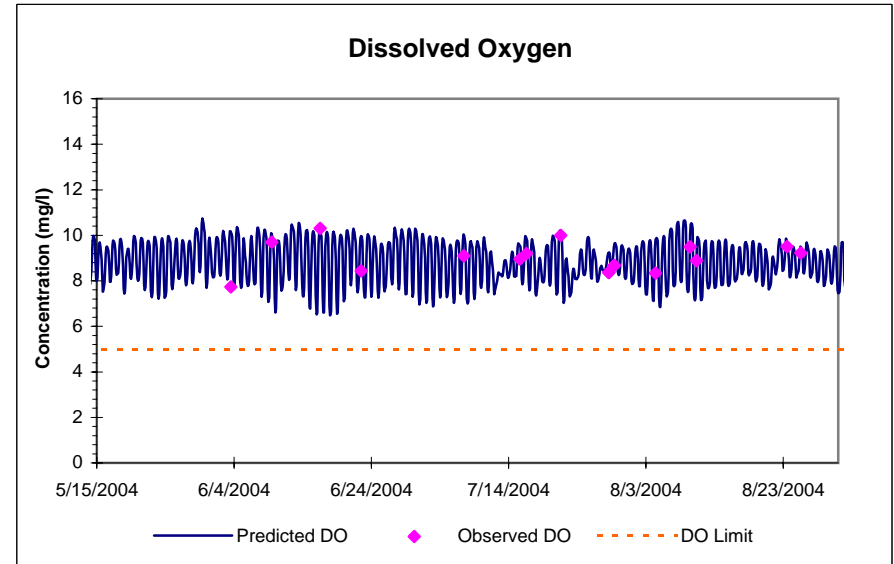
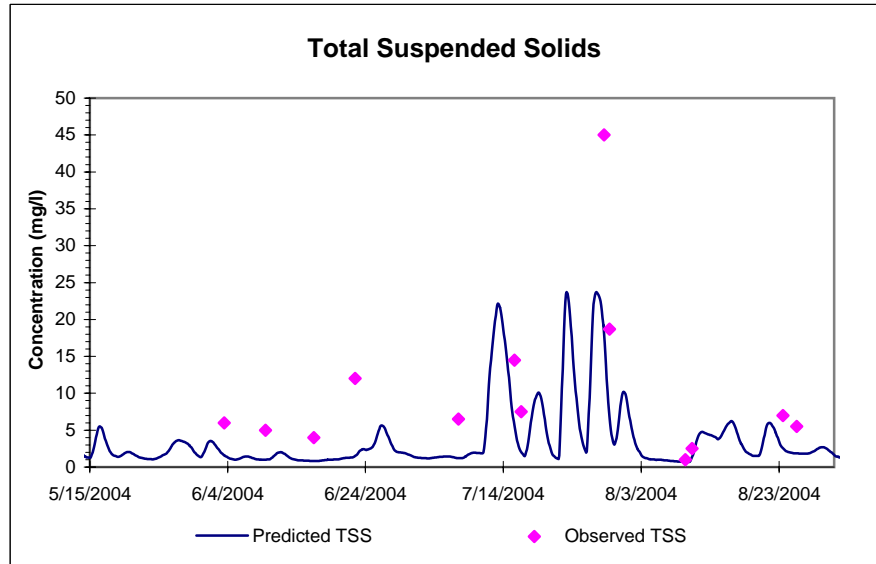
see section III.G.3 for discussion of this event



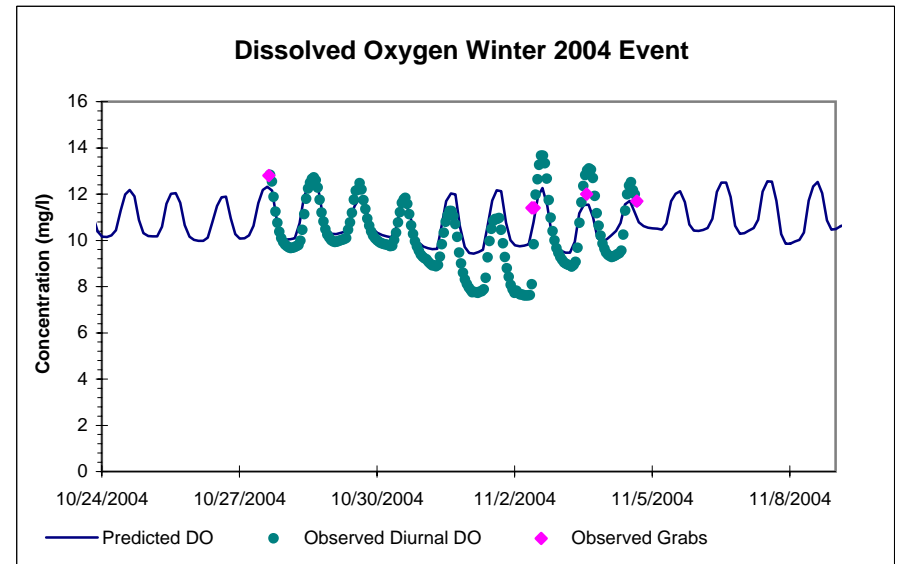
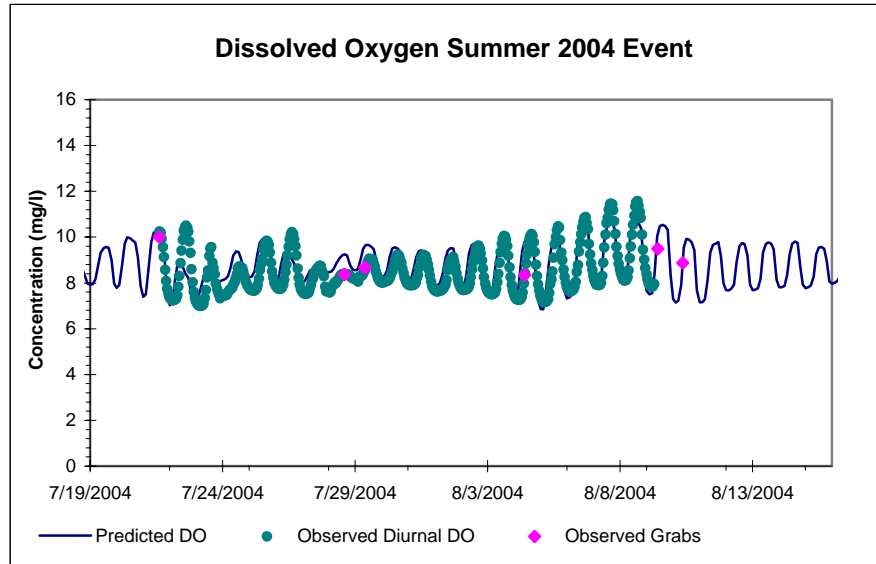
## South Branch Raritan River at Stanton Rd. in Stanton Station (SBRR8, USGS 01397000)



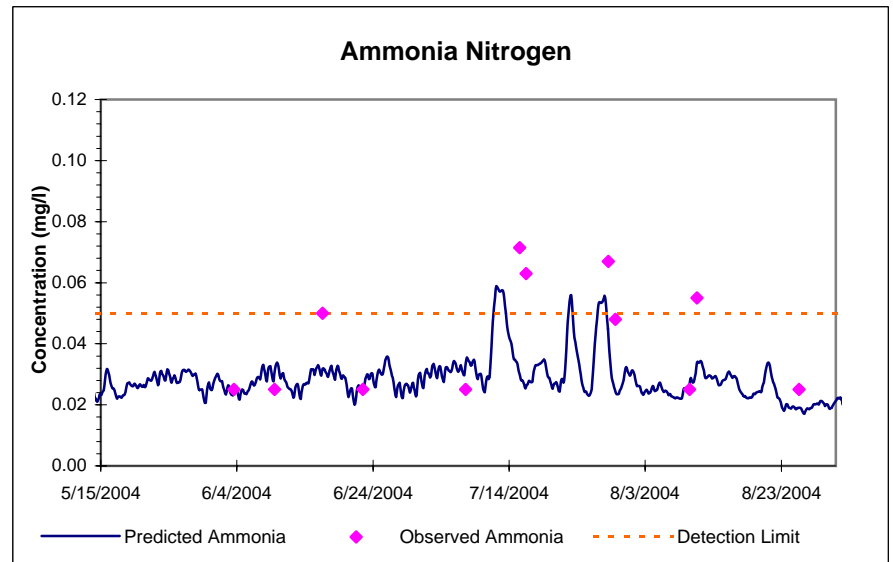
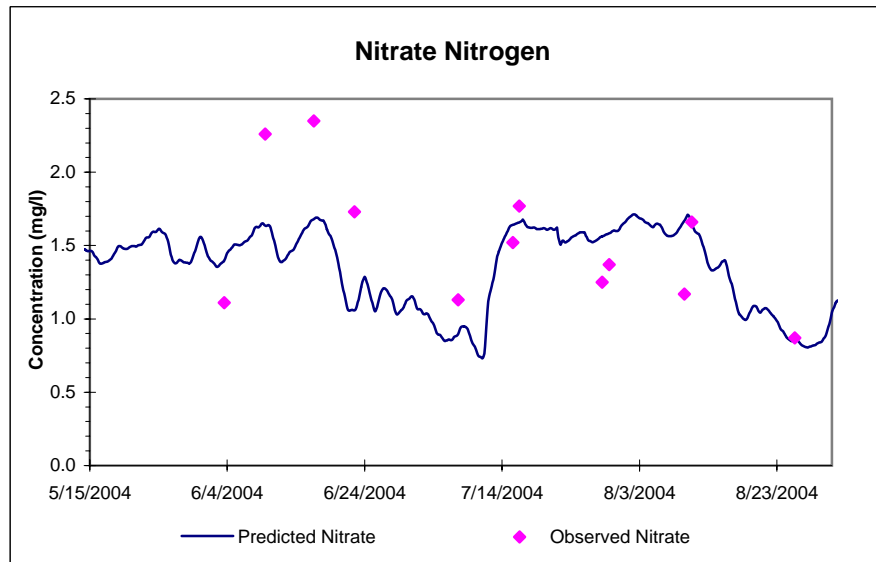
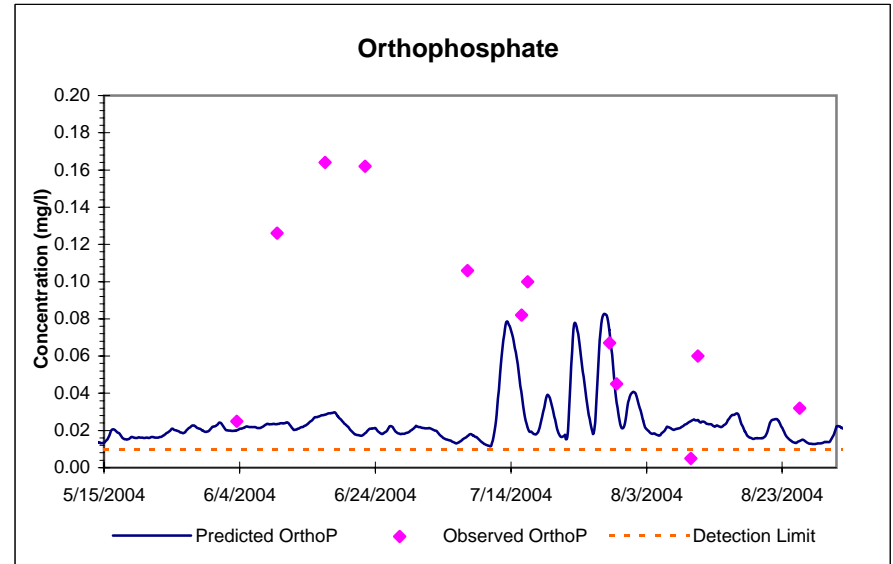
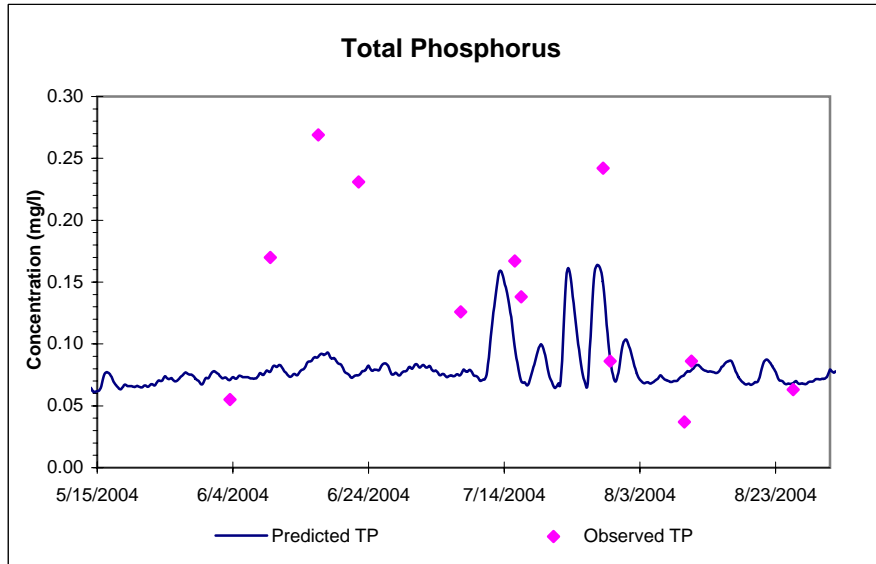
# South Branch Raritan River at Stanton Rd. in Stanton Station (SBRR8, USGS 01397000)



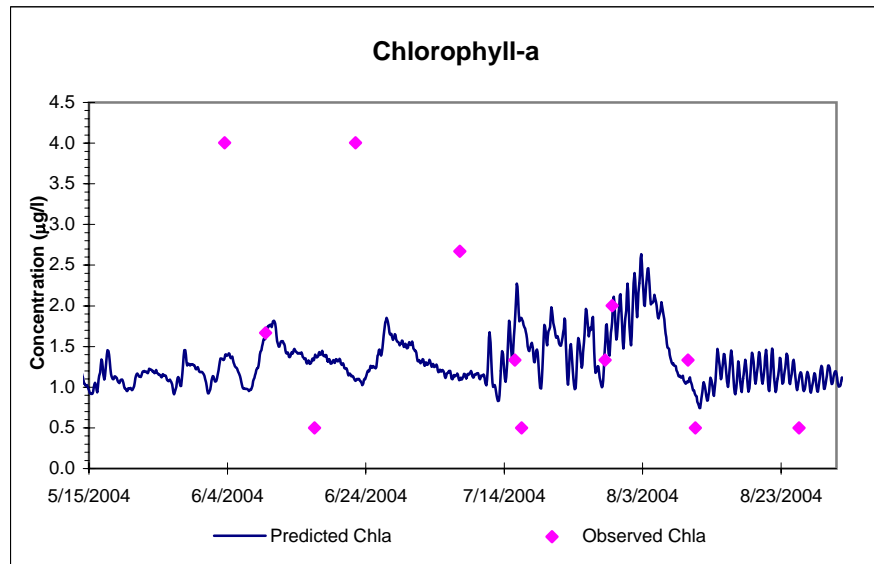
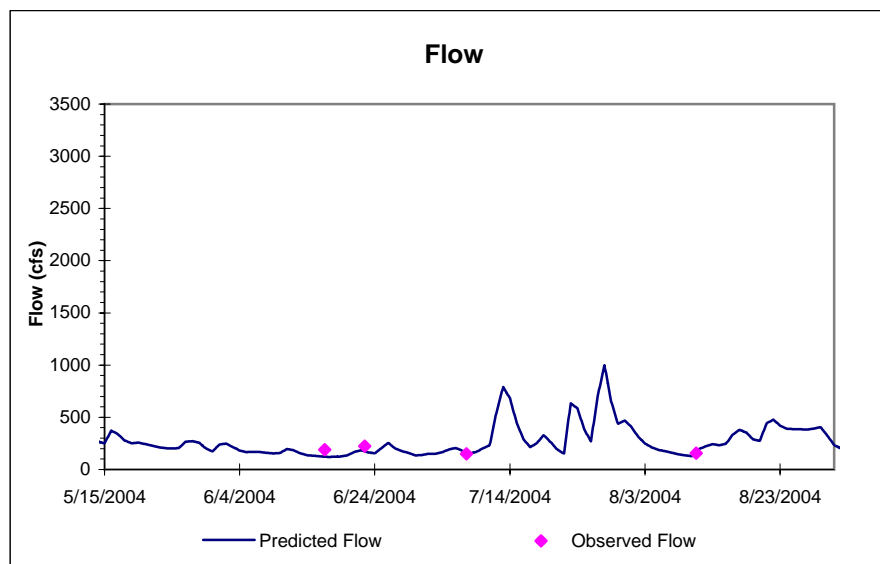
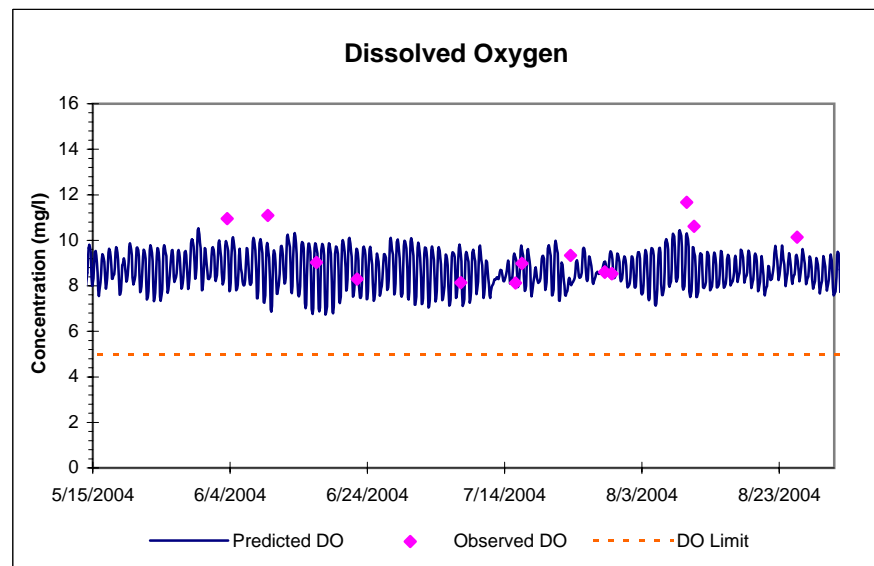
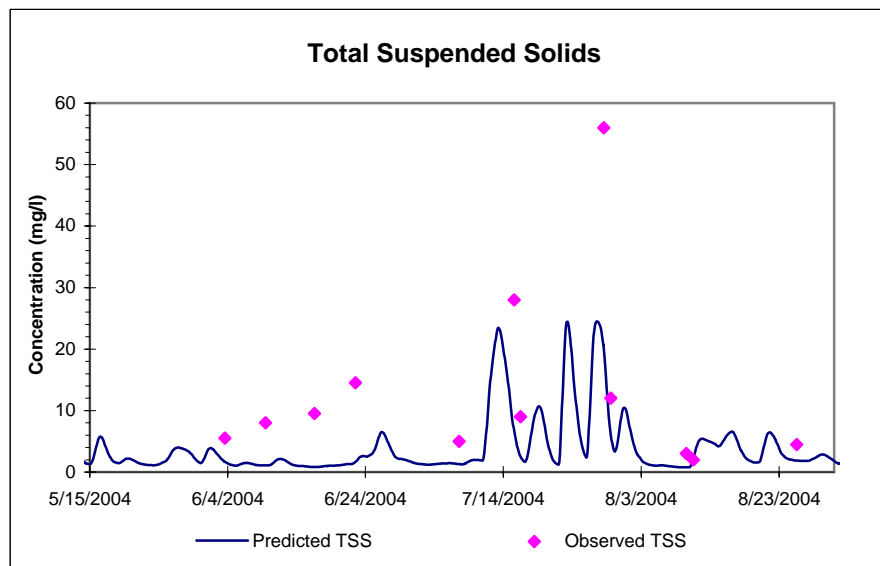
## South Branch Raritan River at Stanton Rd. in Stanton Station (SBRR8, USGS 01397000)



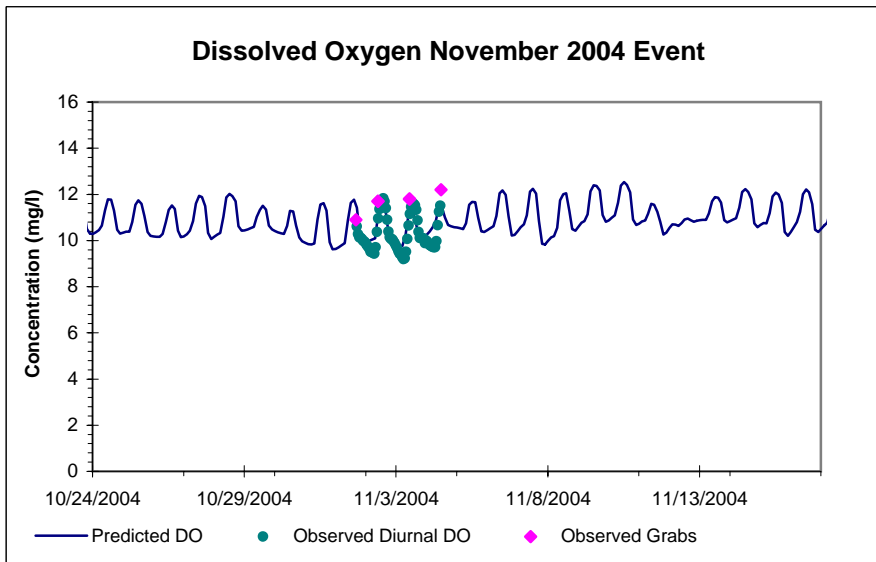
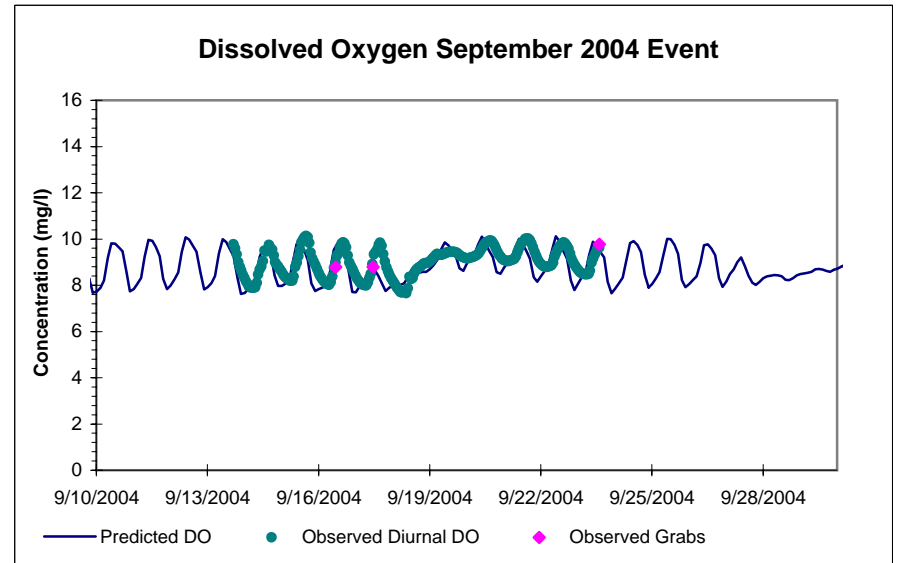
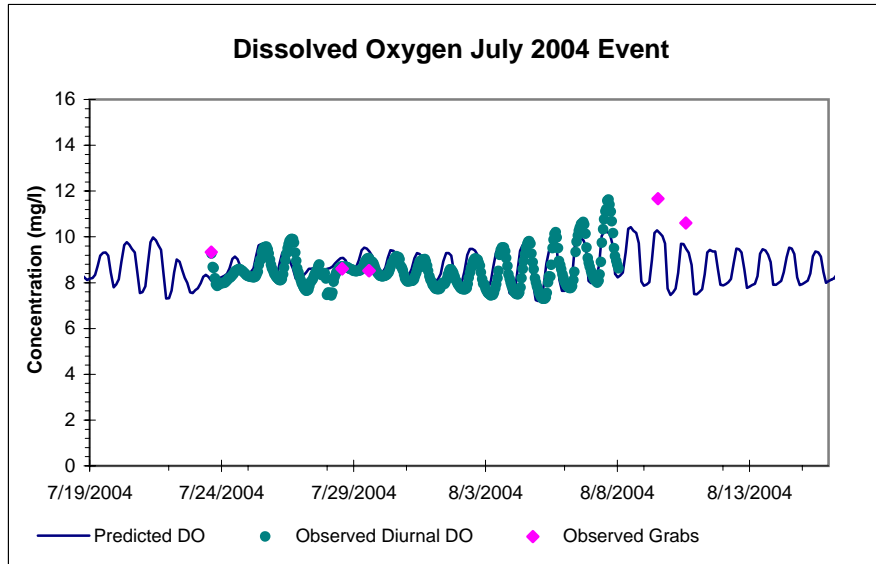
## South Branch Raritan River at Main Street in Three Bridges (SBRR9)



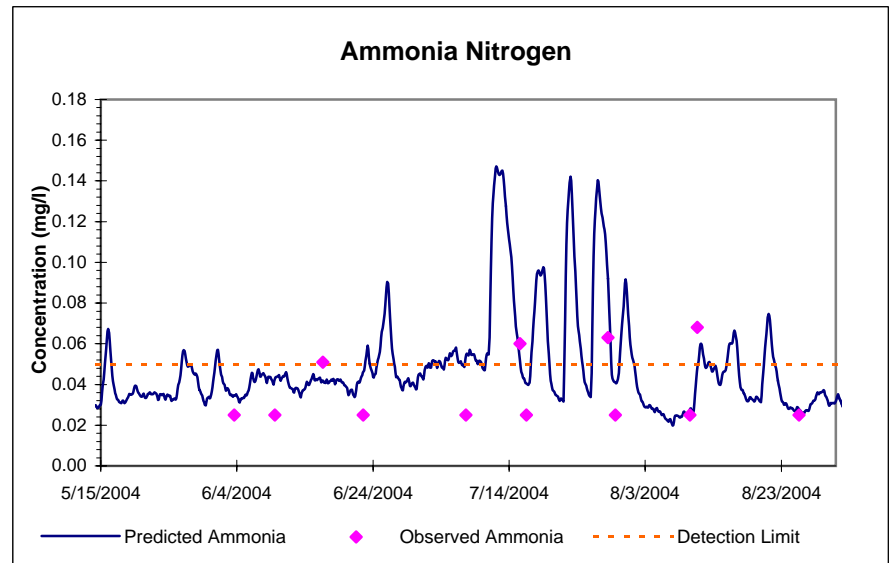
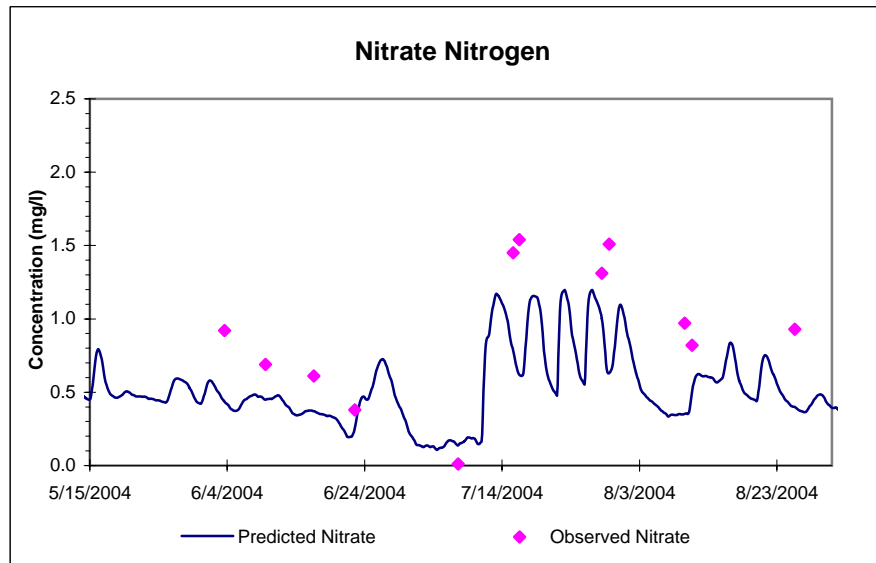
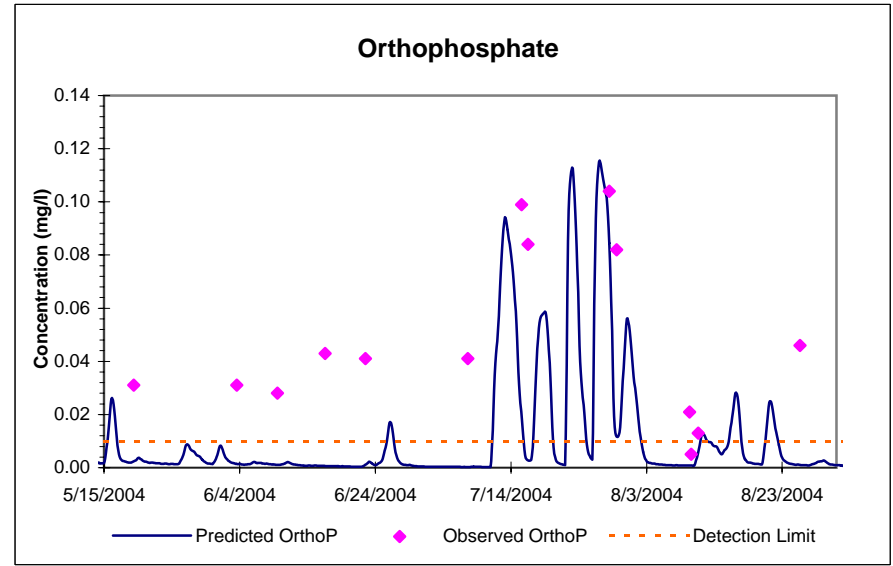
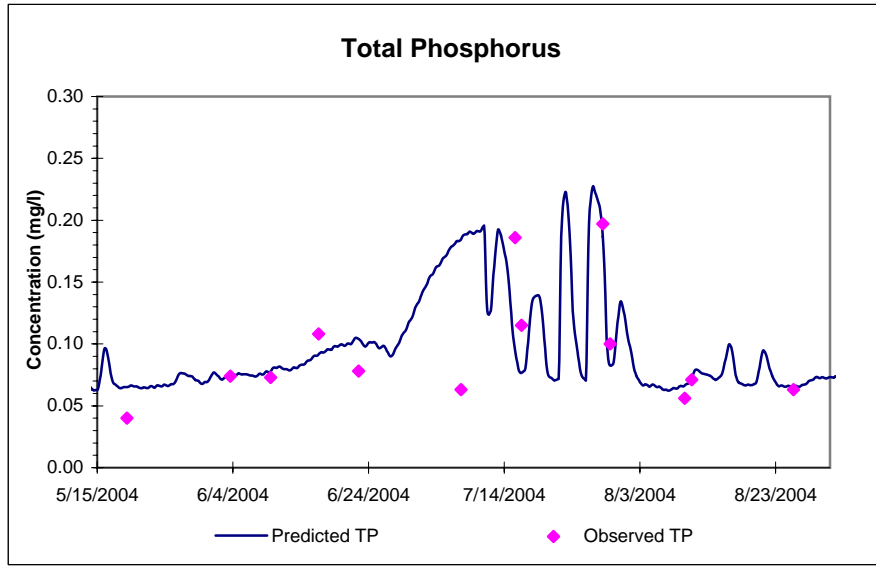
## South Branch Raritan River at Main Street in Three Bridges (SBRR9)



## South Branch Raritan River at Main Street in Three Bridges (SBRR9)

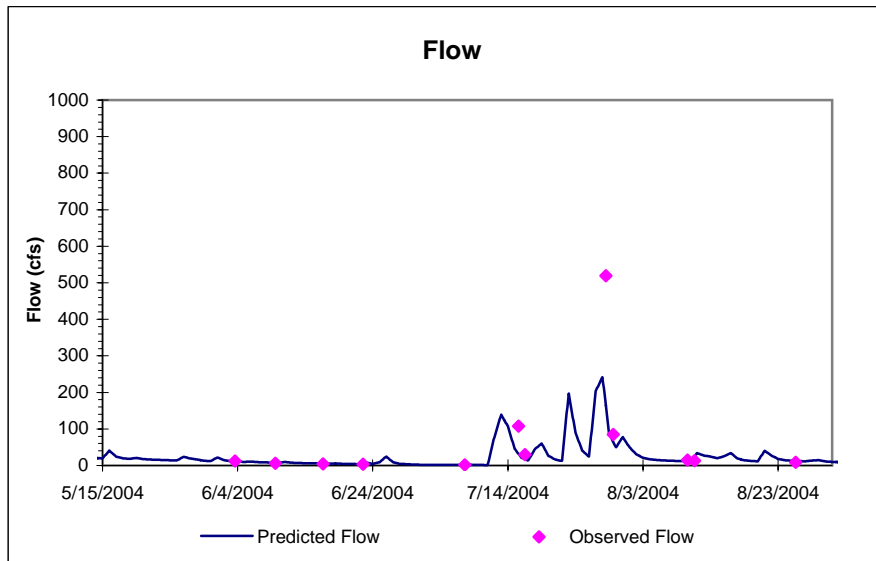
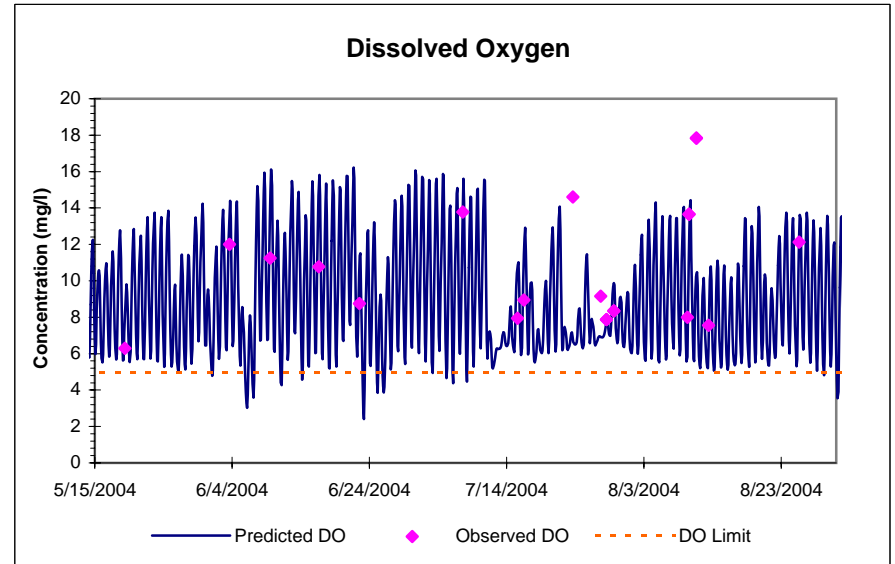
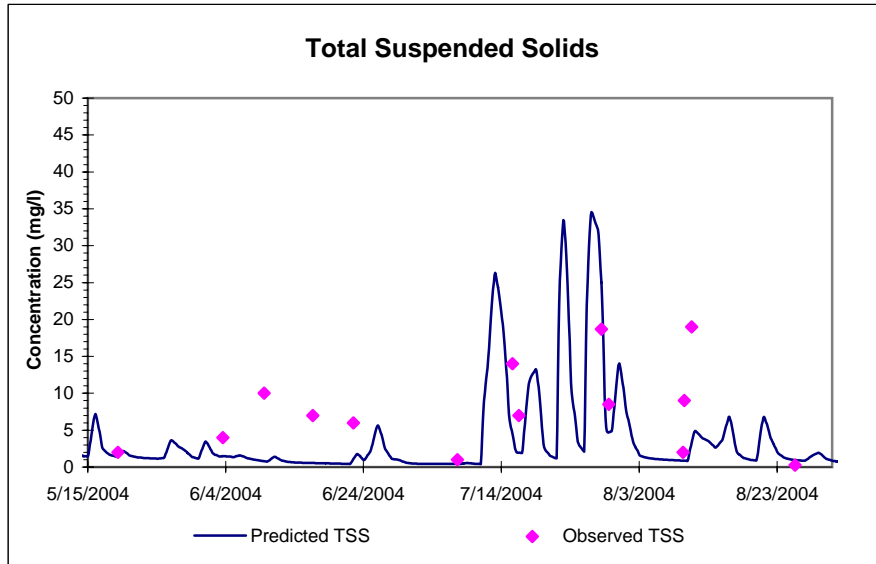


## Neshanic River at Reaville Rd. near Reaville (NR1, USGS 01398000)

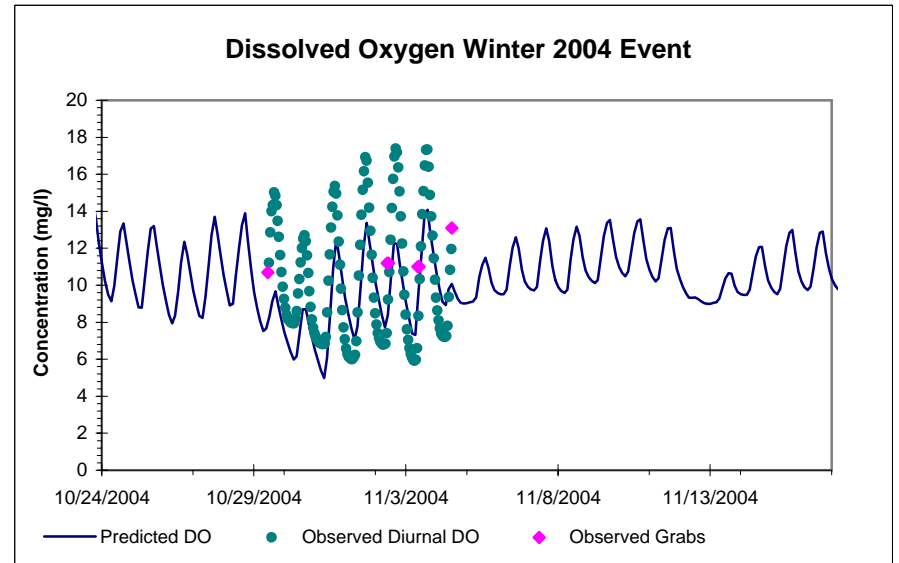
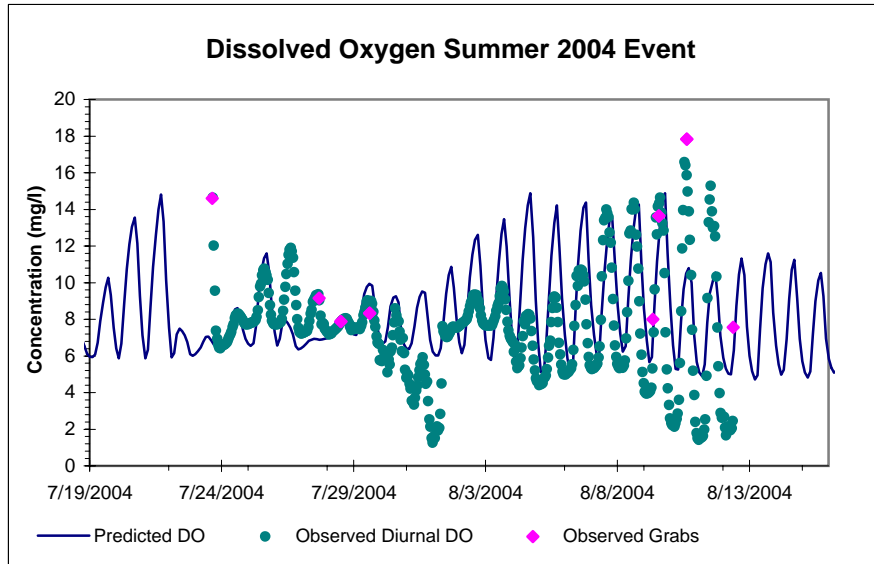




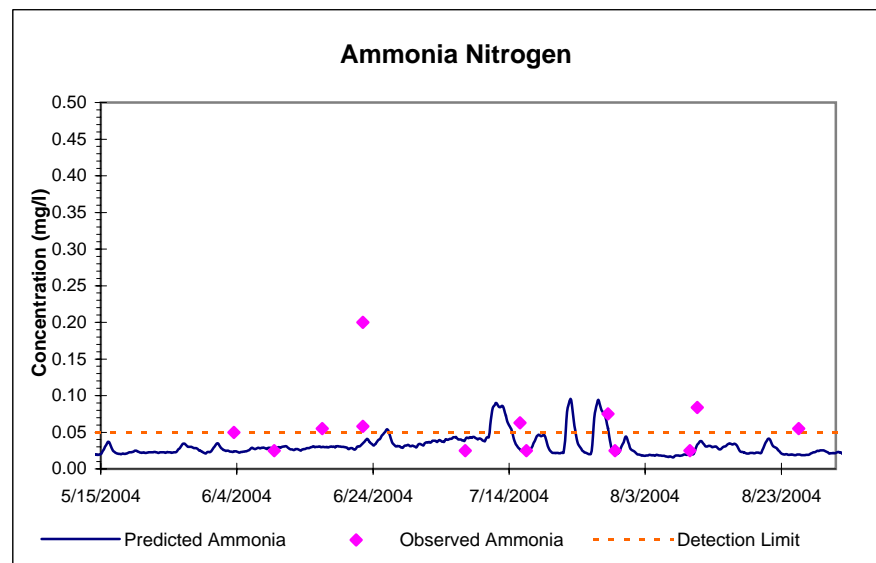
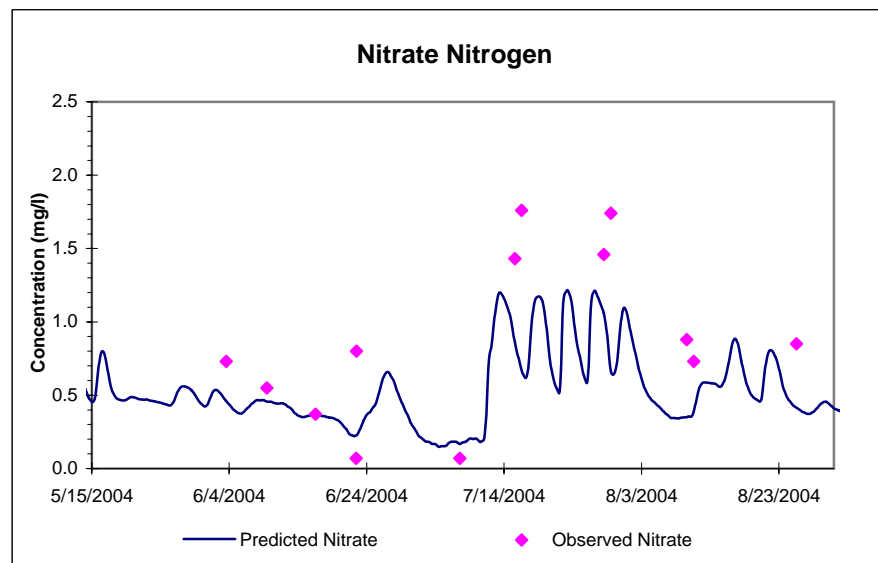
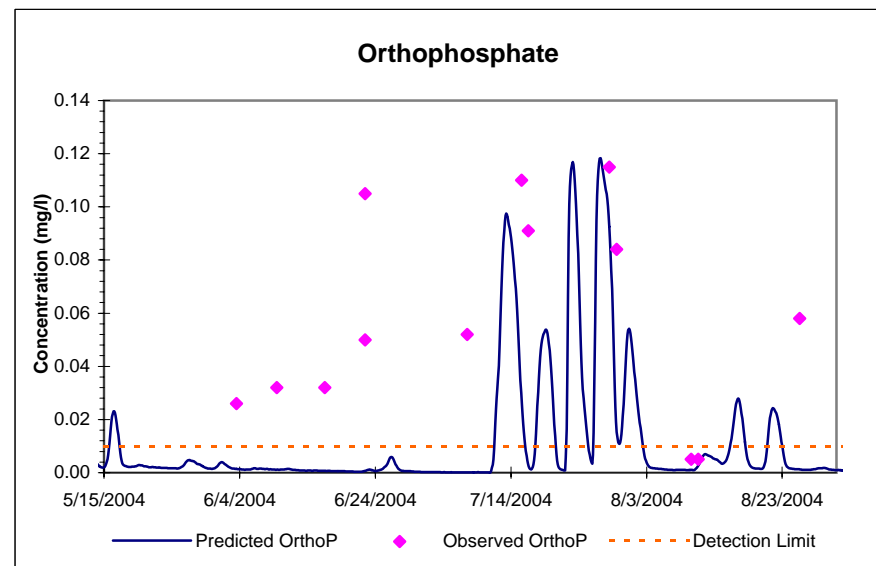
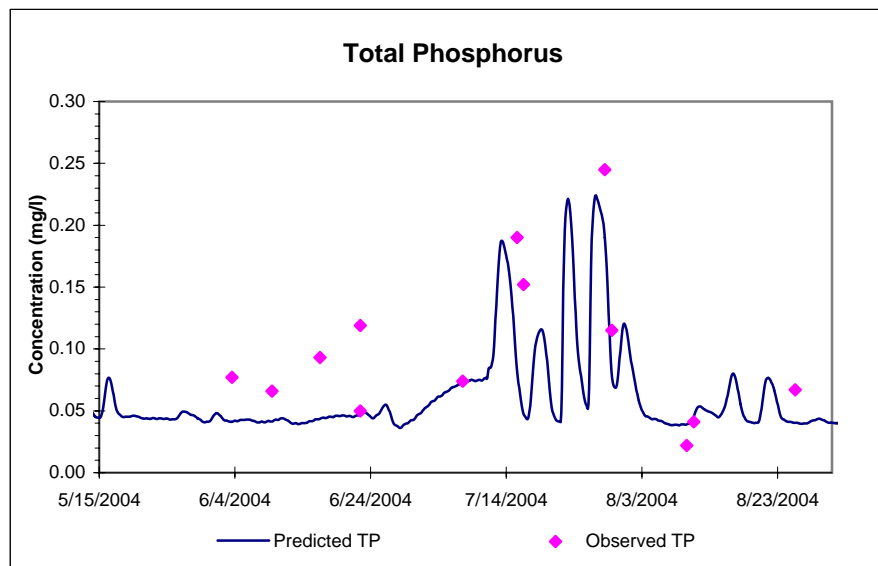
## Neshanic River at Reaville Rd. near Reaville (NR1, USGS 01398000)



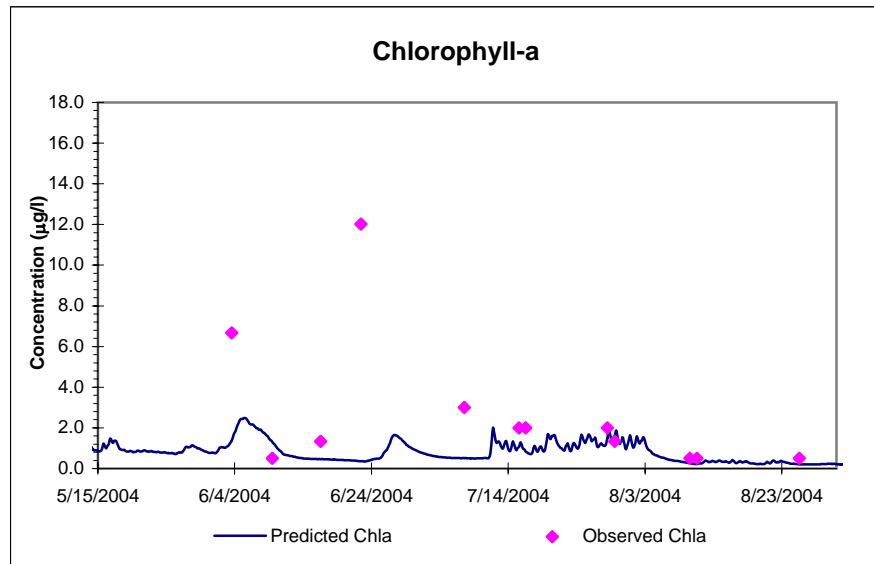
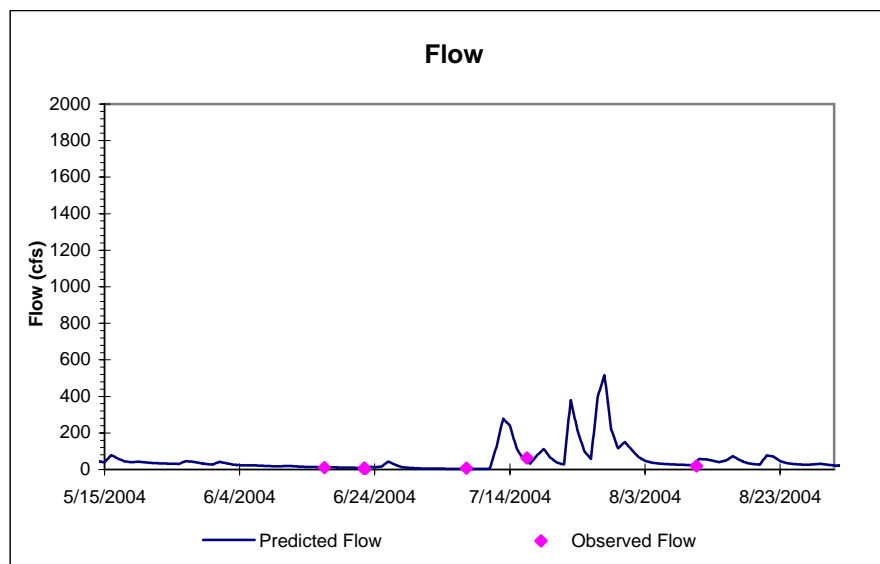
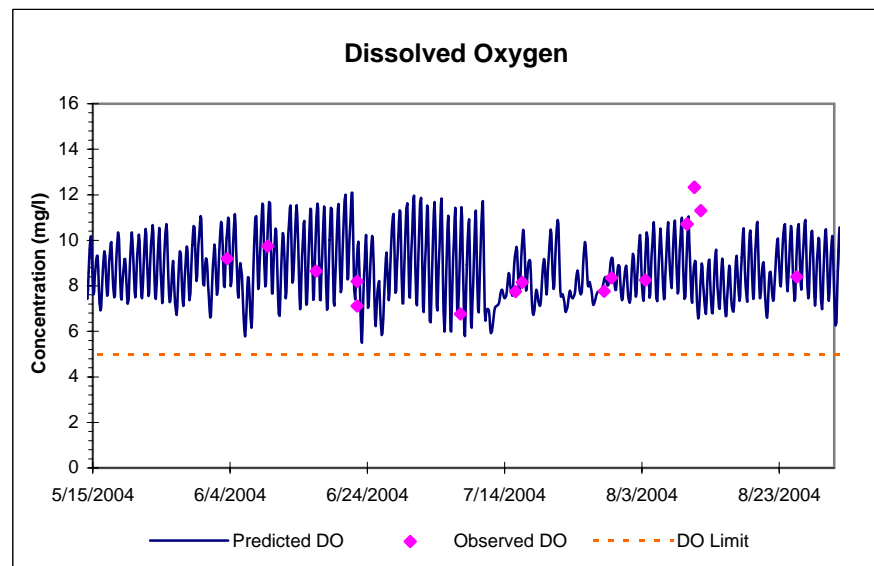
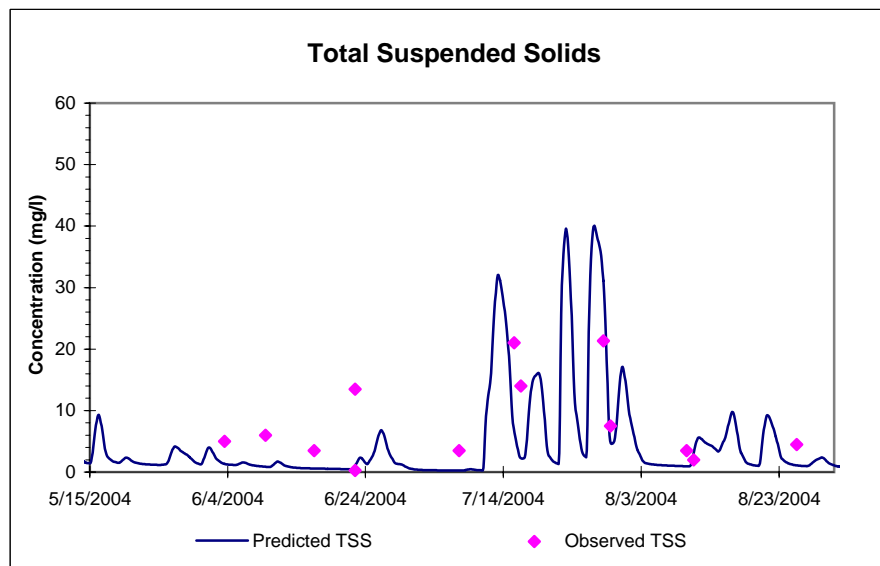
## Neshanic River at Reaville Rd. near Reaville (NR1, USGS 01398000)



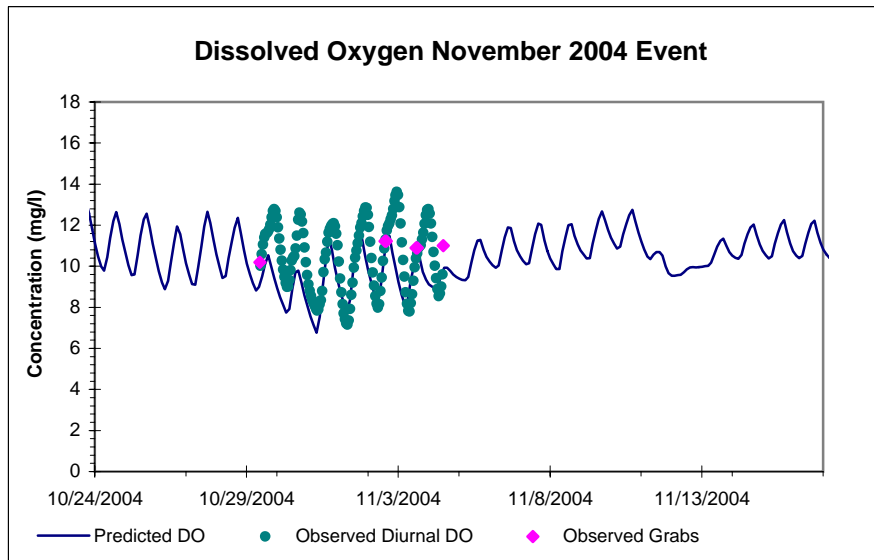
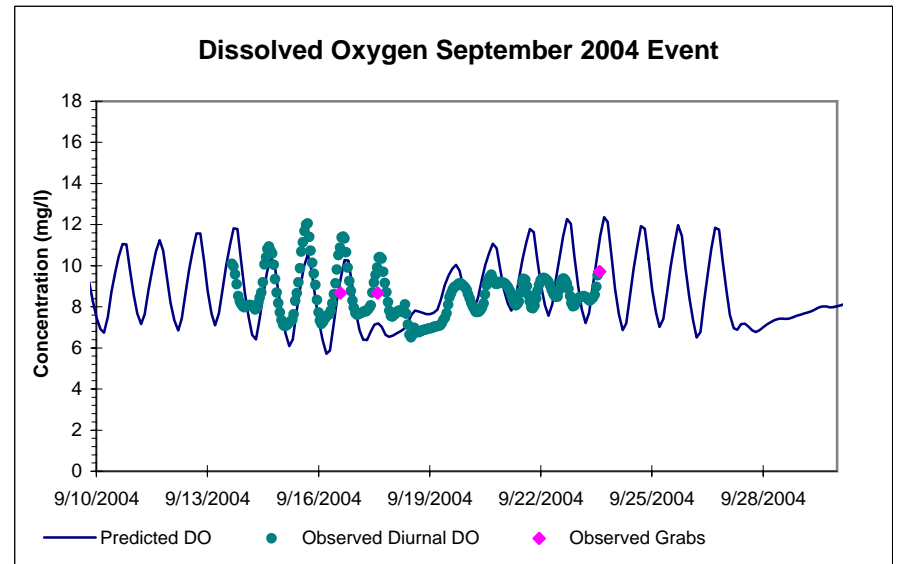
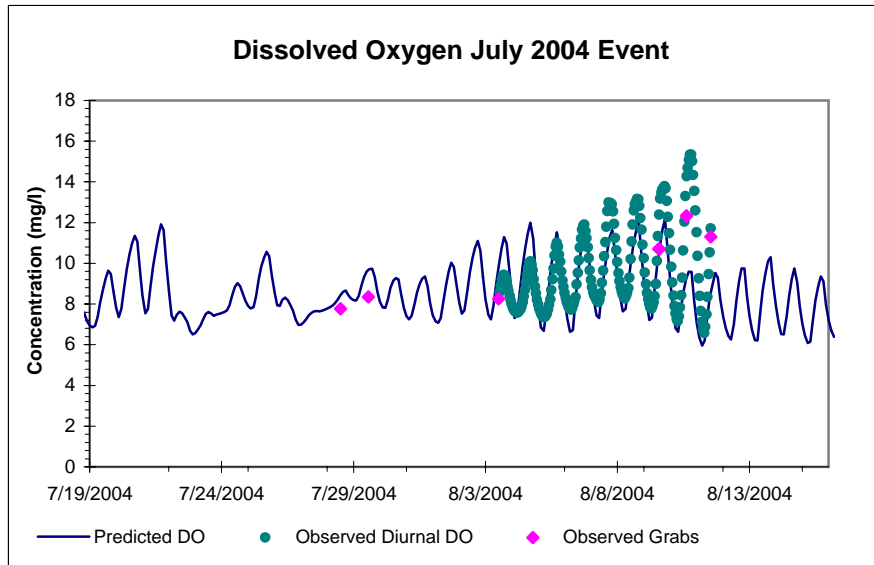
## Neshanic River at Amwell Rd. in Hillsborough (NR2)



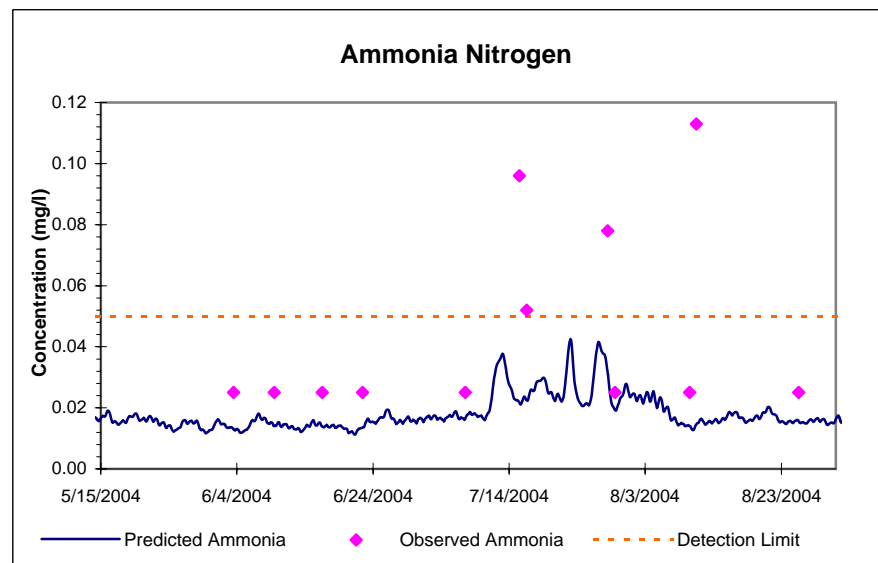
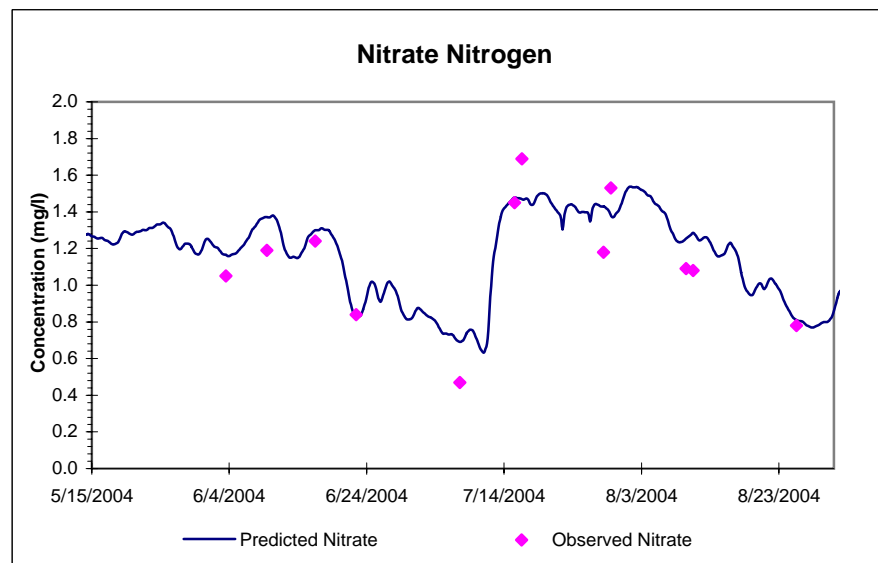
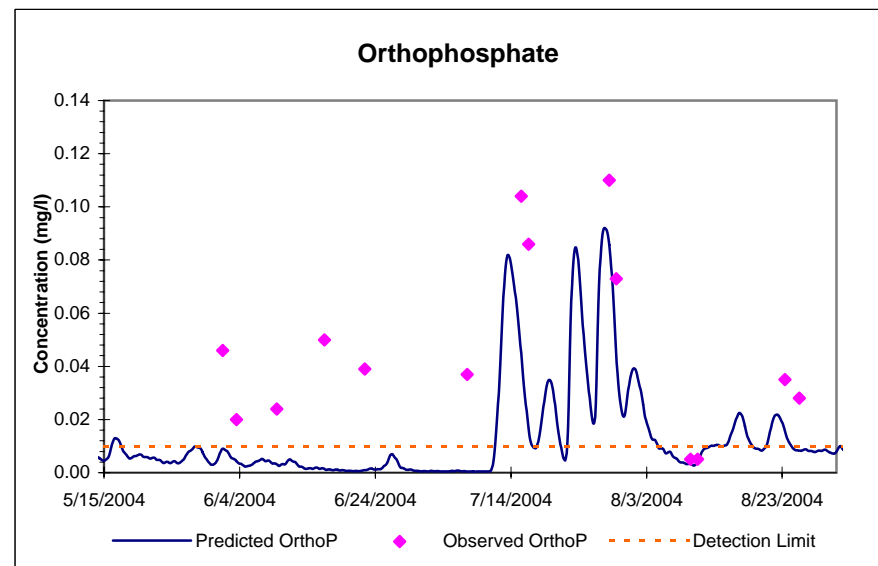
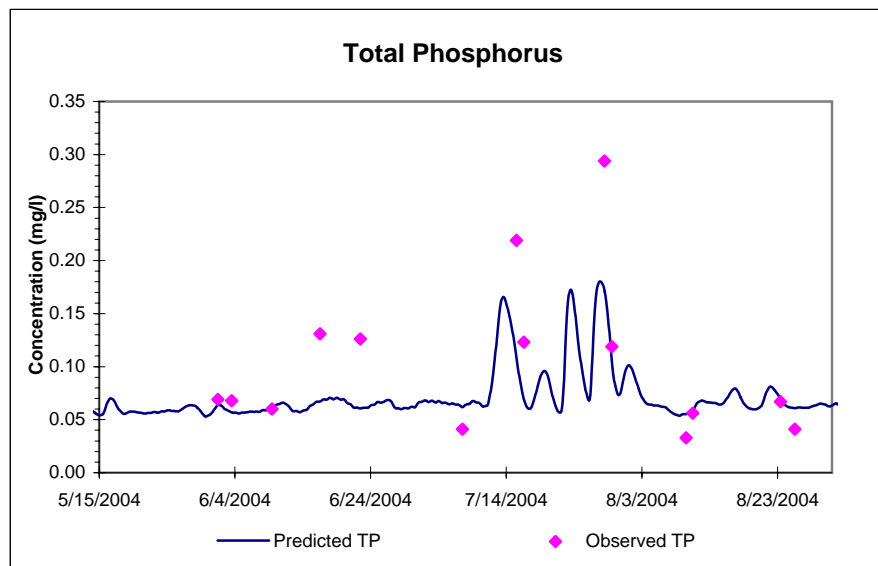
## Neshanic River at Amwell Rd. in Hillsborough (NR2)



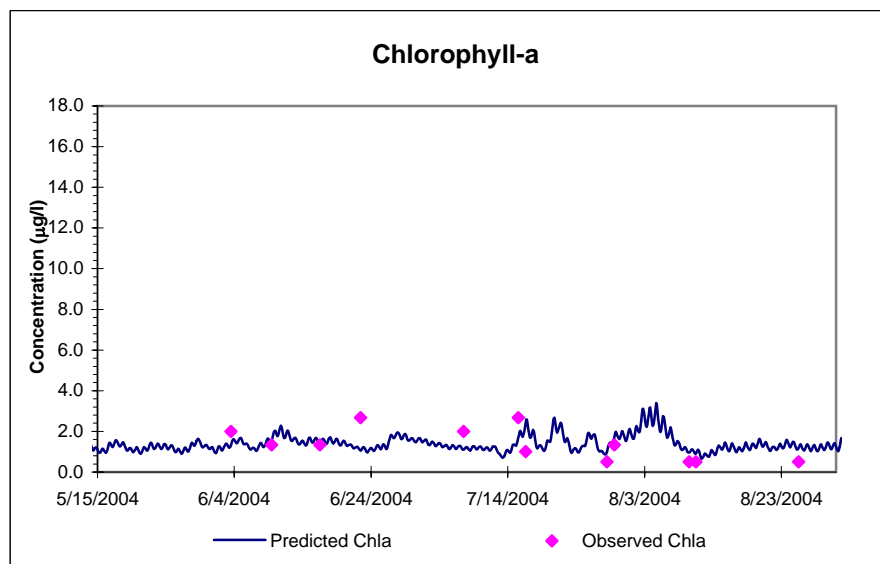
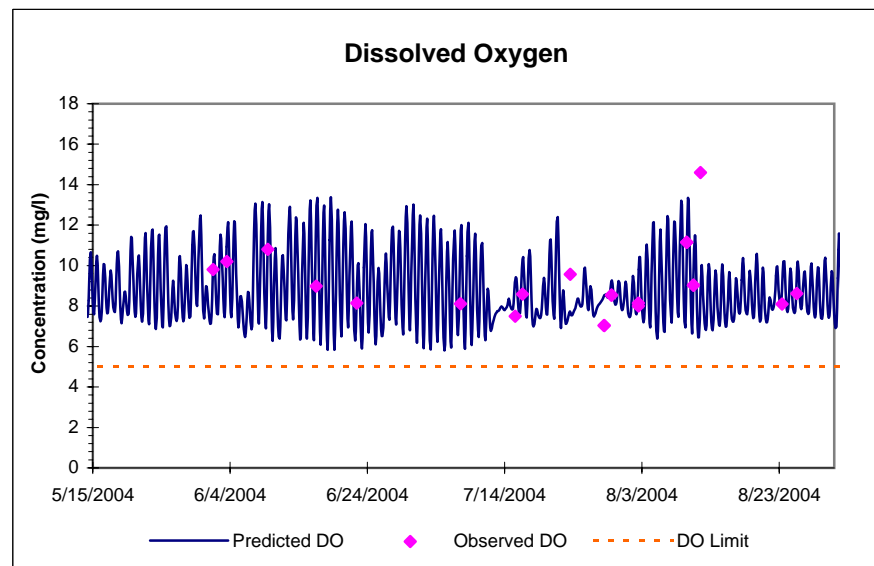
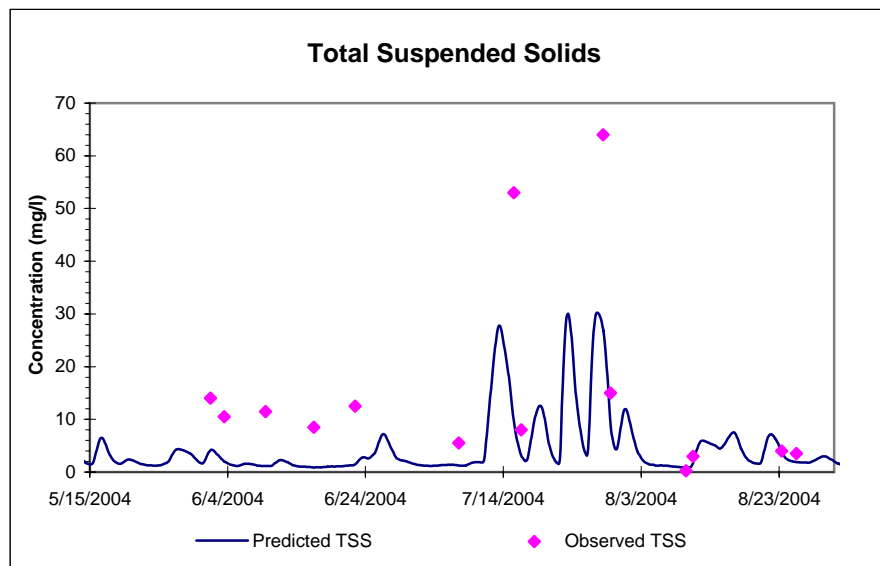
## Neshanic River at Amwell Rd. in Hillsborough (NR2)



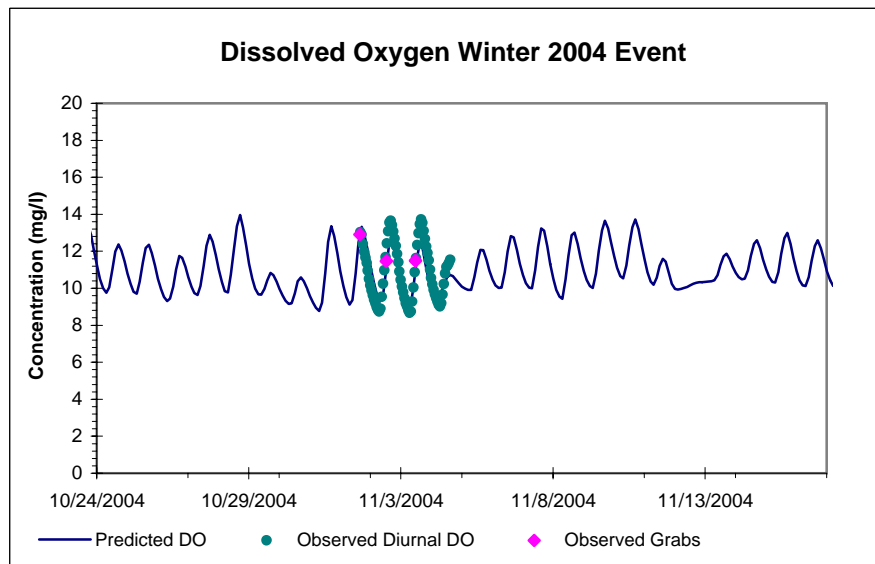
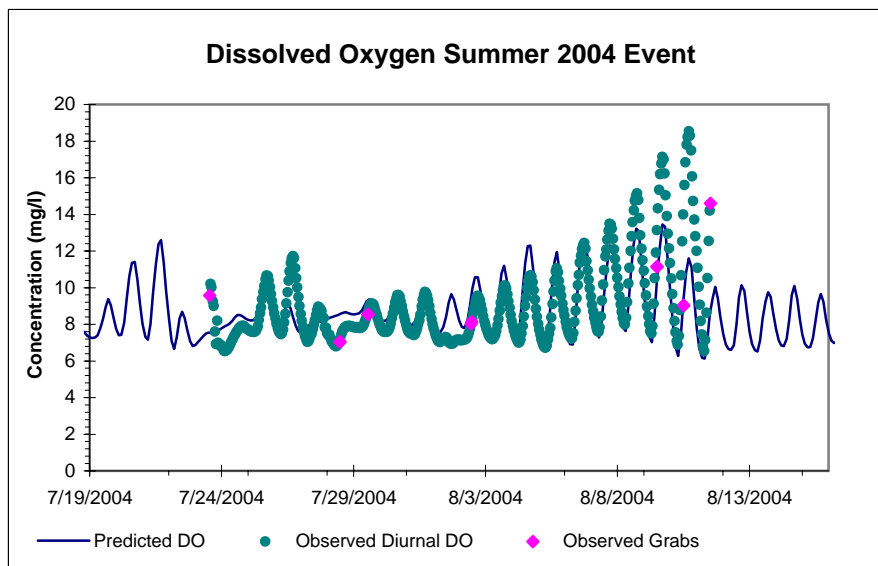
## South Branch Raritan River at Studdiford Dr. in South Branch (SBRR10, USGS 01398102)



## South Branch Raritan River at Studdiford Dr. in South Branch (SBRR10, USGS 01398102)



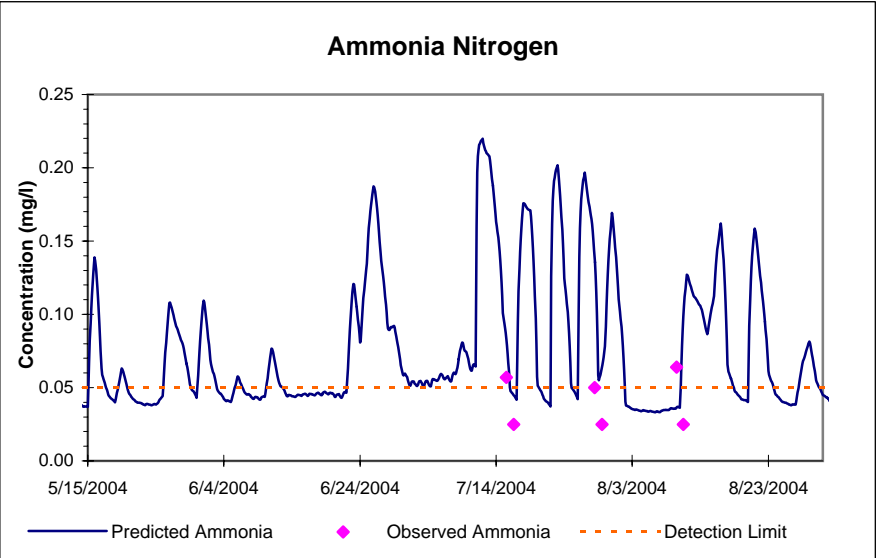
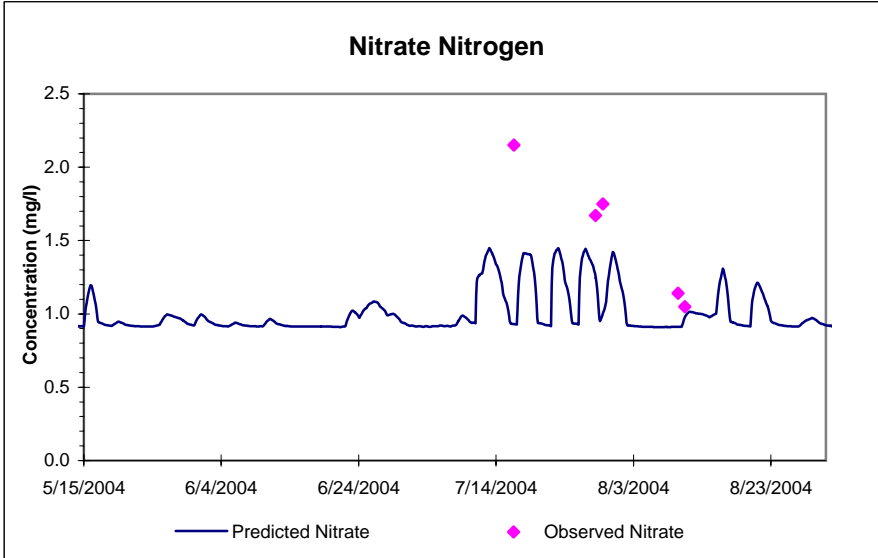
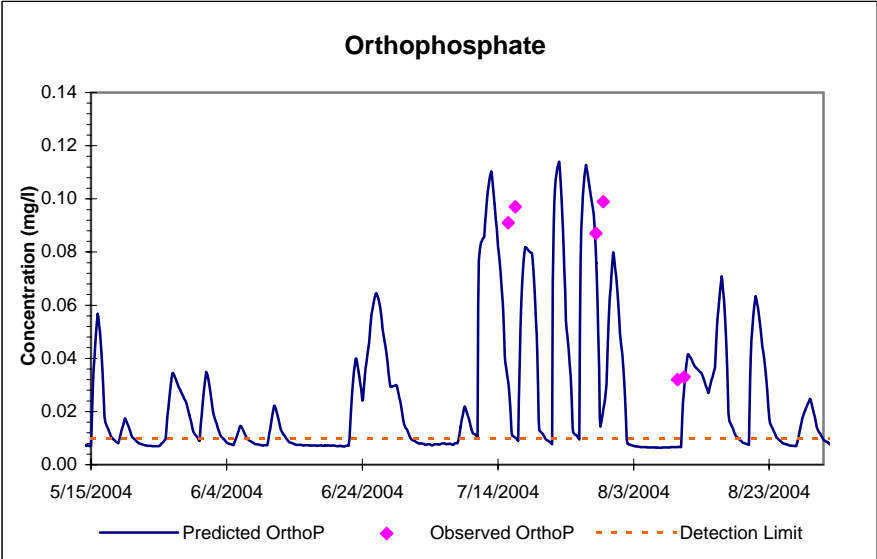
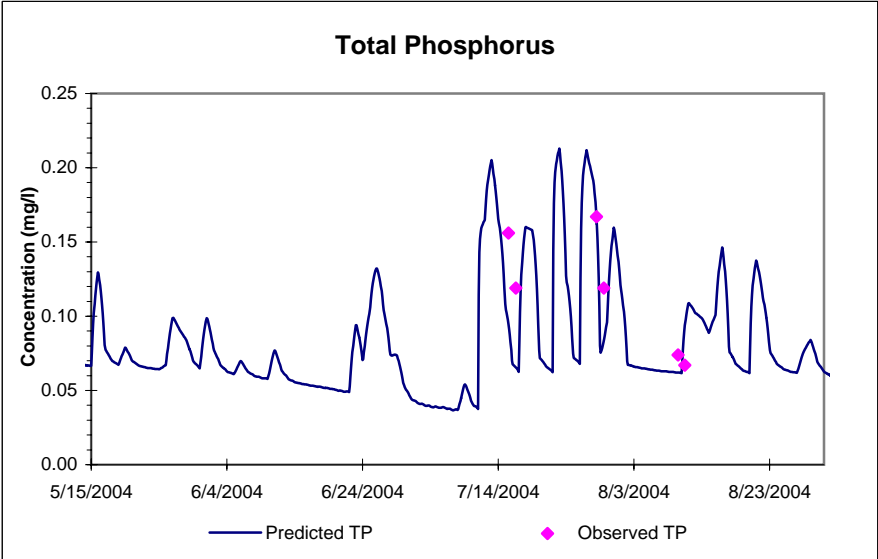
## South Branch Raritan River at Studdiford Dr. in South Branch (SBRR10, USGS 01398102)



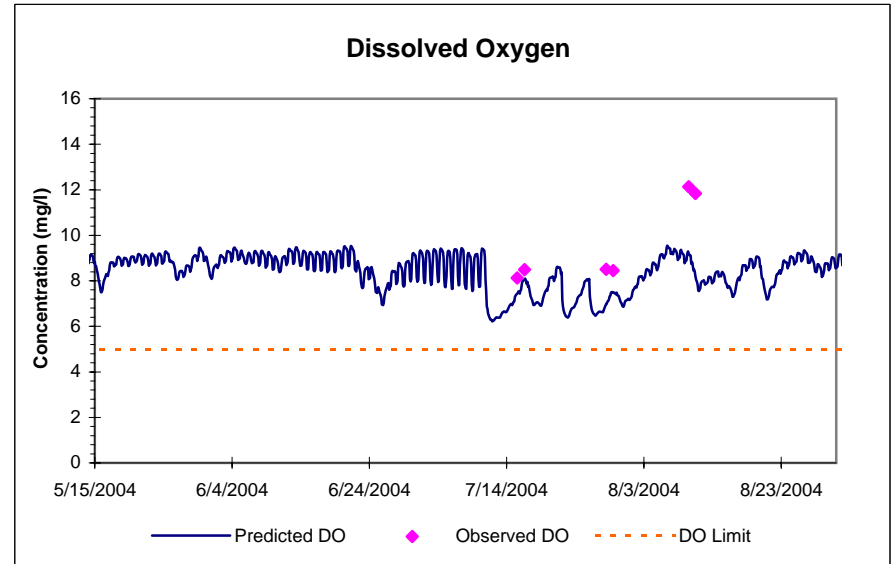
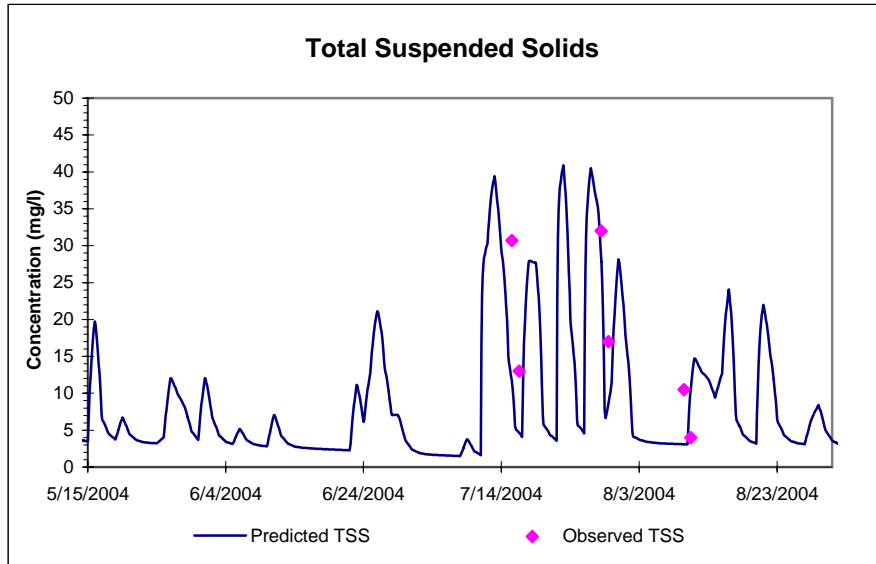
see section III.G.3 for discussion of this event



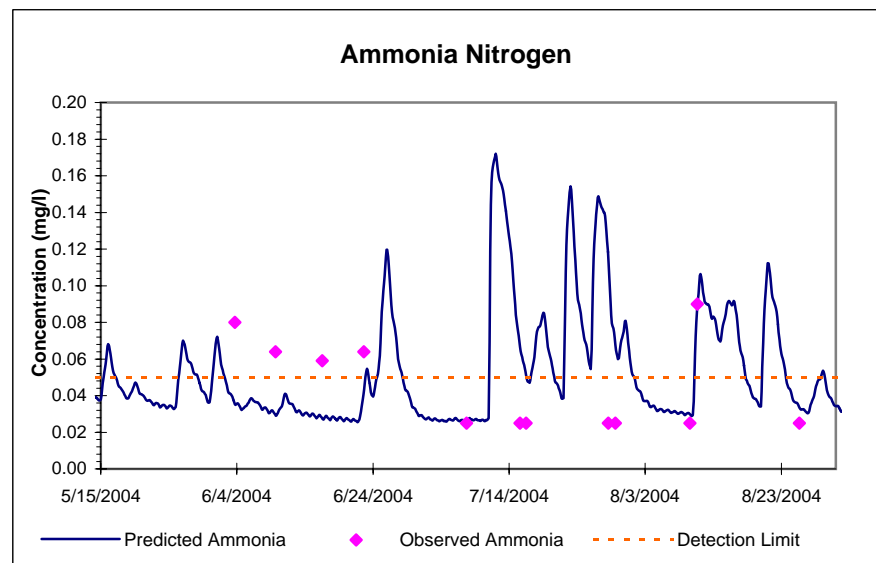
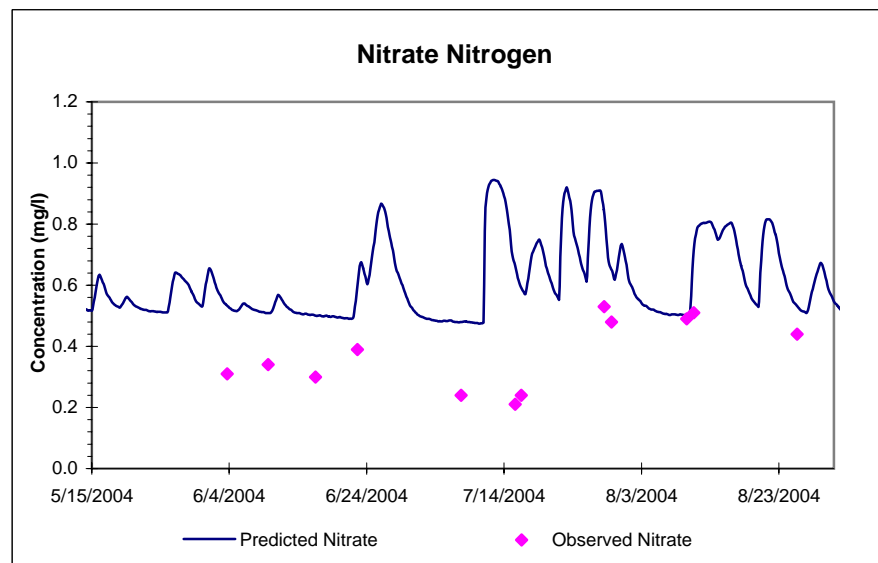
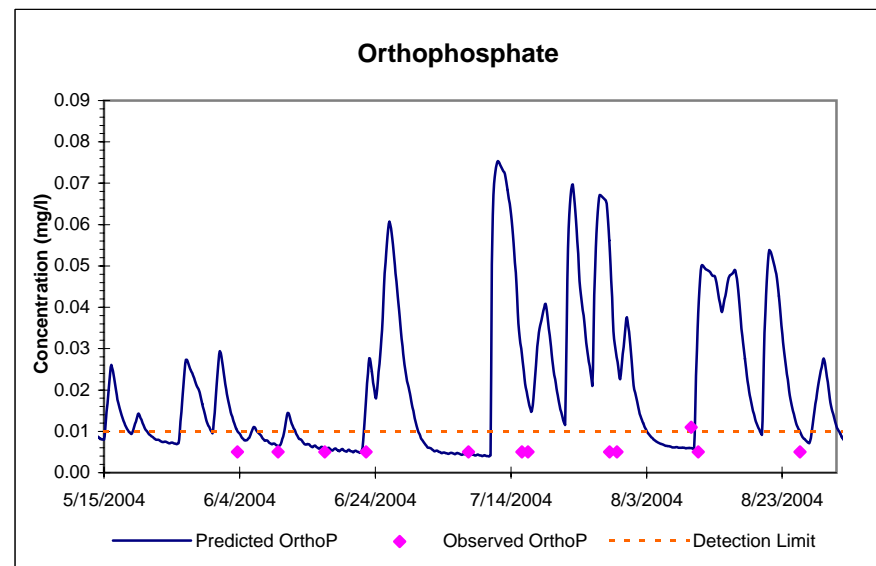
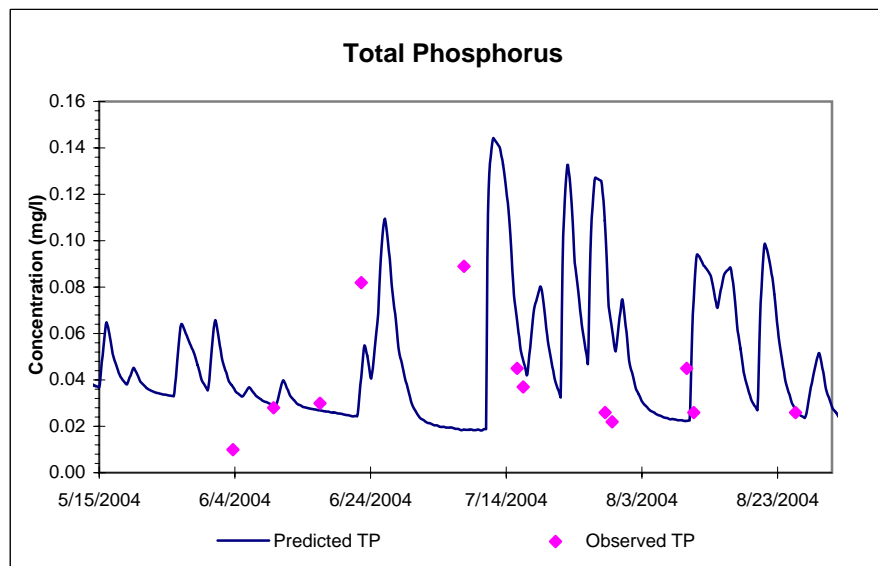
# Holland Brook at South Branch Rd. near South Branch (HB1)



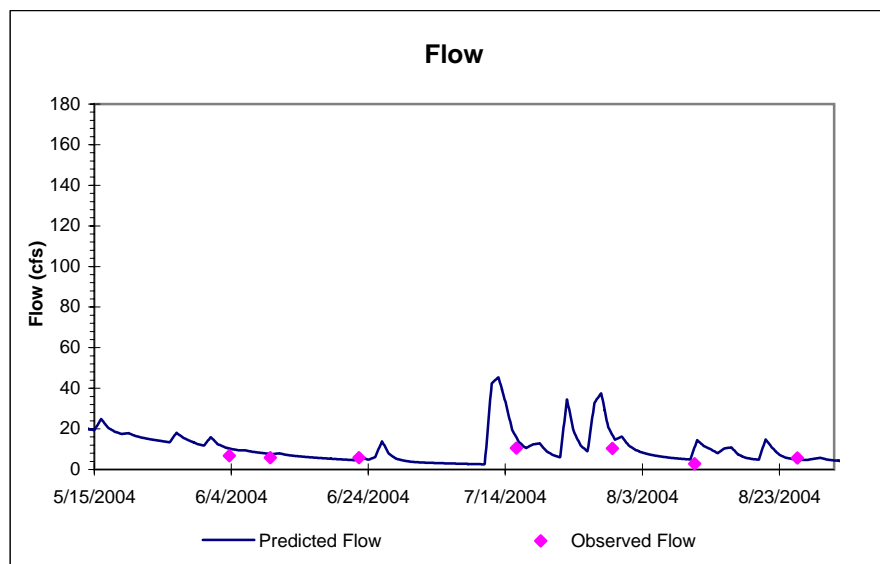
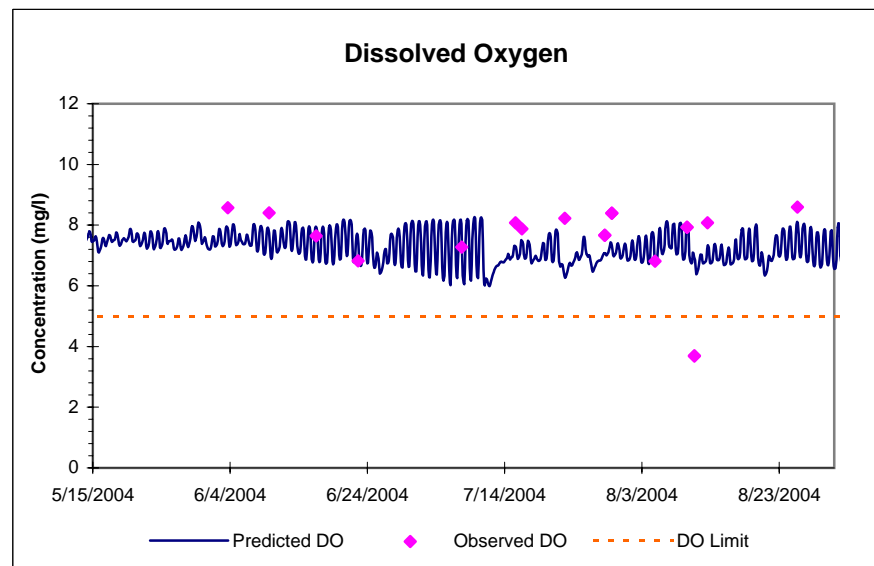
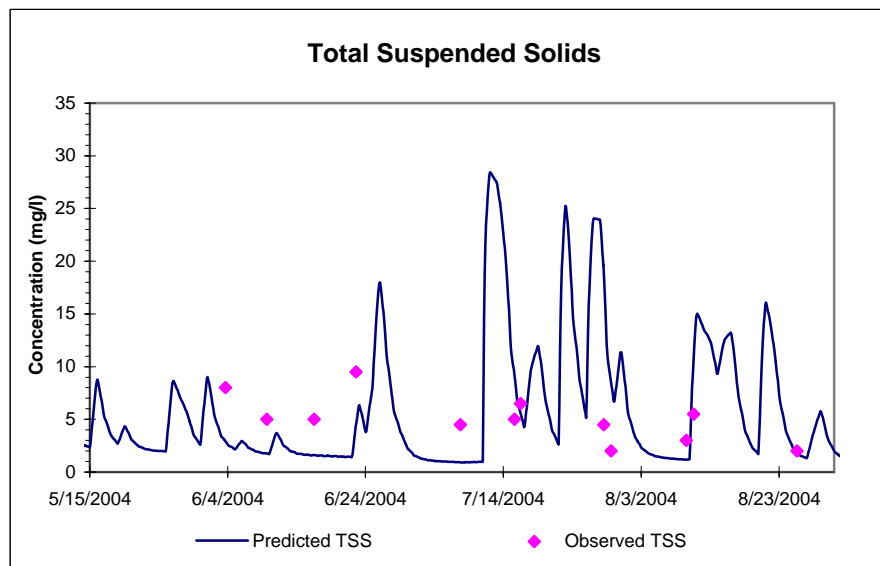
## Holland Brook at South Branch Rd. near South Branch (HB1)



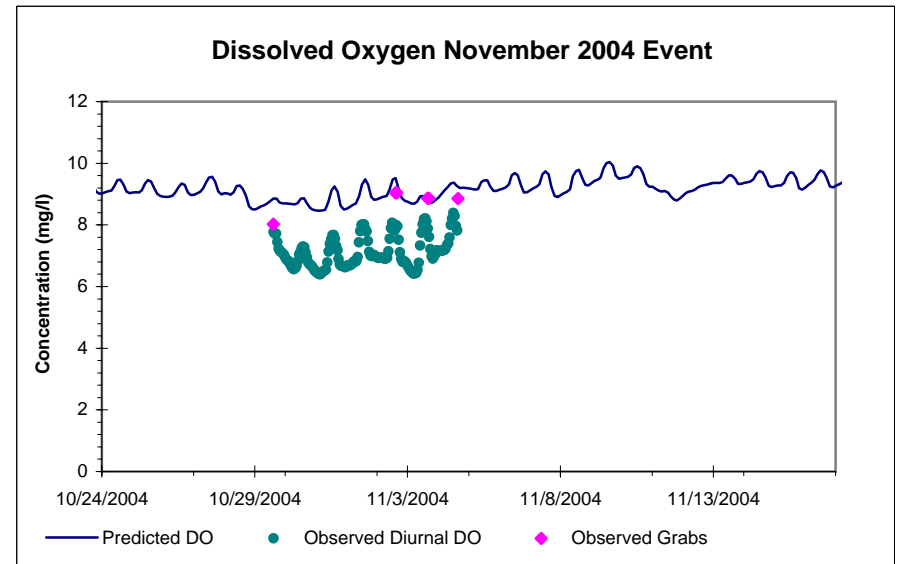
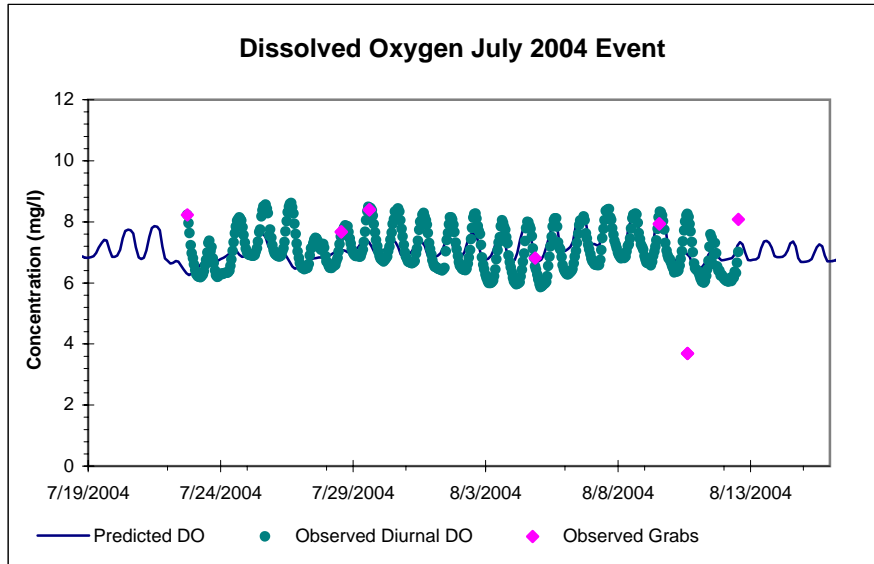
## Lamington River at Righter Road near Succasunna (LR1)



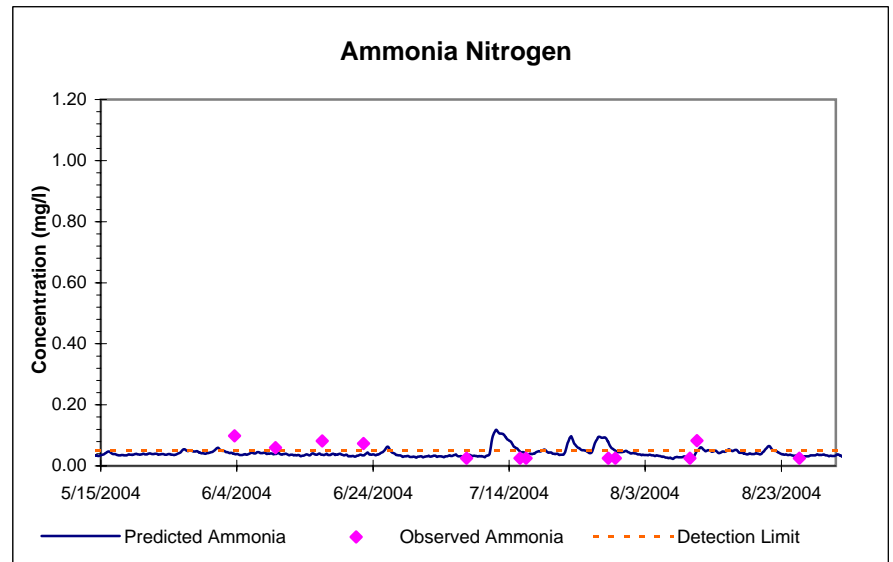
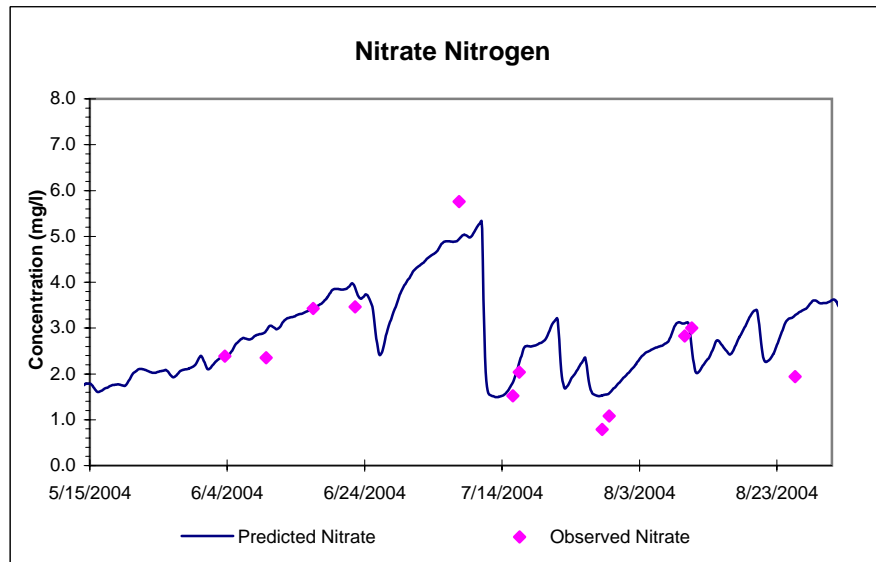
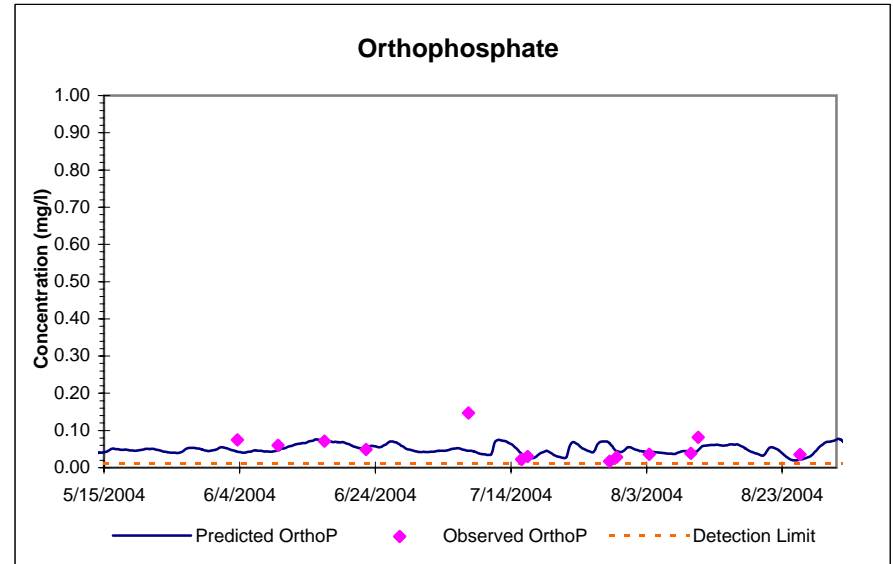
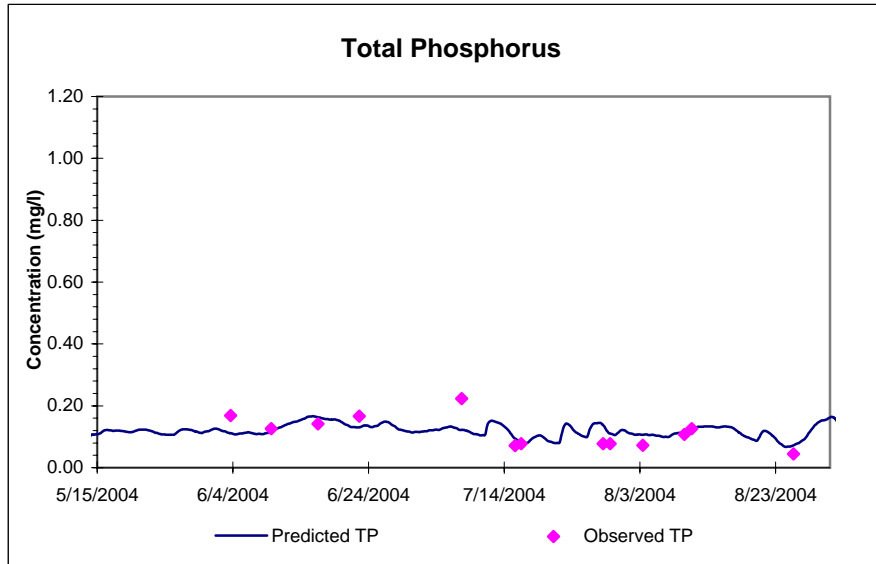
## Lamington River at Righter Road near Succasunna (LR1)



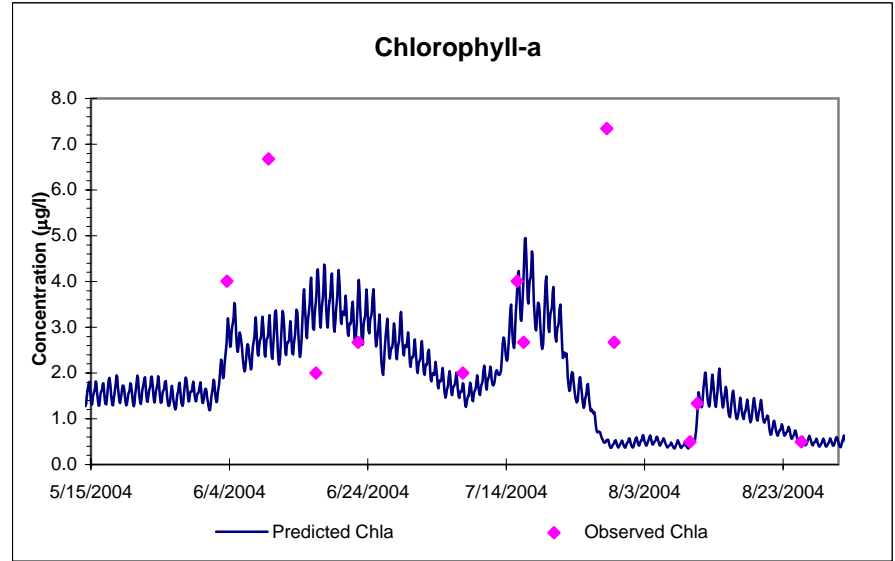
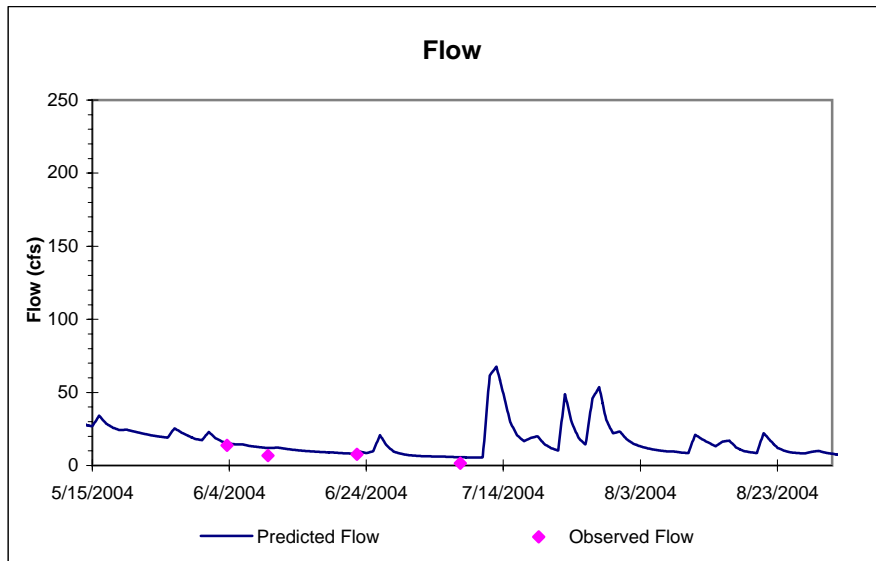
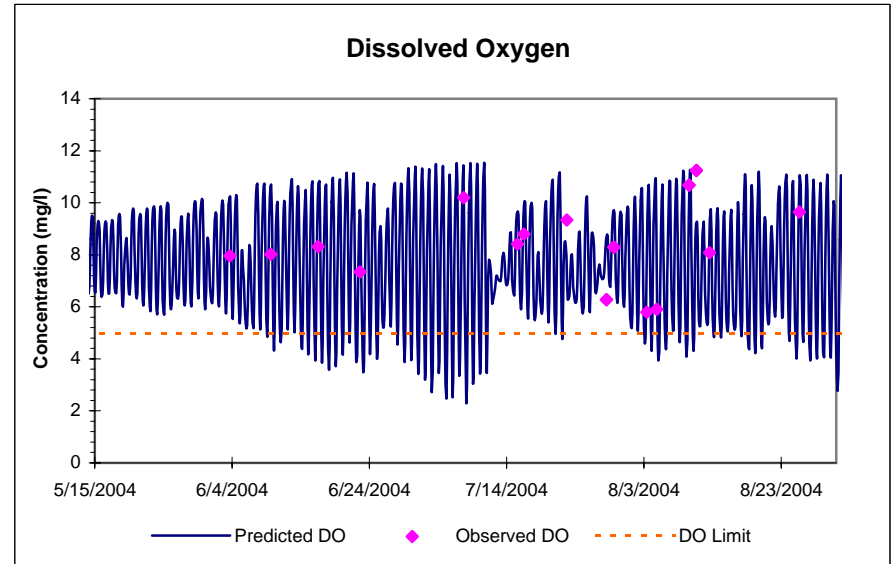
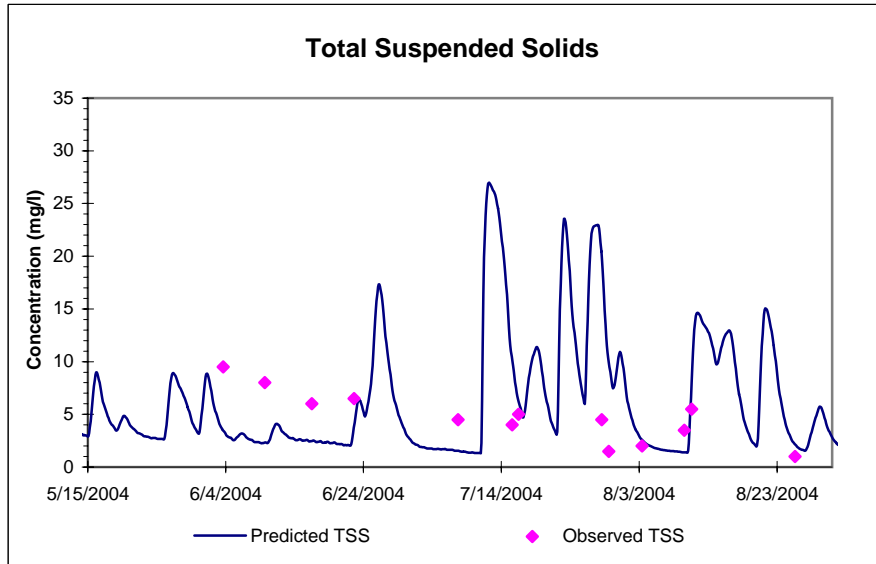
## Lamington River at Righter Road near Succasunna (LR1)



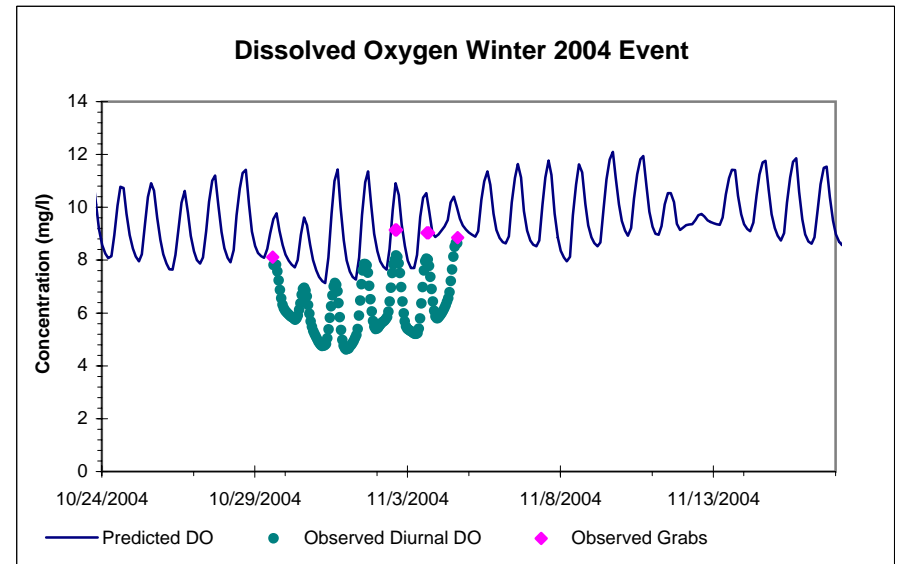
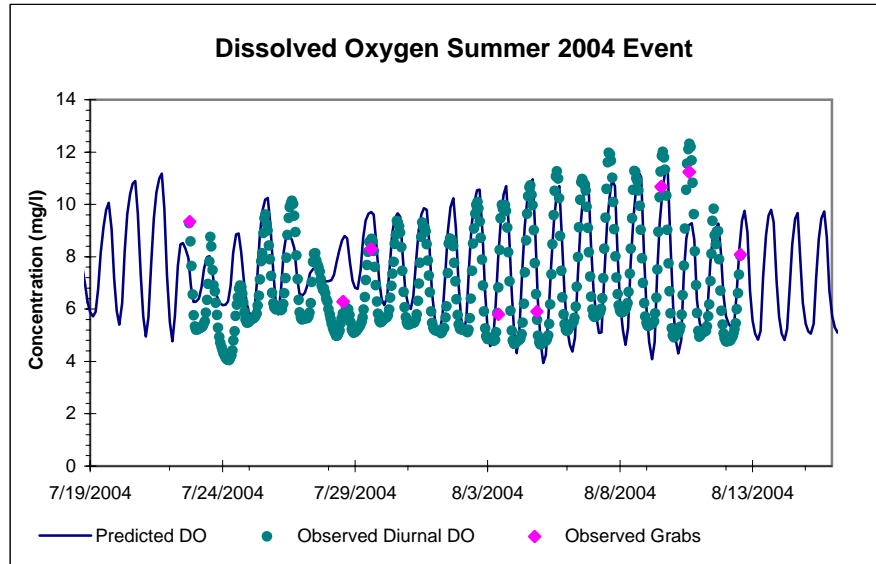
## Lamington River at Ironia Road Downstream of Roxbury STP (LR2)



## Lamington River at Ironia Road Downstream of Roxbury STP (LR2)

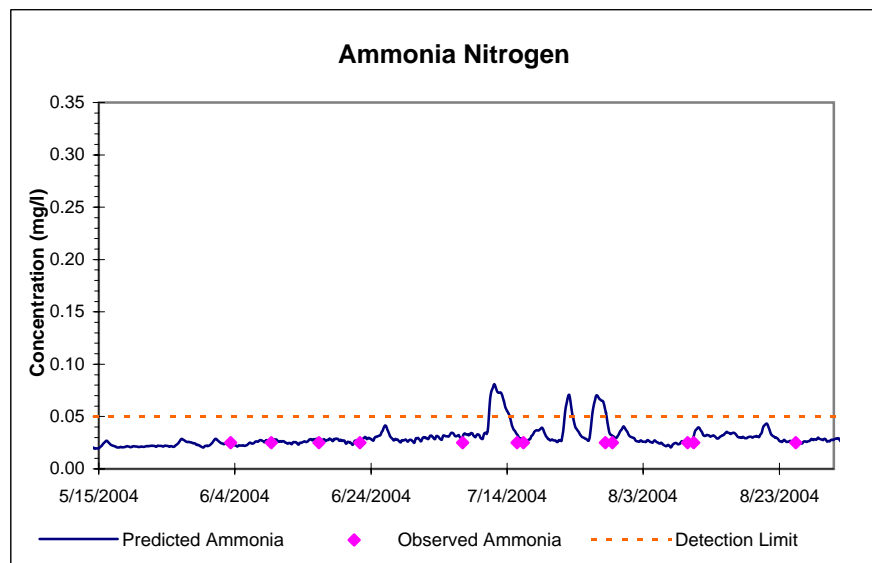
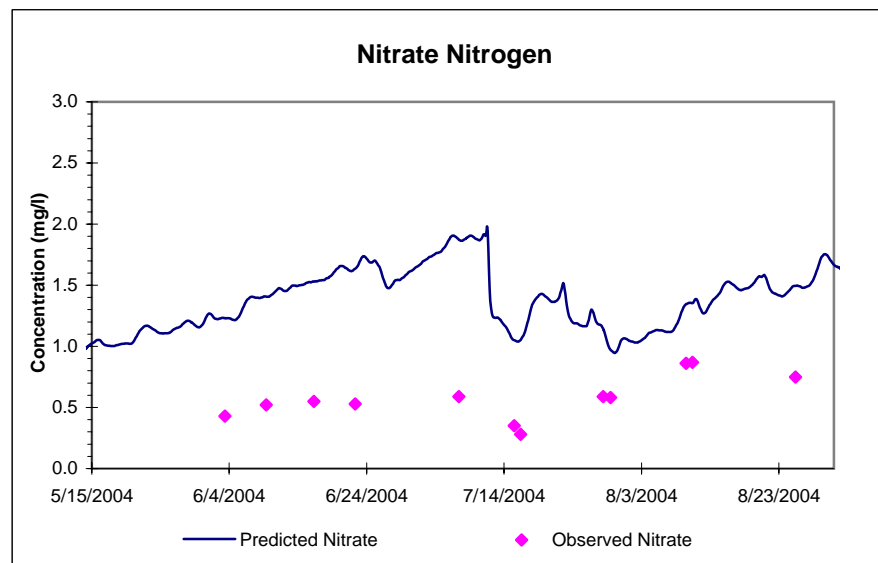
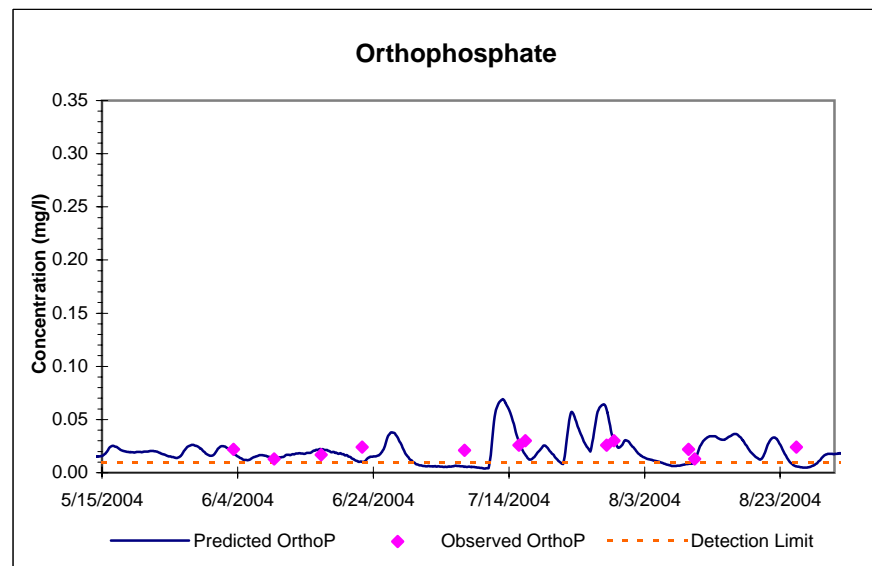
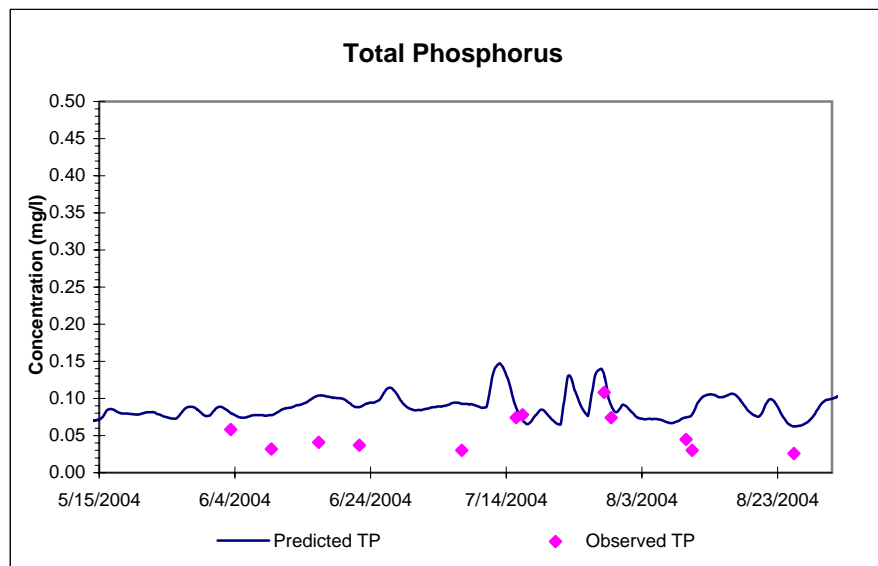


## Lamington River at Ironia Road Downstream of Roxbury STP (LR2)



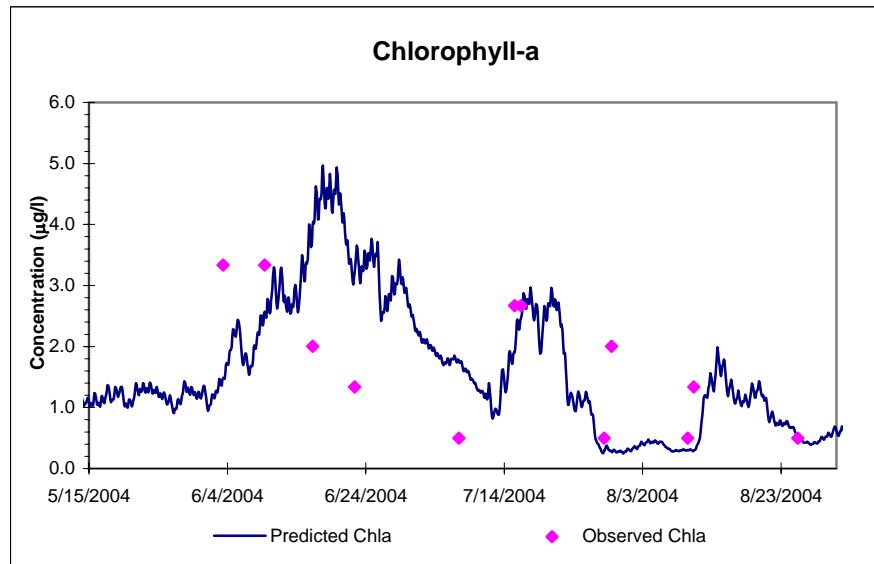
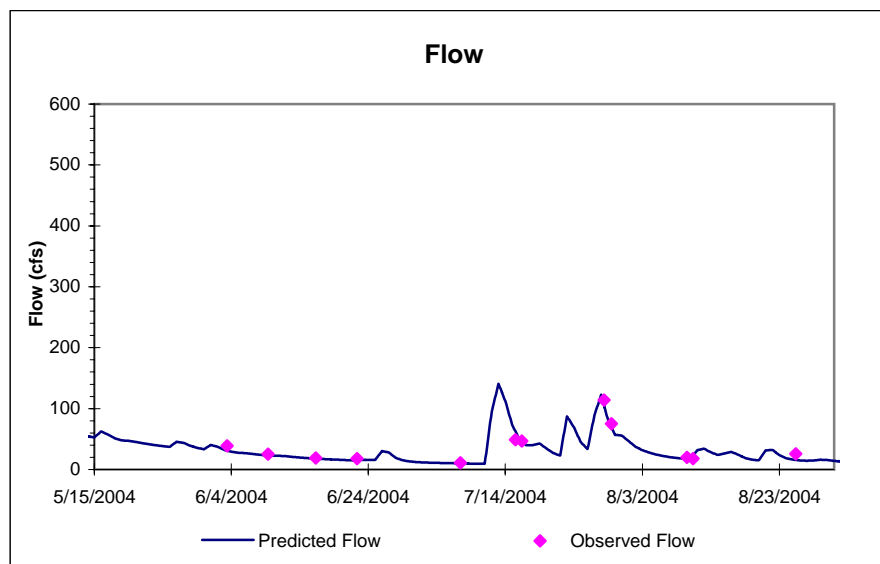
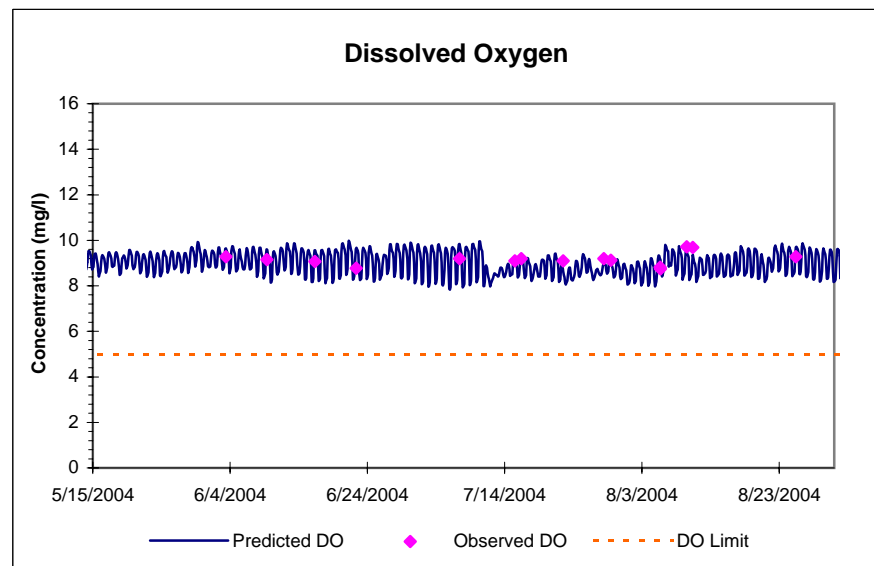
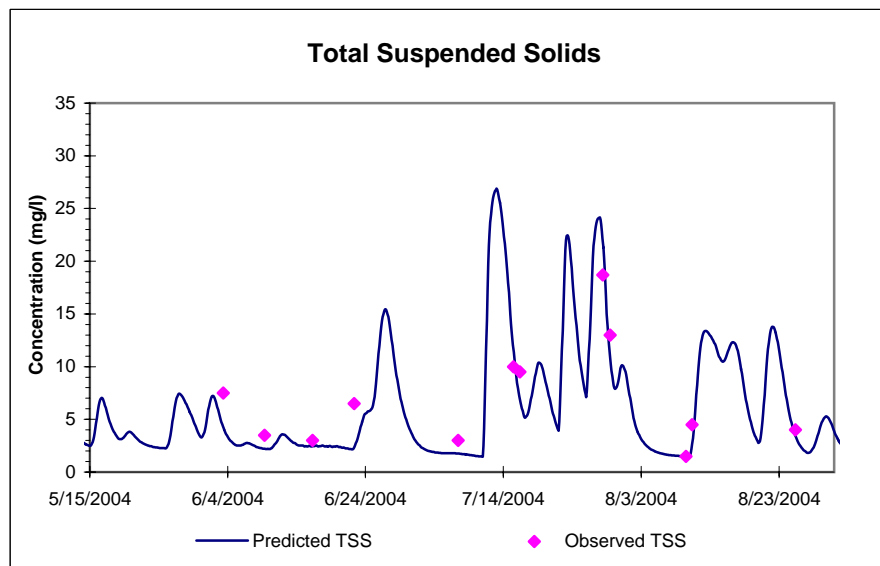


## Lamington River at Route 512 in Pottersville (LR3)

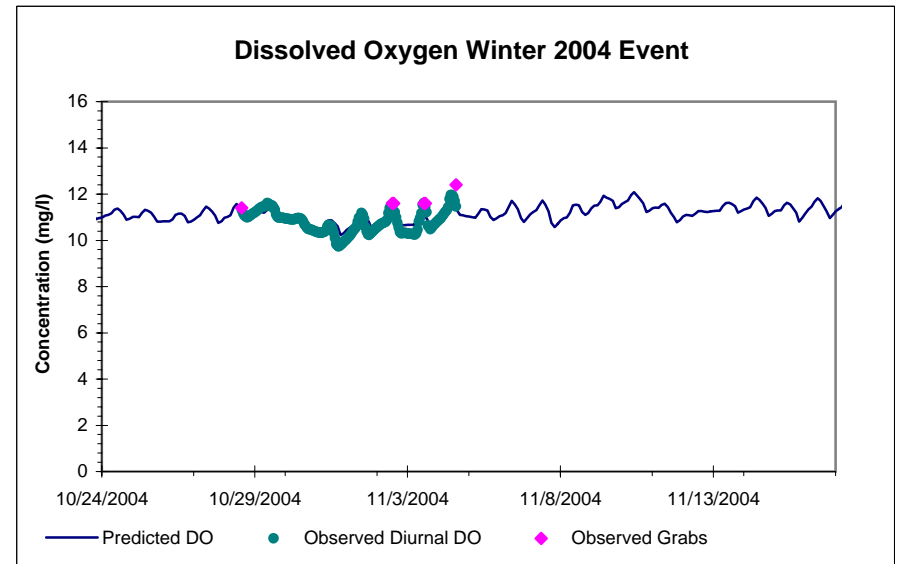
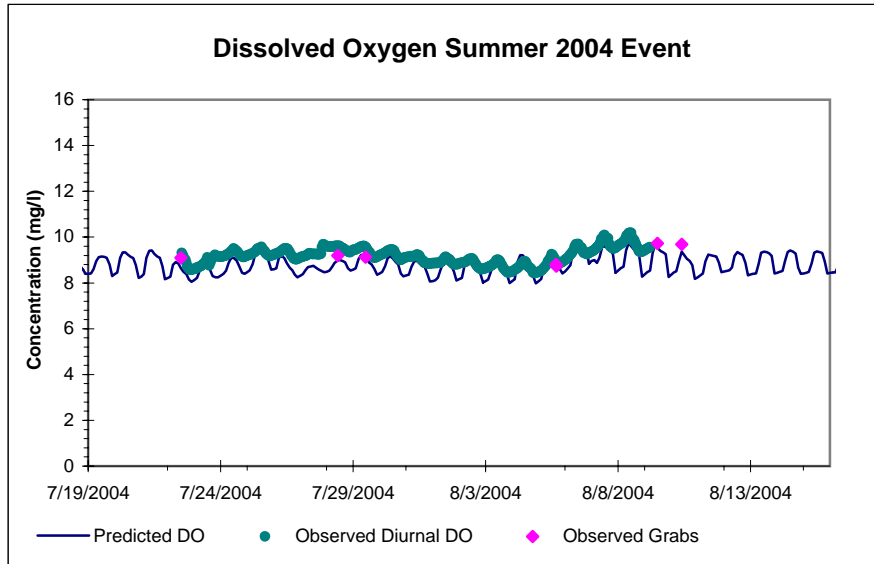


See section III.G.2.d for discussion of nitrate loss in this area. Also compare LR2 and LR4 graphs.

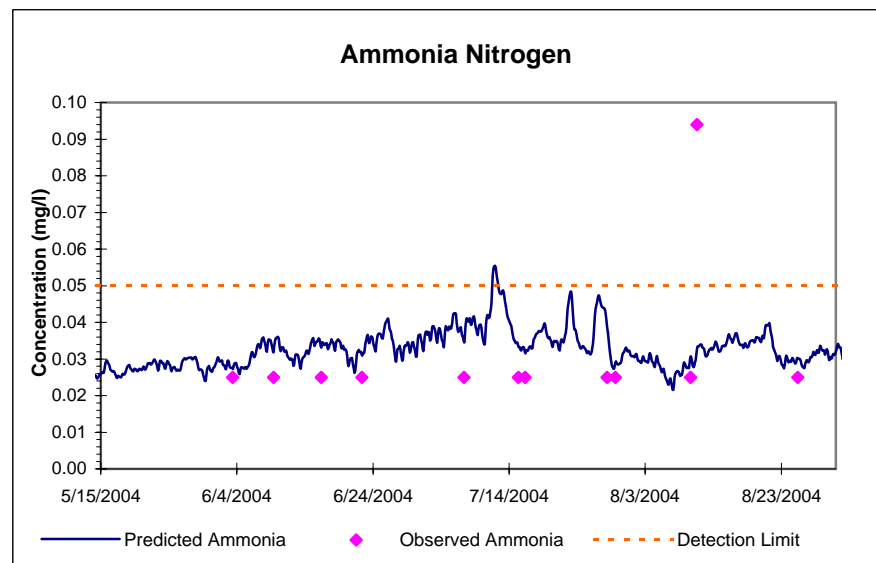
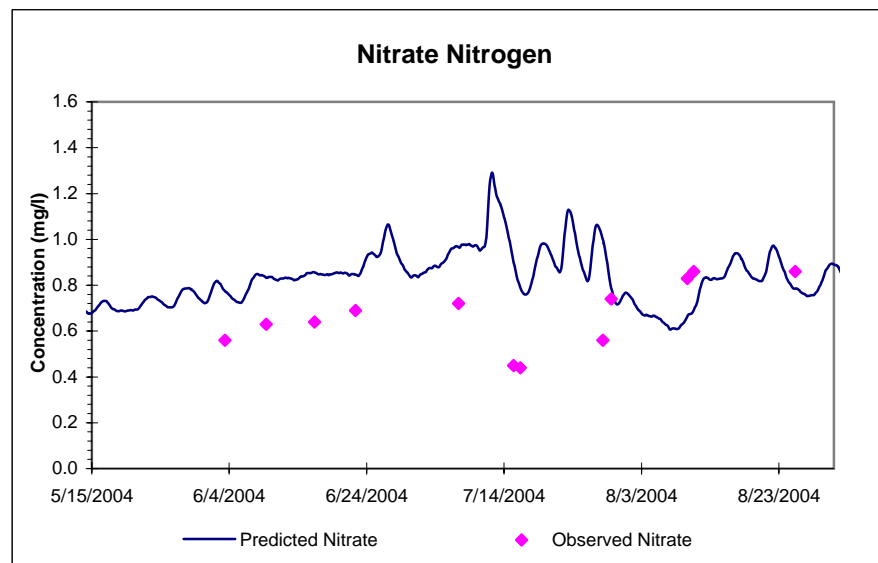
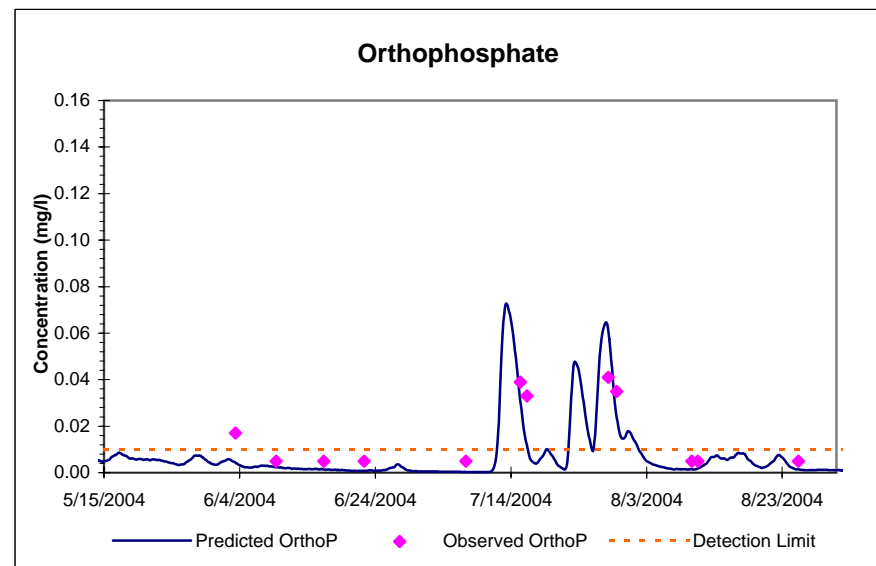
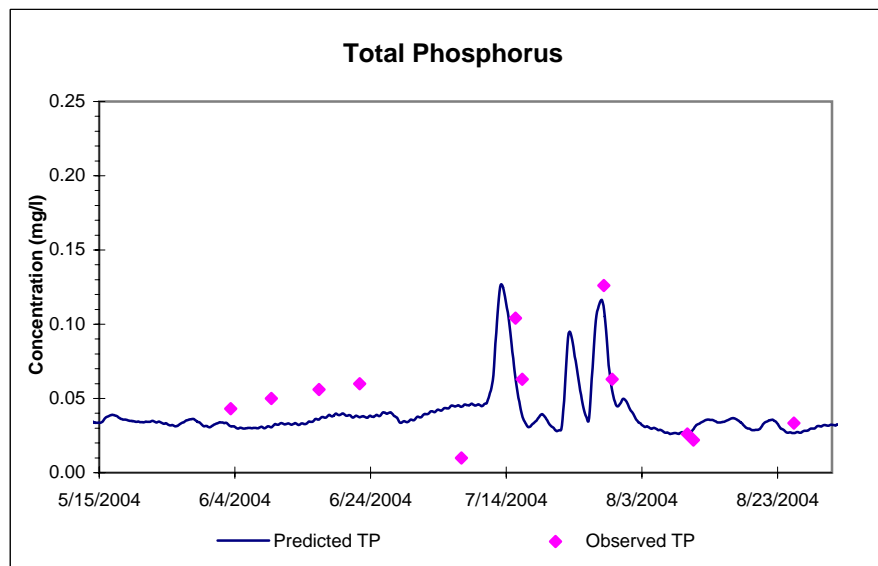
## Lamington River at Route 512 in Pottersville (LR3)



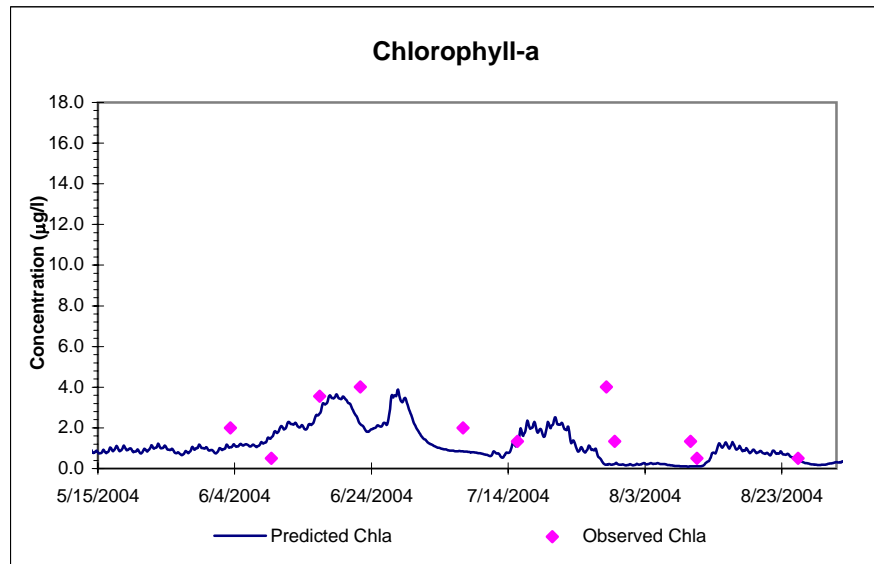
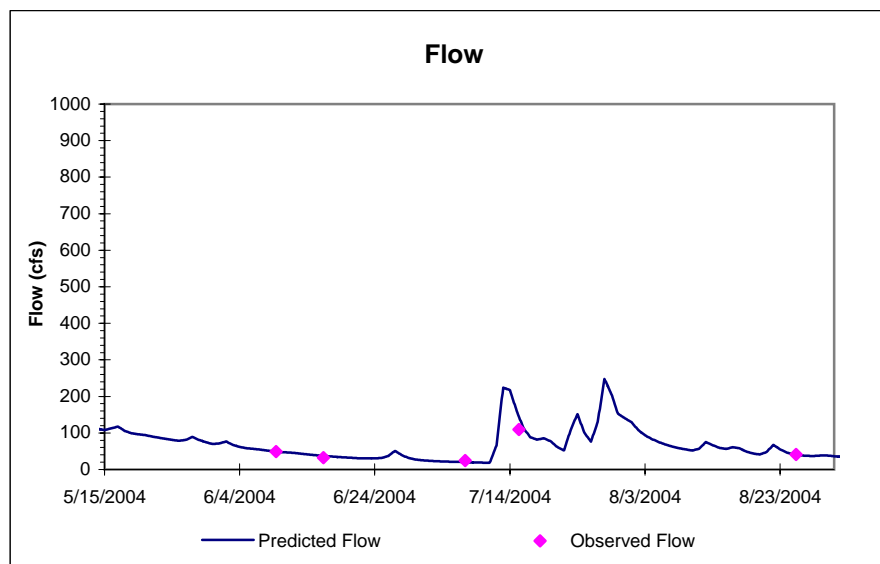
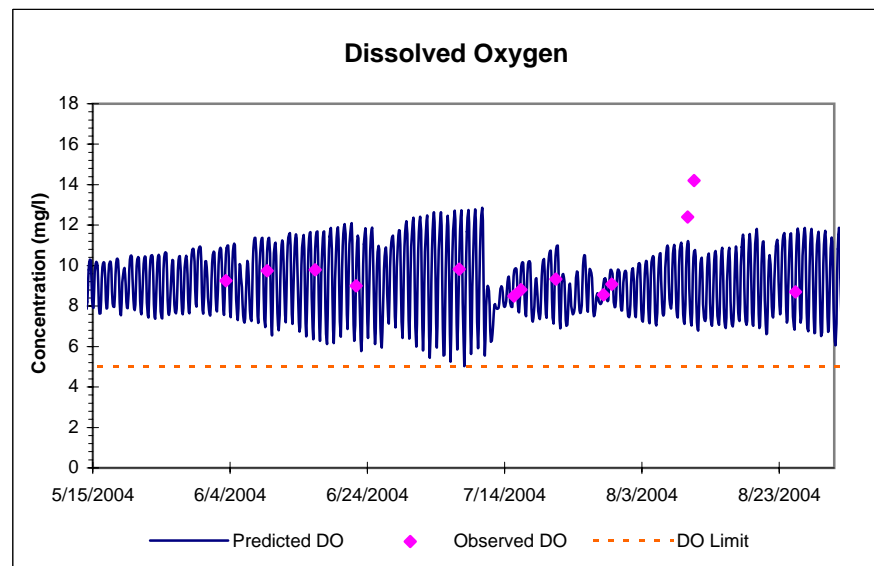
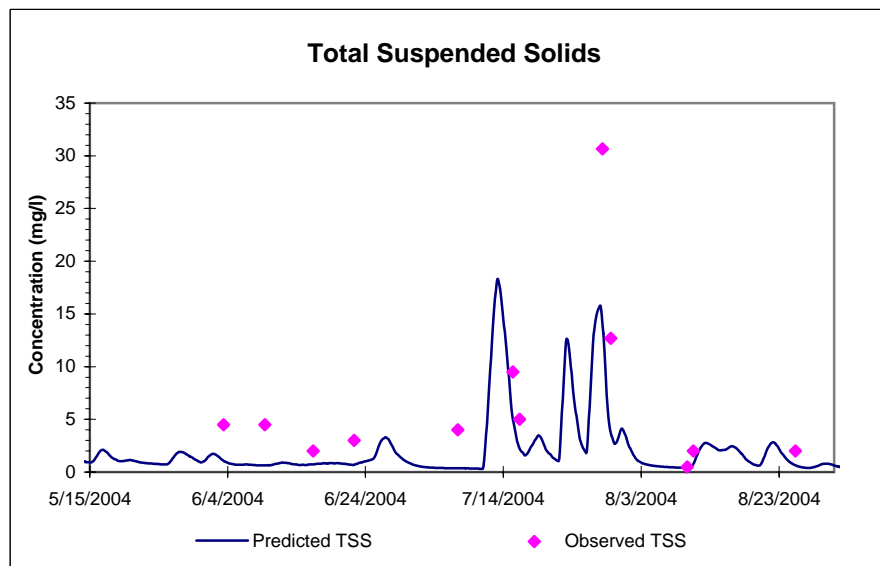
## Lamington River at Route 512 in Pottersville (LR3)



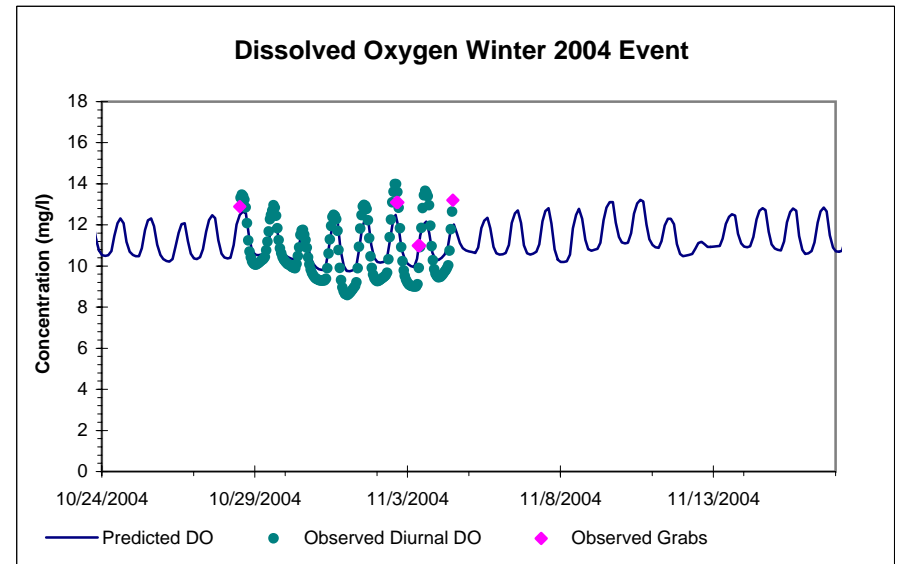
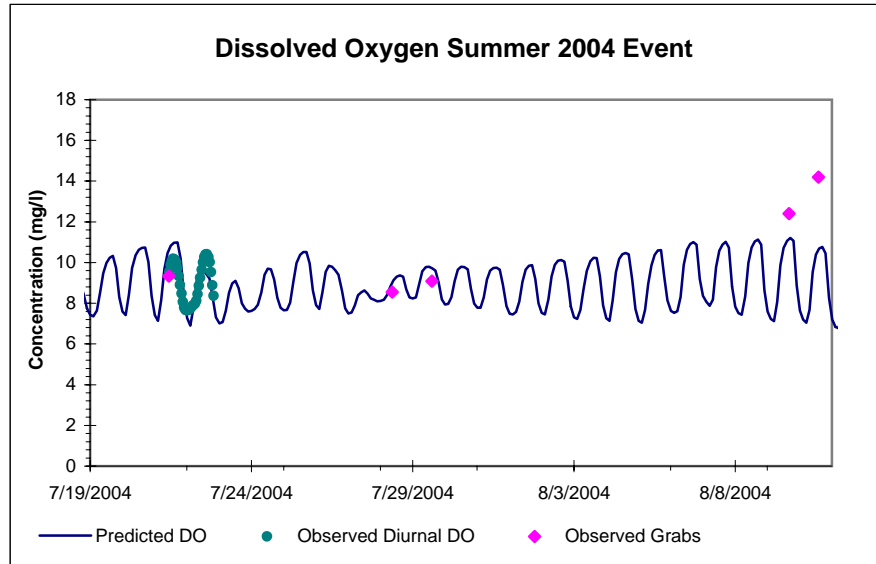
## Lamington River at River Road in Bedminster Twp. (LR4)



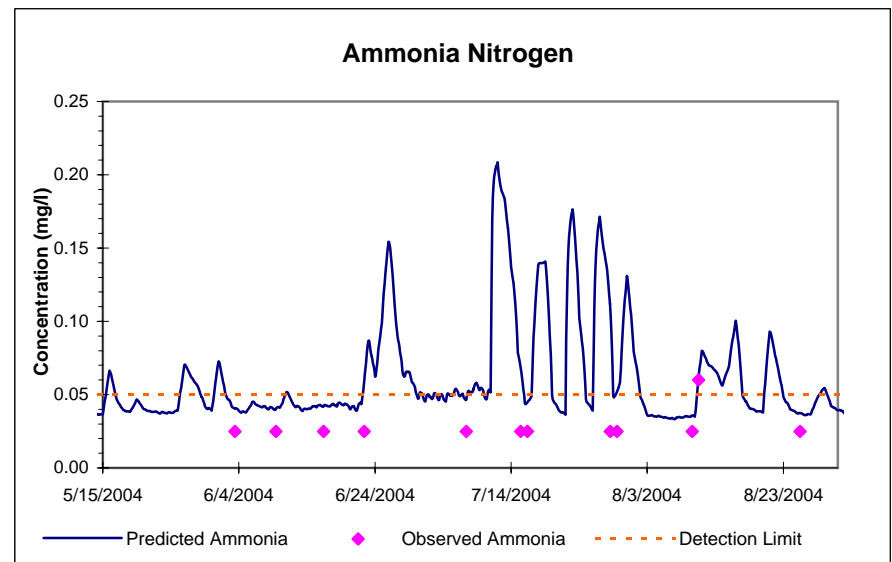
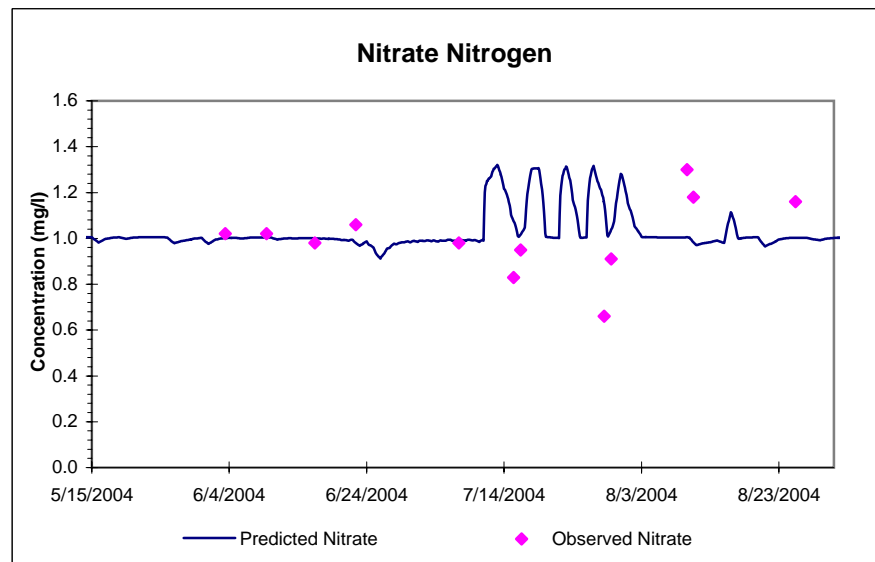
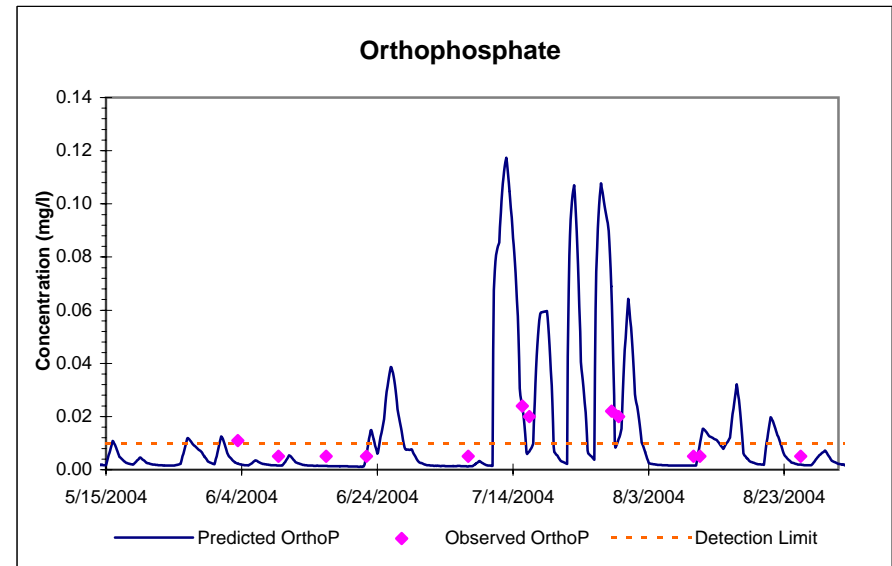
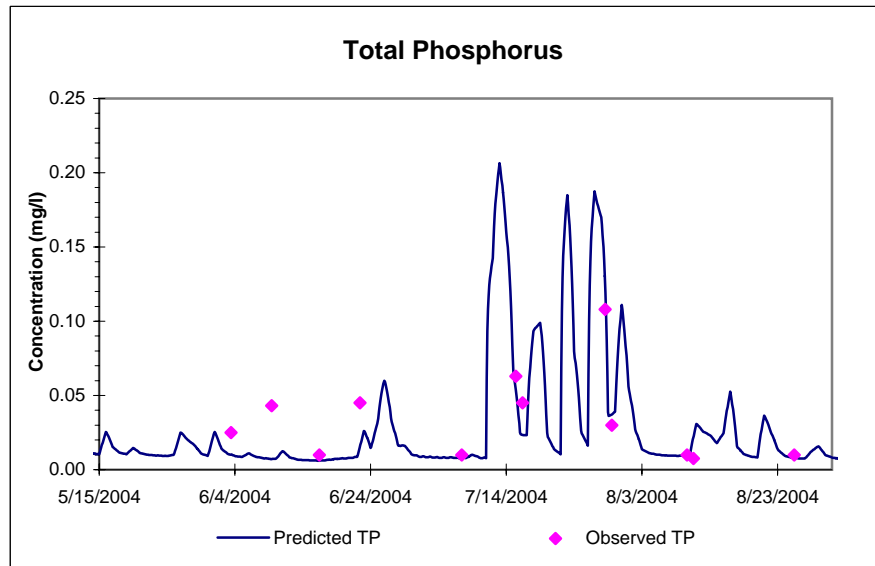
## Lamington River at River Road in Bedminster Twp. (LR4)



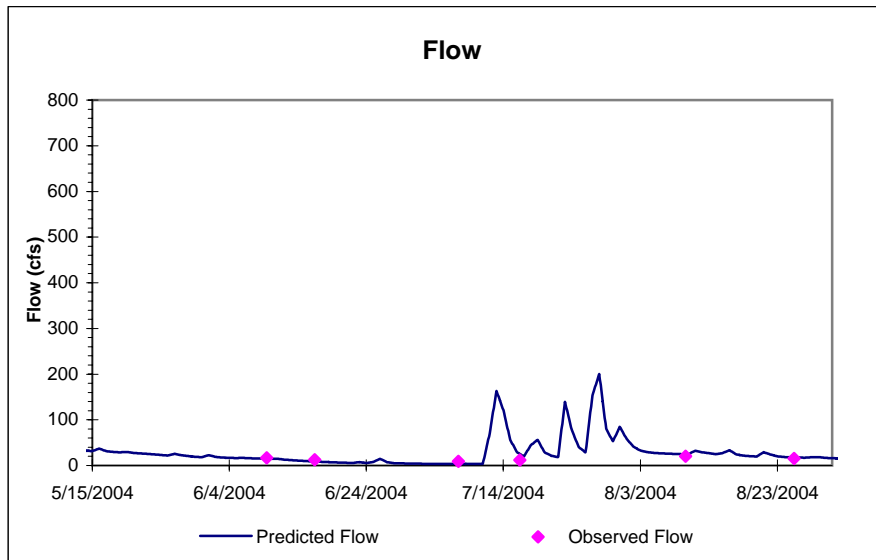
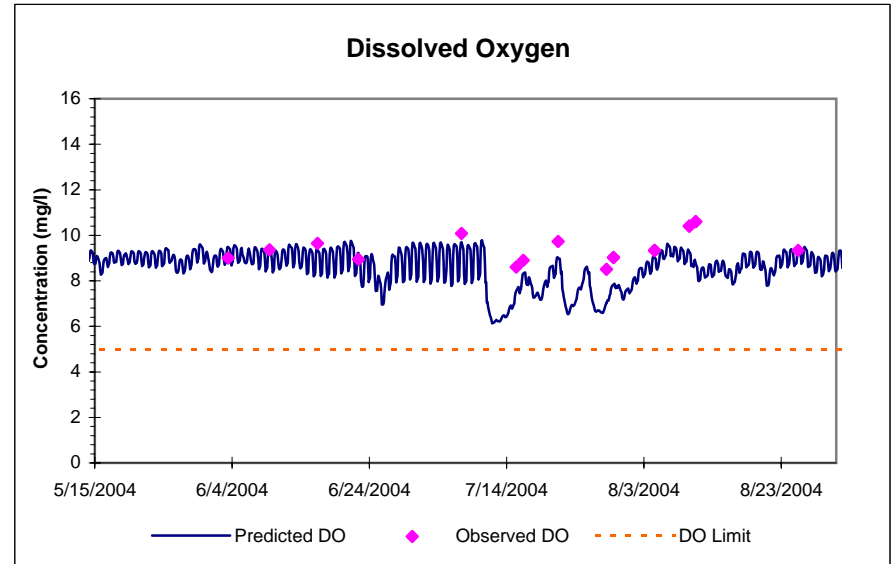
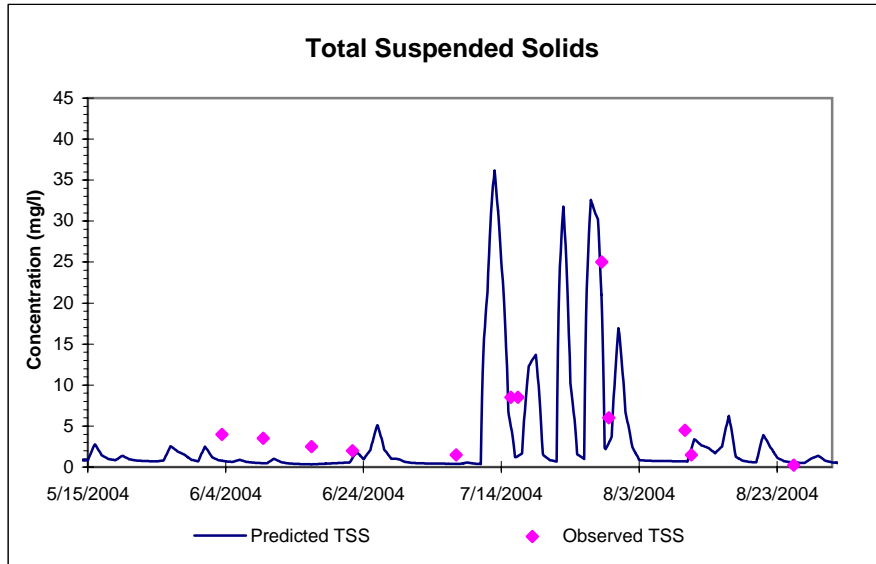
## Lamington River at River Road in Bedminster Twp. (LR4)



## North Branch Rockaway Creek at Route 523 in Readington Twp. (NBRC1)

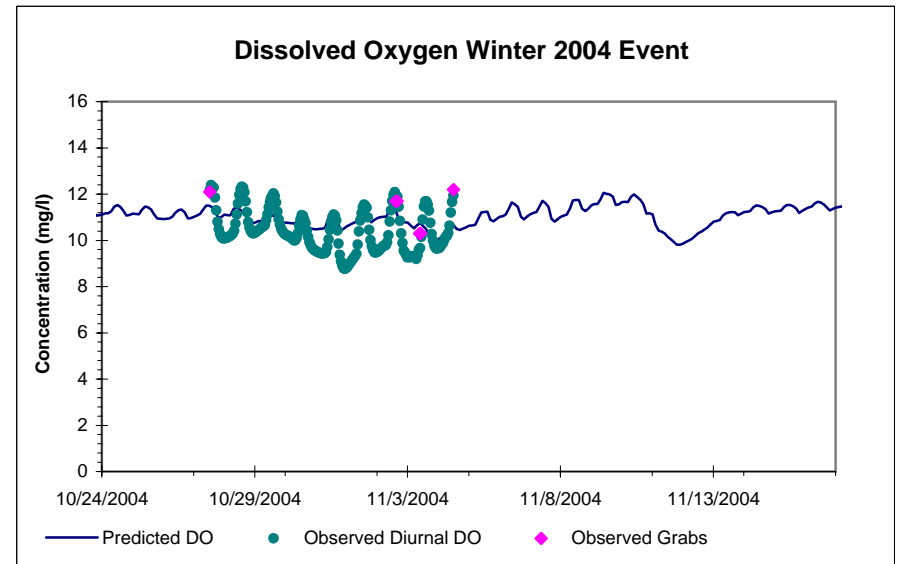
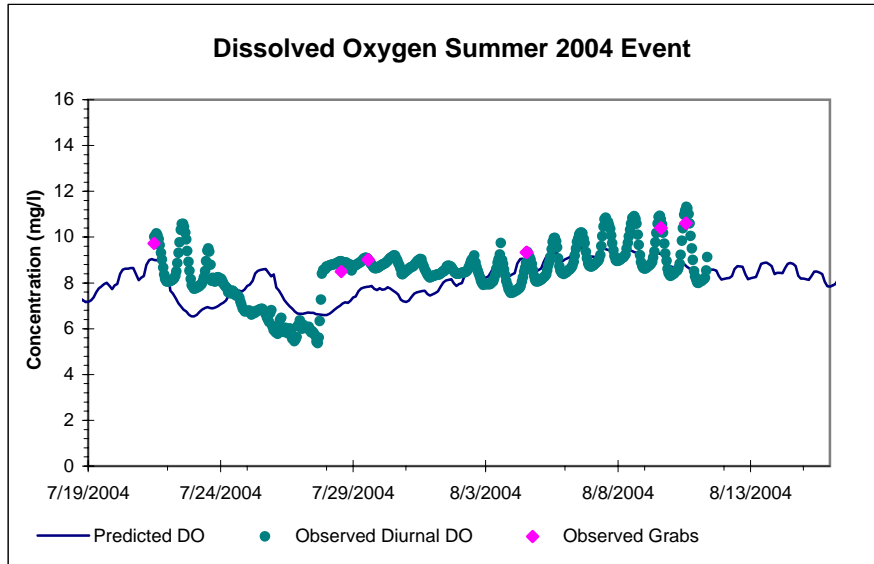


## North Branch Rockaway Creek at Route 523 in Readington Twp. (NBRC1)

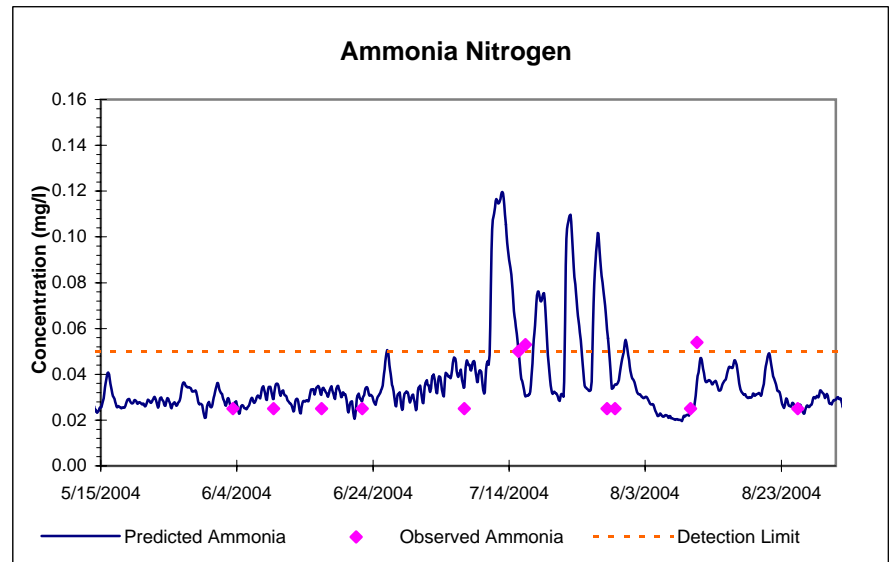
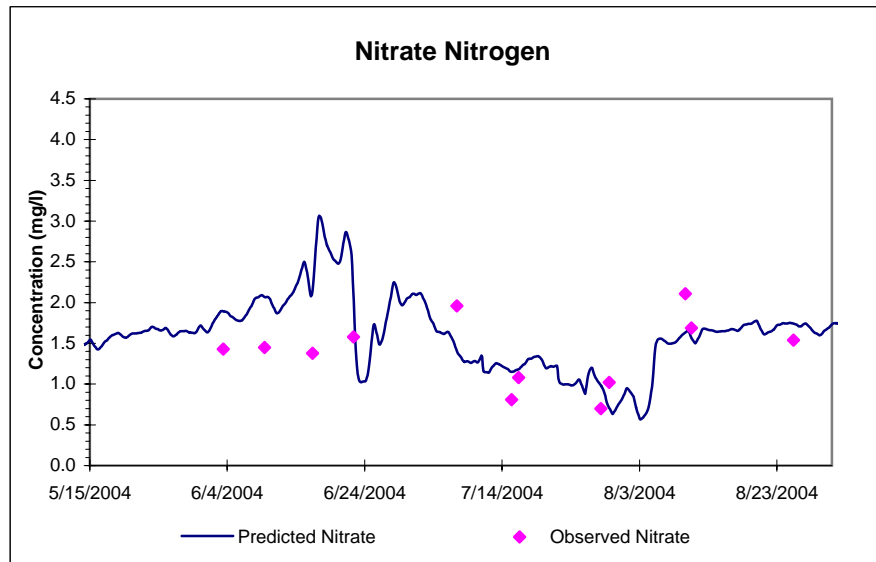
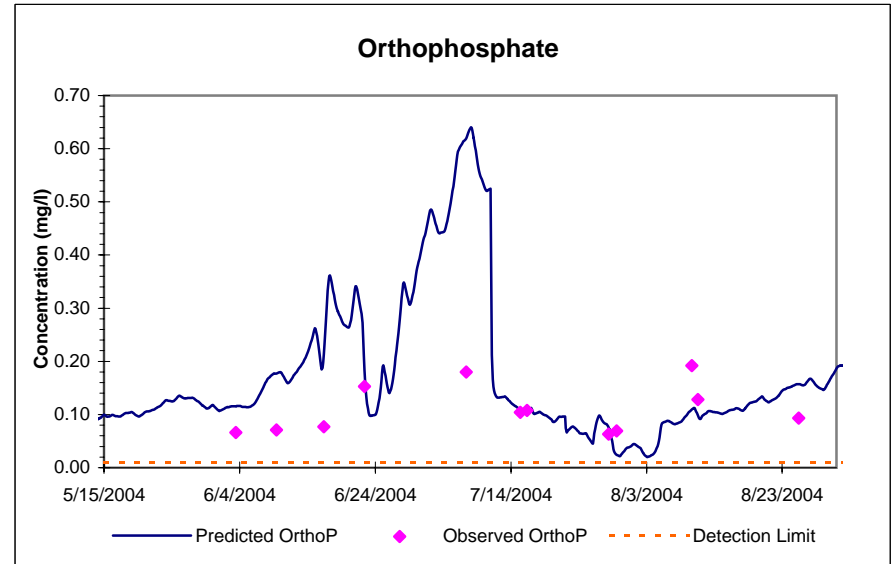
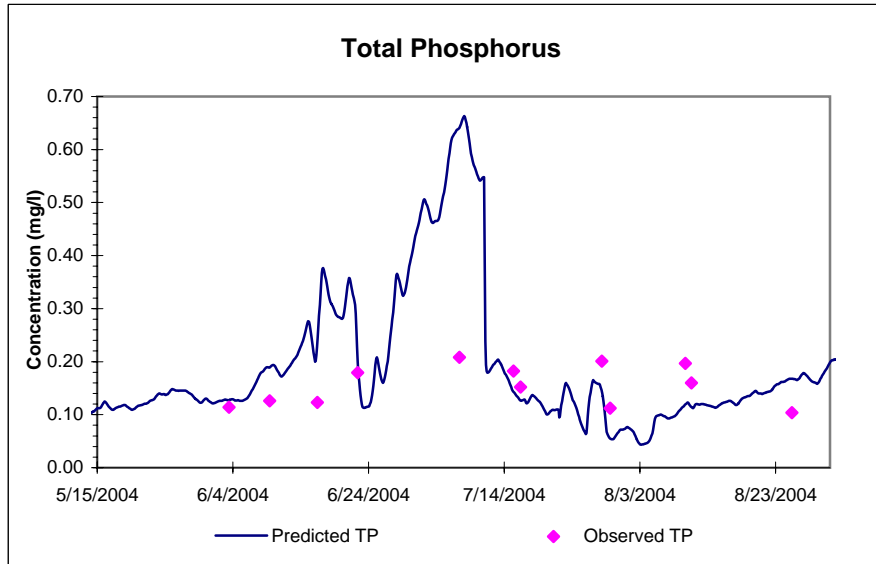




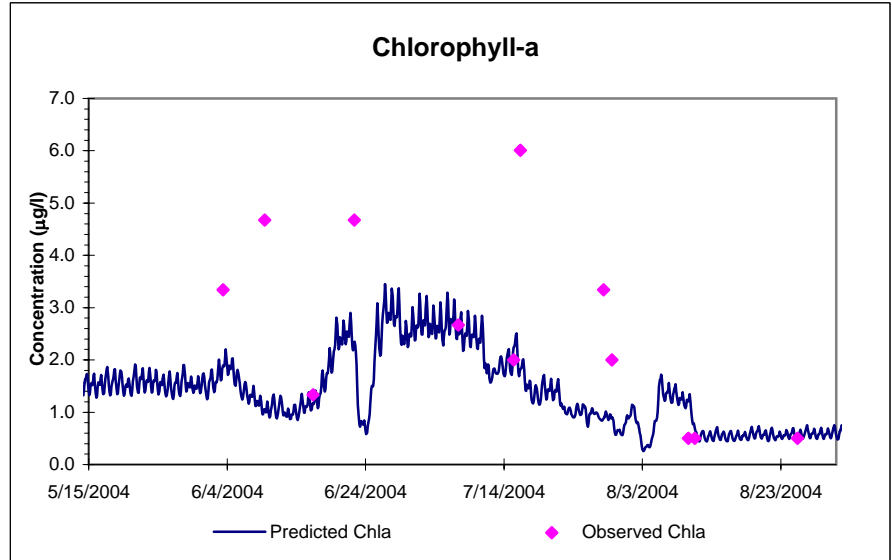
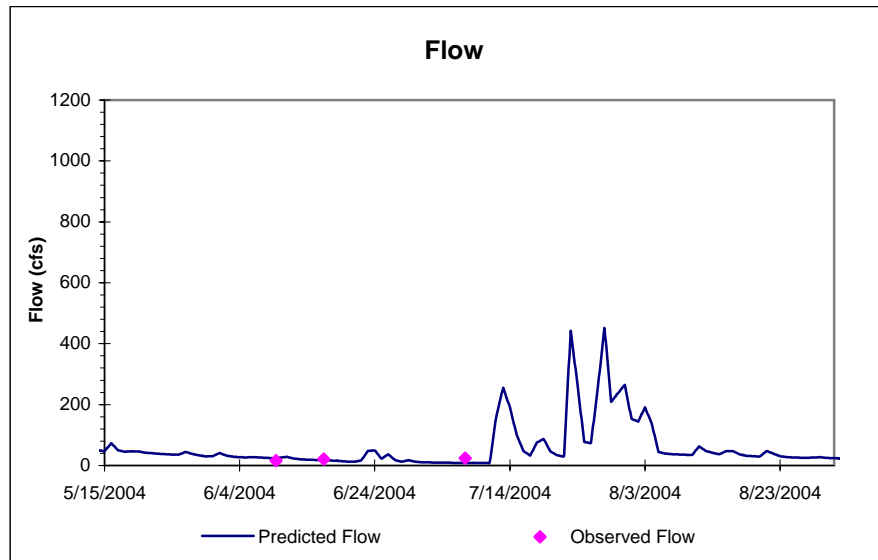
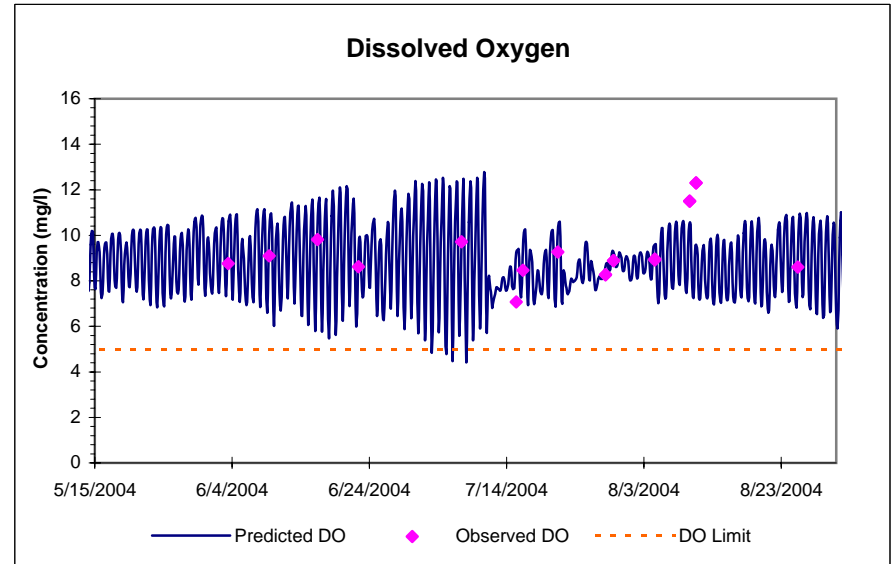
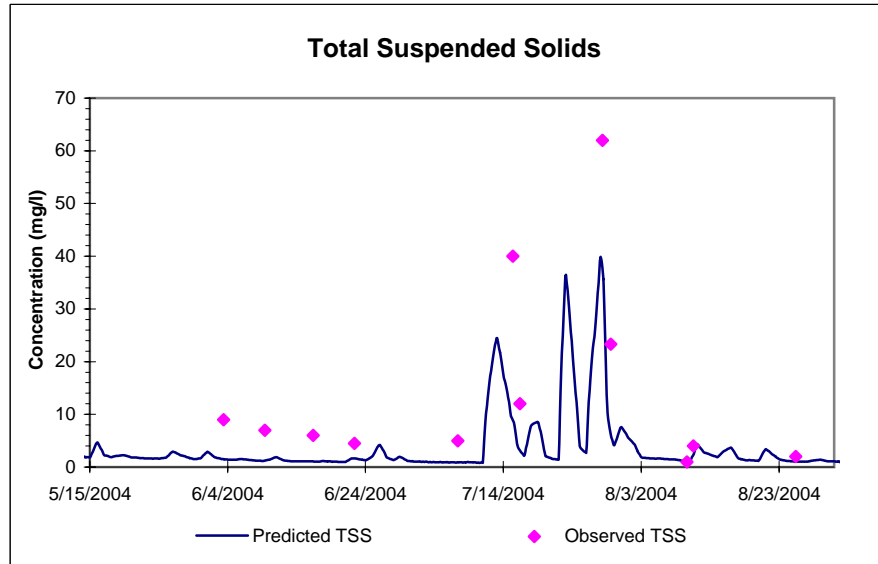
## North Branch Rockaway Creek at Route 523 in Readington Twp. (NBRC1)



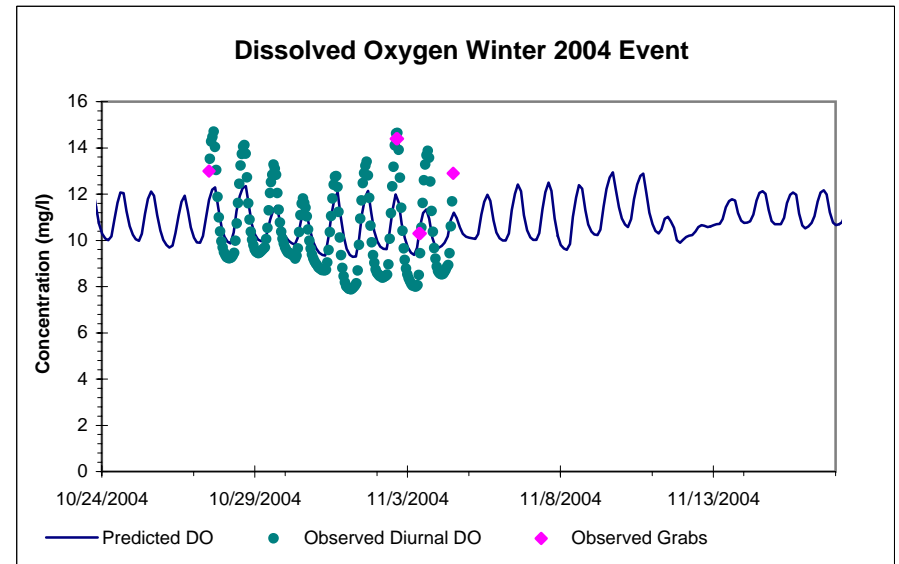
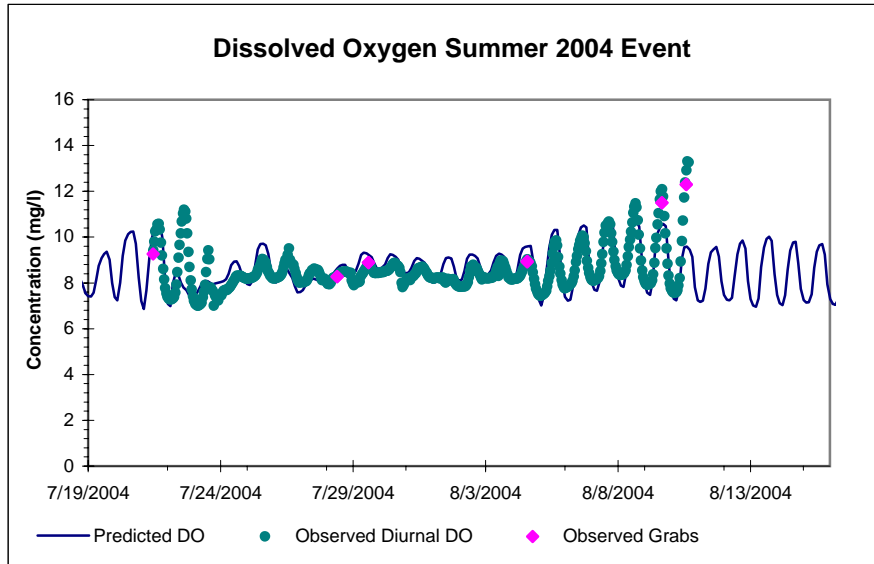
## Rockaway Creek at Lamington Road near Whitehouse (RC1, USGS 01399700)



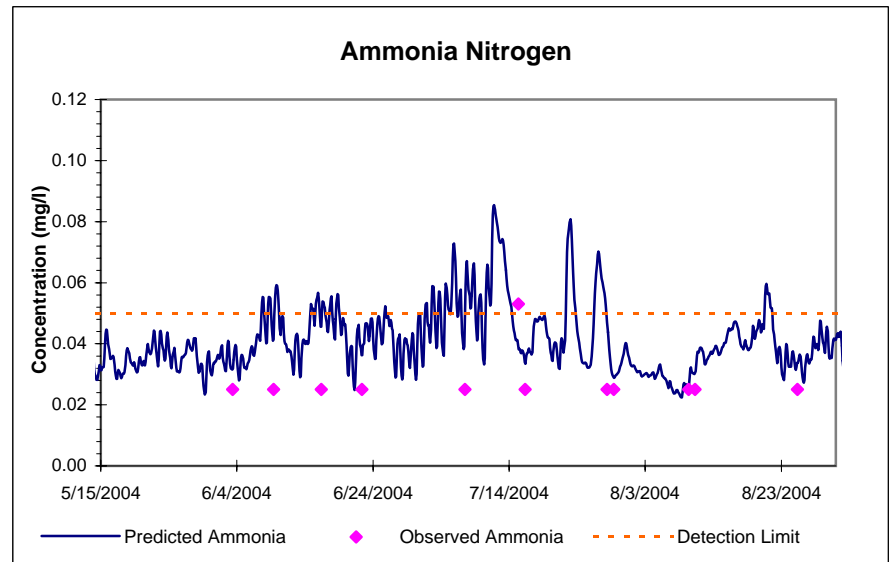
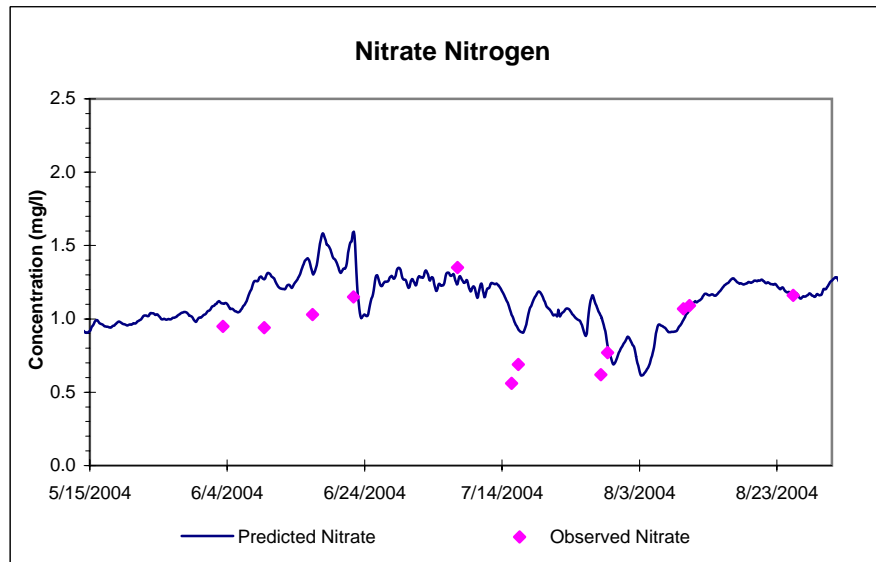
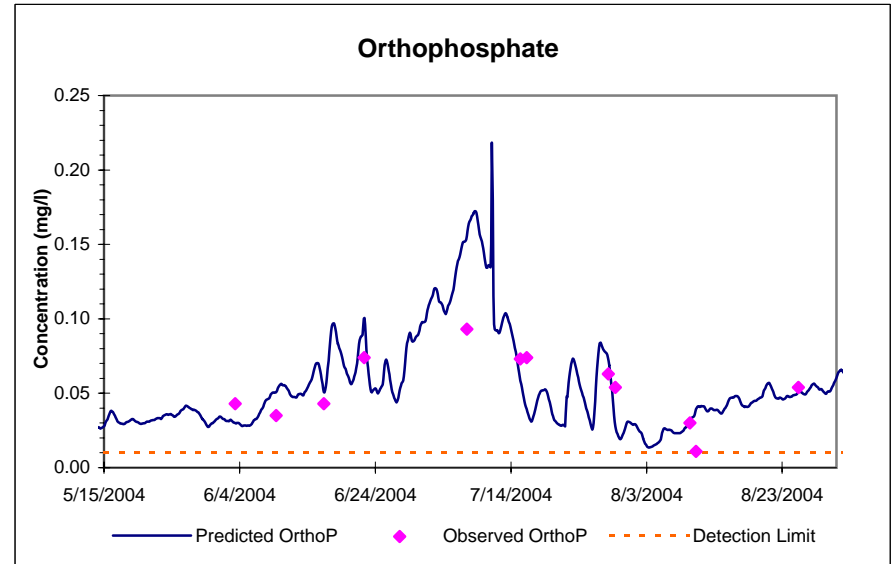
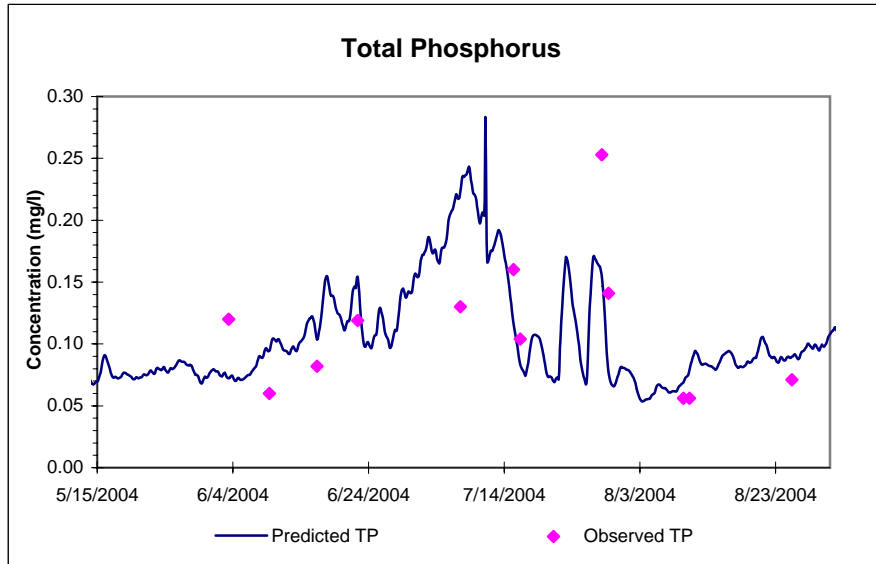
# Rockaway Creek at Lamington Road near Whitehouse (RC1, USGS 01399700)



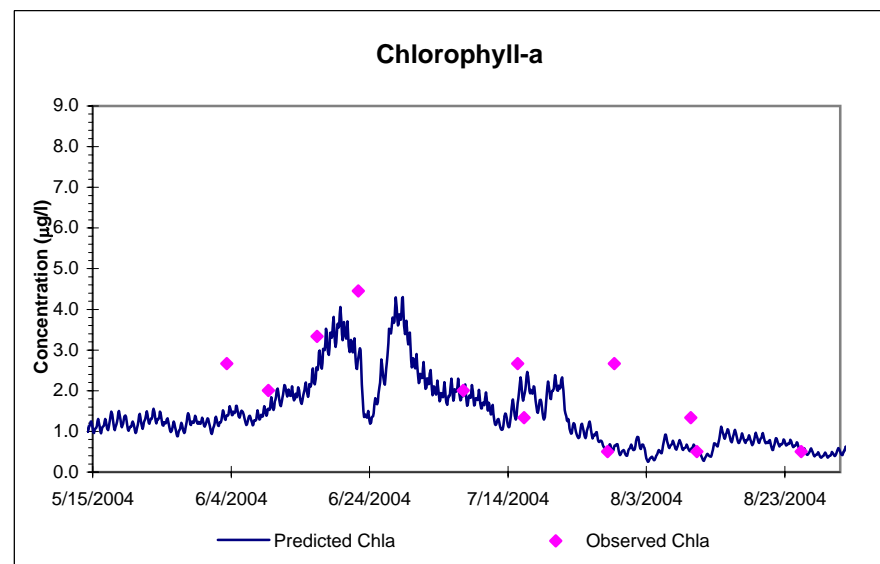
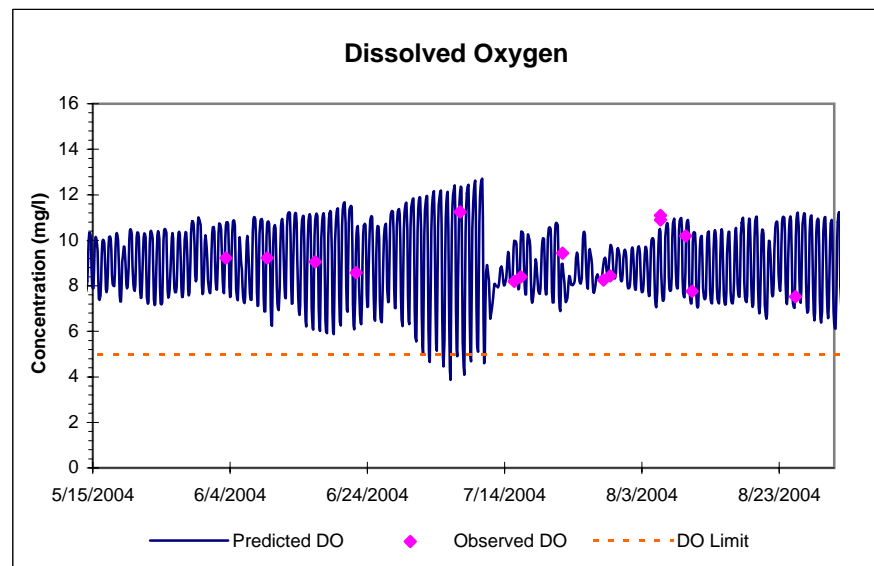
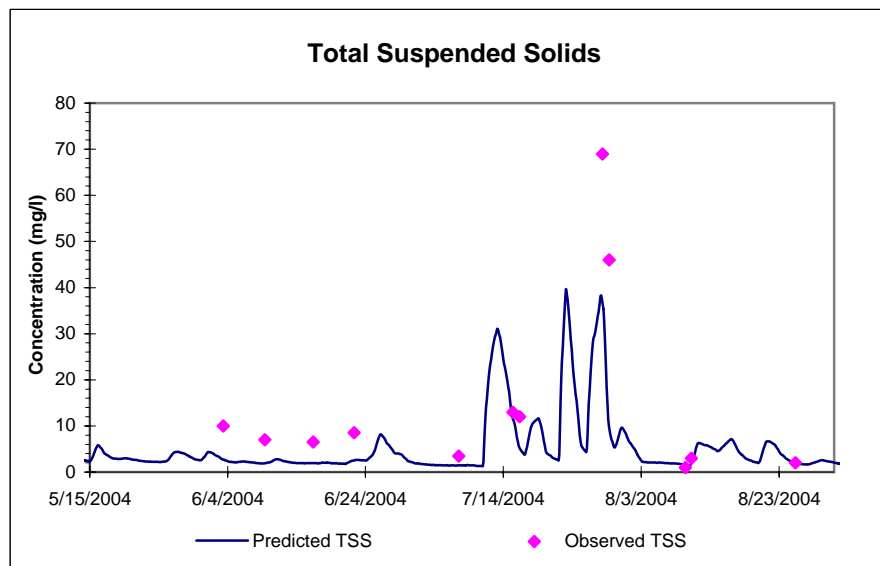
## Rockaway Creek at Lamington Road near Whitehouse (RC1, USGS 01399700)



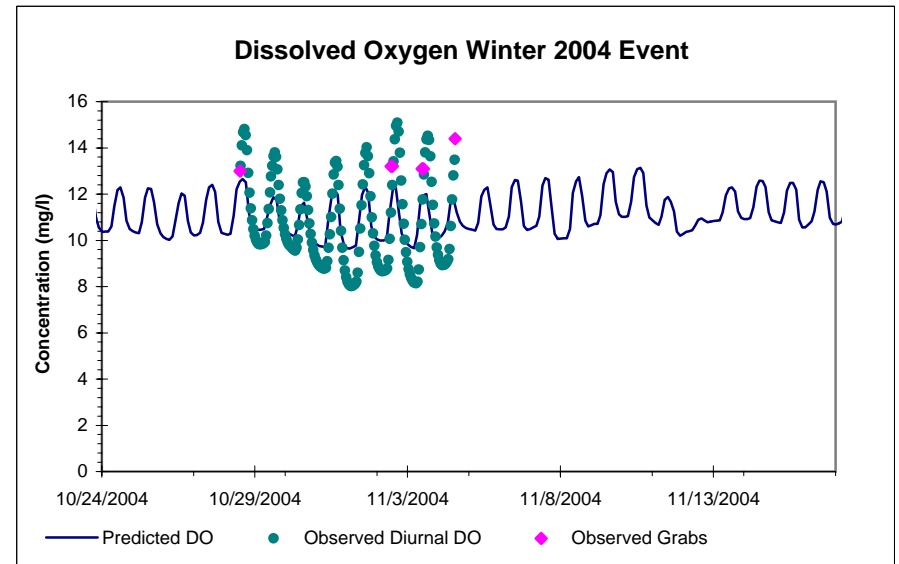
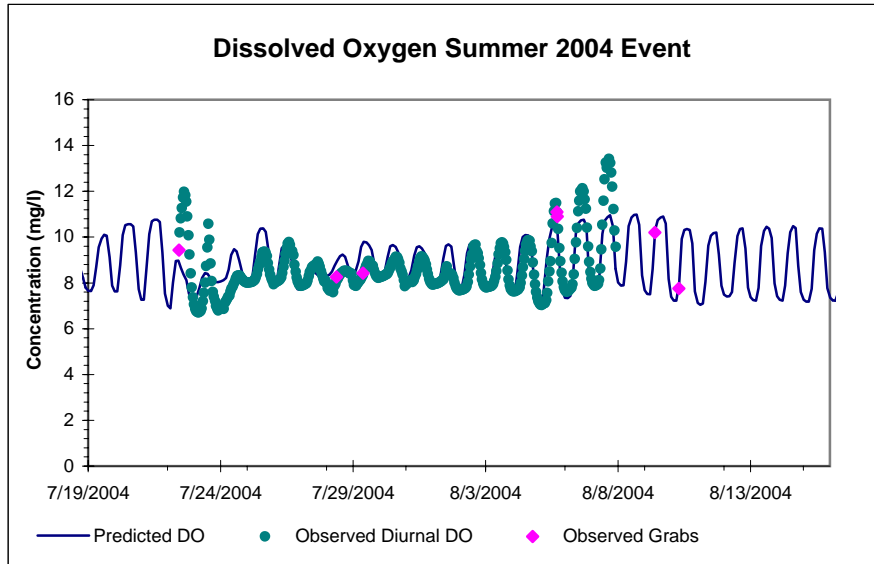
## Lamington River at Cowperthwaite Road in Burnt Mills (LR5)



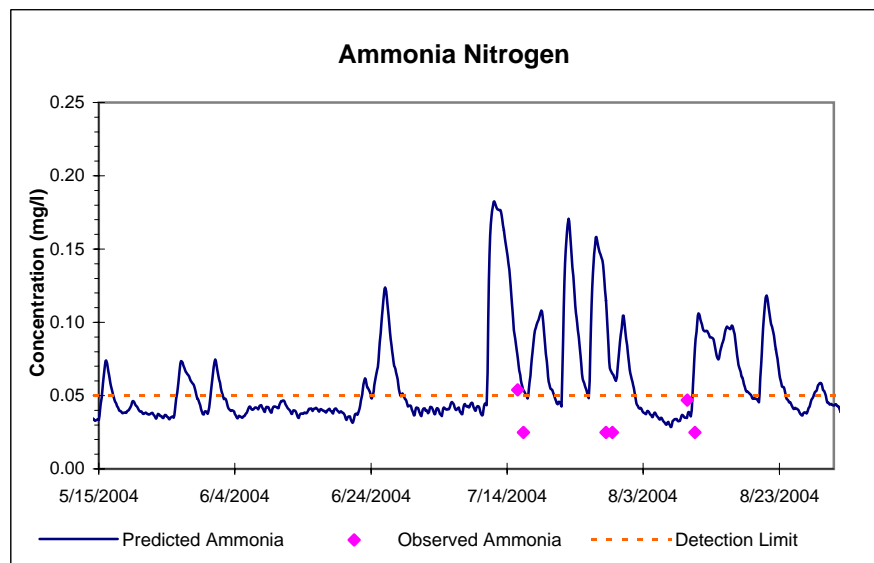
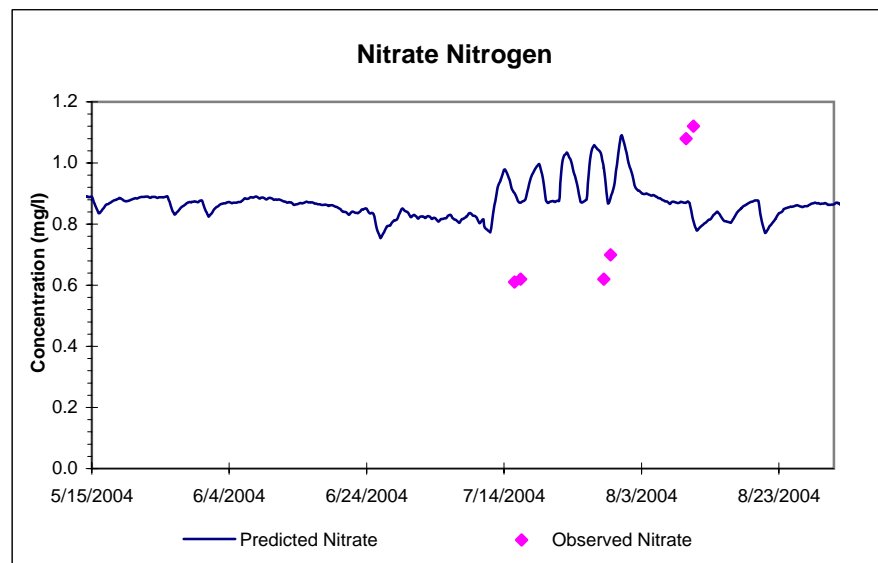
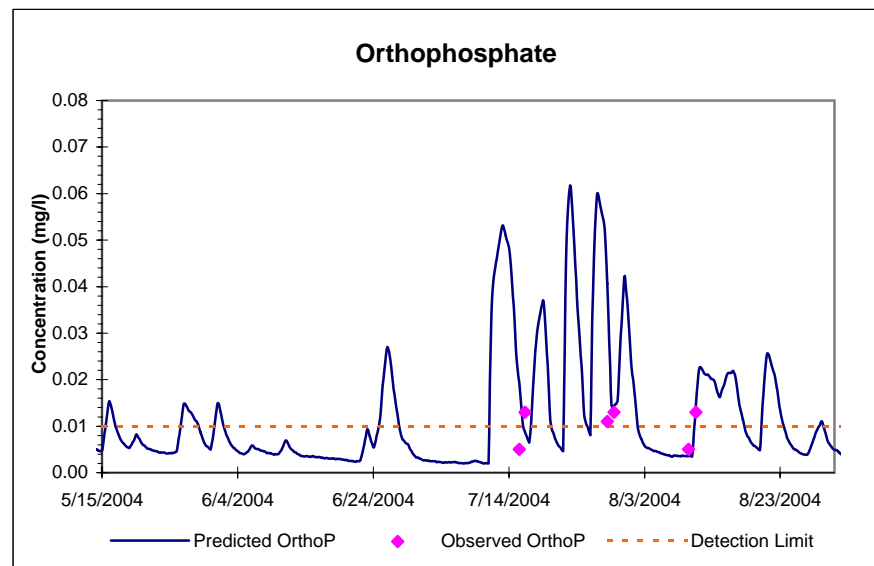
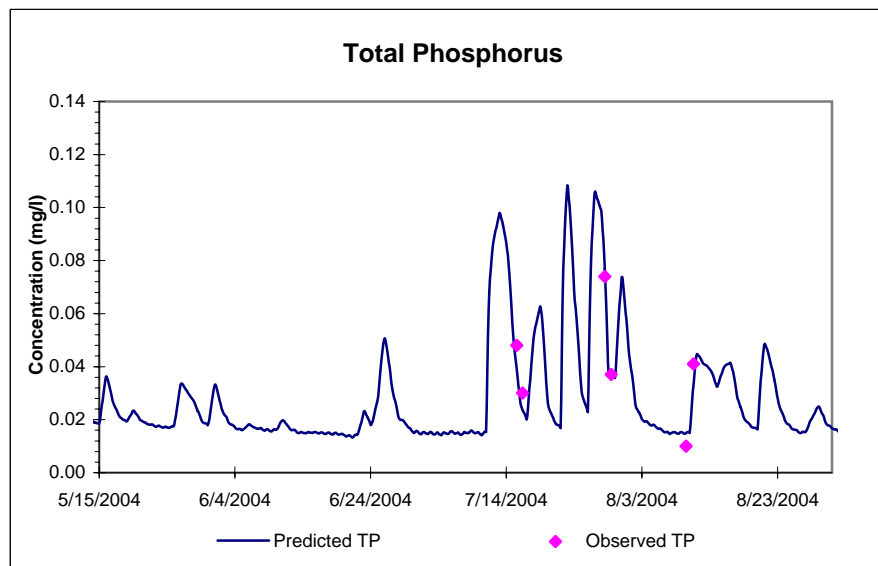
## Lamington River at Cowperthwaite Road in Burnt Mills (LR5)



## Lamington River at Cowperthwaite Road in Burnt Mills (LR5)

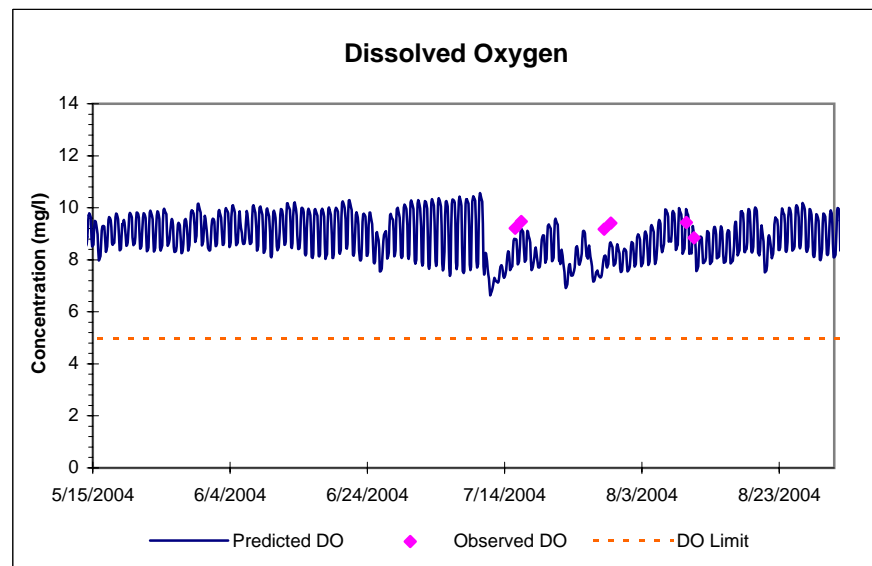
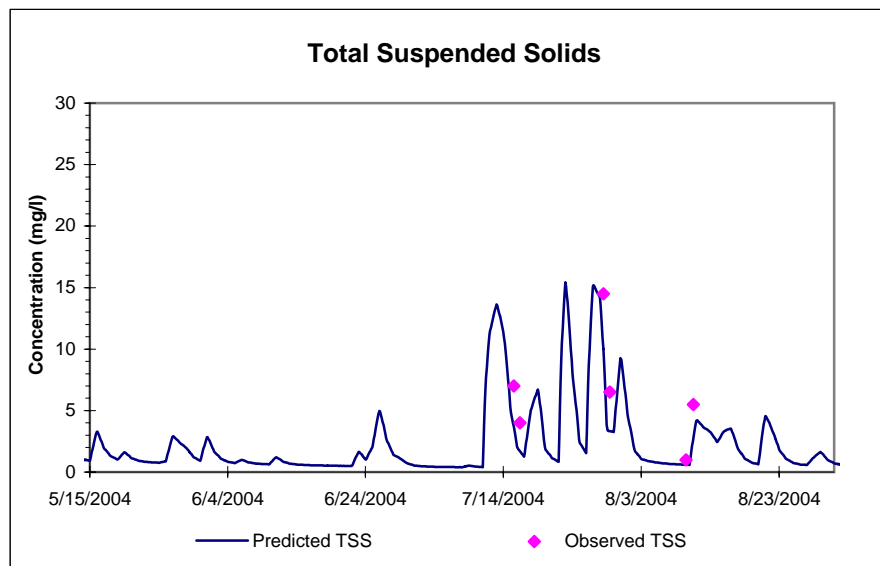


## India Brook at Mountainside Road in Mendham (IB1)

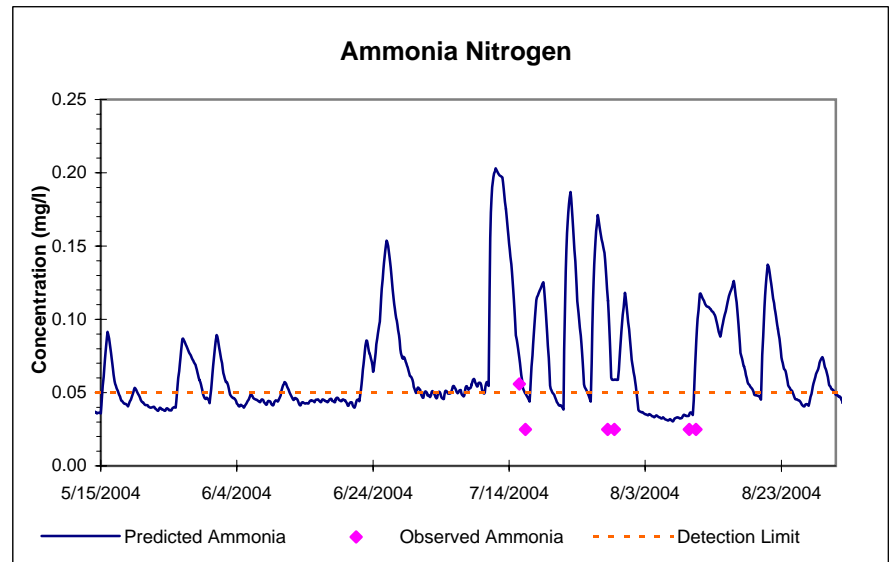
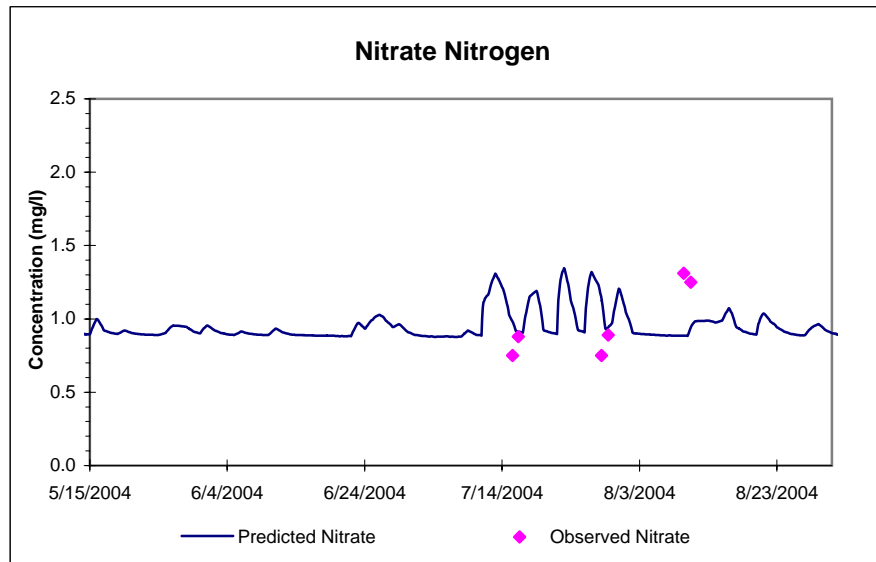
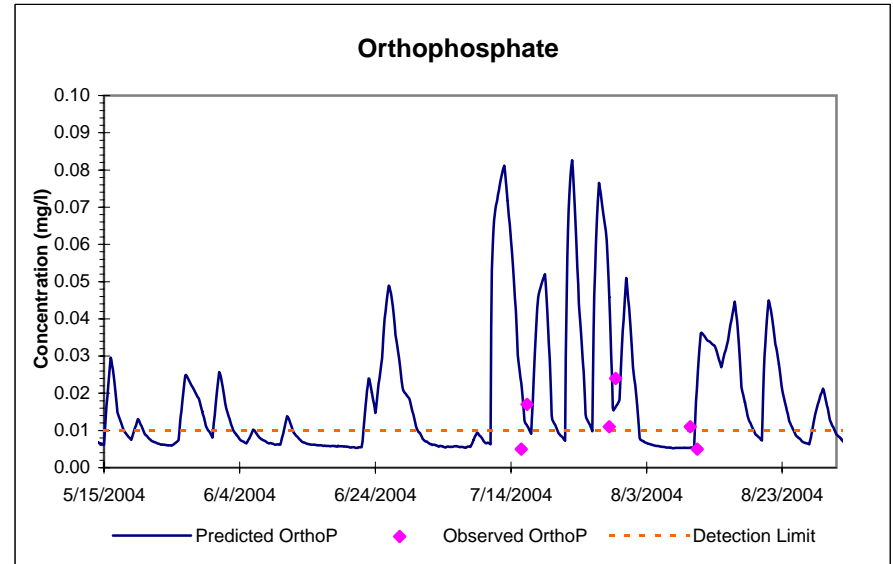
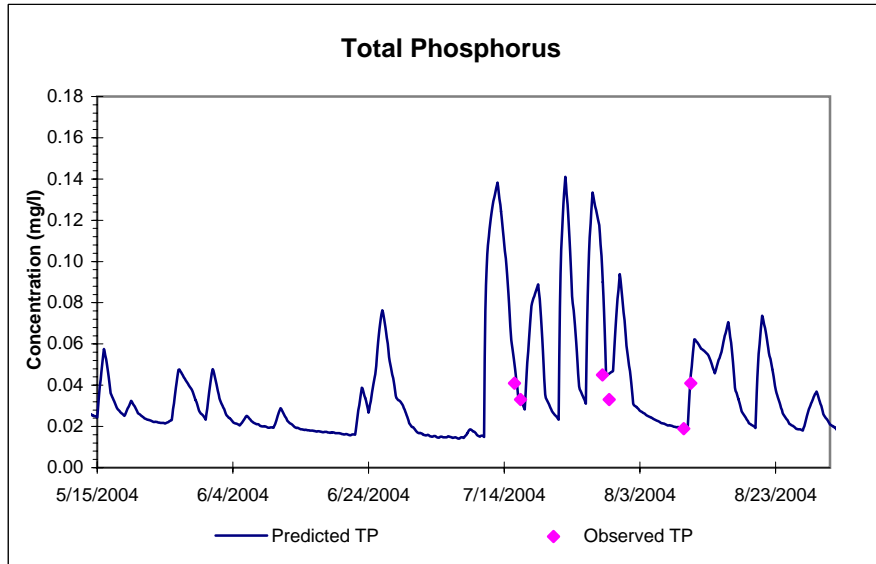




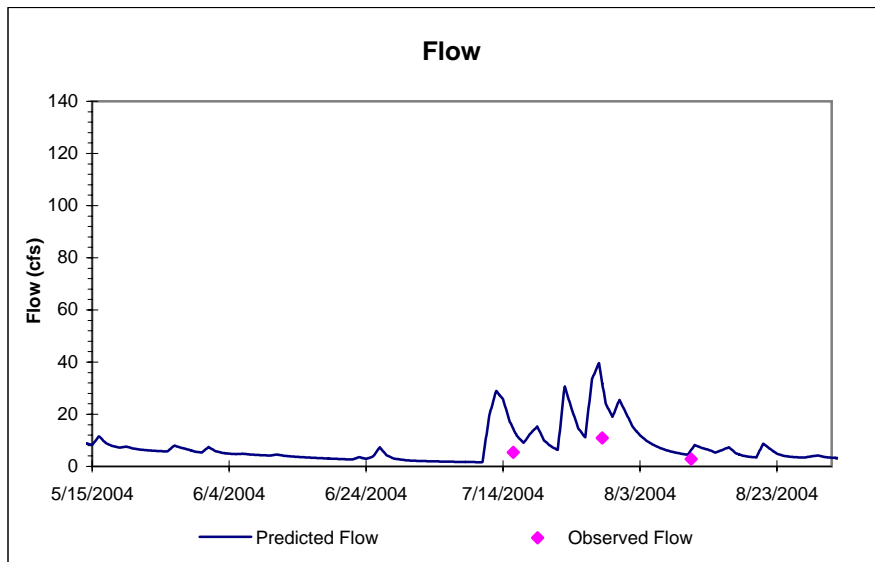
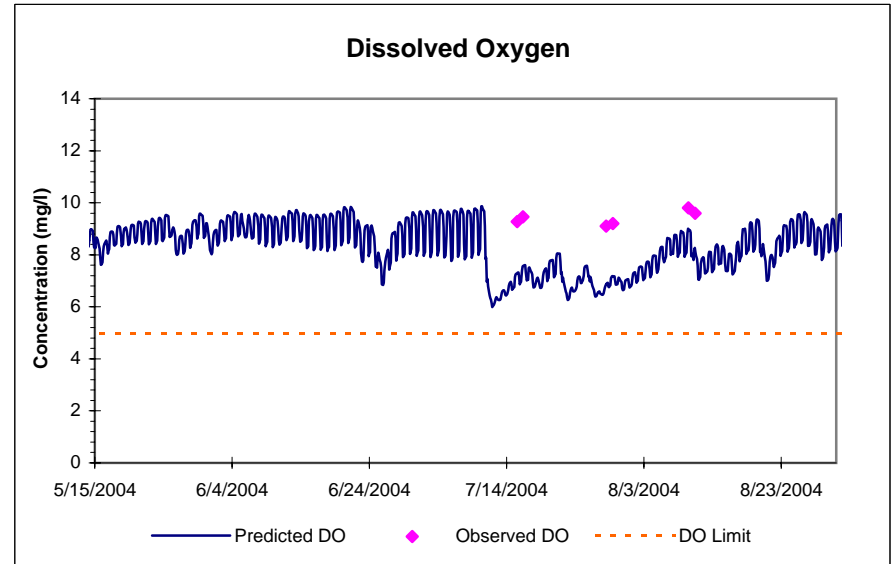
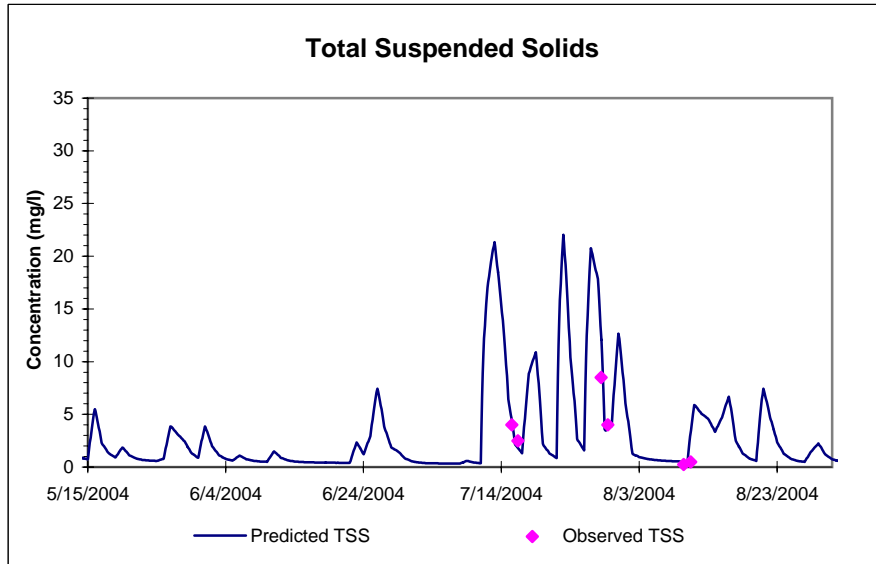
## India Brook at Mountainside Road in Mendham (IB1)



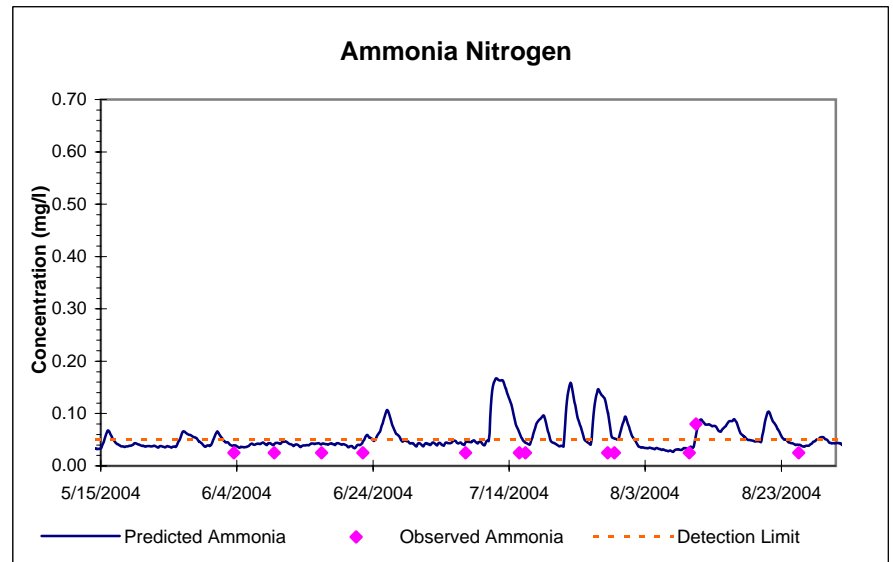
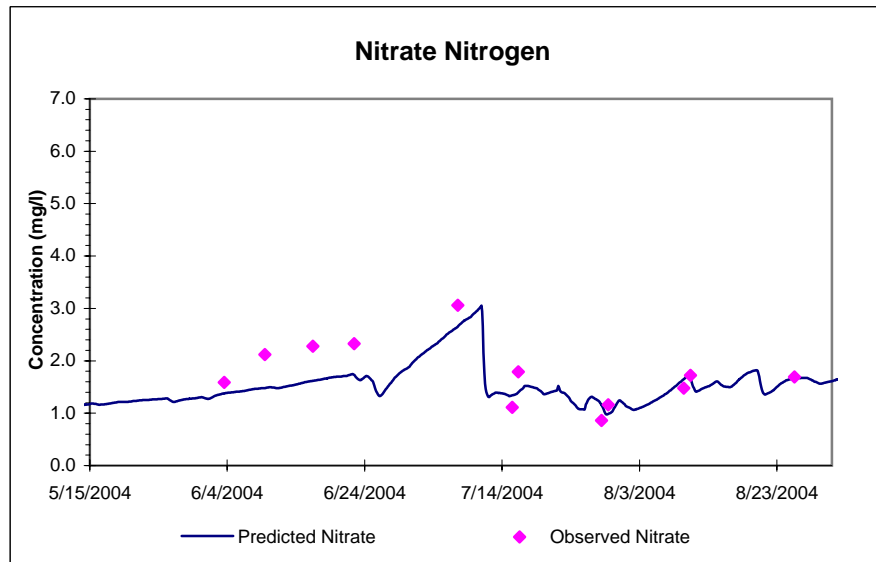
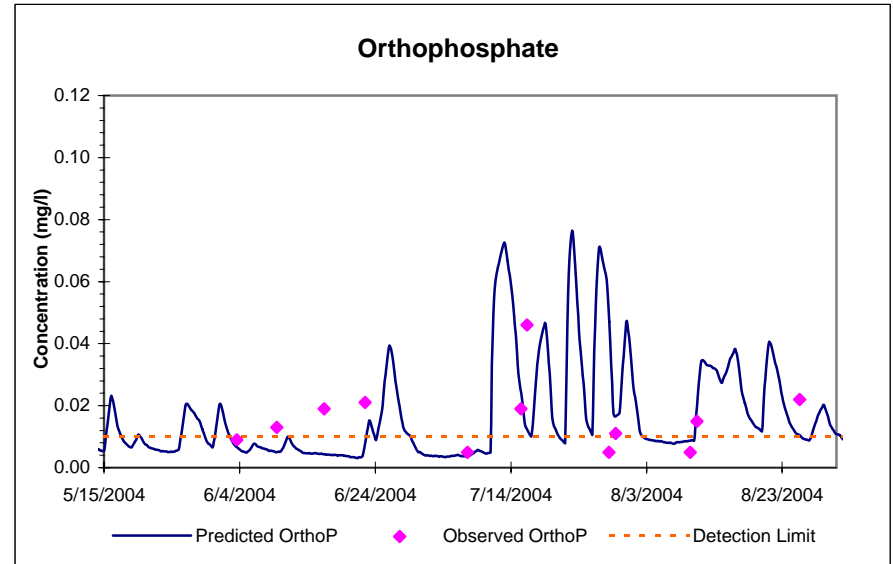
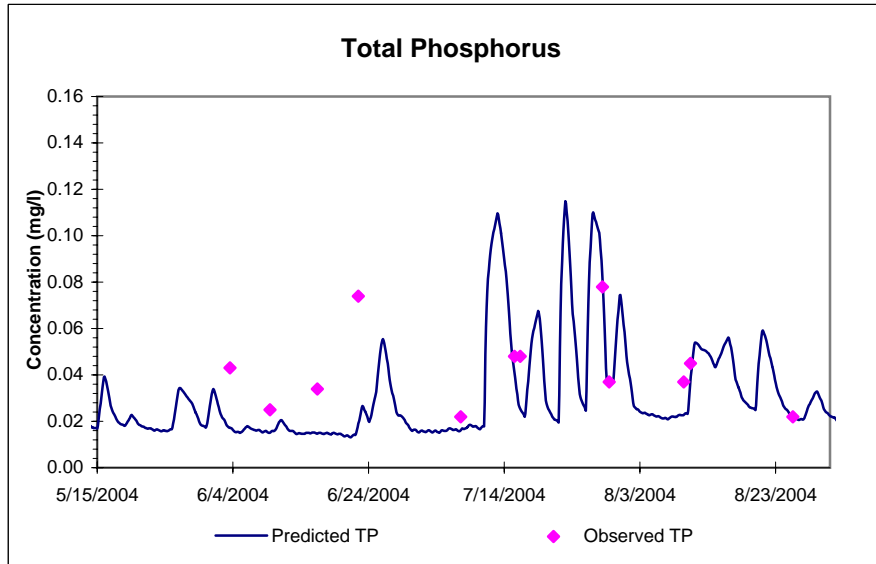
## Burnett Brook at Washington Tpk. (Route 24) in Chester (BuB1)



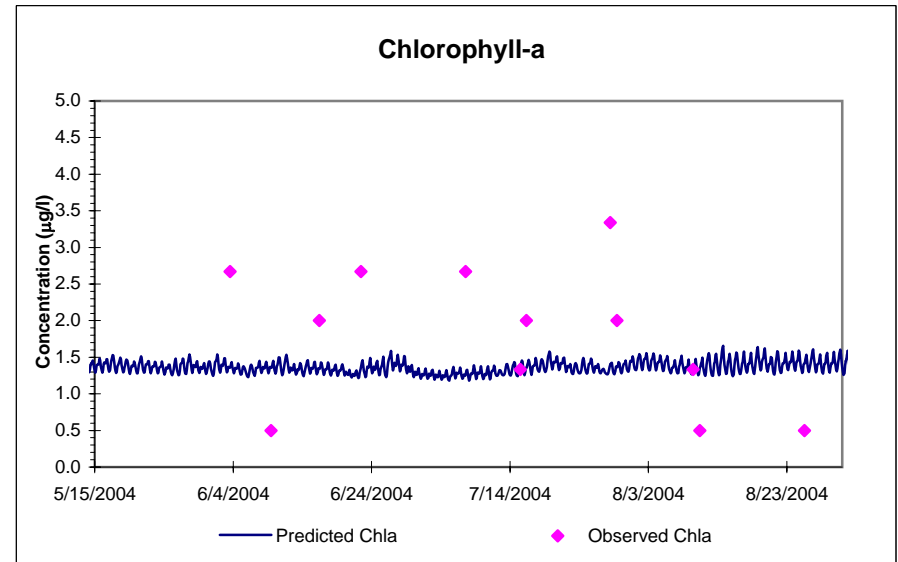
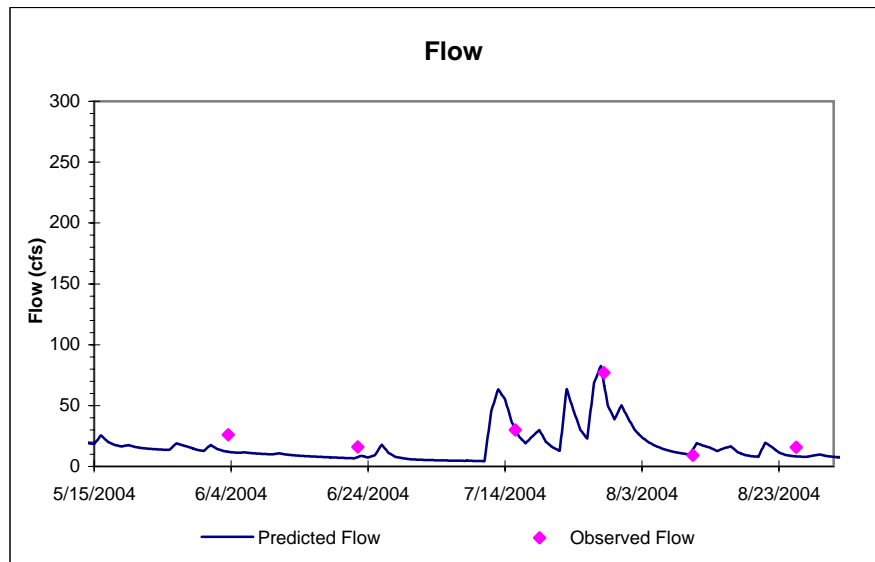
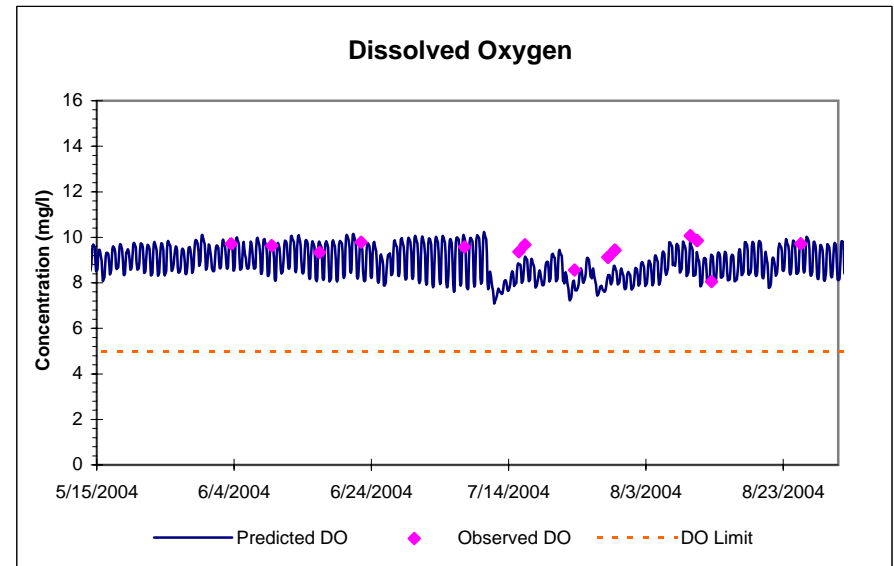
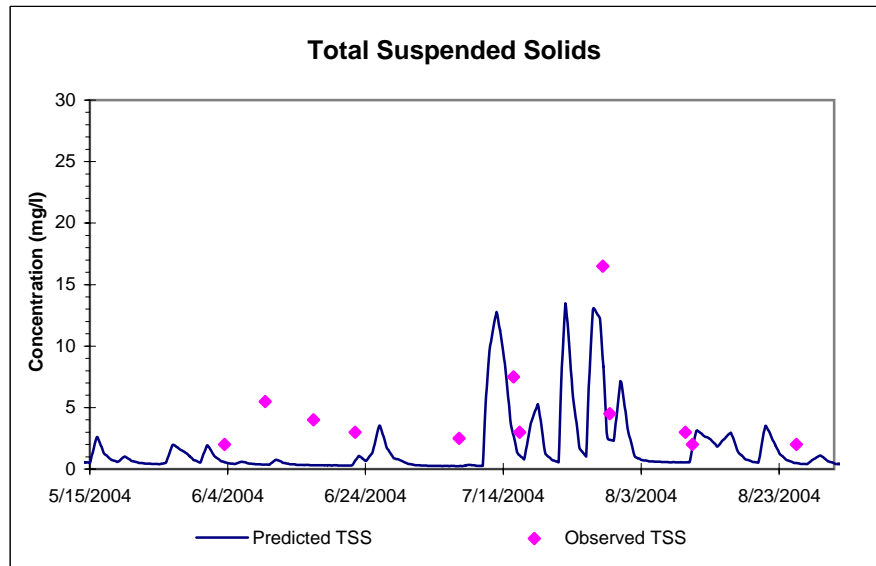
## Burnett Brook at Washington Tpk. (Route 24) in Chester (BuB1)



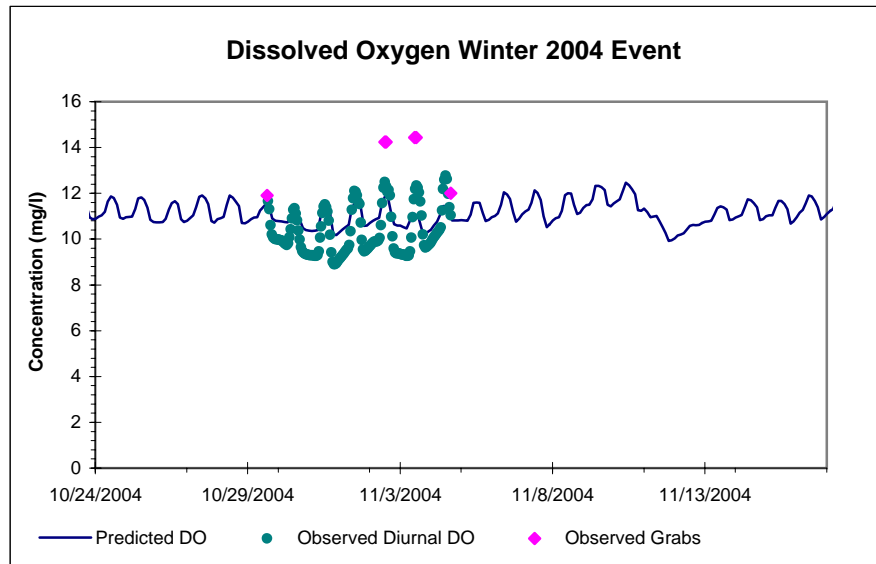
## North Branch Raritan River at Roxiticus Rd. in Mendham Twp. (NBRR1)



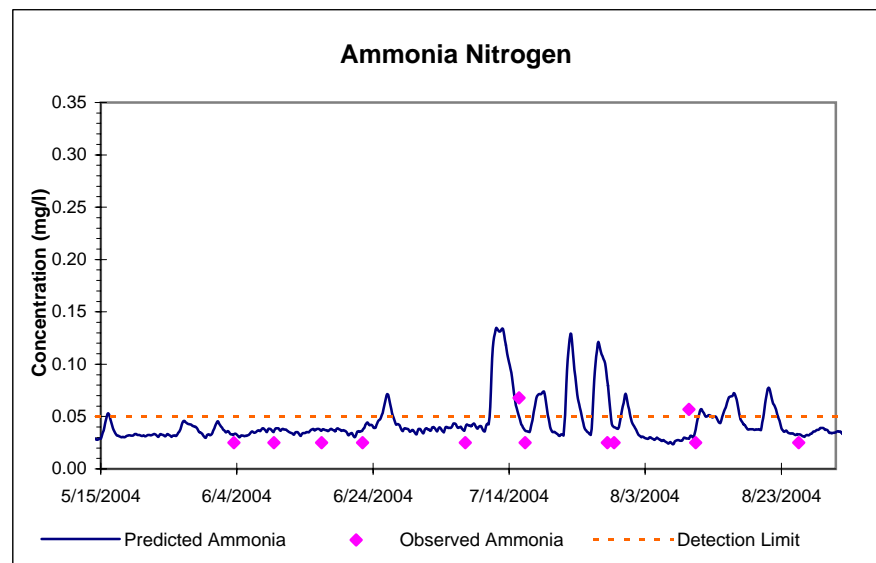
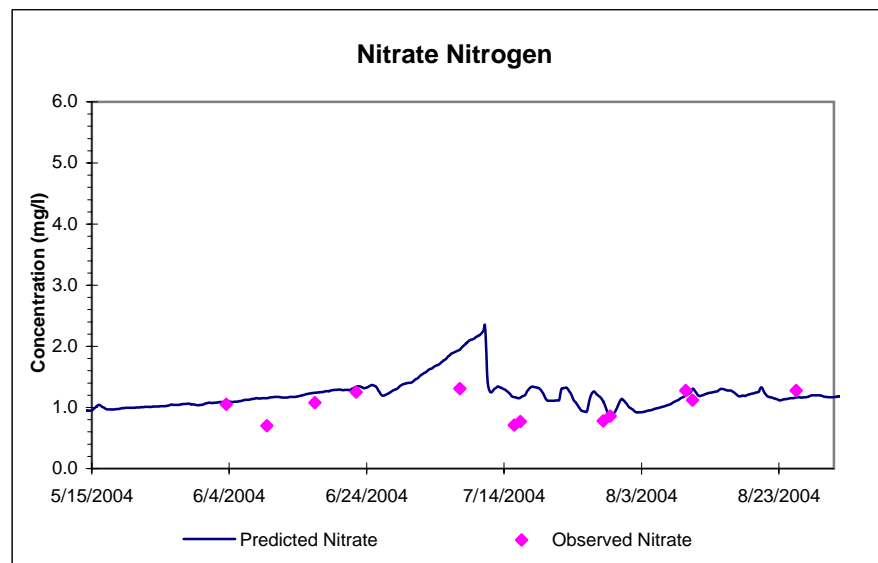
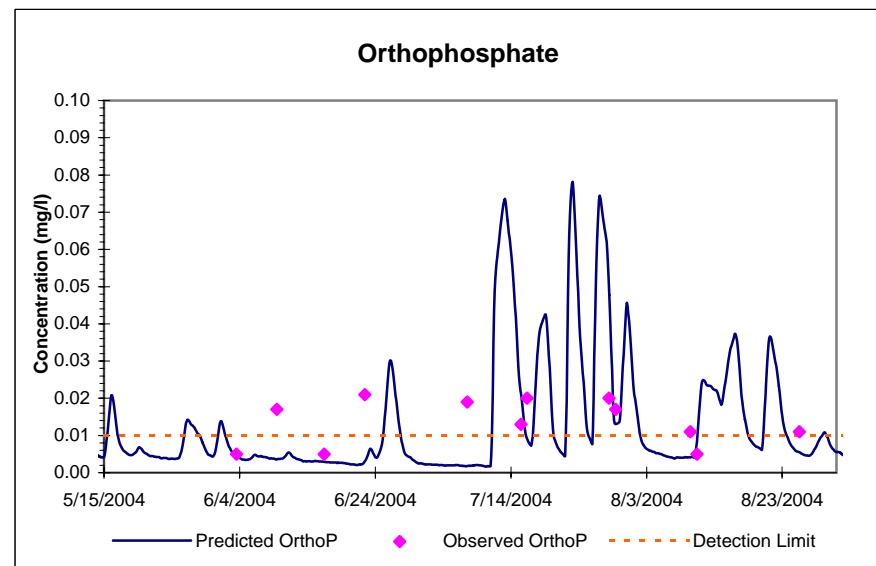
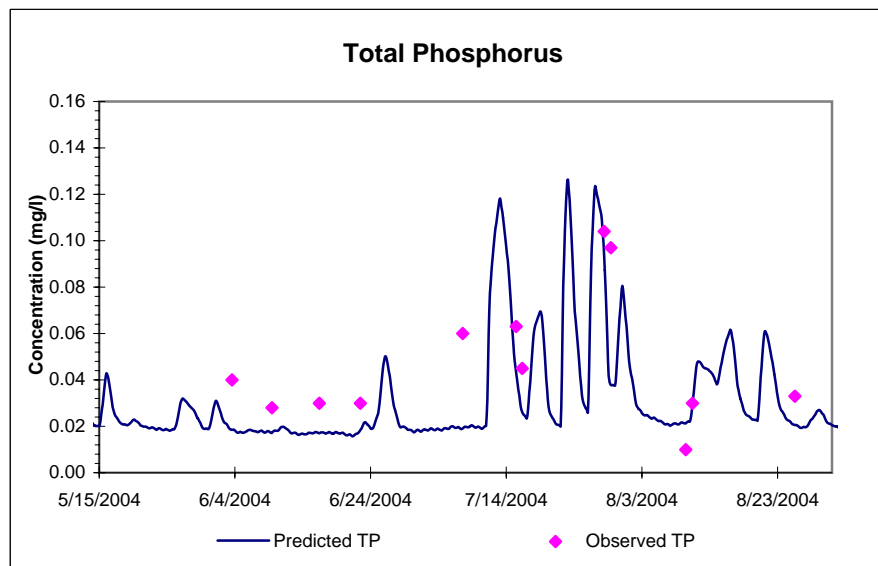
## North Branch Raritan River at Roxiticus Rd. in Mendham Twp. (NBRR1)



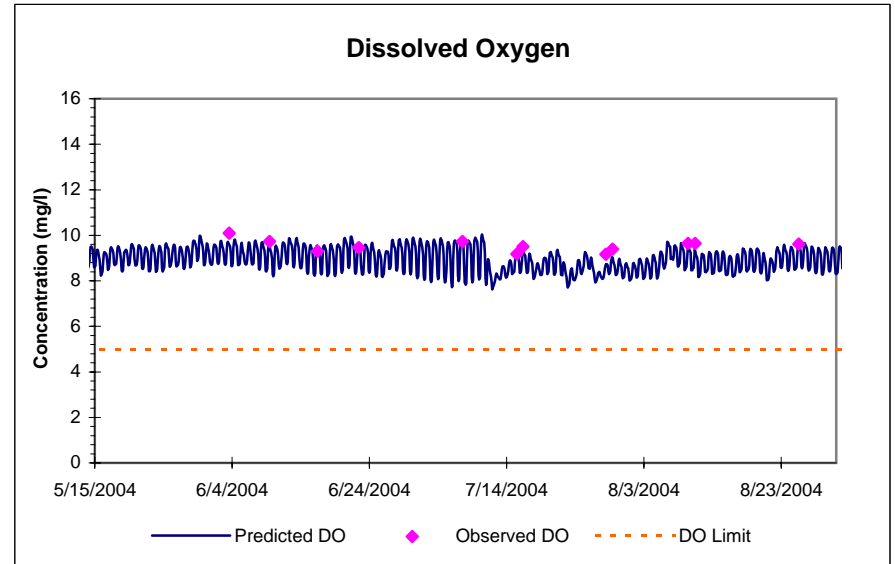
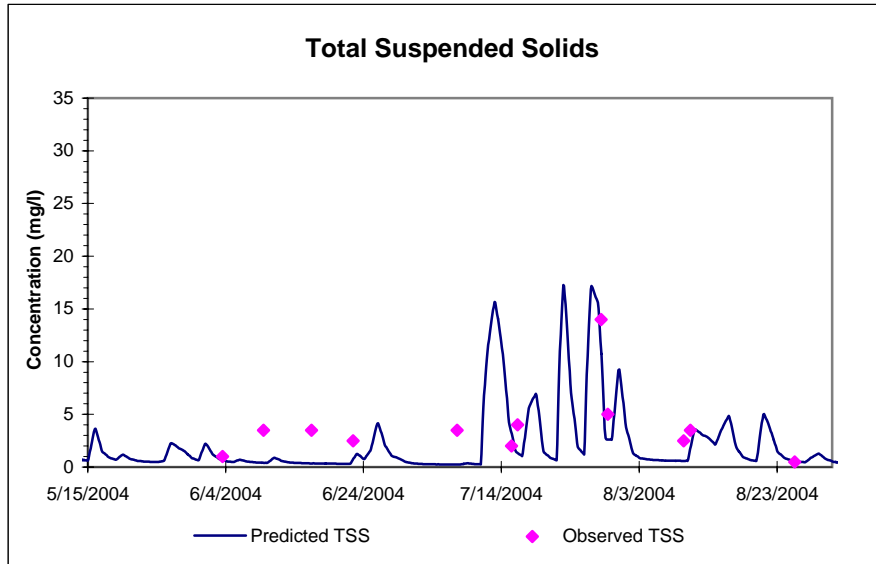
## North Branch Raritan River at Roxiticus Rd. in Mendham Twp. (NBRR1)



## North Branch Raritan River at Willow Ave. in Peapack-Gladstone (NBRR2)

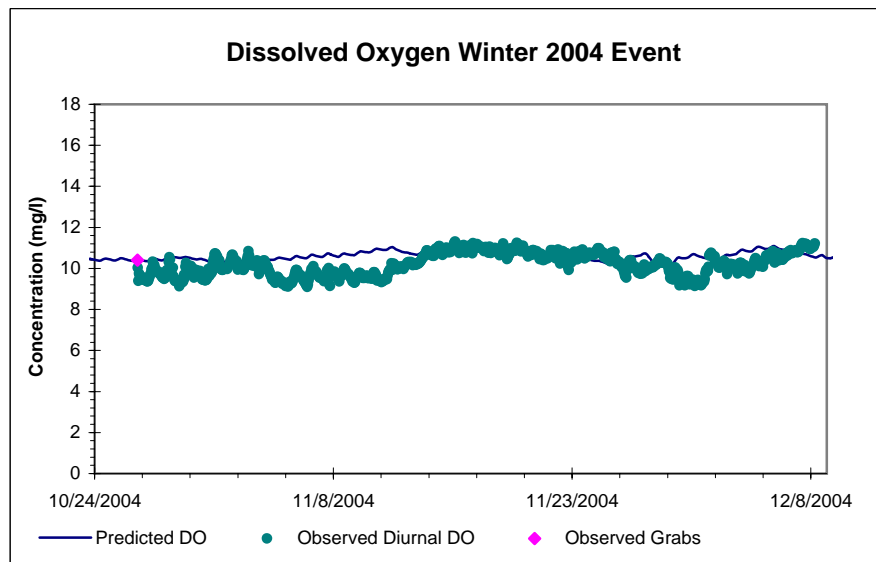
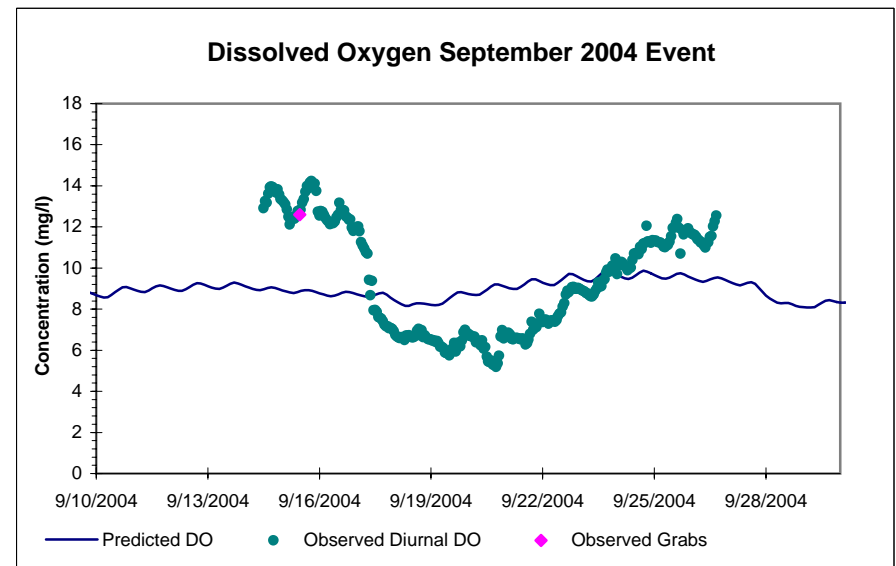
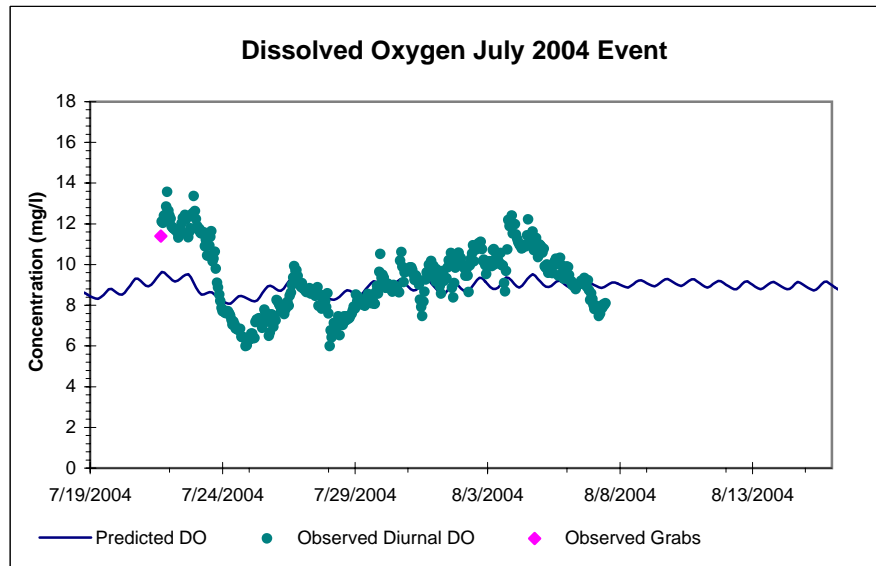


## North Branch Raritan River at Willow Ave. in Peapack-Gladstone (NBRR2)



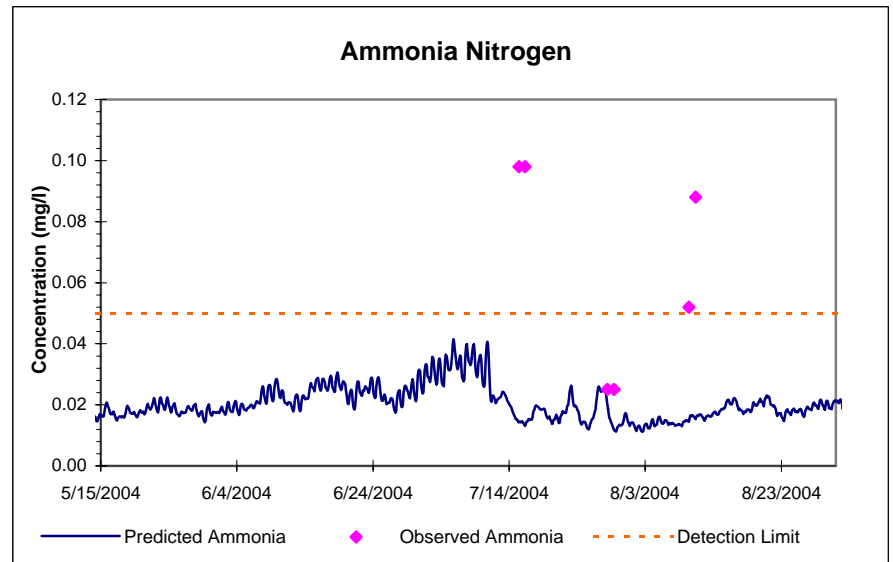
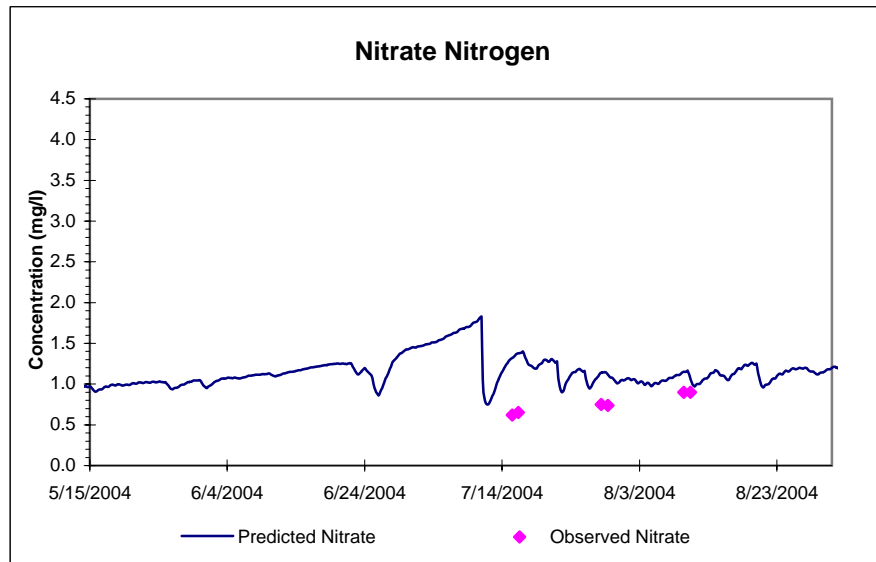
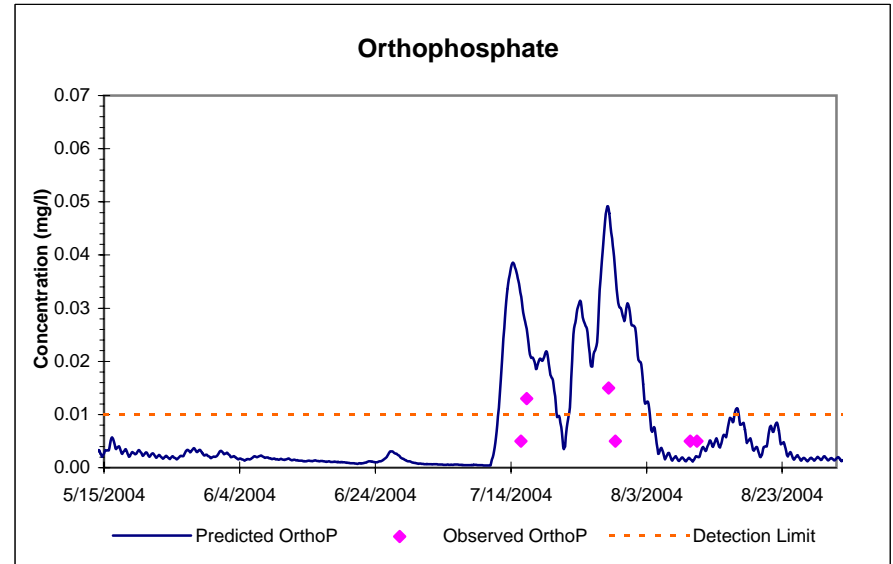
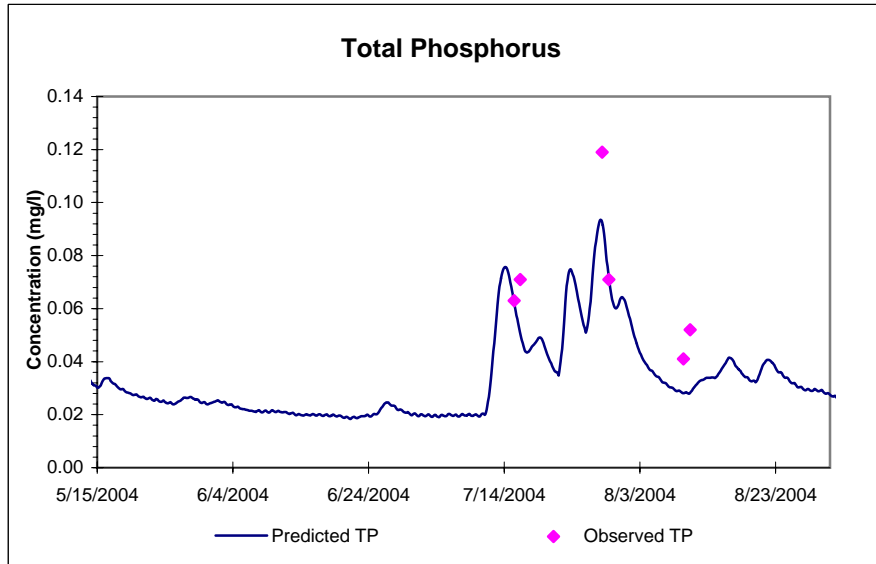


## North Branch Raritan River at Ravine Lake (NBRR3)

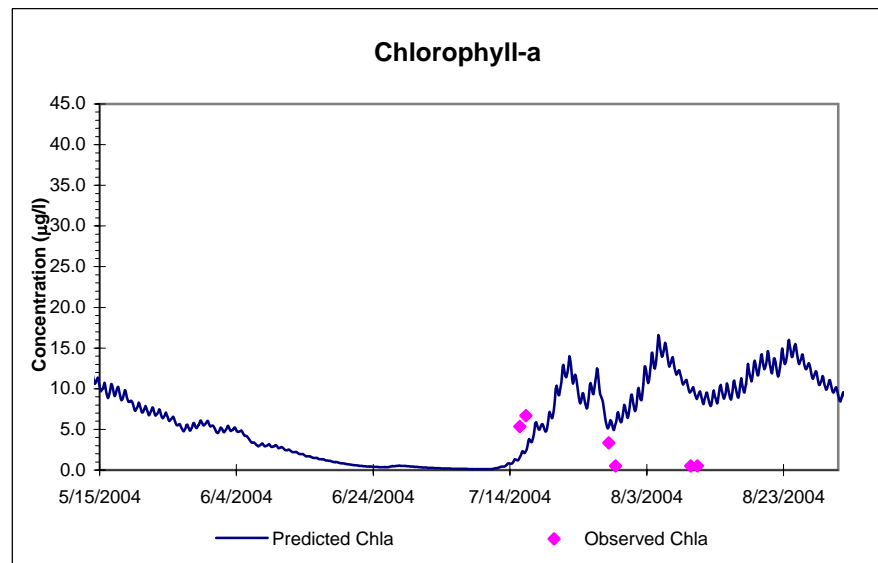
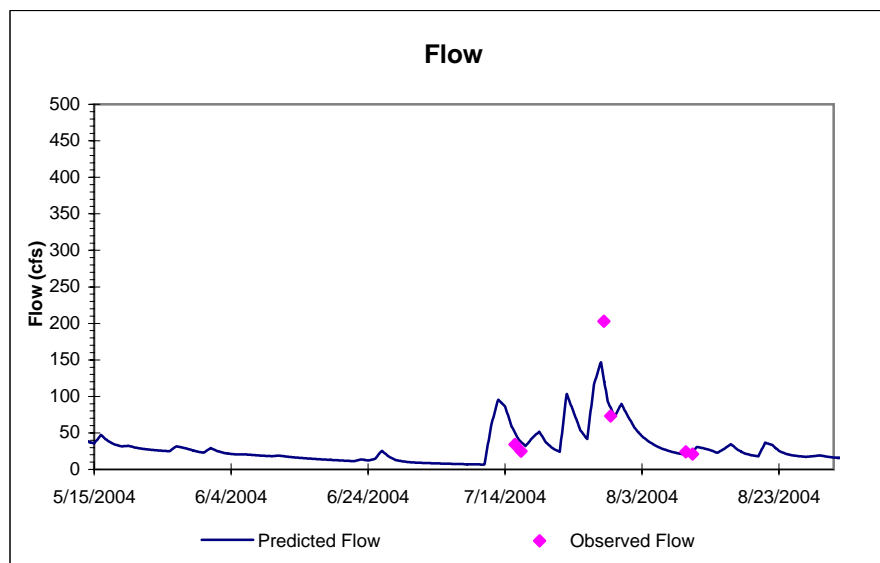
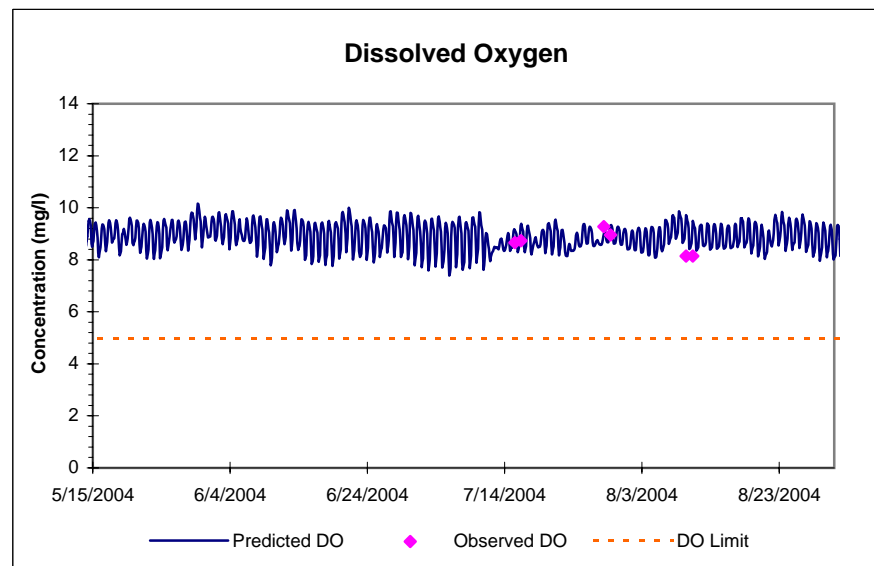
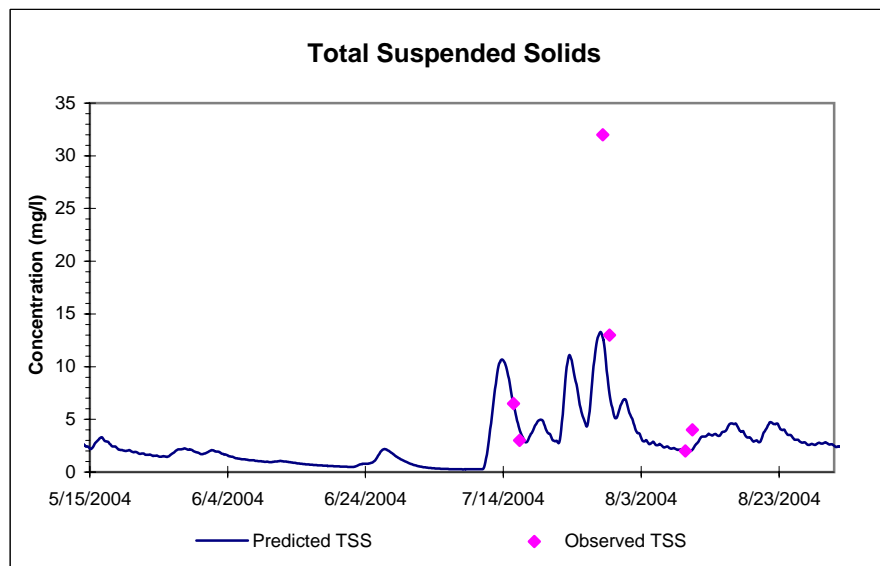


NOTE: DO was measured at a fixed depth in this lake. During summer periods, the lake exhibits stratification, whereas the model prediction assumes complete vertical mixing.

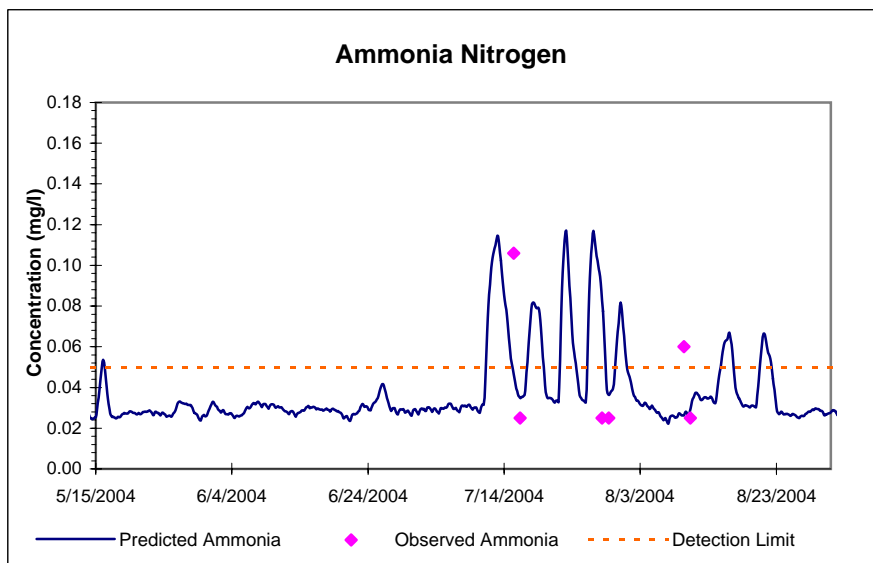
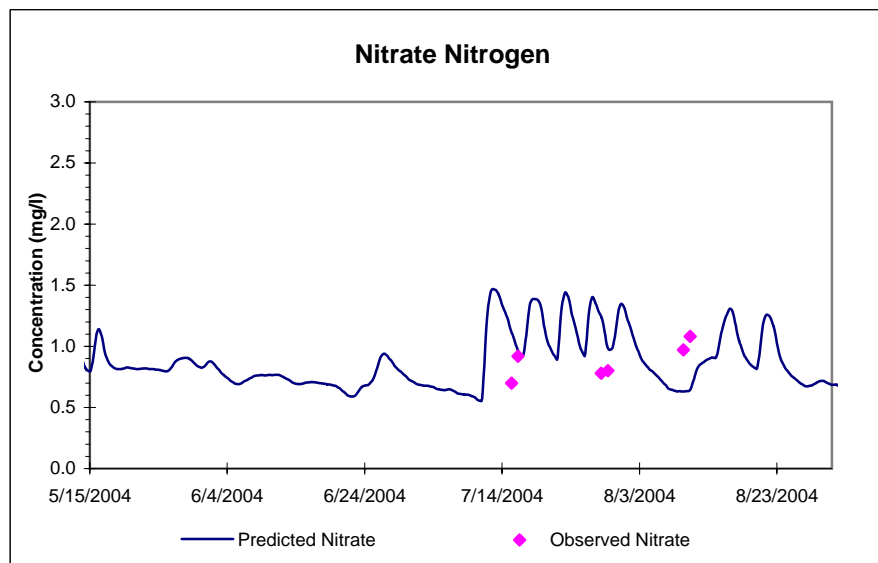
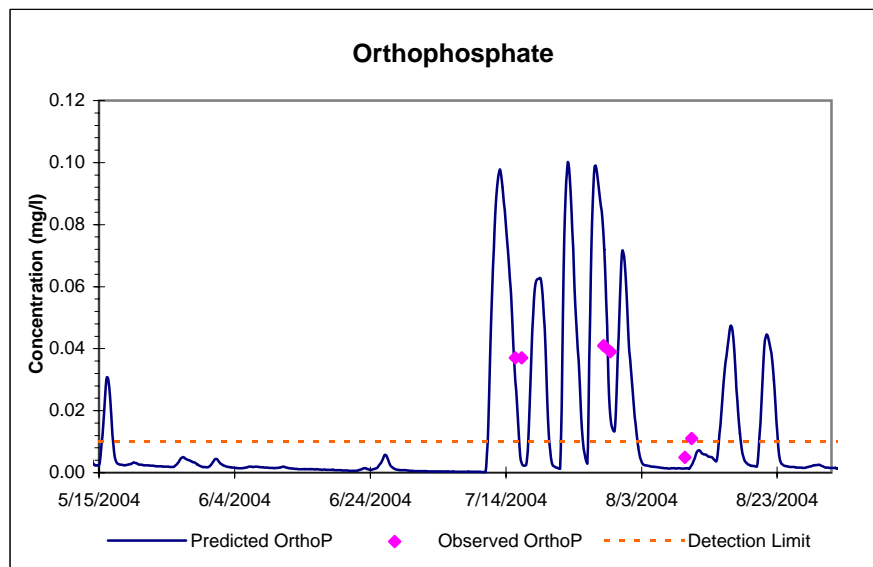
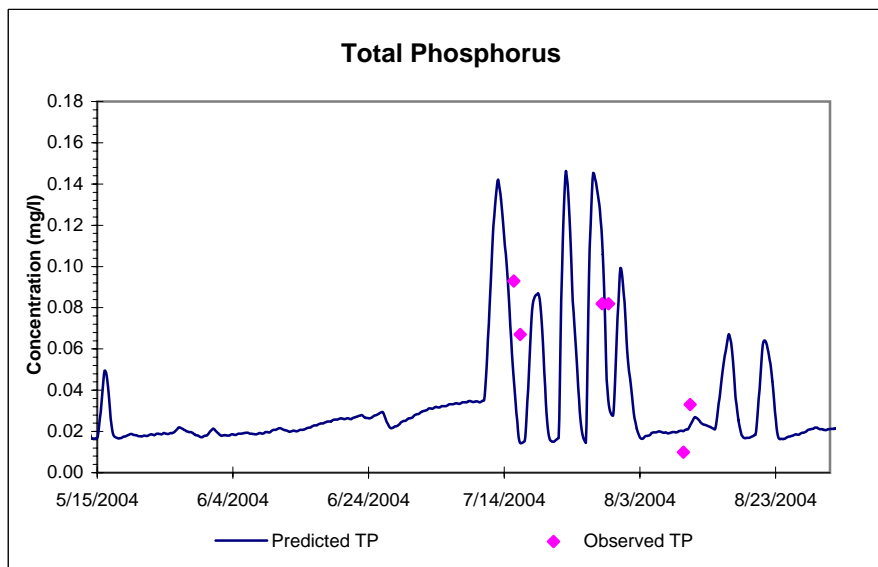
## North Branch Raritan River Downstream Ravine Lake (NBRR4)



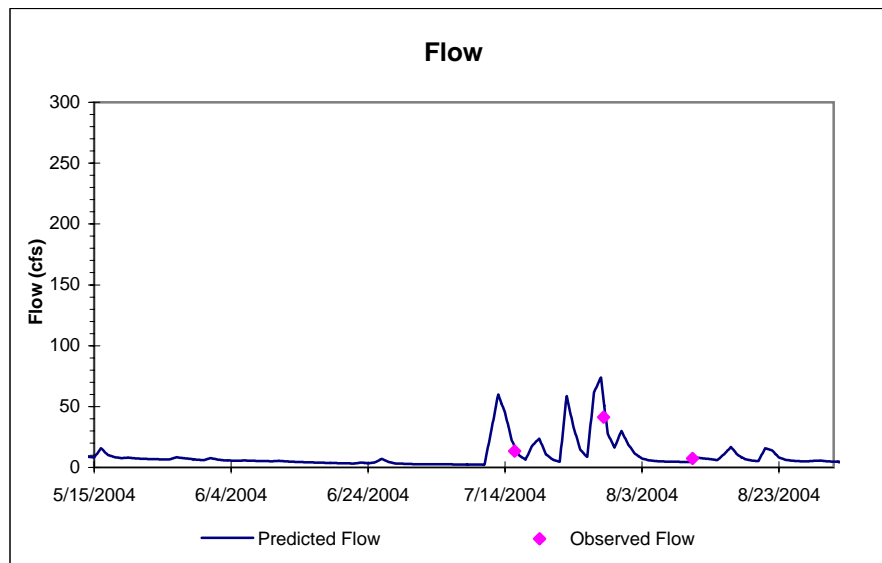
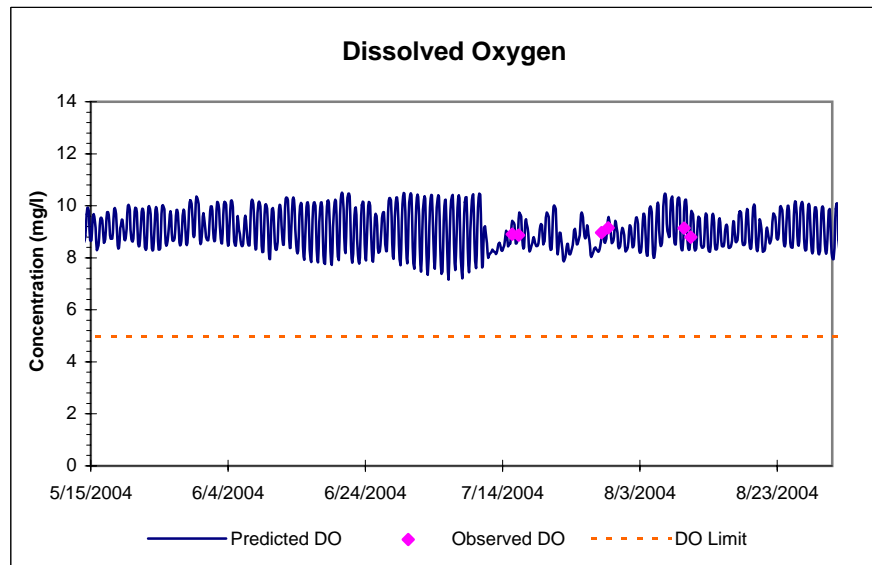
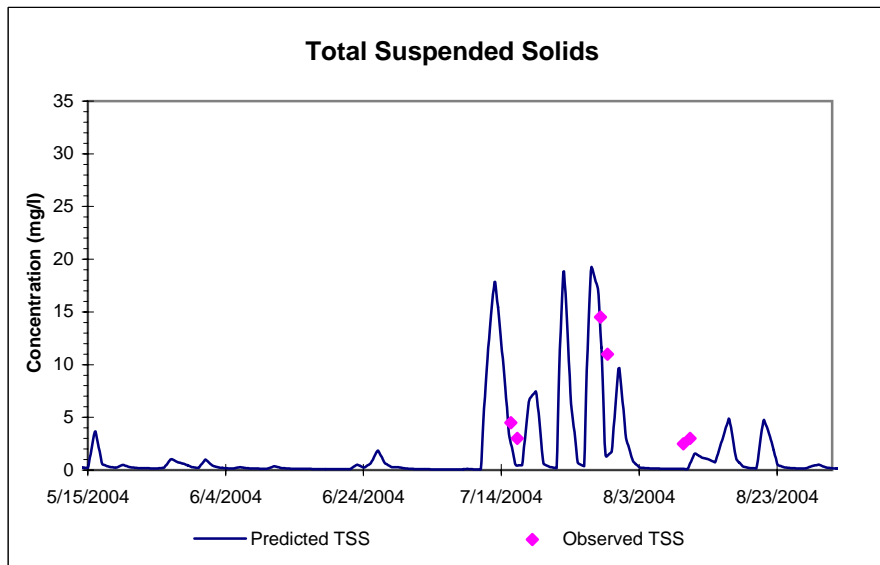
## North Branch Raritan River Downstream Ravine Lake (NBRR4)



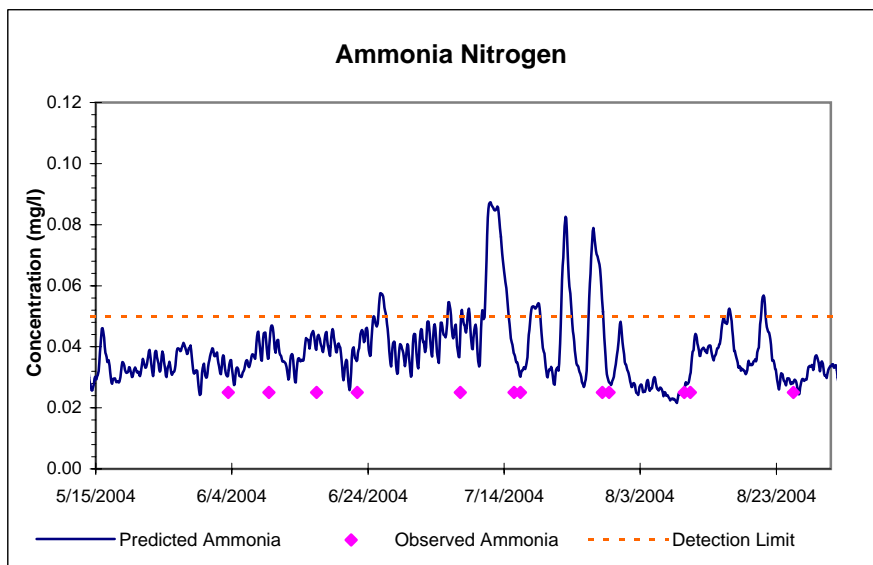
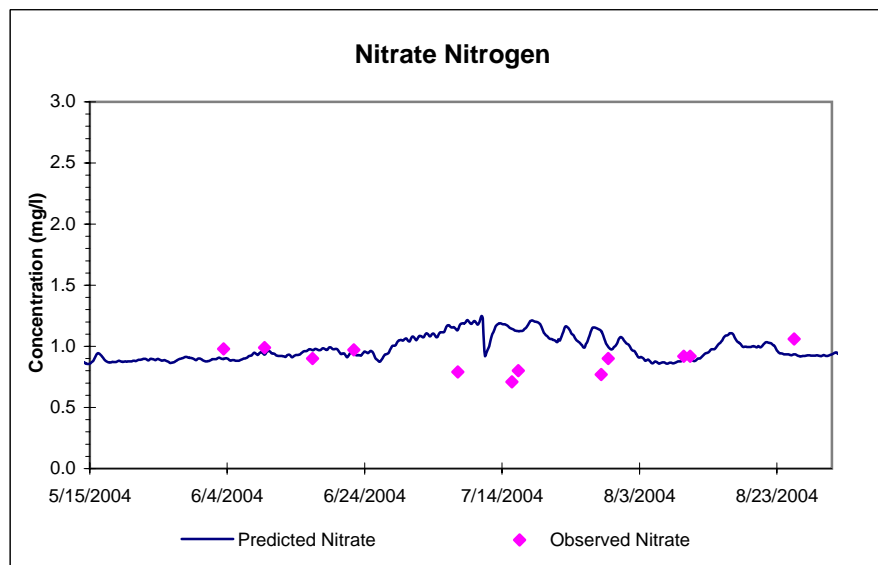
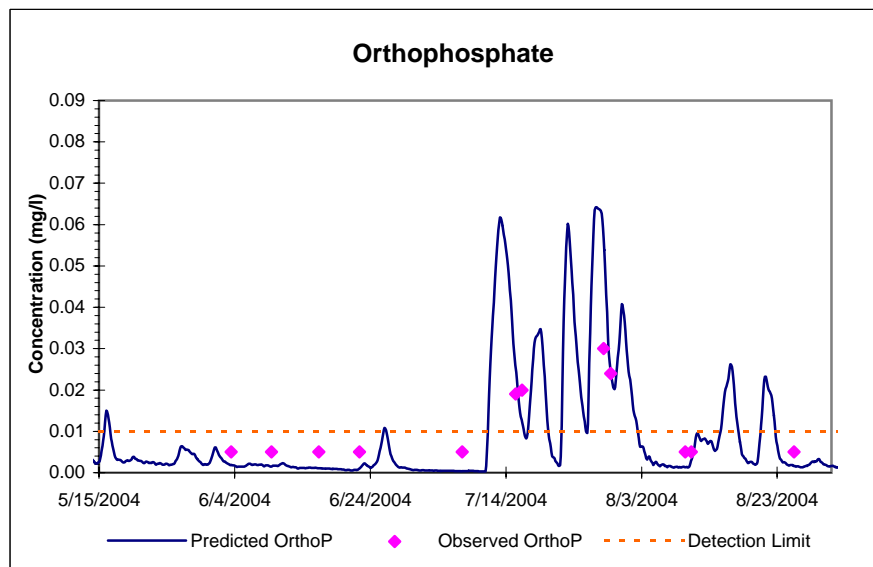
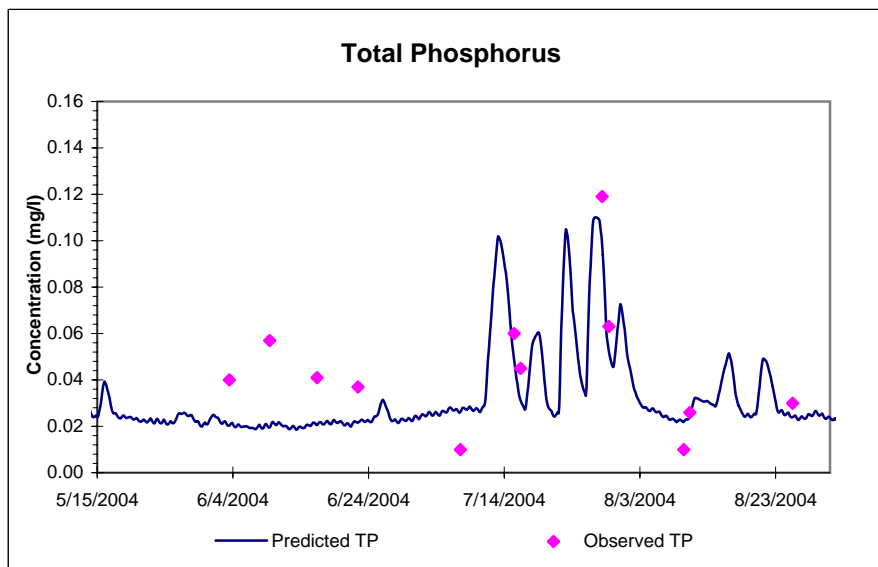
## Mine Brook at Liberty Corner Rd. near Far Hills Station (MiB1)



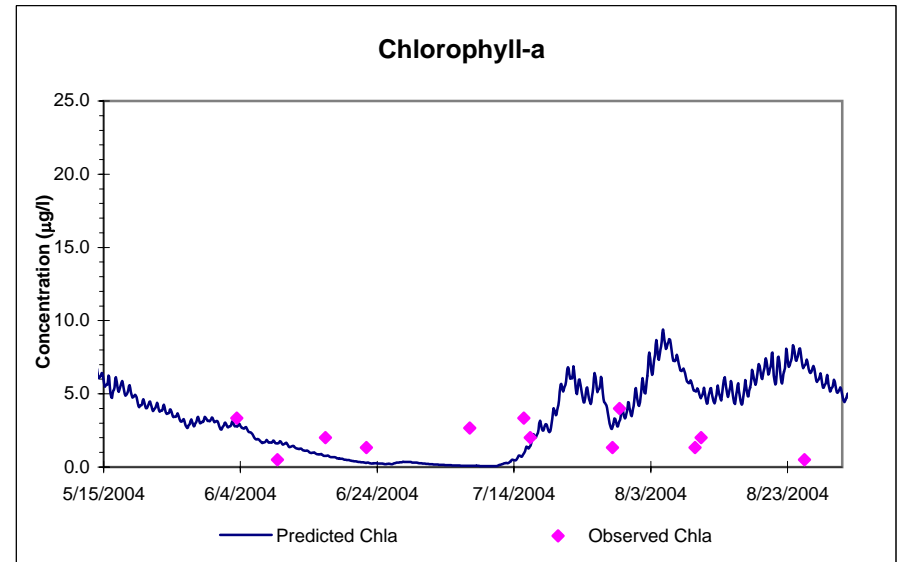
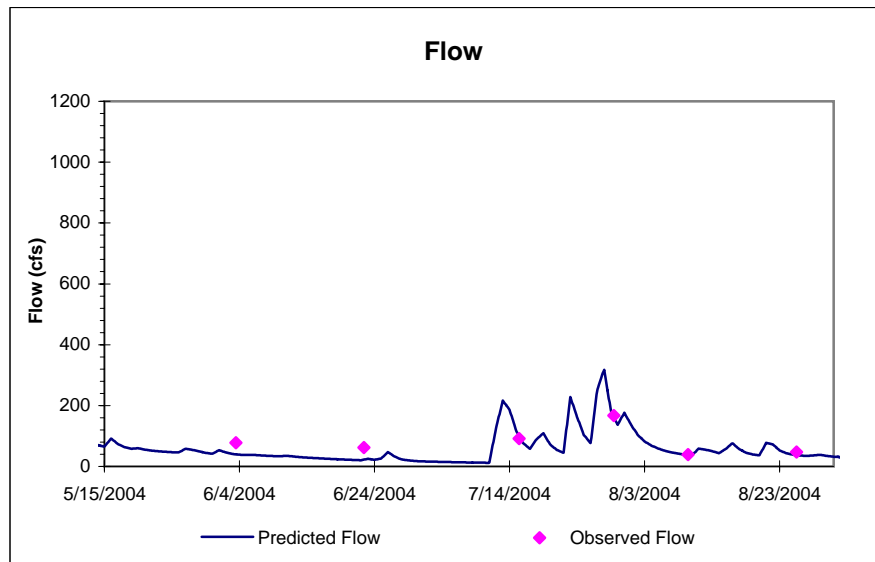
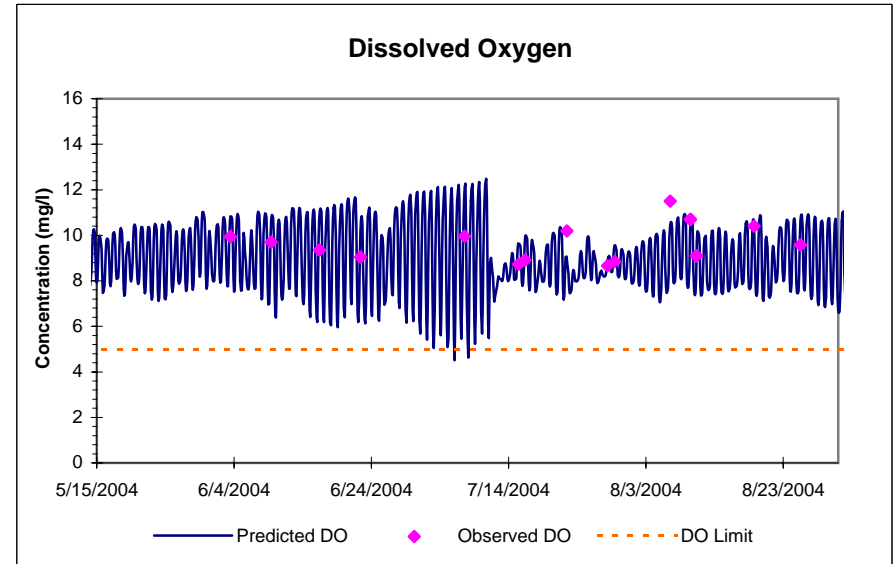
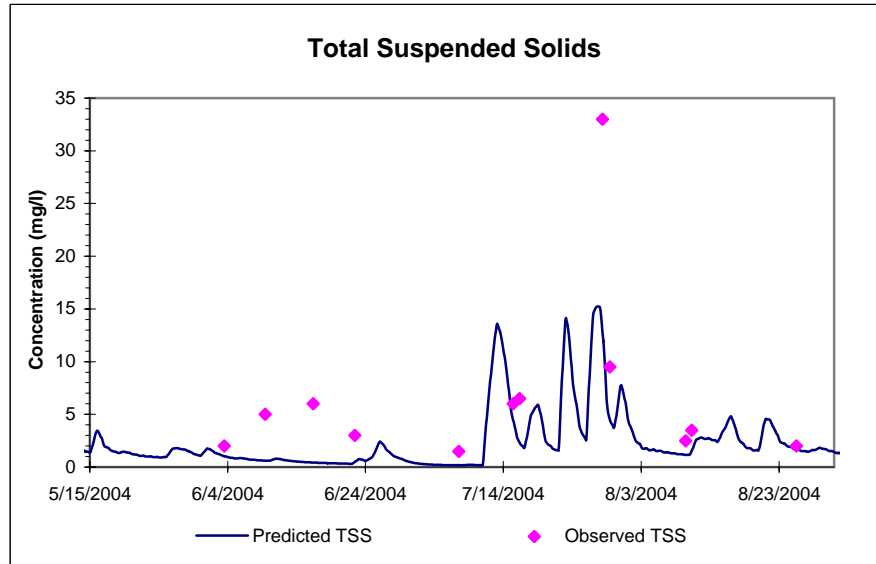
# Mine Brook at Liberty Corner Rd. near Far Hills Station (MiB1)



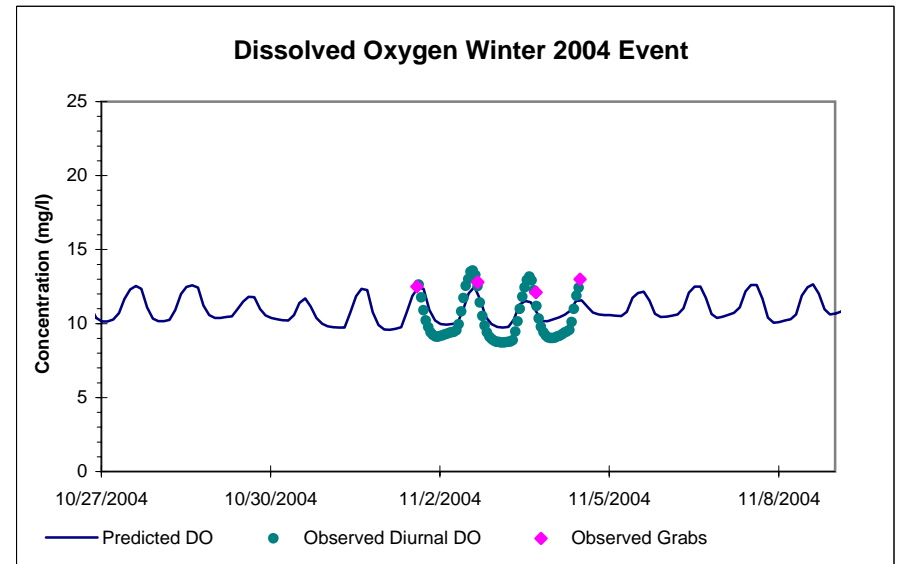
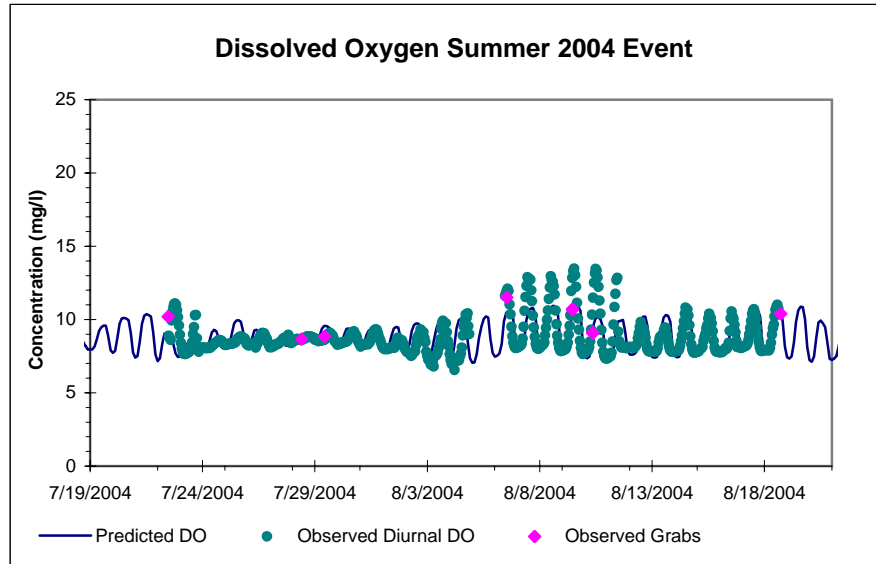
## North Branch Raritan River at Route 202/206 in Bedminster Twp. (NBRR5)



## North Branch Raritan River at Route 202/206 in Bedminster Twp. (NBRR5)

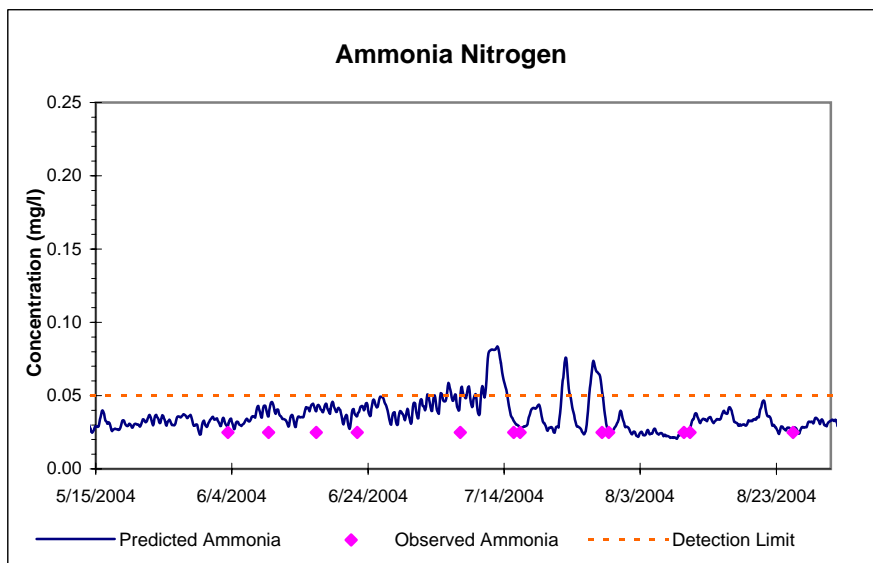
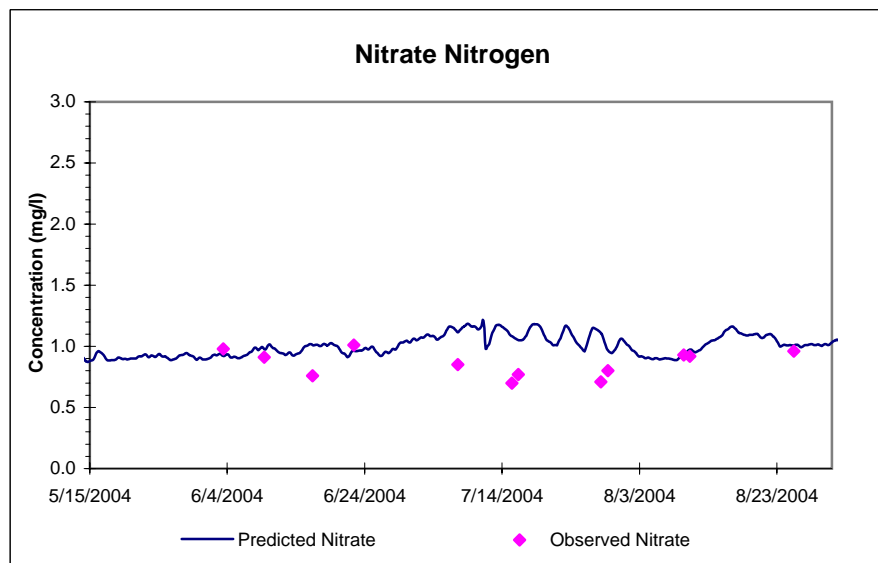
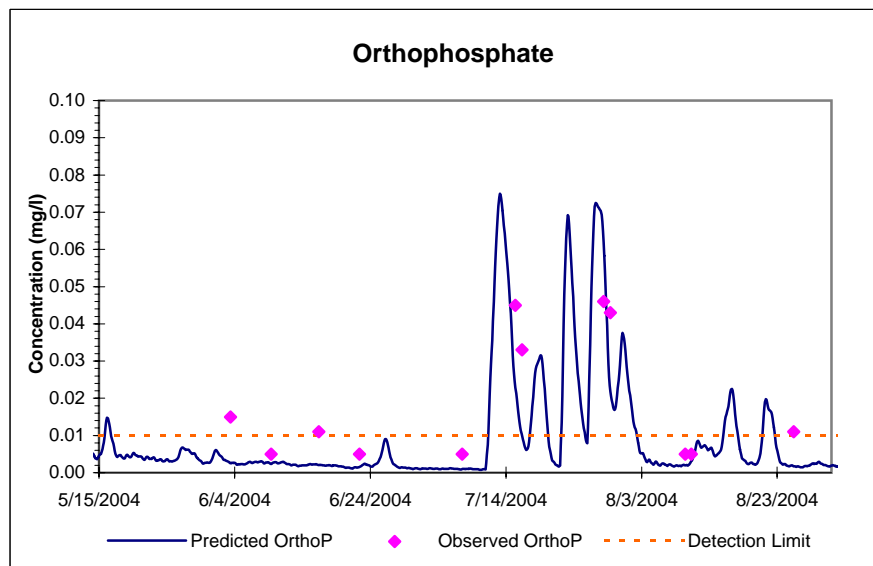
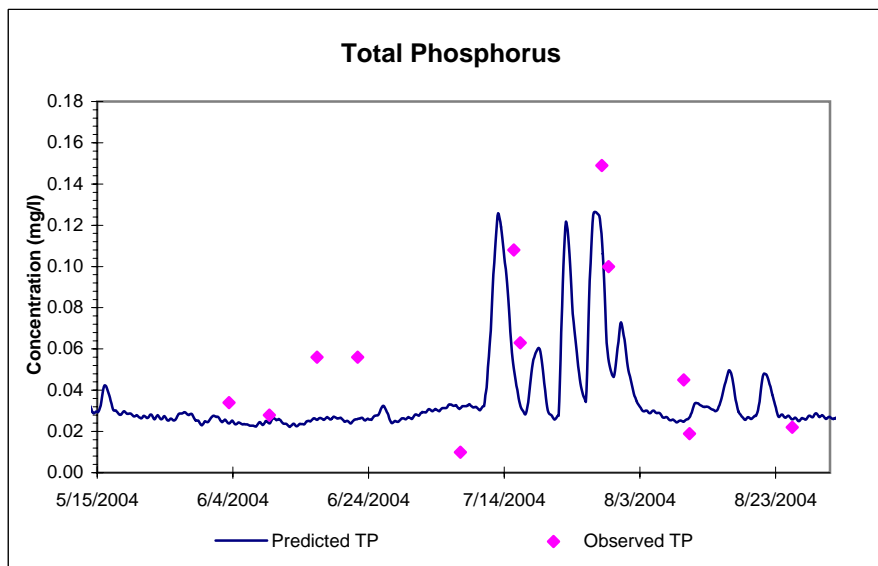


## North Branch Raritan River at Route 202/206 in Bedminster Twp. (NBRR5)

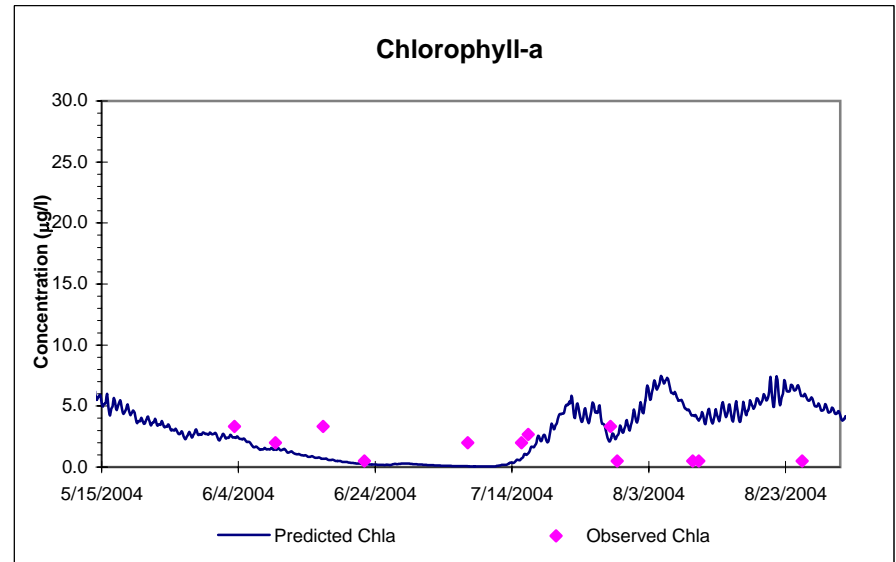
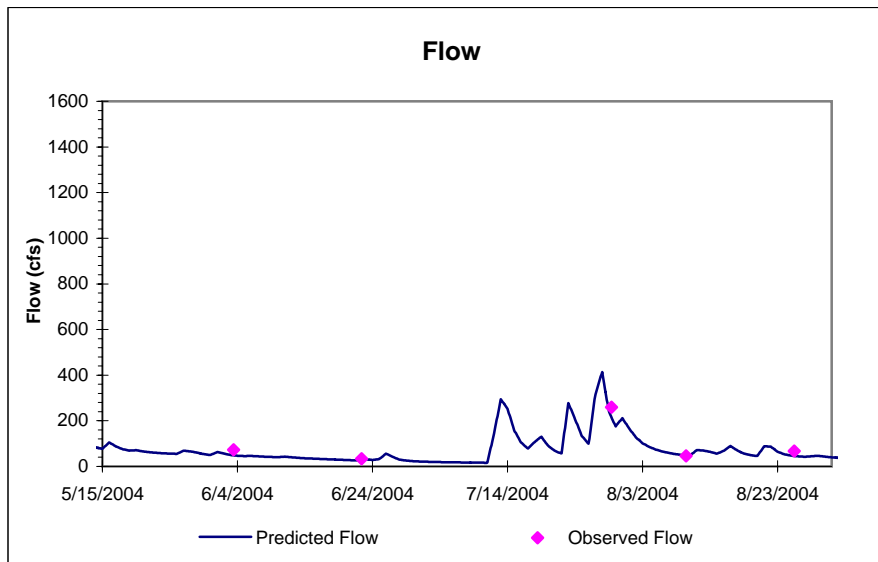
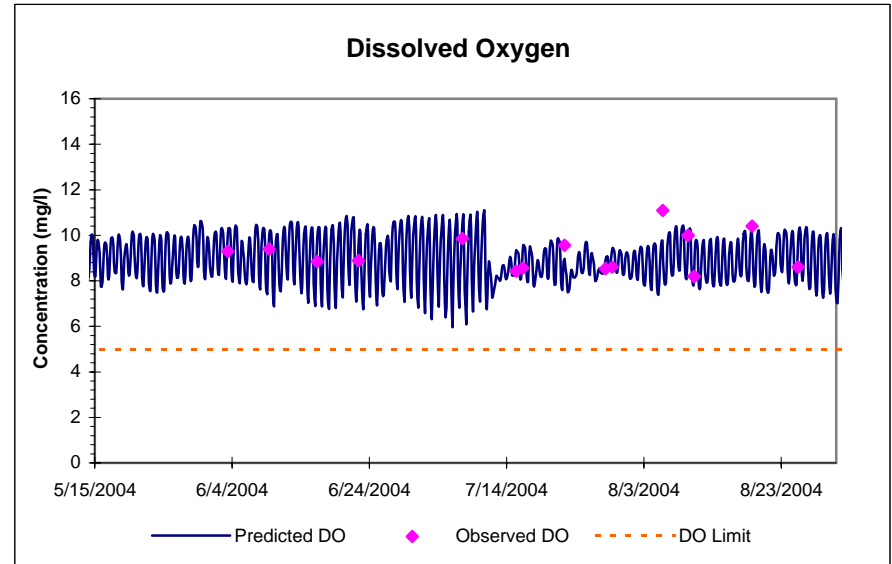
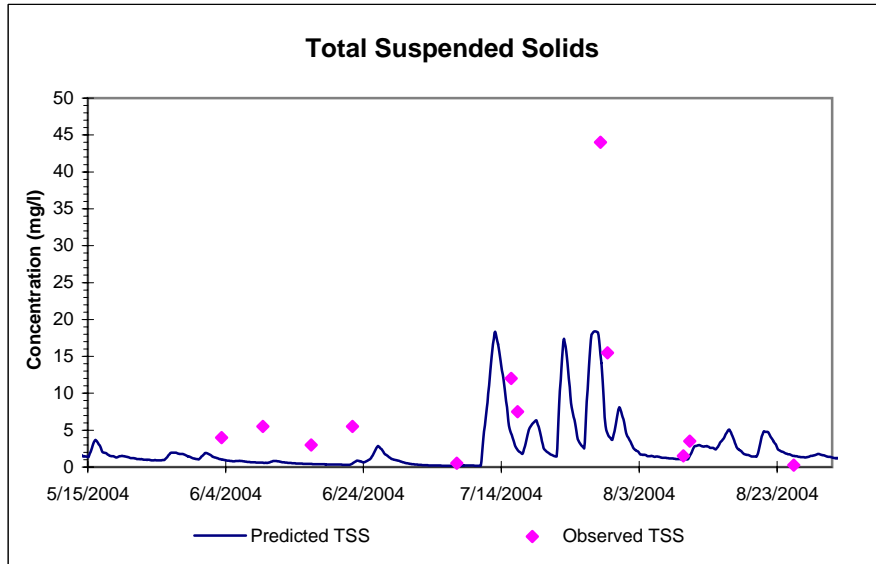




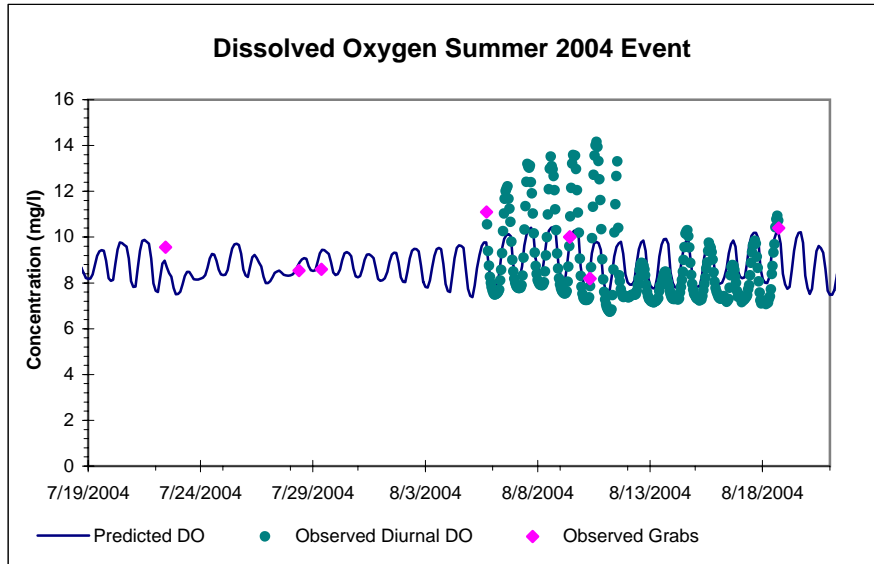
## North Branch Raritan River at Burnt Mills Rd. in Burnt Mills (NBRR6)



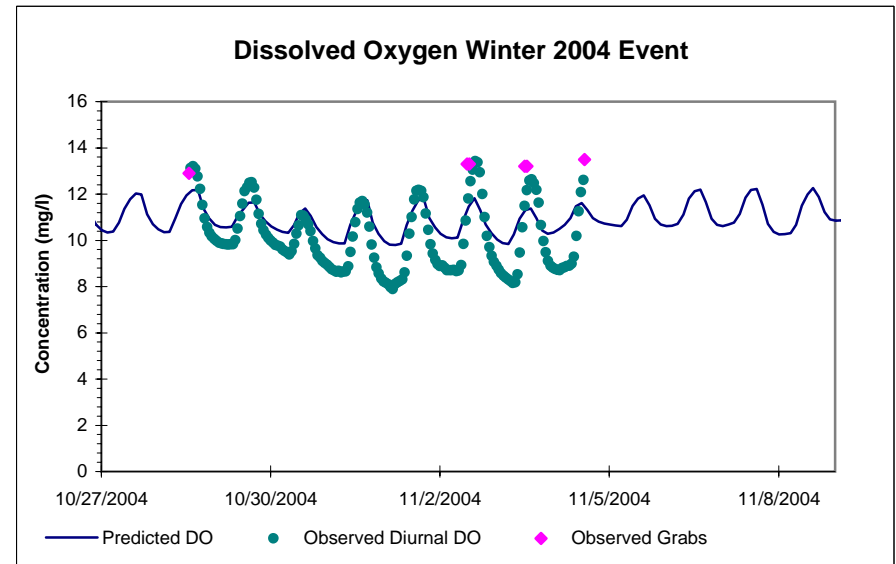
## North Branch Raritan River at Burnt Mills Rd. in Burnt Mills (NBRR6)



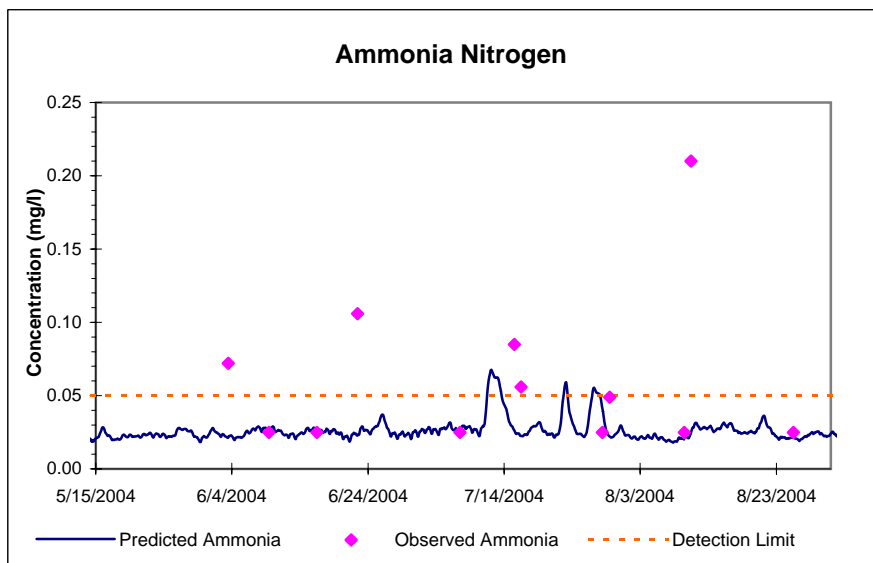
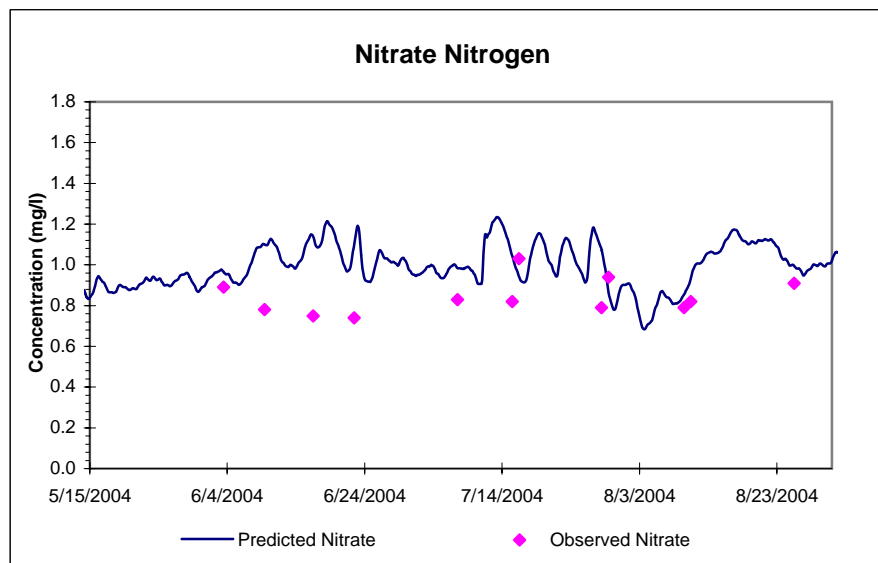
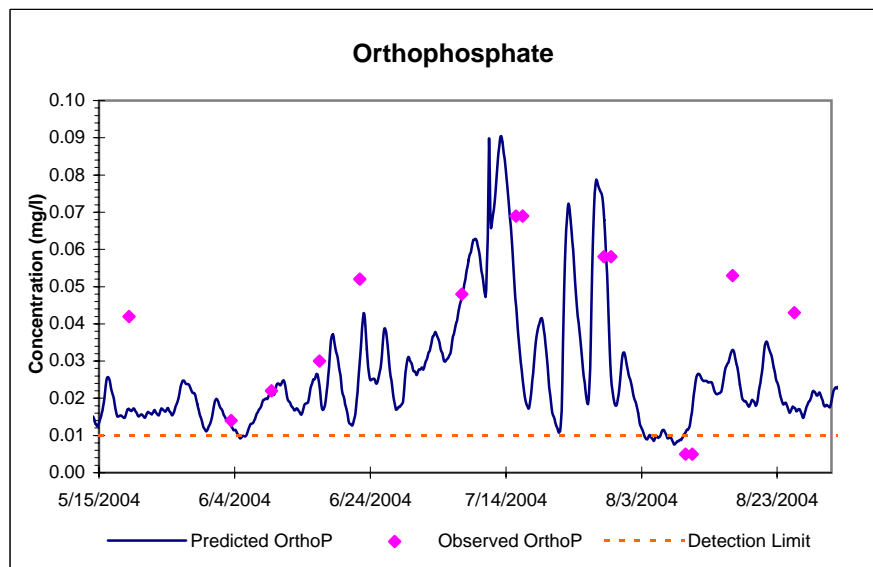
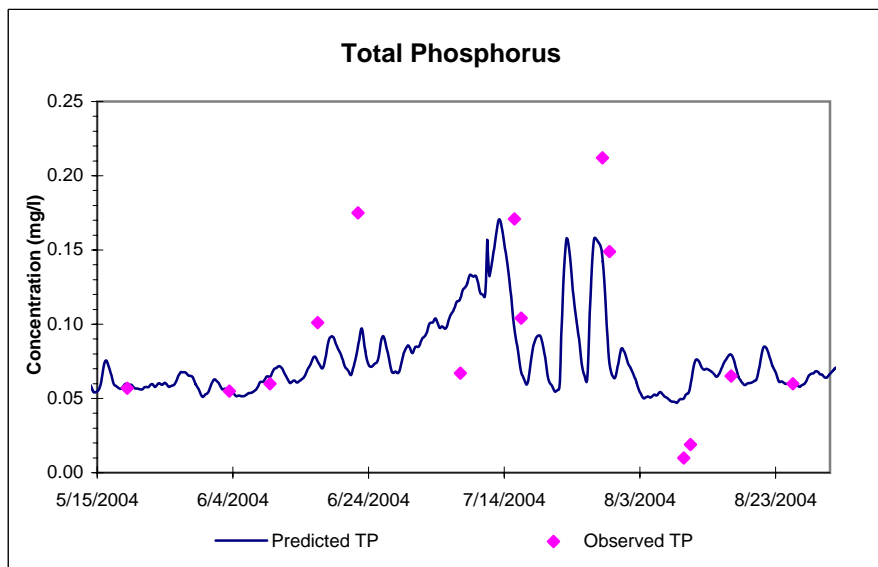
## North Branch Raritan River at Burnt Mills Rd. in Burnt Mills (NBRR6)



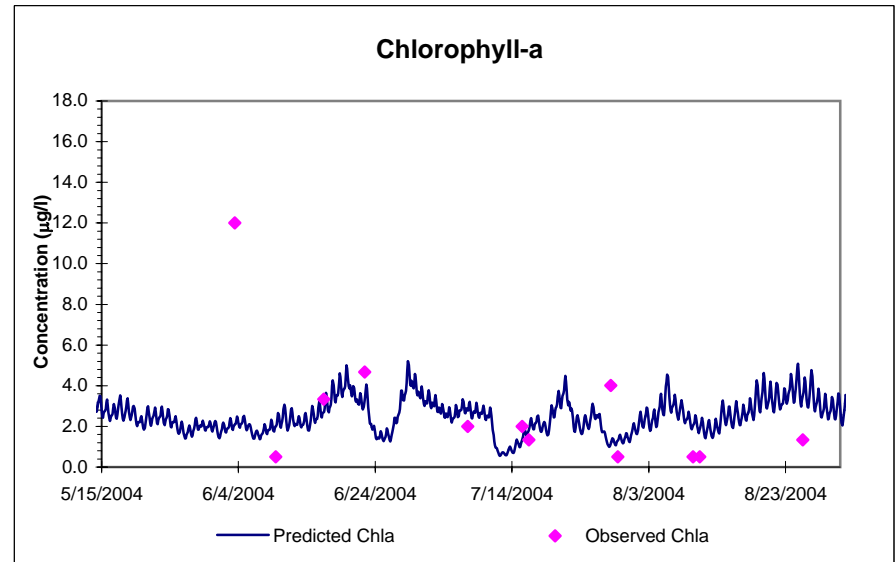
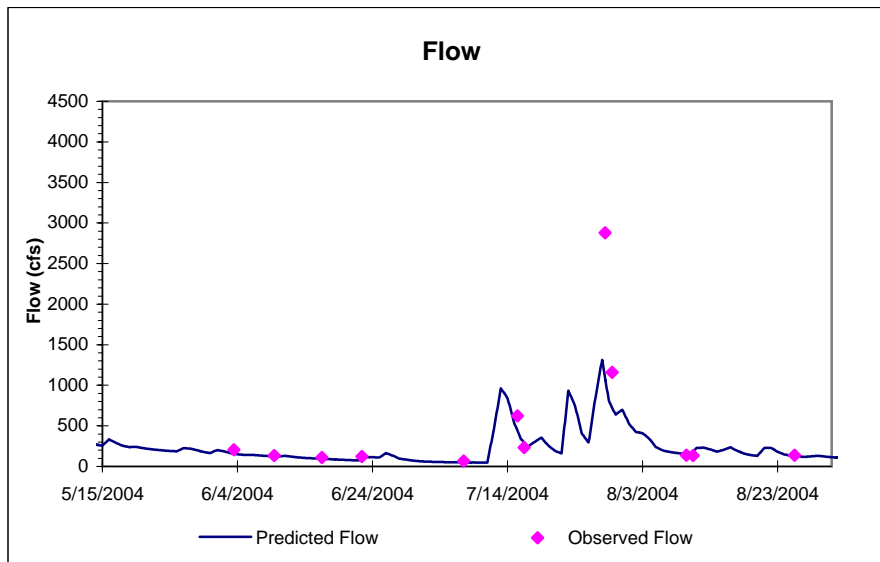
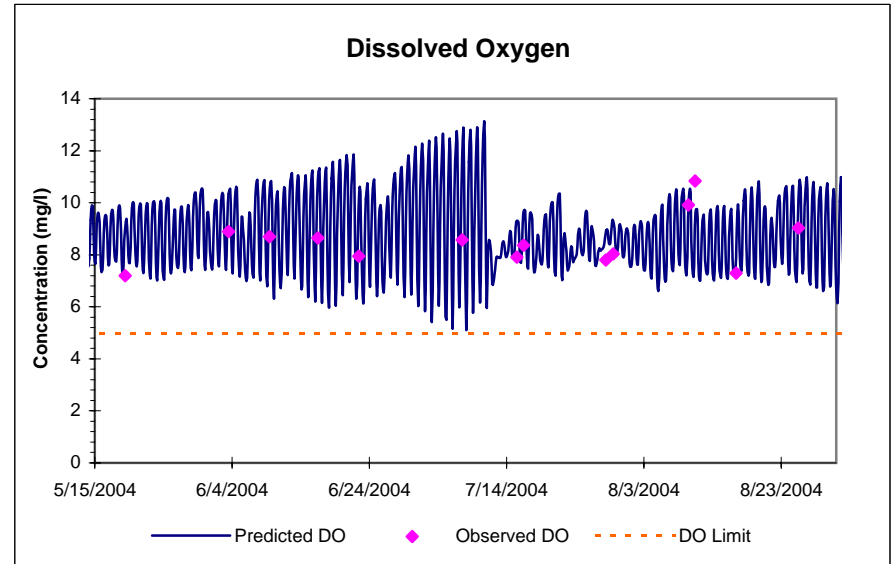
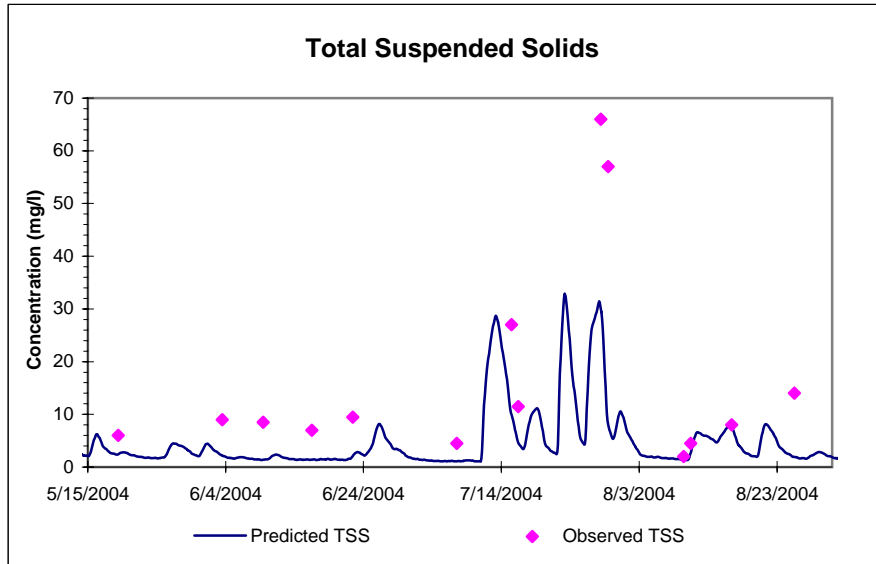
see section III.G.3 for discussion of this event



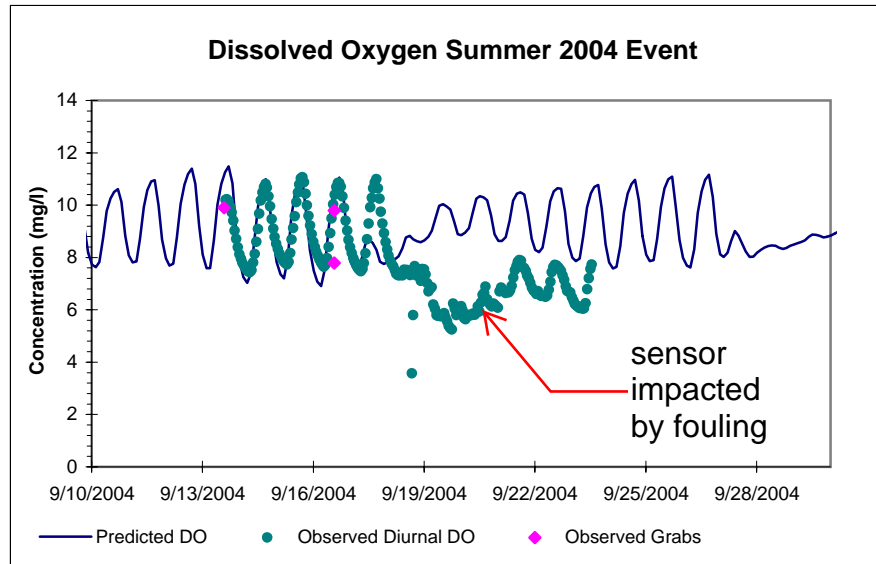
## North Branch Raritan River at Route 202 in Bridgewater (NBRR7, USGS 01400000)



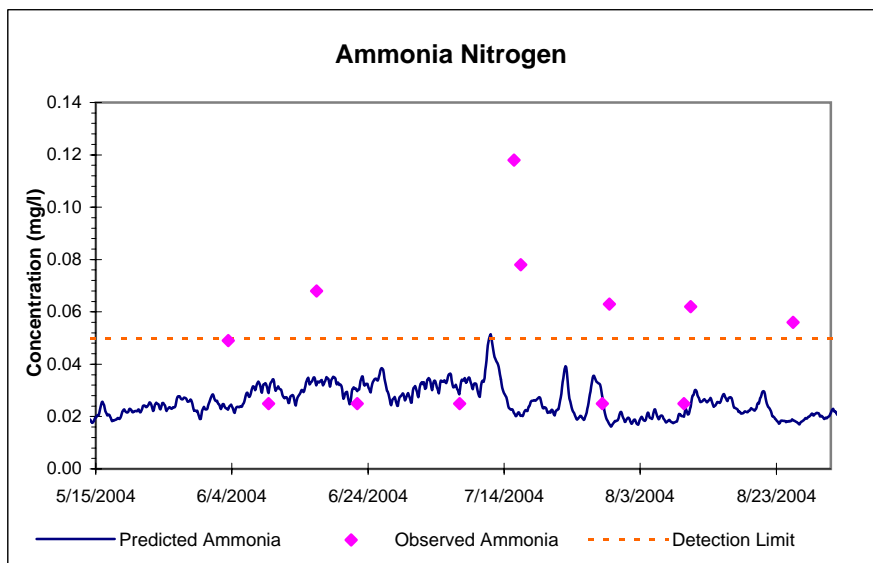
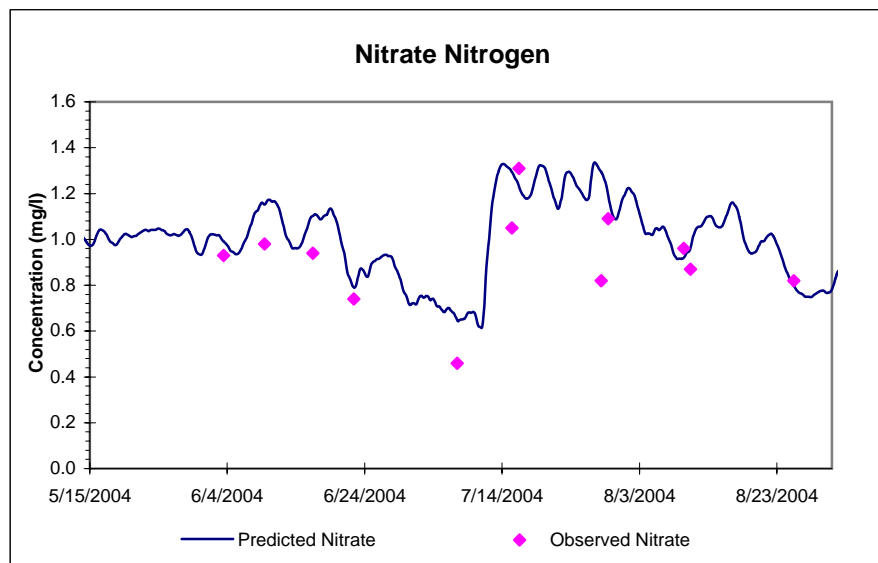
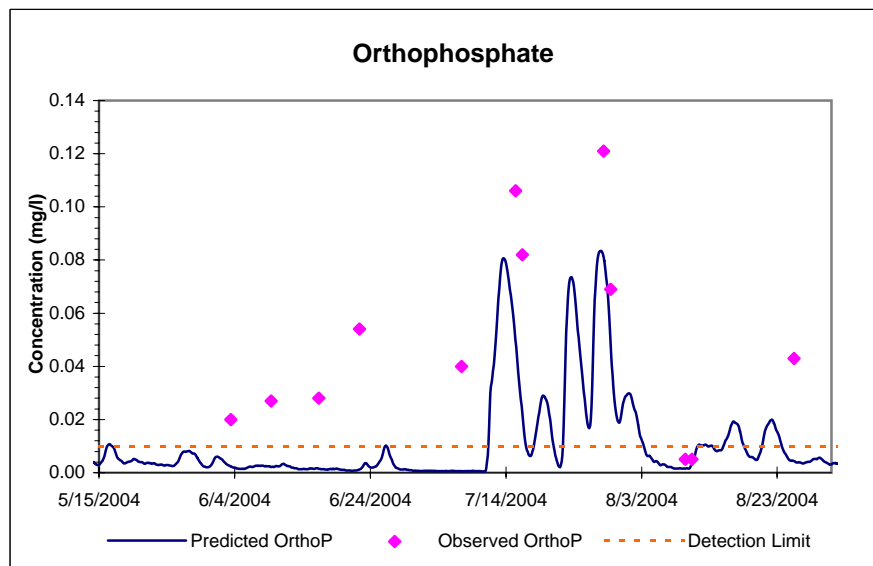
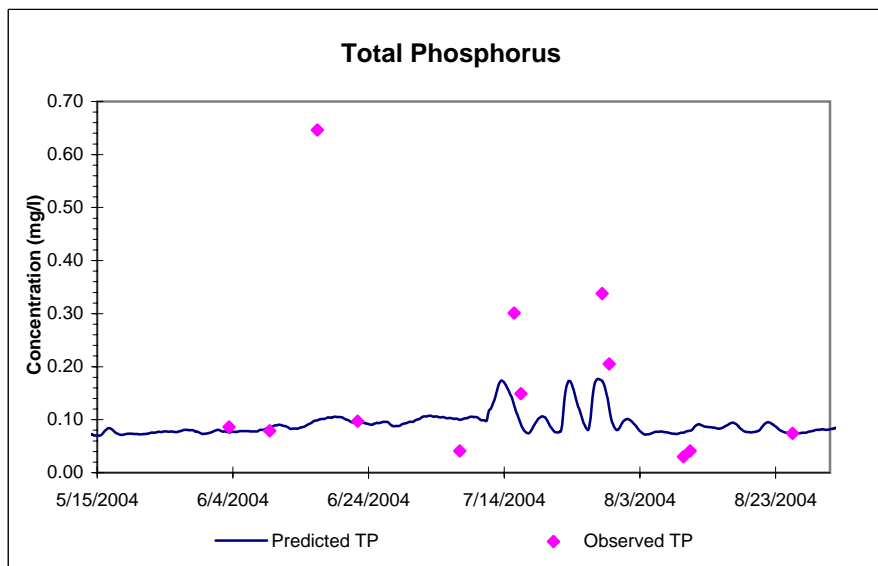
## North Branch Raritan River at Route 202 in Bridgewater (NBRR7, USGS 01400000)



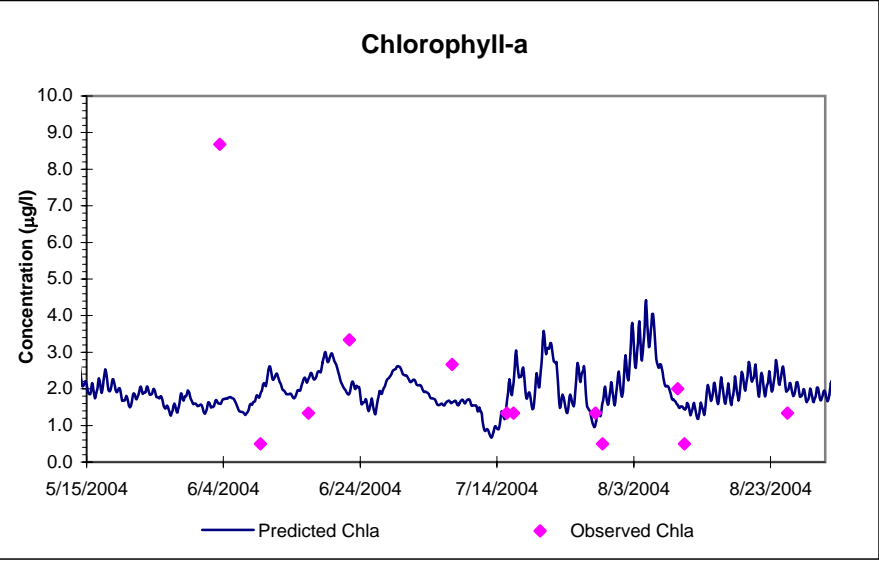
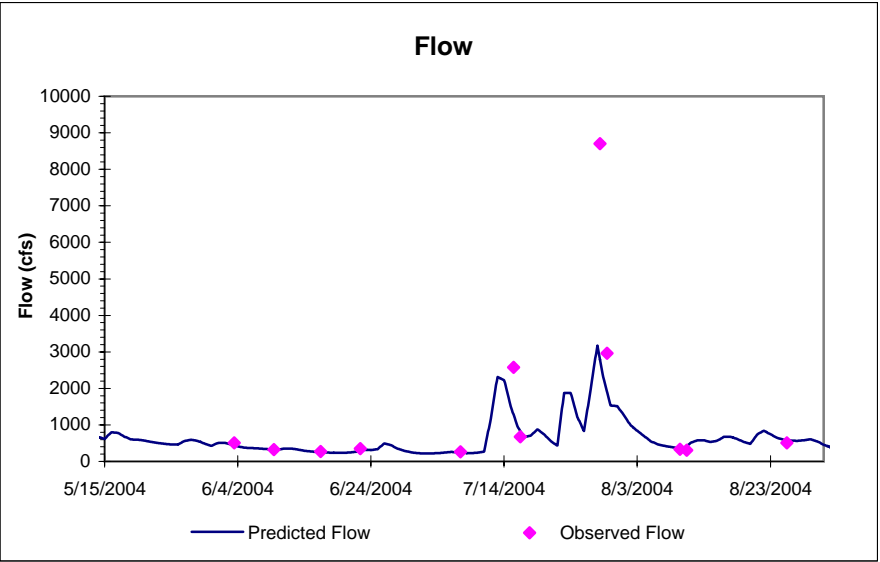
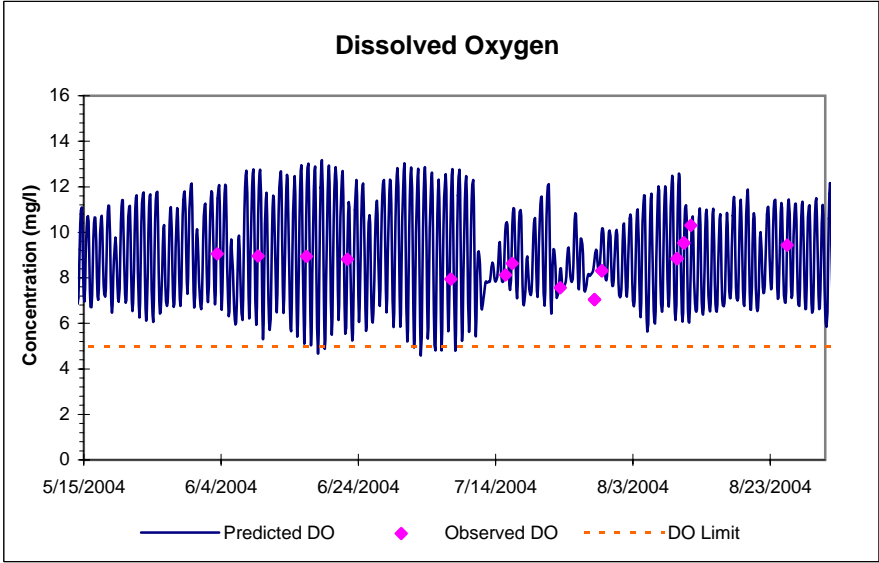
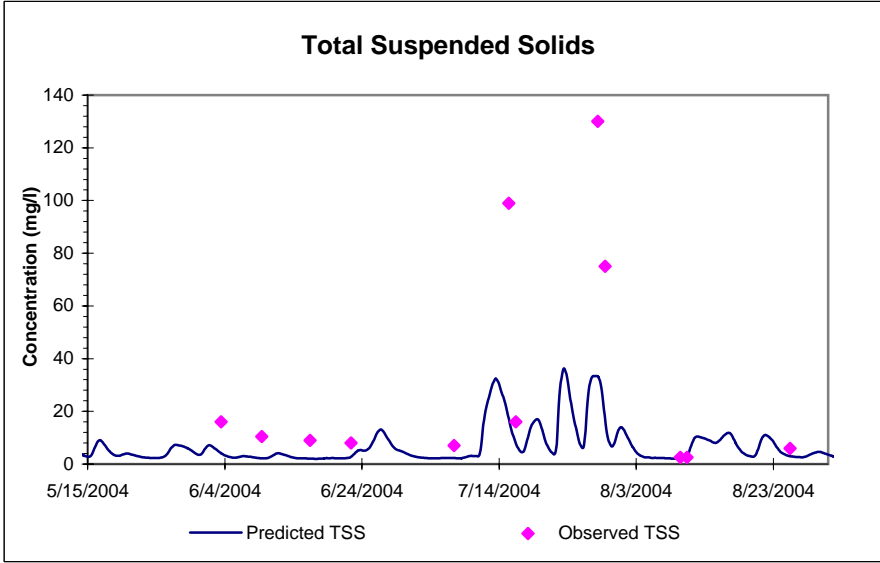
# North Branch Raritan River at Route 202 in Bridgewater (NBRR7, USGS 01400000)



## Raritan River at Main Street in Manville (RR1, USGS 01400500)

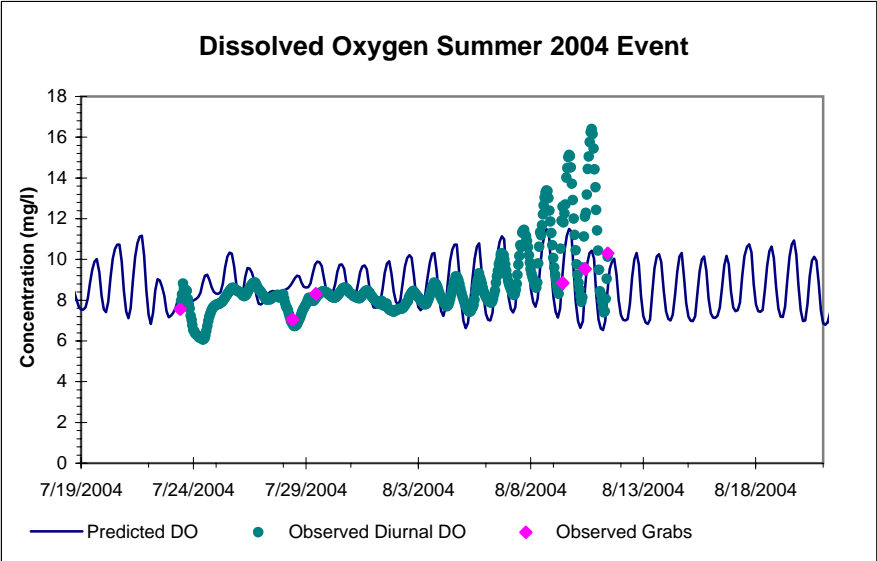


# Raritan River at Main Street in Manville (RR1, USGS 01400500)

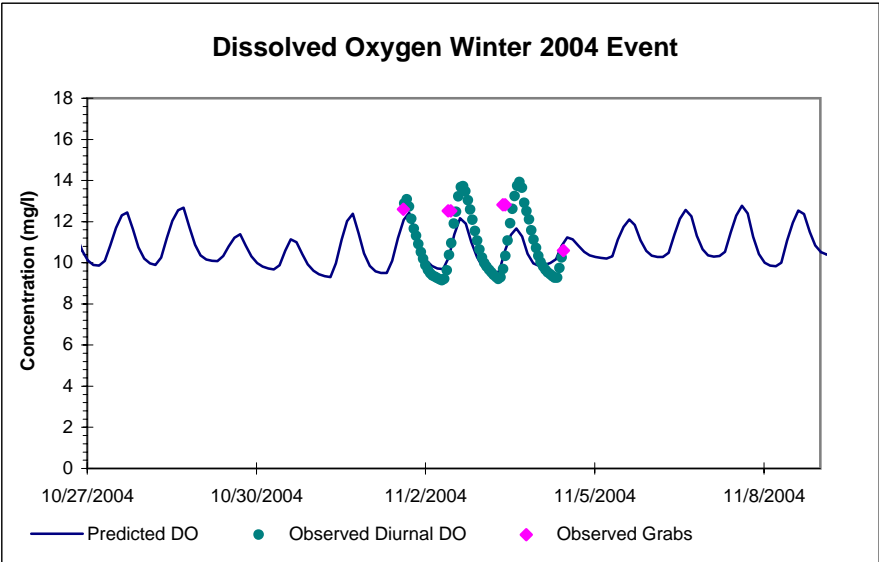




### Raritan River at Main Street in Manville (RR1, USGS 01400500)

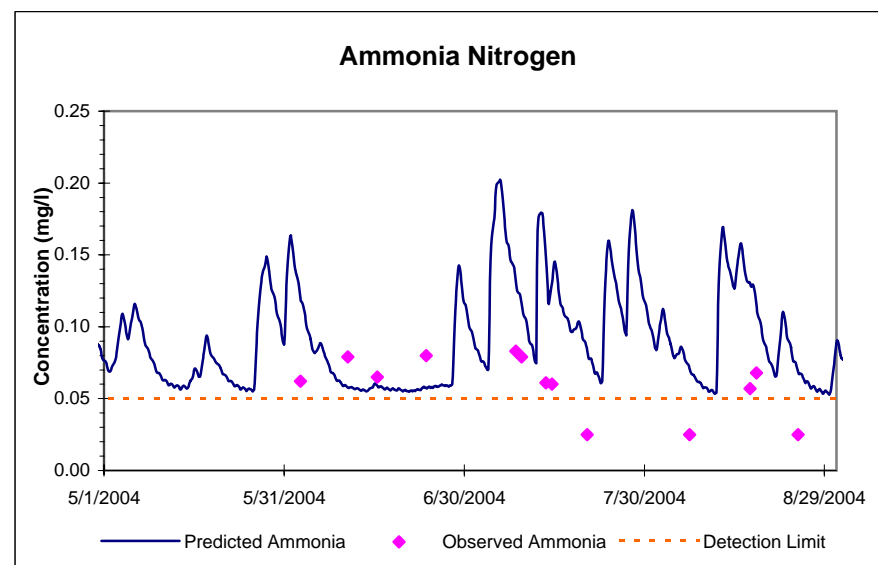
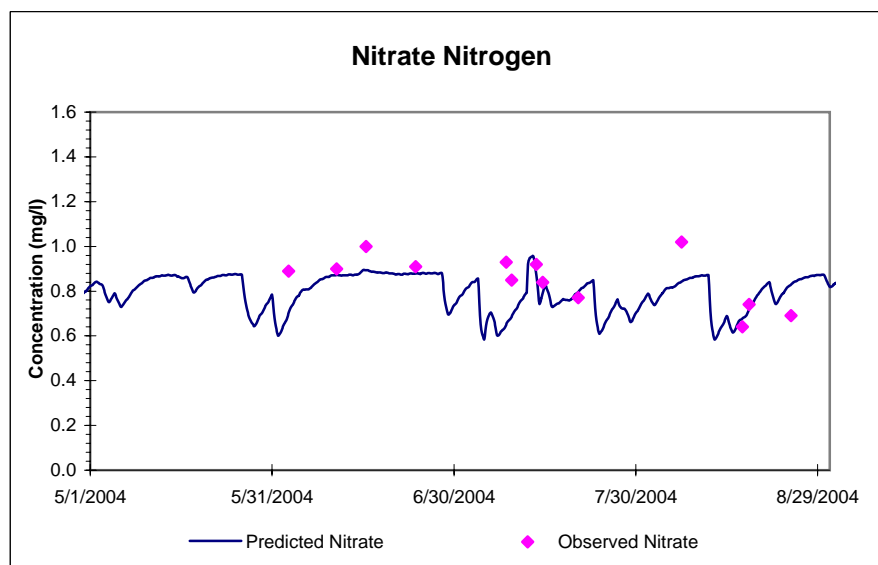
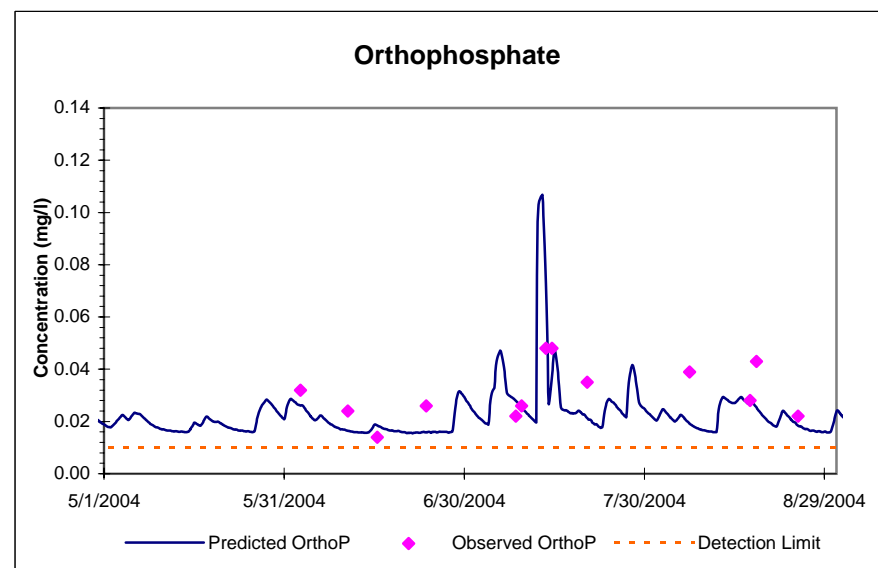
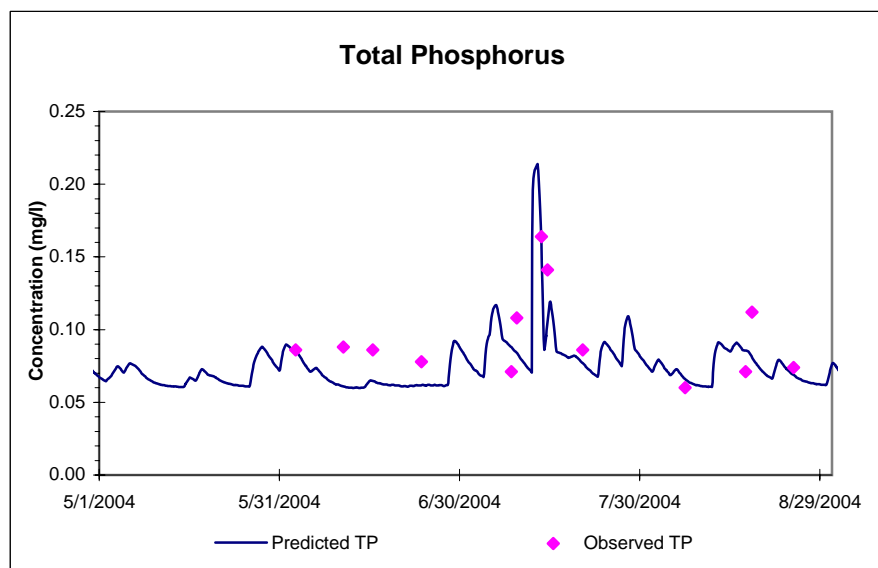


see section III.G.3 for discussion of this event

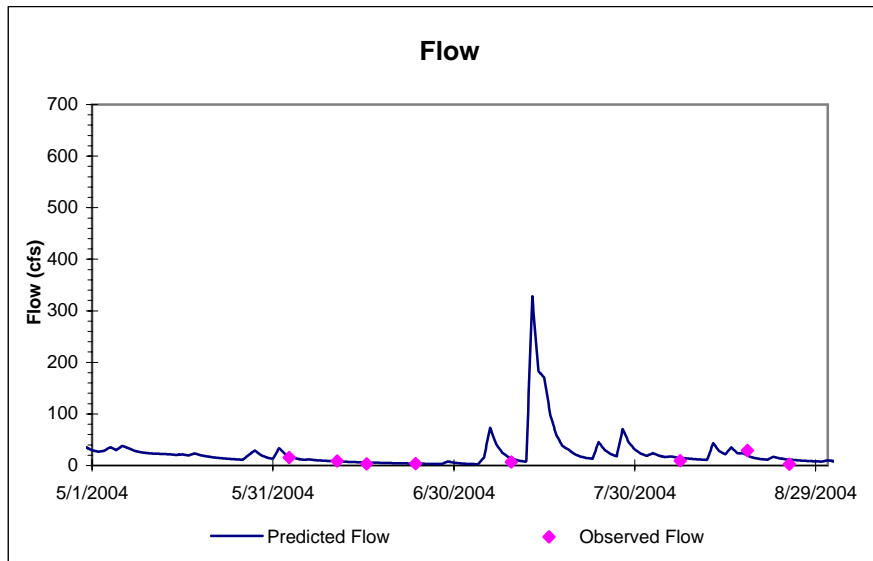
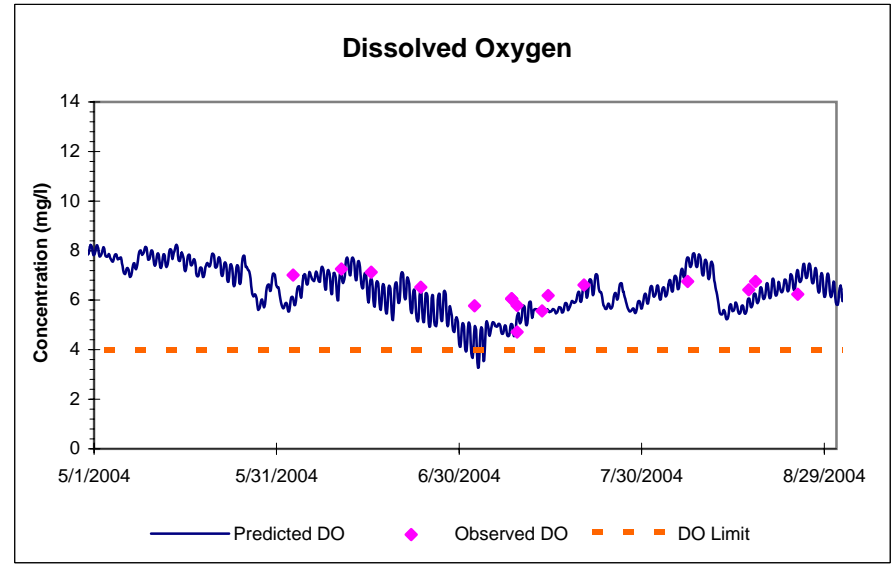
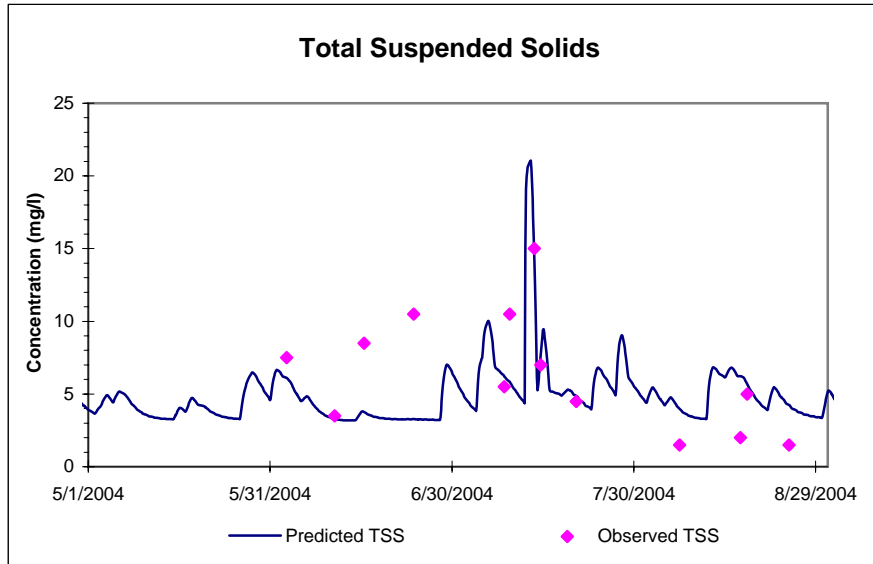


Upper Millstone River Watershed Area Model  
Water Quality Model Calibration Graphs

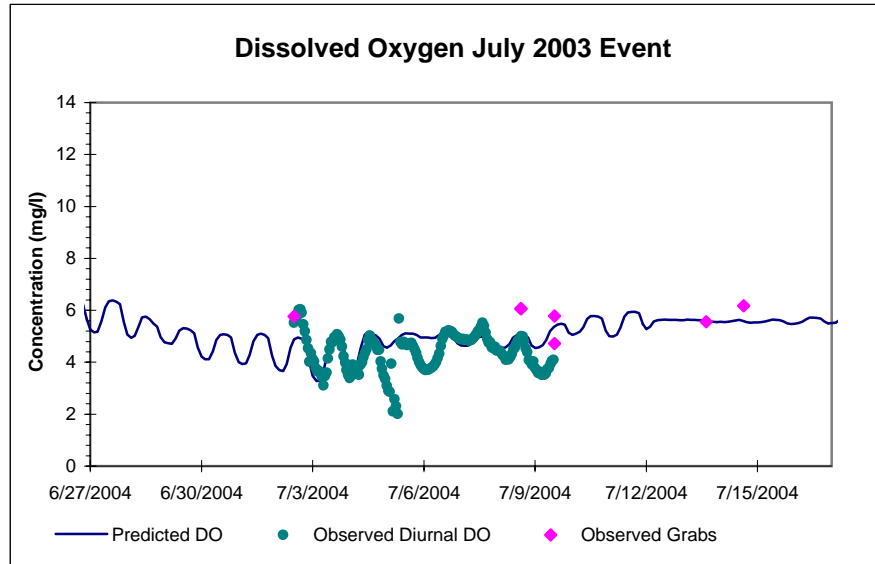
## Upper Millstone River at Old Cranbury Rd. in Millstone (UMR1)



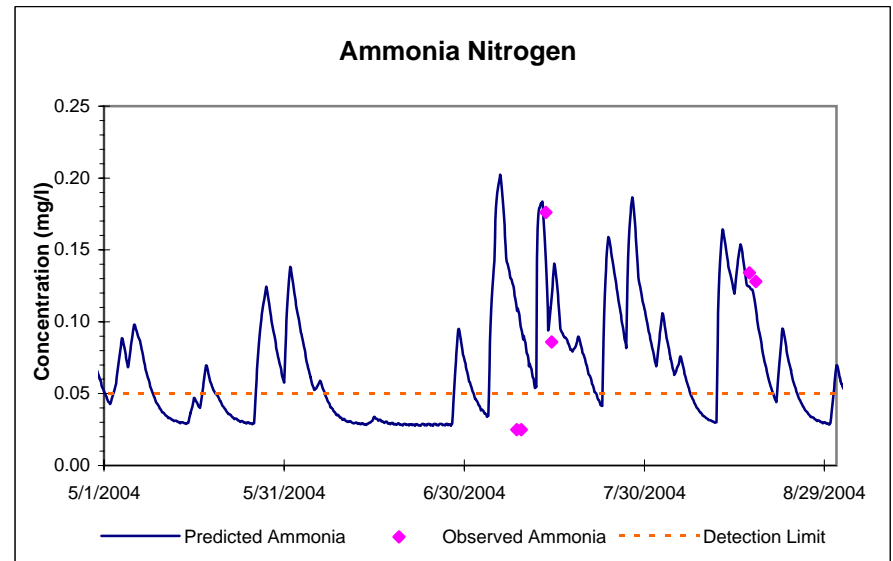
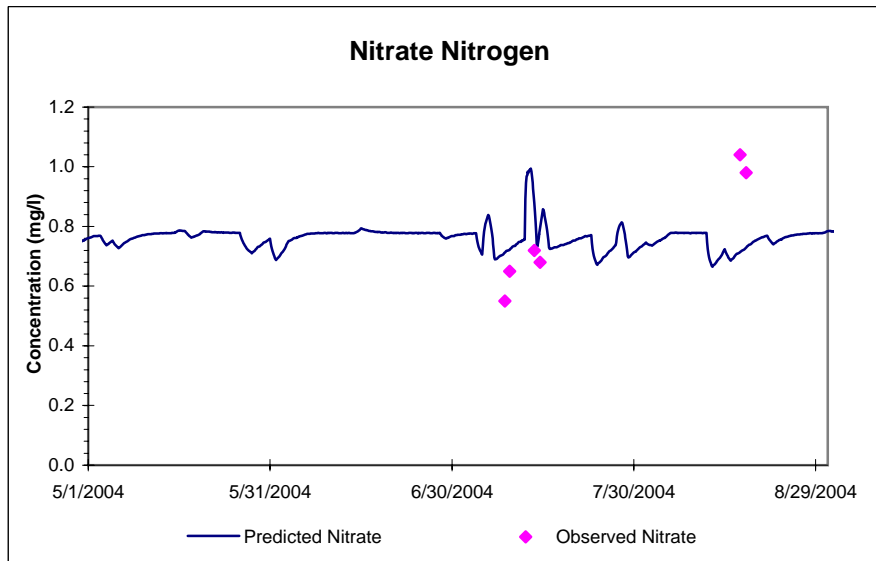
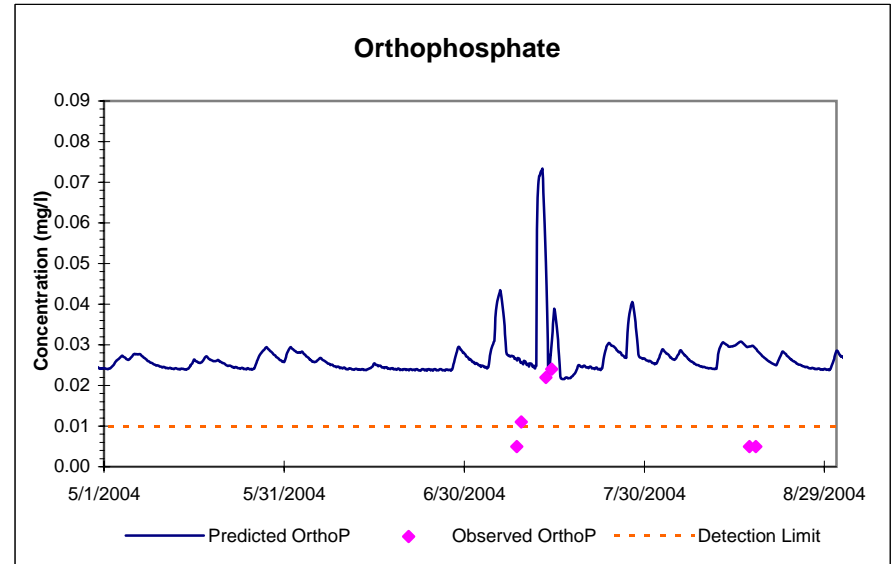
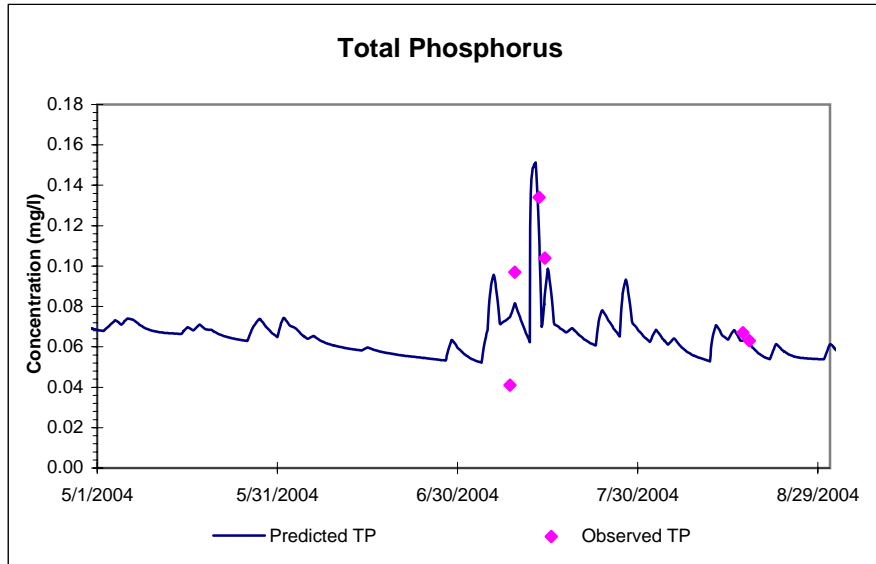
## Upper Millstone River at Old Cranbury Rd. in Millstone (UMR1)



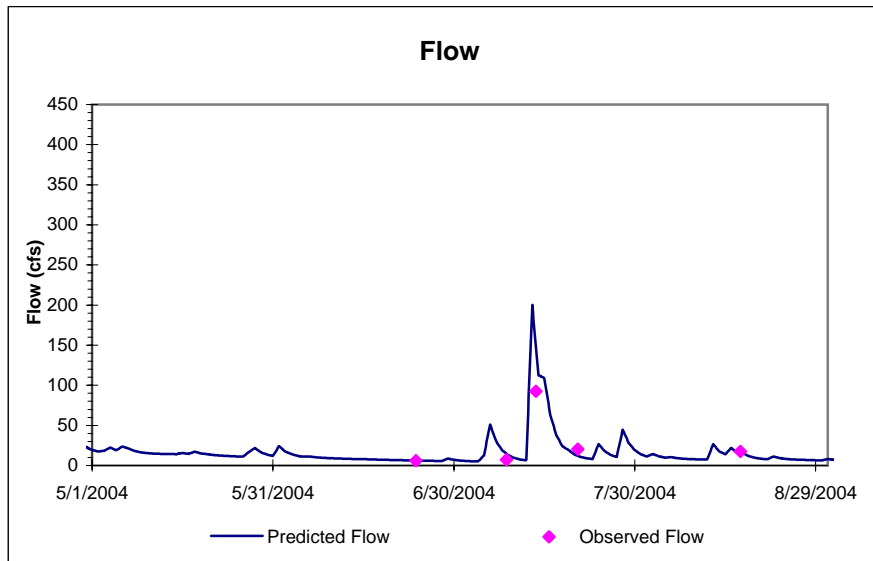
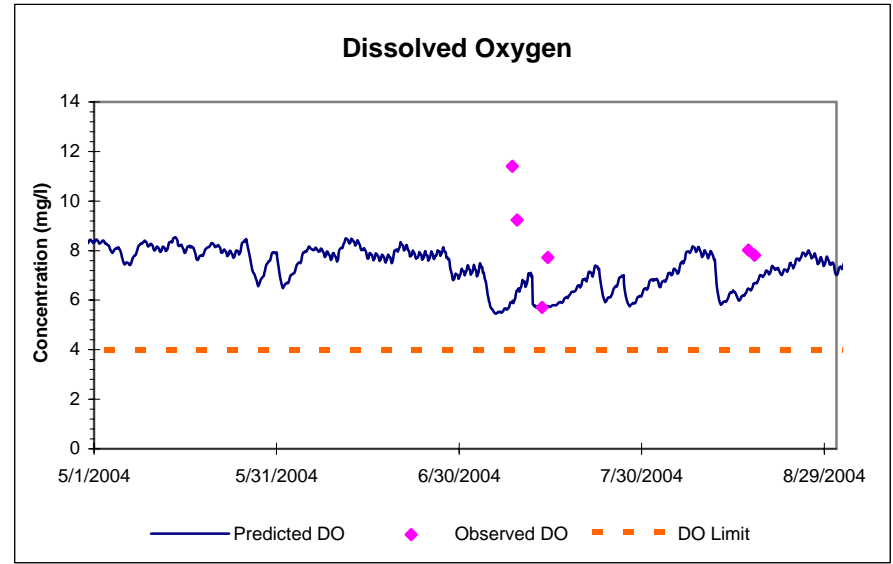
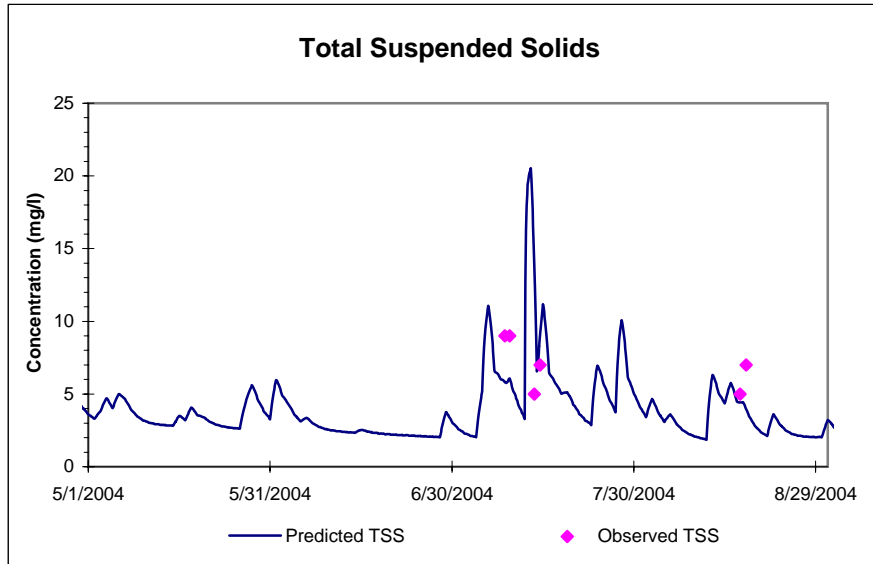
## Upper Millstone River at Old Cranbury Rd. in Millstone (UMR1)



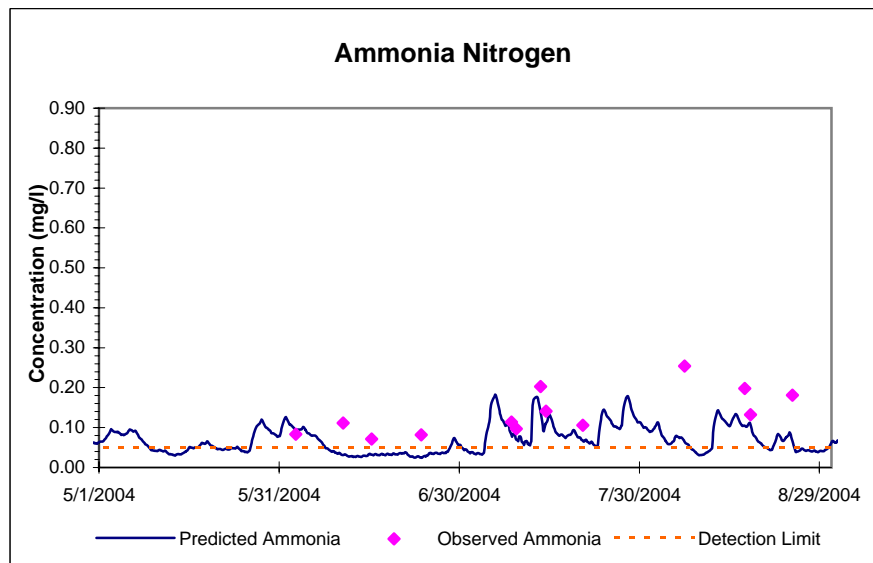
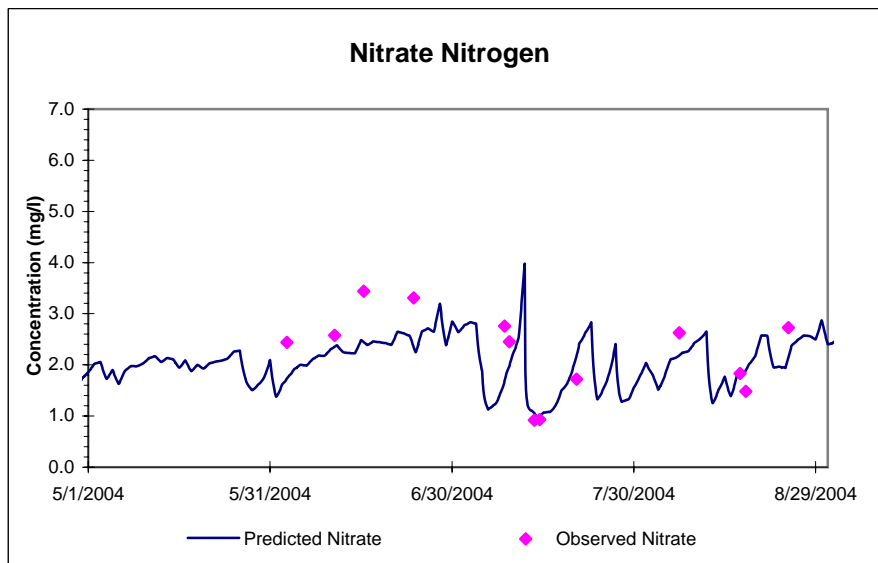
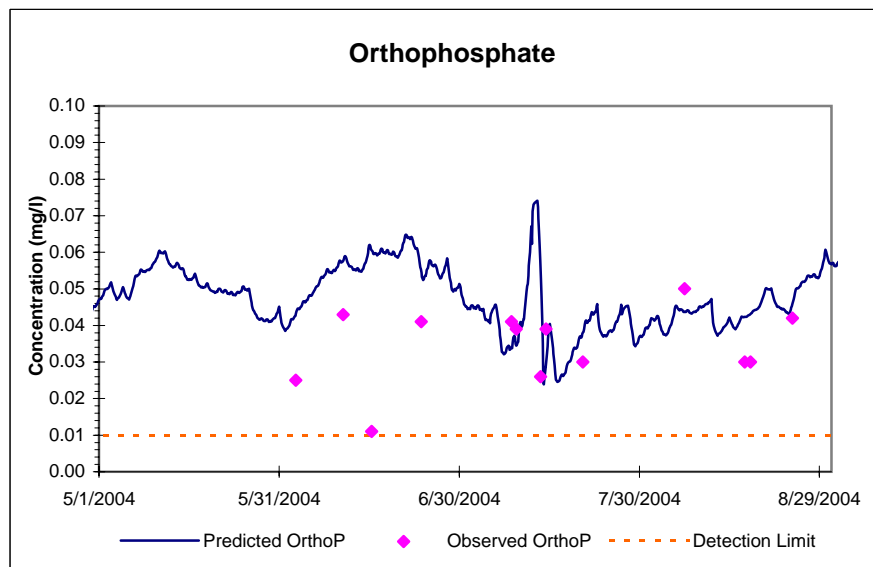
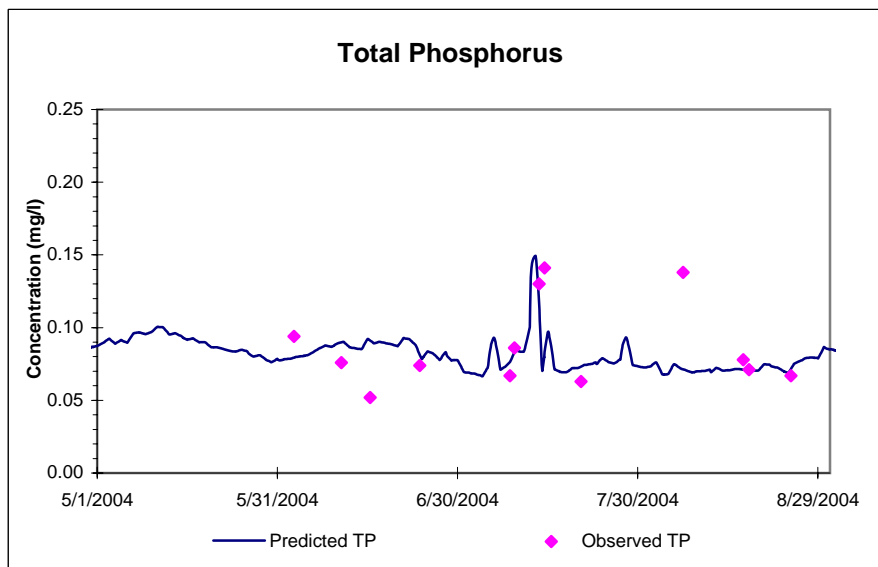
## Rocky Brook at Peddie Lake Outlet in Hightstown (RB3)



## Rocky Brook at Peddie Lake Outlet in Hightstown (RB3)

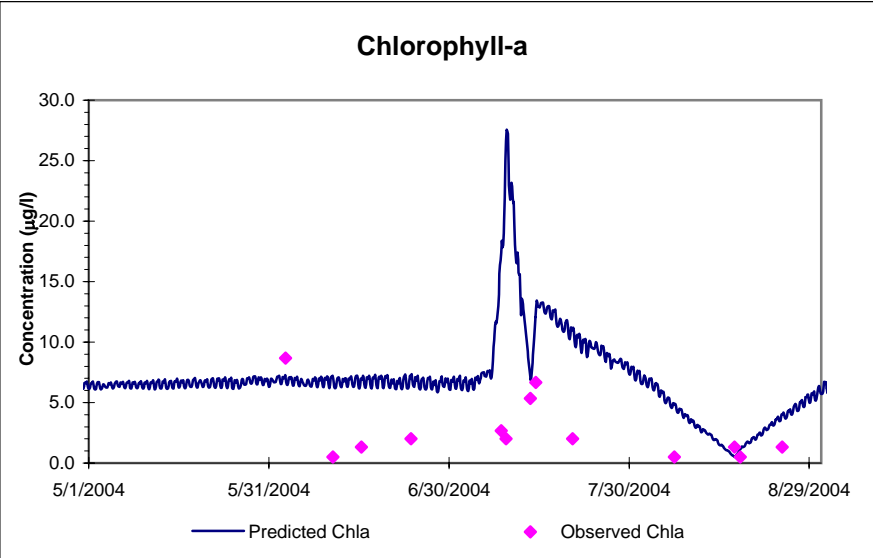
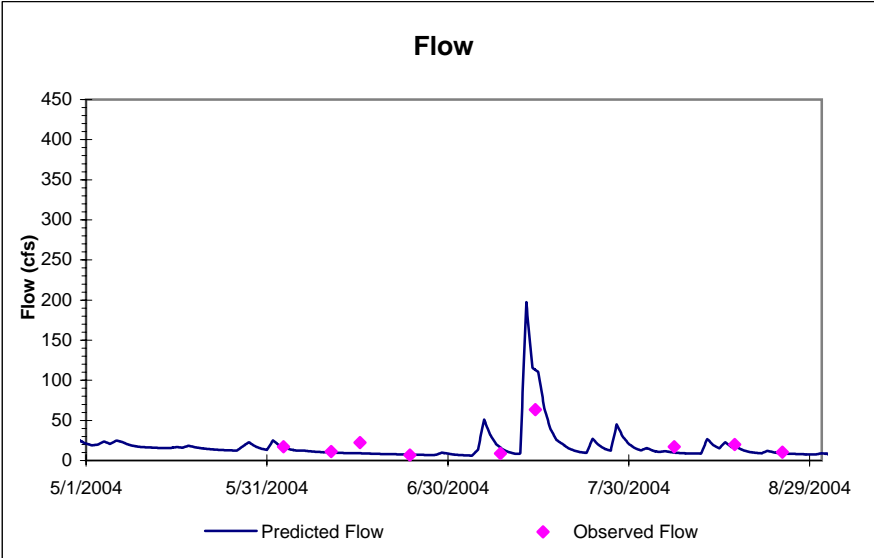
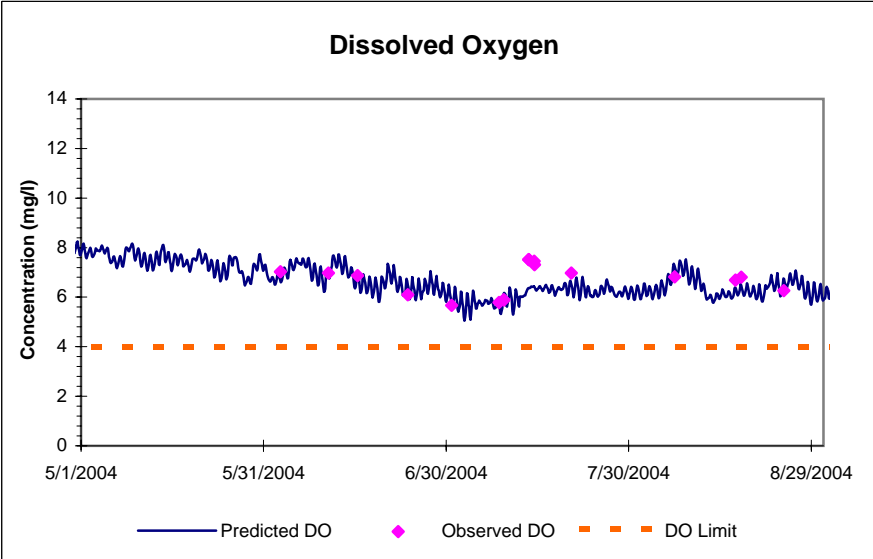
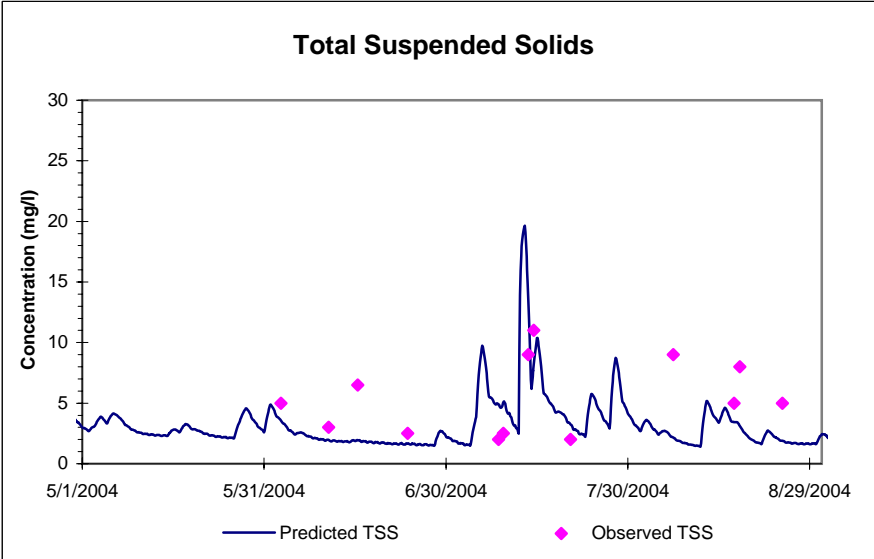


## Rocky Brook at Route 130 in East Windsor (RB4)

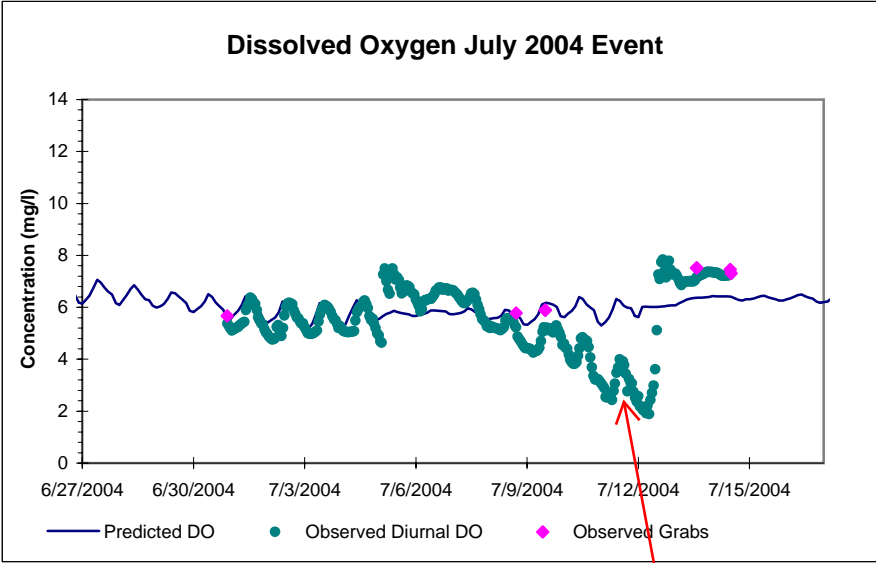




# Rocky Brook at Route 130 in East Windsor (RB4)

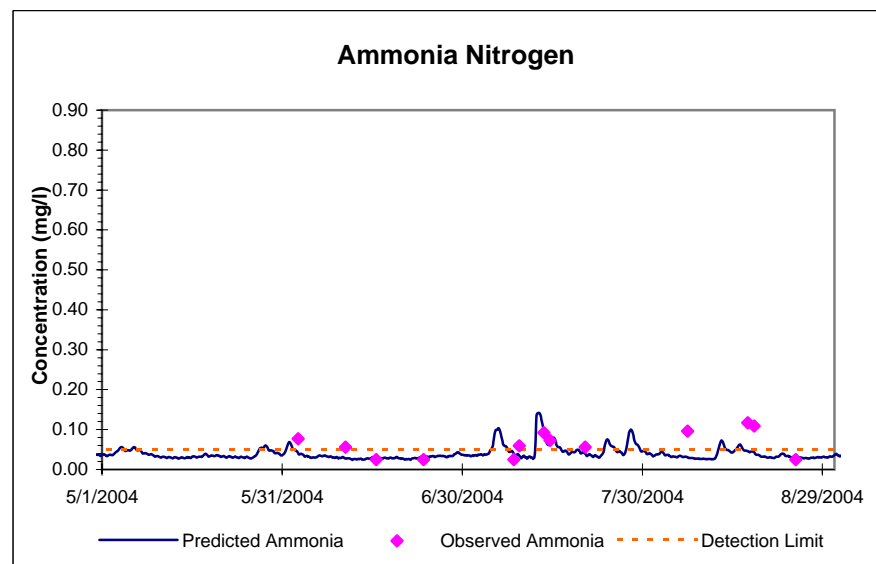
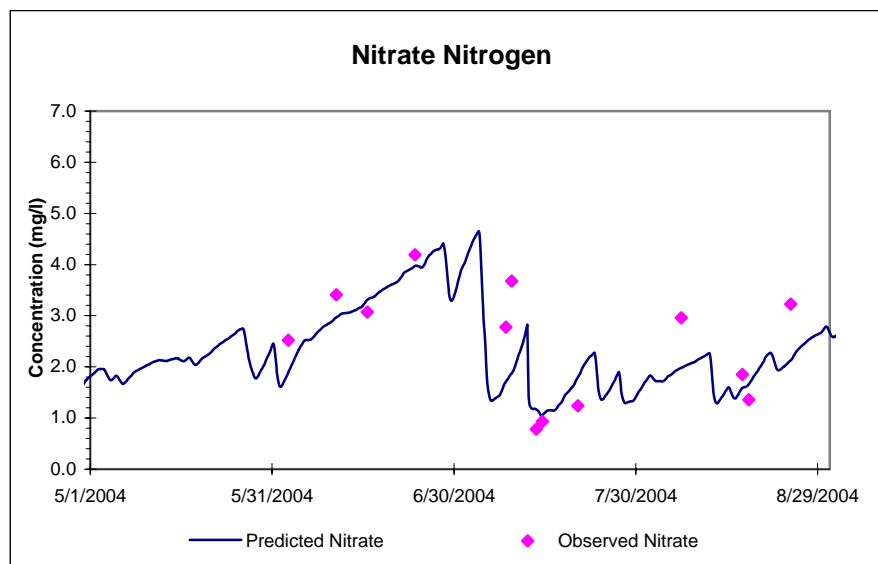
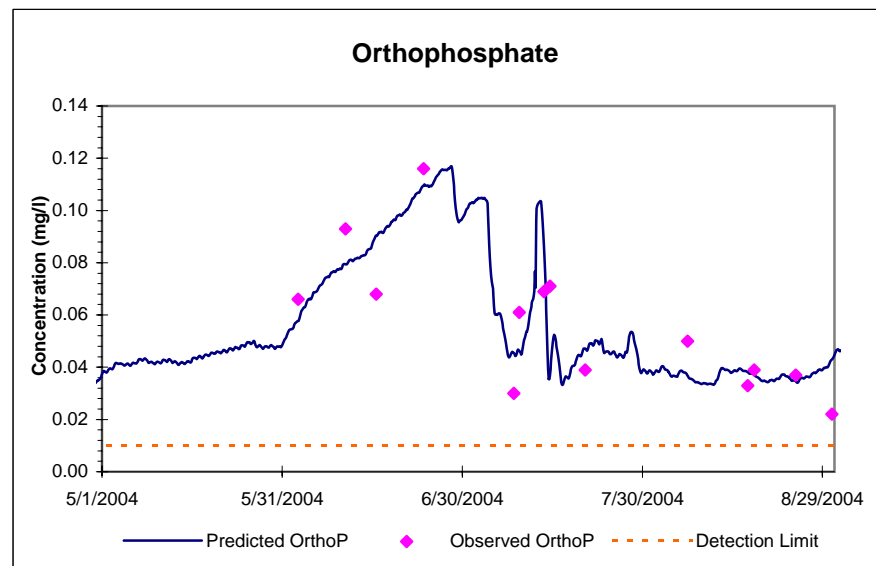
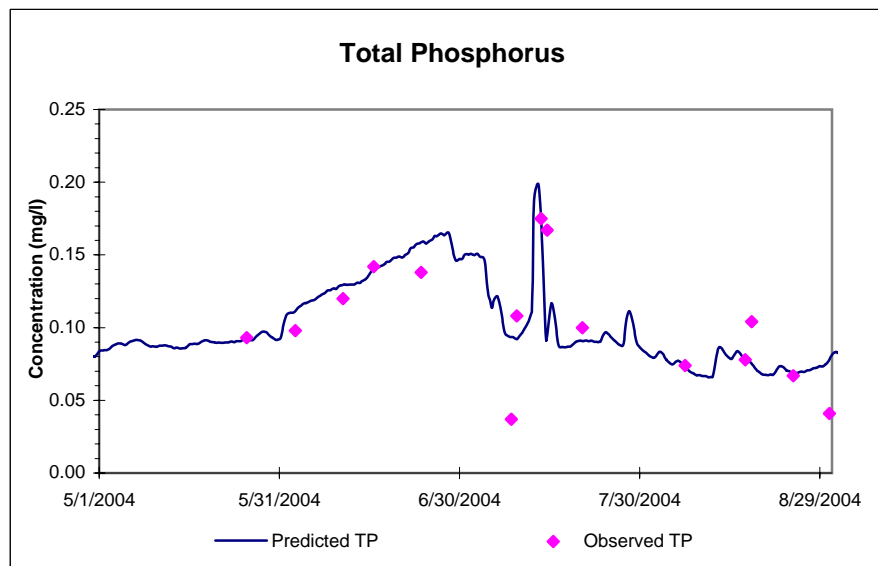


# Rocky Brook at Route 130 in East Windsor (RB4)

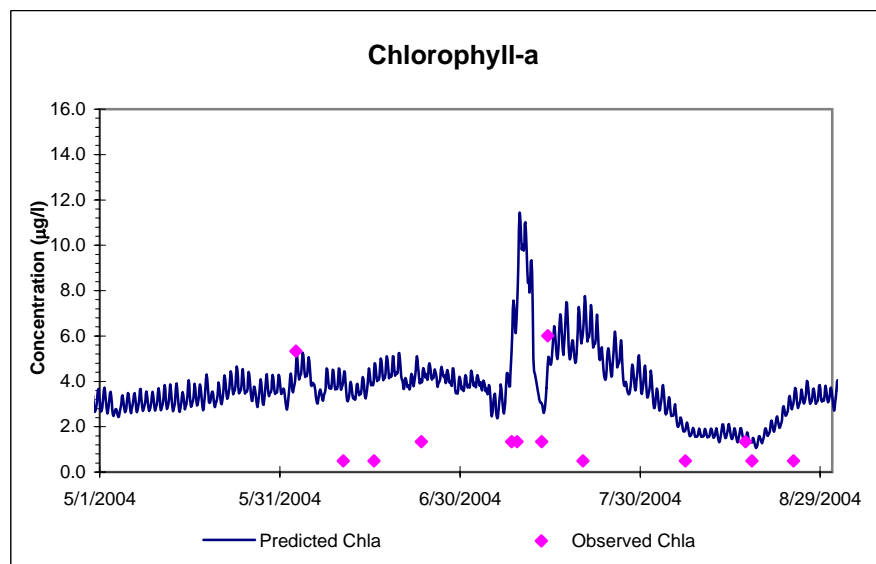
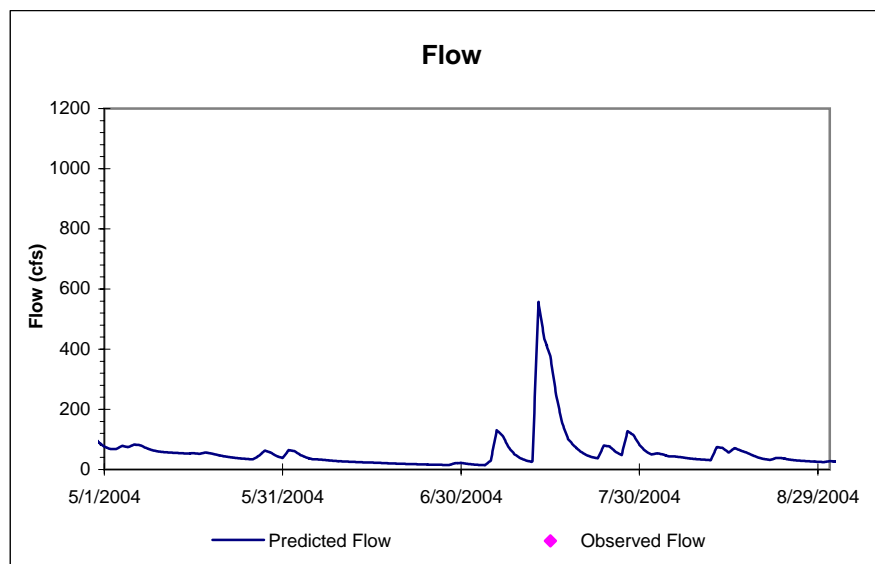
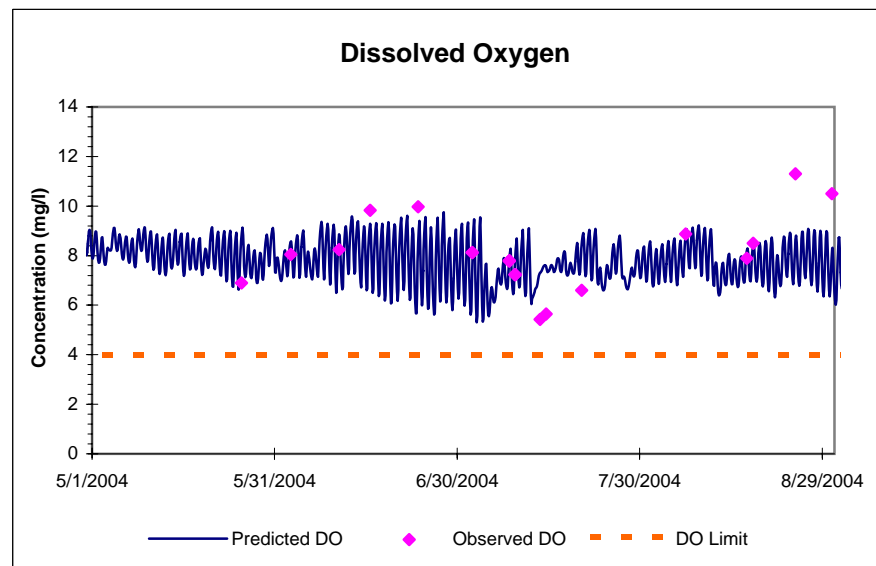
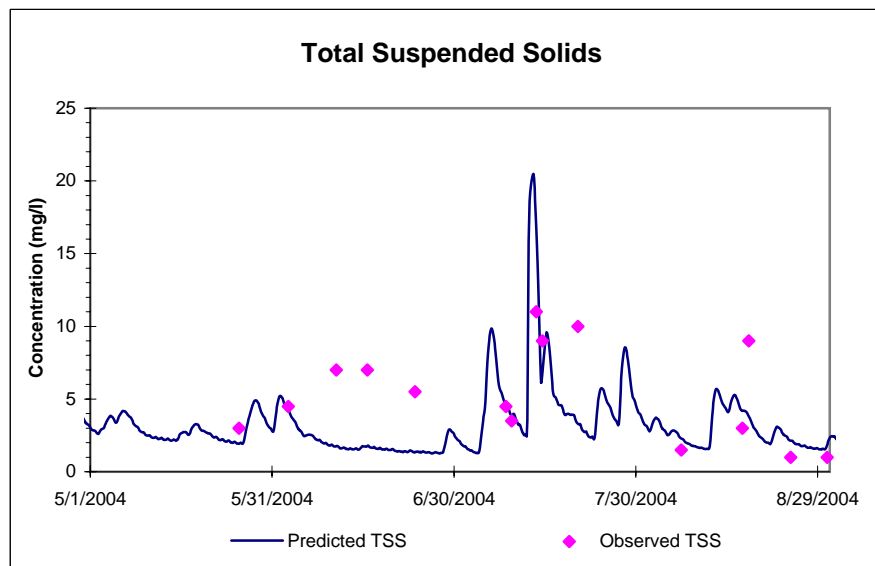


sensor impacted by fouling

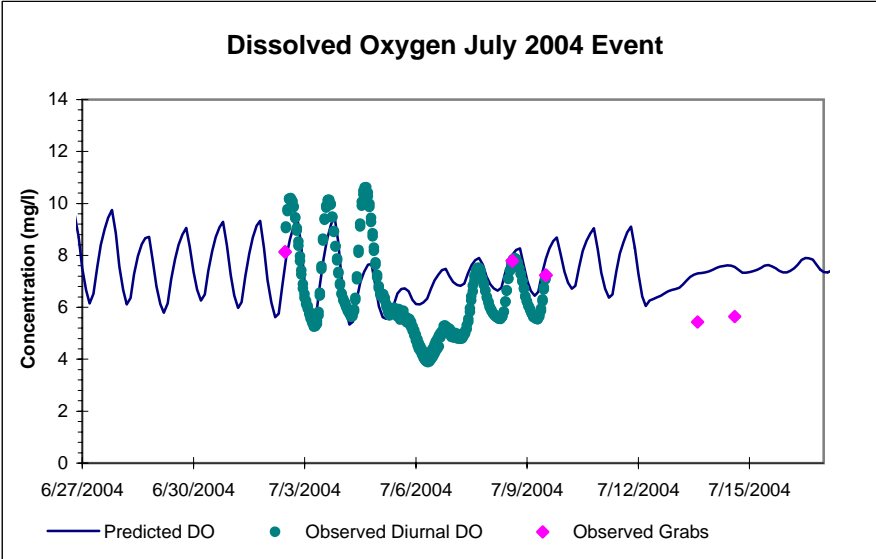
## Upper Millstone River at Cranbury Neck Rd. in Plainsboro (UMR2)



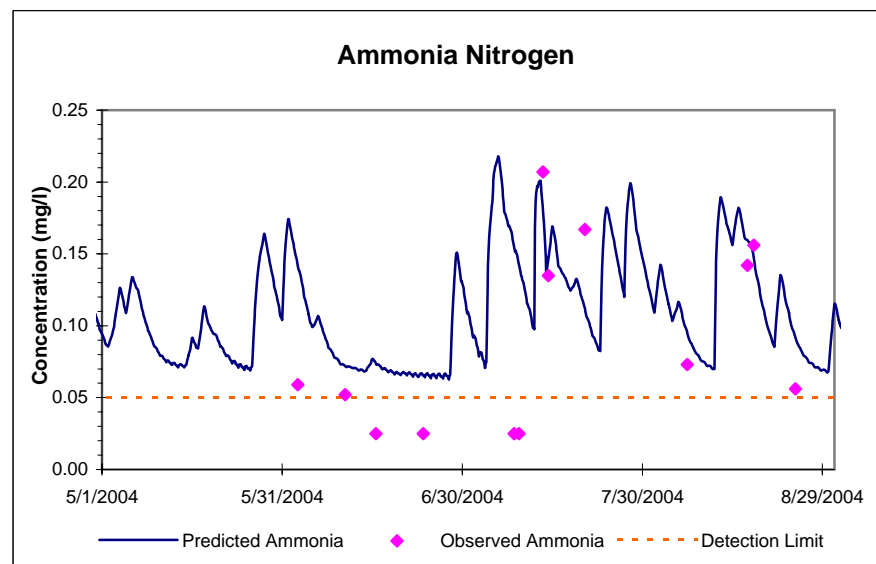
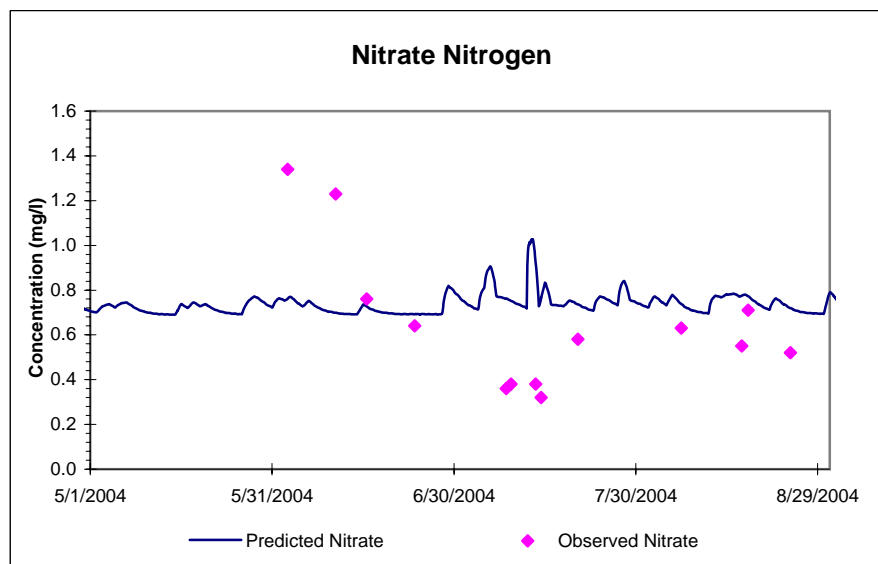
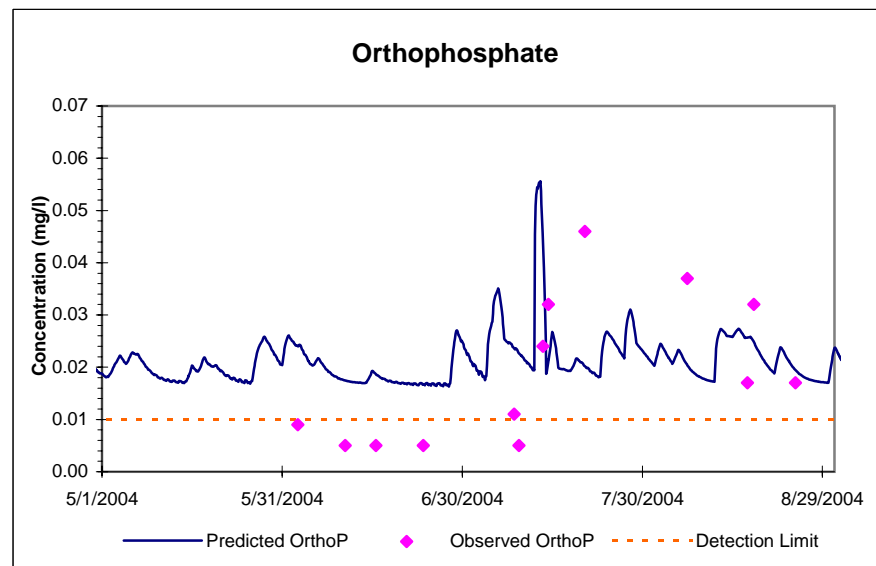
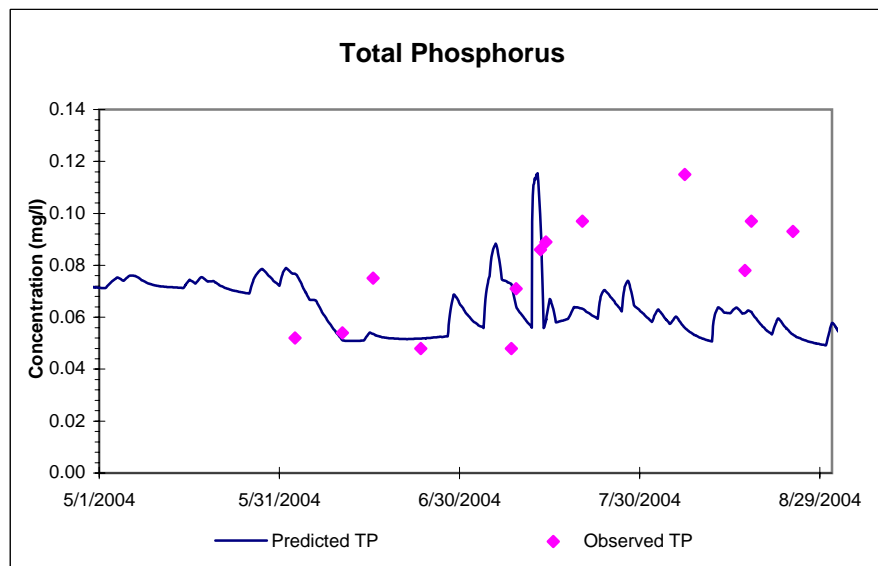
## Upper Millstone River at Cranbury Neck Rd. in Plainsboro (UMR2)



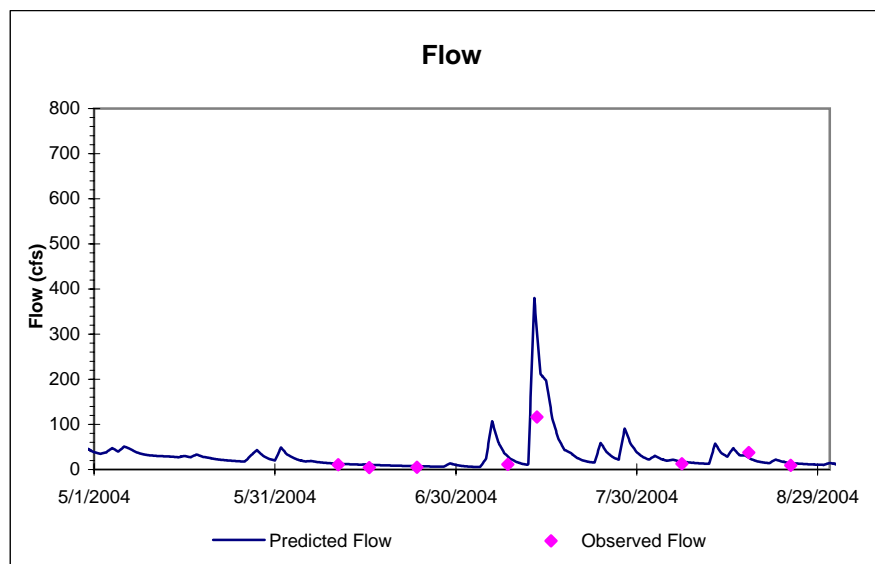
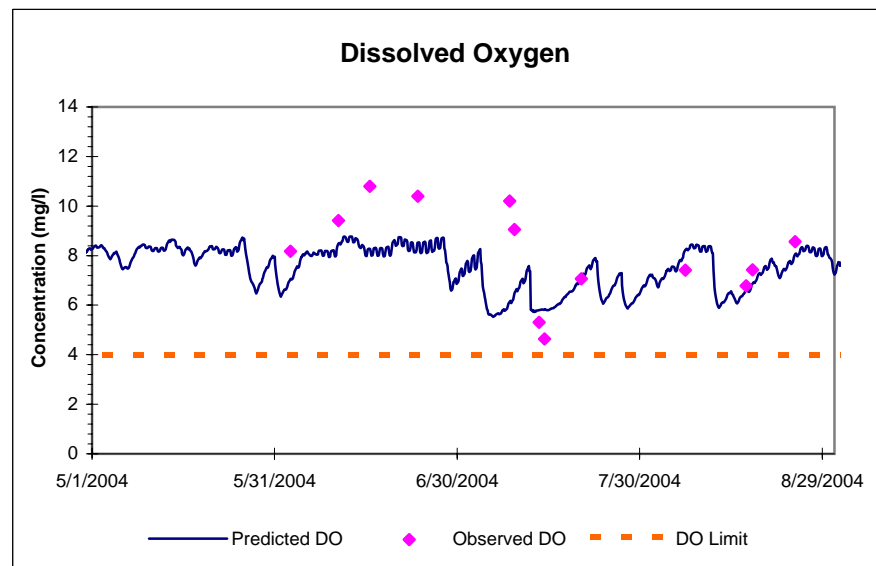
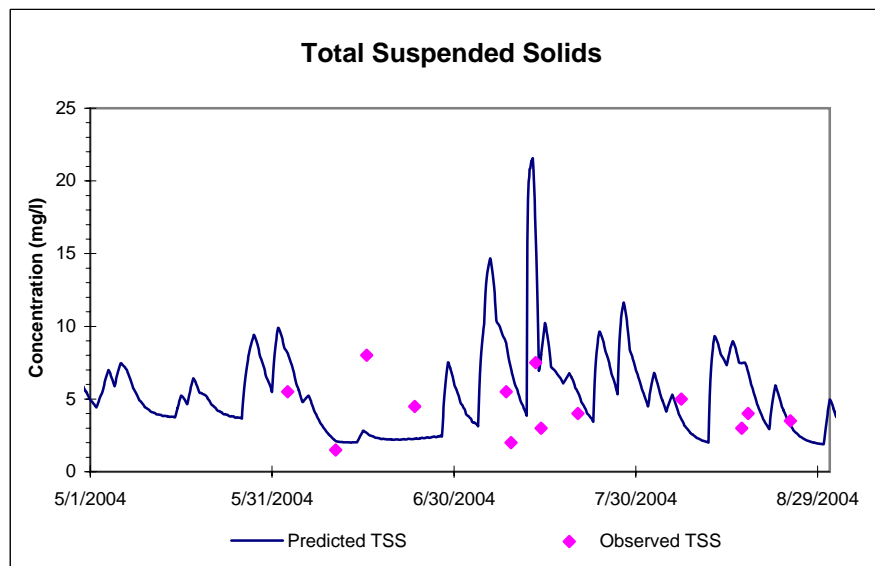
# Upper Millstone River at Cranbury Neck Rd. in Plainsboro (UMR2)



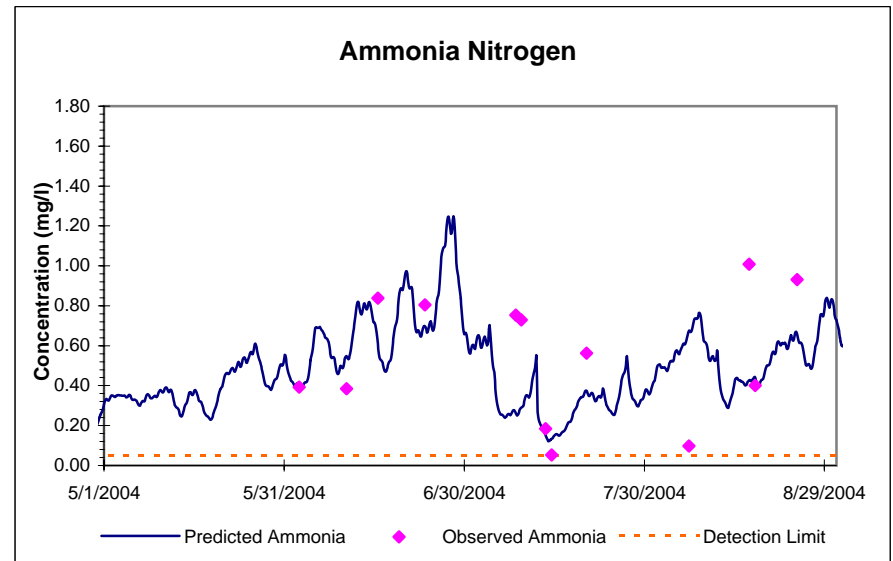
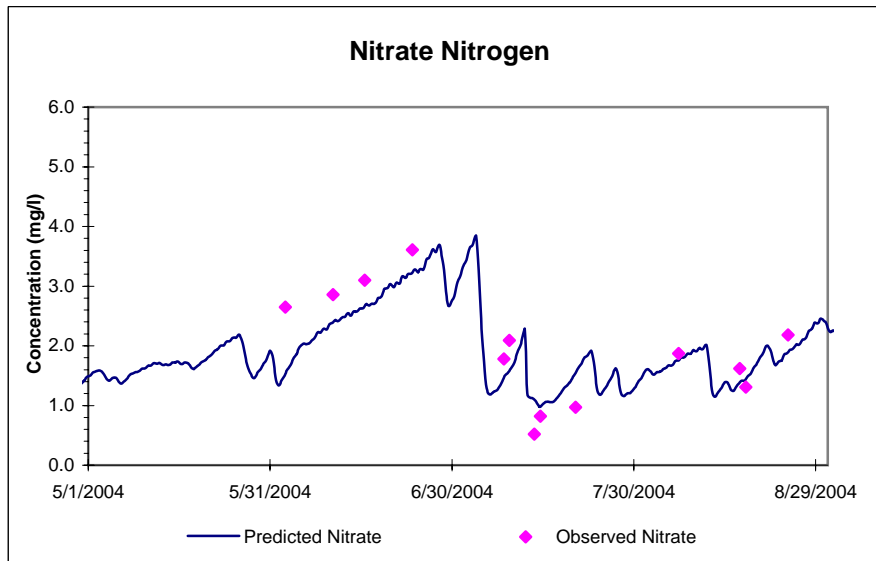
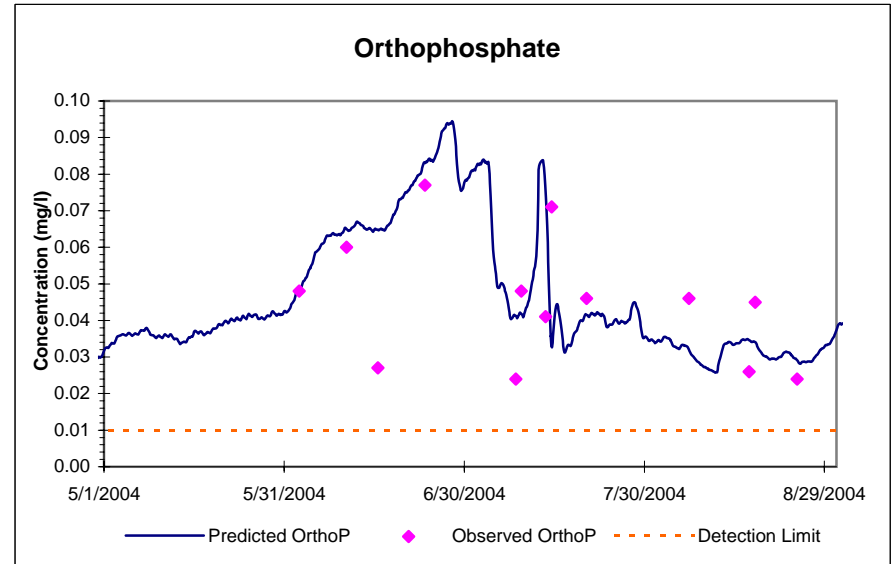
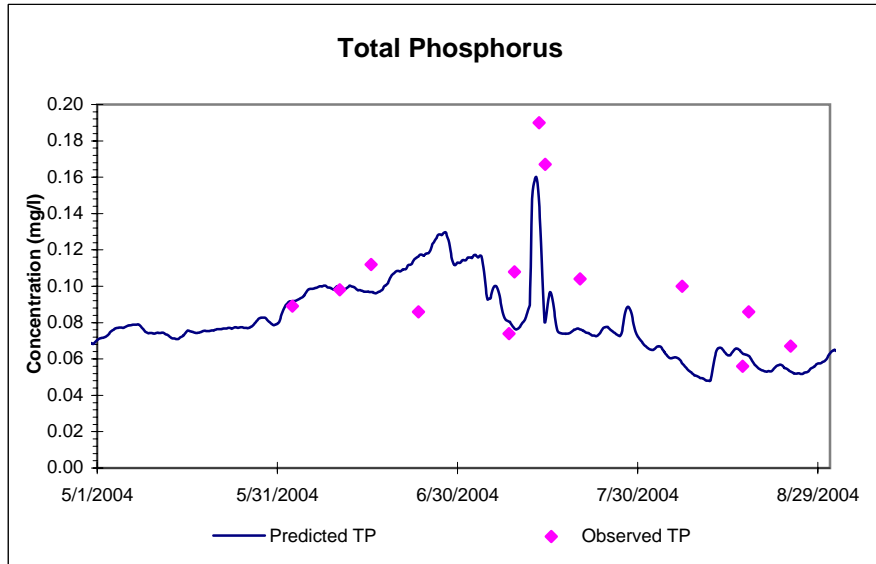
## Cranbury Brook at Plainsboro Pond Outlet (CB3)



## Cranbury Brook at Plainsboro Pond Outlet (CB3)

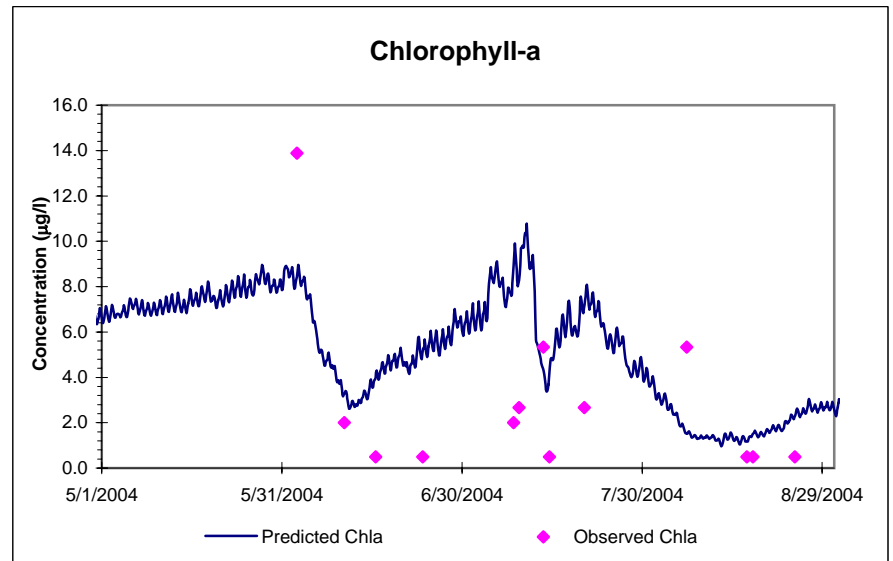
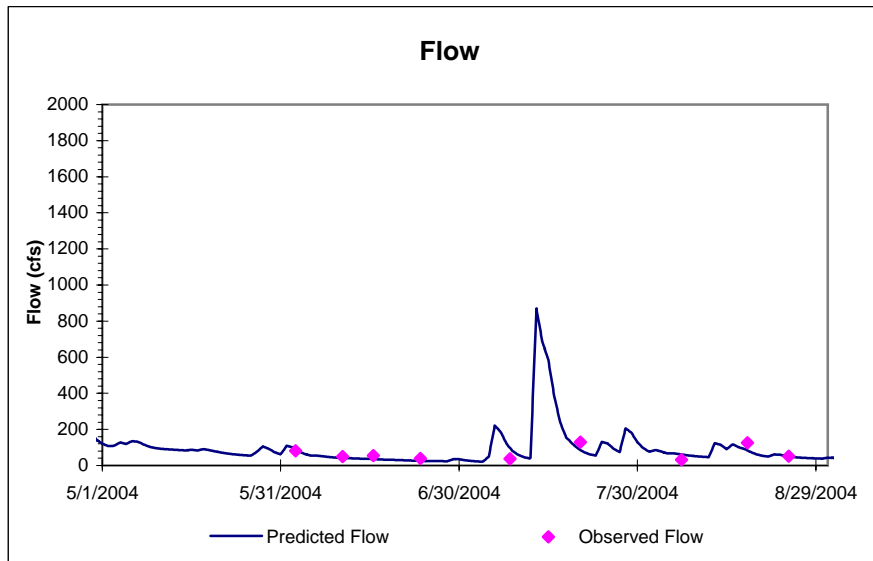
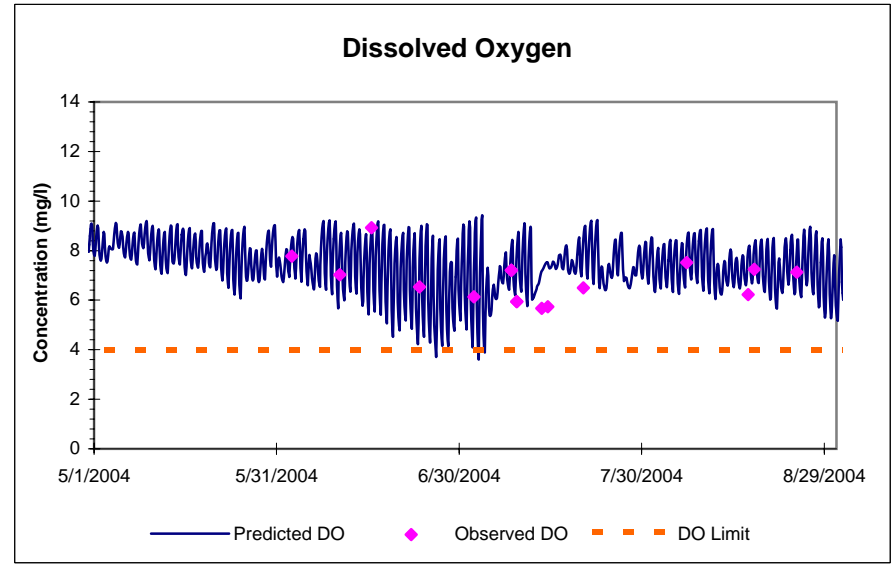
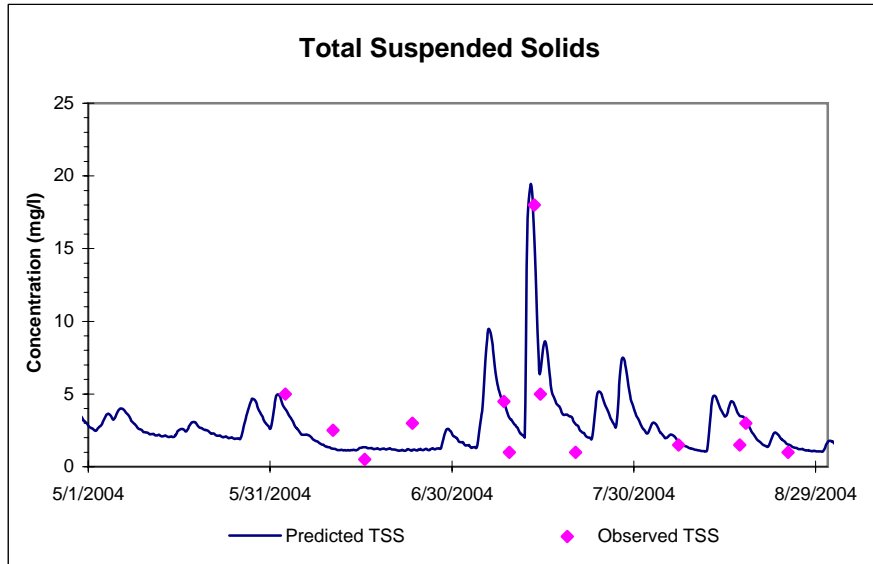


# Upper Millstone River Downstream of Railroad Crossing near Princeton Junction (UMR3)

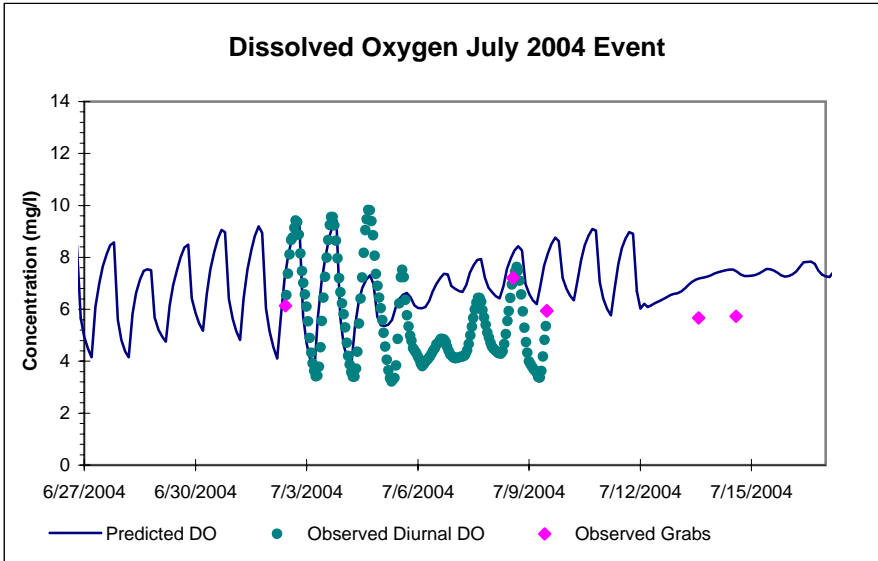




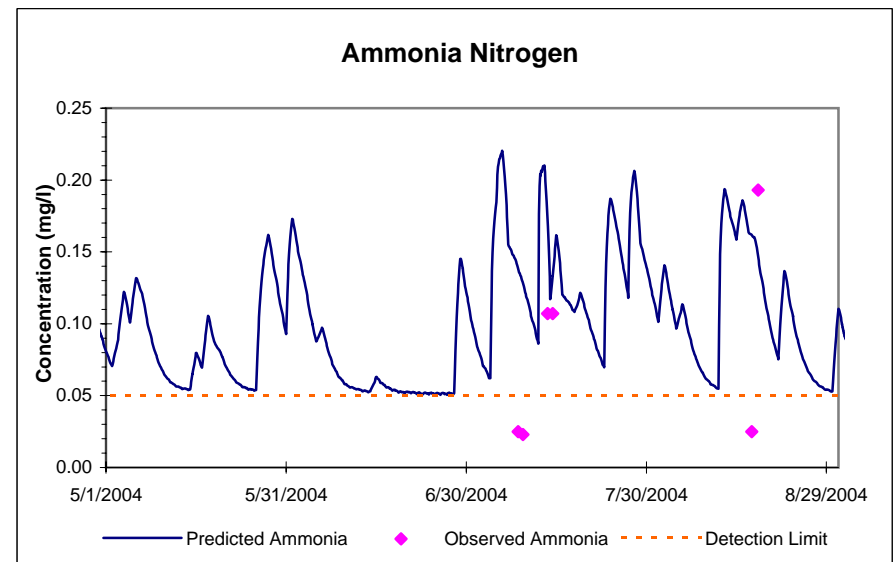
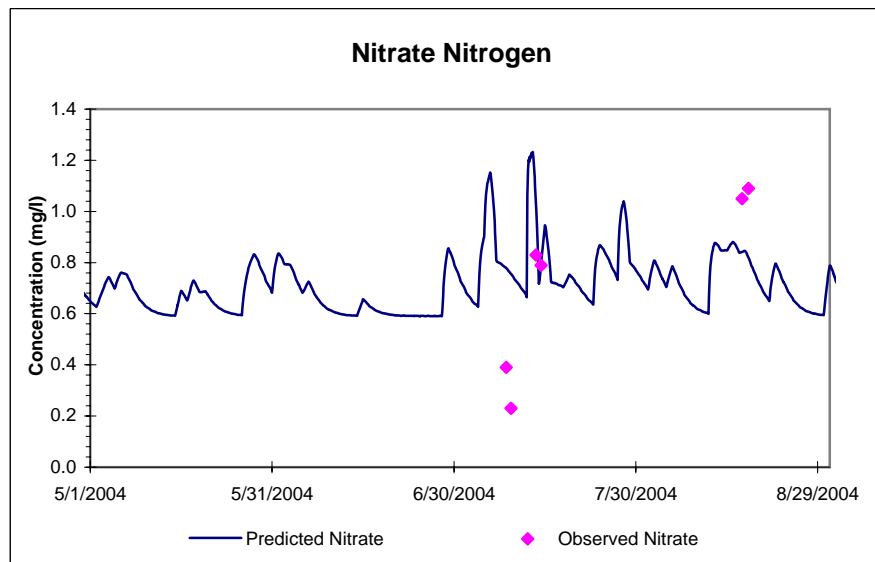
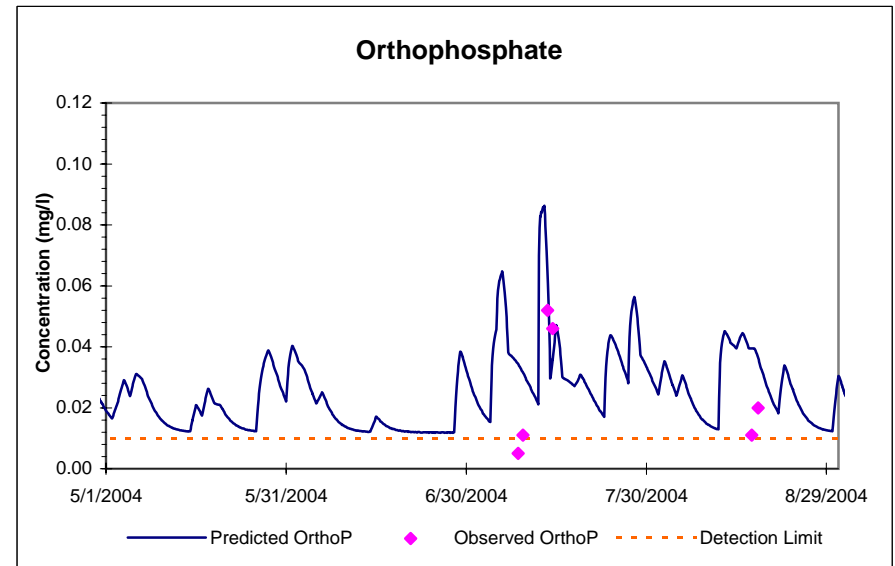
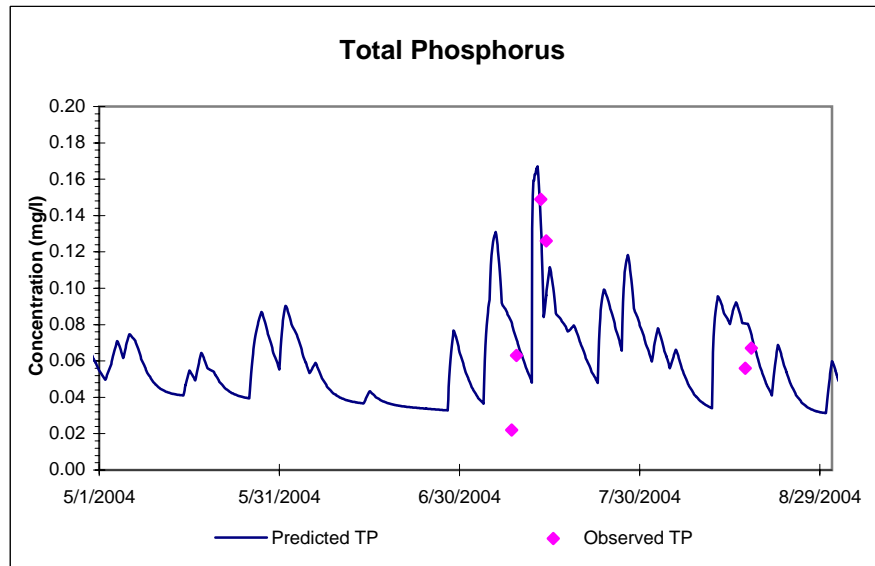
## Upper Millstone River Downstream of Railroad Crossing near Princeton Junction (UMR3)



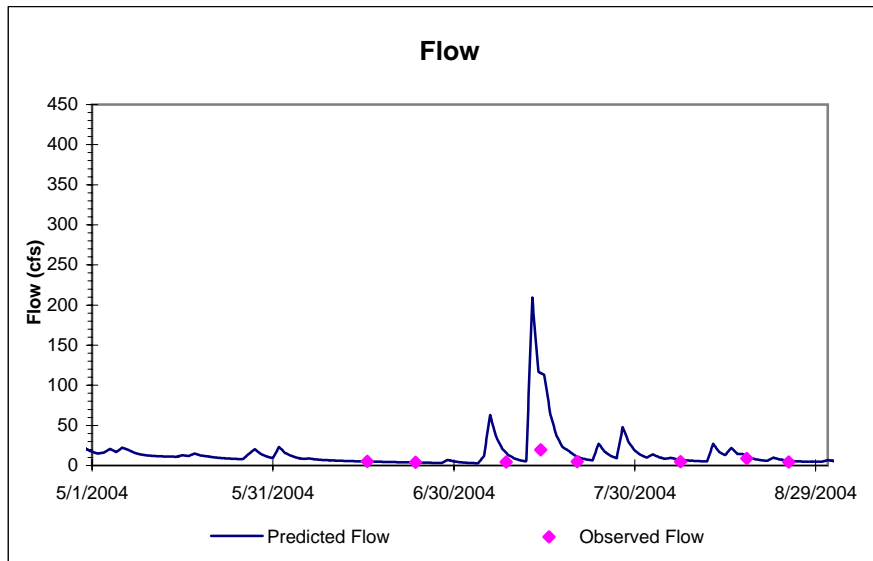
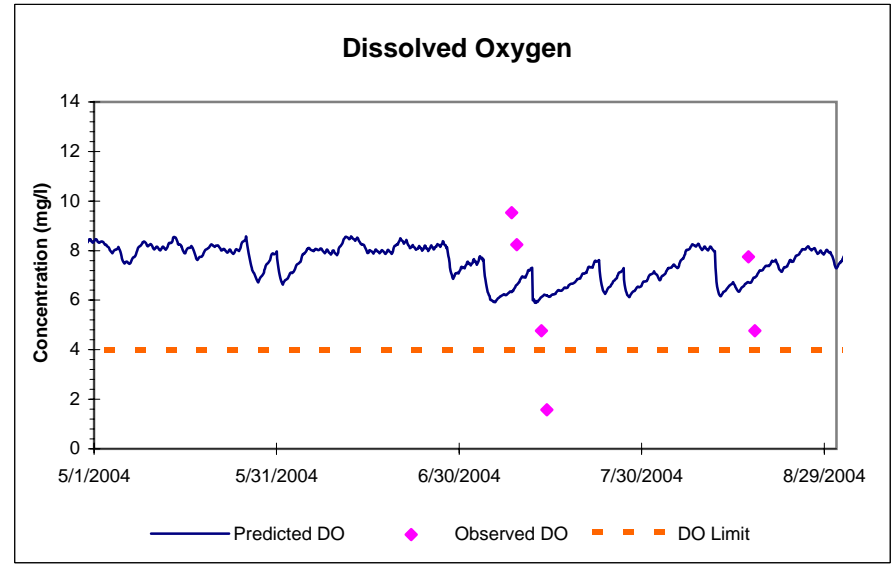
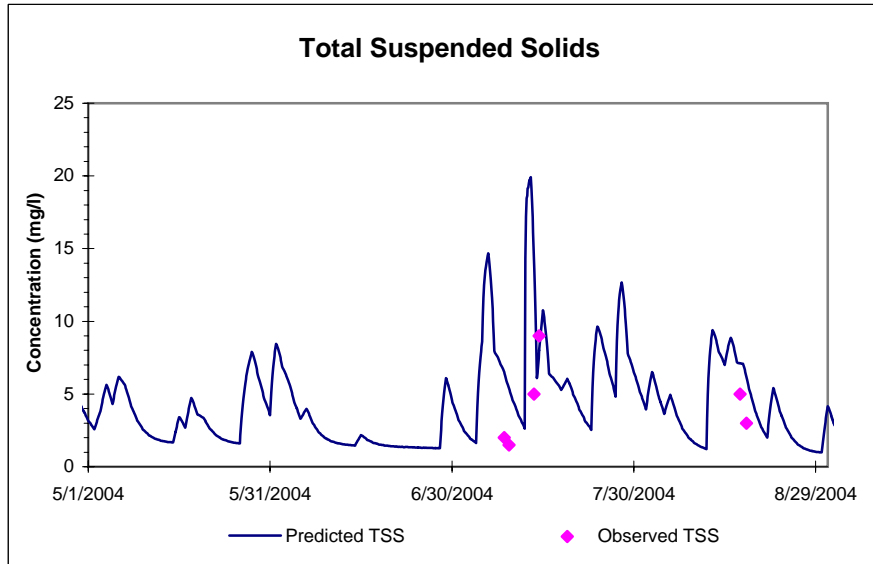
# Upper Millstone River Downstream of Railroad Crossing near Princeton Junction (UMR3)



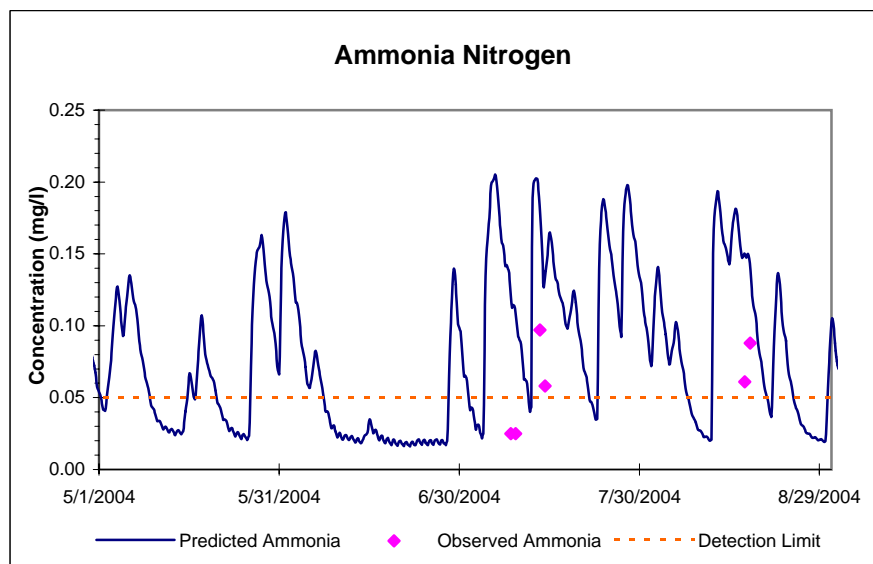
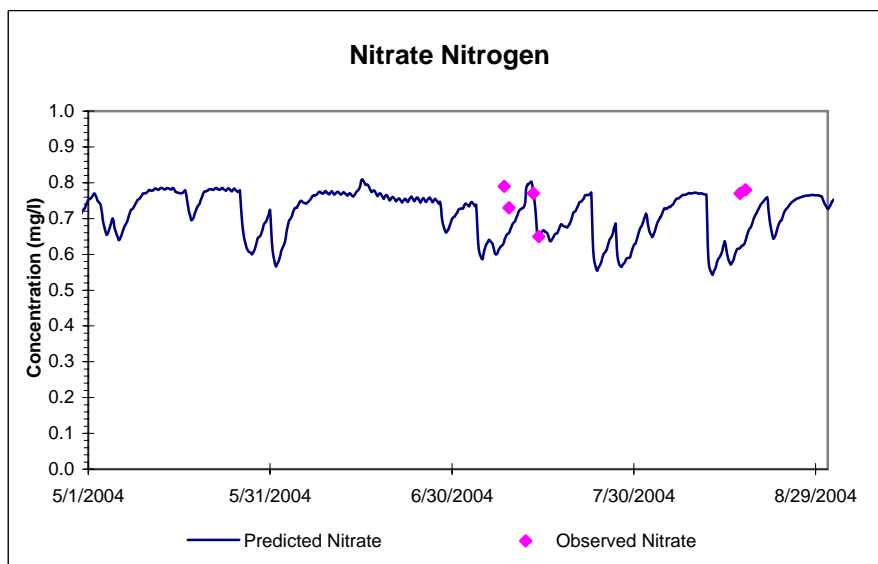
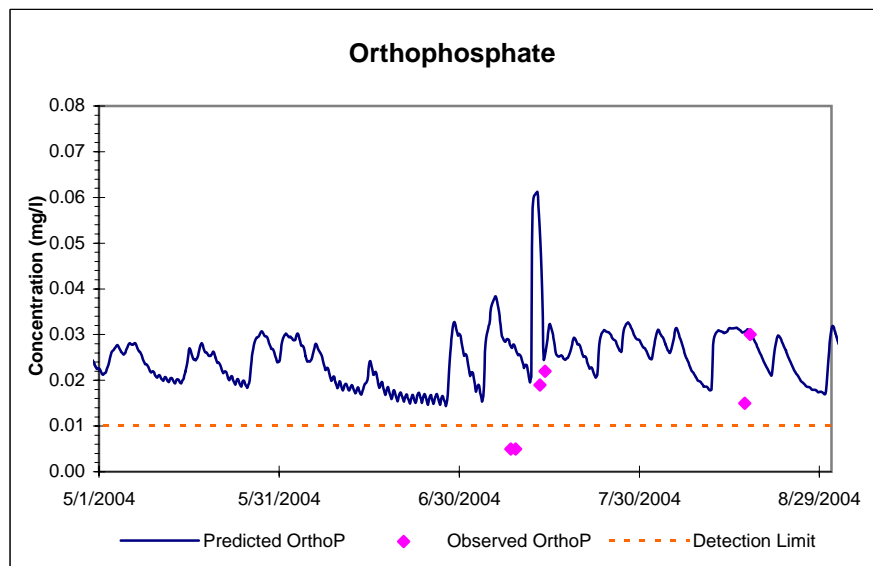
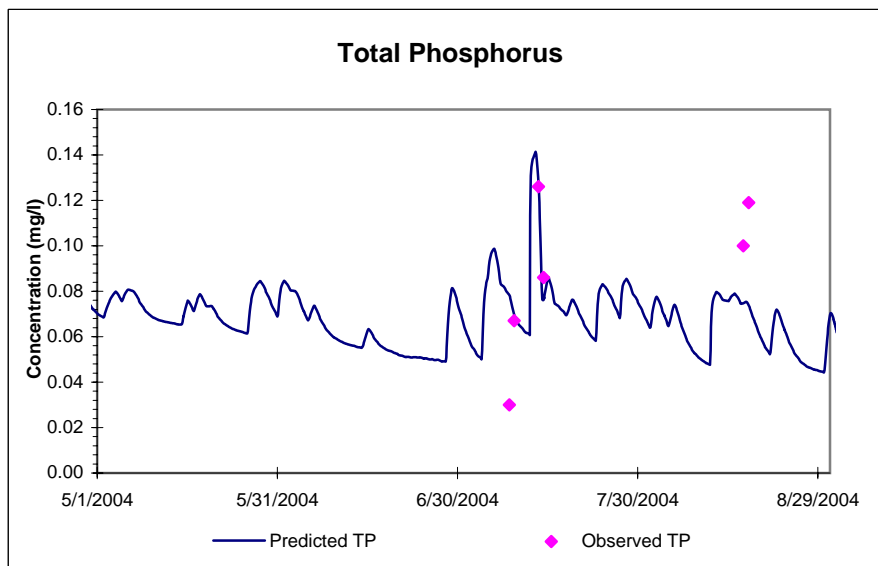
## Big Bear Brook at Grovers Mill Pond Outlet (BBB3)



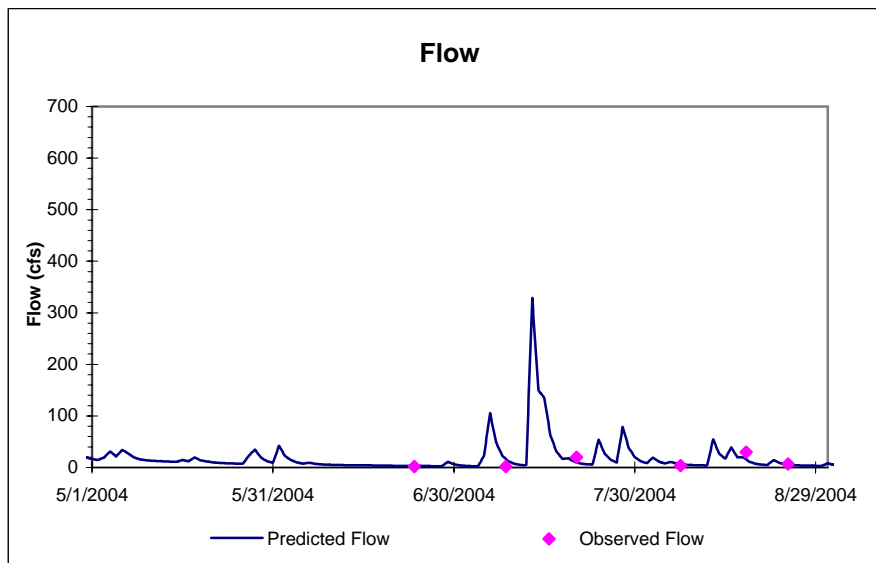
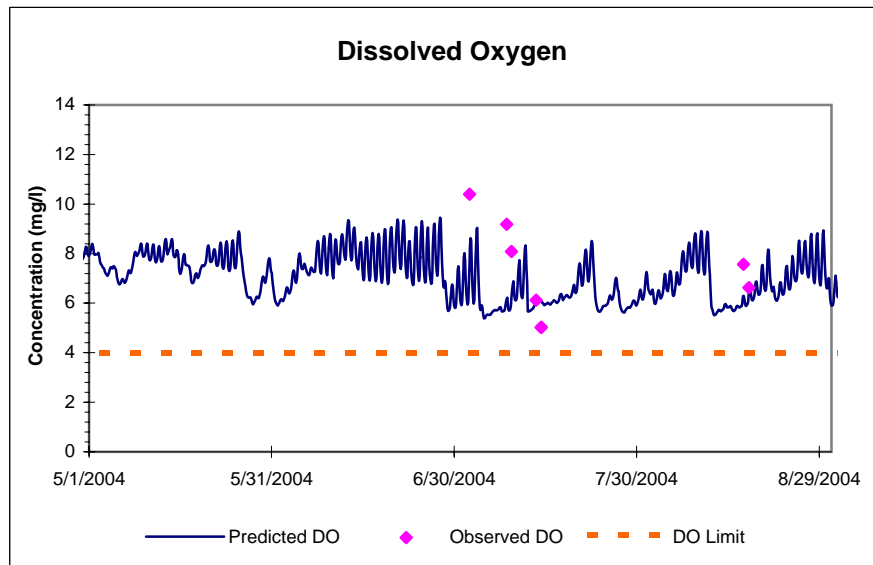
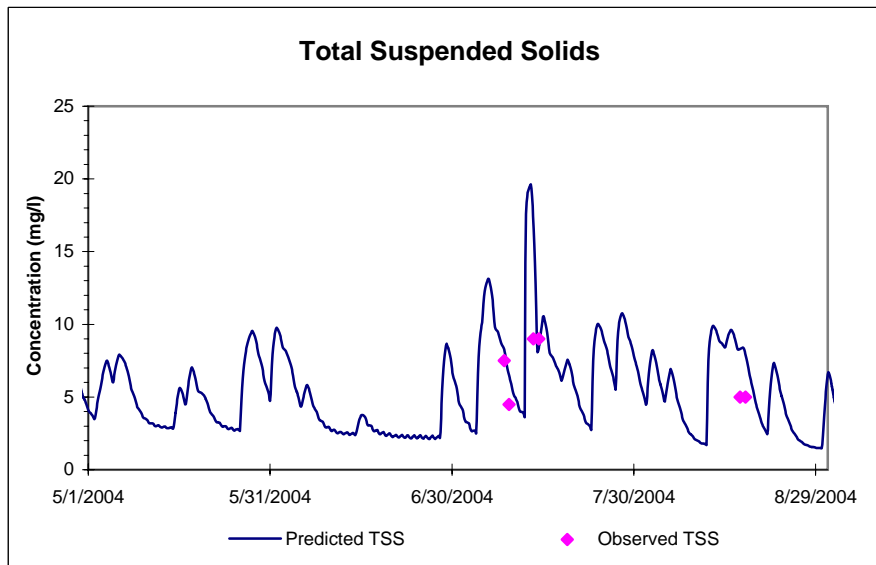
## Big Bear Brook at Grovers Mill Pond Outlet (BBB3)



## Devils Brook at Gordon Pond Outlet in Plainsboro (DB3)

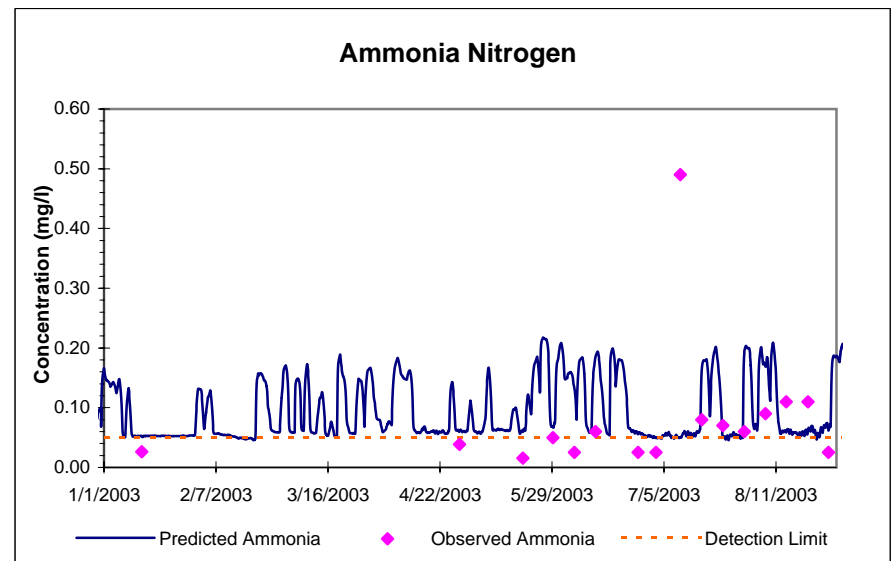
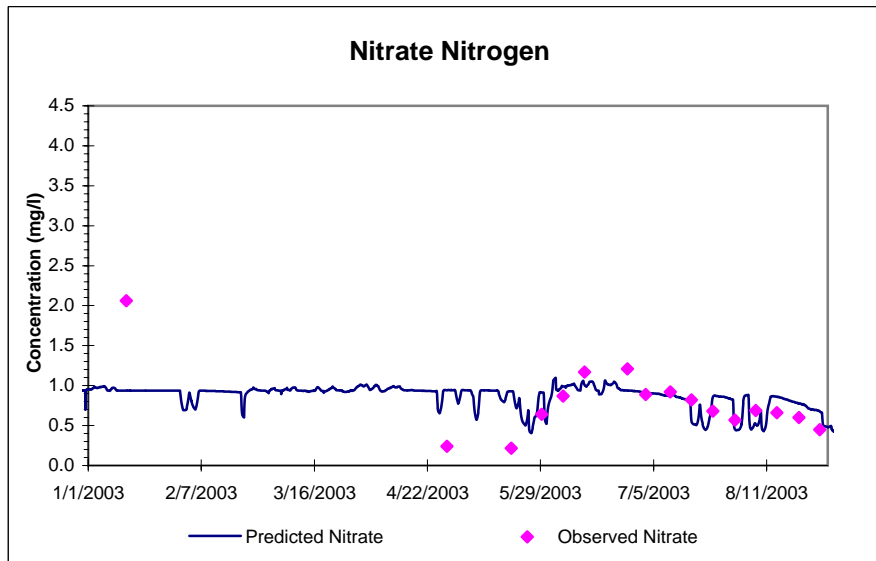
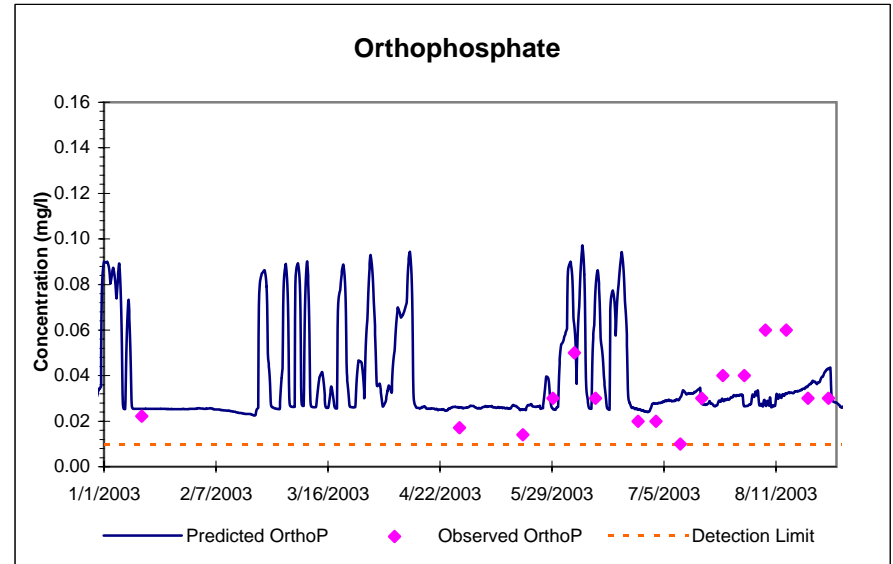
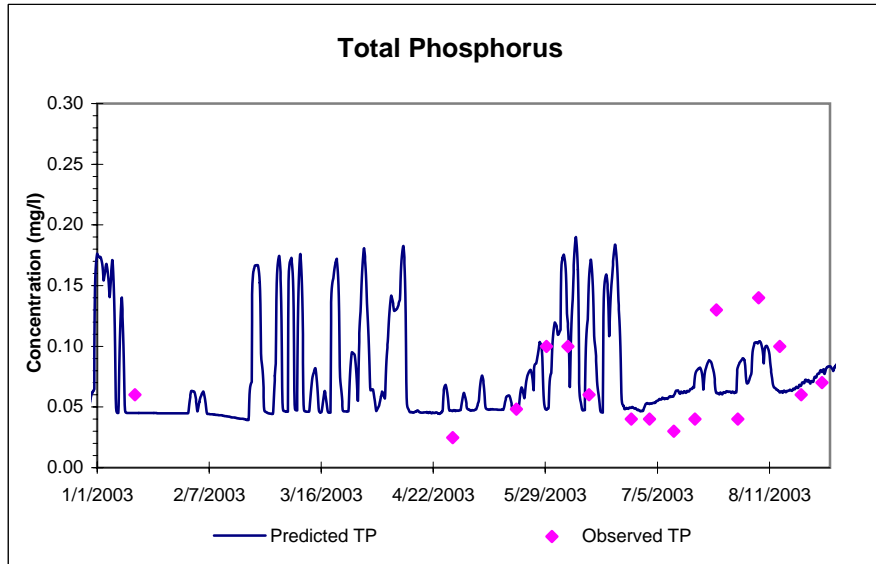


## Devils Brook at Gordon Pond Outlet in Plainsboro (DB3)



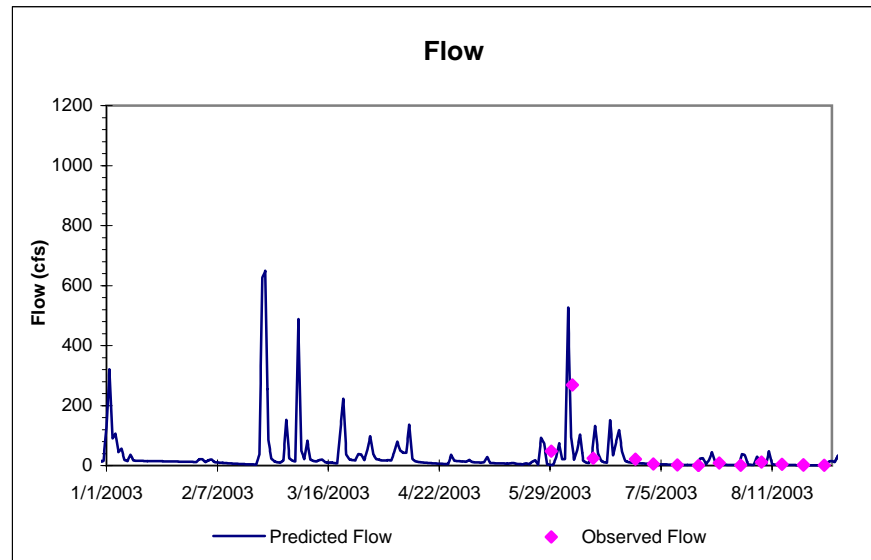
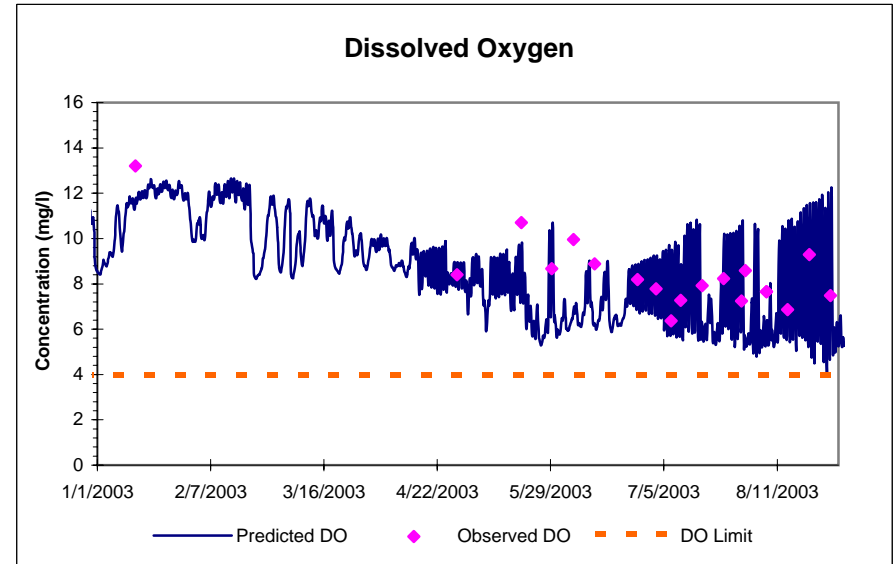
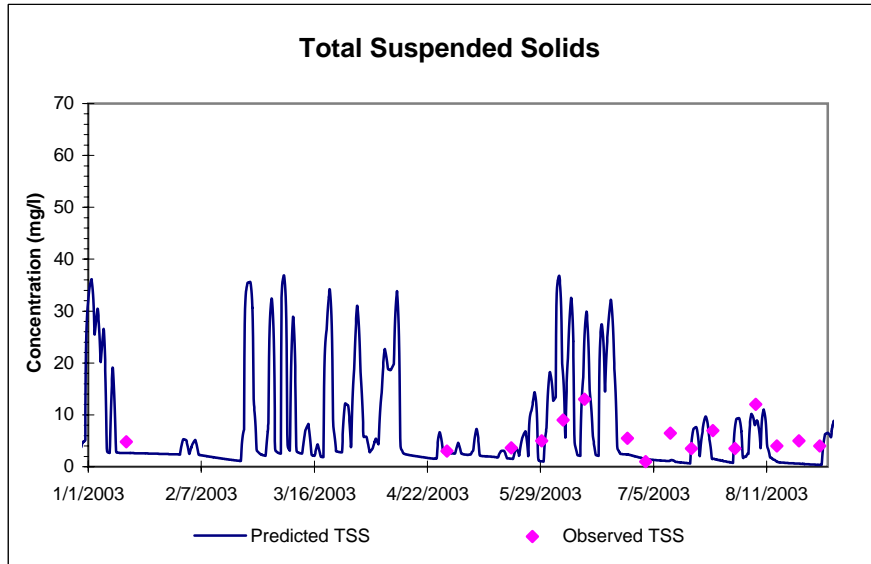
Stony Brook Watershed Area Model  
Water Quality Model Calibration Graphs

## Stony Brook Upstream of SBRSA - Pennington STP (SB1)

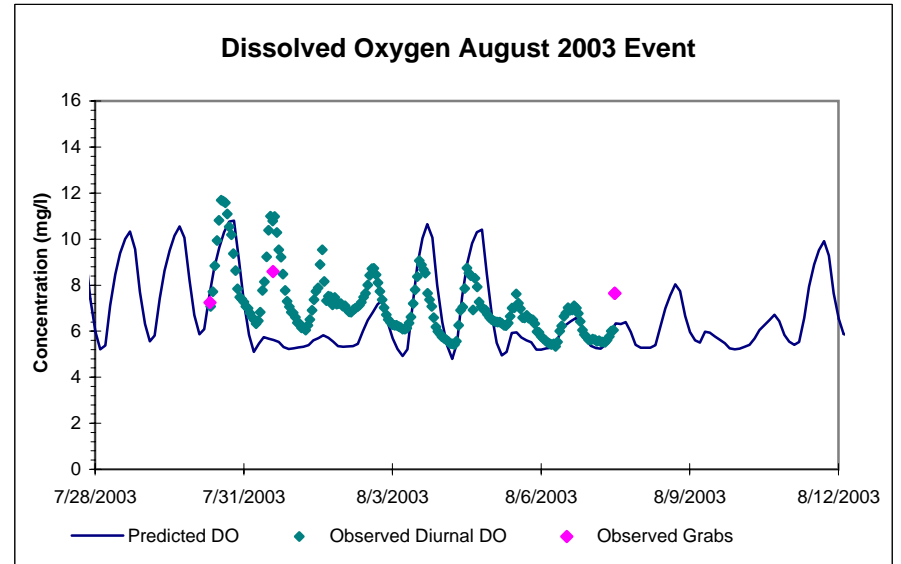
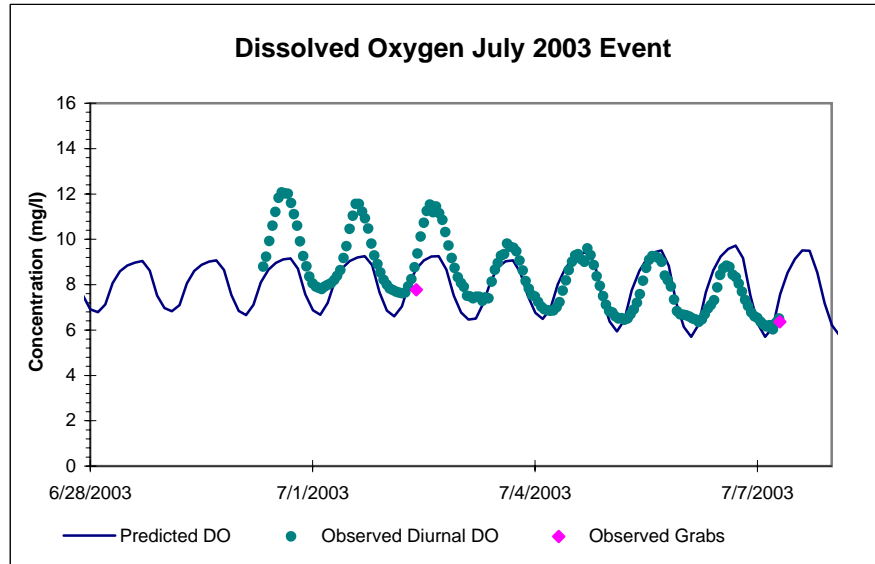




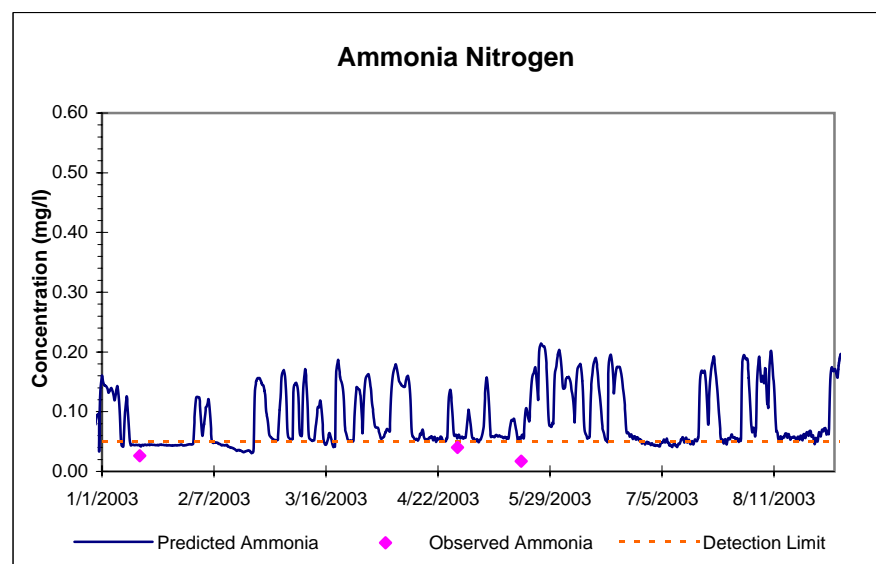
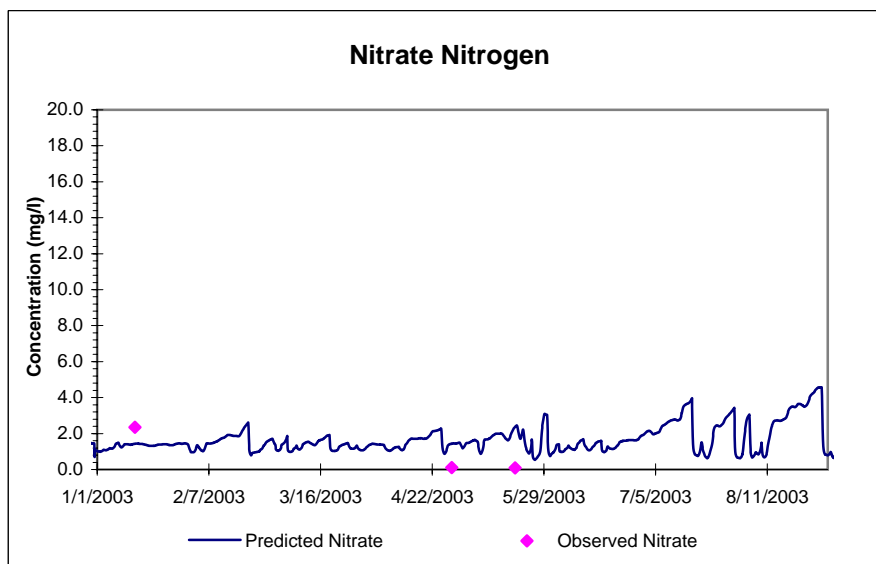
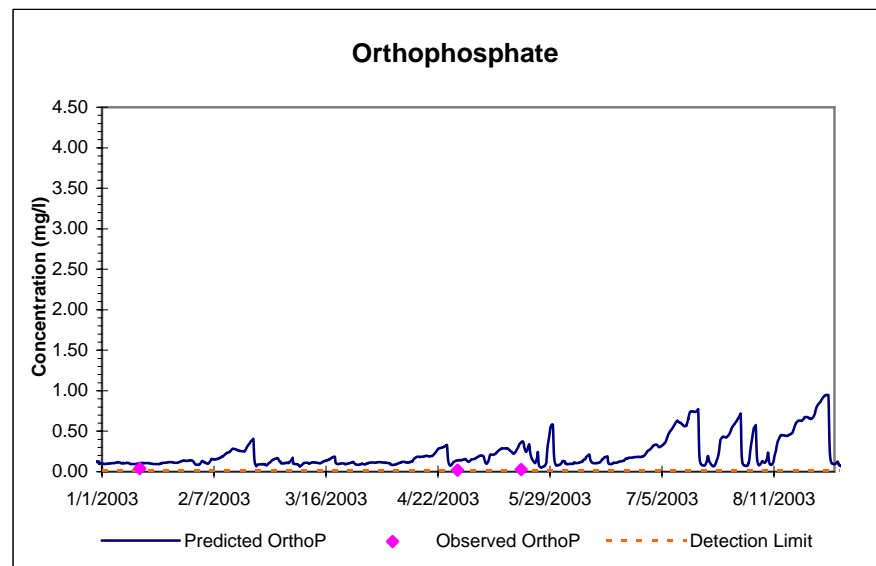
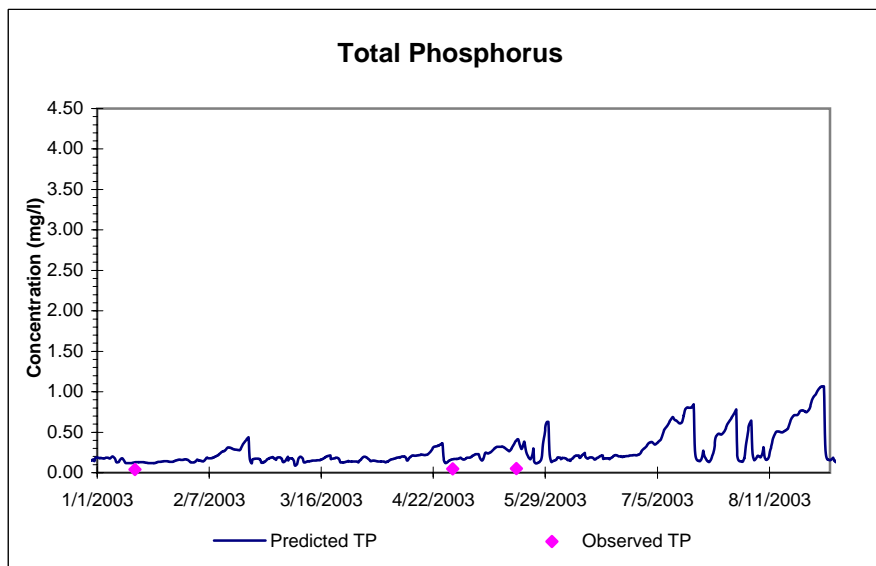
## Stony Brook Upstream of SBRSA - Pennington STP (SB1)



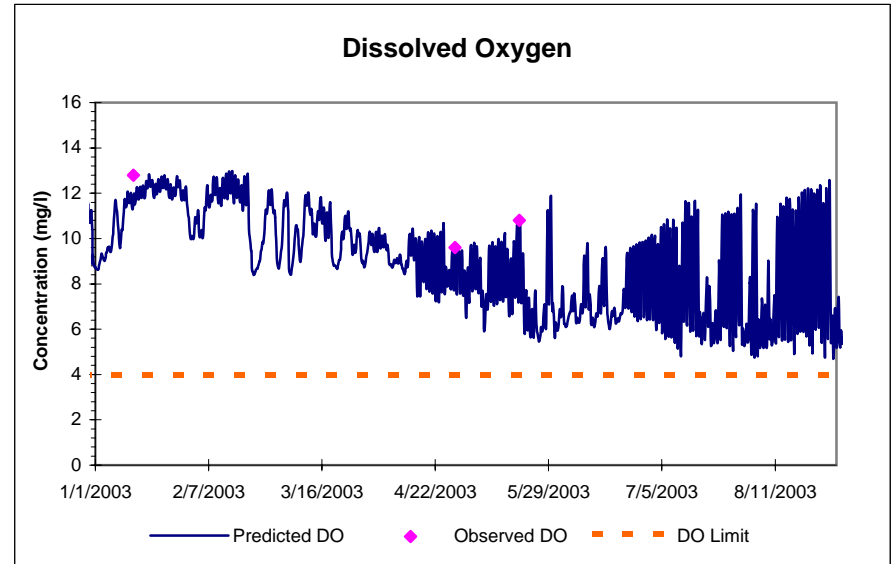
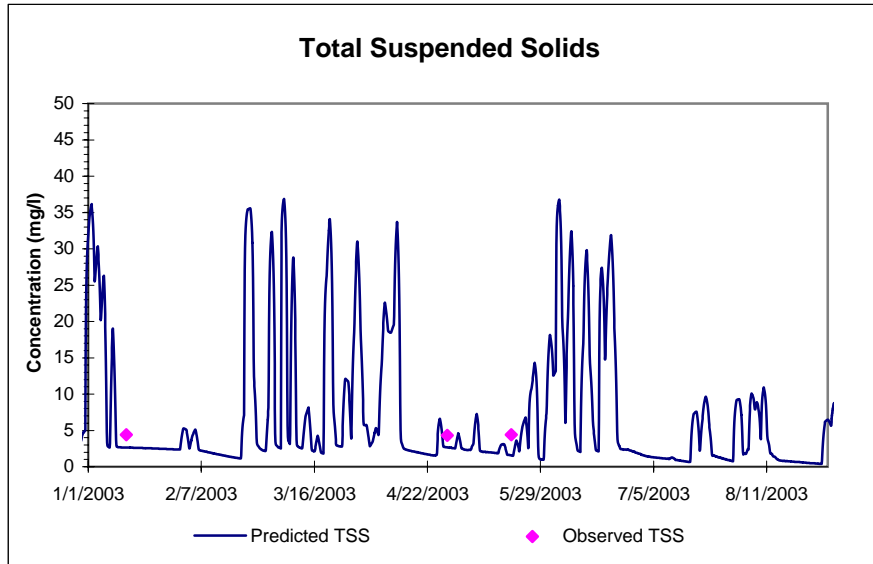
## Stony Brook Upstream of SBRSA - Pennington STP (SB1)



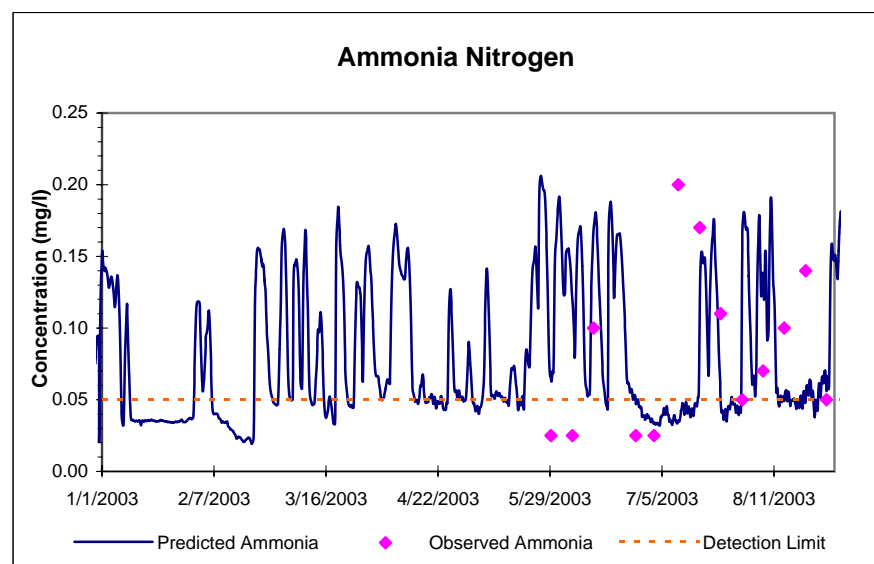
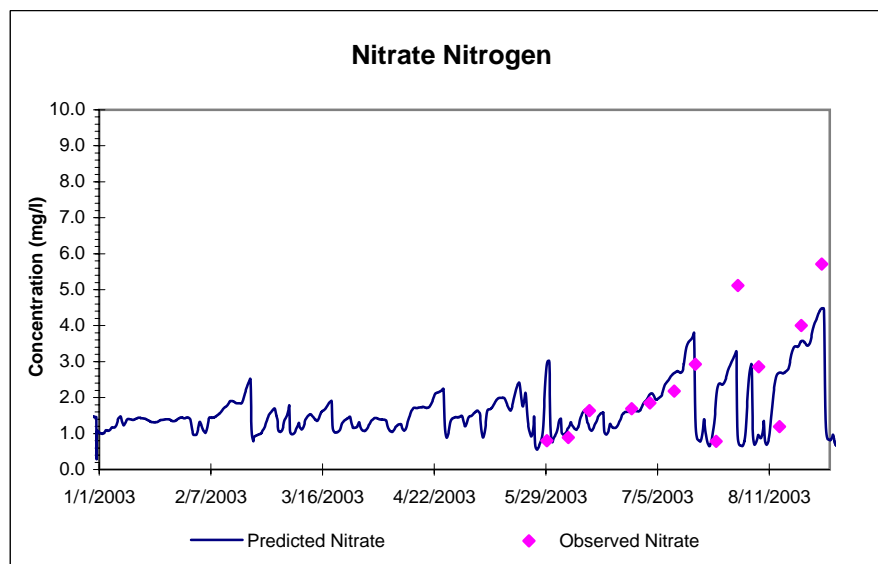
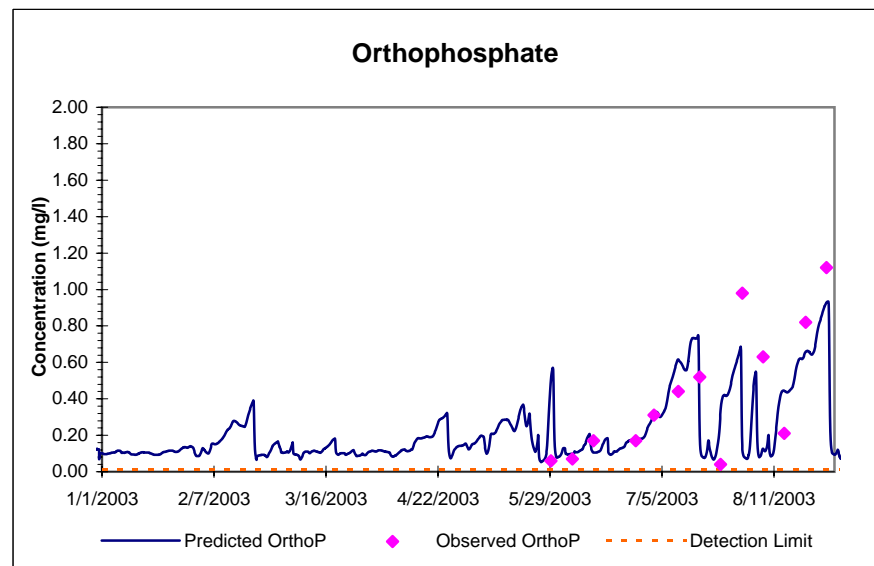
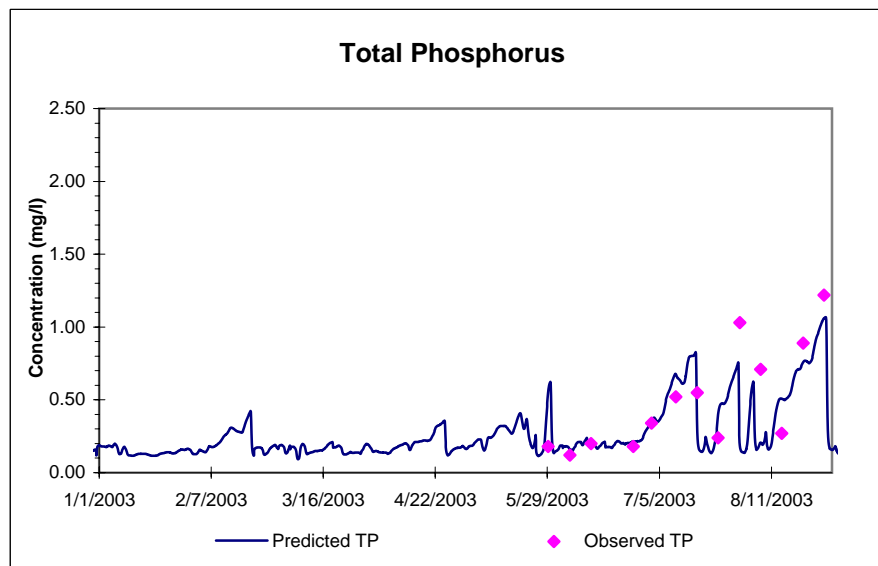
## Stony Brook Downstream of SBRSA - Pennington STP Discharge



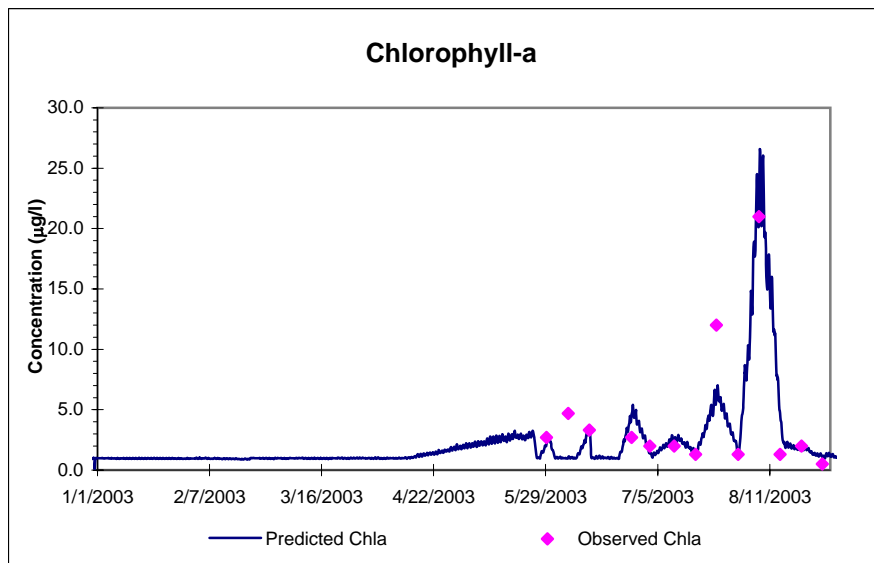
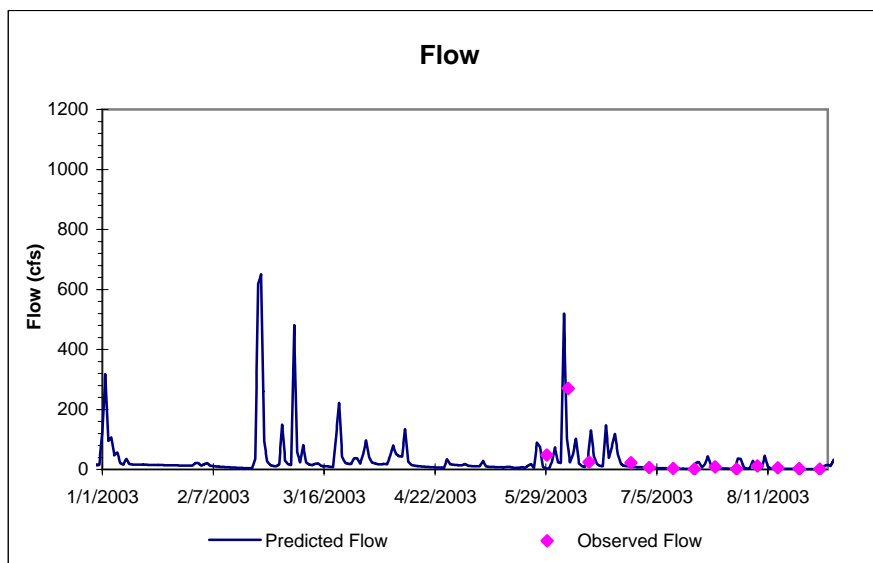
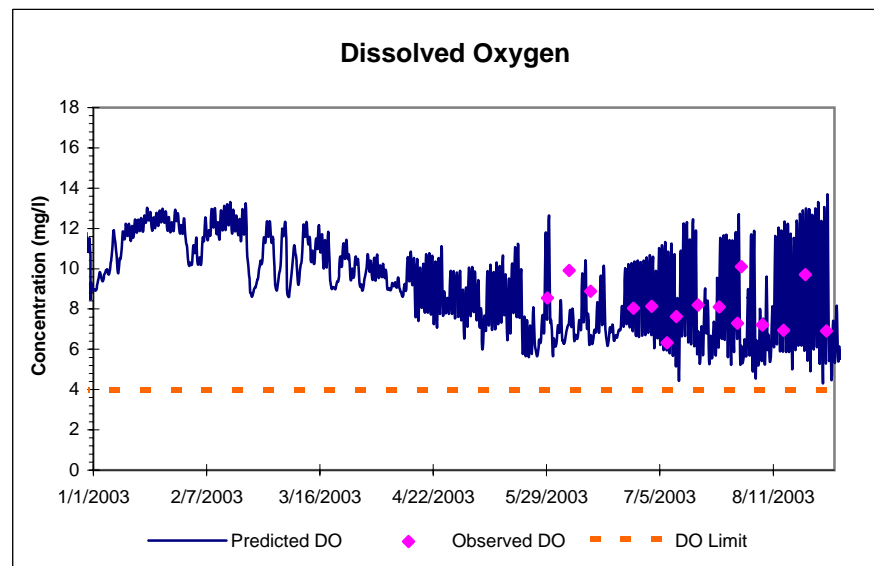
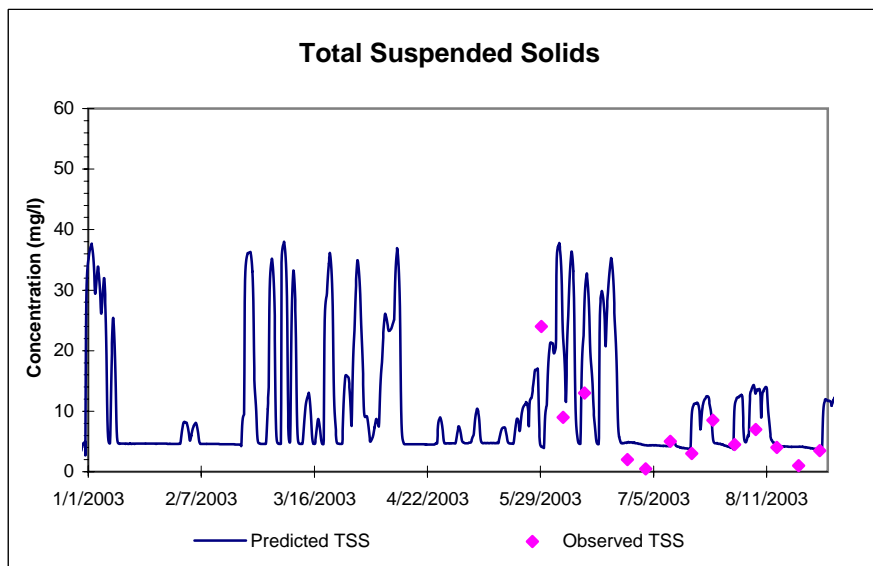
## Stony Brook Downstream of SBRSA - Pennington STP Discharge



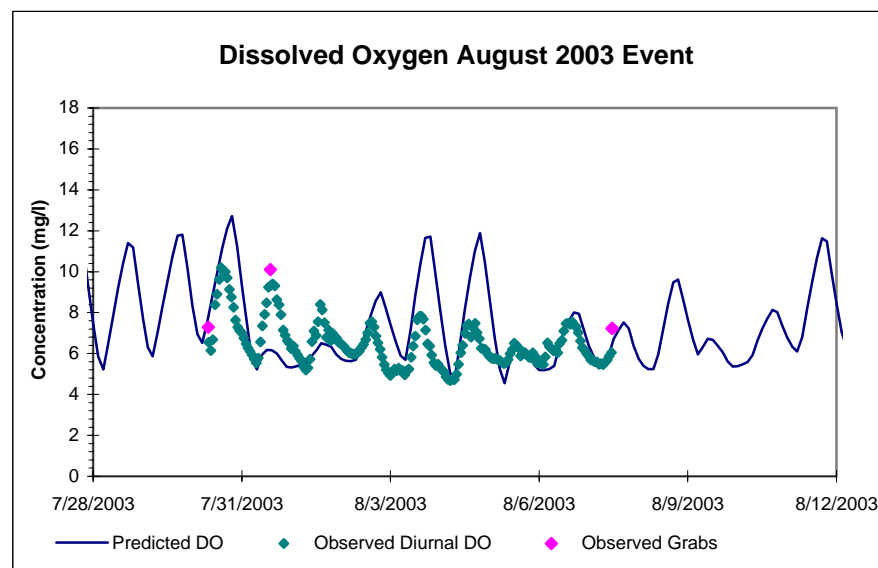
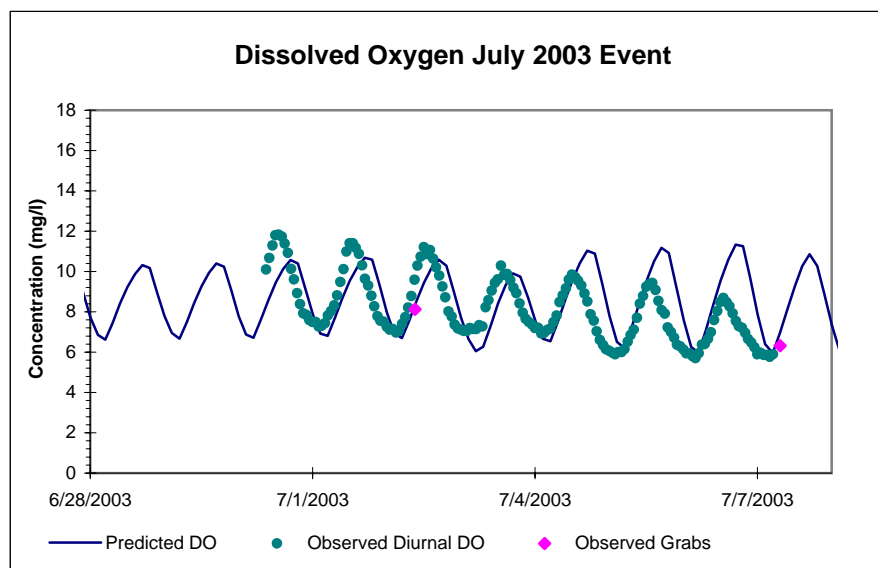
## Stony Brook at Delaware Avenue in Pennington (SB2)



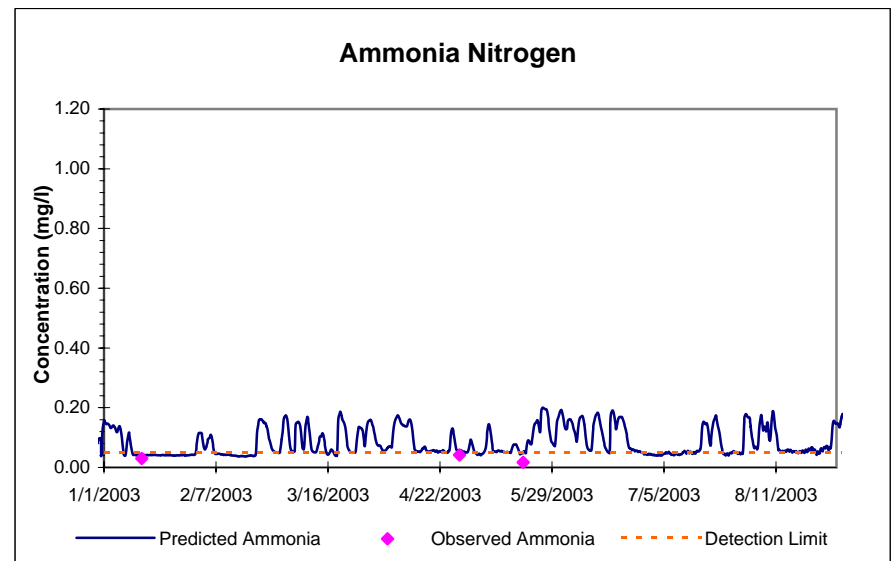
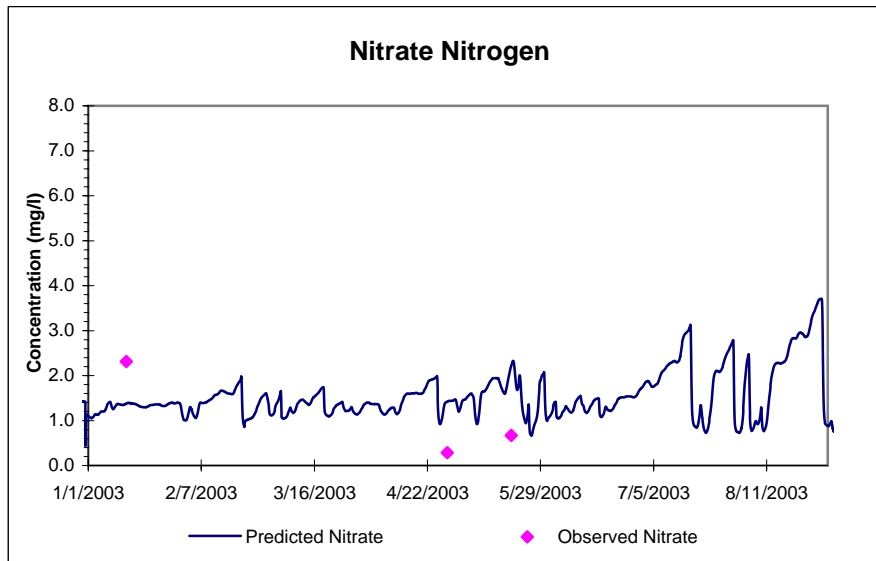
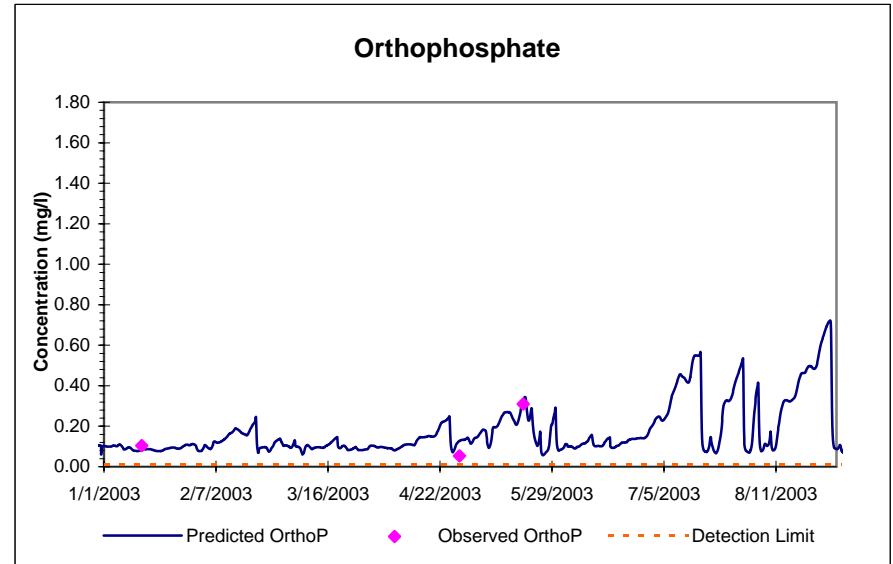
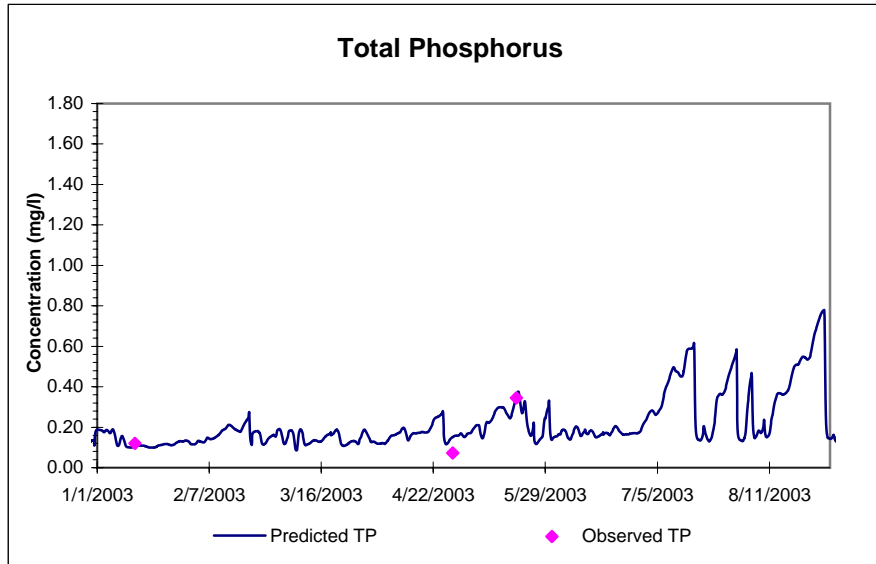
## Stony Brook at Delaware Avenue in Pennington (SB2)



## Stony Brook at Delaware Avenue in Pennington (SB2)

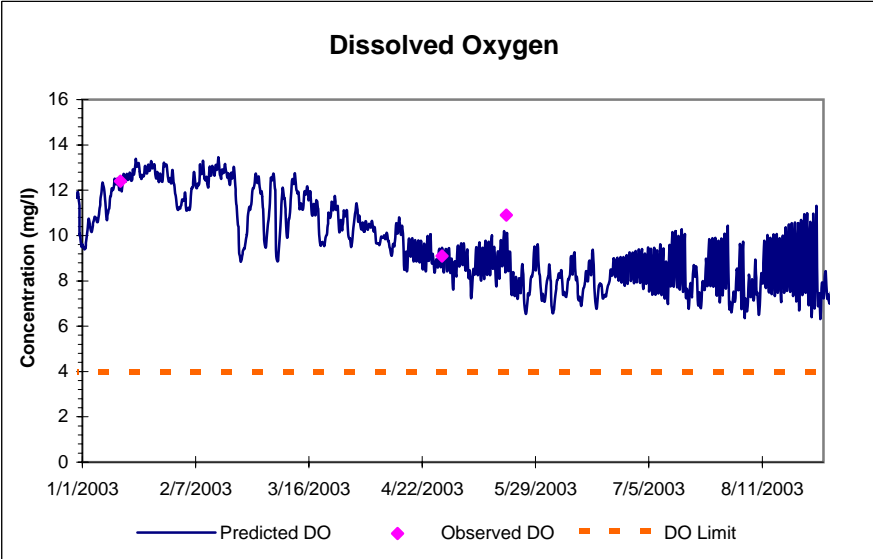
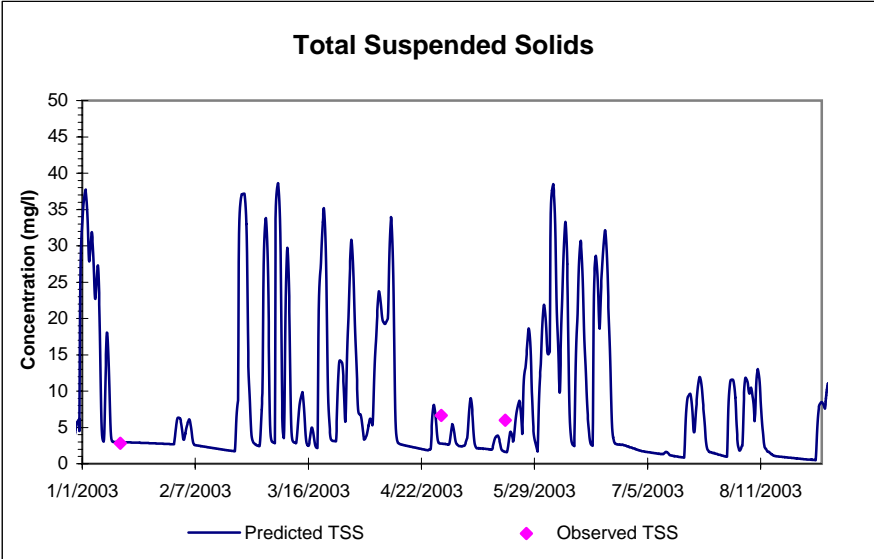


# Stony Brook at Old Mill Rd. in Pennington

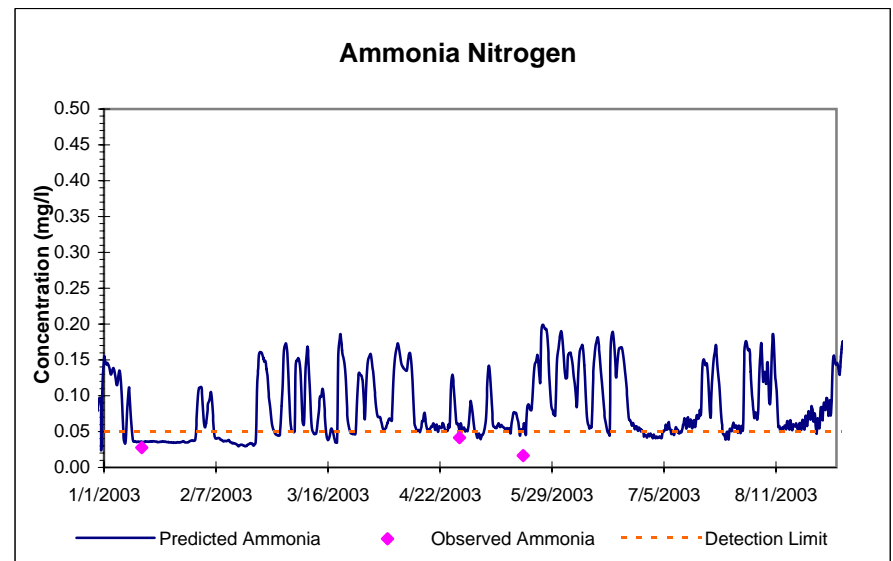
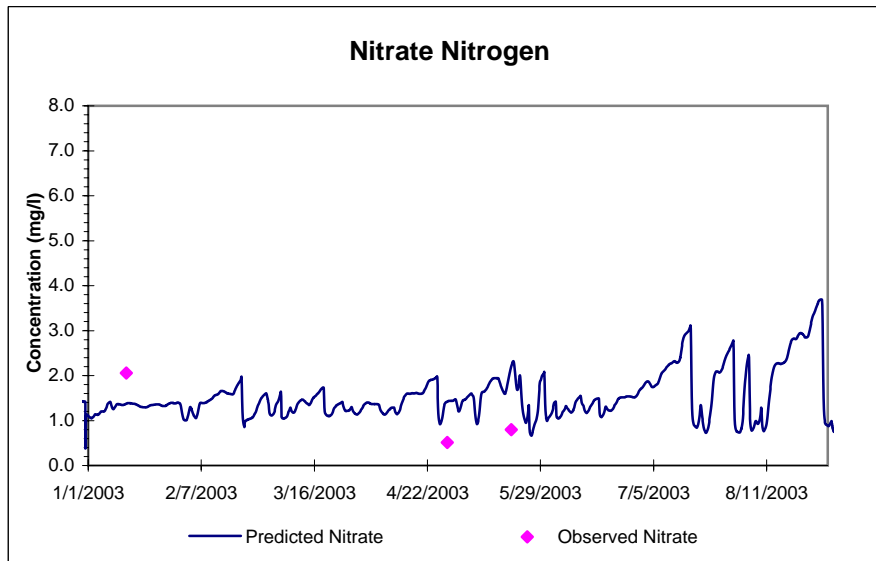
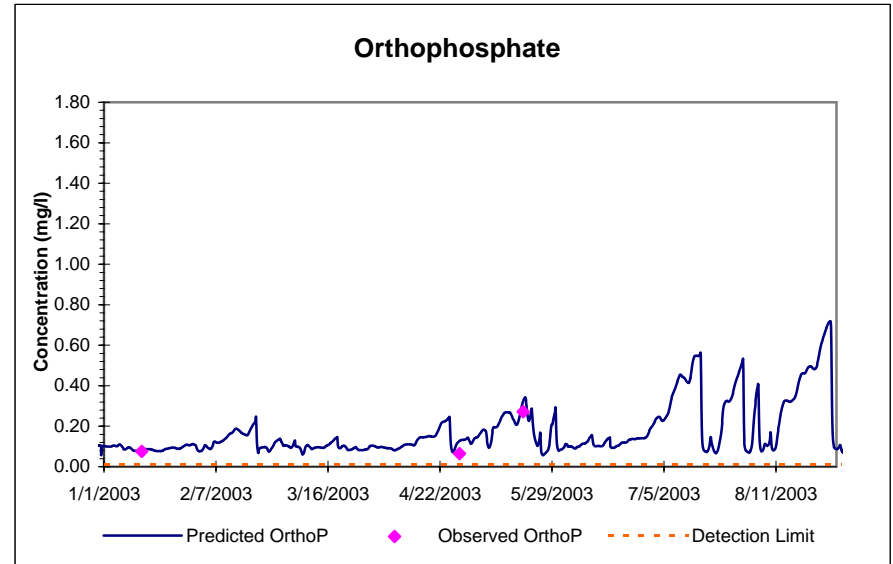
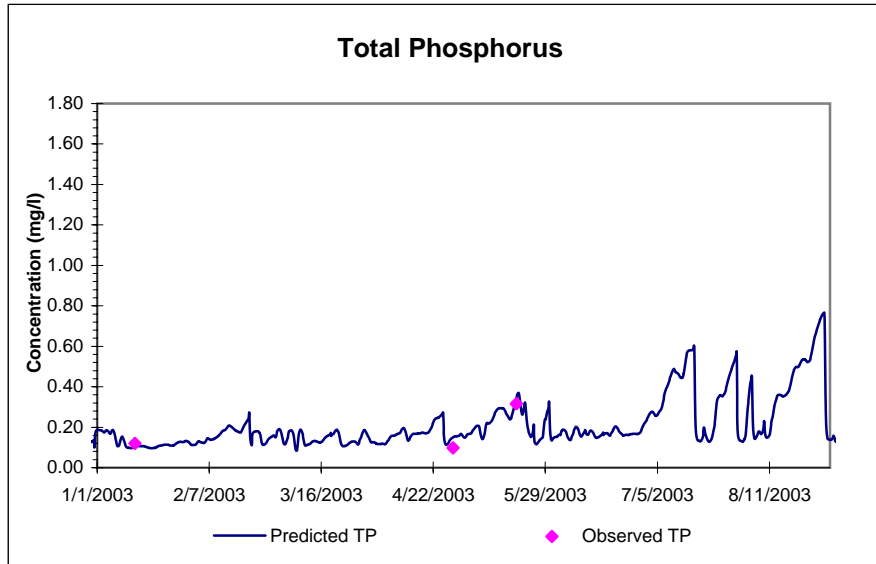




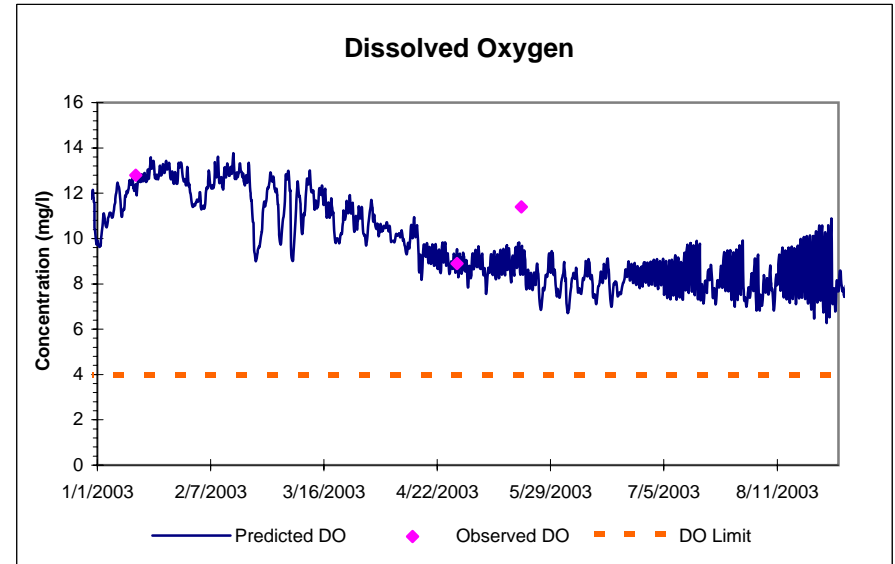
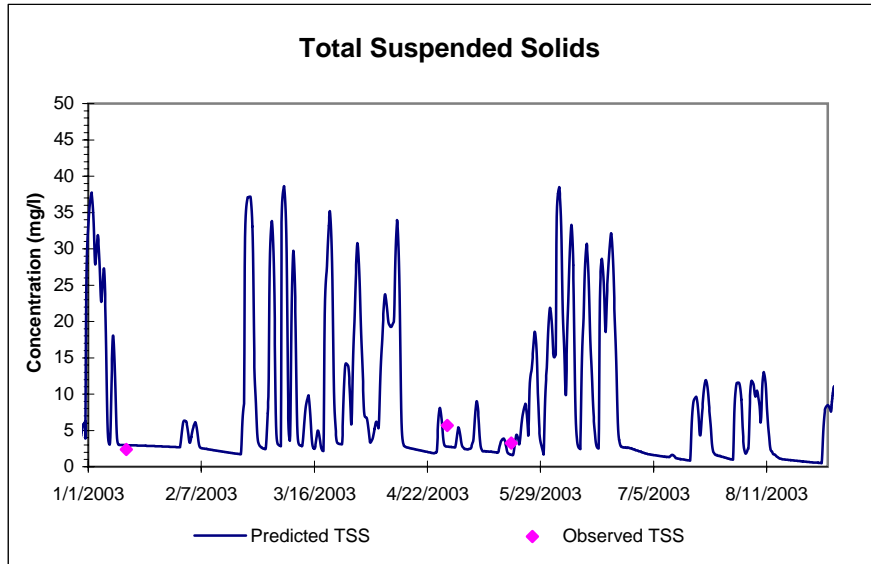
# Stony Brook at Old Mill Rd. in Pennington



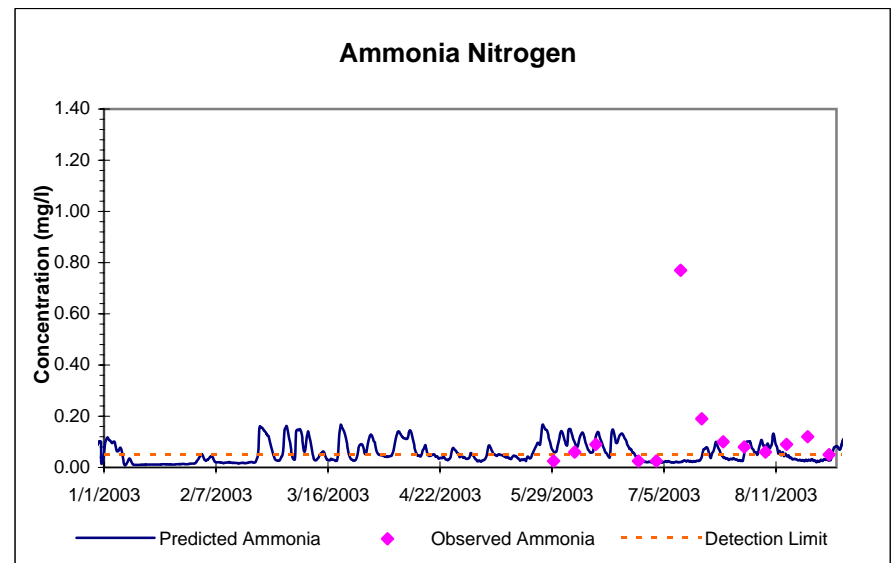
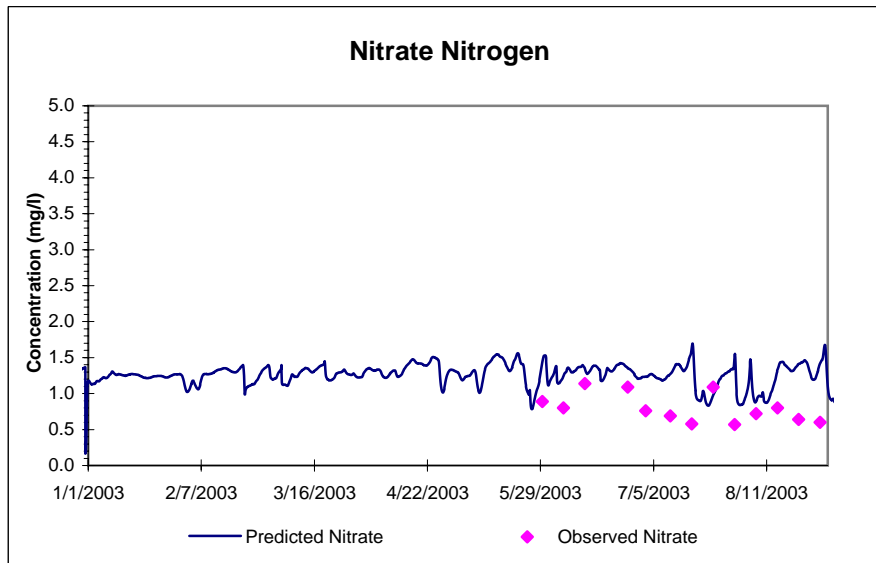
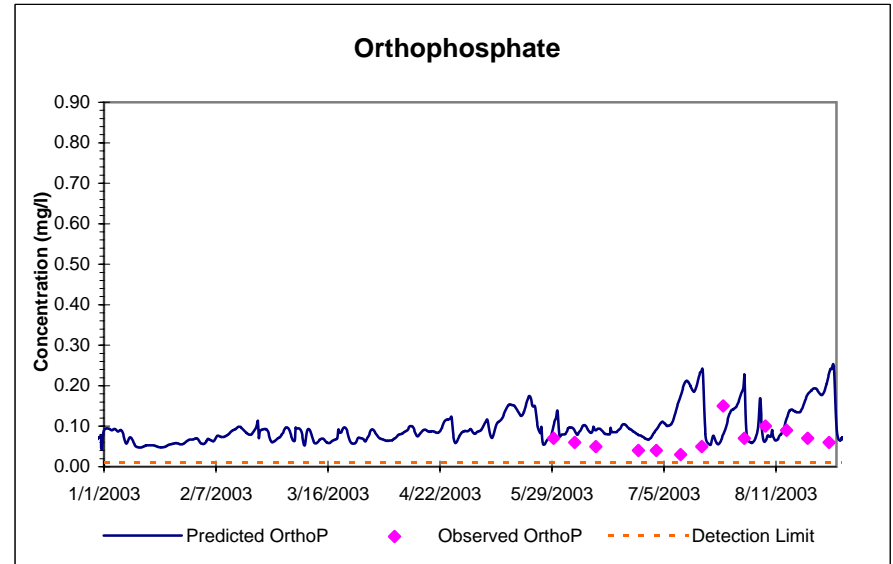
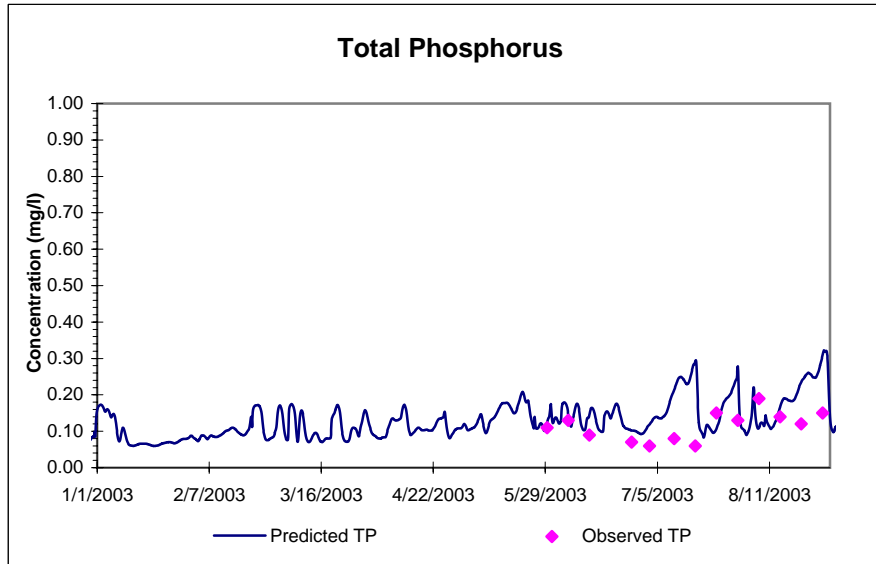
# Stony Brook at Rosedale Park in Hopewell



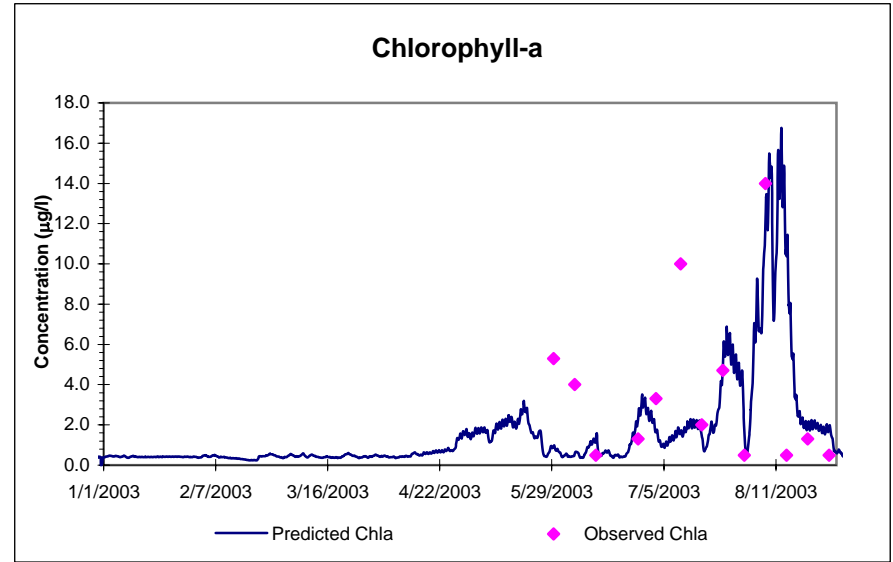
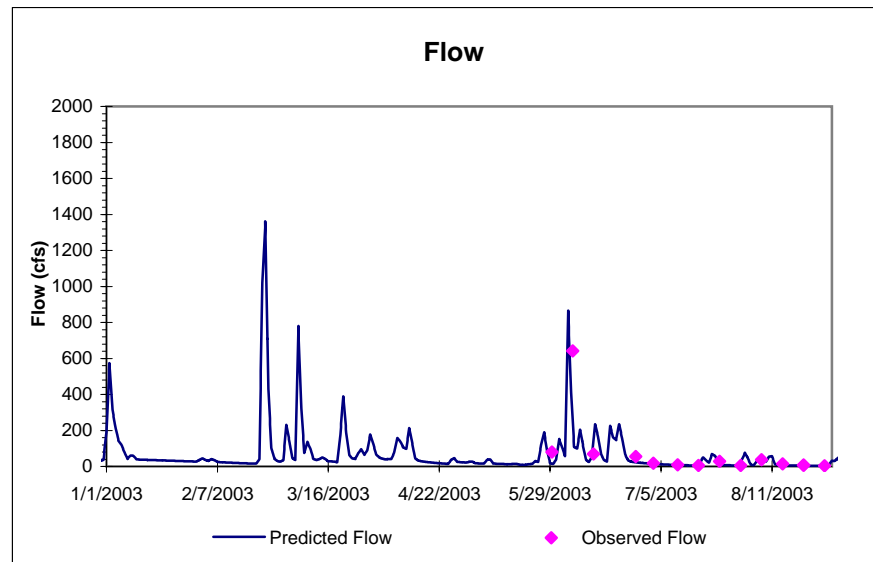
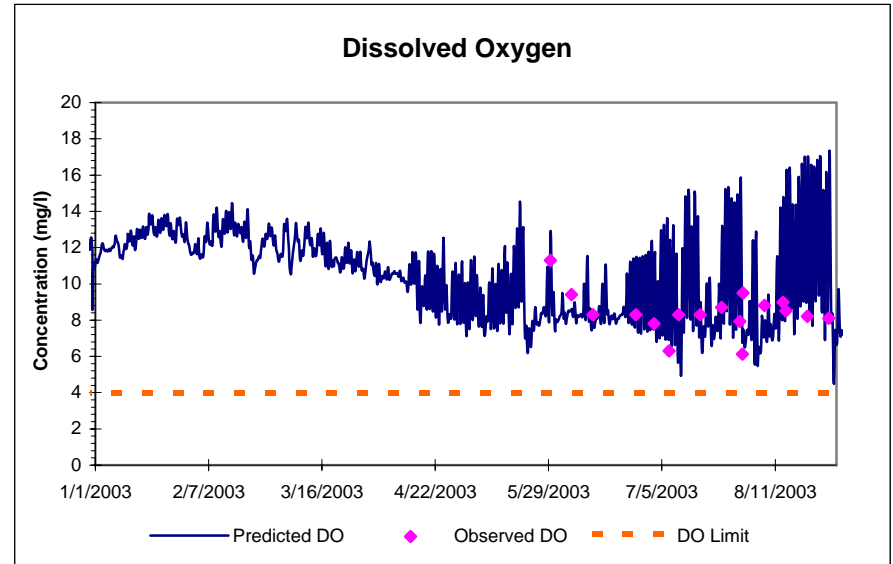
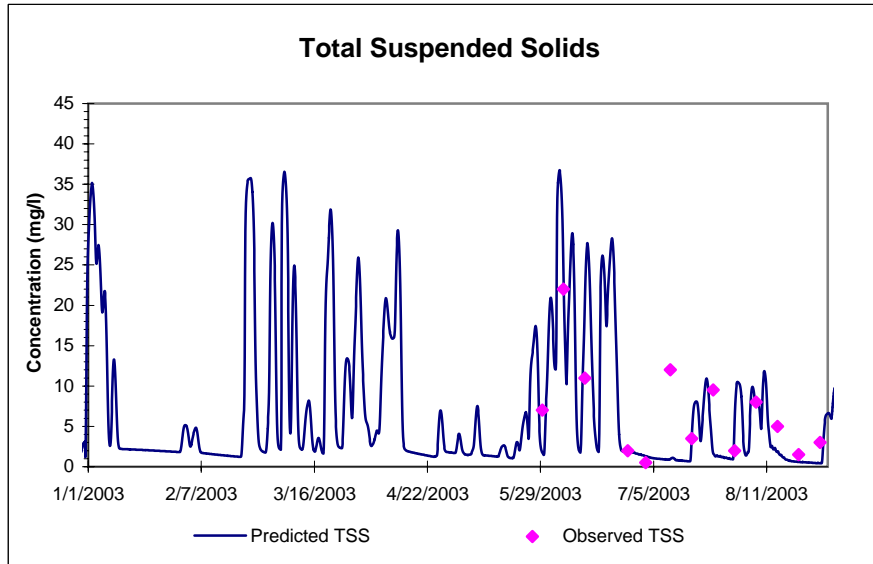
## Stony Brook at Rosedale Park in Hopewell



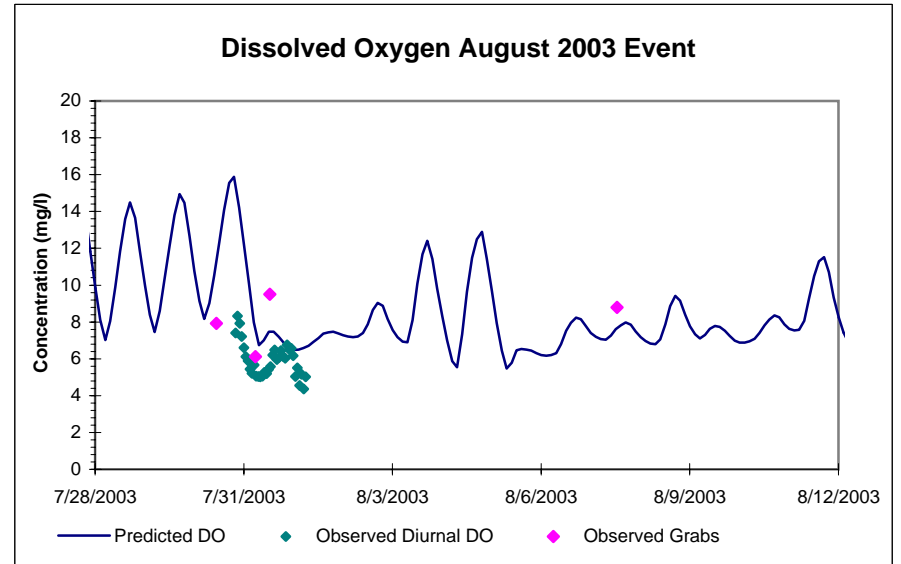
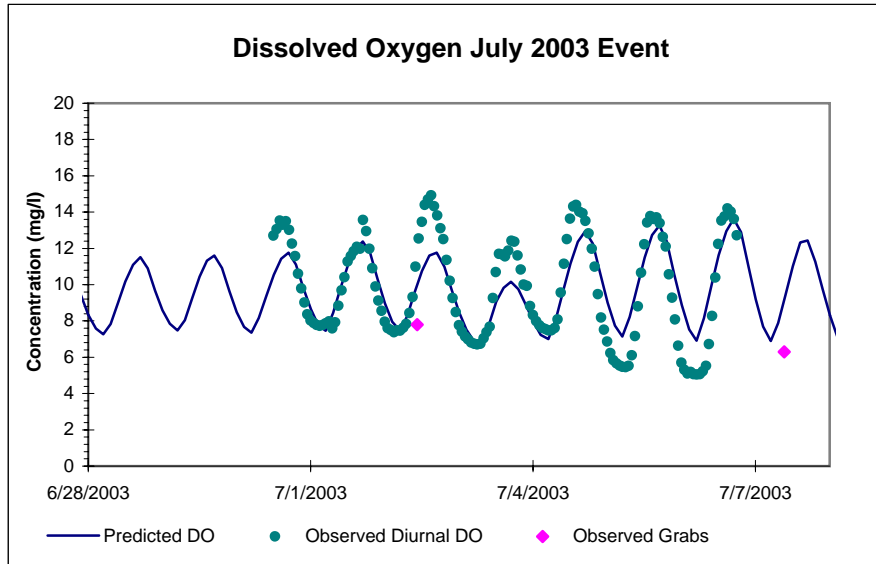
## Stony Brook at Route 206 in Princeton (SB3)



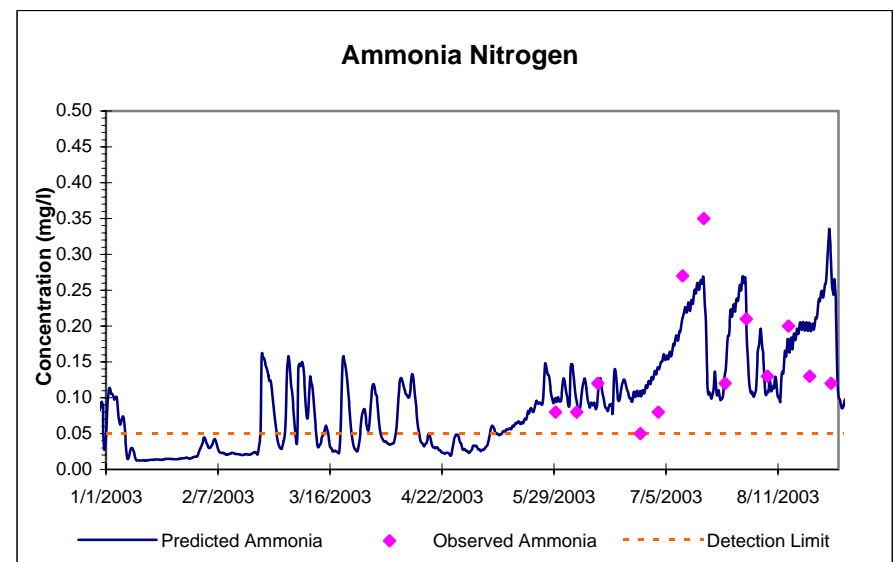
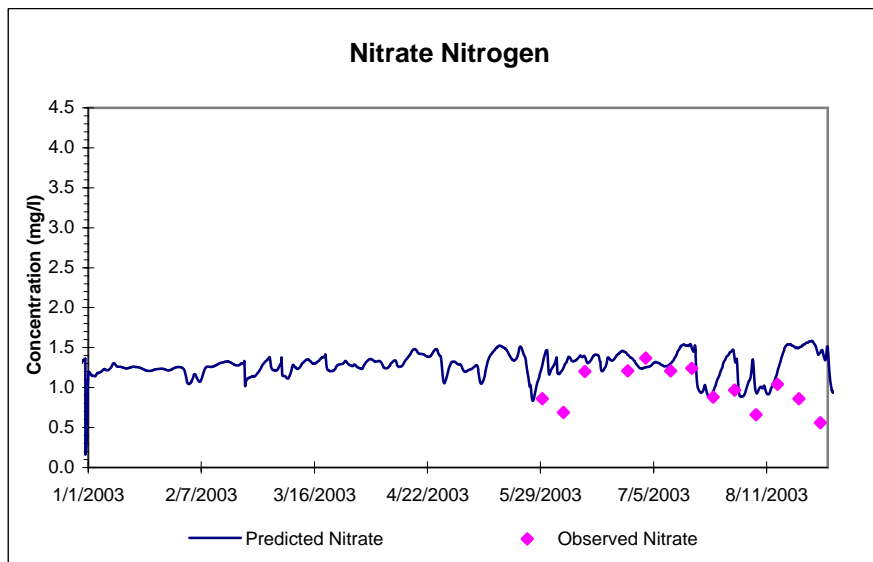
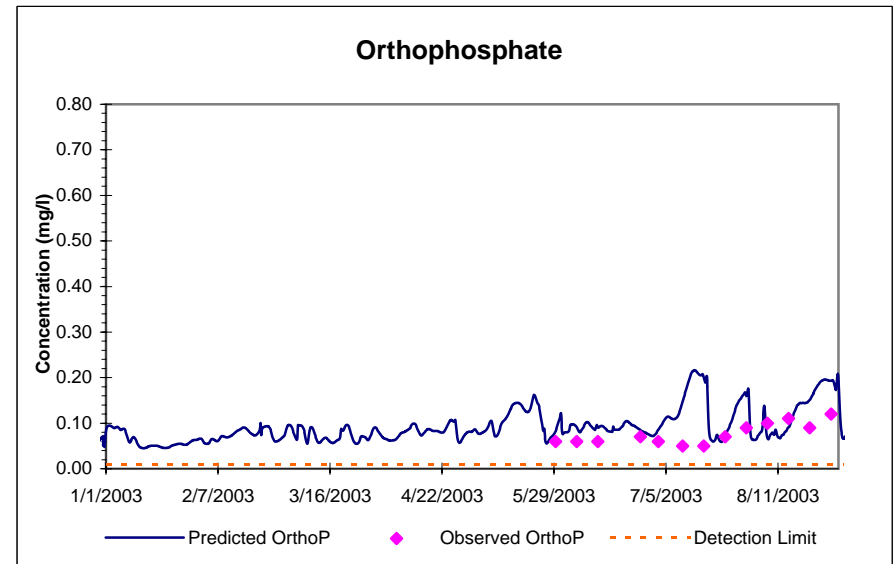
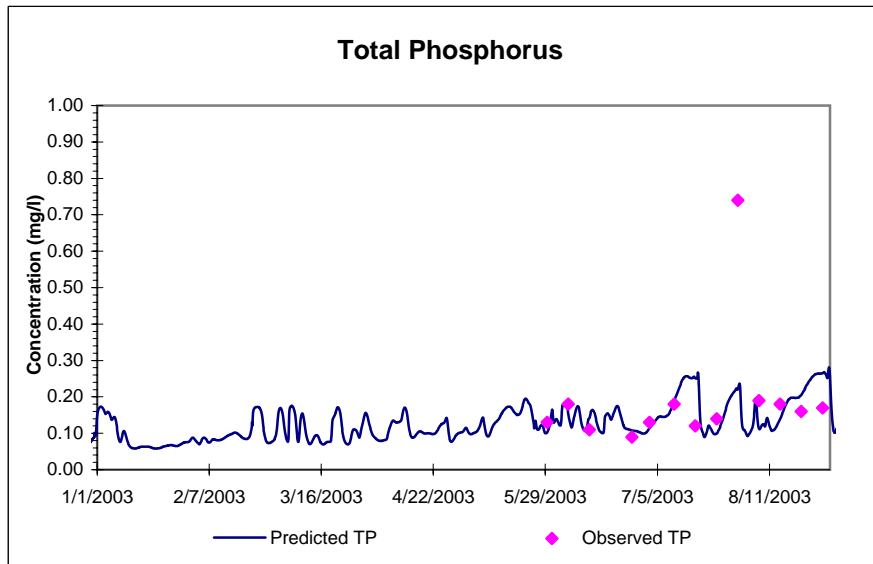
# Stony Brook at Route 206 in Princeton (SB3)



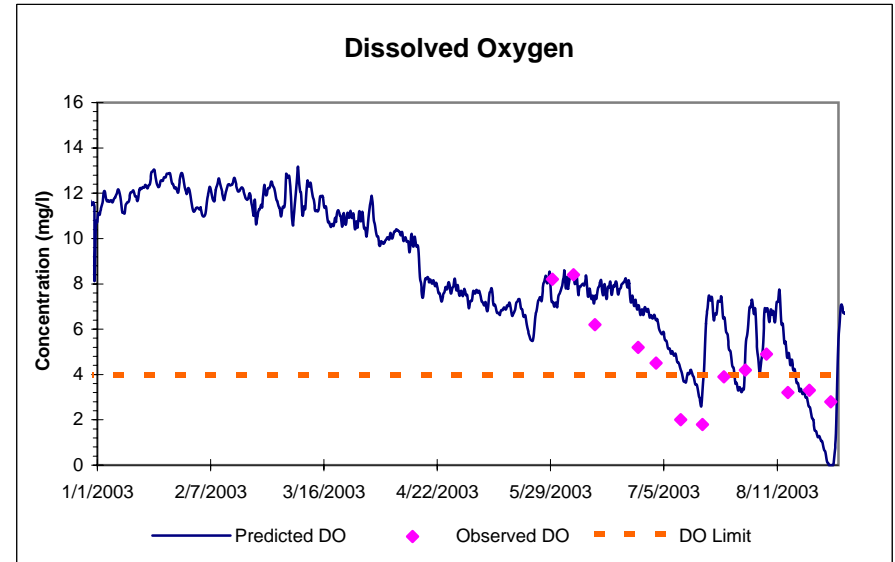
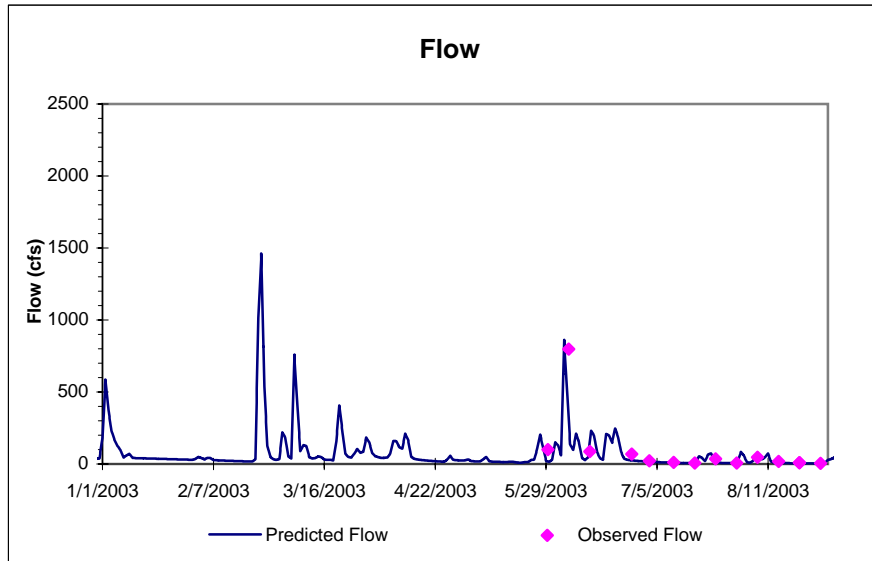
## Stony Brook at Route 206 in Princeton (SB3)



## Stony Brook at Alexander Road in Princeton (SB4)



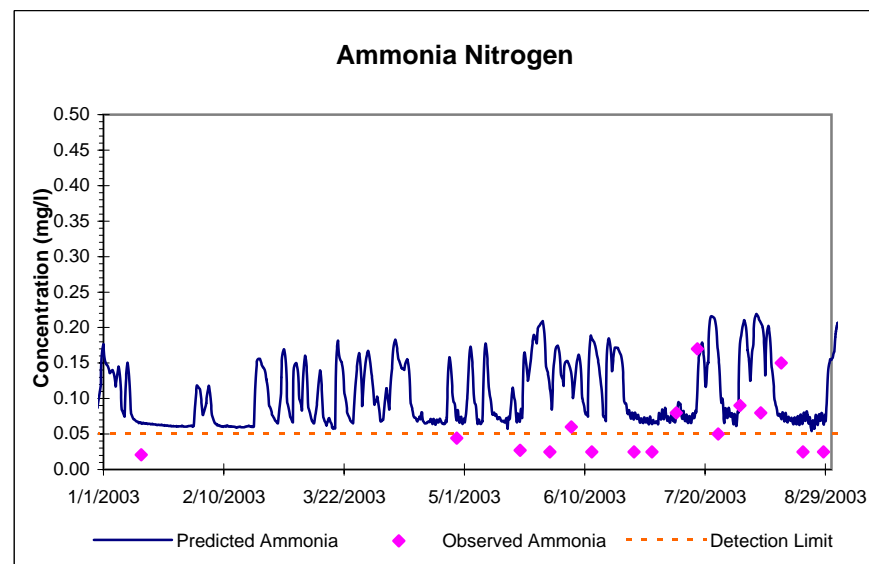
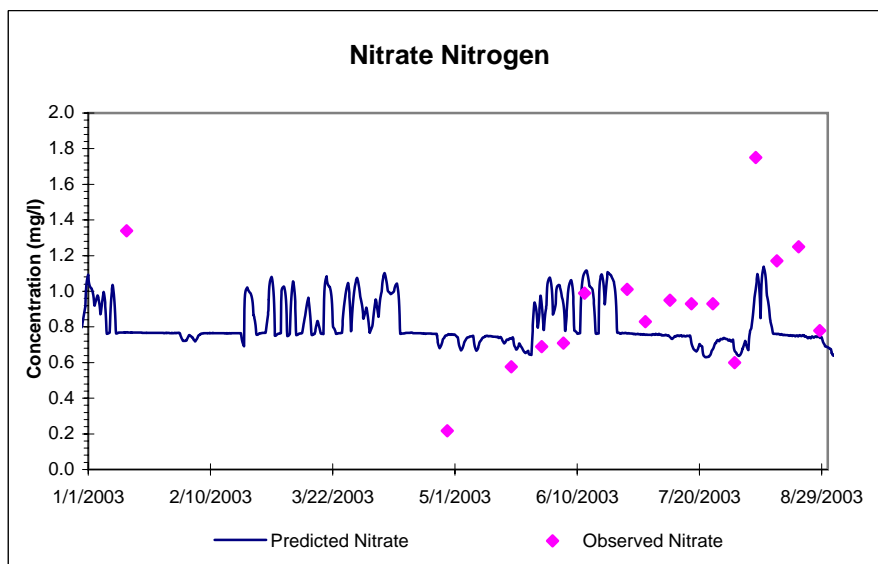
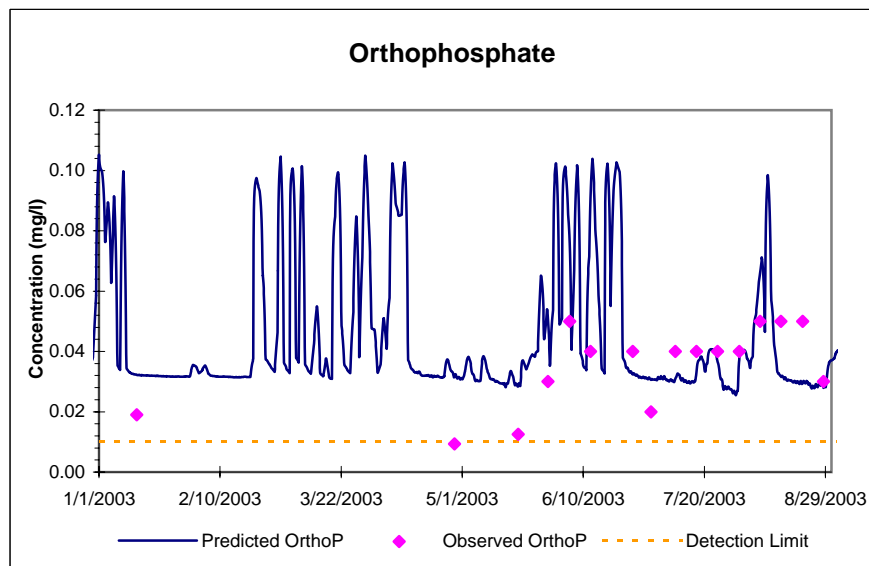
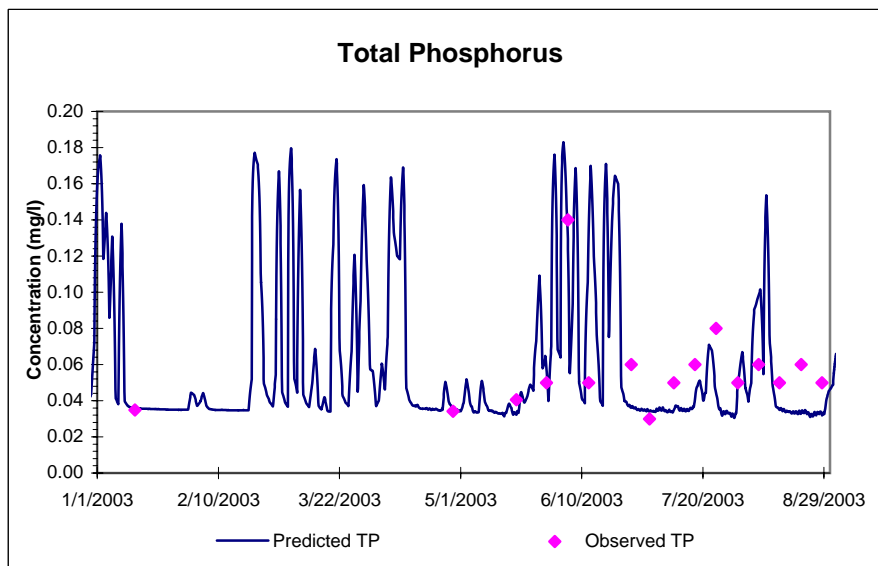
## Stony Brook at Alexander Road in Princeton (SB4)



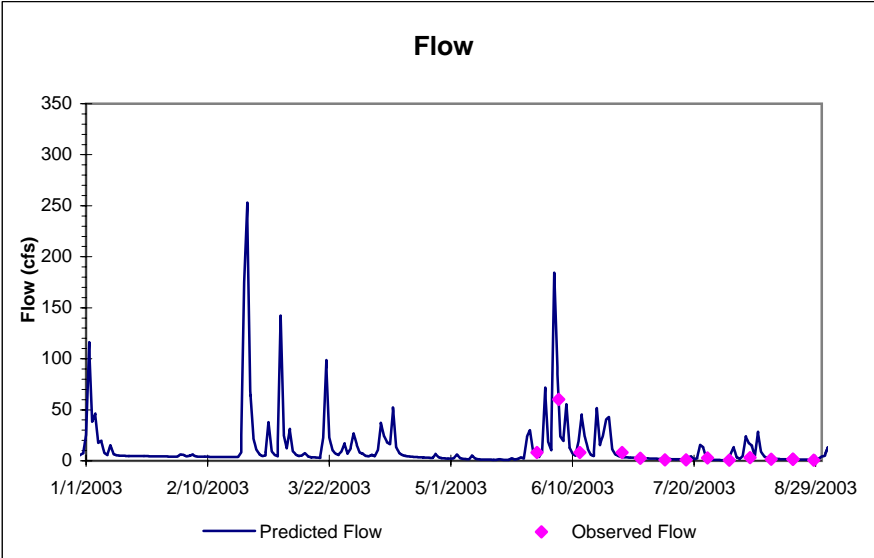
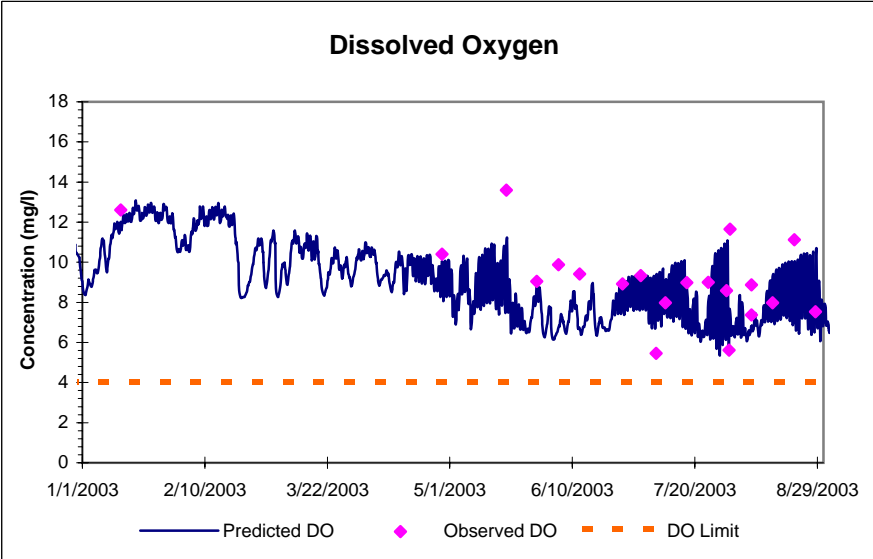
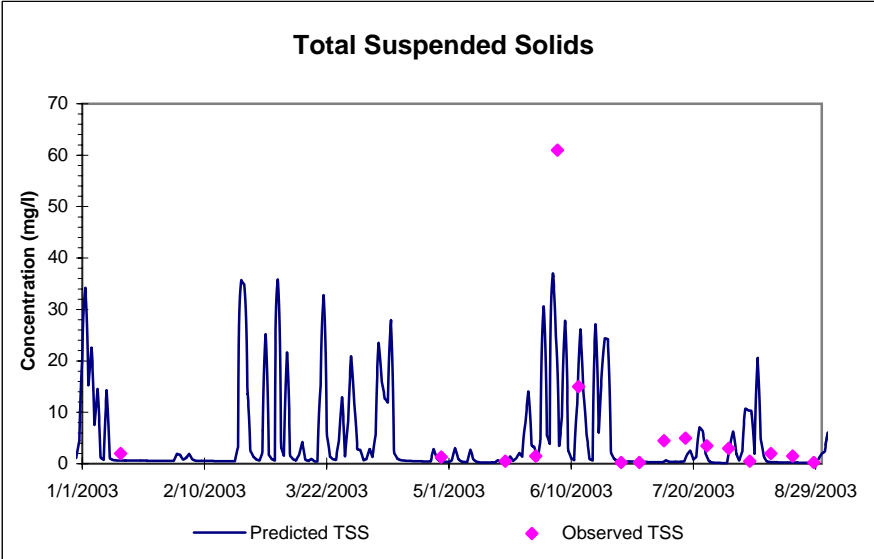


**Beden Brook / Lower Millstone River Watershed Area Model**  
Water Quality Model Calibration Graphs

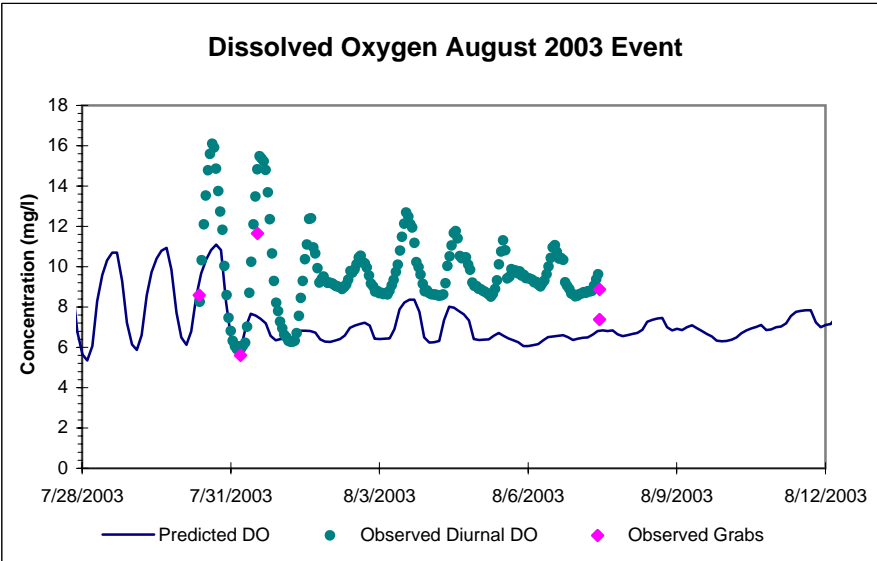
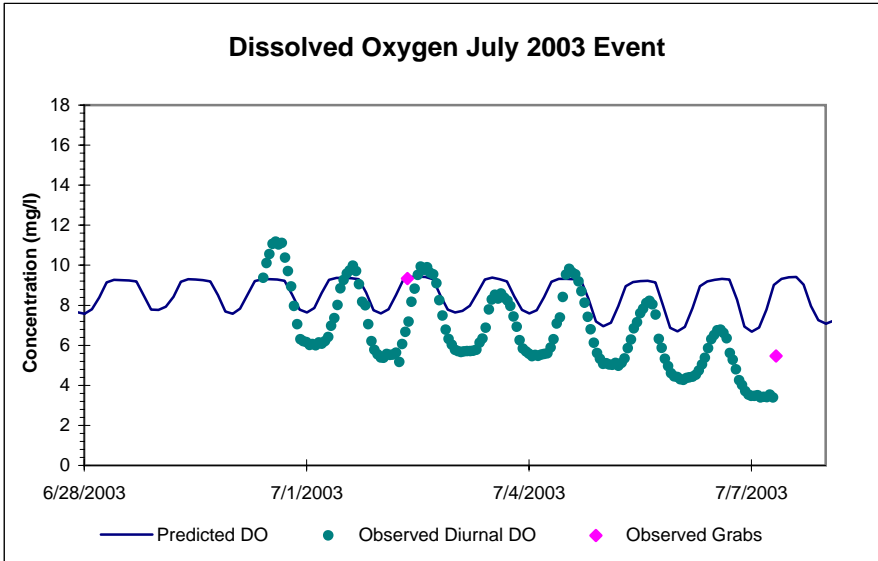
## Beden Brook at Aunt Molly Road in Hopewell (BB1)



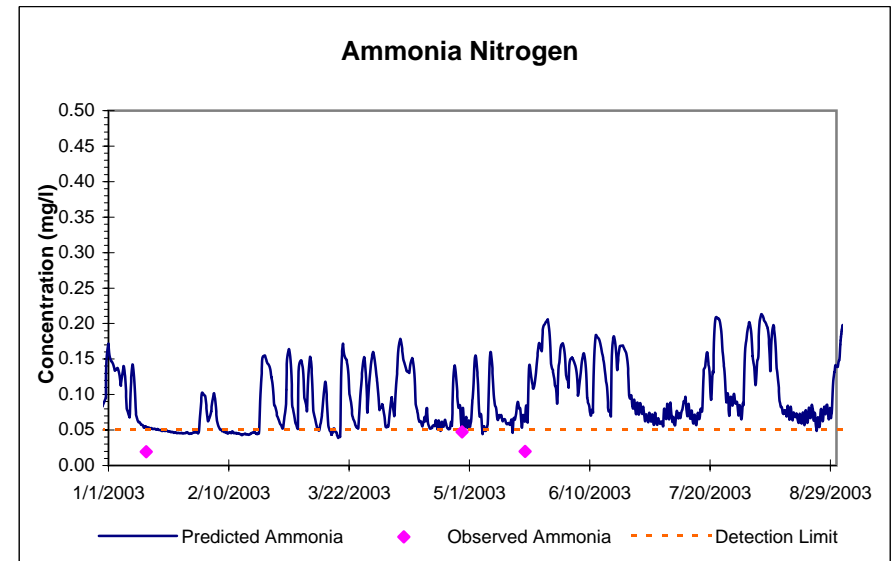
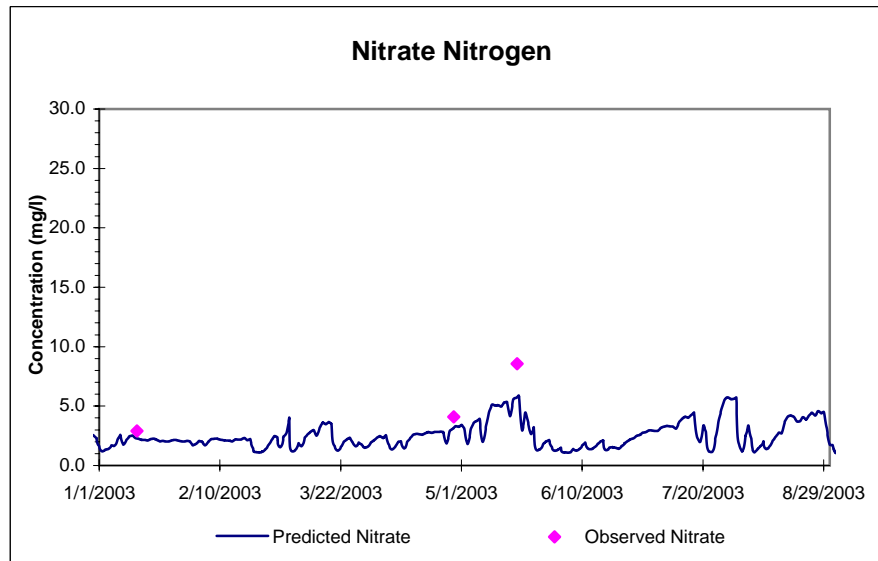
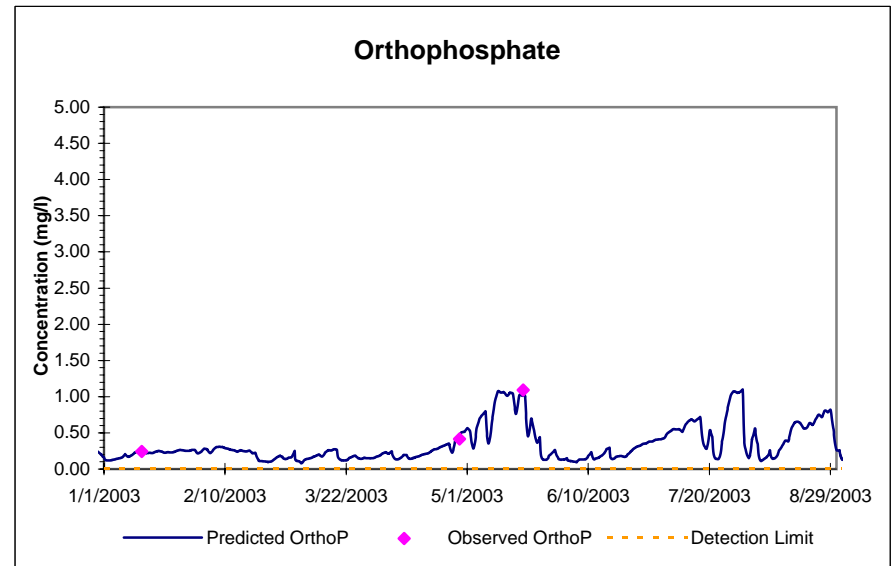
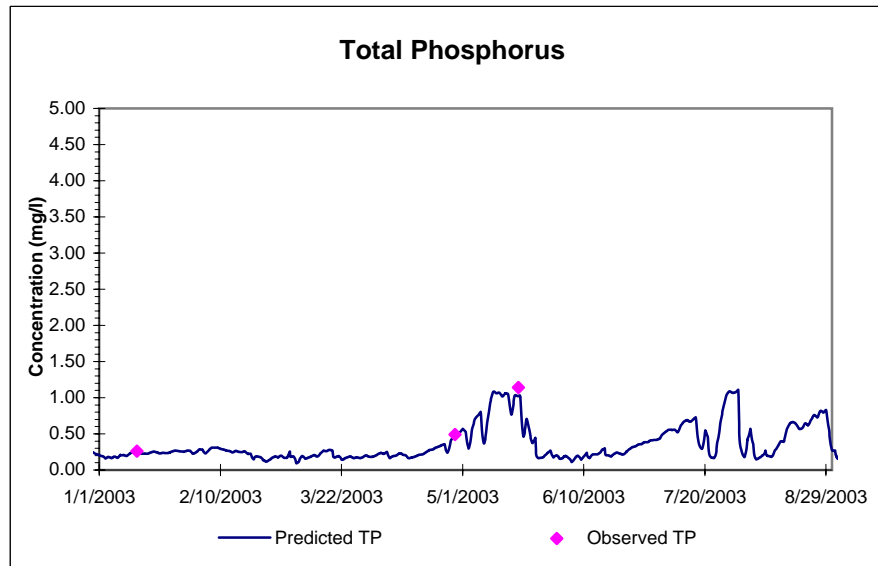
# Beden Brook at Aunt Molly Road in Hopewell (BB1)



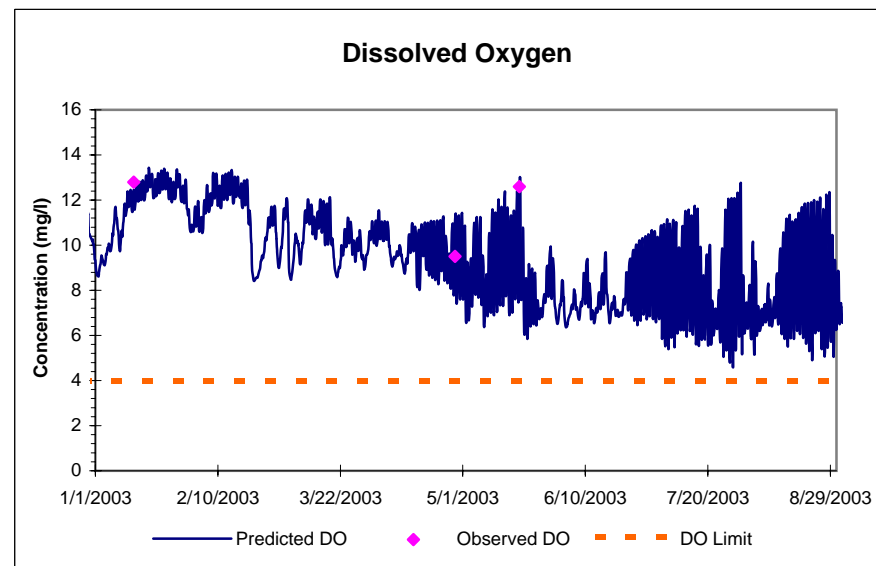
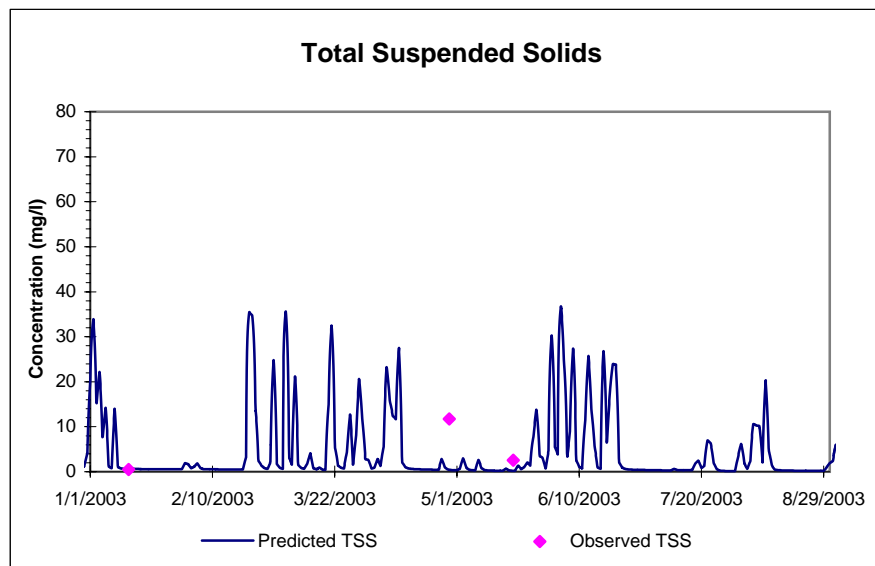
# Beden Brook at Aunt Molly Road in Hopewell (BB1)



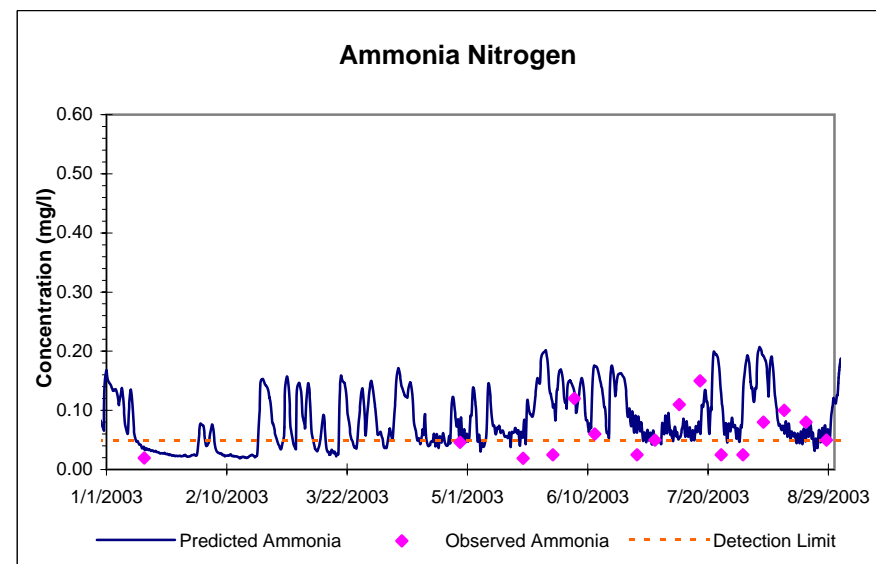
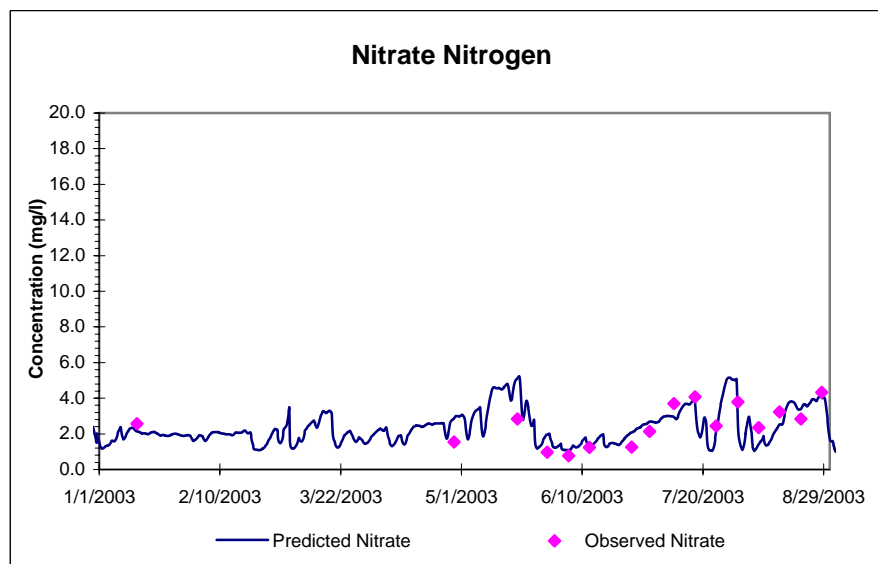
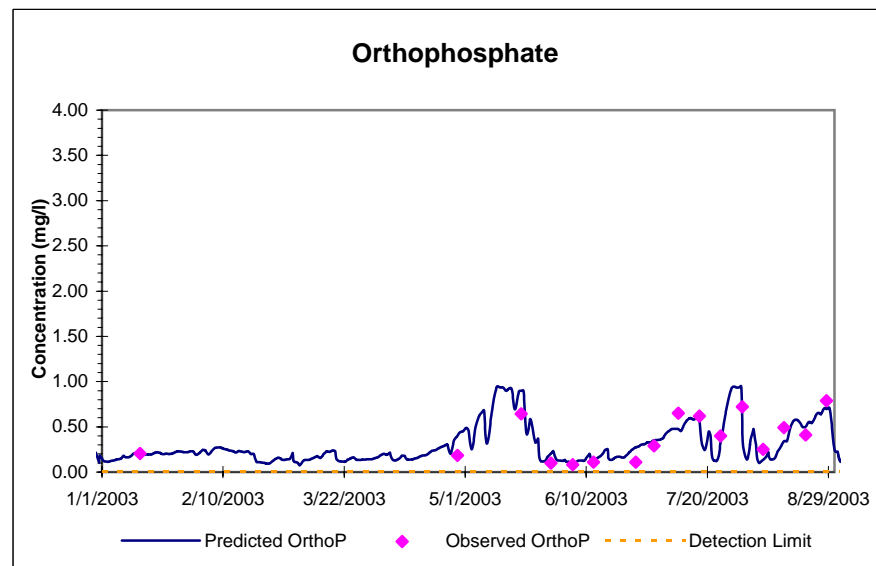
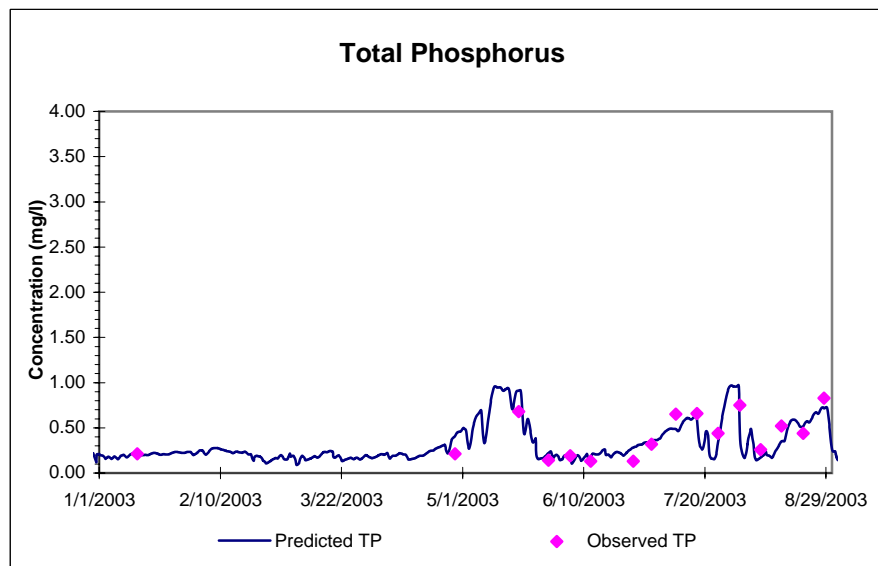
## Beden Brook Downstream of SBRSA-Hopewell STP



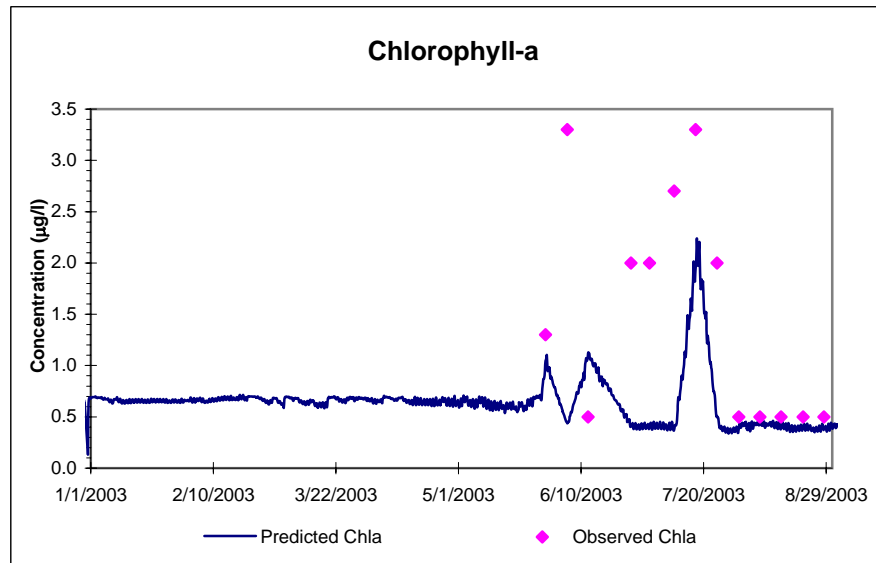
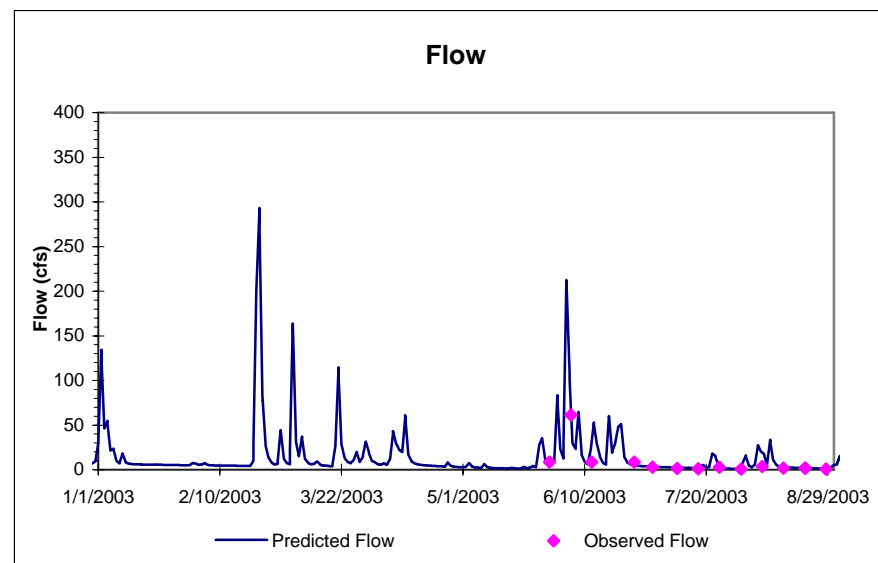
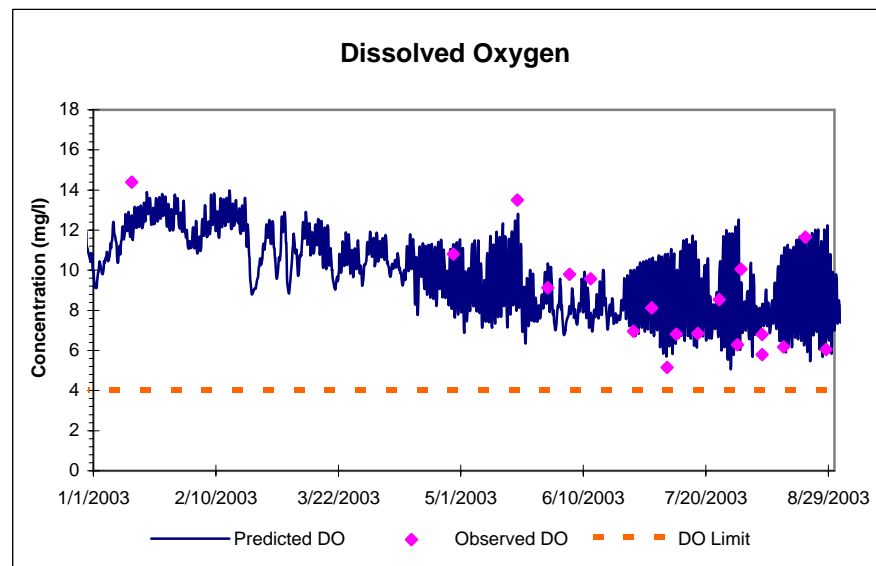
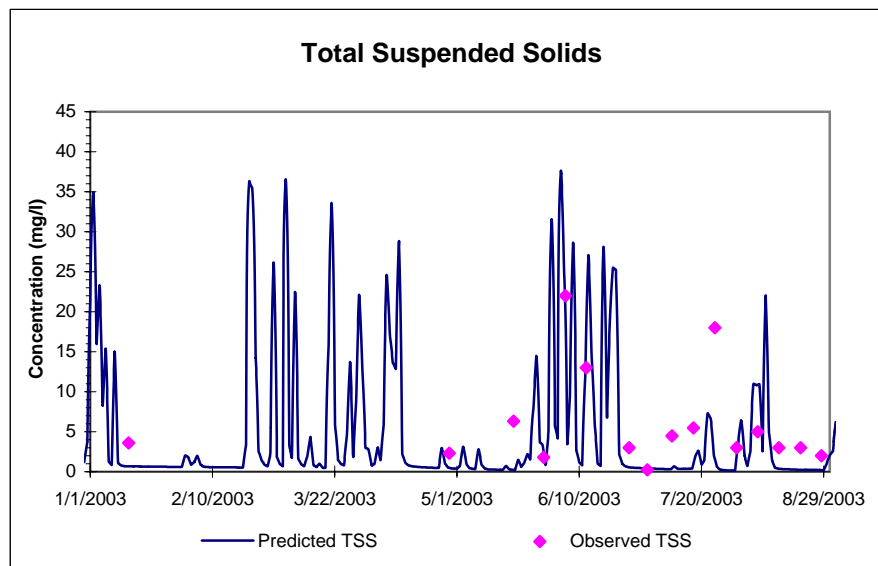
## Beden Brook Downstream of SBRSA-Hopewell STP



## Beden Brook at Province Line Rd. in Hopewell (BB2)

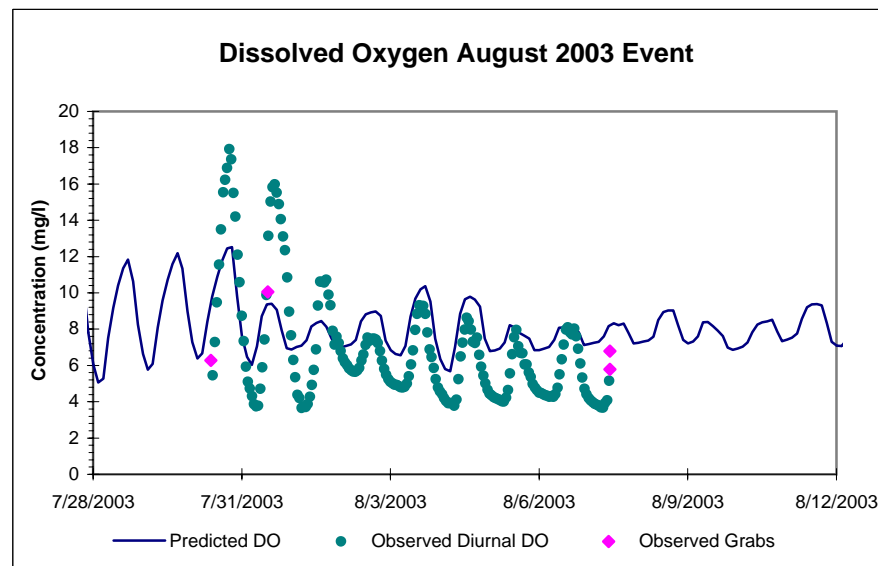
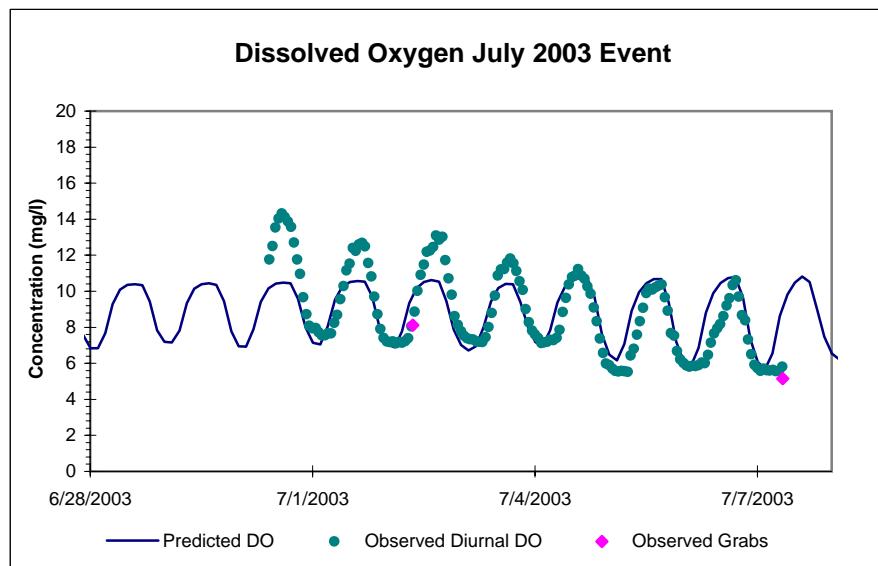


## Beden Brook at Province Line Rd. in Hopewell (BB2)

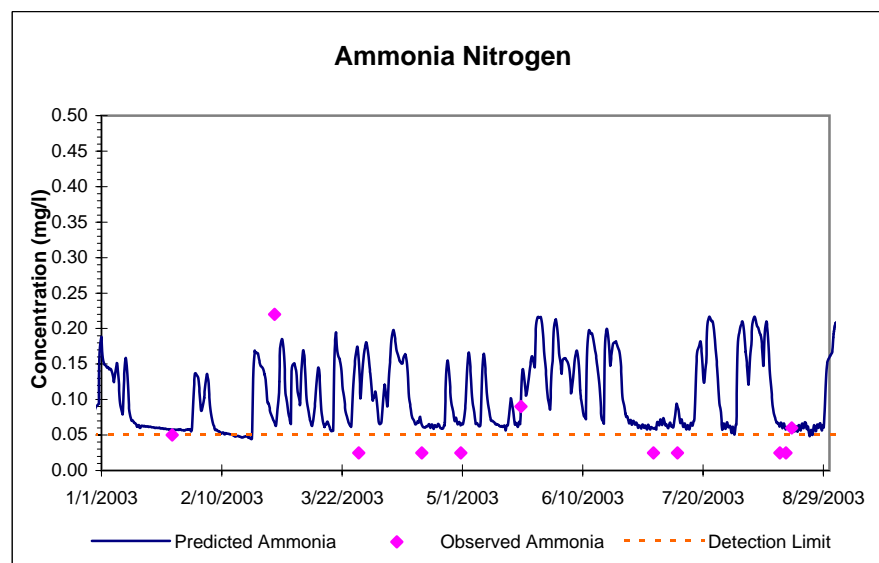
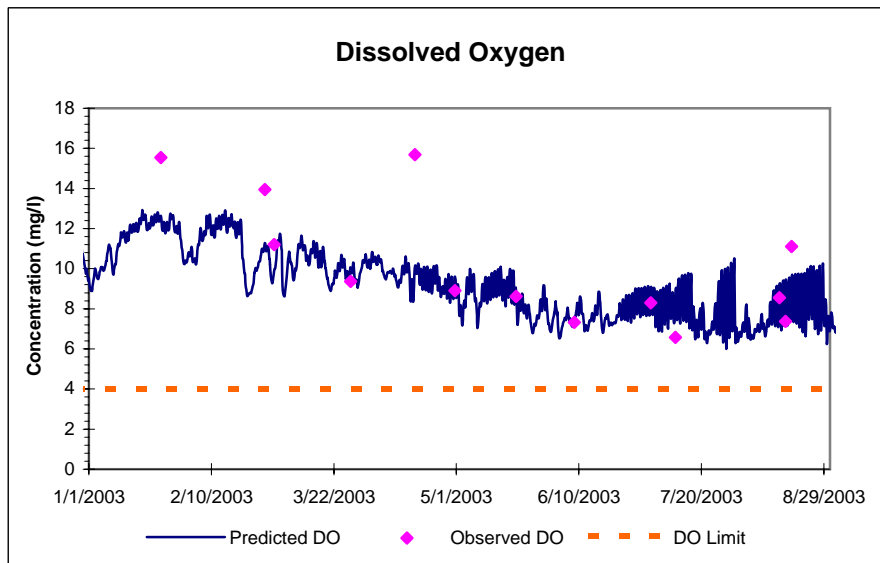
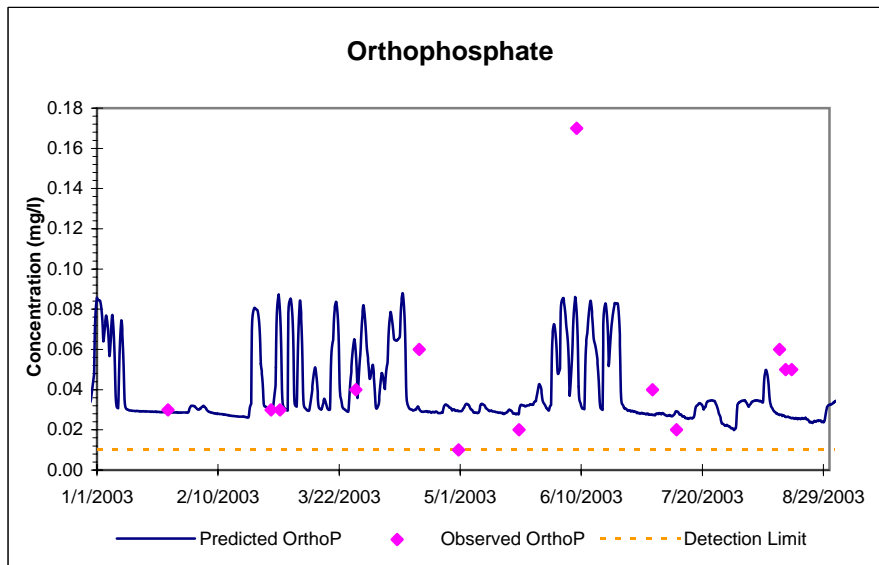
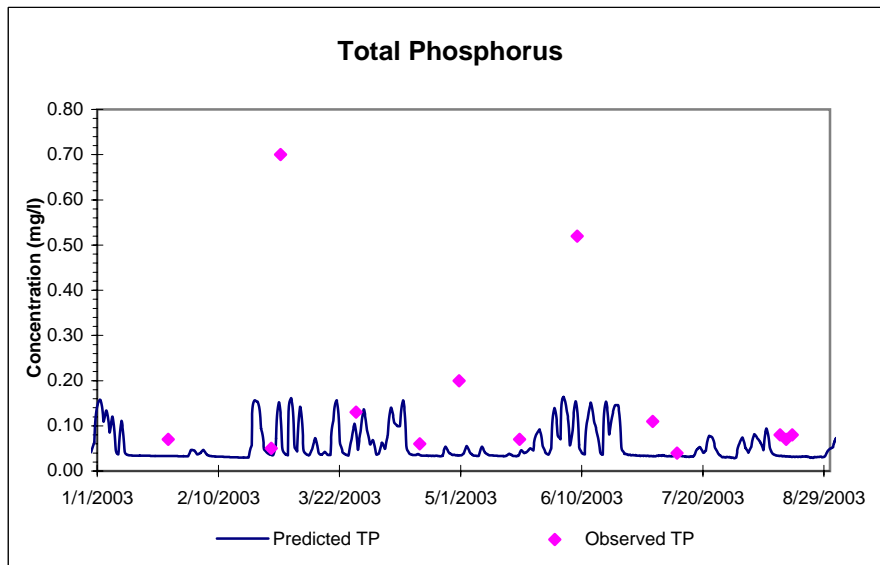




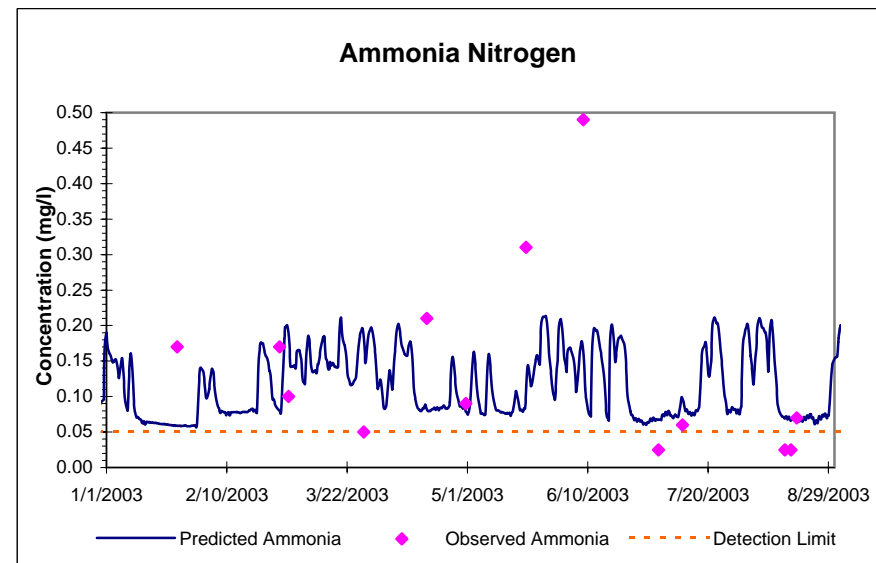
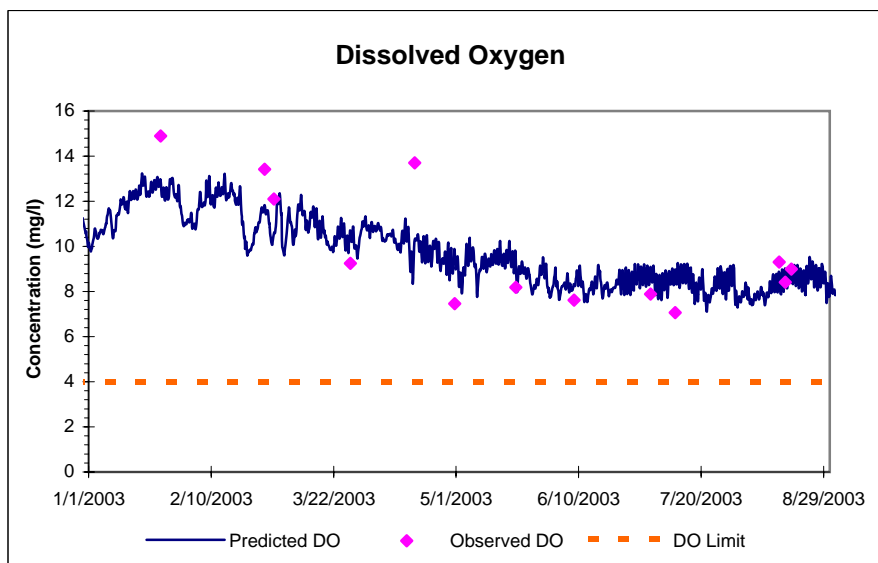
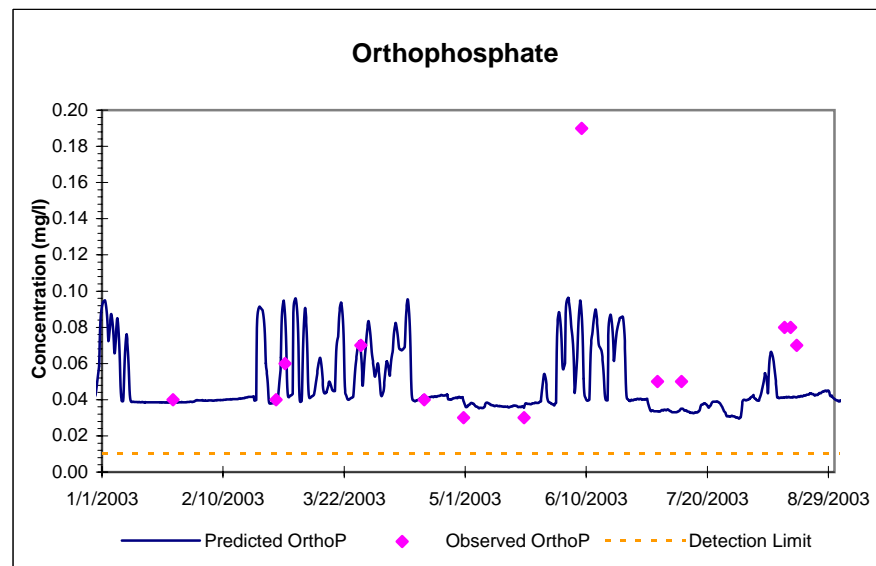
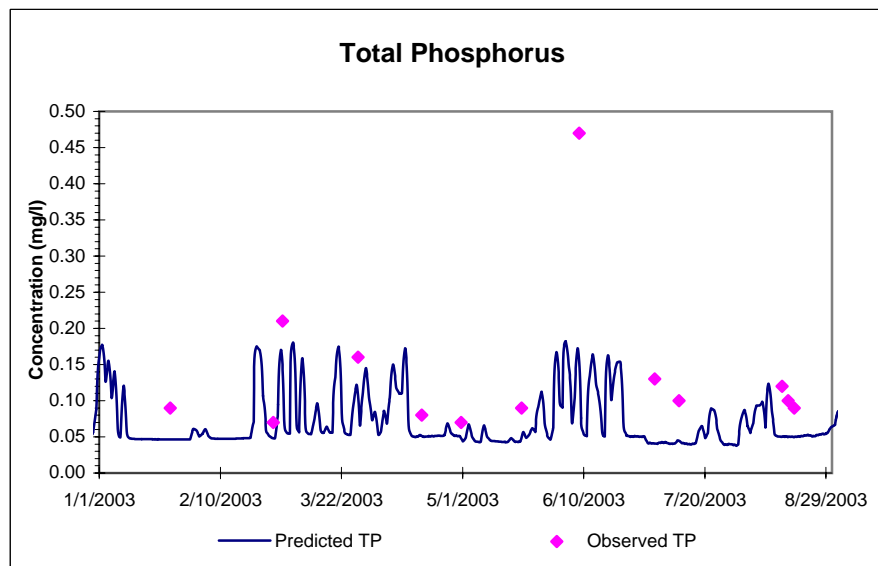
## Beden Brook at Province Line Rd. in Hopewell (BB2)



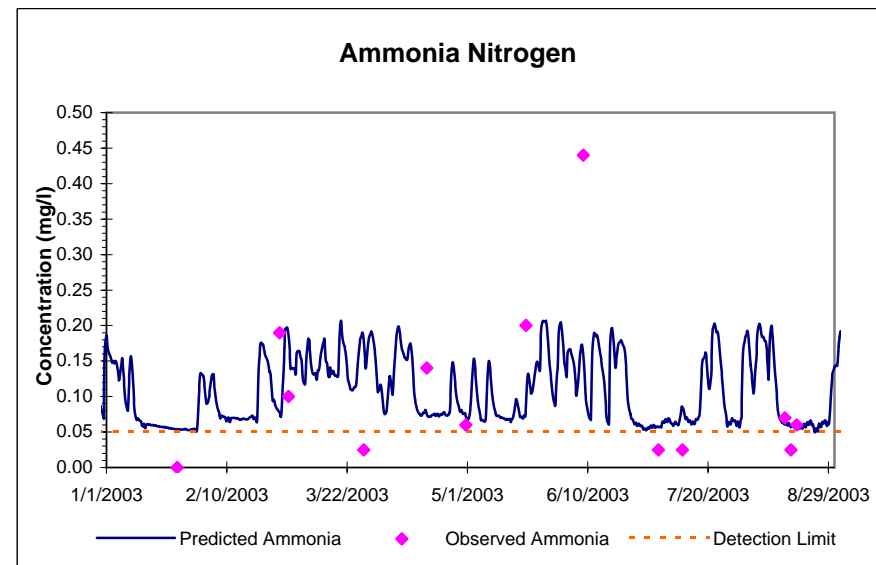
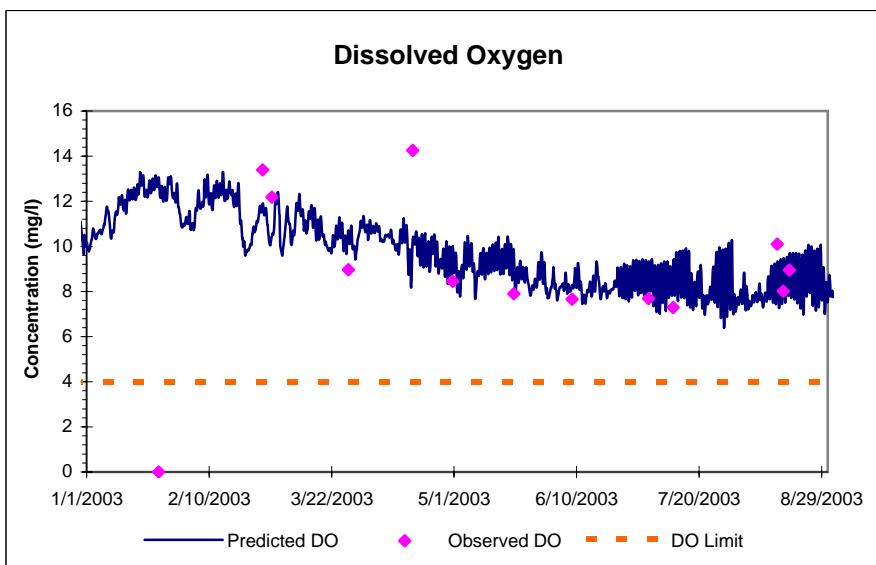
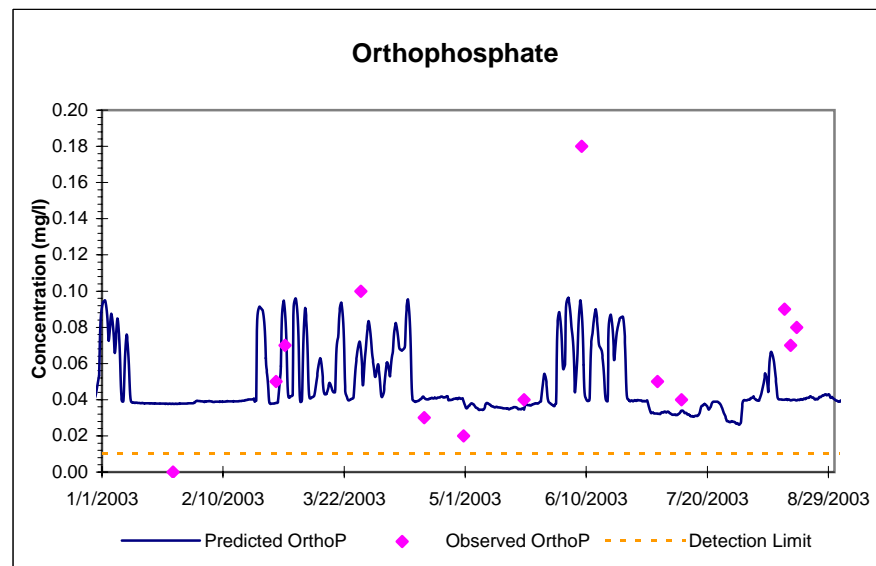
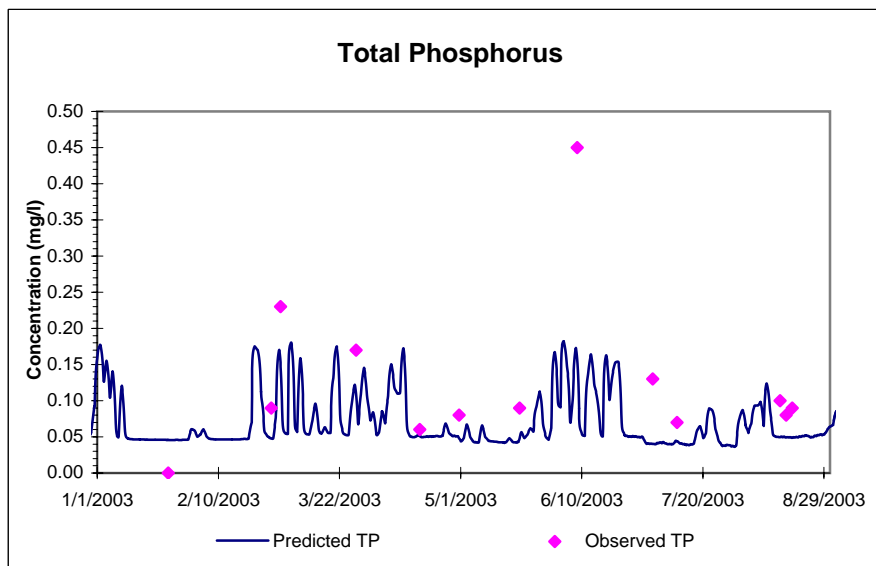
## Pike Run Upstream of Pike Brook STP in Montgomery



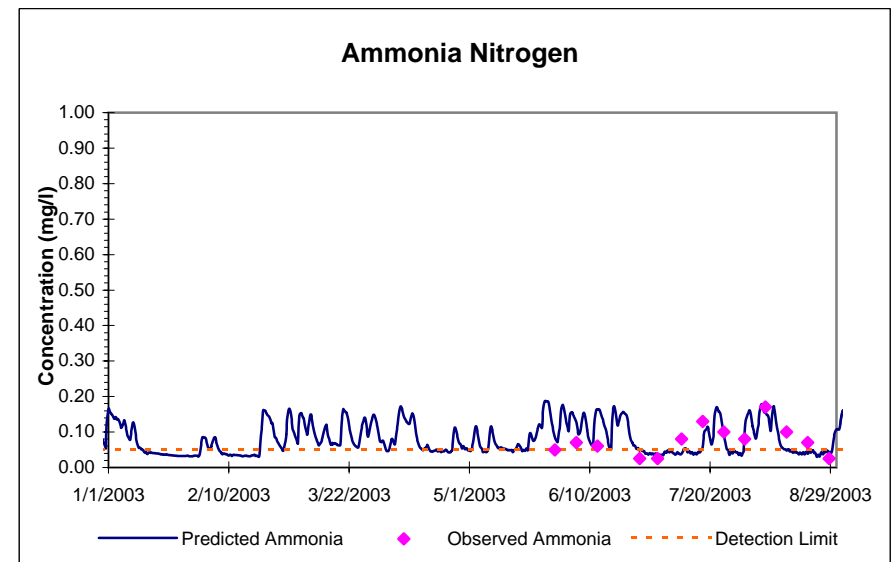
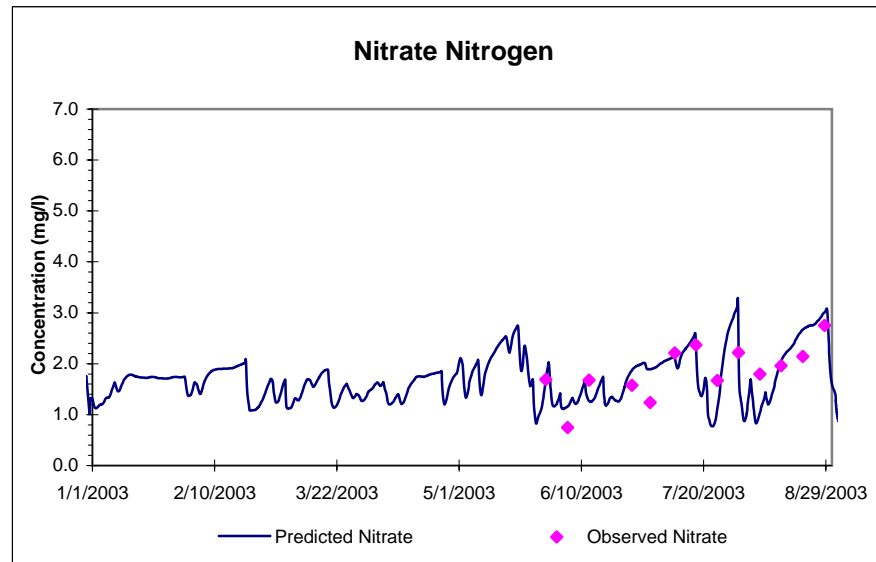
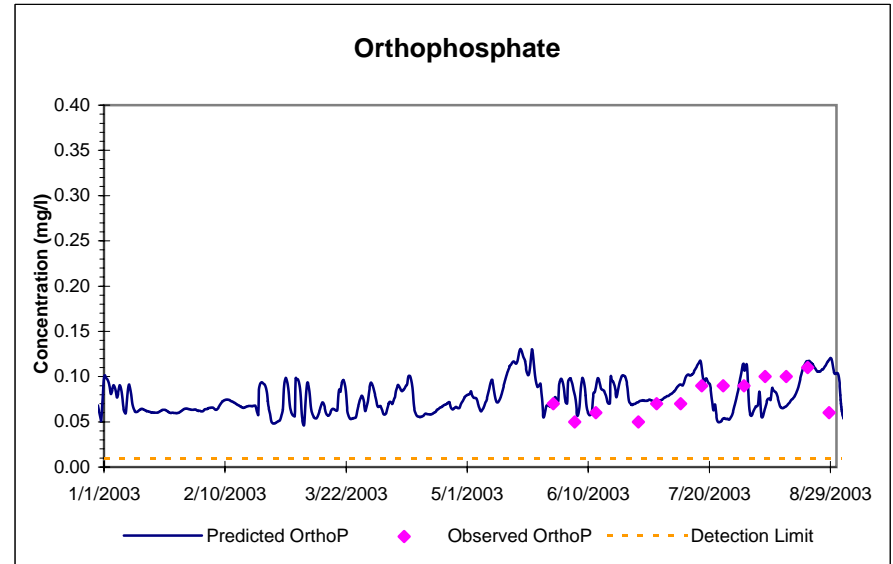
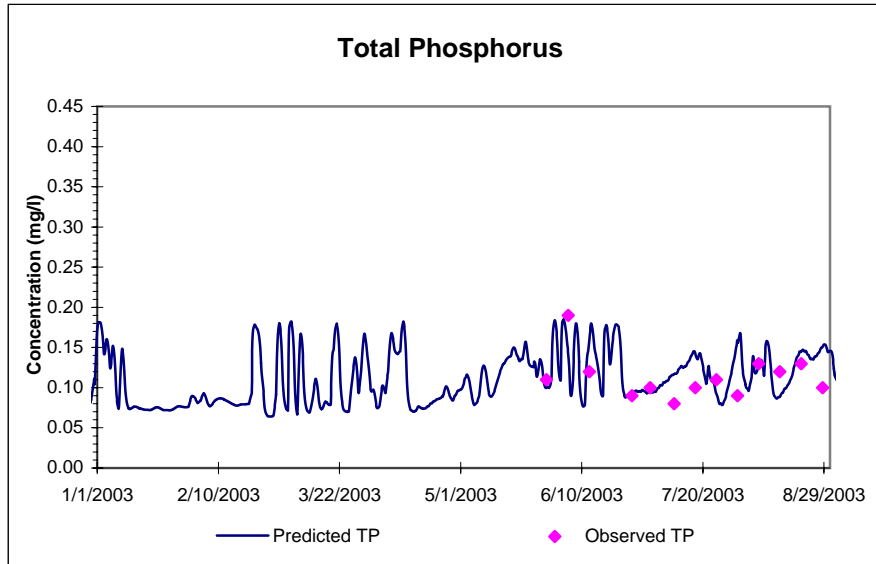
## Pike Brook upstream Oxbridge STP in Bridgepoint



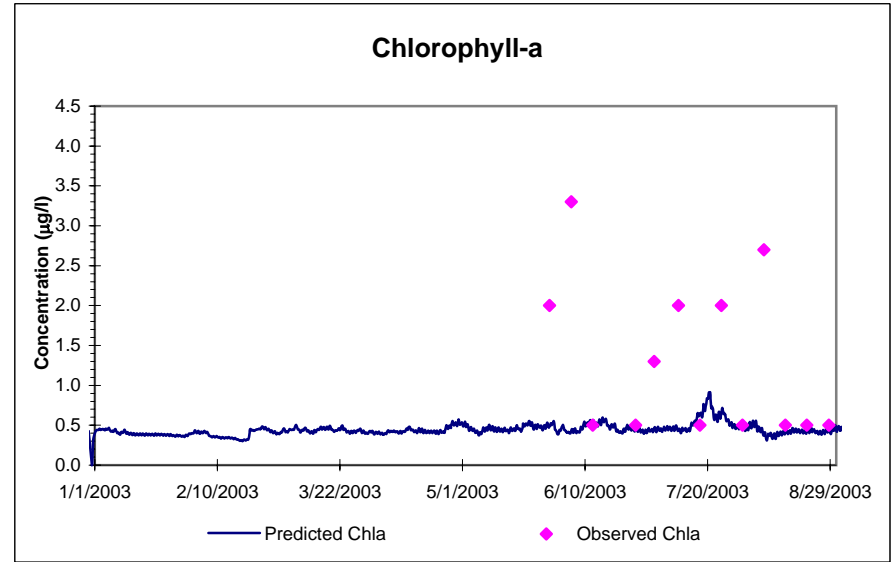
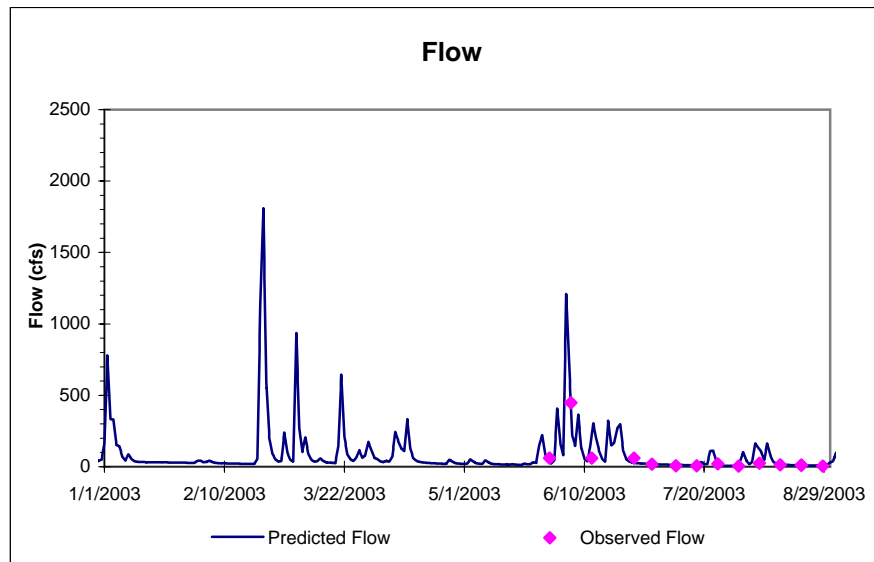
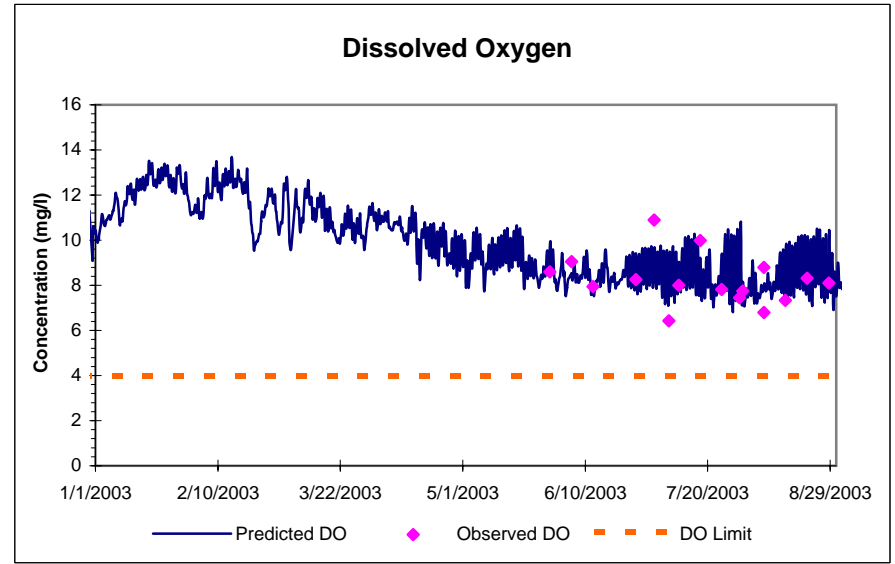
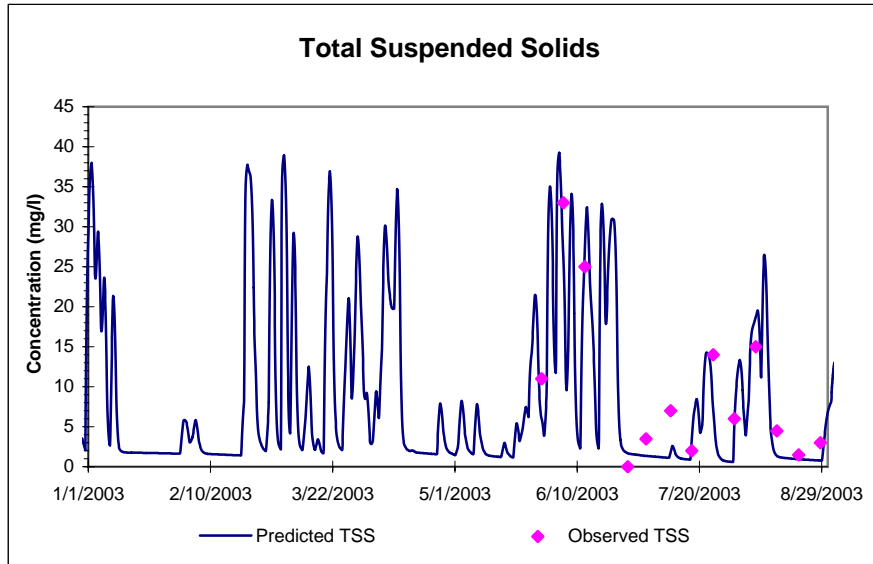
## Pike Brook Upstream of Beden Brook Confluence in Montgomery



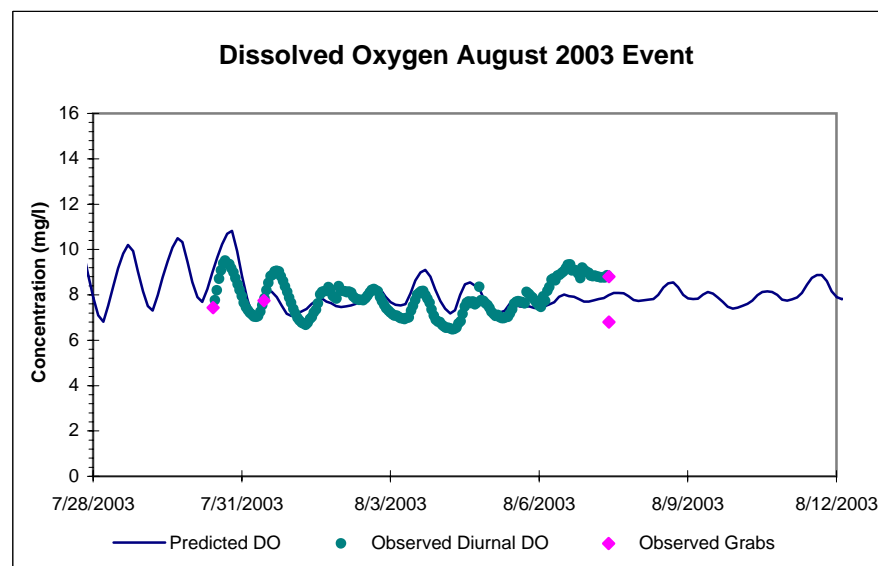
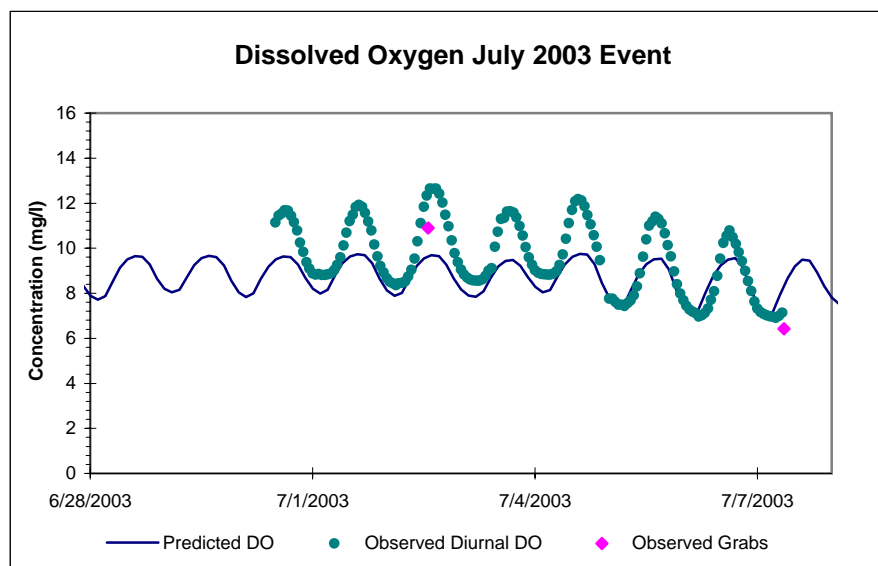
## Beden Brook Downstream of Pike Brook Confluence (BB3)



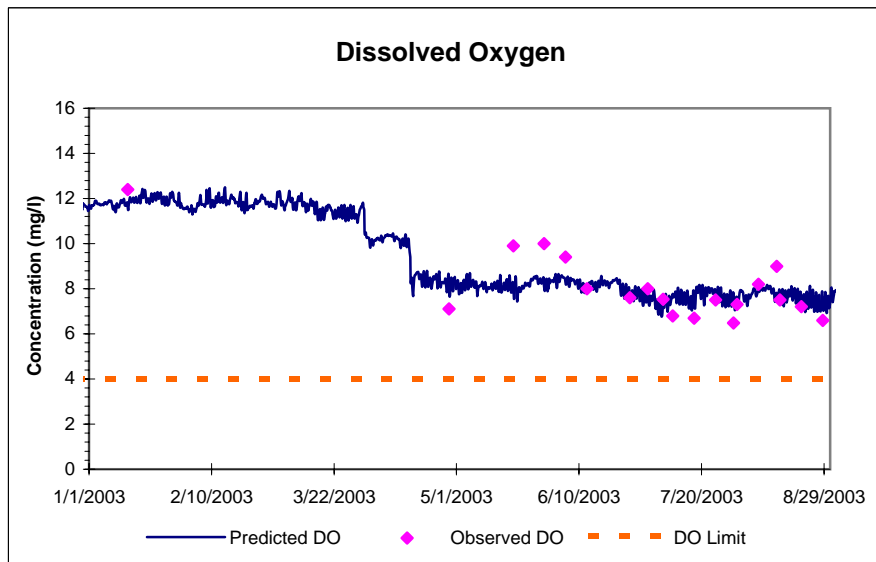
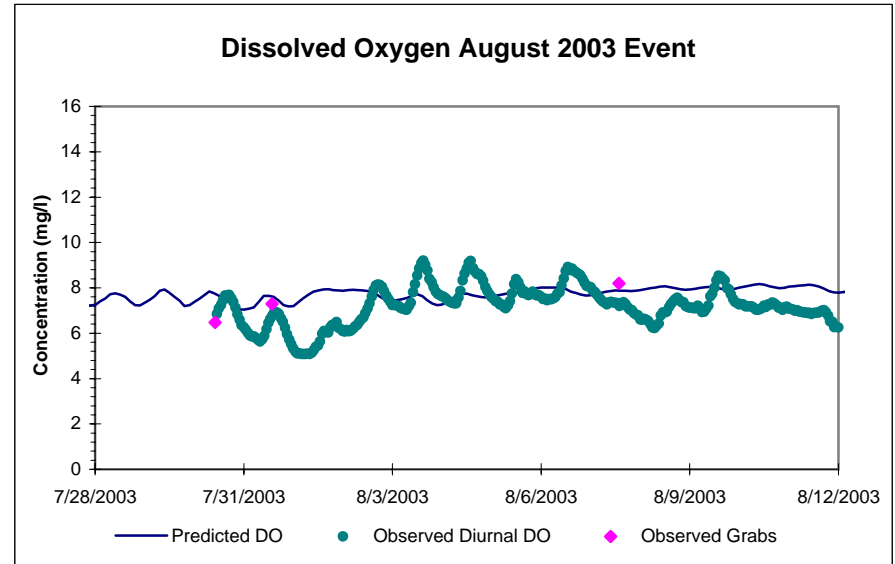
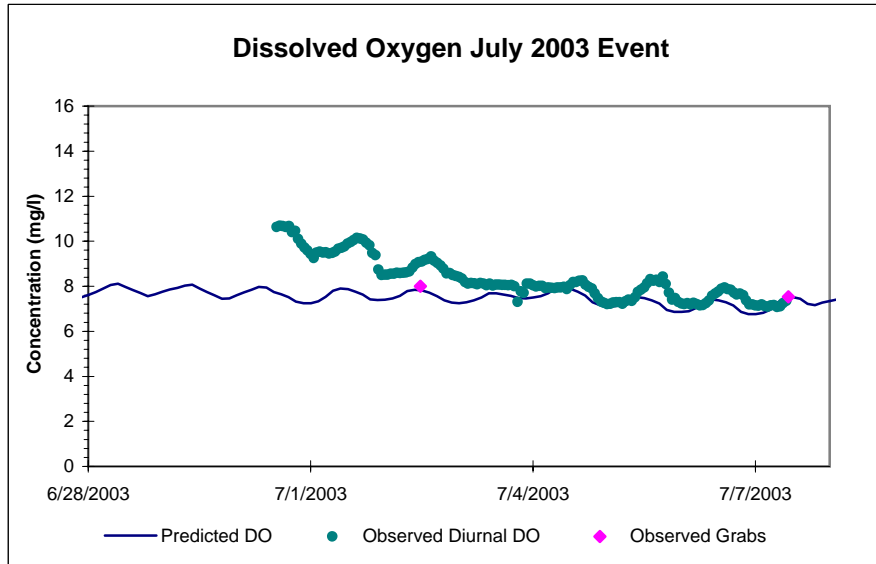
## Beden Brook Downstream of Pike Brook Confluence (BB3)



## Beden Brook Downstream of Pike Brook Confluence (BB3)

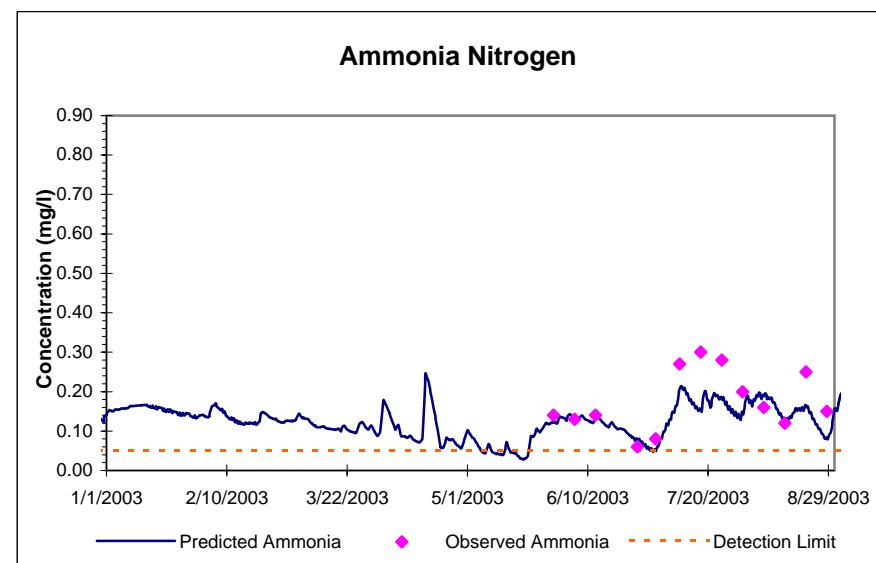
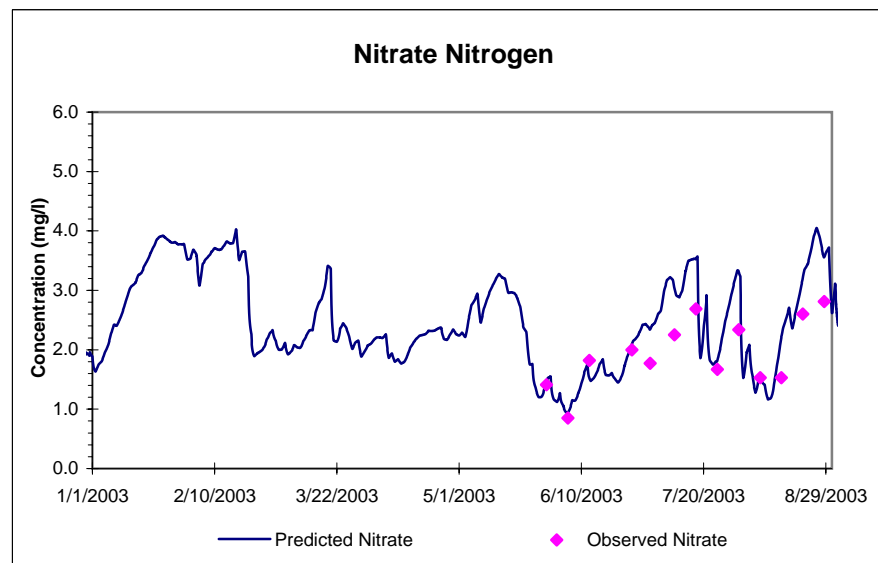
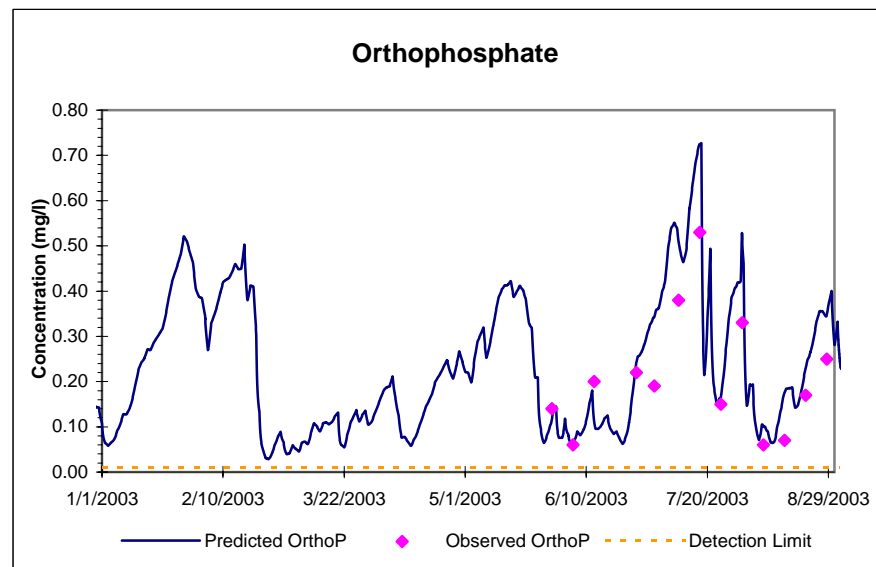
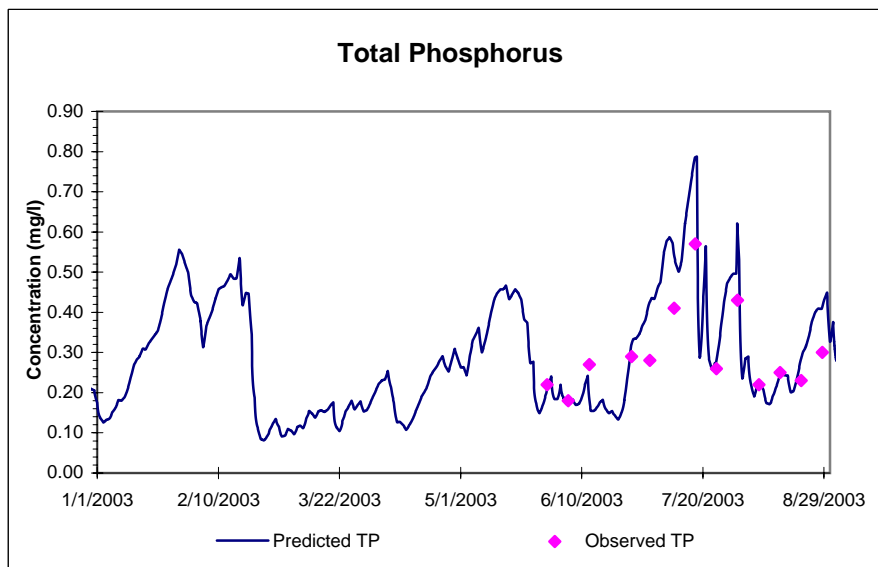


## Lower Millstone River Downstream of Carnegie Lake (M2)

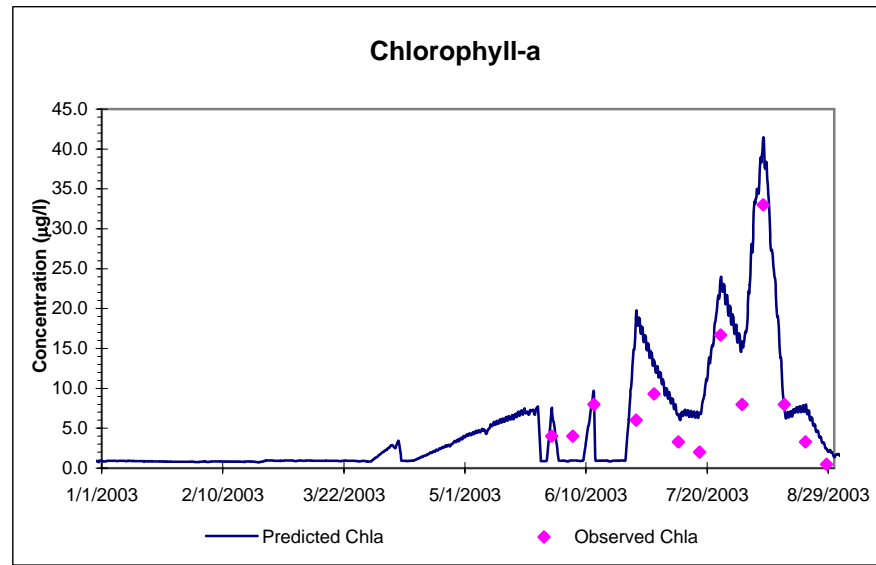
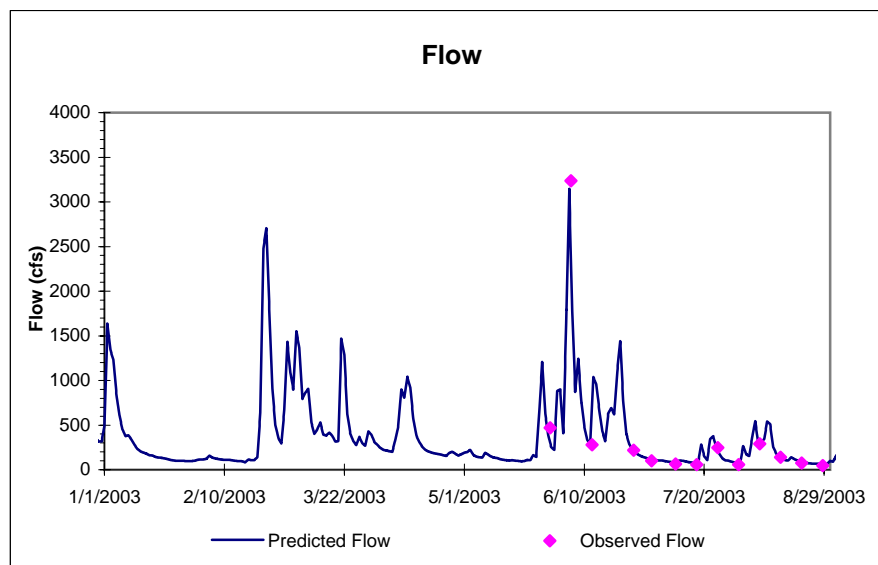
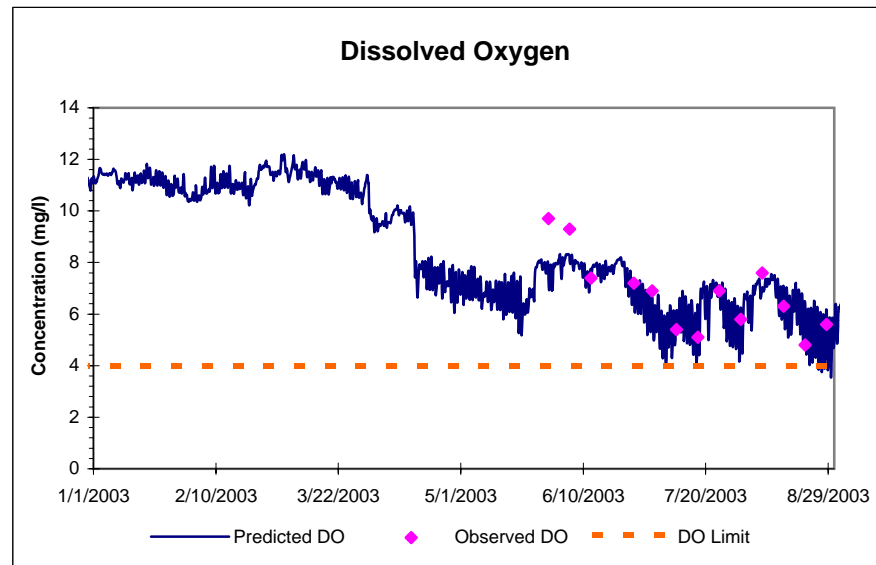
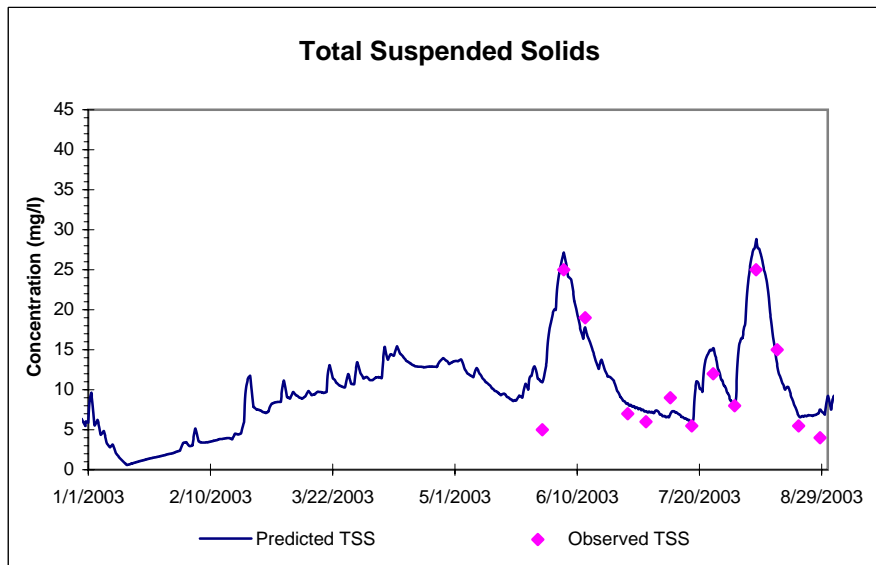




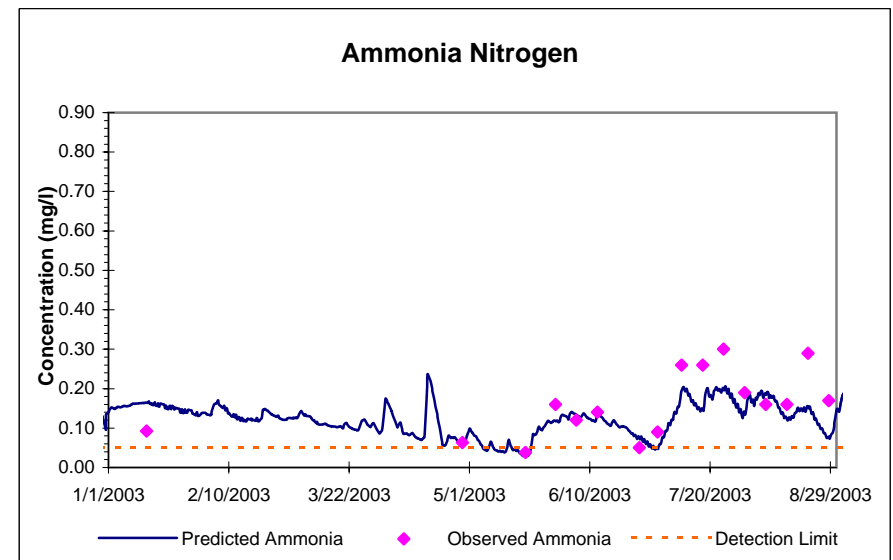
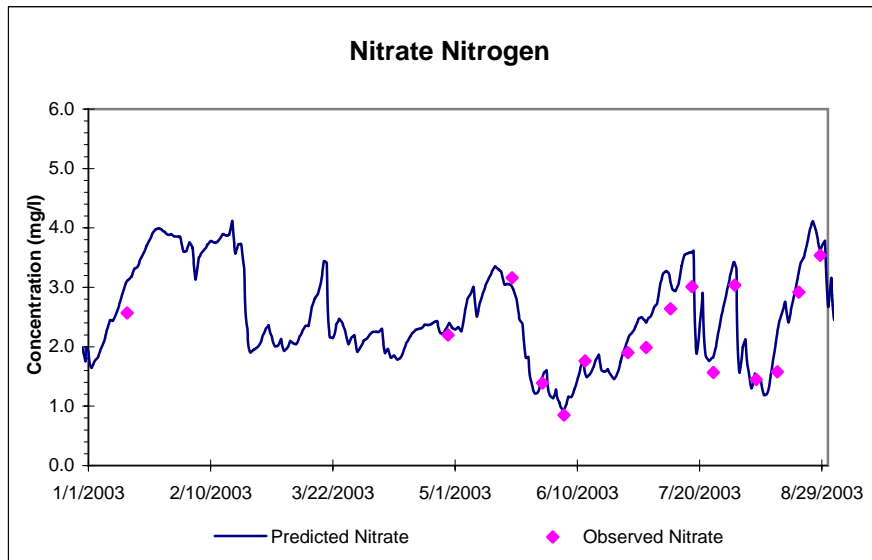
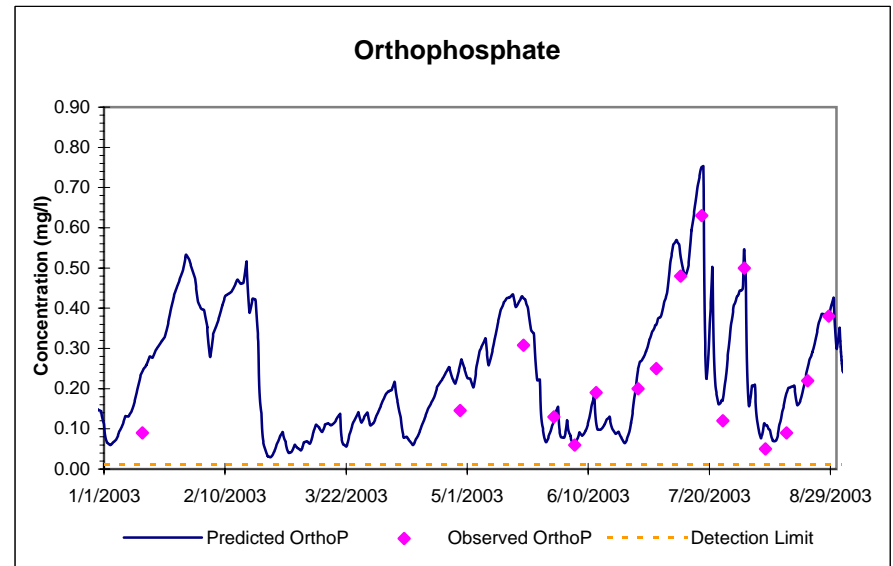
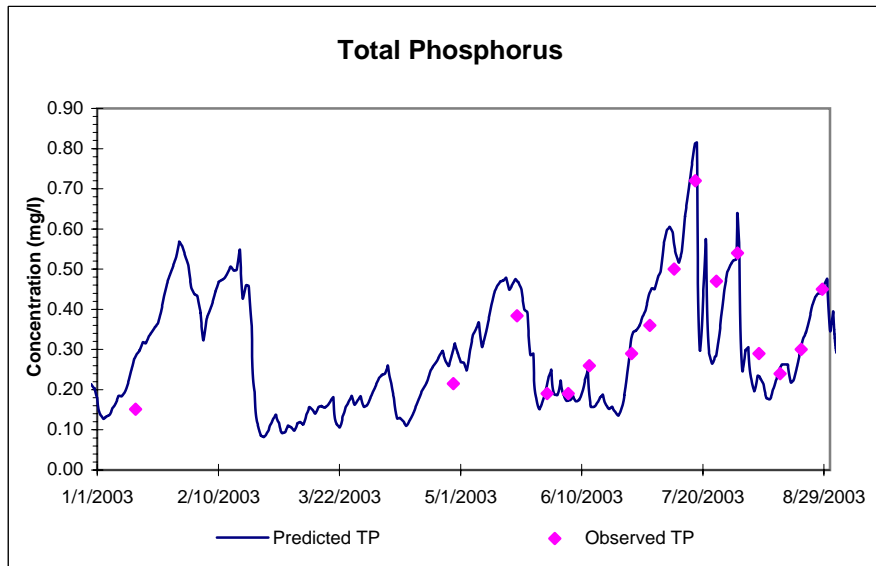
## Lower Millstone River Upstream of Montgomery Stage II STP (M3)



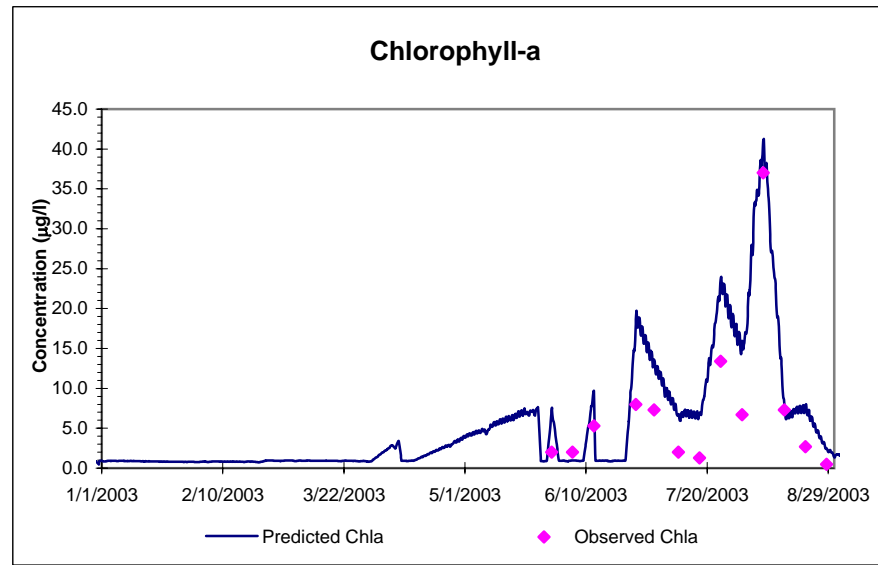
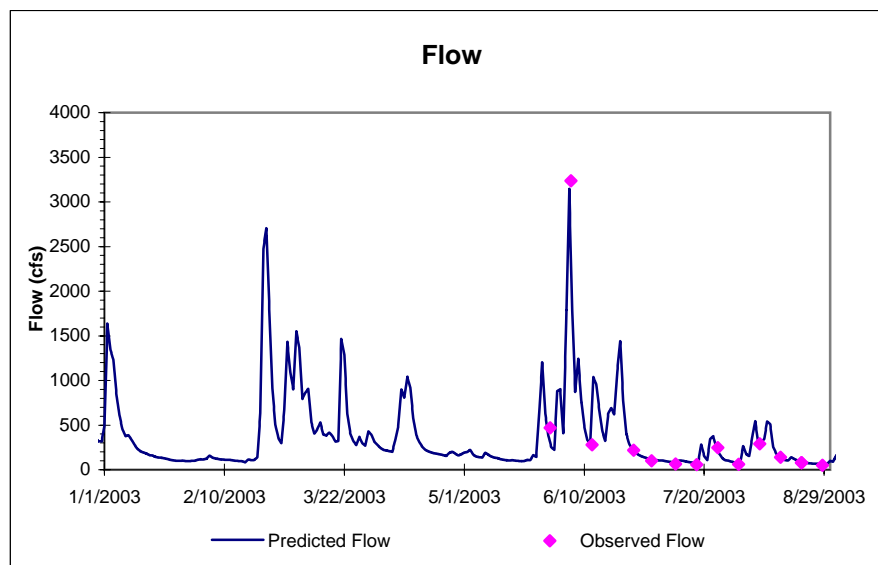
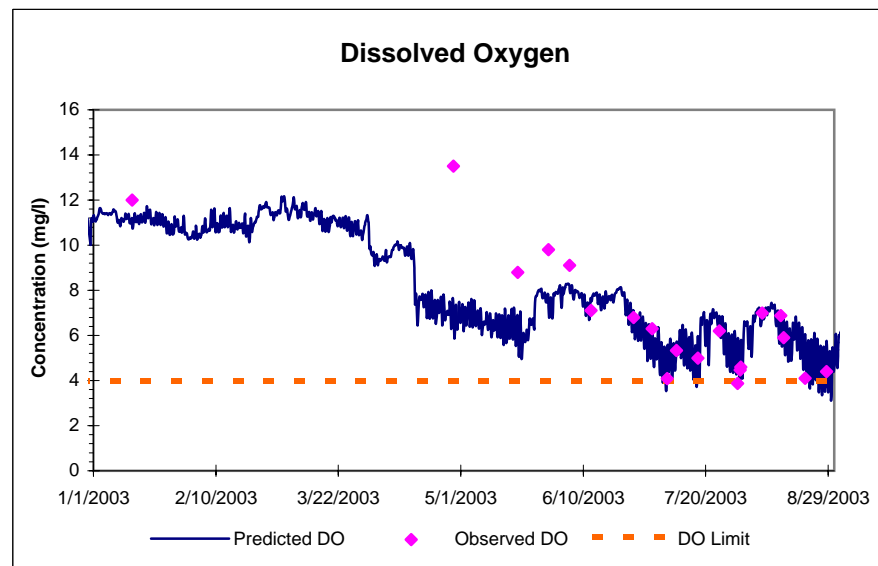
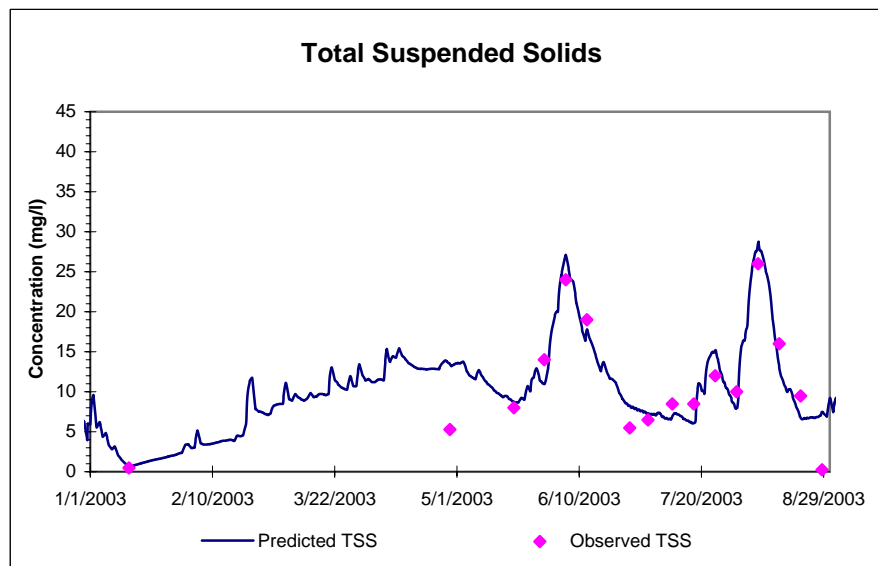
## Lower Millstone River Upstream of Montgomery Stage II STP (M3)



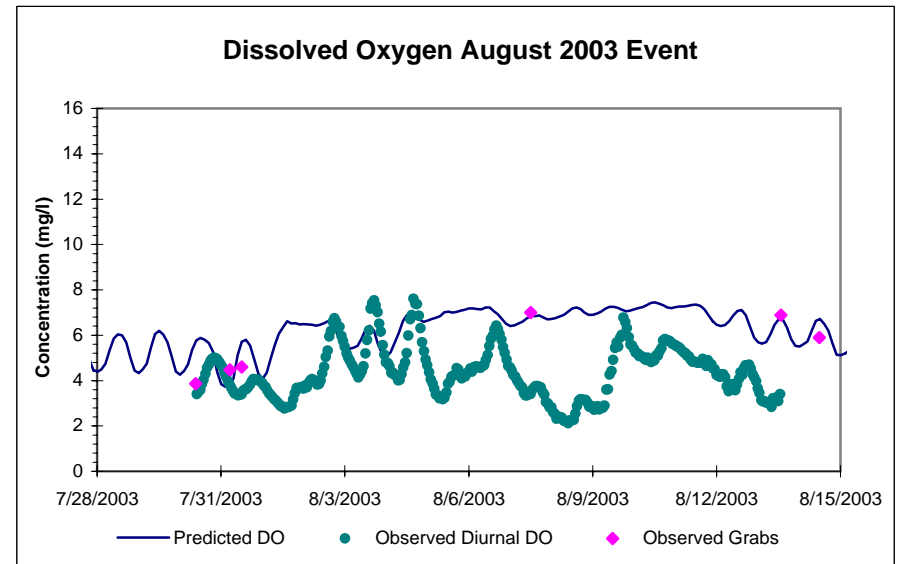
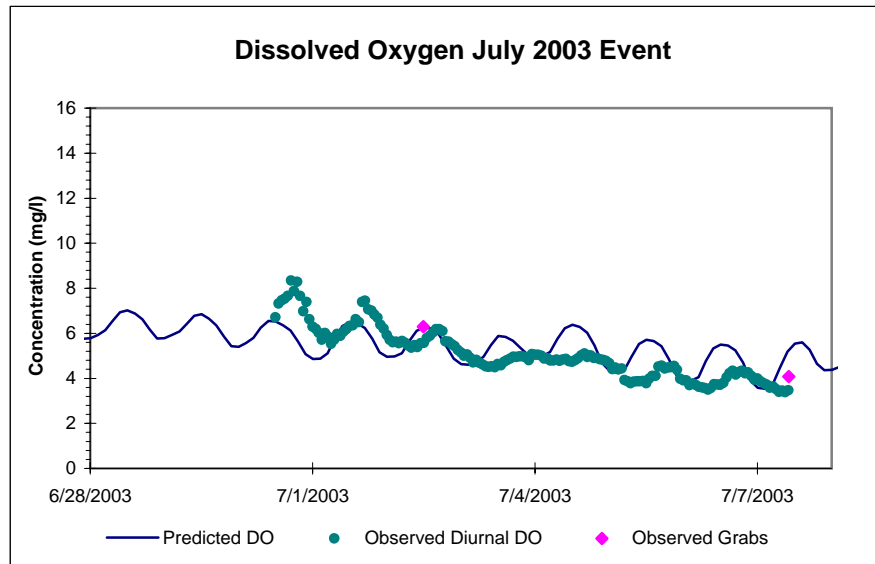
## Lower Millstone River at Route 518 in Rocky Hill (M4)



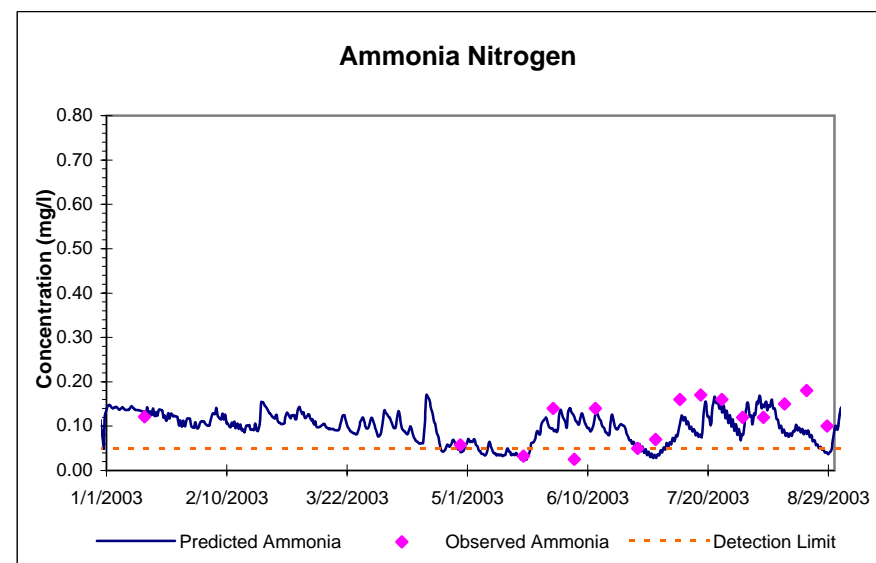
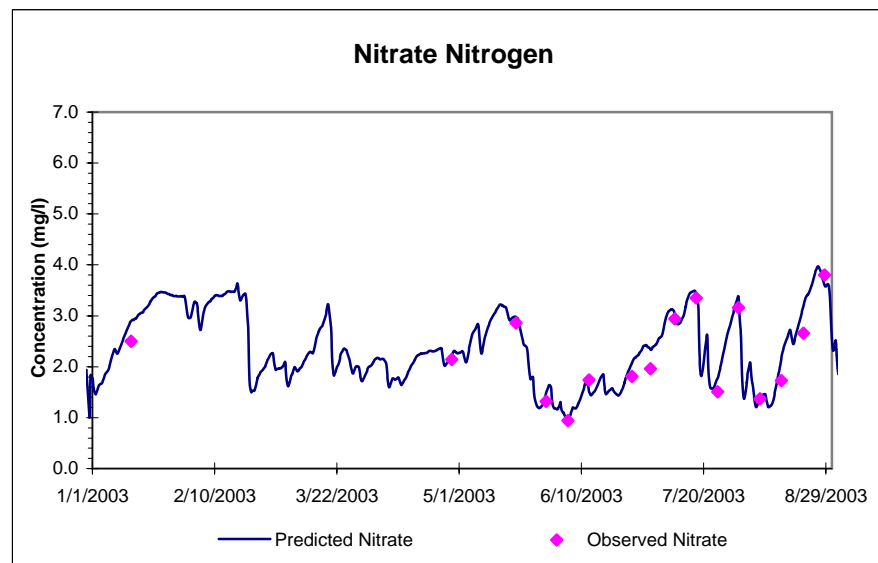
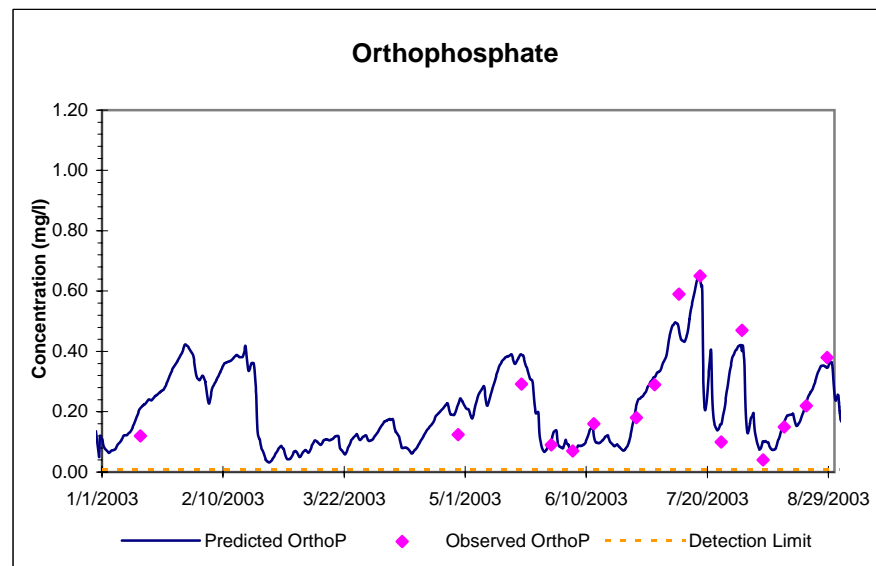
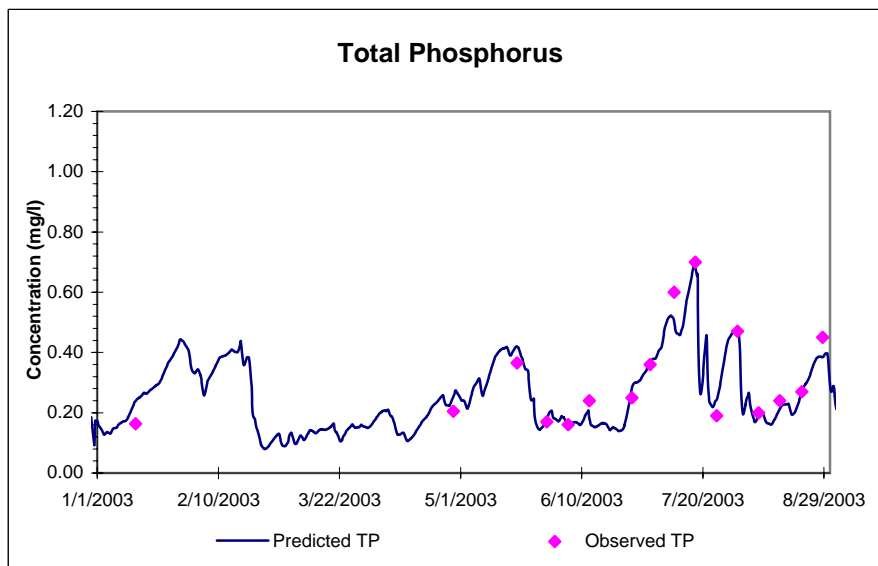
## Lower Millstone River at Route 518 in Rocky Hill (M4)



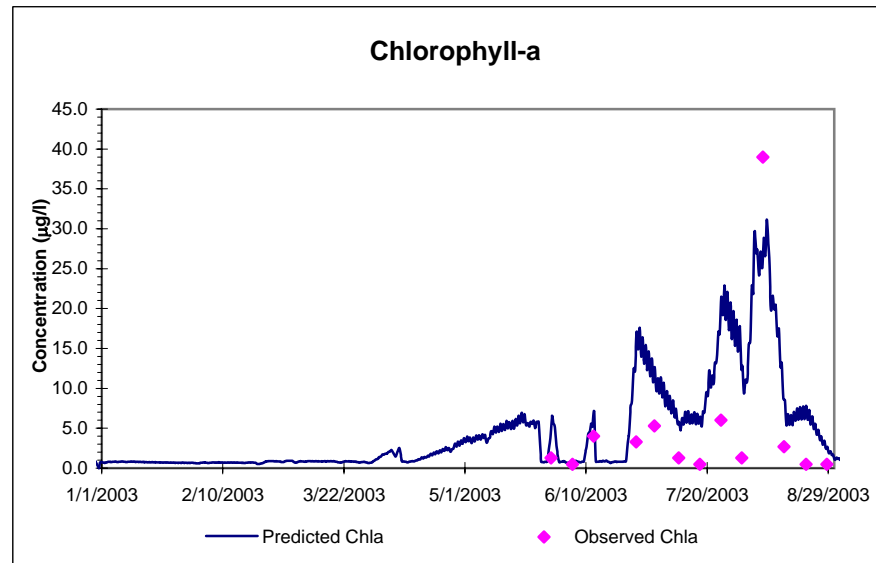
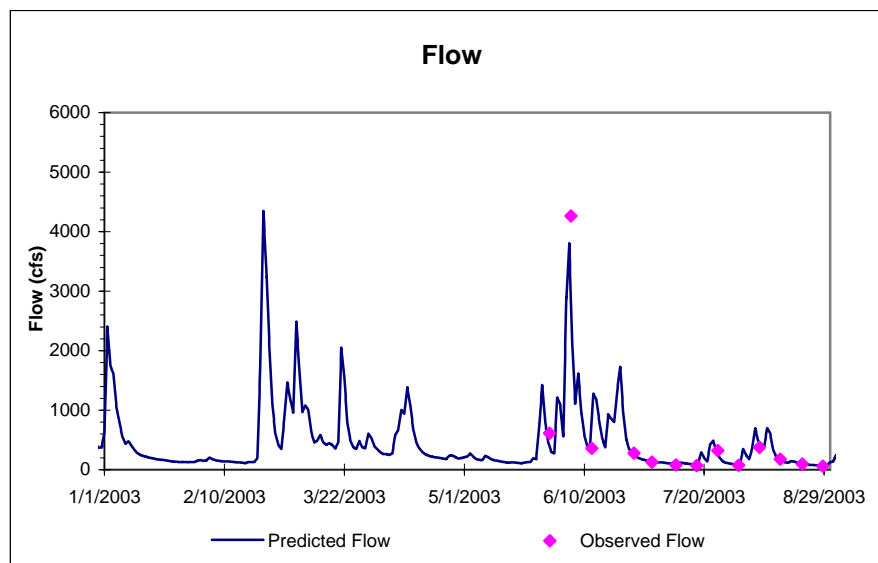
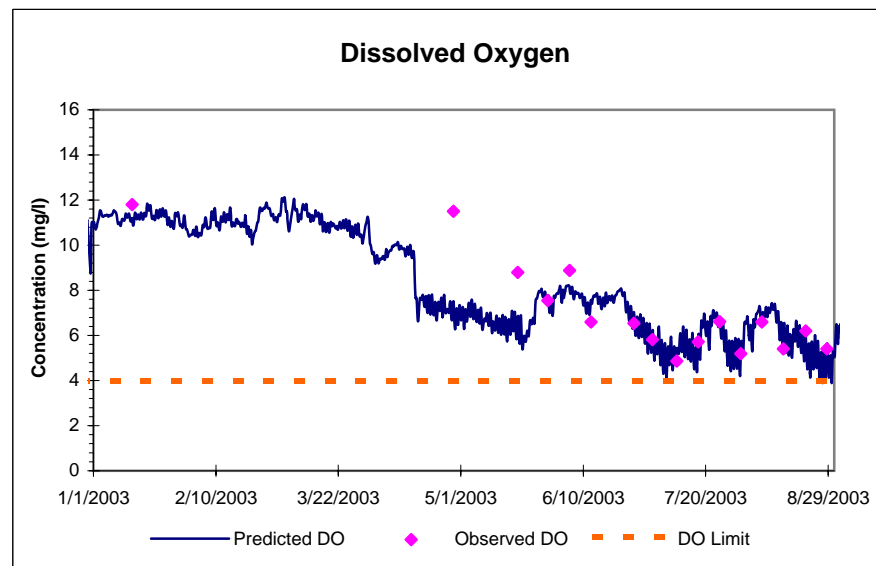
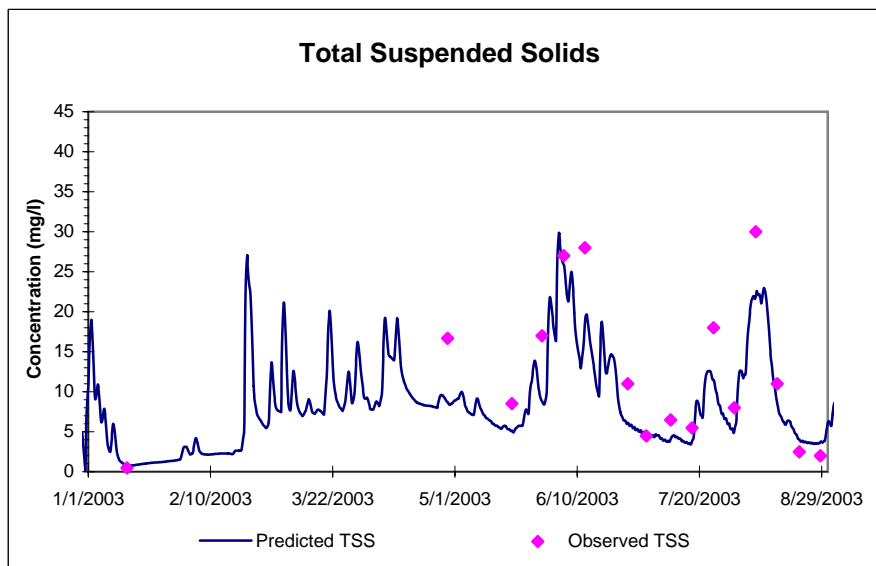
## Lower Millstone River at Route 518 in Rocky Hill (M4)



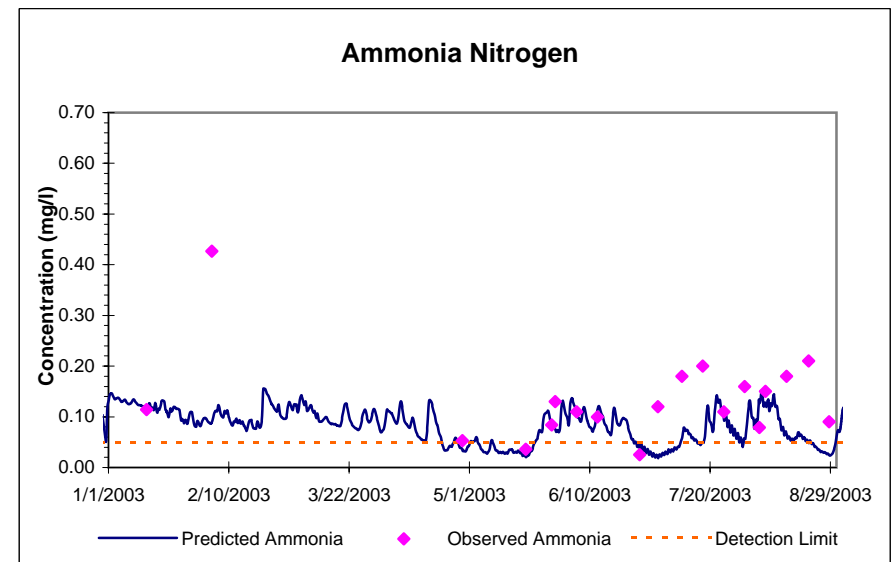
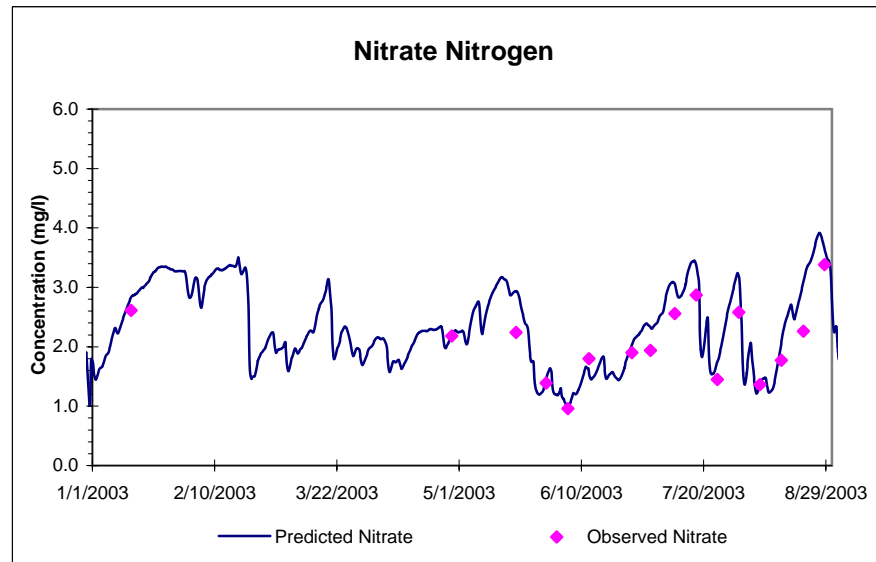
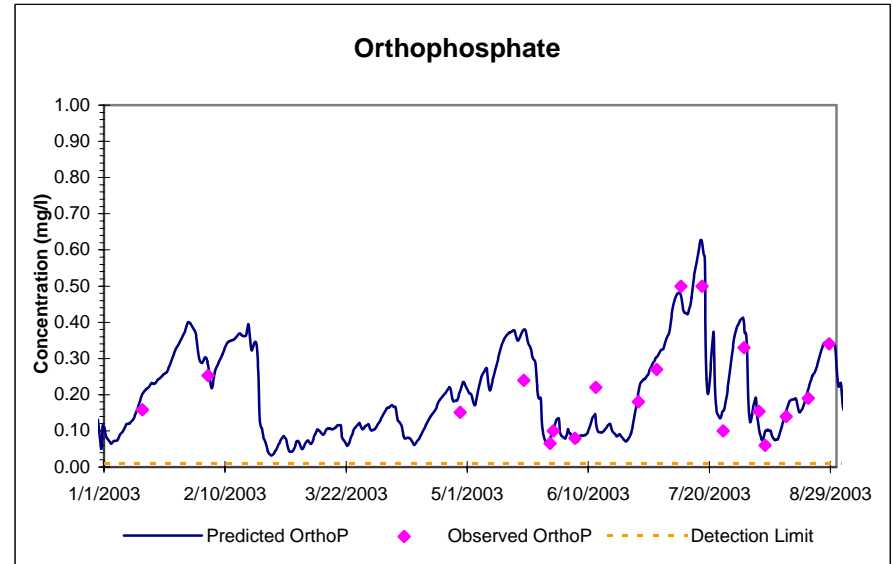
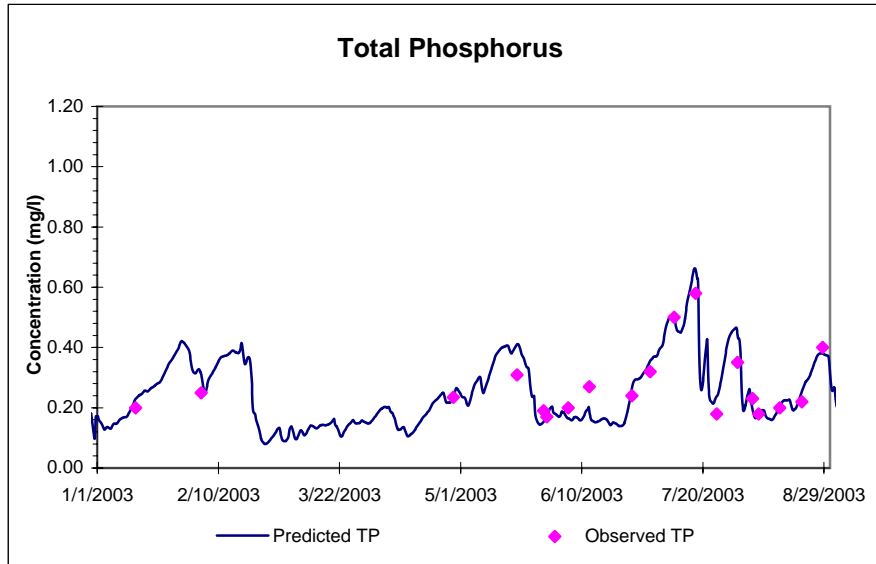
## Lower Millstone River at Griggstown Causeway (M5)



## Lower Millstone River at Griggstown Causeway (M5)

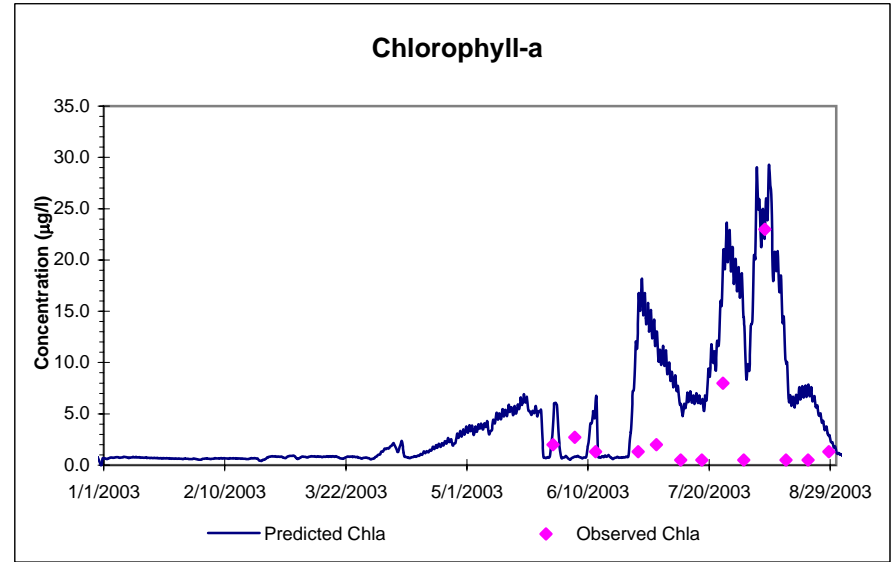
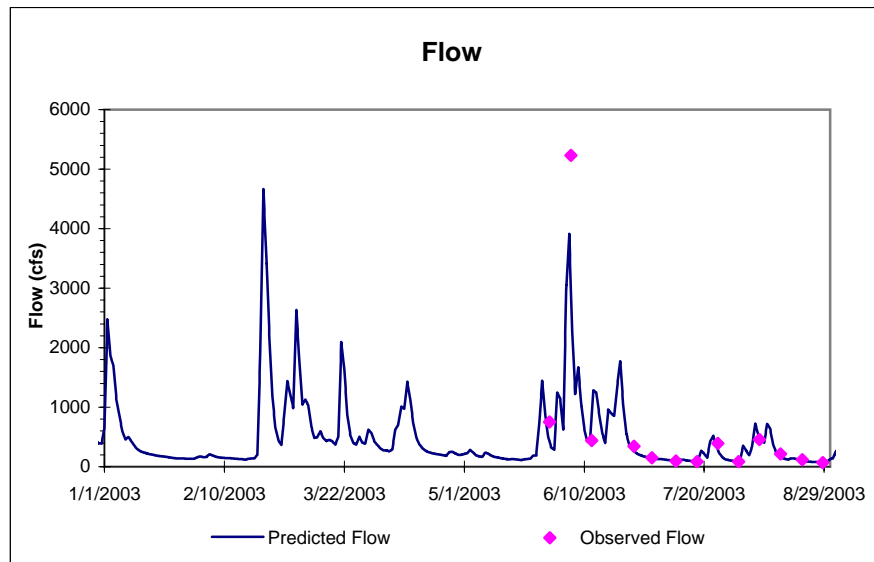
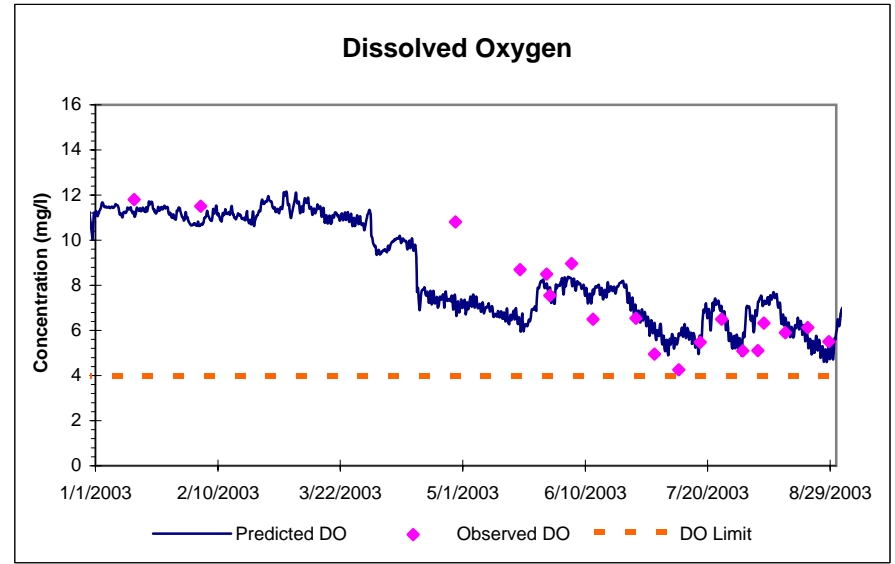
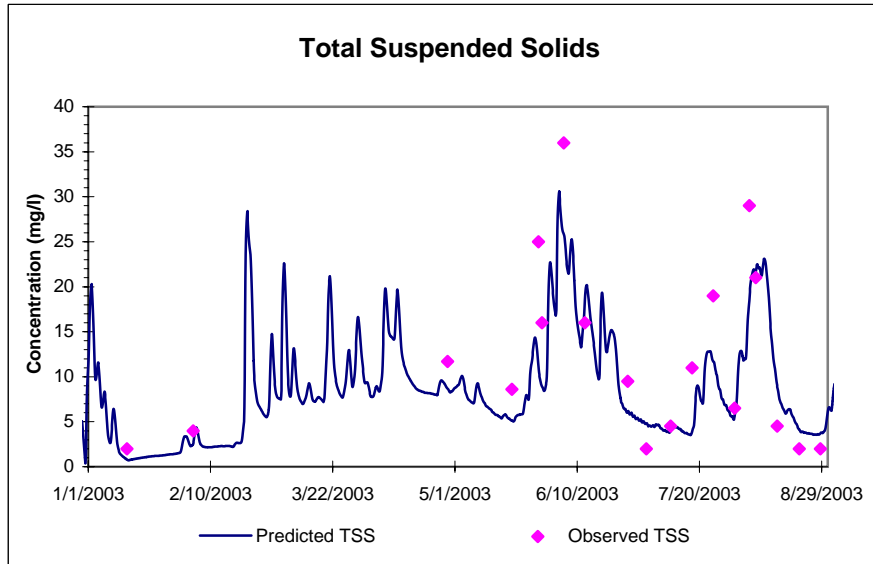


## Lower Millstone River at Blackwells Mills Rd. (M6, USGS 01402000)

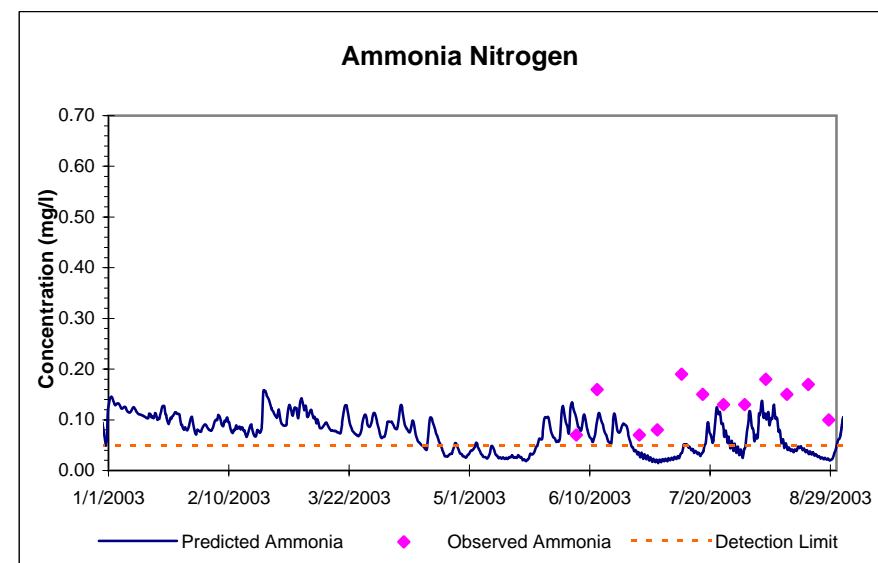
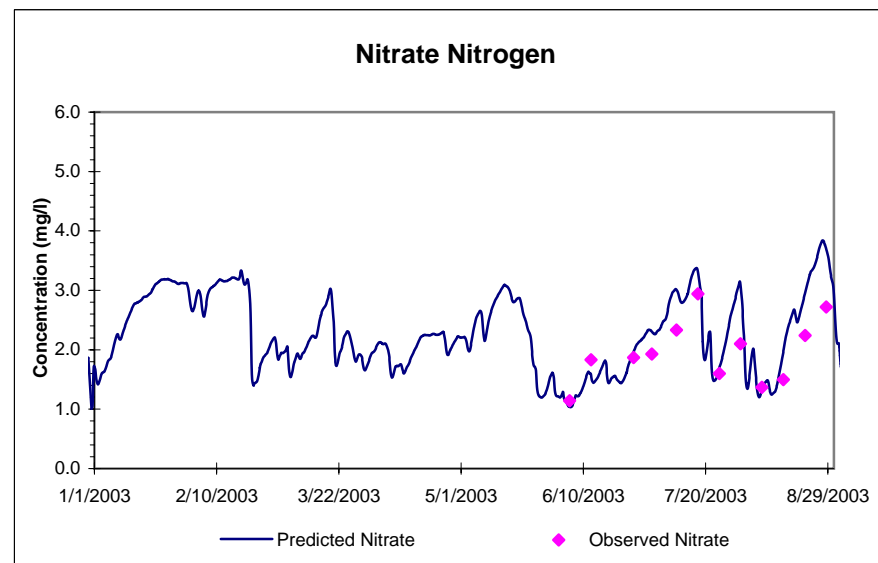
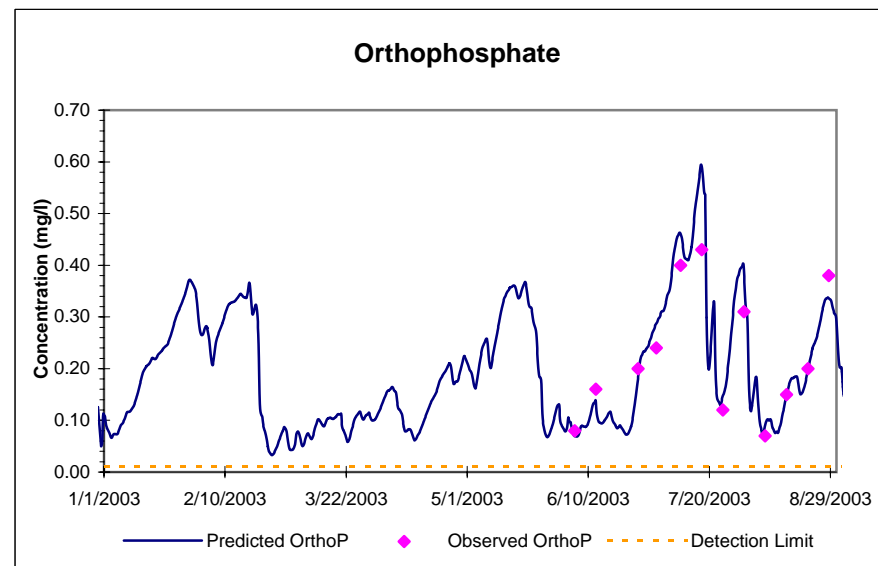
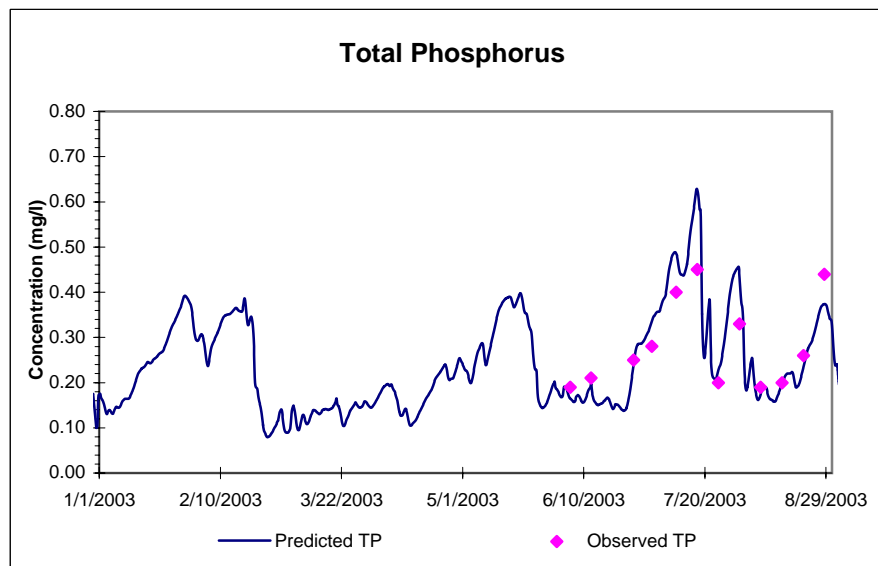




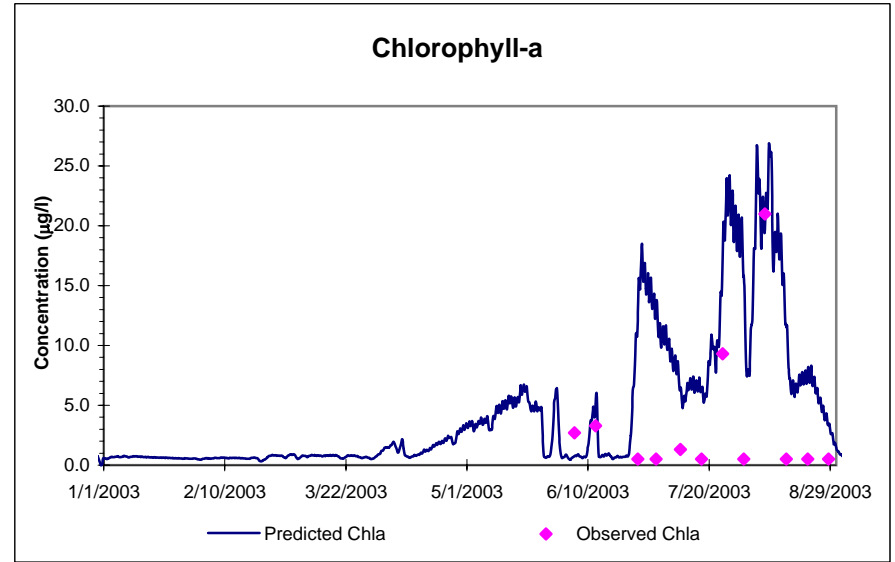
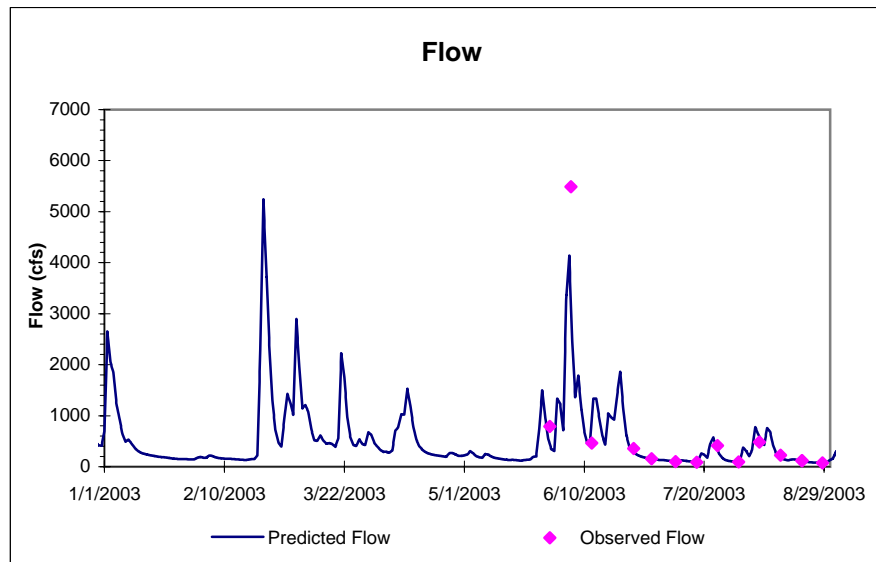
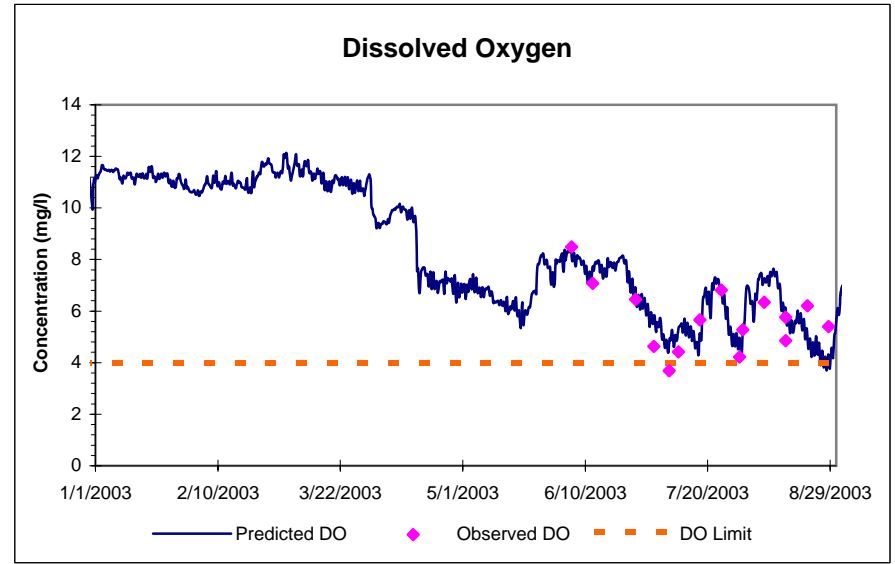
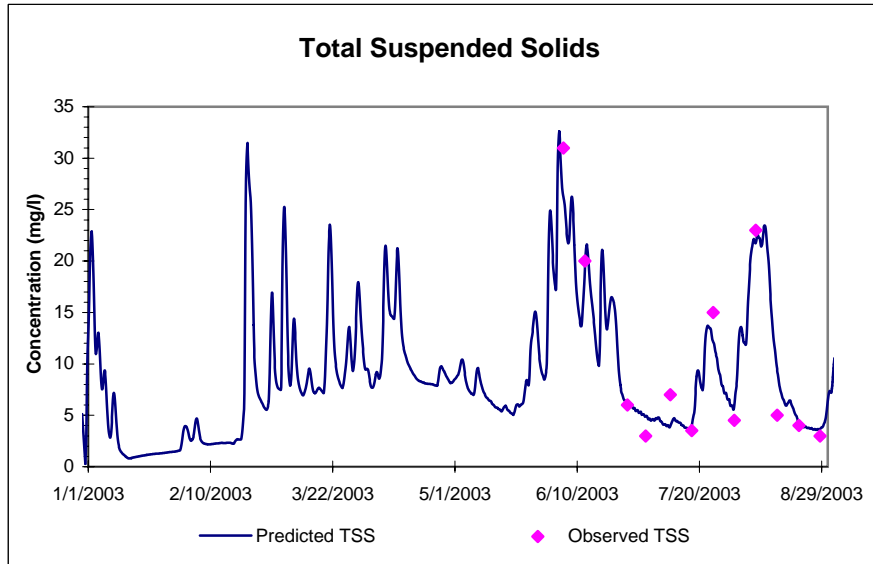
## Lower Millstone River at Blackwells Mills Rd. (M6, USGS 01402000)



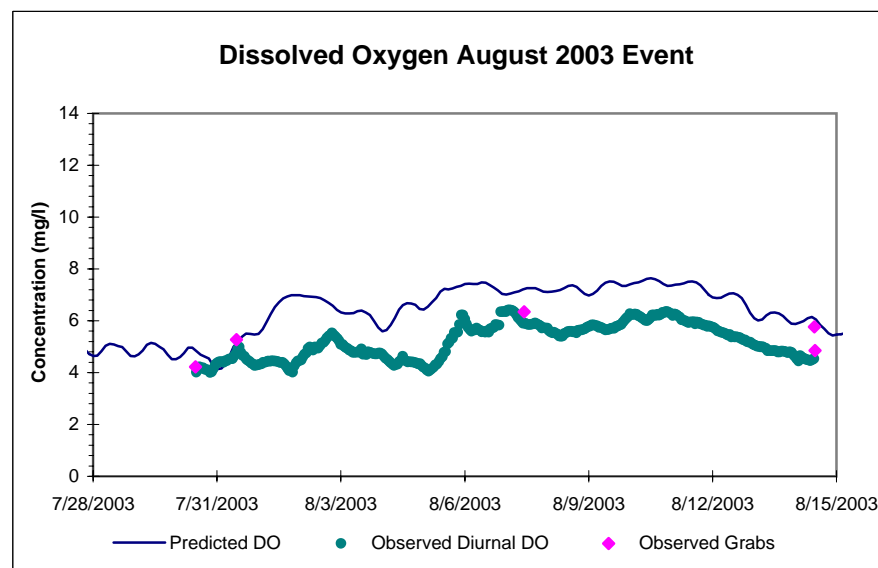
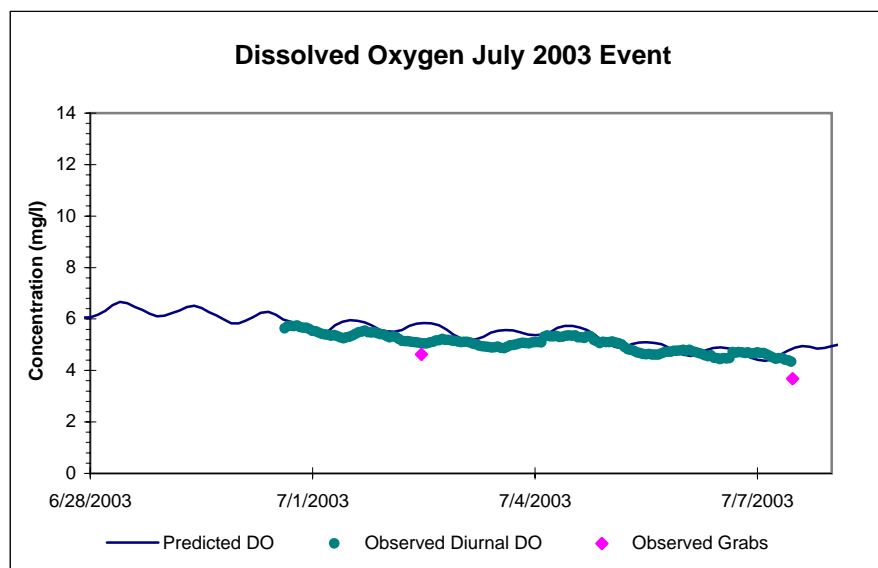
## Lower Millstone River at Manville Causeway (M7)



## Lower Millstone River at Manville Causeway (M7)

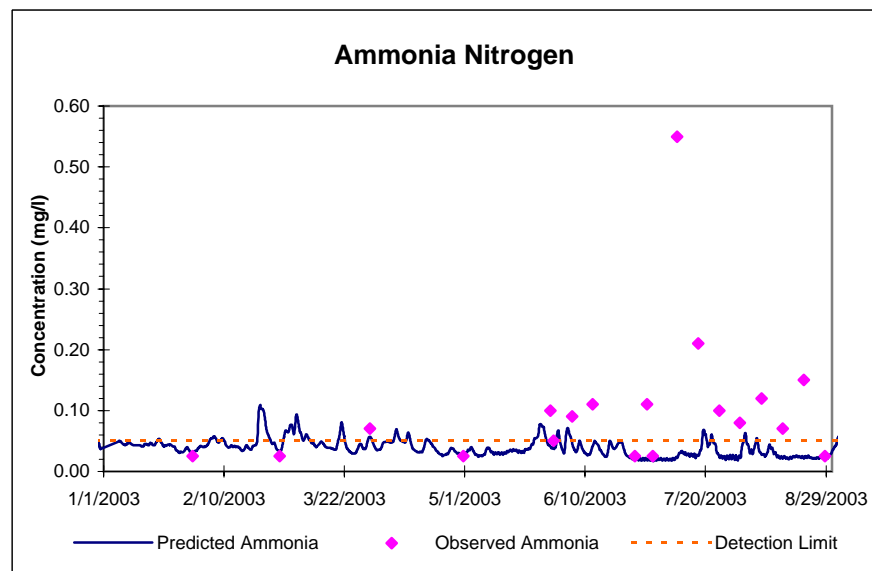
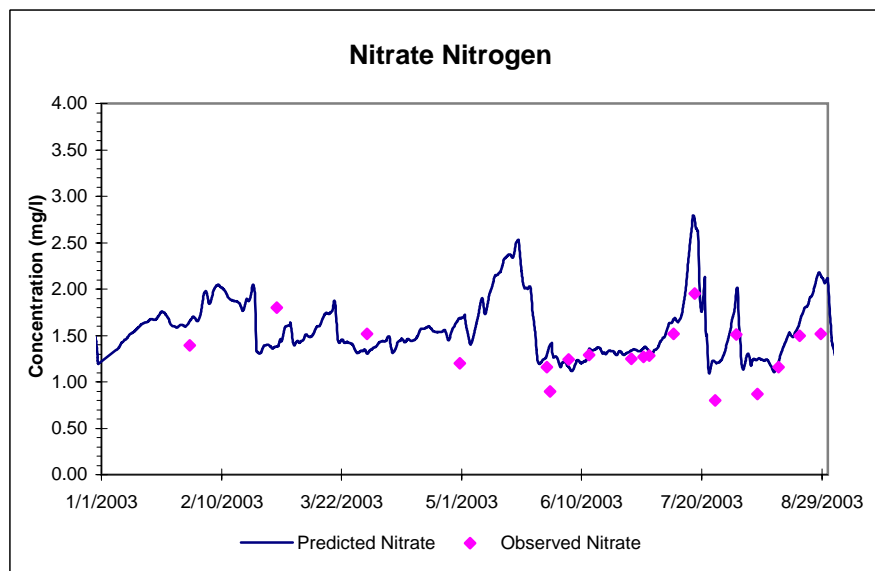
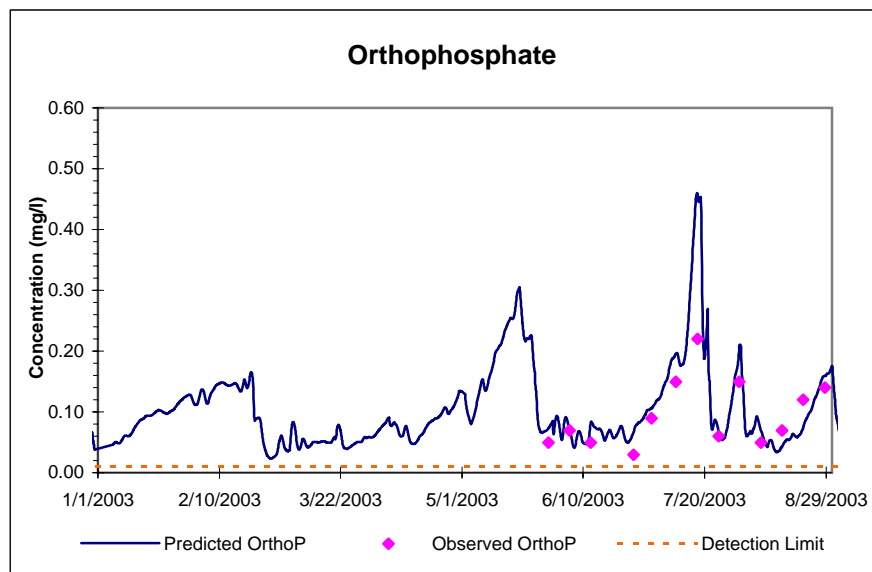
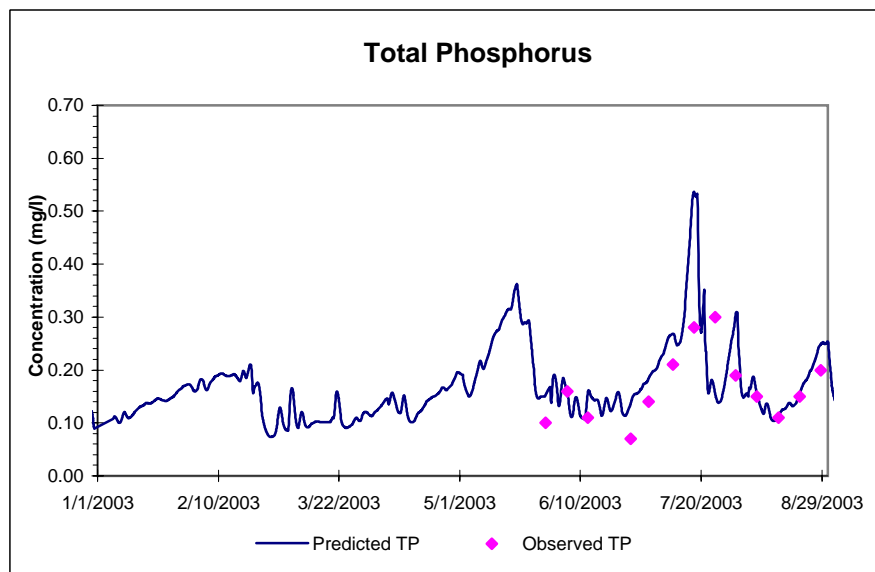


## Lower Millstone River at Manville Causeway (M7)

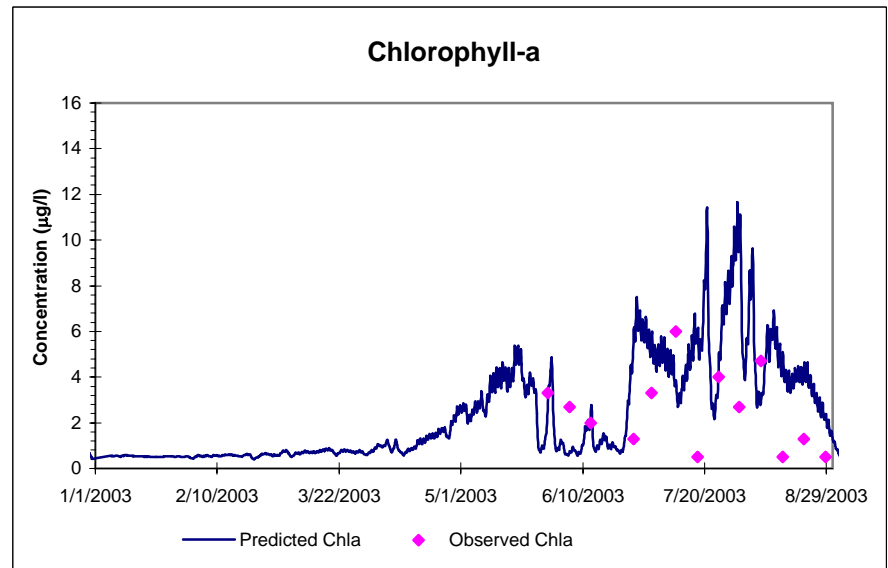
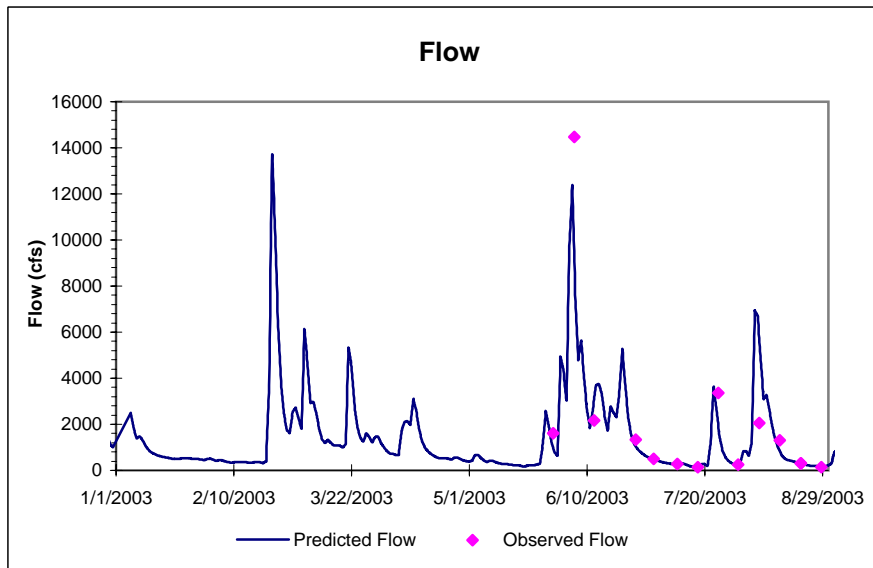
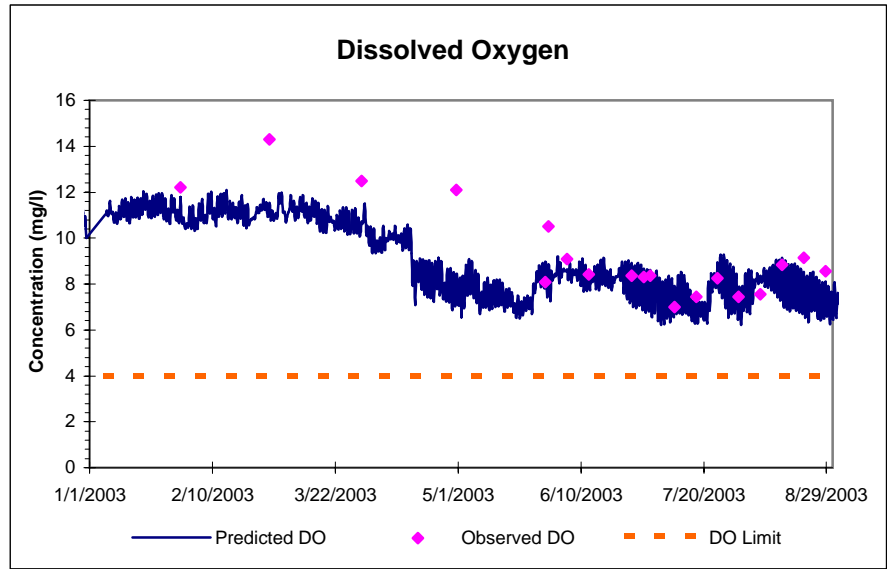
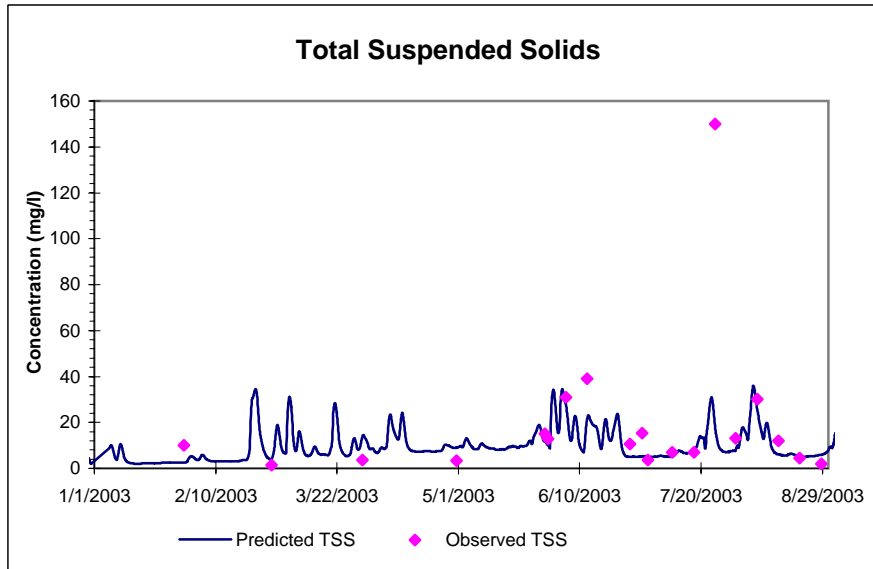


Mainstem Raritan River Watershed Area Model  
Water Quality Model Calibration Graphs

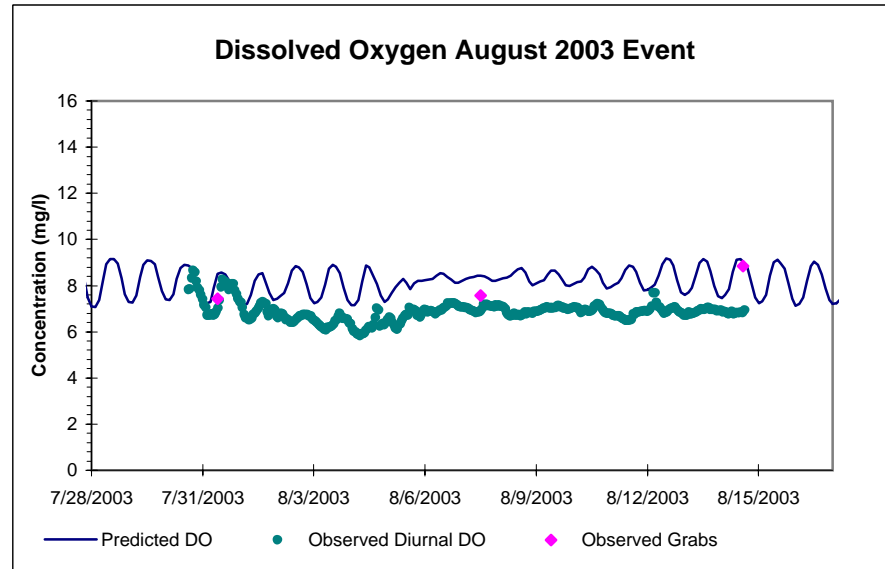
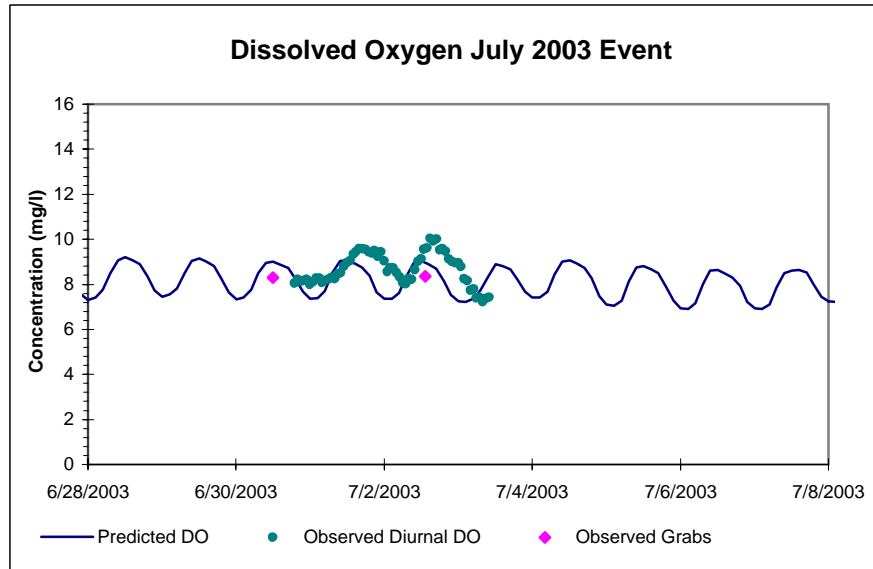
## Raritan River Downstream Millstone River Confluence (R2)



## Raritan River Downstream Millstone River Confluence (R2)

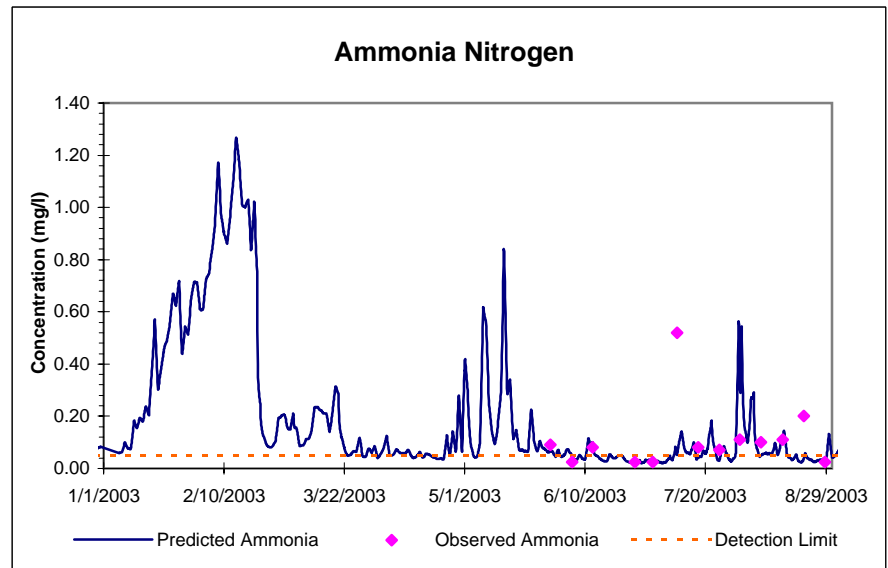
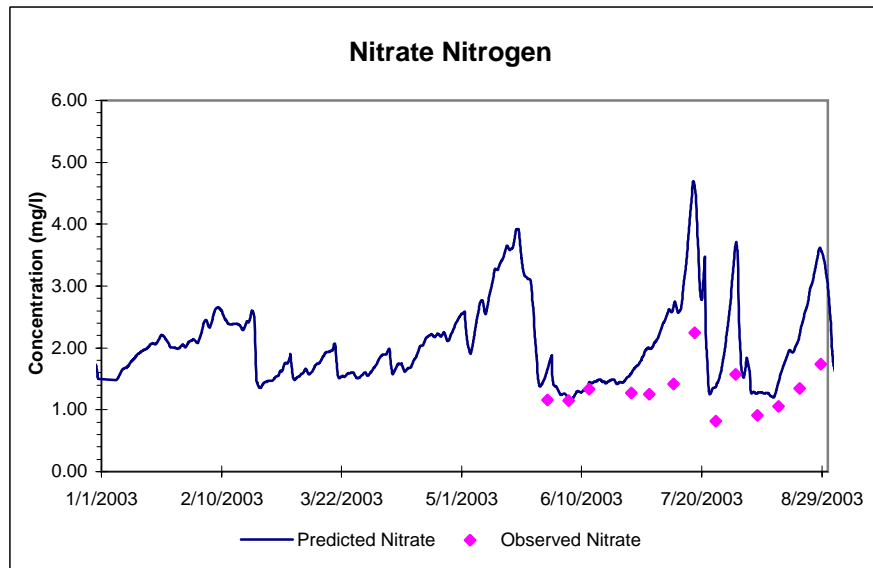
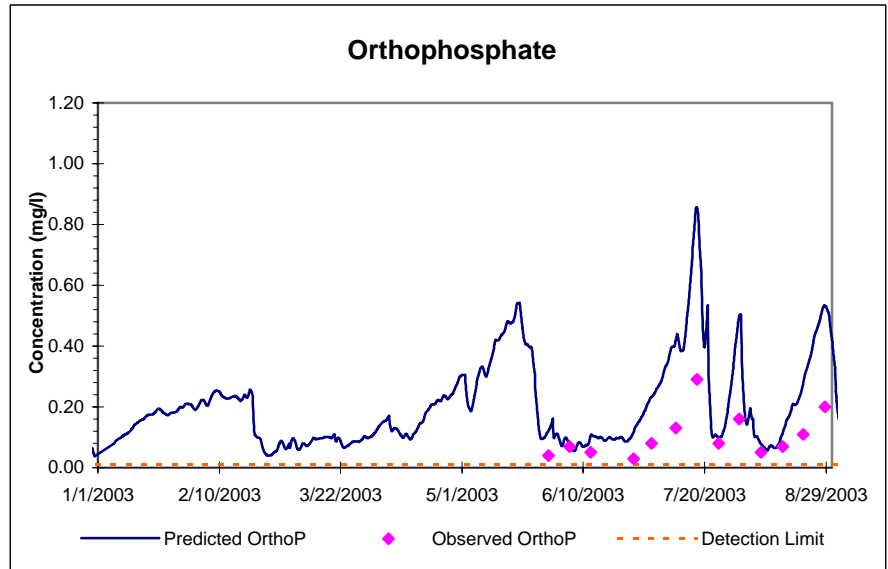
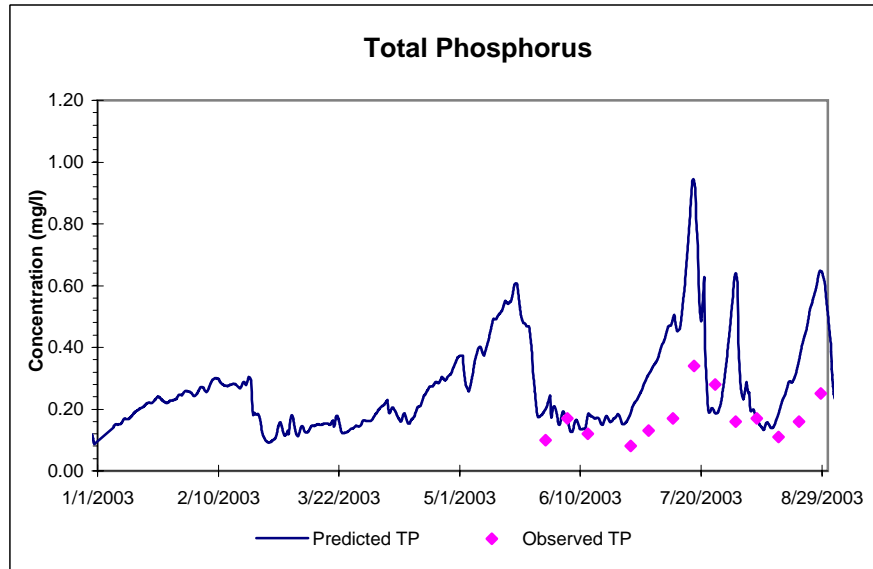


## Raritan River Downstream Millstone River Confluence (R2)

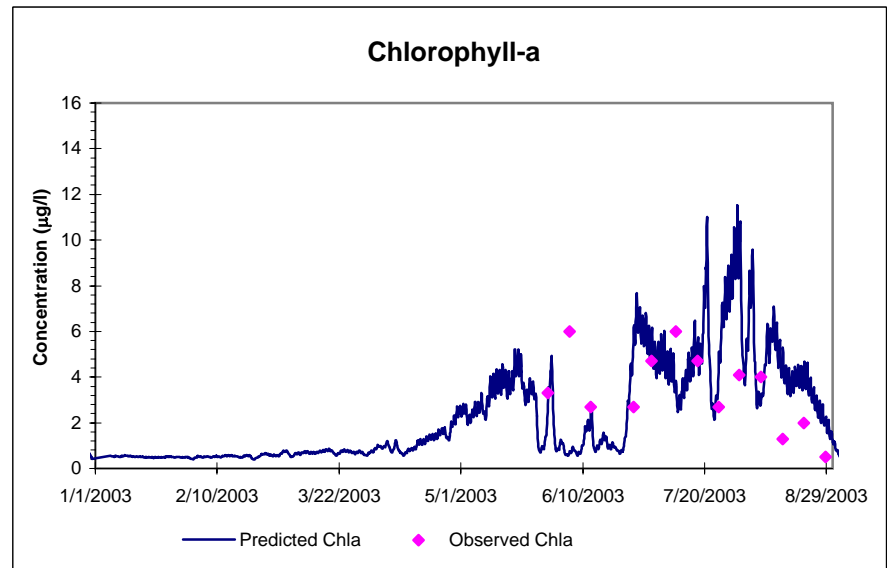
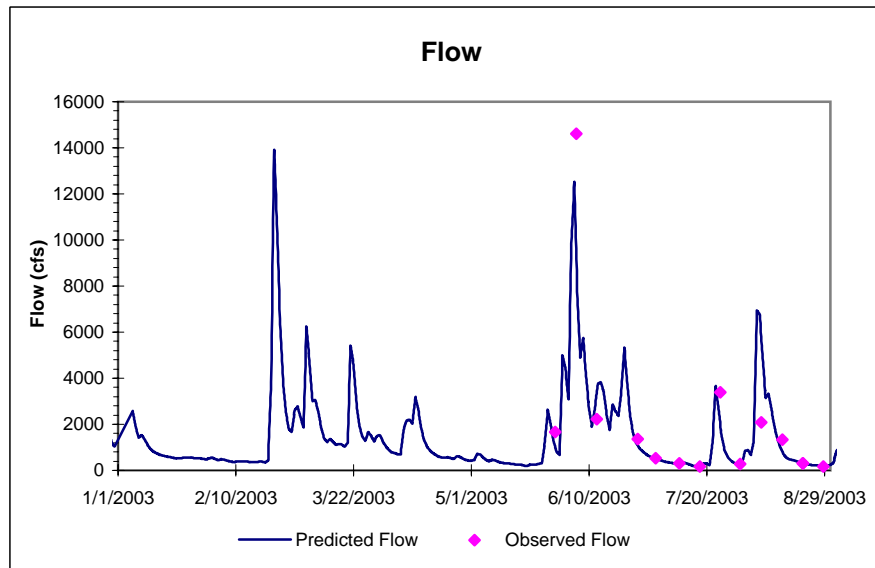
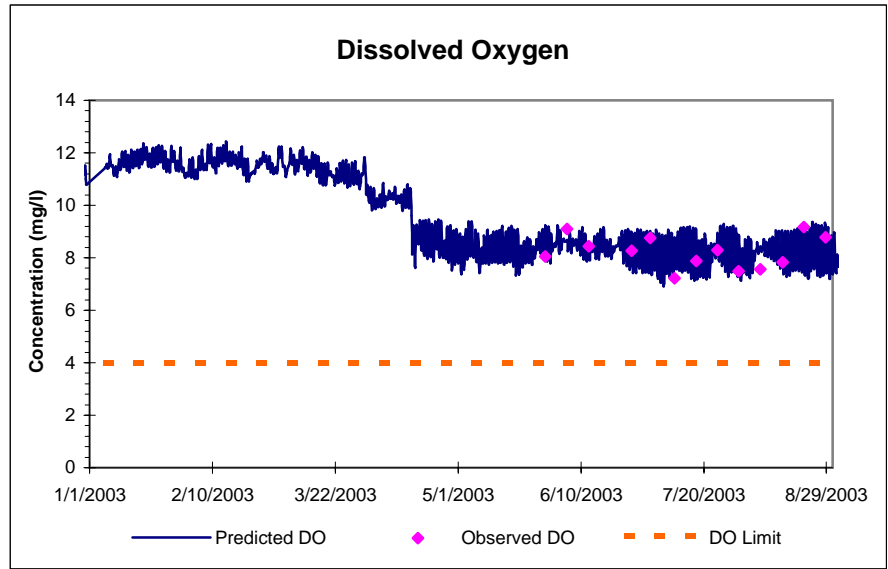
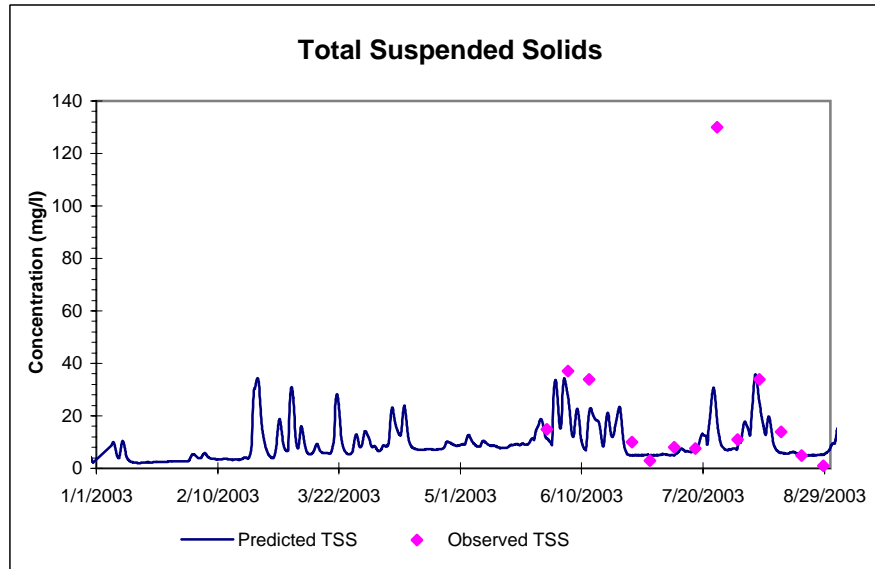




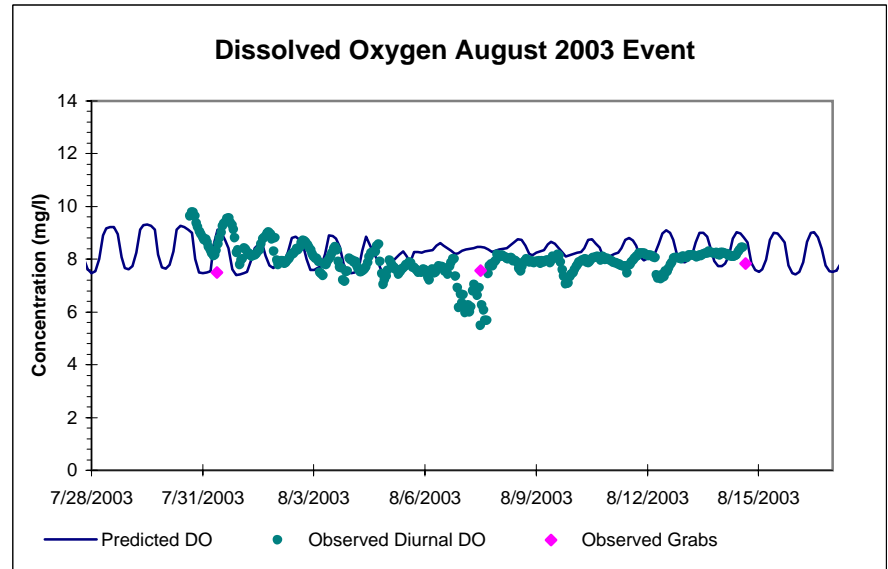
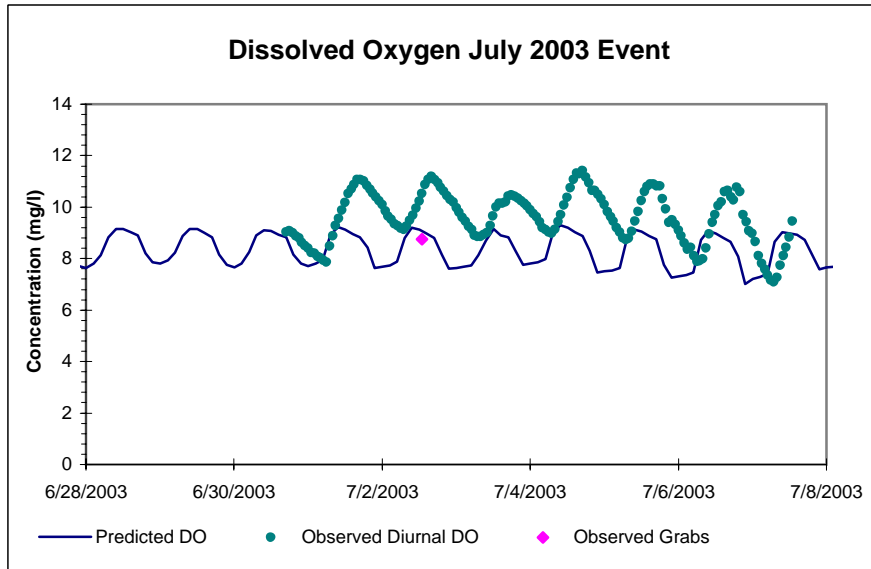
## Raritan River at Calco Dam near Bound Brook (USGS 01403060)



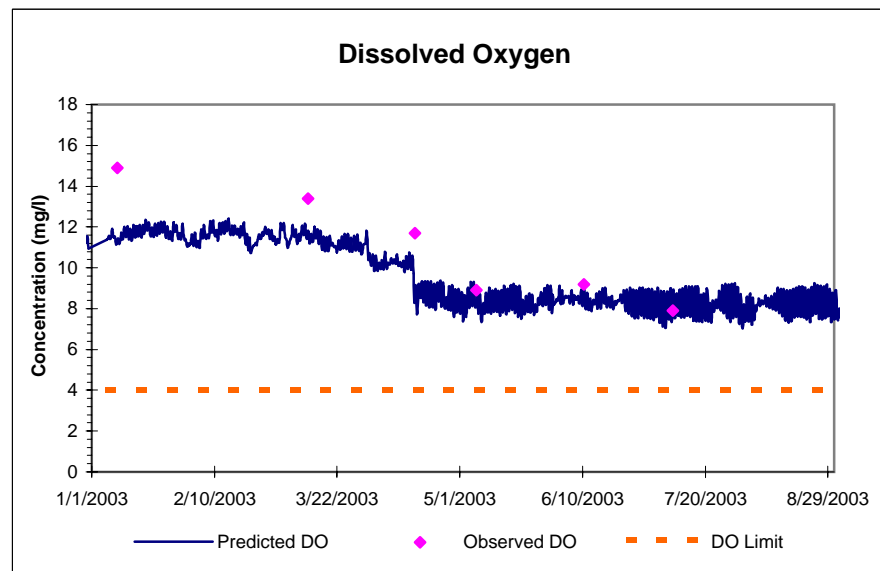
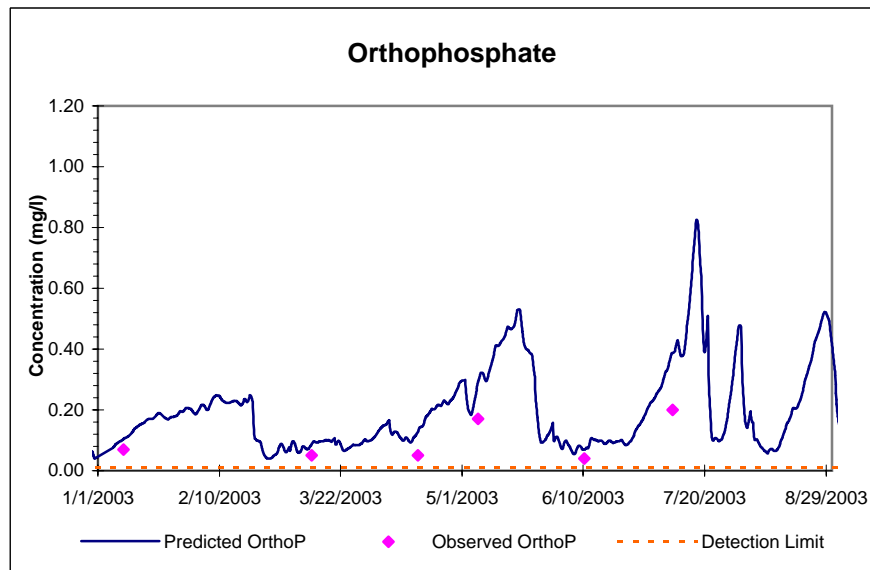
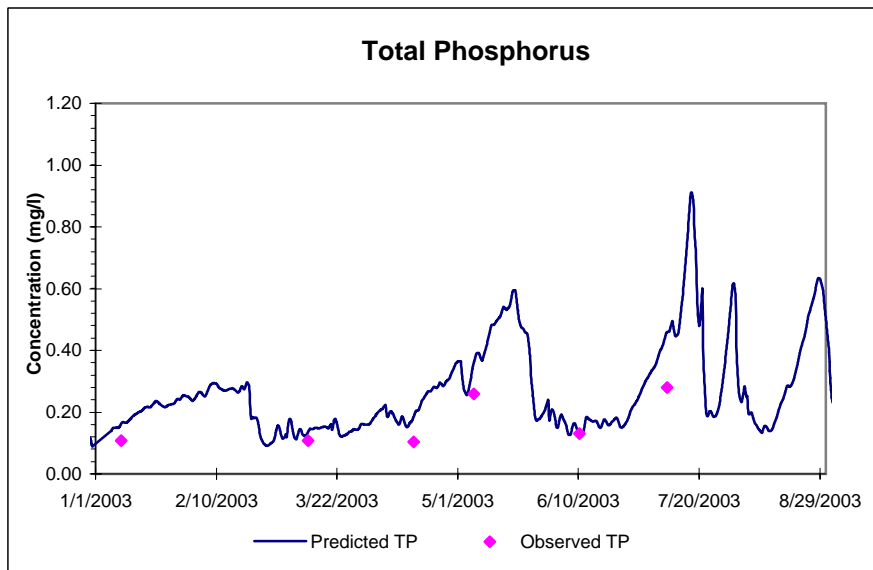
## Raritan River at Calco Dam near Bound Brook (USGS 01403060)



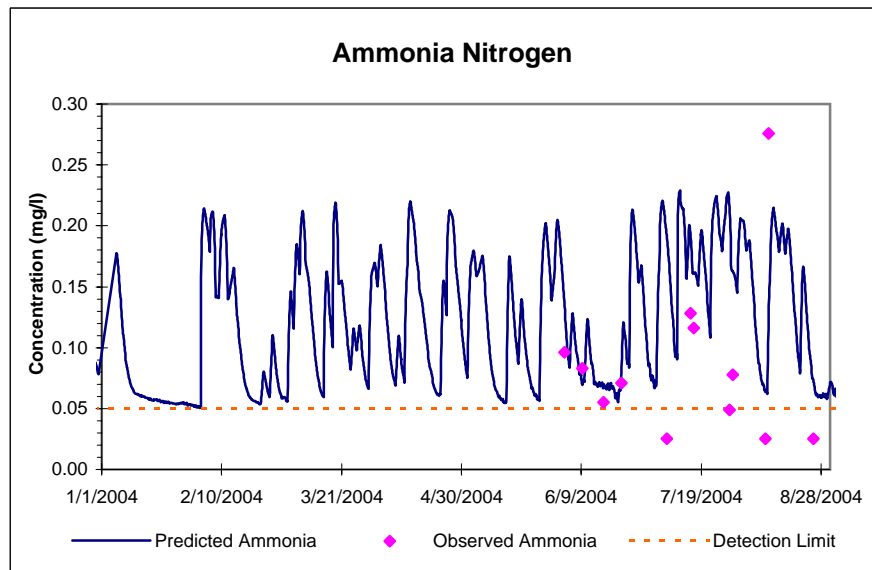
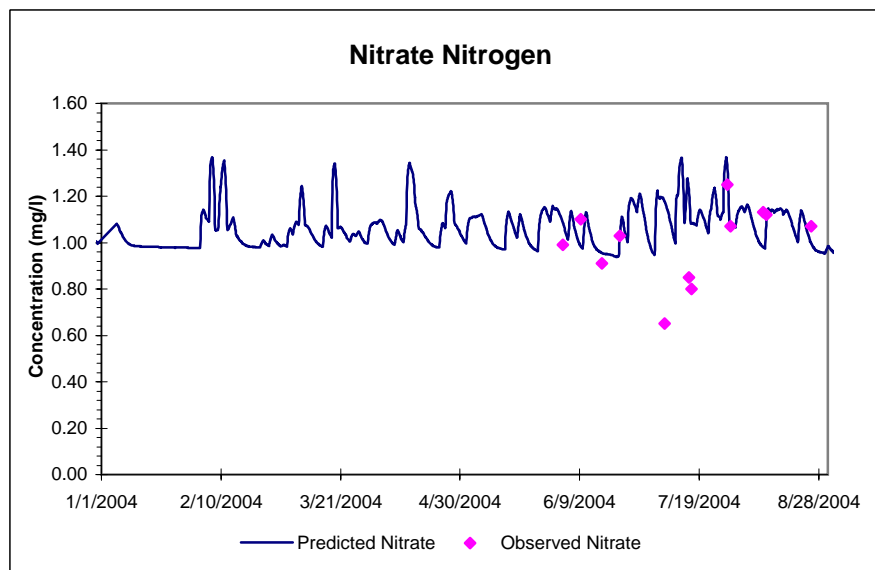
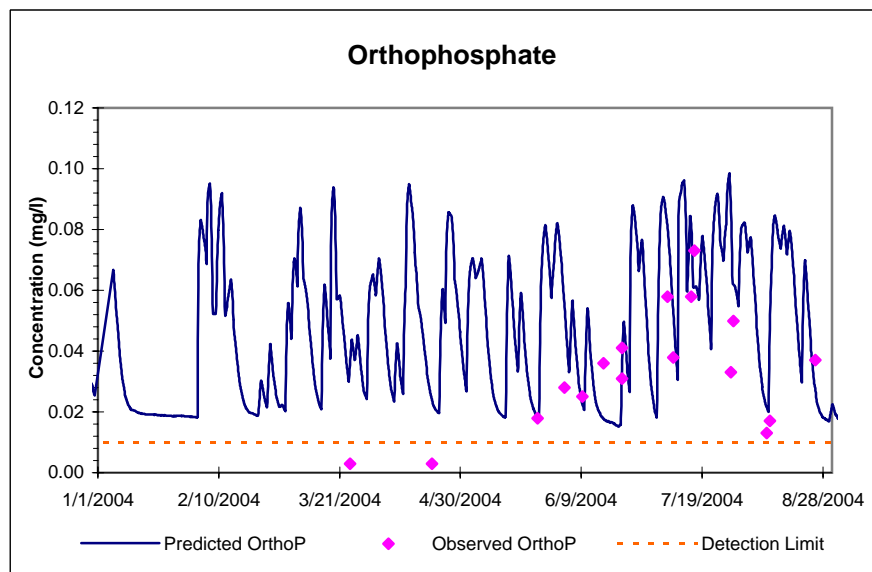
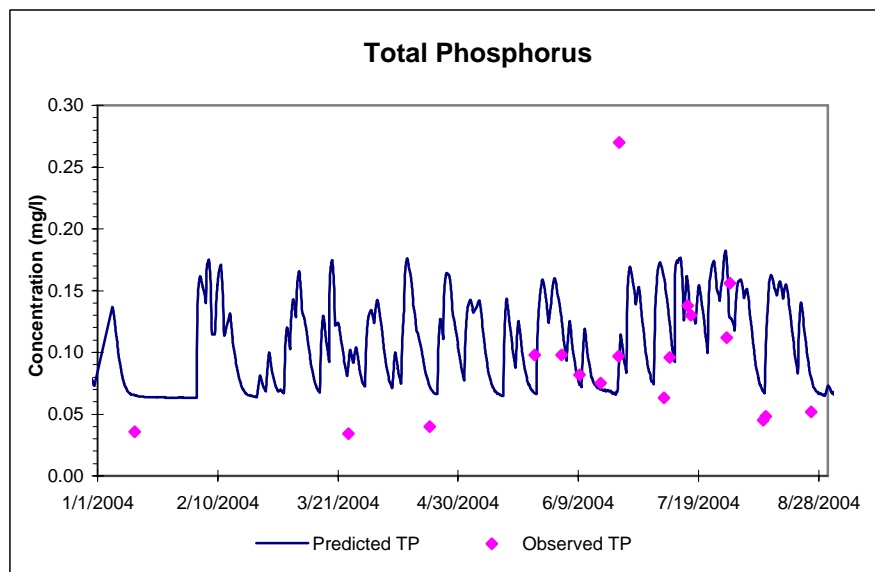
## Raritan River at Calco Dam near Bound Brook (USGS 01403060)



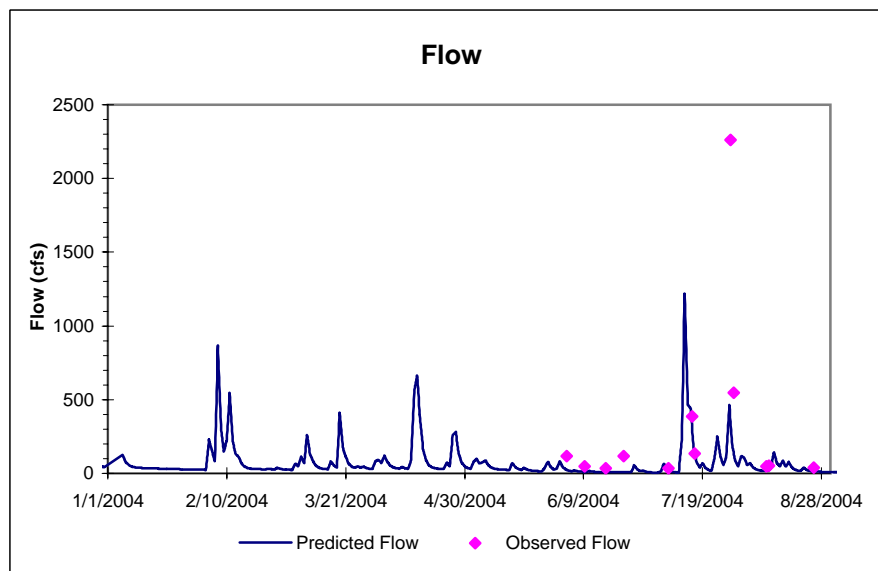
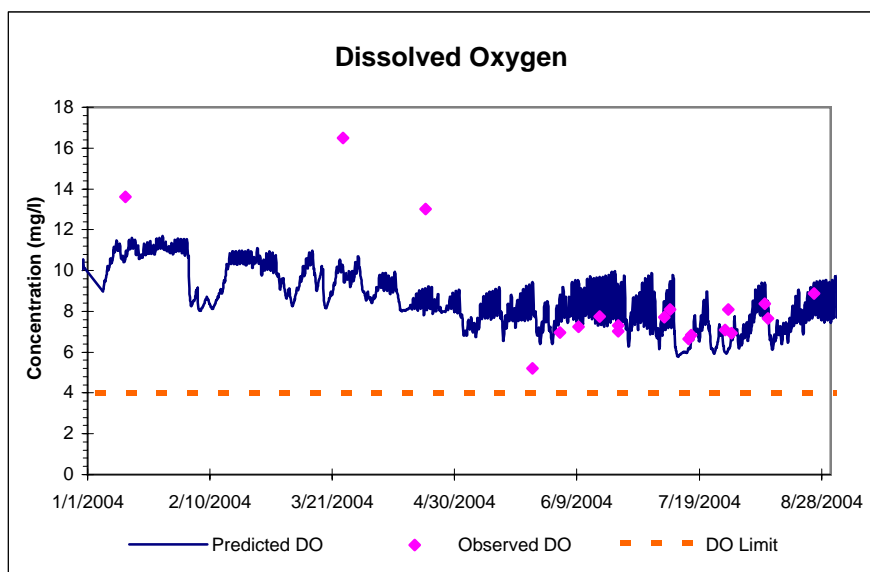
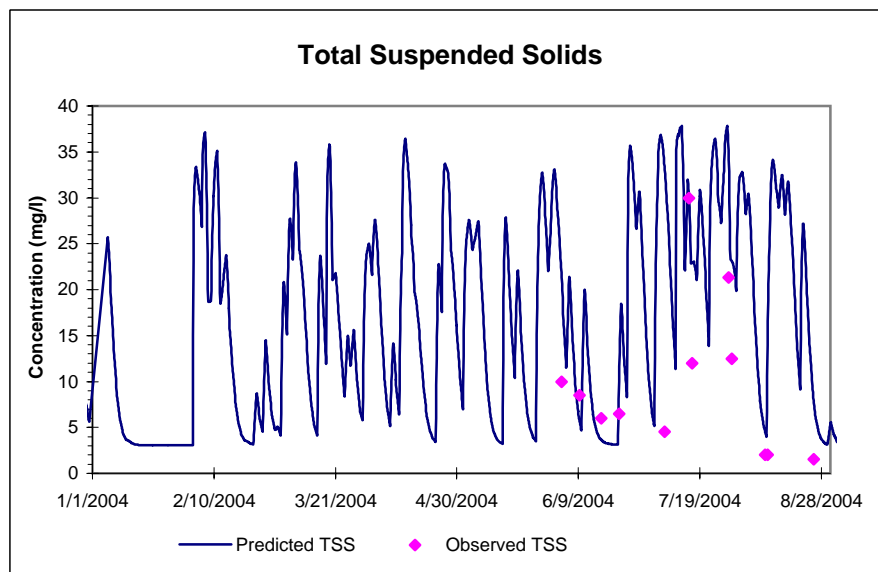
## Raritan River at Queens Bridge in South Bound Brook (USGS 01403900)



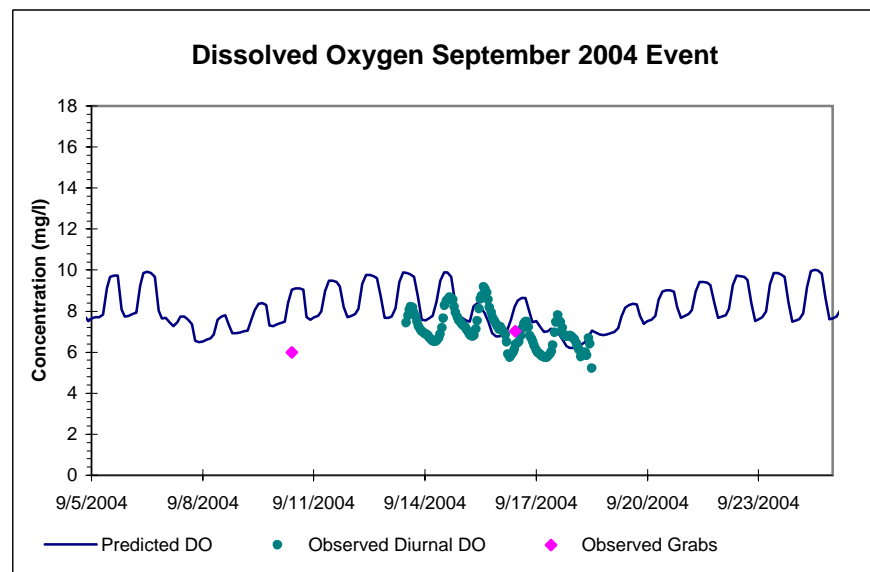
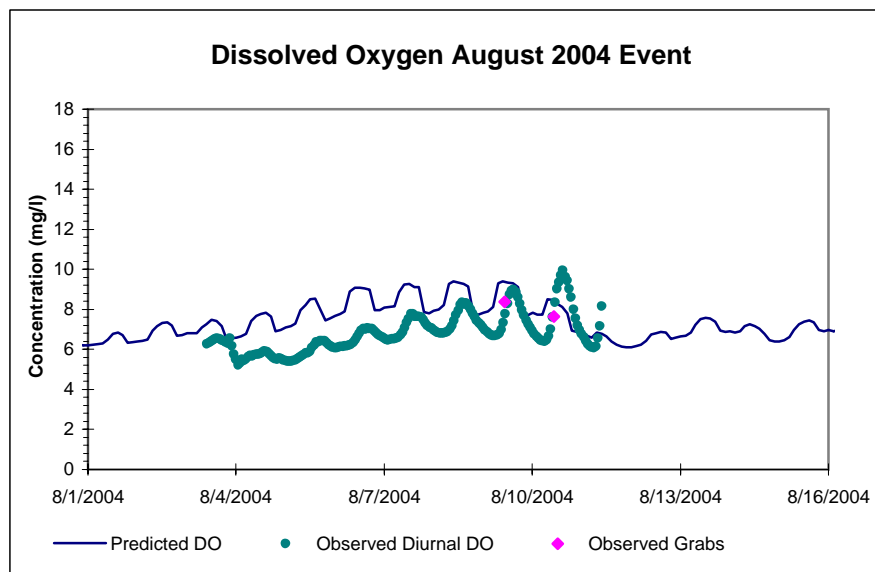
## Bound Brook at Greenbrook Rd. in Middlesex (GB1, USGS 01403900)



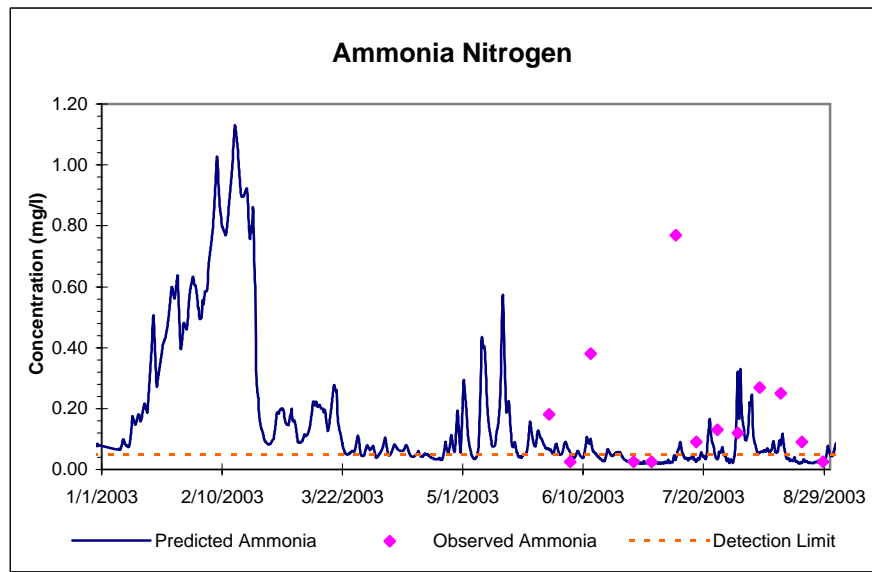
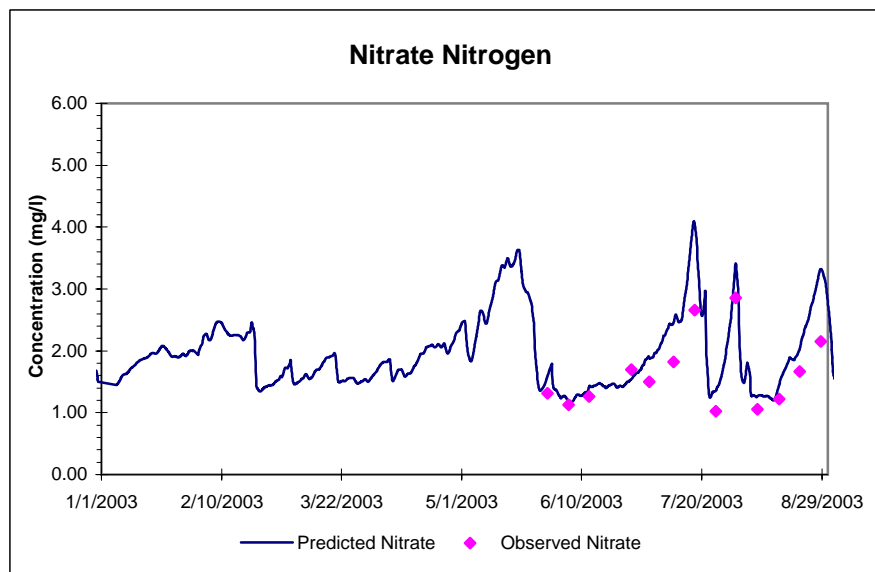
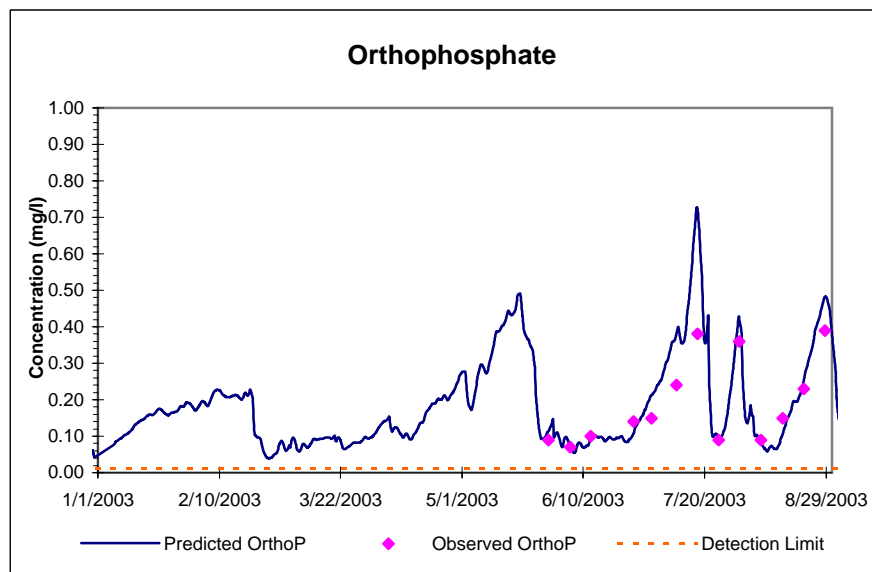
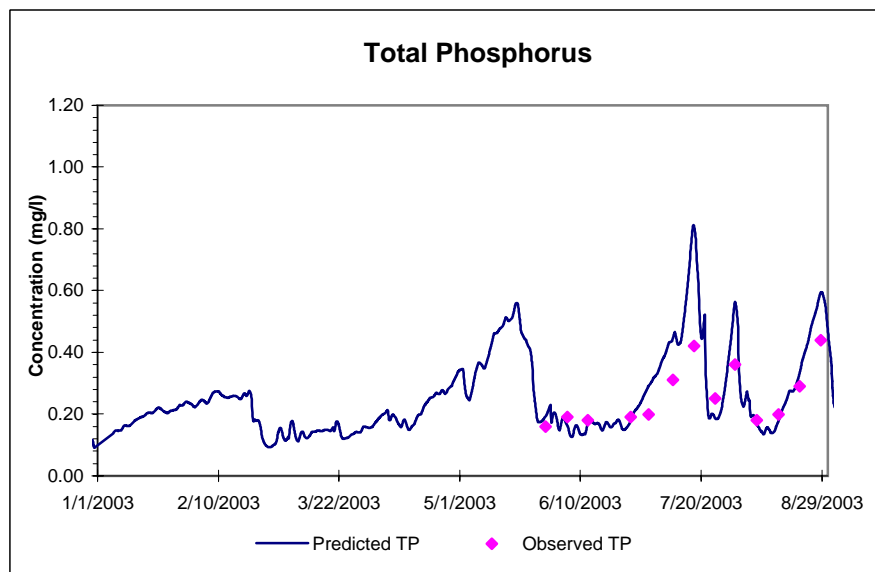
## Bound Brook at Greenbrook Rd. in Middlesex (GB1, USGS 01403900)



## Bound Brook at Greenbrook Rd. in Middlesex (GB1, USGS 01403900)

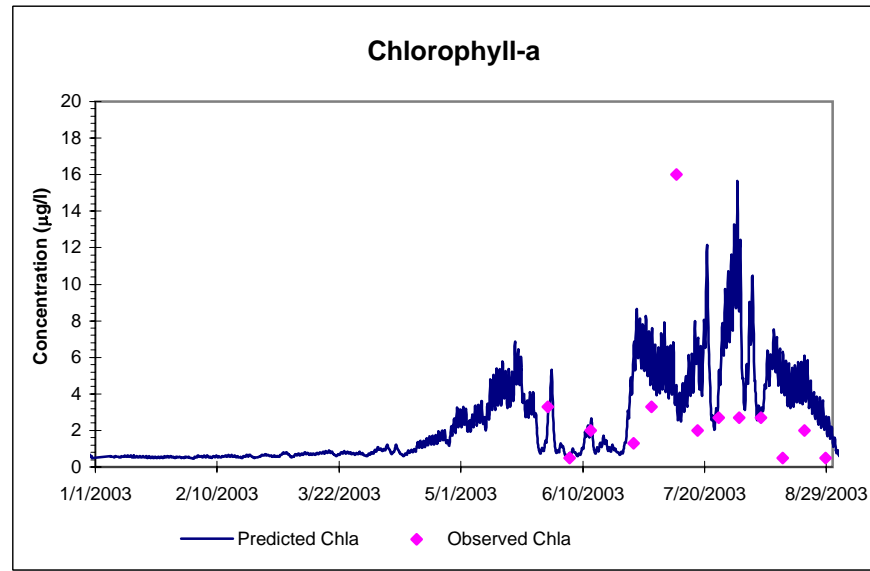
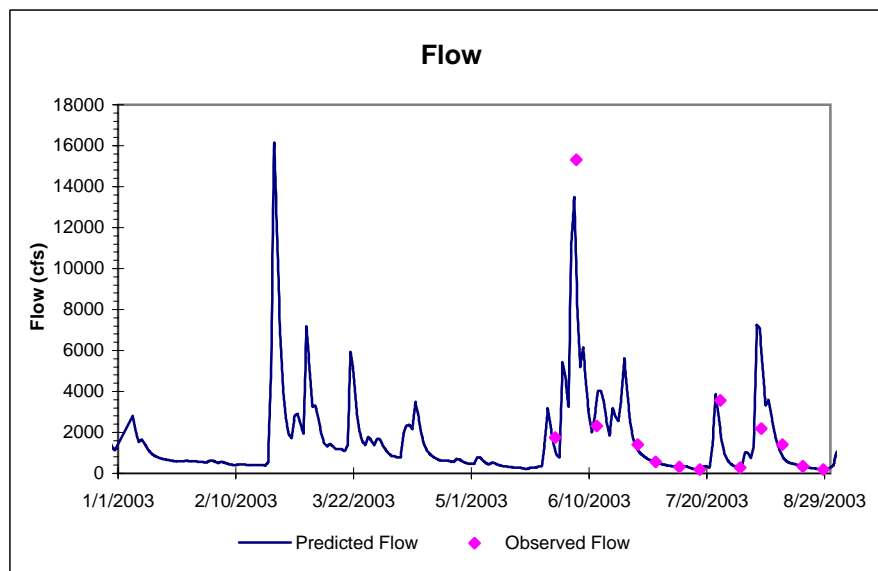
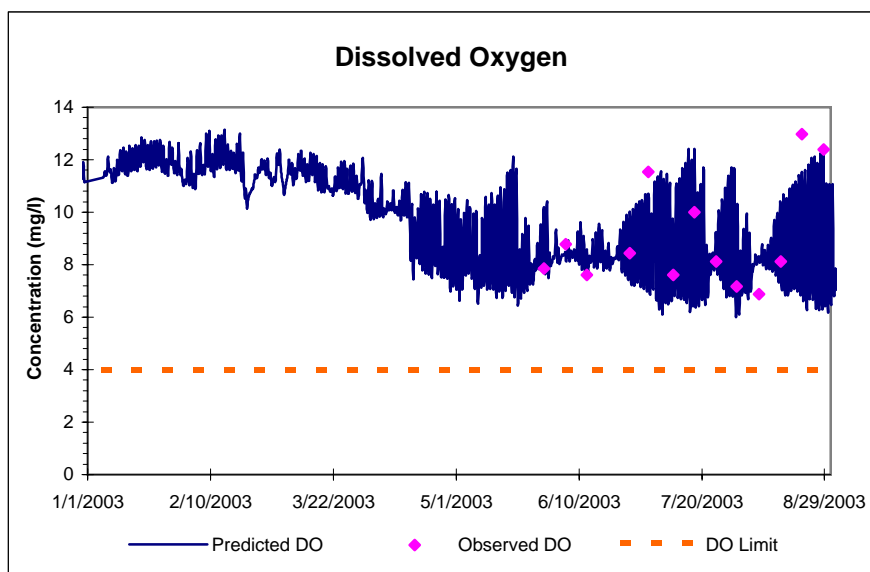
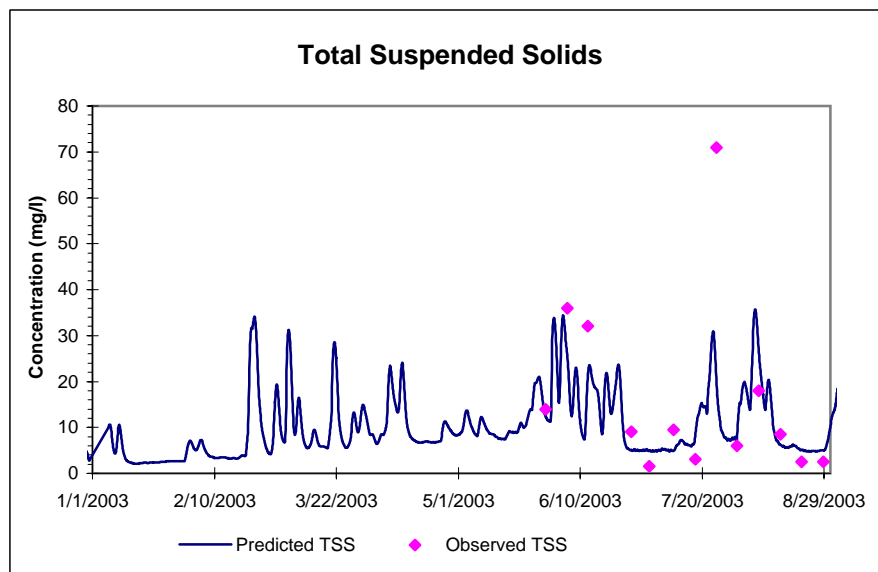


## Raritan River Upstream Fieldville Dam (R4)

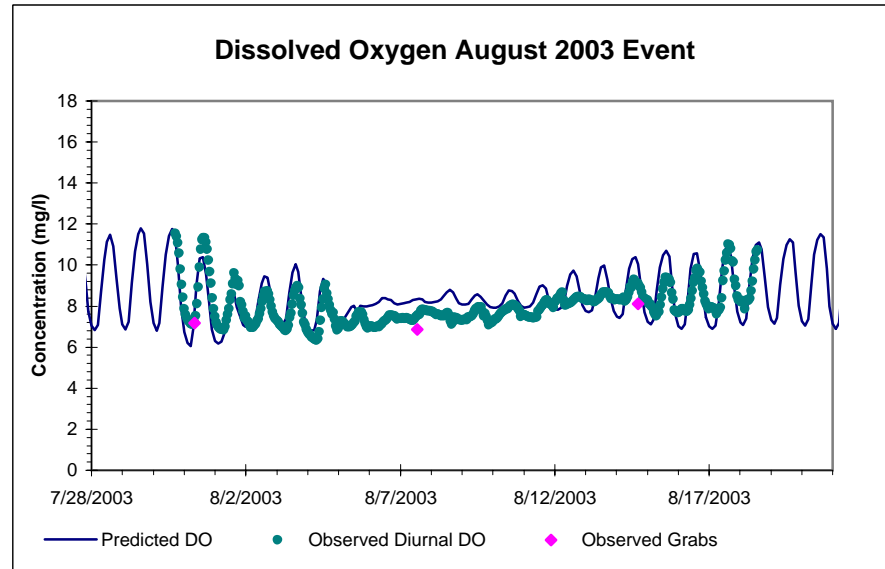
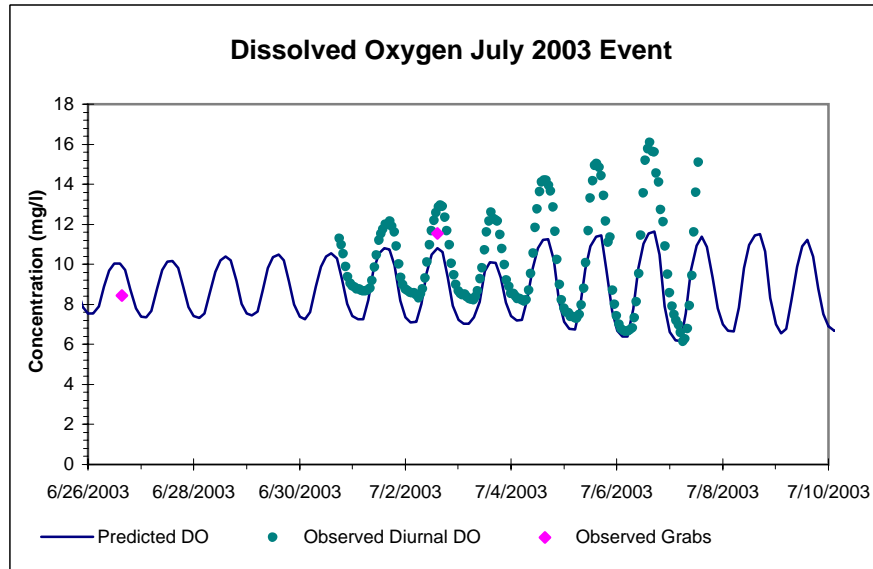




## Raritan River Upstream Fieldville Dam (R4)



## Raritan River Upstream Fieldville Dam (R4)



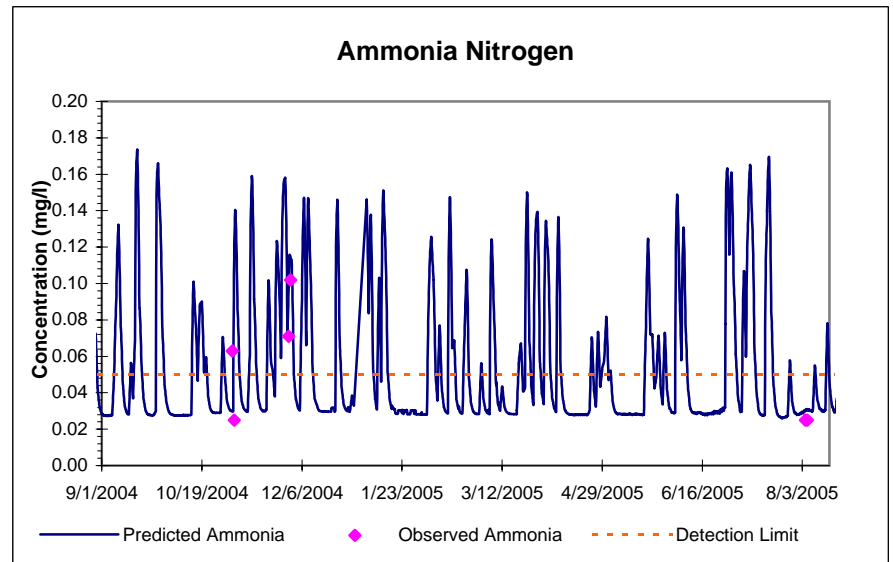
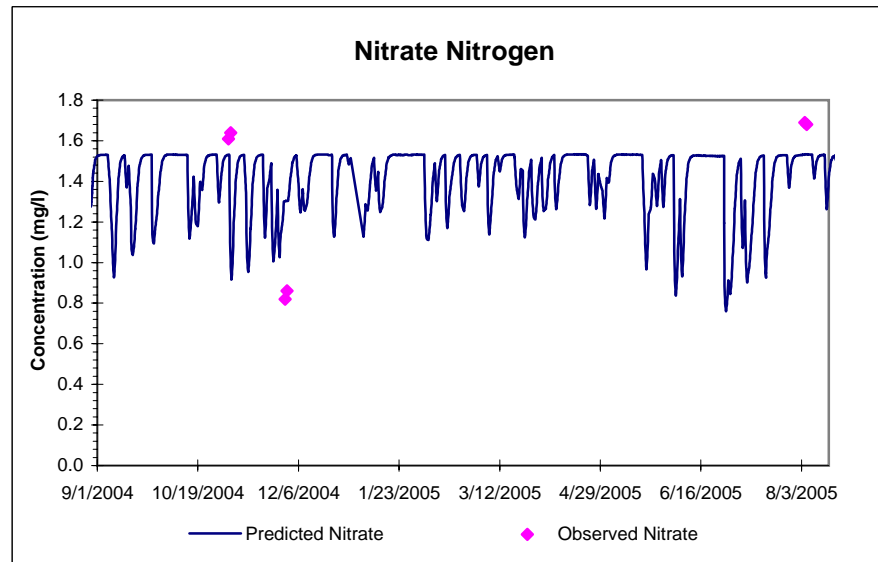
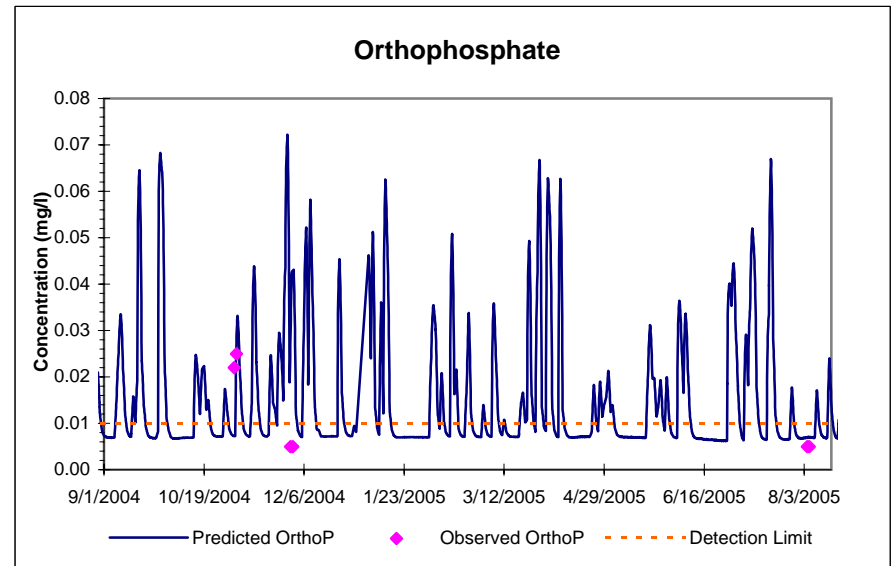
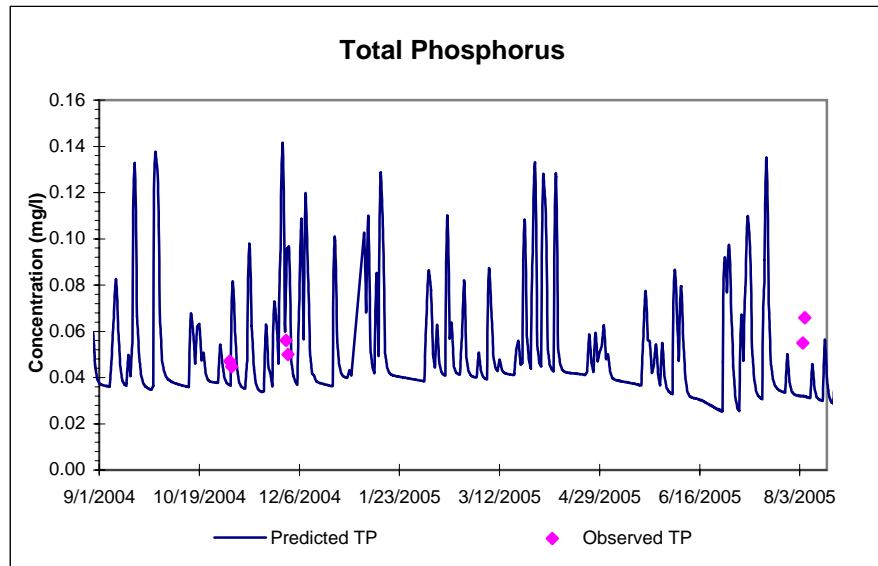
see discussion in section II.D.5 regarding DO at this location

## **APPENDIX L**

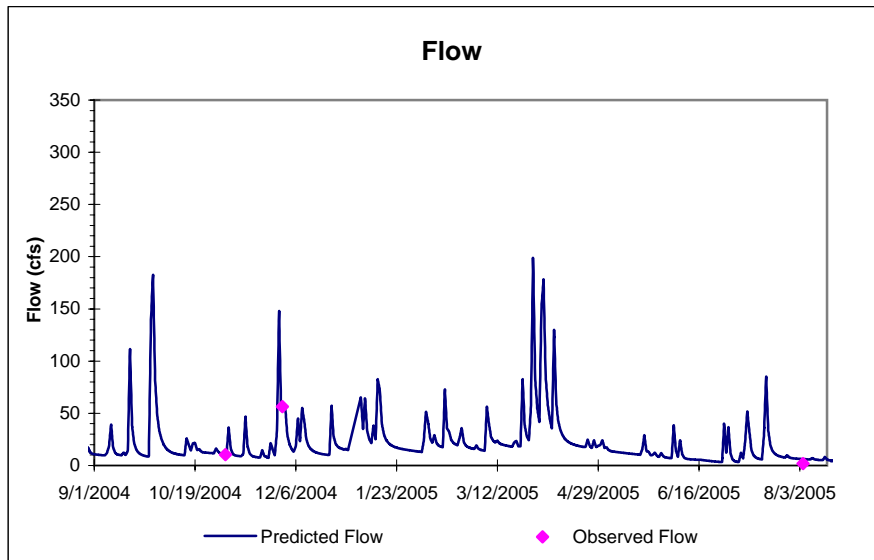
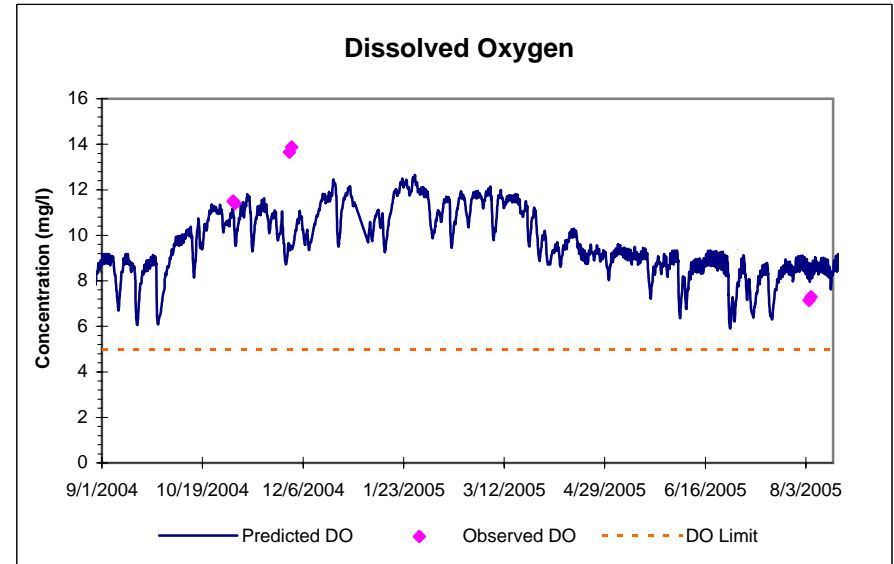
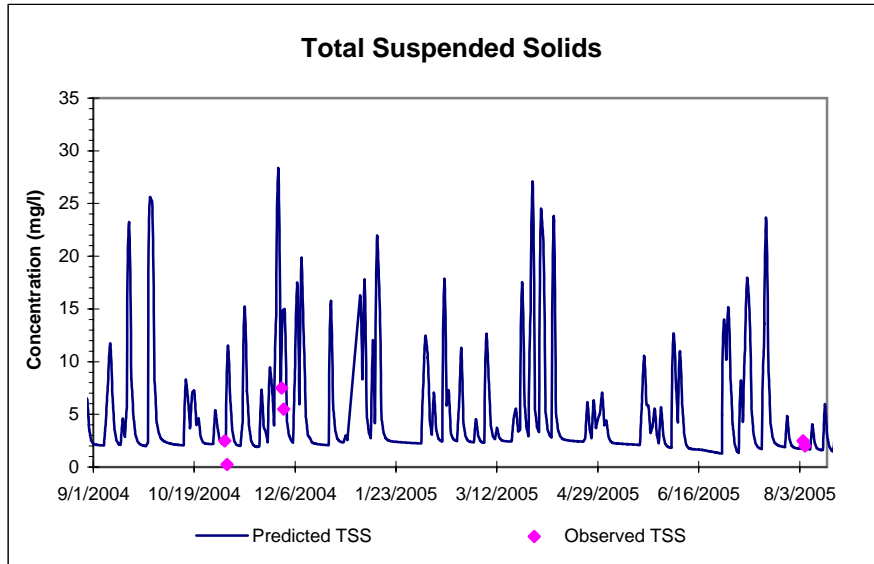
Water Quality Model Validation Graphs

North South Branch Raritan River Watershed Area Model  
Water Quality Model Validation Graphs

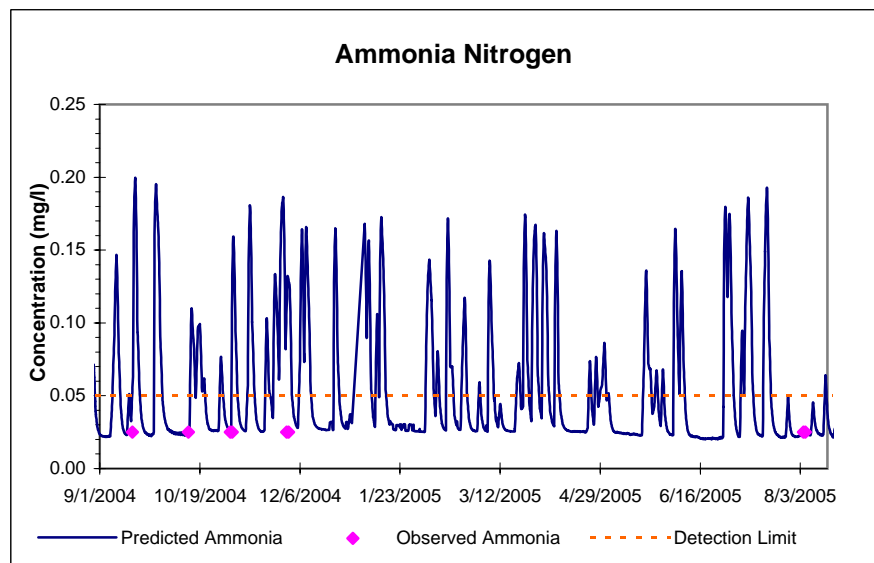
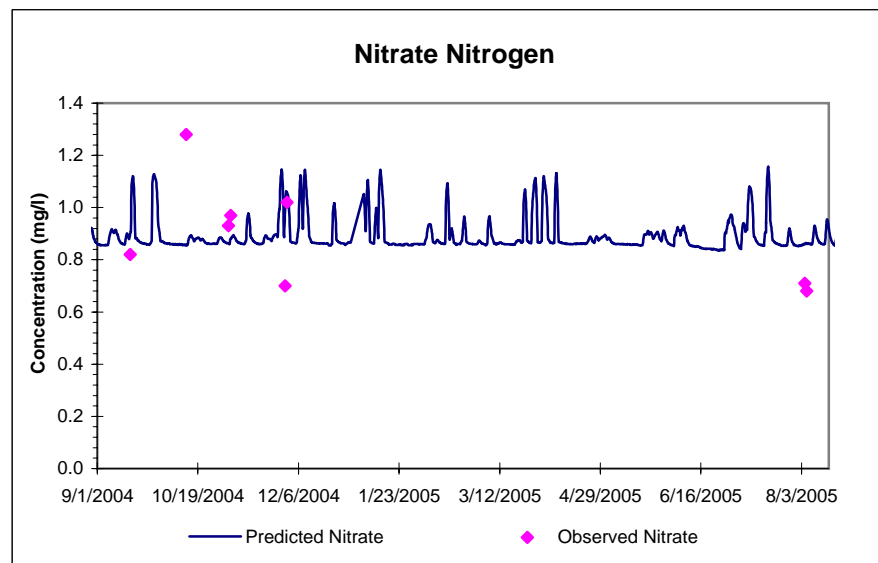
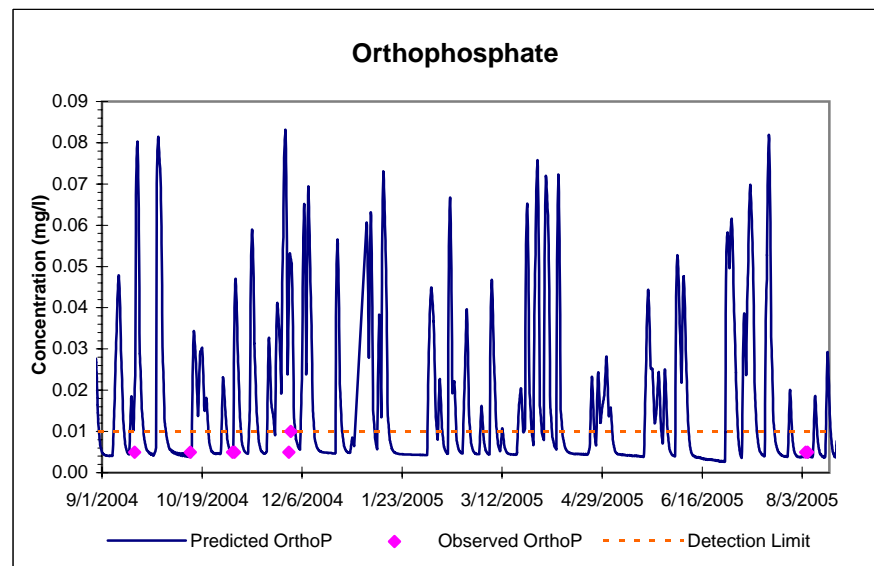
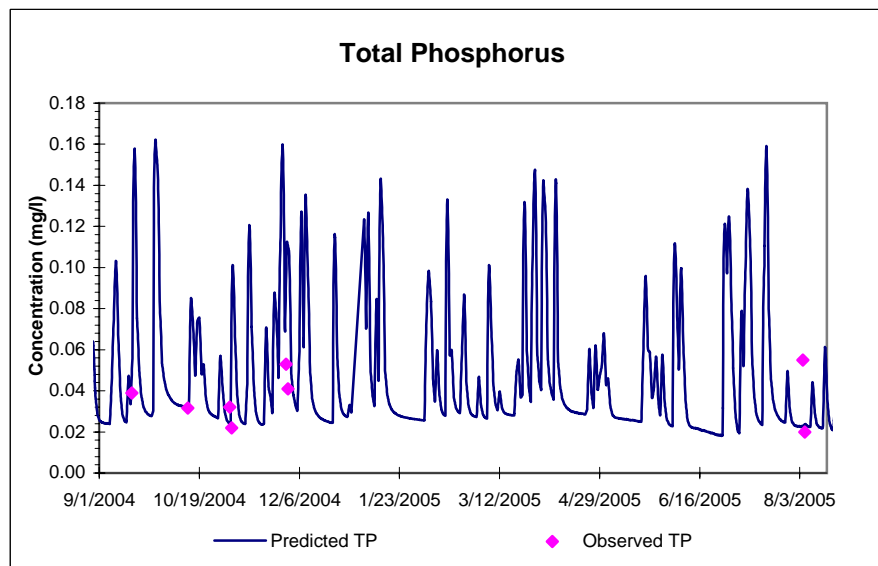
## South Branch Raritan River at Bartley-Drakestown Road in Mount Olive (SBRR1)



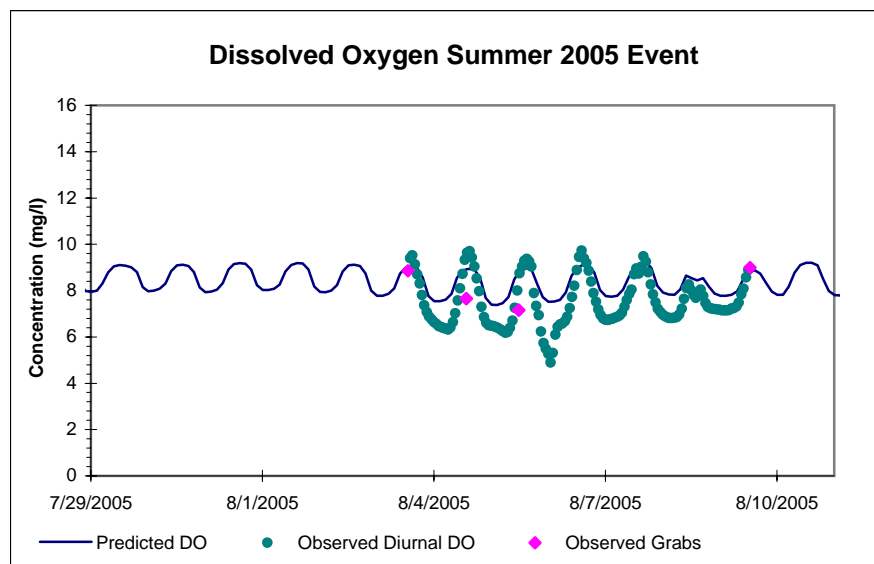
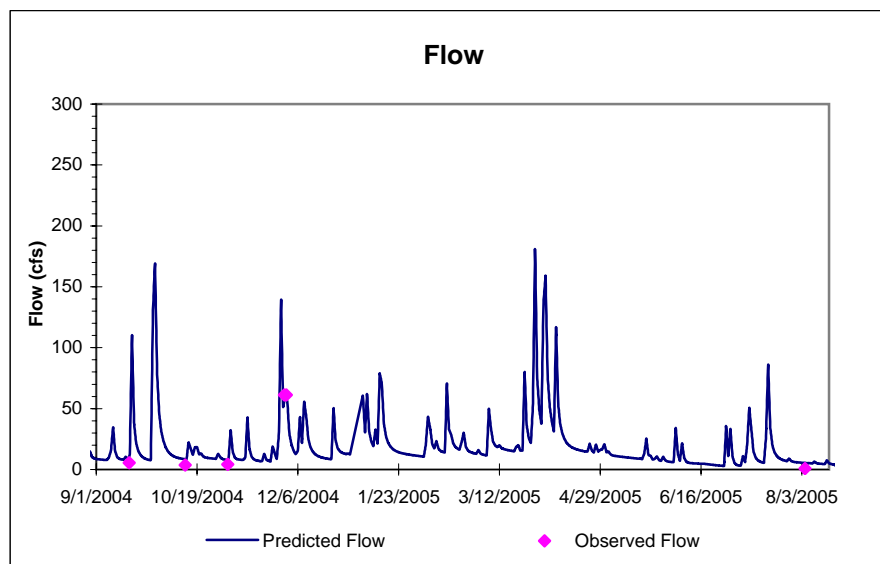
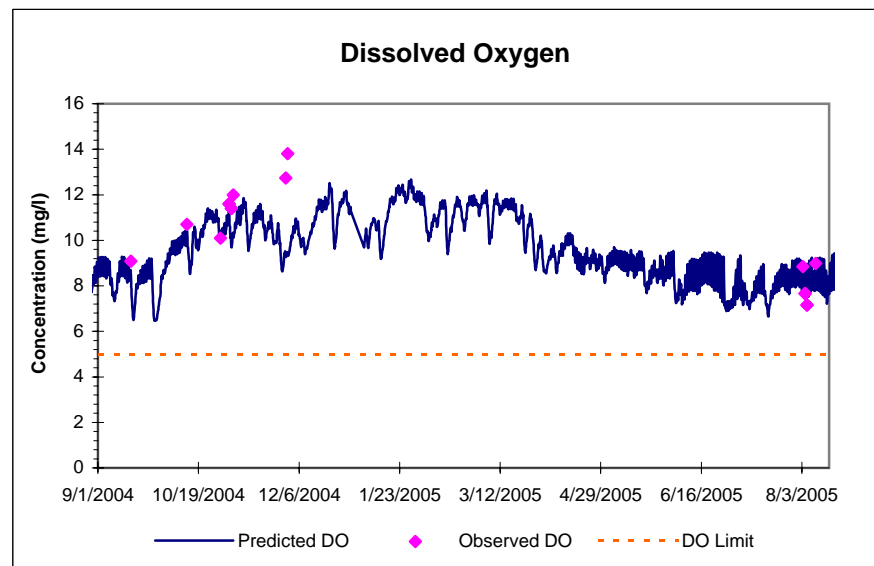
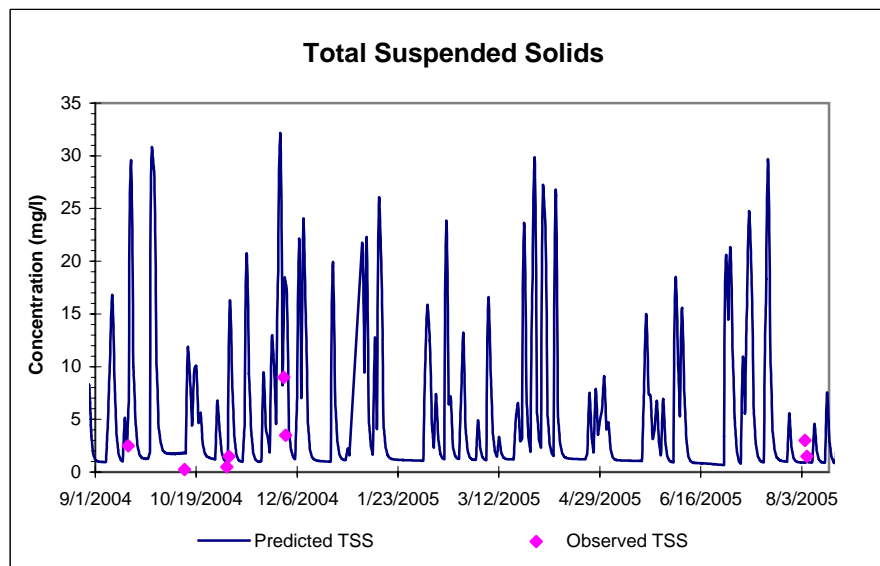
## South Branch Raritan River at Bartley-Drakestown Road in Mount Olive (SBRR1)



## Drakes Brook Upstream of Mt. Olive STP in Mount Olive (DkB1)

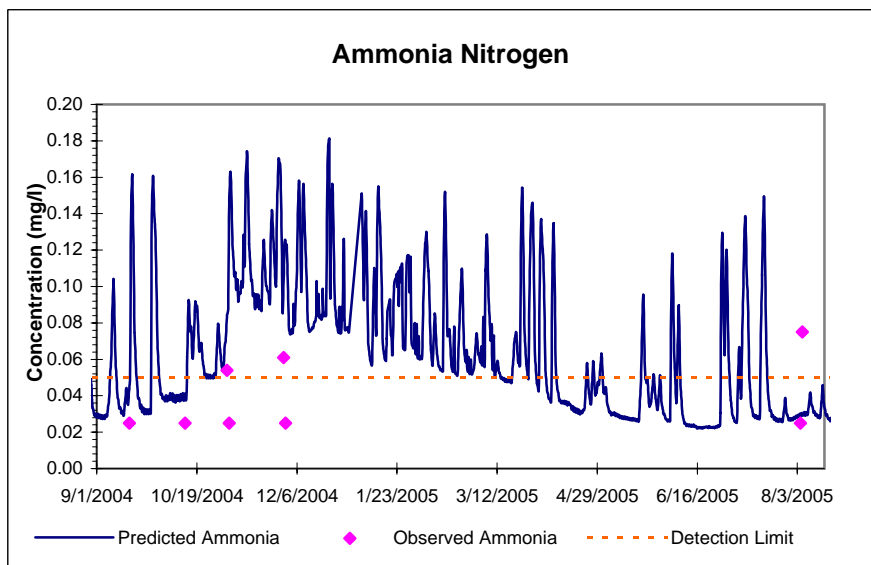
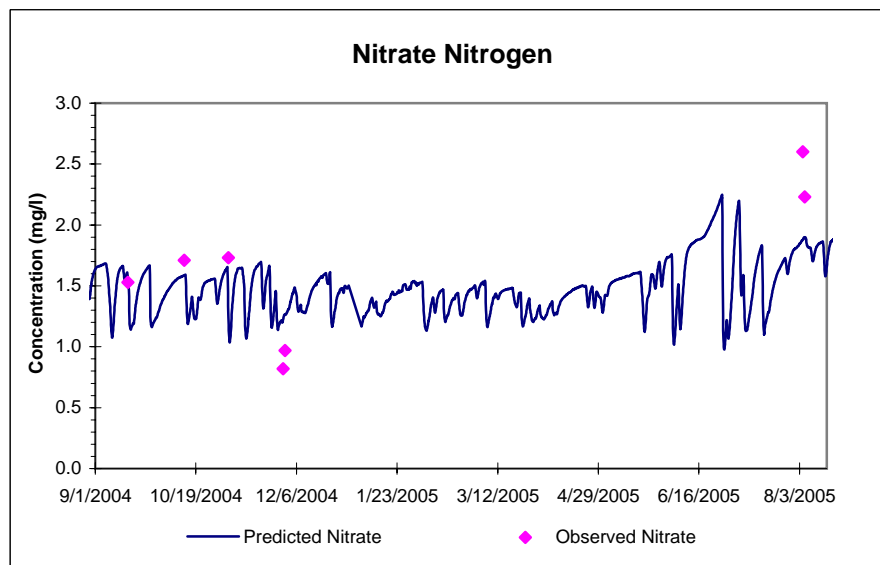
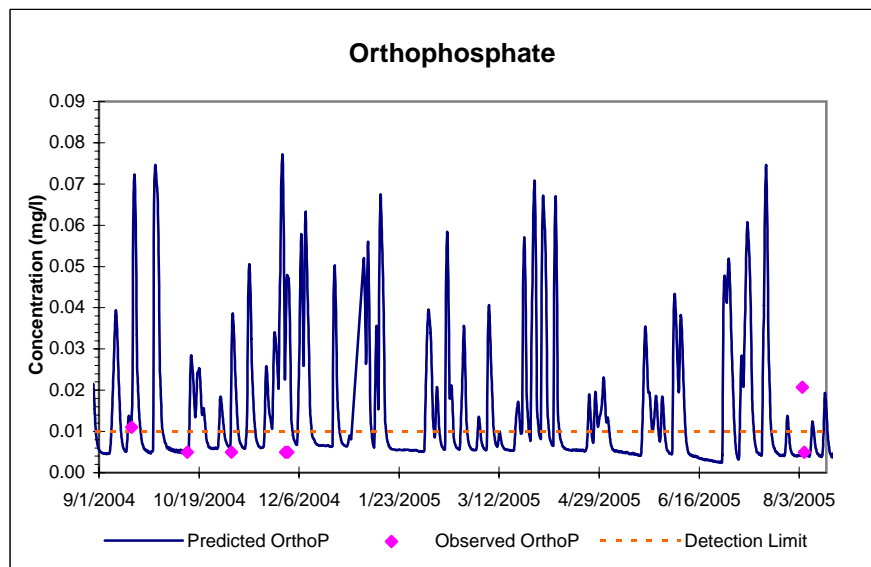
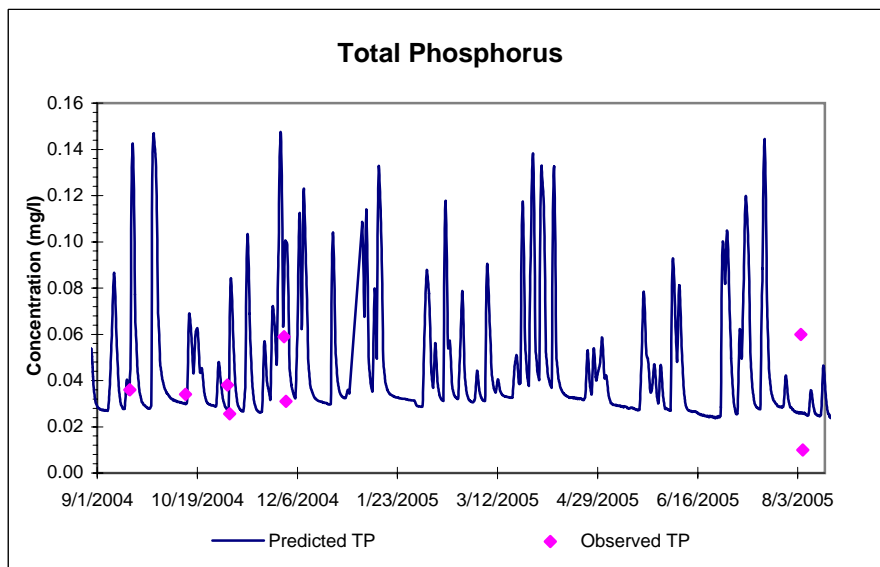


## Drakes Brook Upstream of Mt. Olive STP in Mount Olive (DkB1)

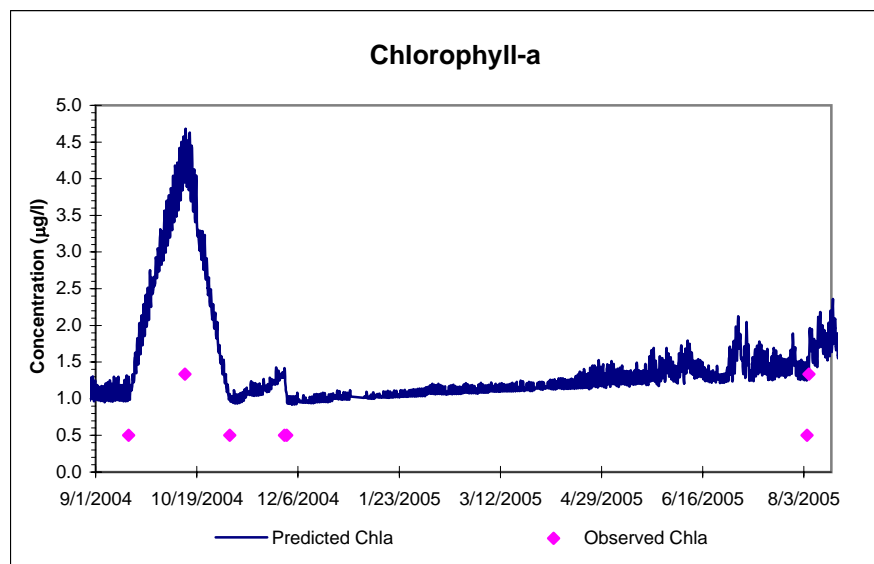
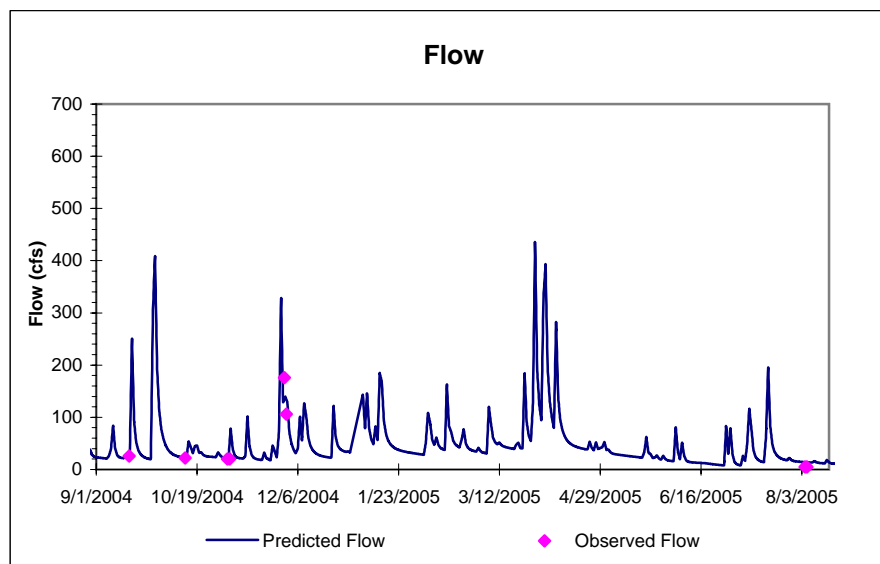
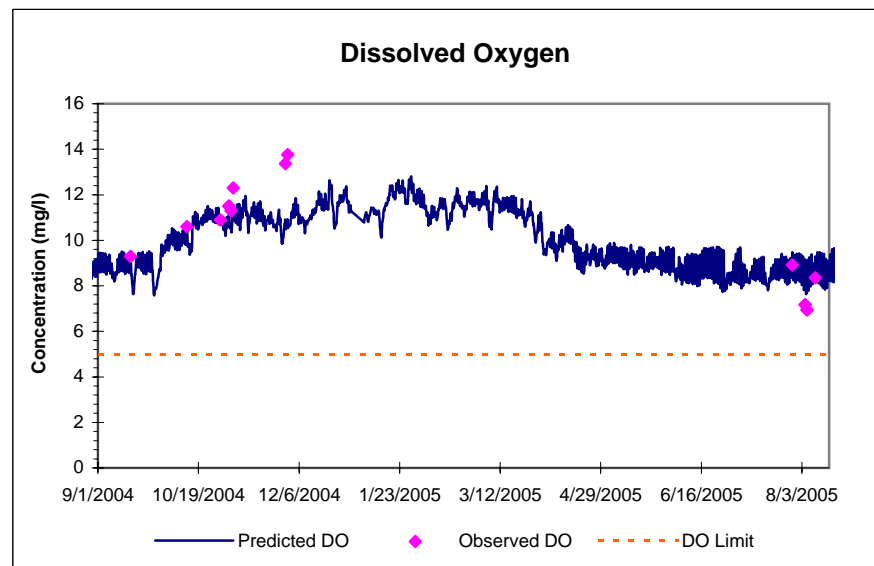
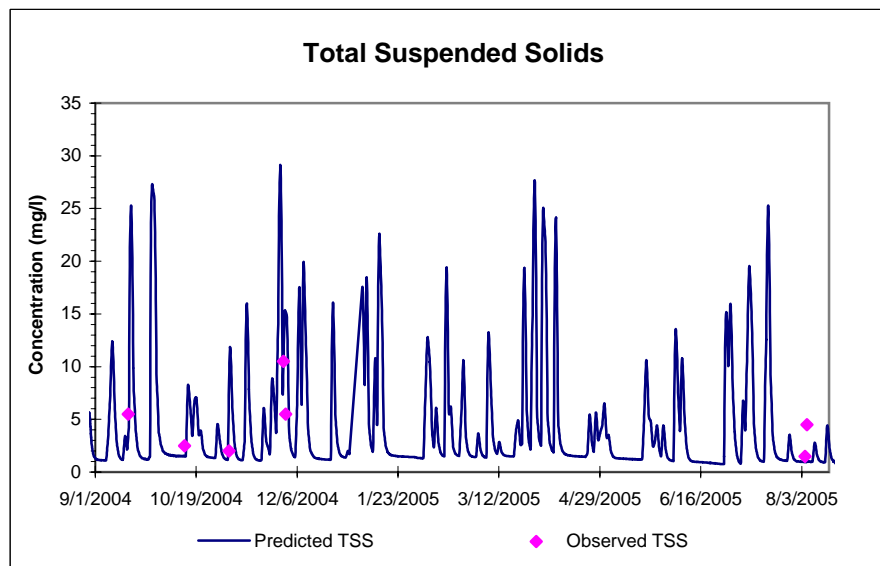




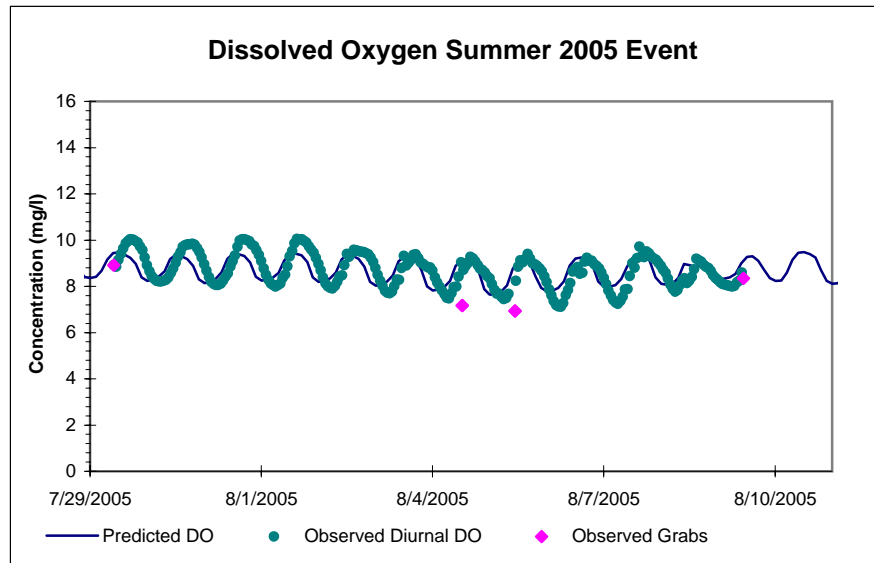
## South Branch Raritan River at Four Bridges (SBRR2, USGS 01396190)



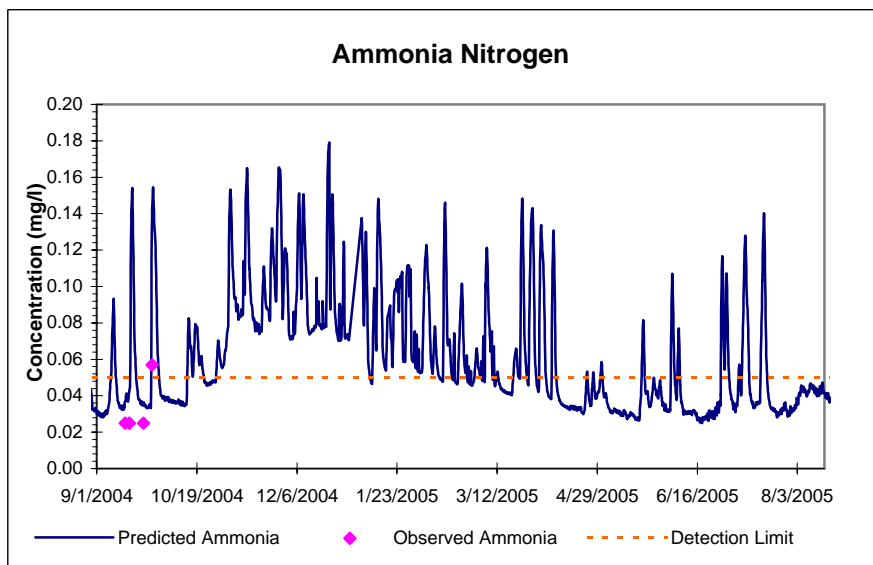
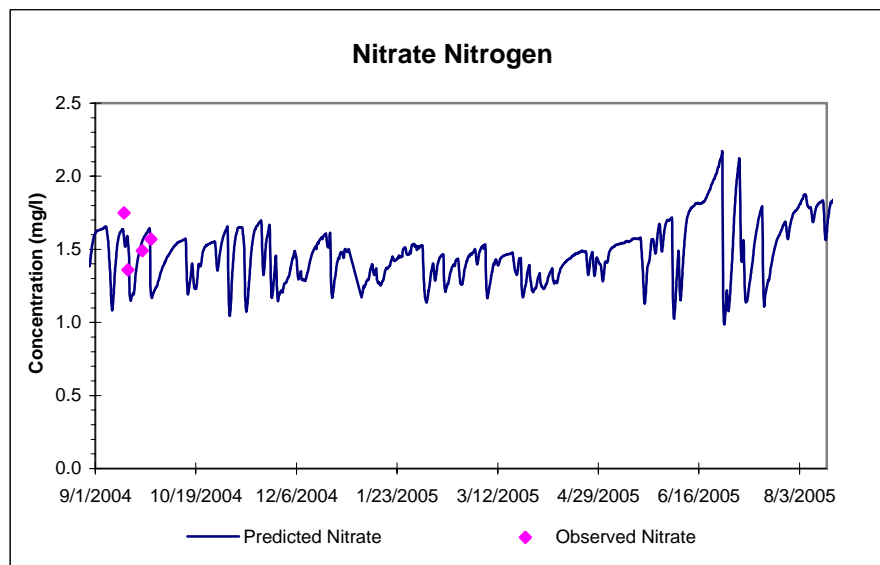
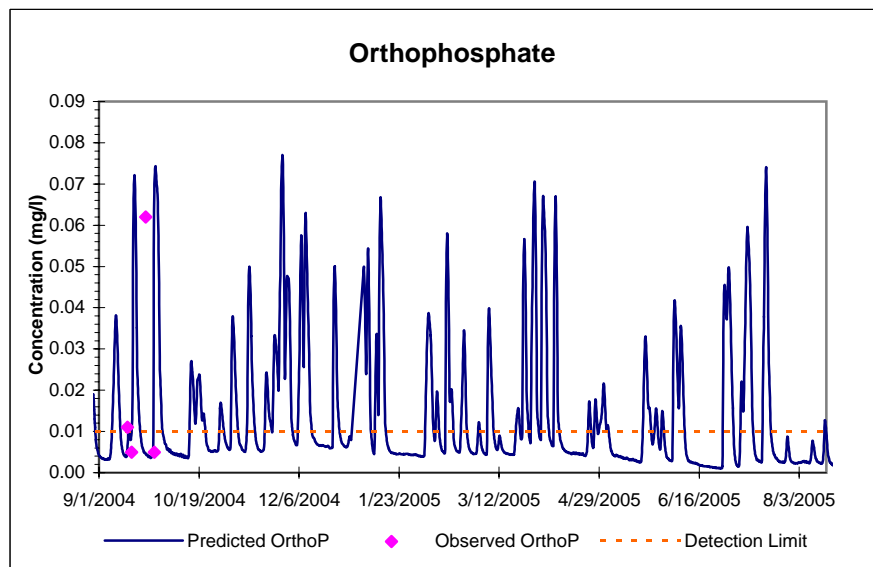
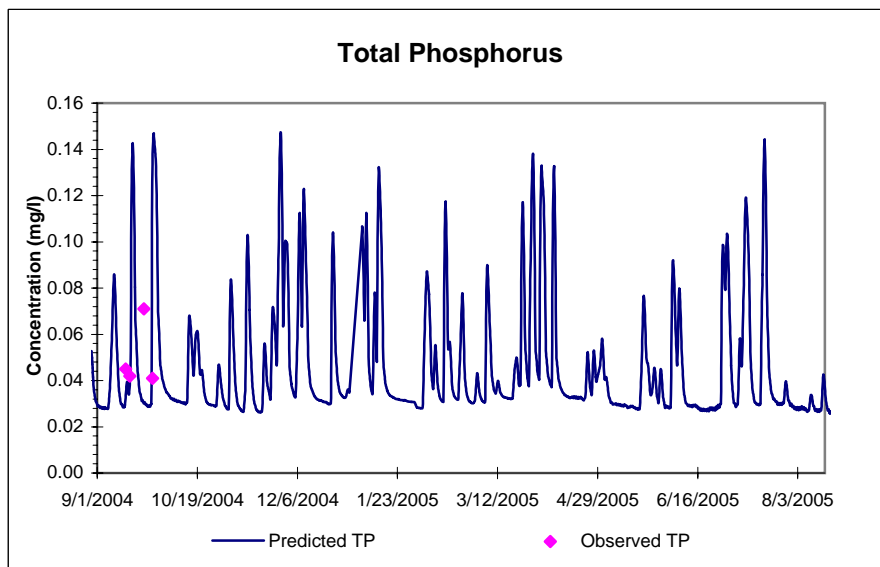
## South Branch Raritan River at Four Bridges (SBRR2, USGS 01396190)



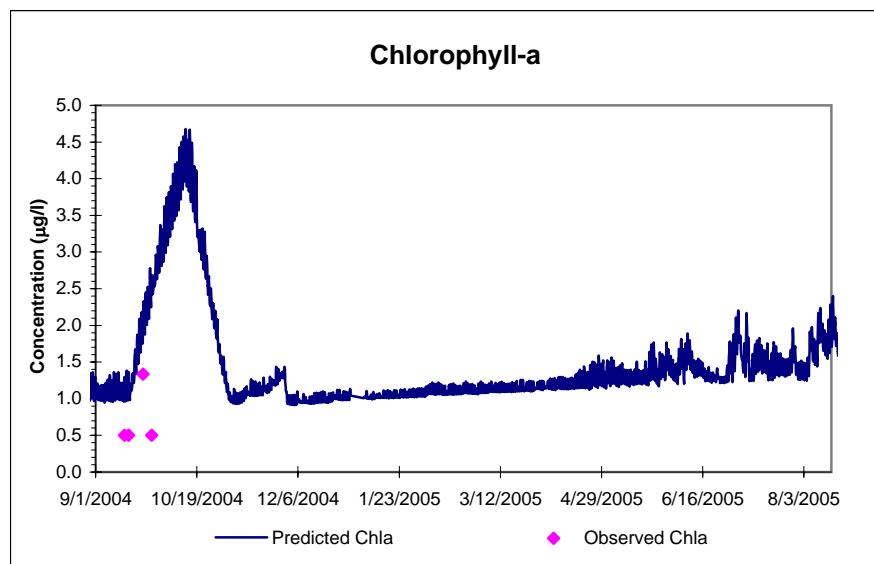
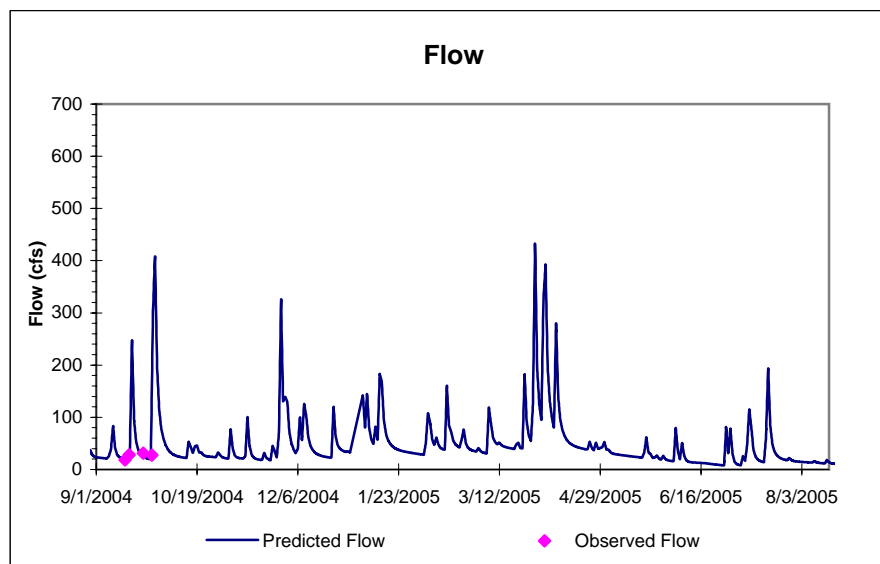
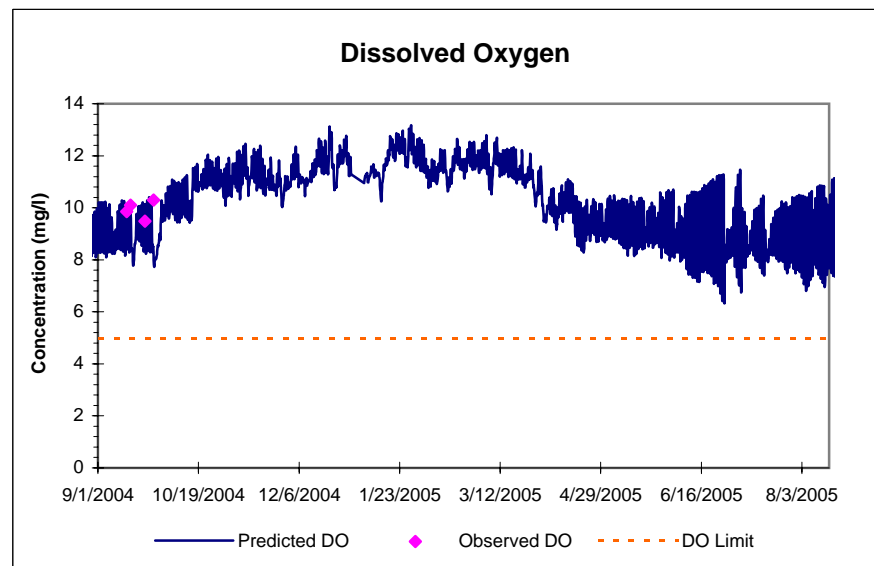
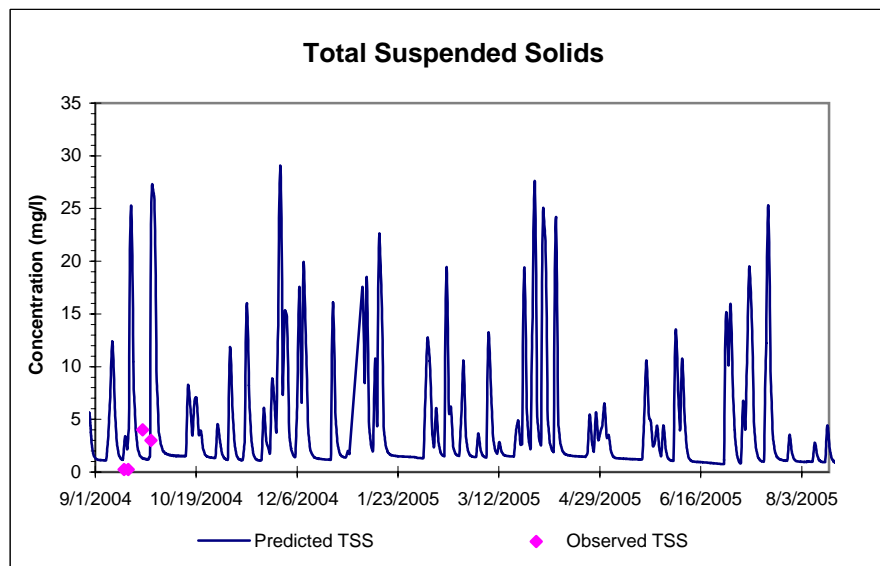
## South Branch Raritan River at Four Bridges (SBRR2, USGS 01396190)



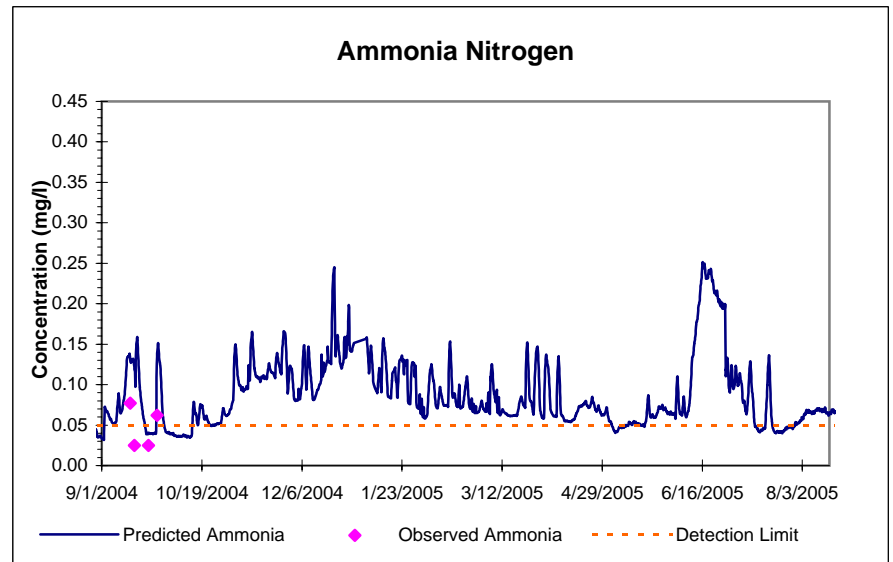
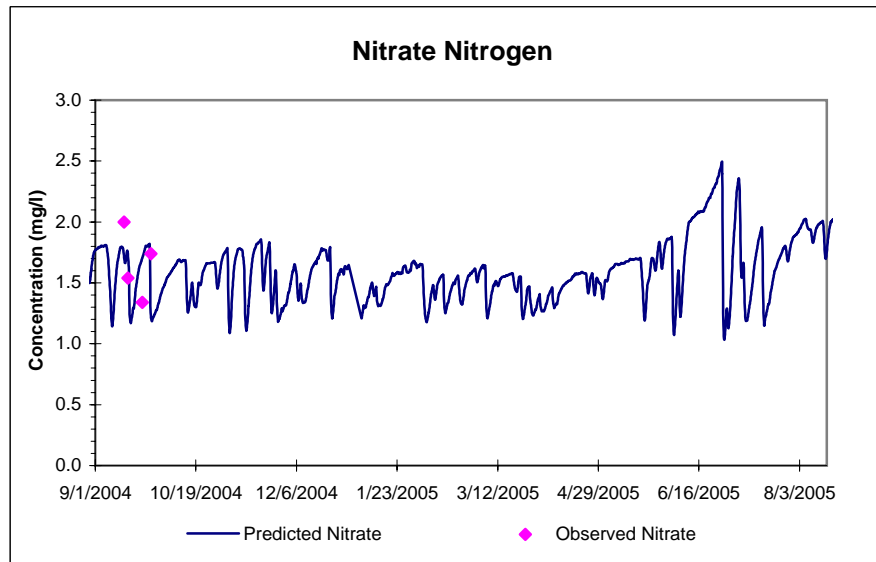
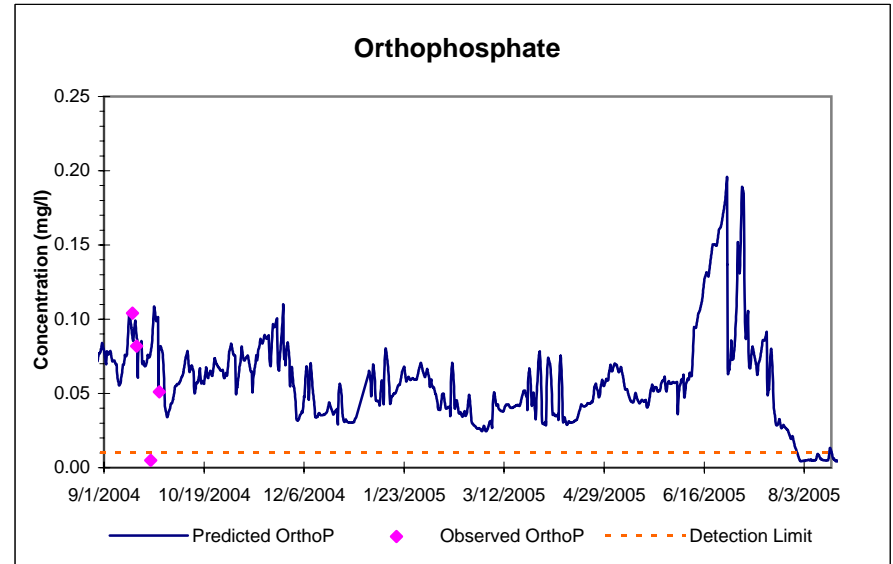
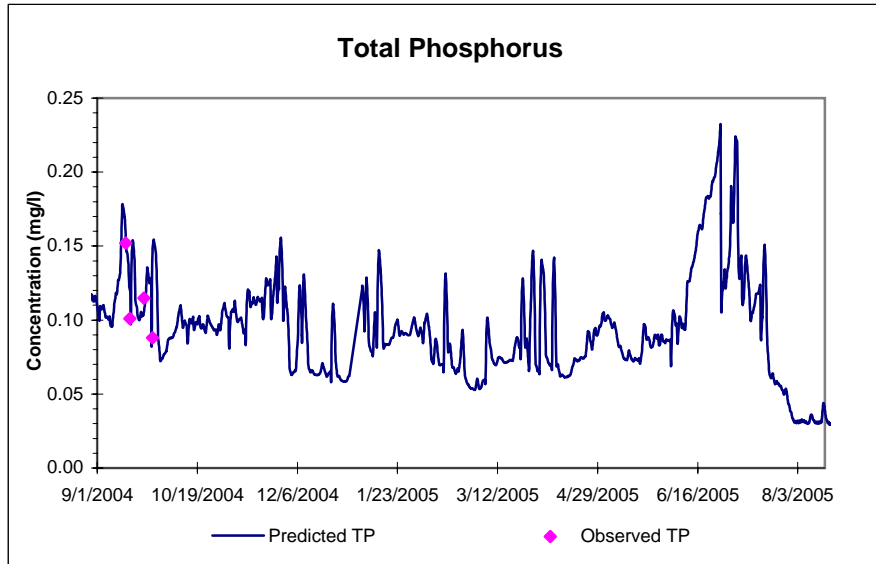
## South Branch Raritan River Upstream of Schooley's Mt. STP in Washington Twp. (SBR1)



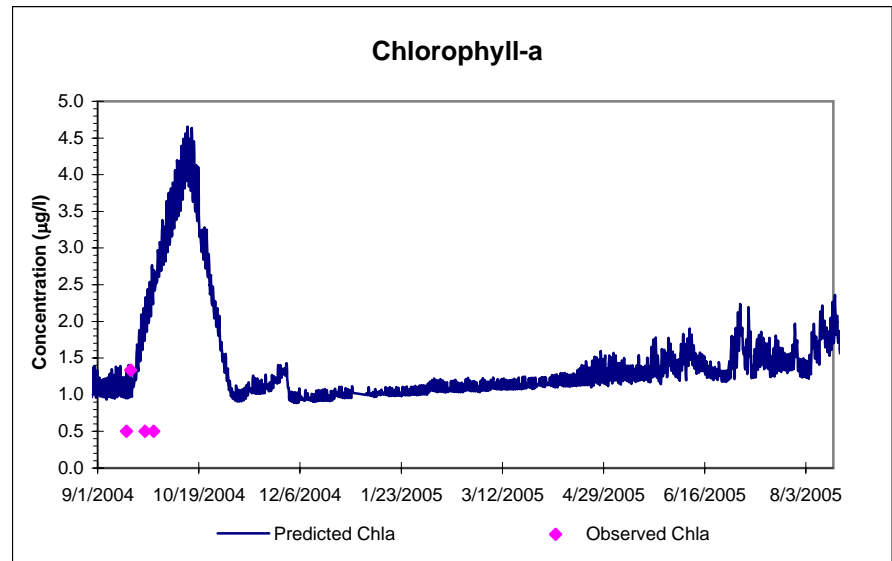
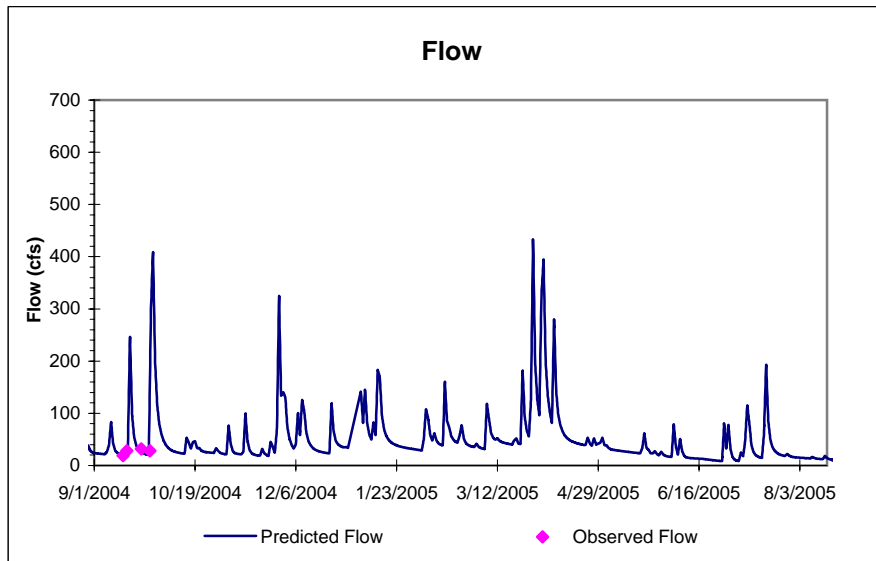
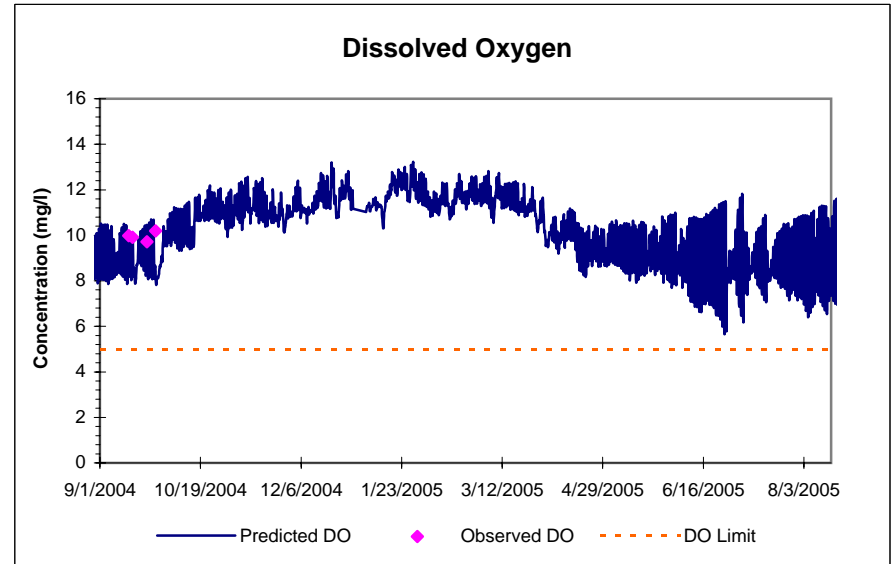
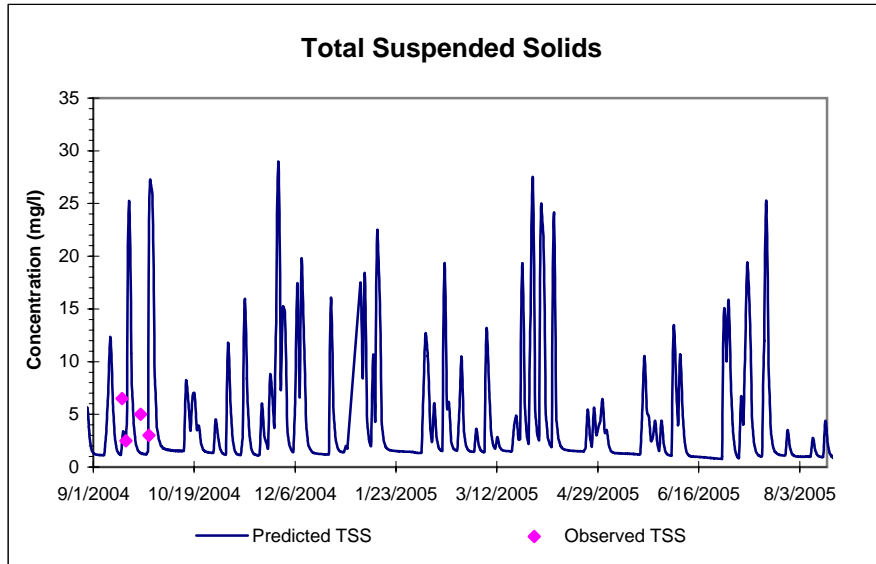
## South Branch Raritan River Upstream of Schooley's Mt. STP in Washington Twp. (SBR1)



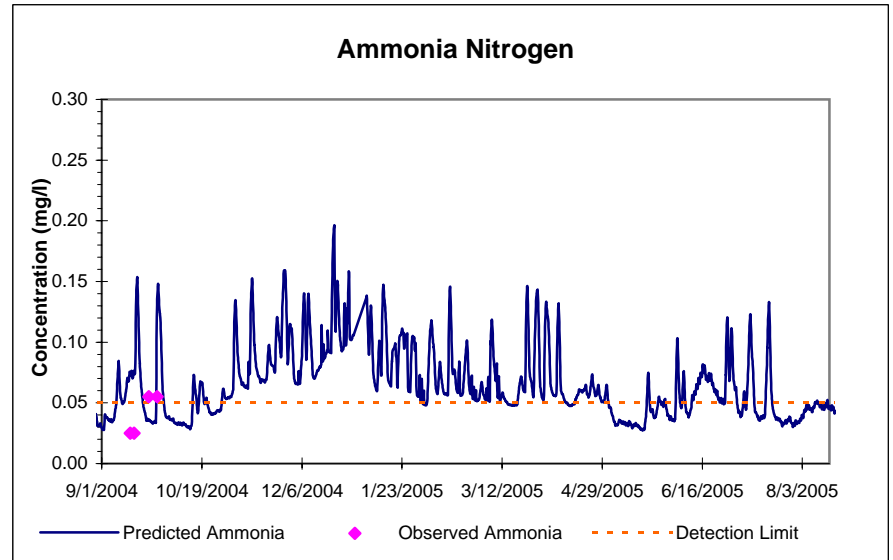
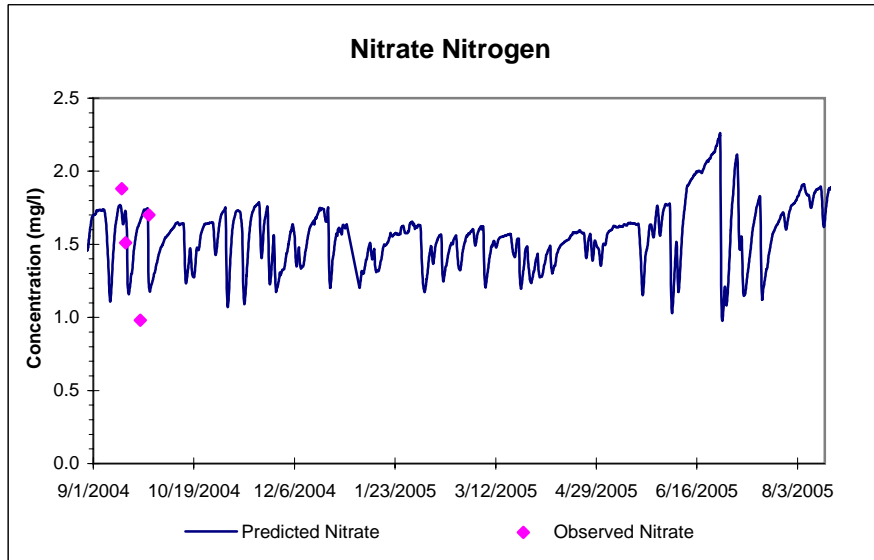
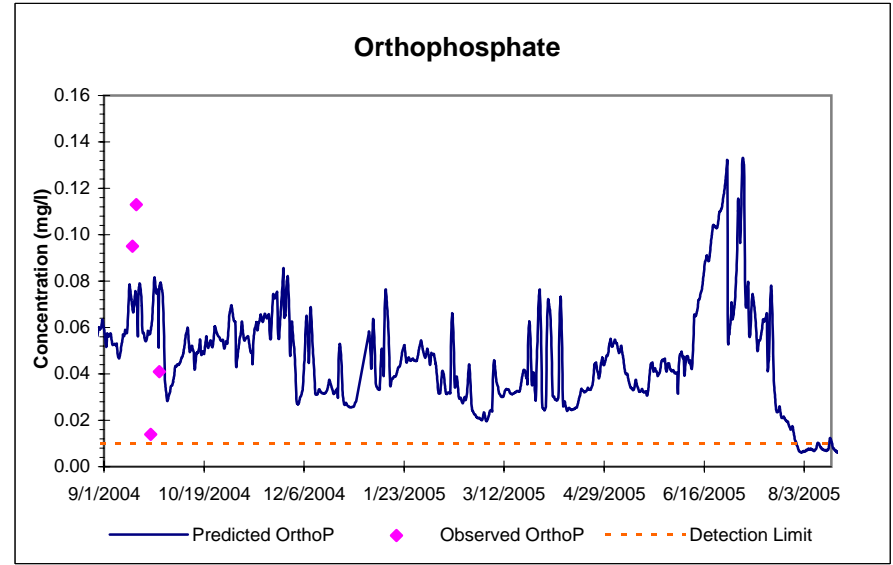
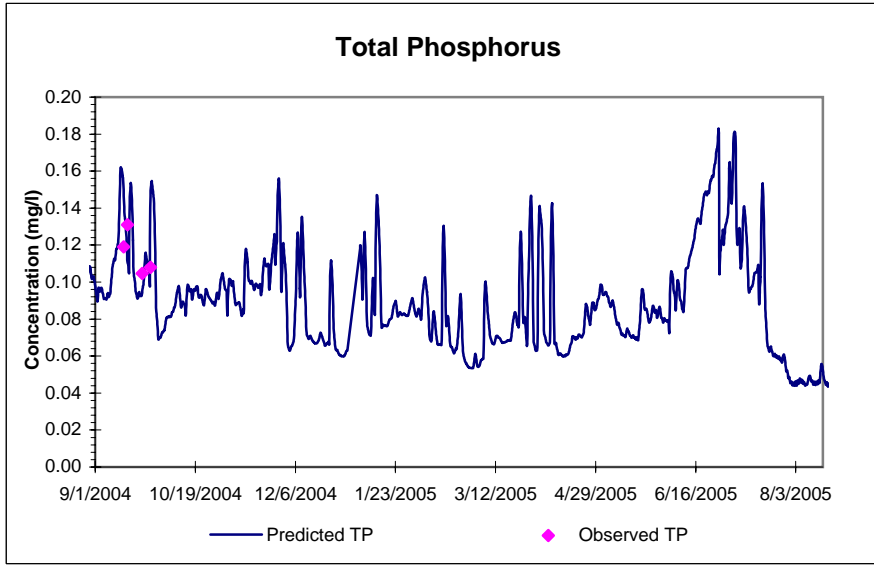
## South Branch Raritan River Downstream of Schooley's Mt. STP in Washington Twp. (SBR2)



## South Branch Raritan River Downstream of Schooley's Mt. STP in Washington Twp. (SBR2)

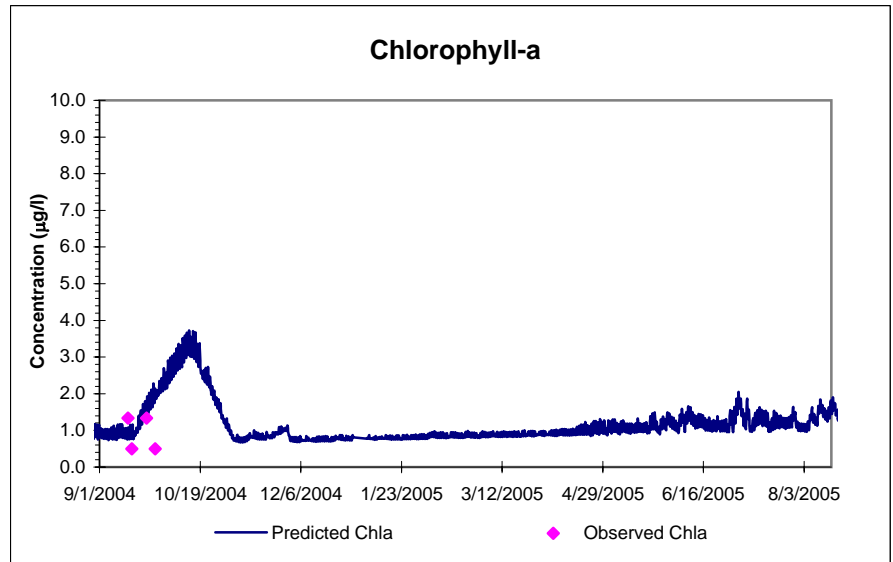
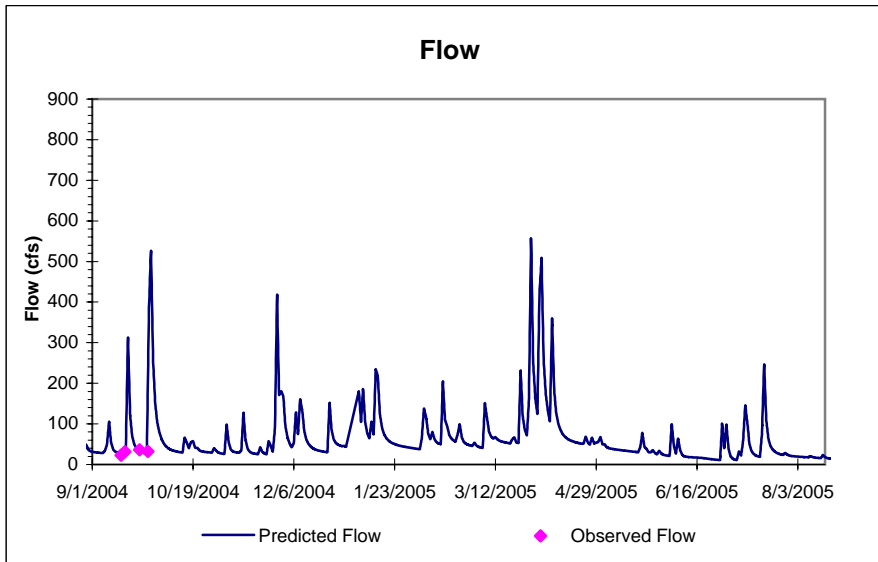
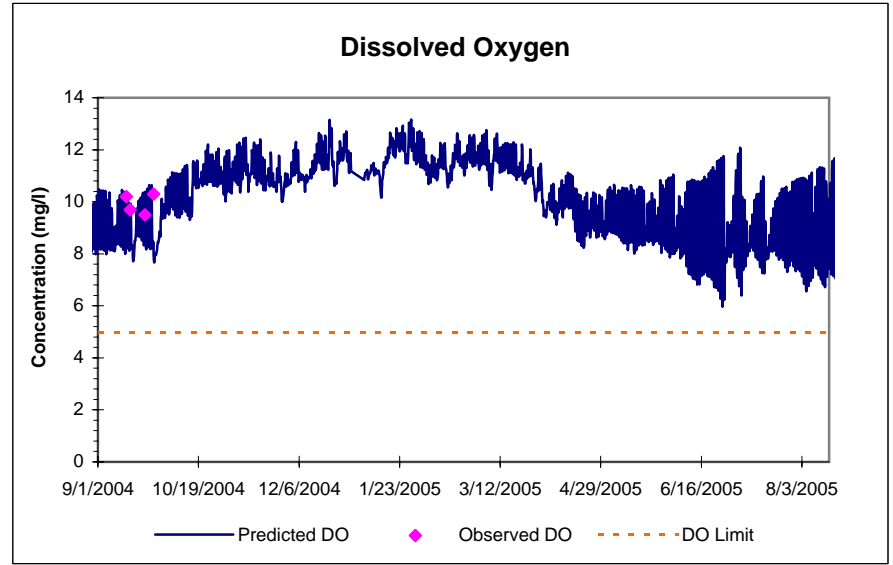
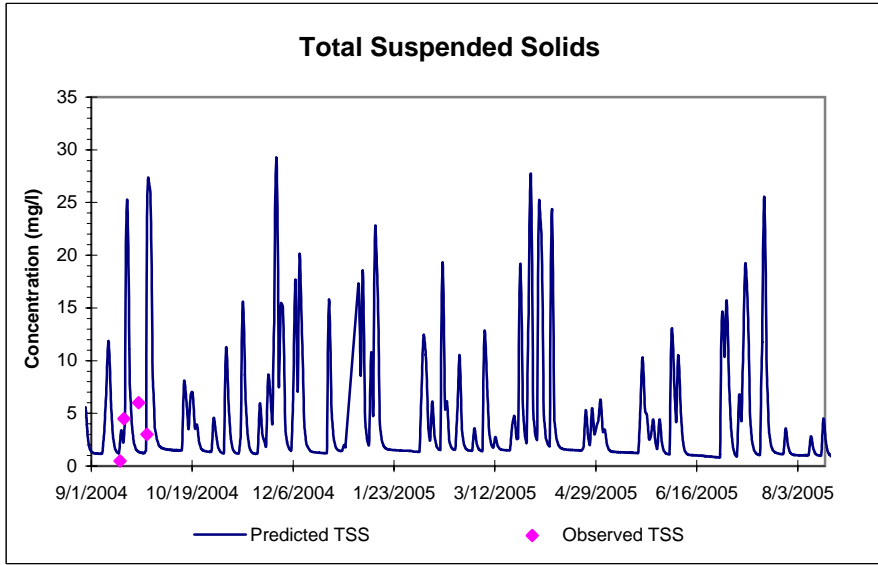


## South Branch Raritan River Downstream of Long Valley STP in Washington Twp. (SBR3)

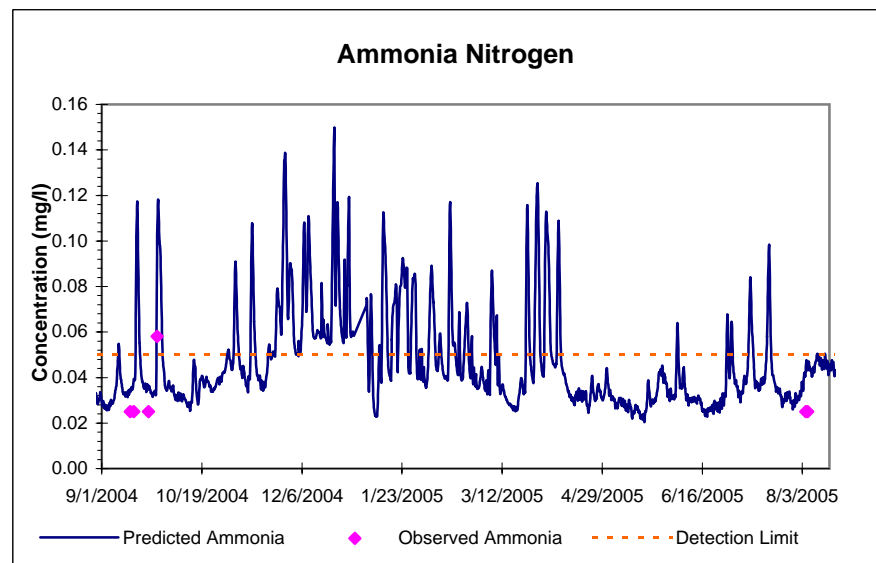
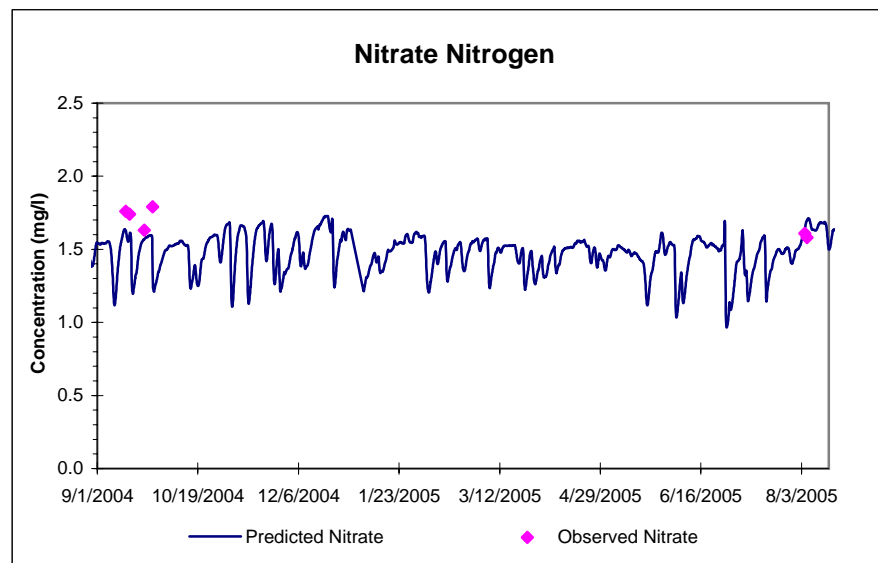
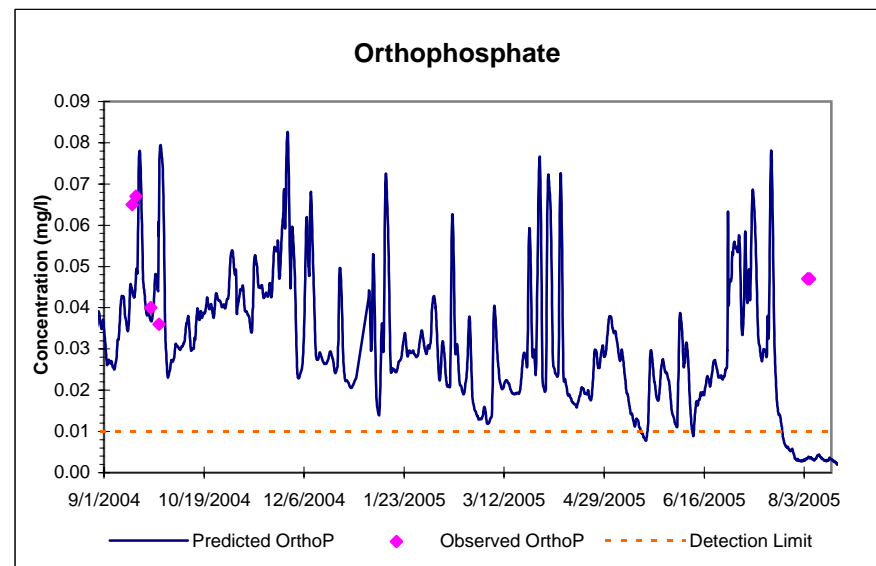
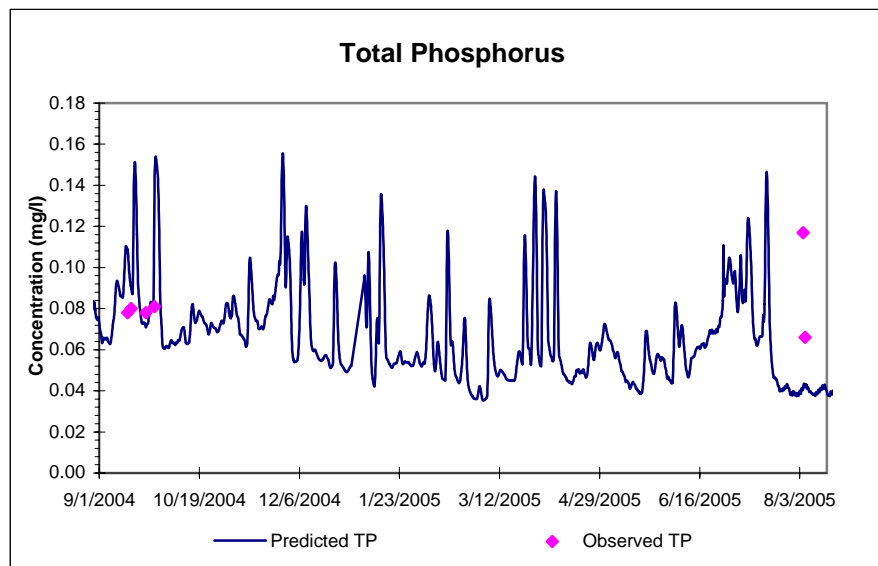




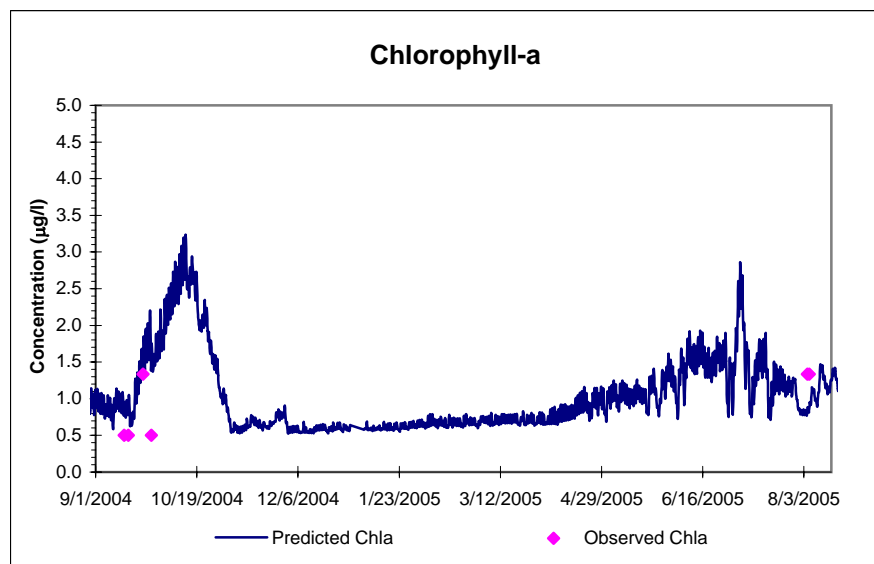
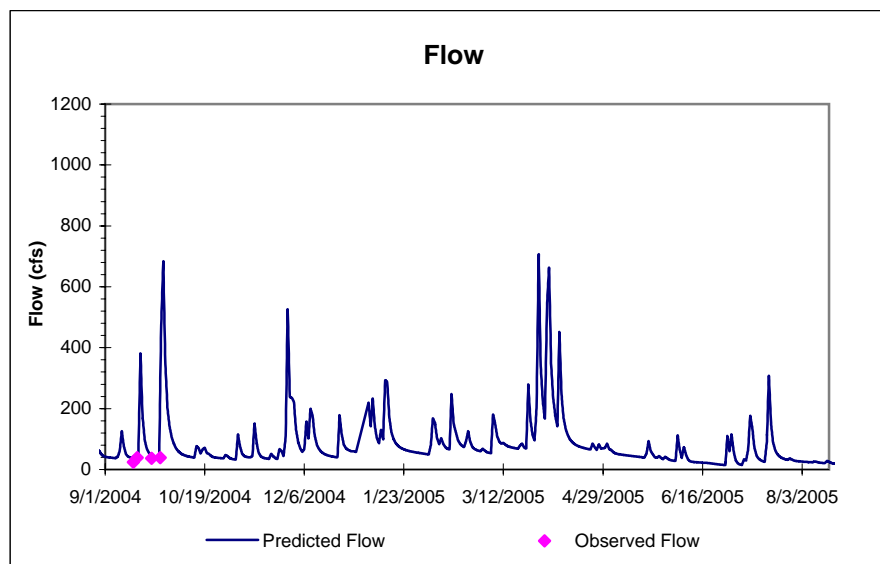
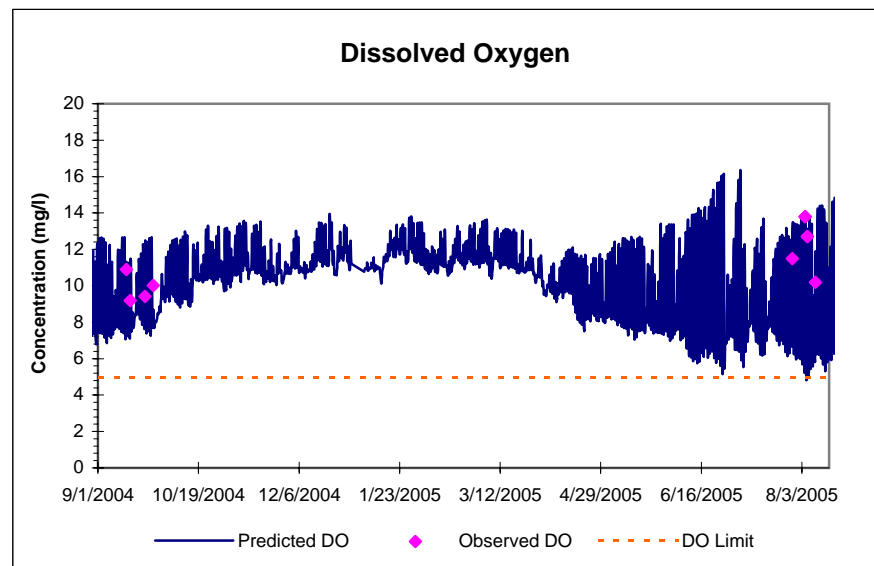
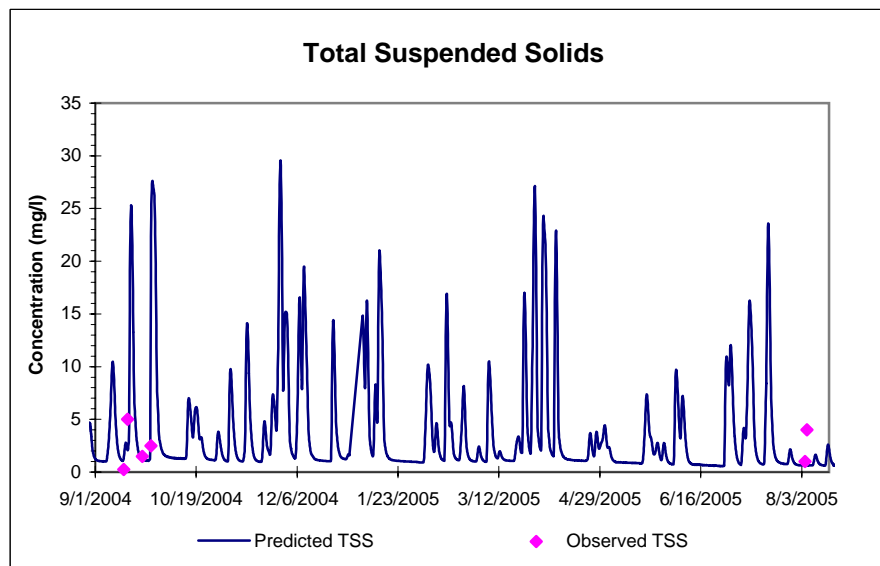
# South Branch Raritan River Downstream of Long Valley STP in Washington Twp. (SBR3)



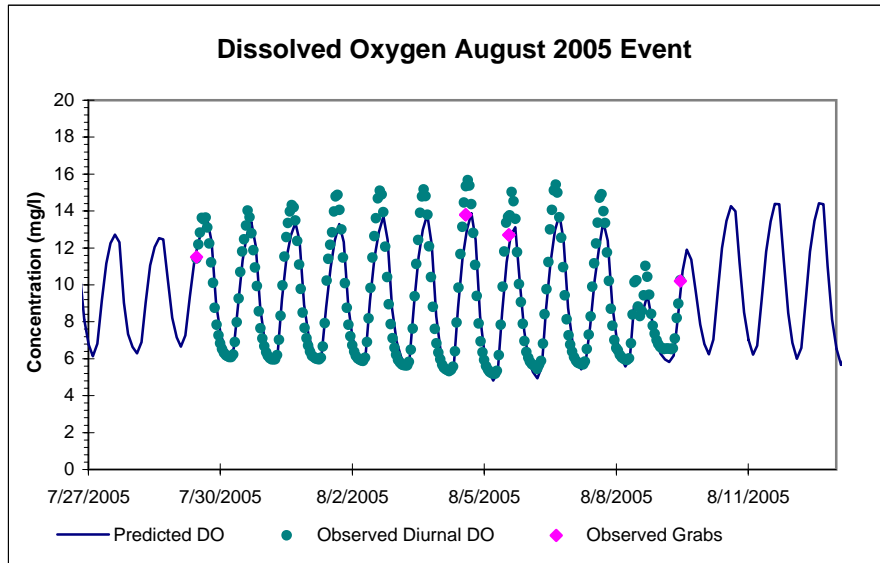
## South Branch Raritan River at Mill Rd. in Middle Valley (SBR4)



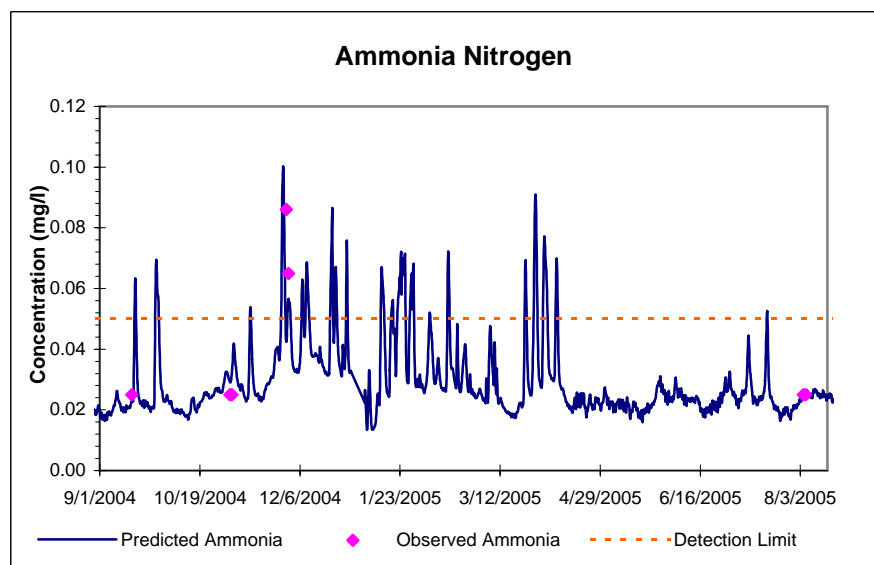
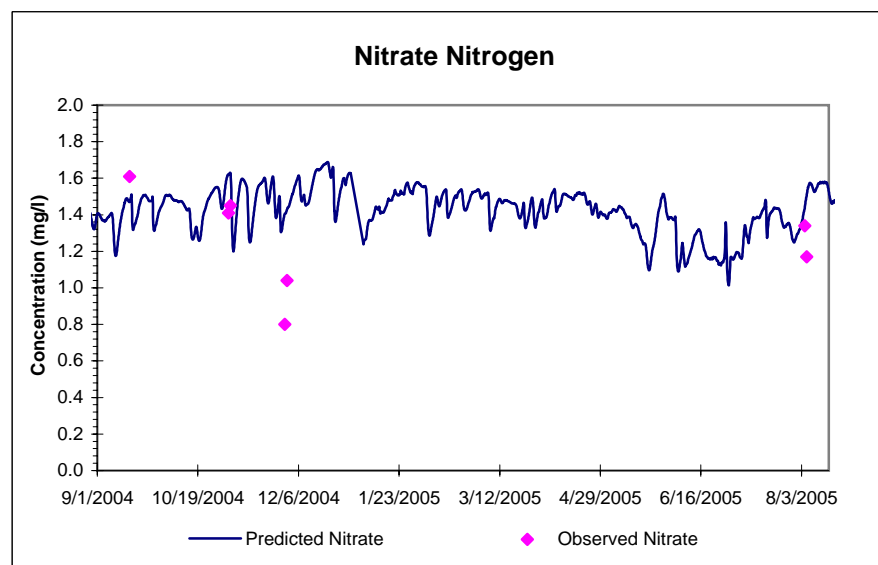
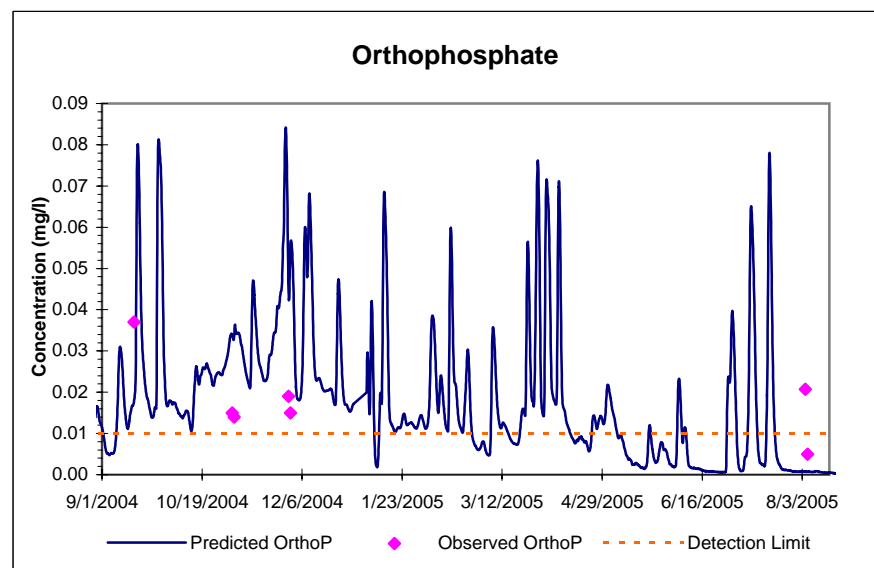
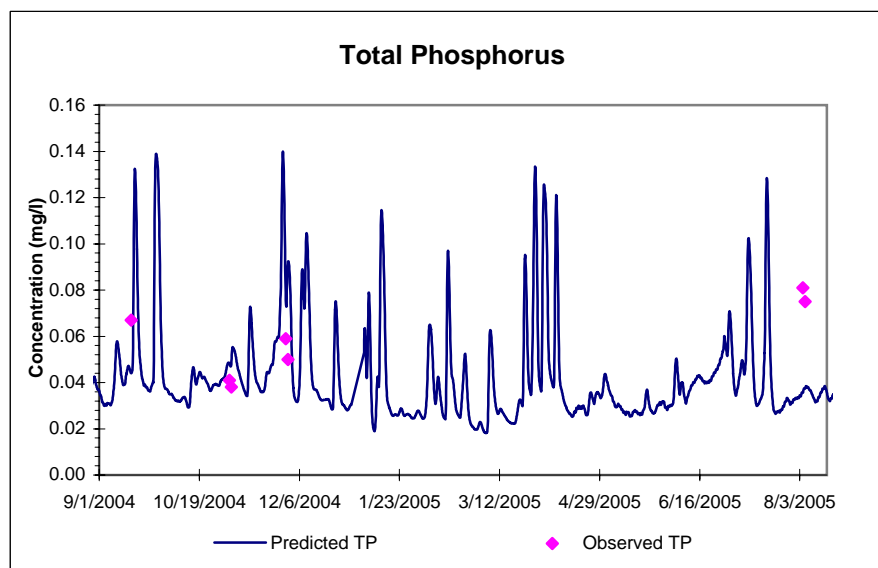
## South Branch Raritan River at Mill Rd. in Middle Valley (SBR4)



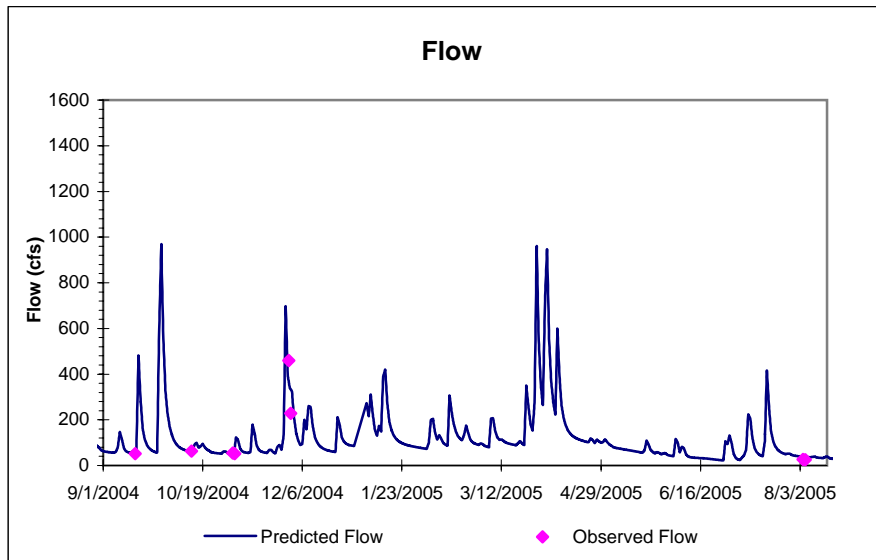
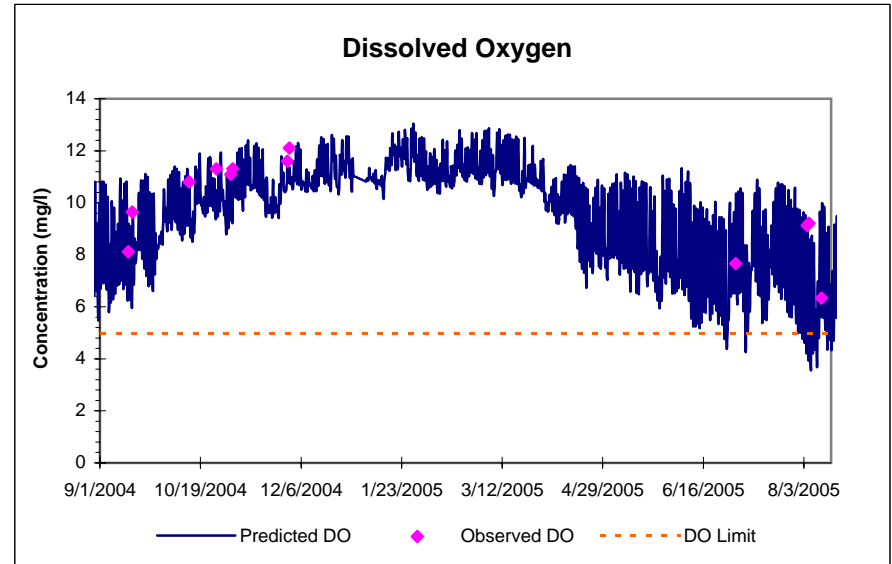
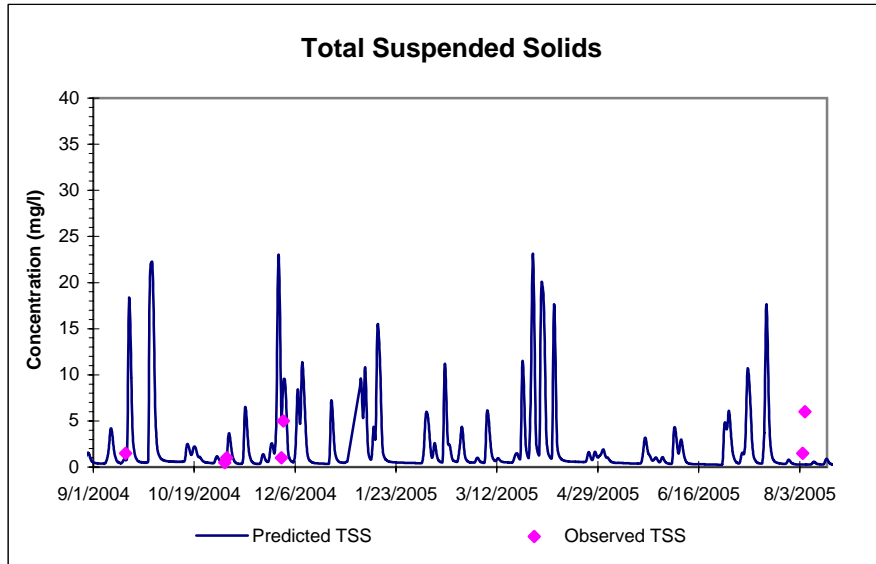
## South Branch Raritan River at Mill Rd. in Middle Valley (SBR4)



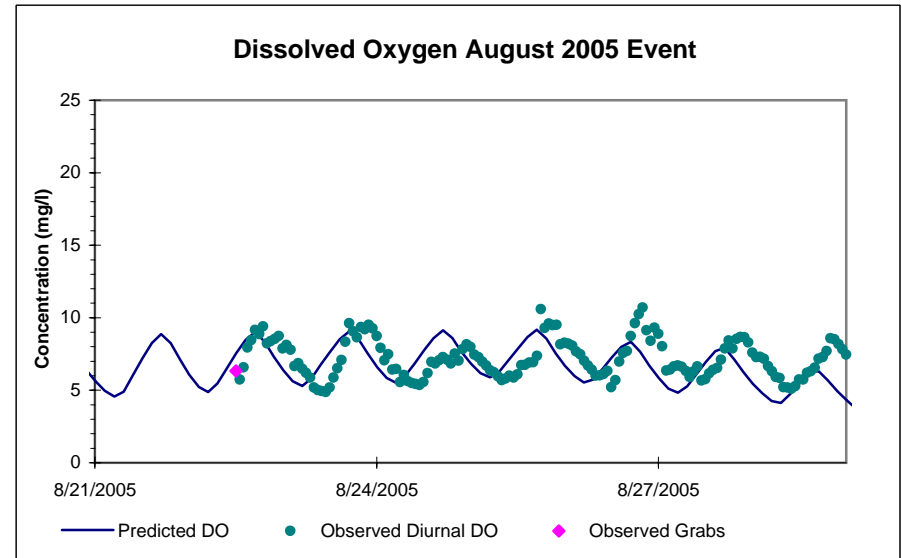
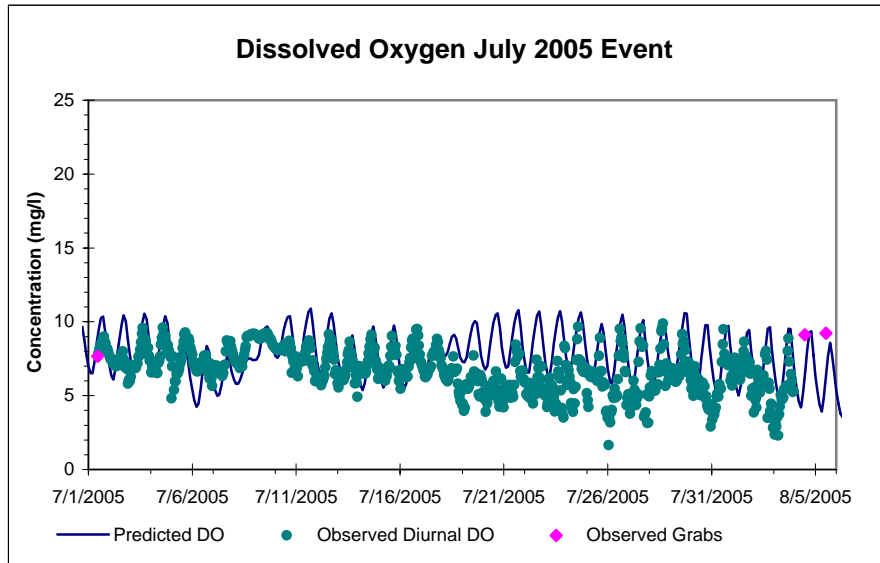
## South Branch Raritan River at Solitude Lake (SBRR3, USGS 01396500)



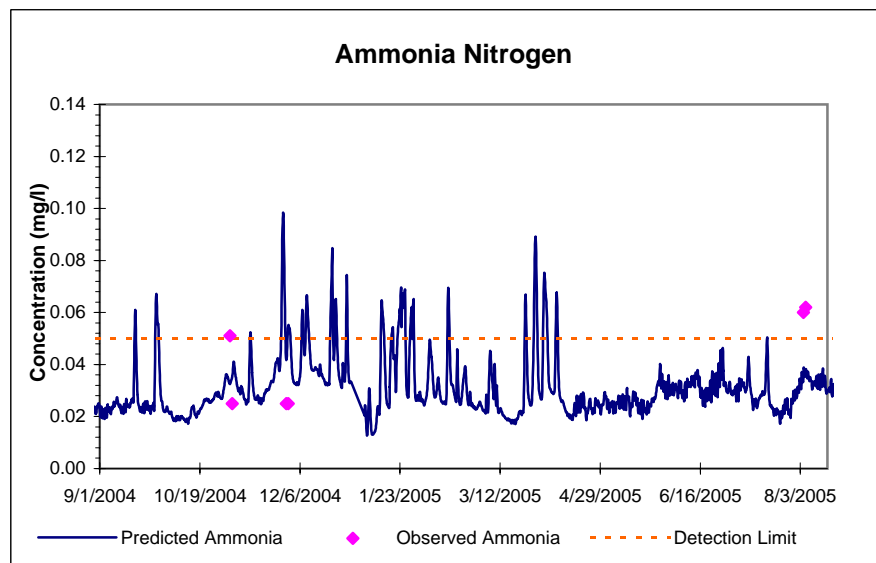
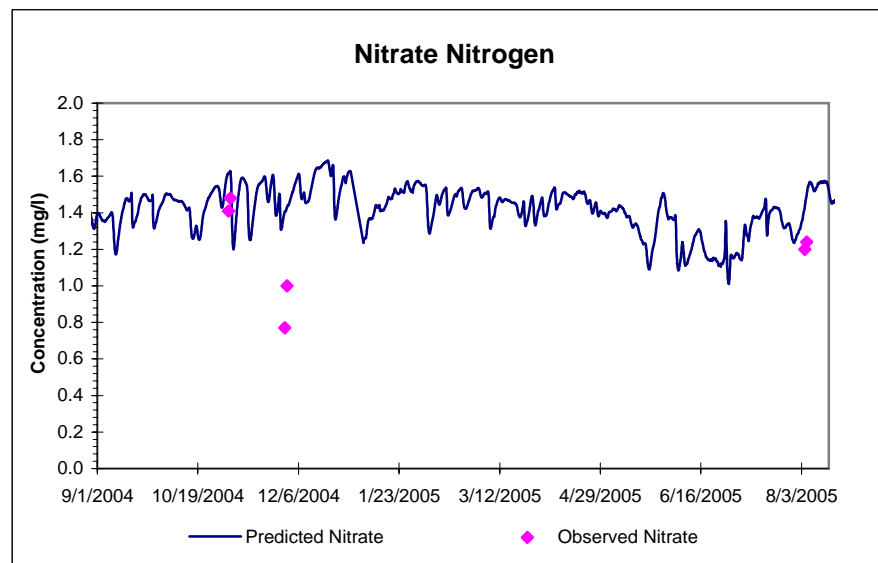
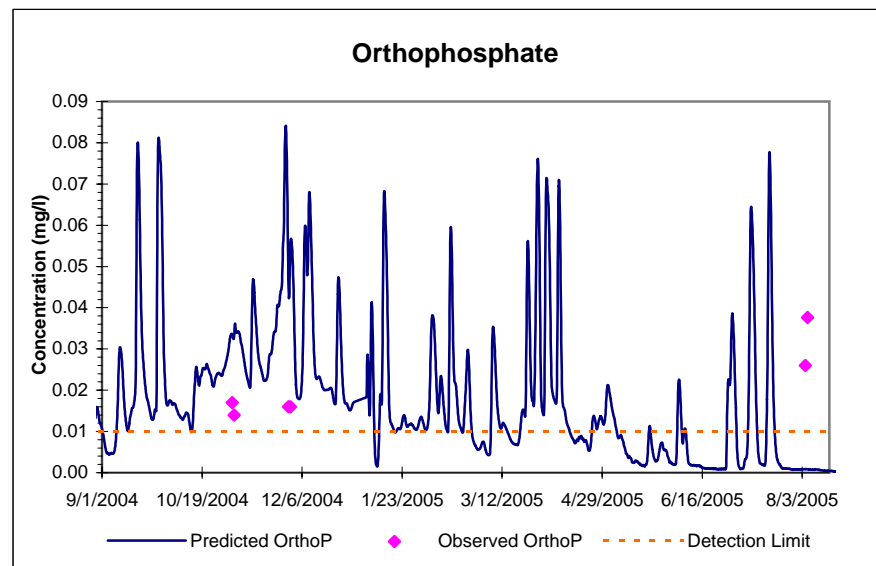
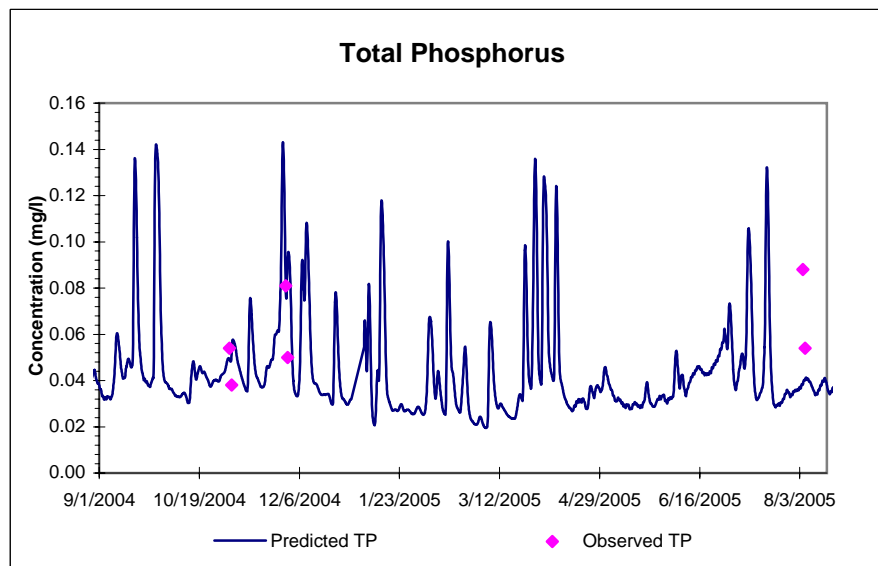
## South Branch Raritan River at Solitude Lake (SBRR3, USGS 01396500)



## South Branch Raritan River at Solitude Lake (SBRR3, USGS 01396500)

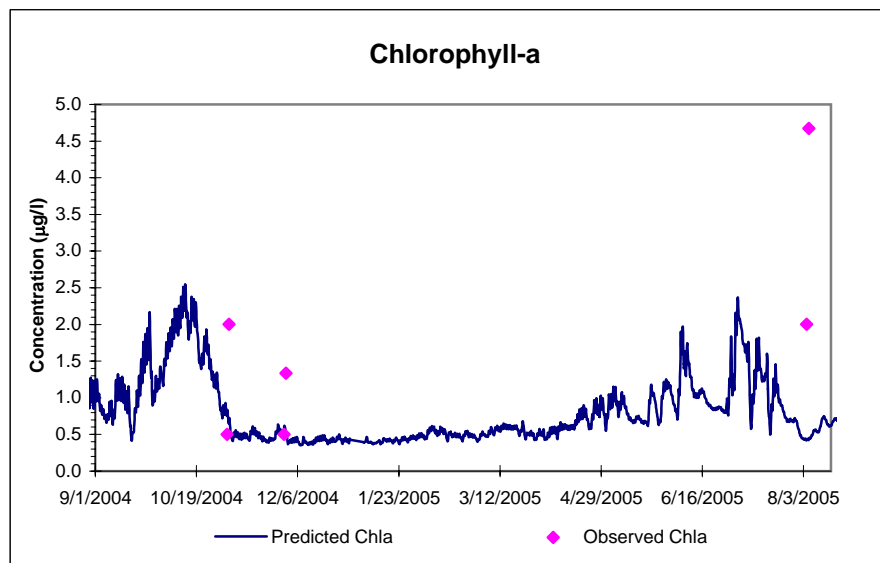
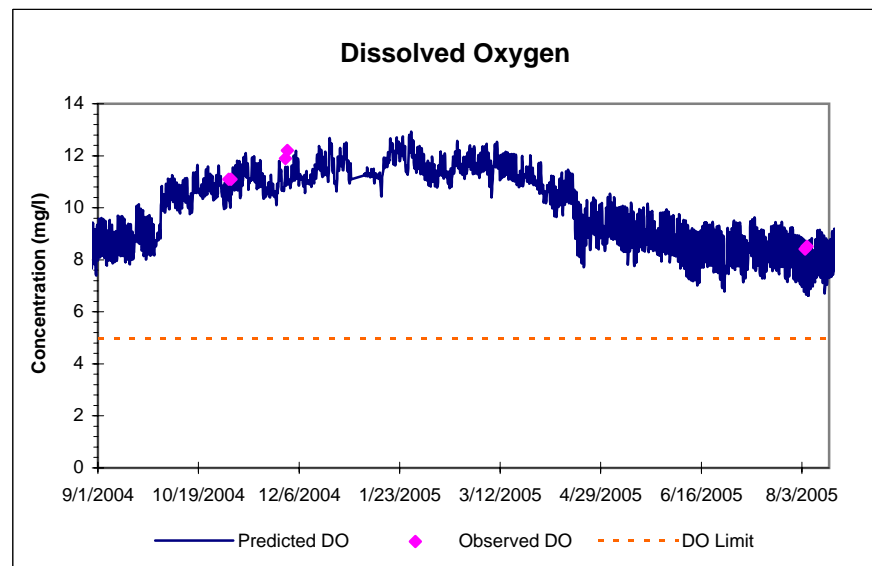
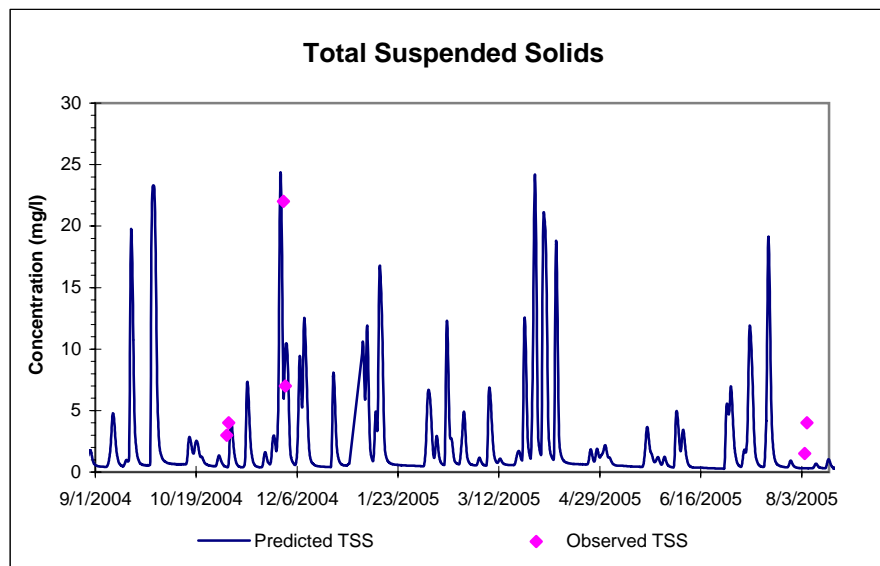


## South Branch Raritan River at Washington Ave in High Bridge (SBRR5)

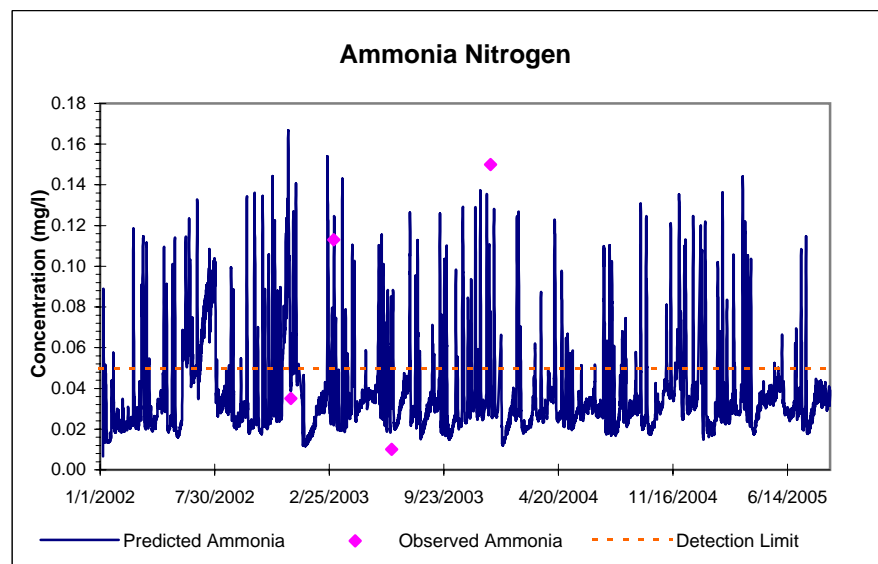
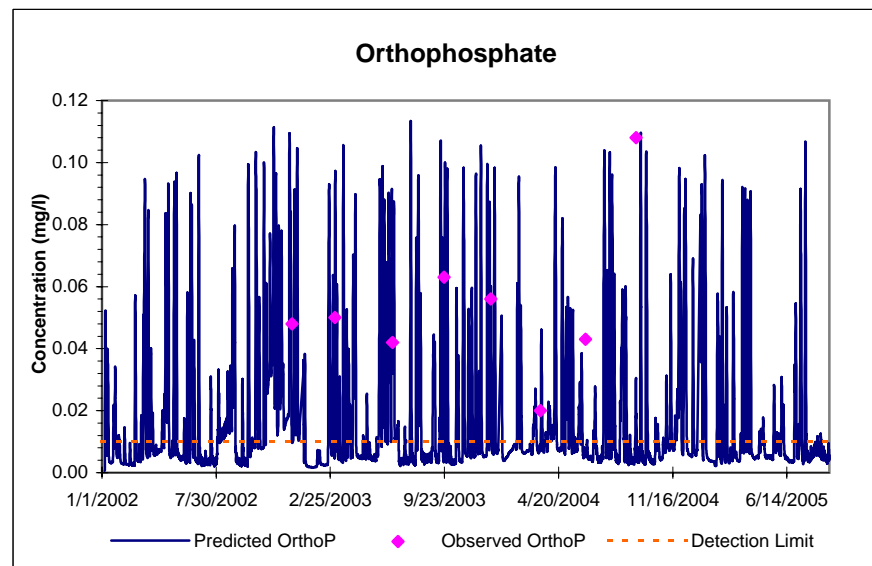
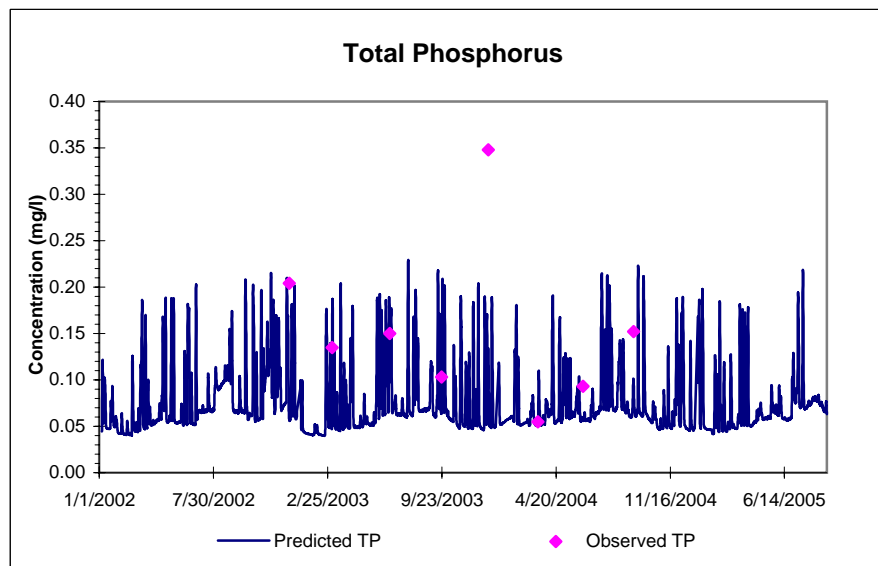




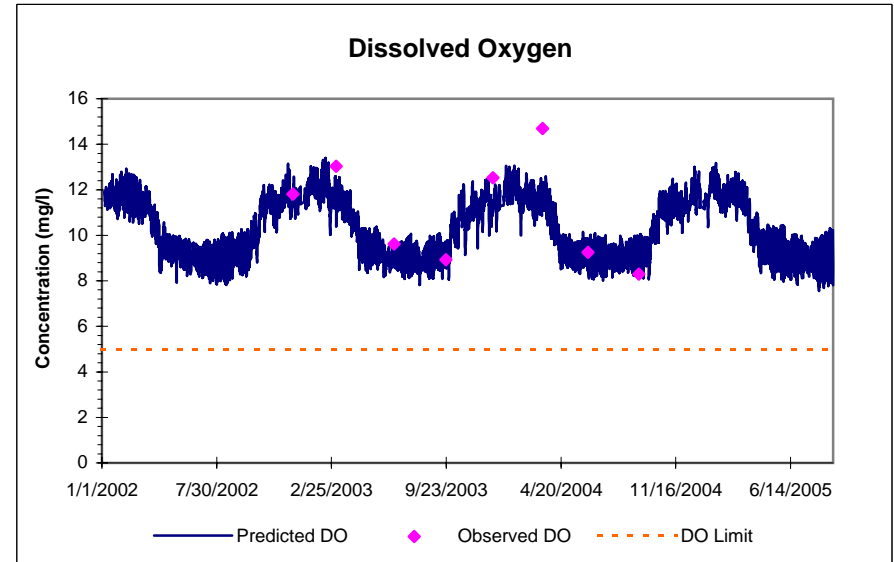
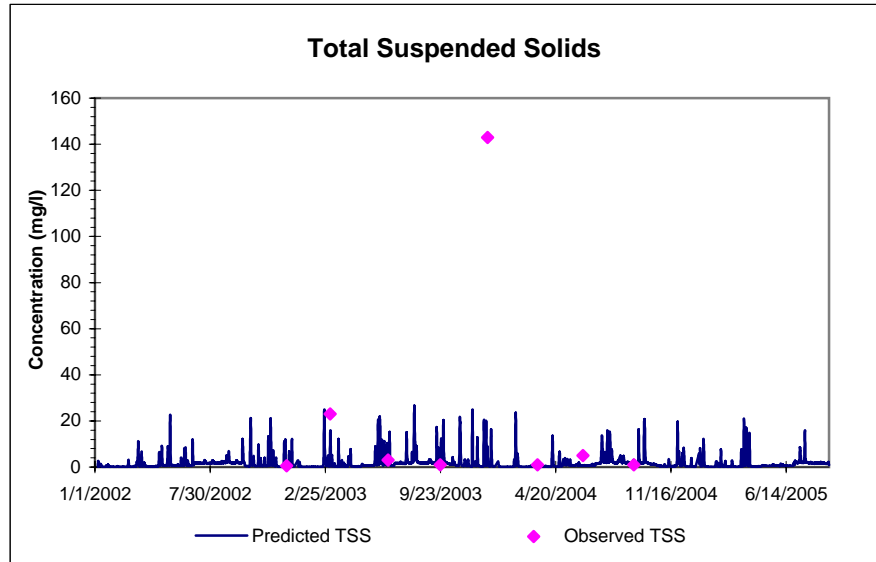
## South Branch Raritan River at Washington Ave in High Bridge (SBRR5)



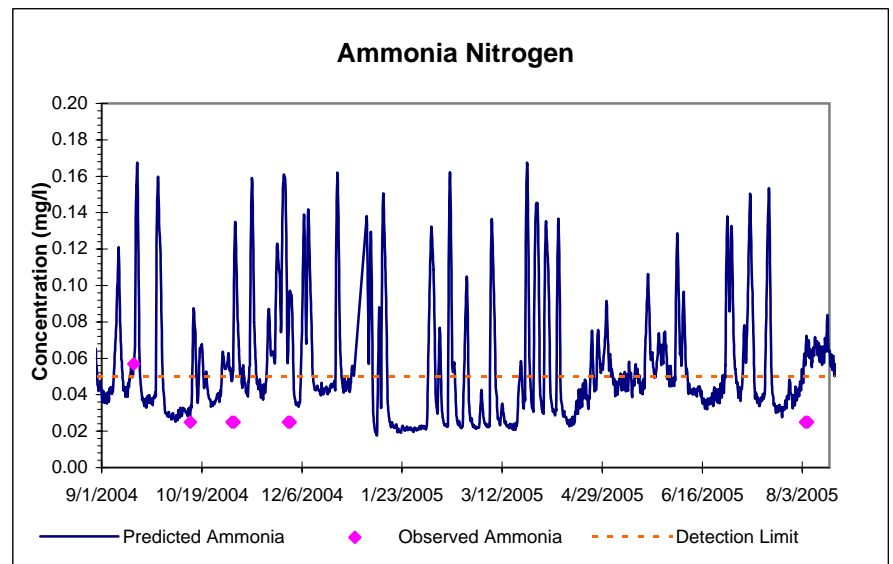
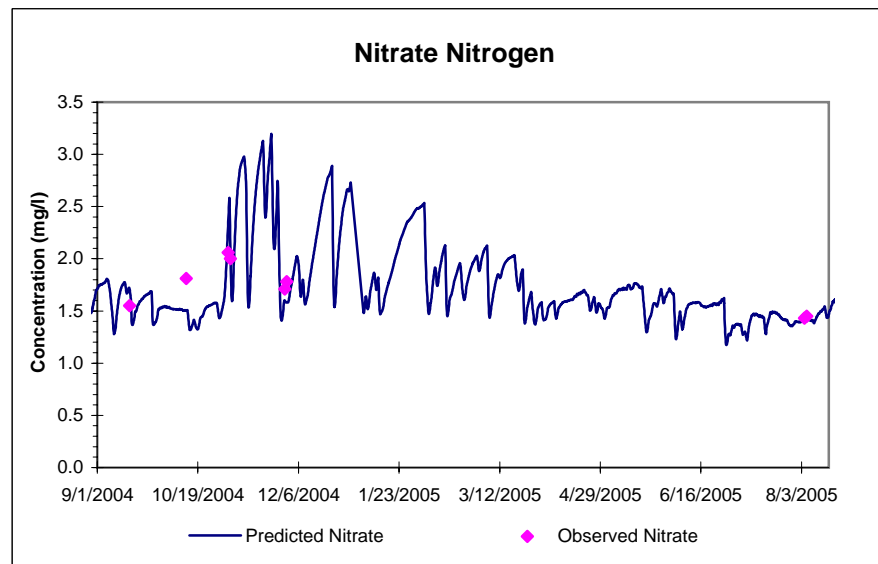
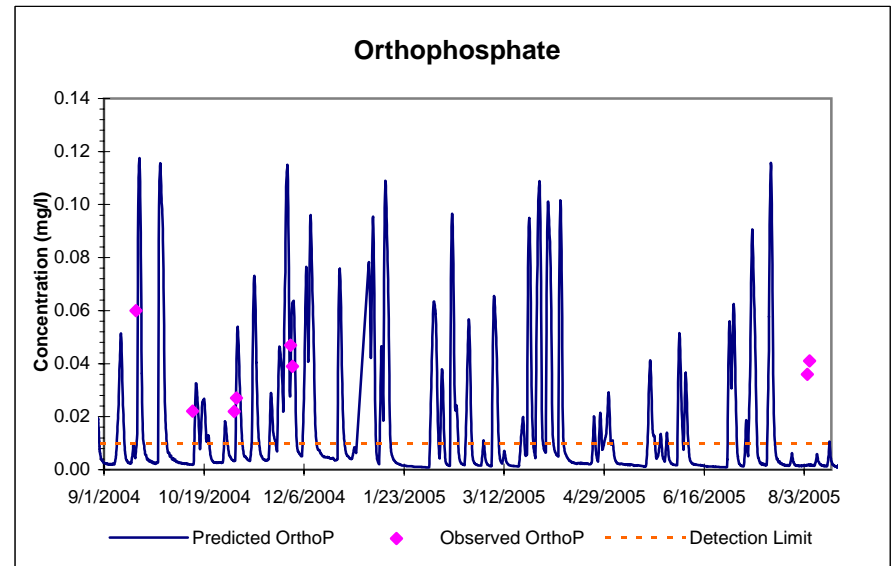
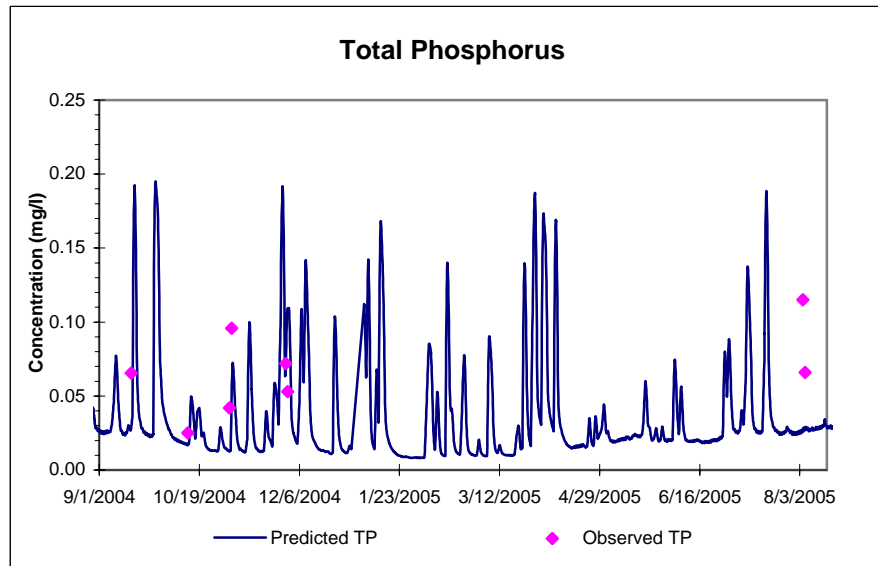
## Beaver Brook at Allerton Rd. in Annandale



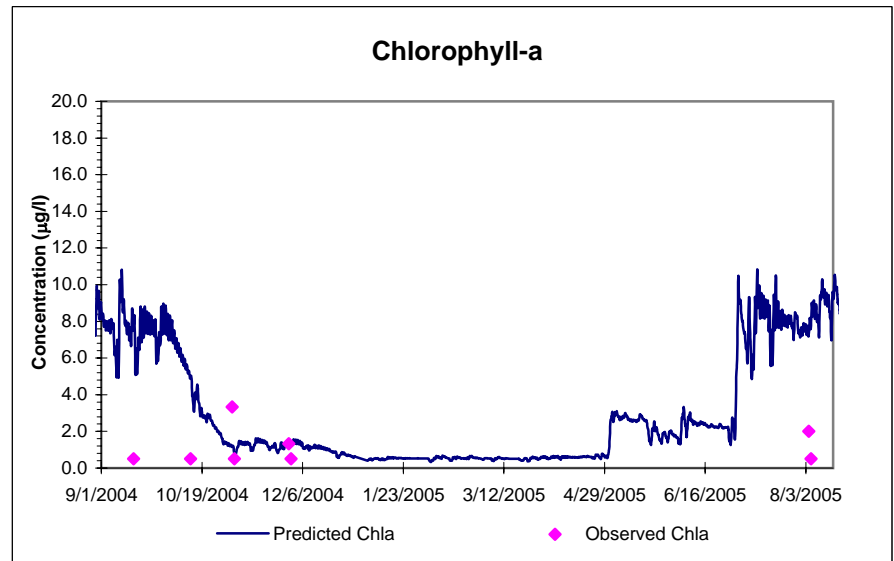
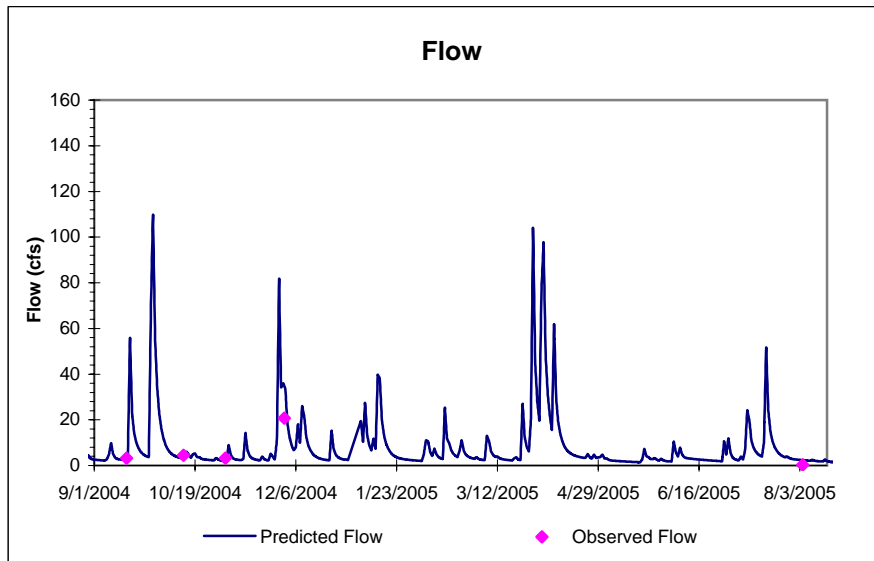
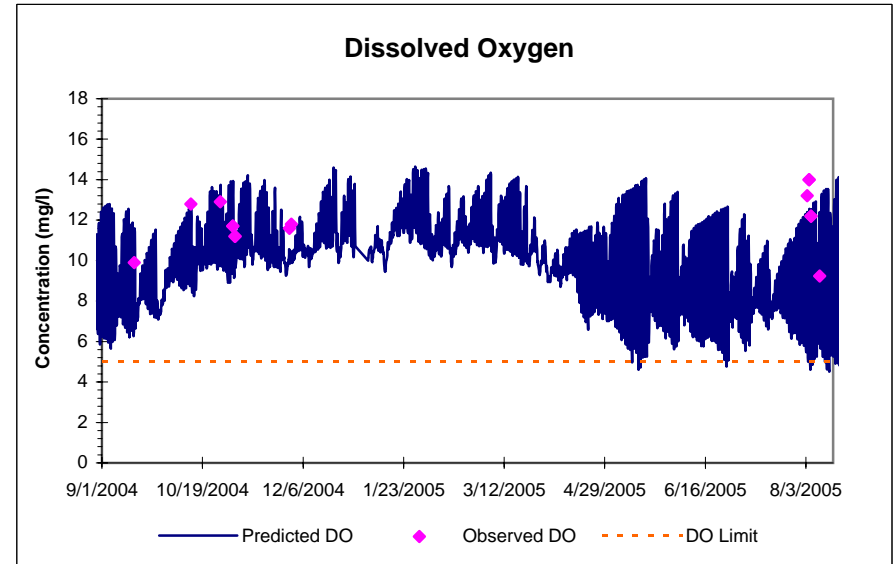
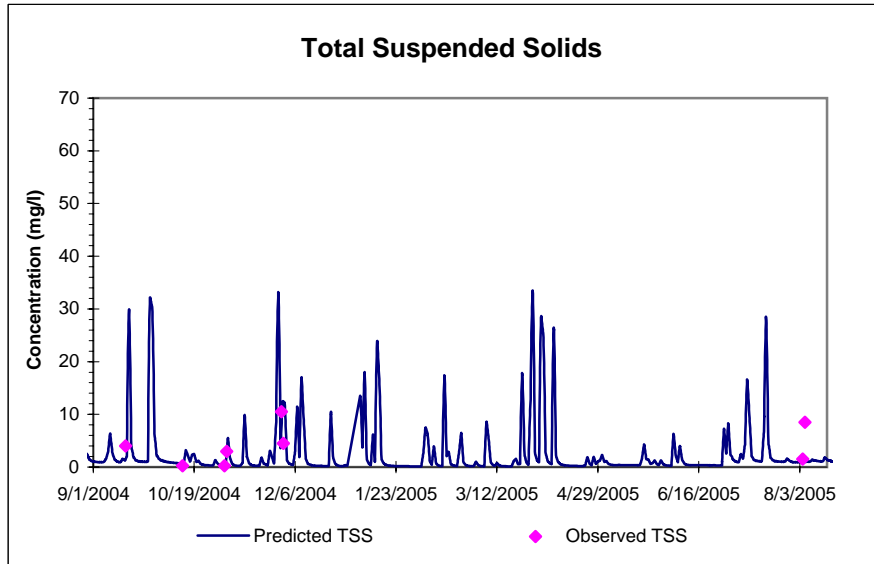
## Beaver Brook at Allerton Rd. in Annandale



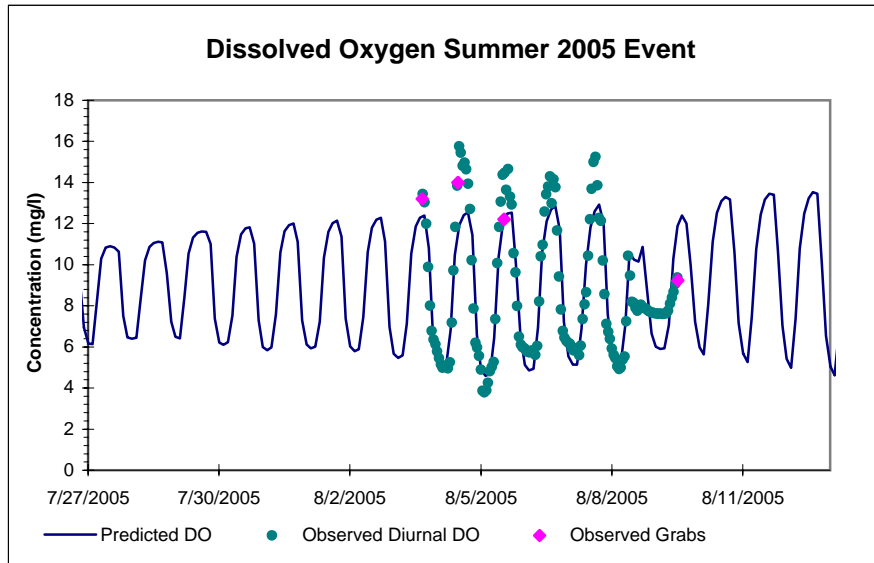
## Beaver Brook at Hamden Rd. in Clinton (BvB1)



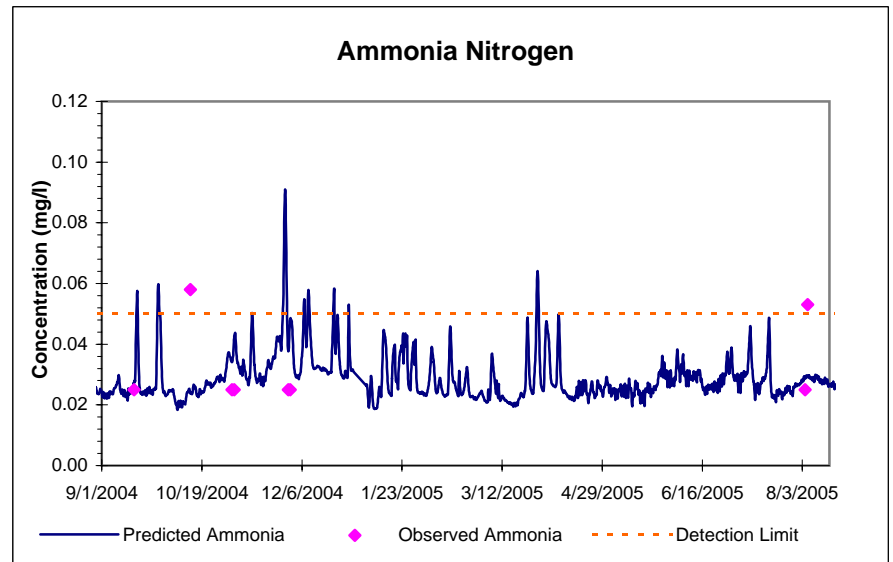
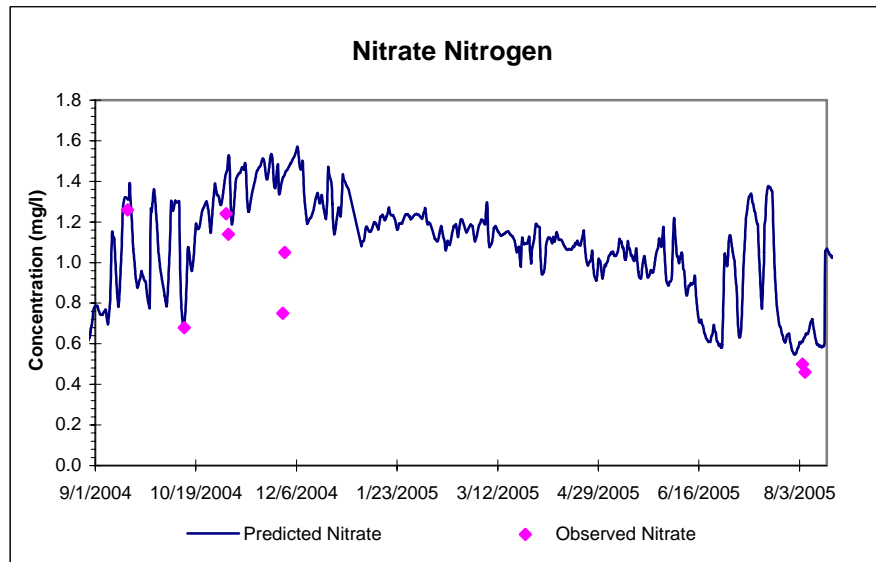
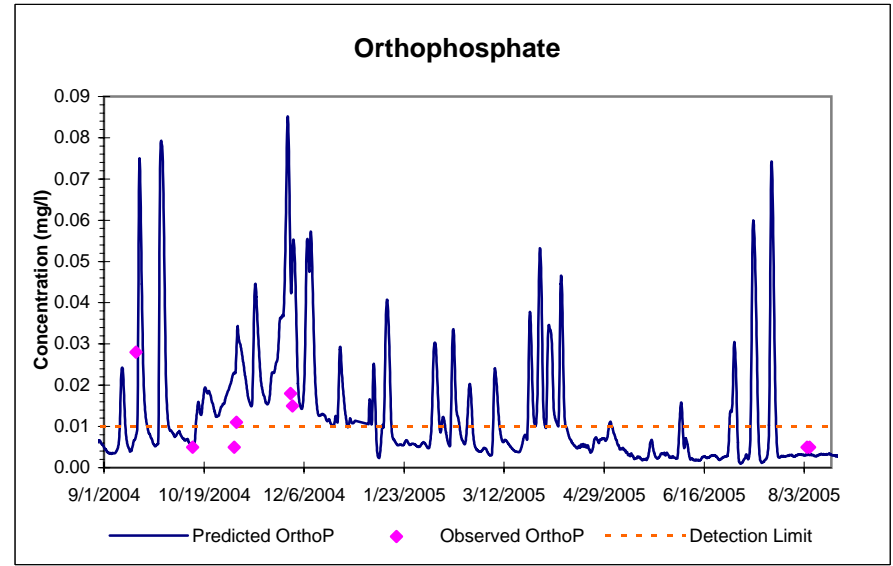
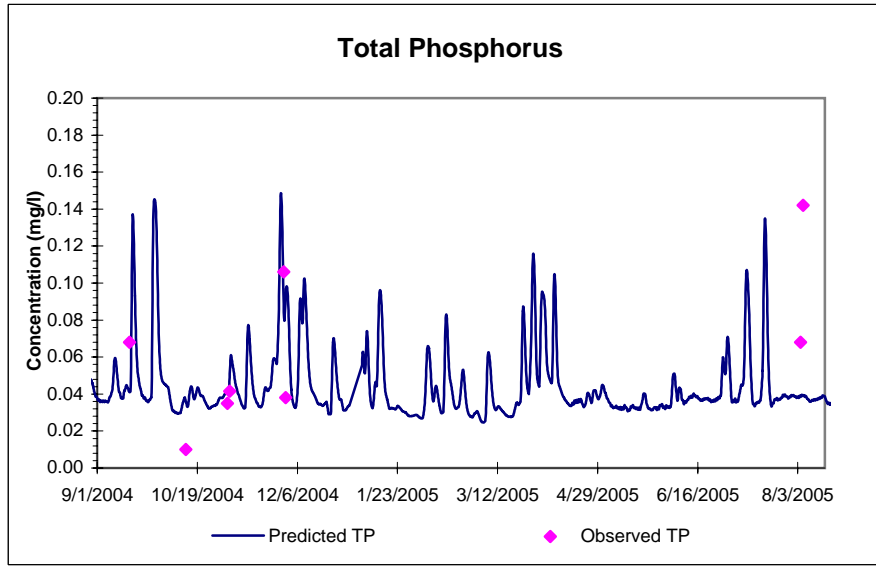
## Beaver Brook at Hamden Rd. in Clinton (BvB1)



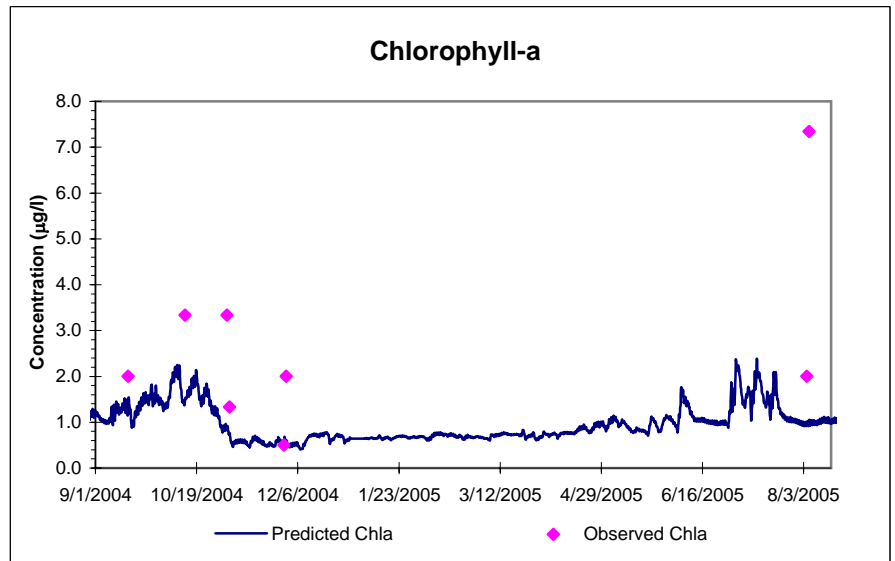
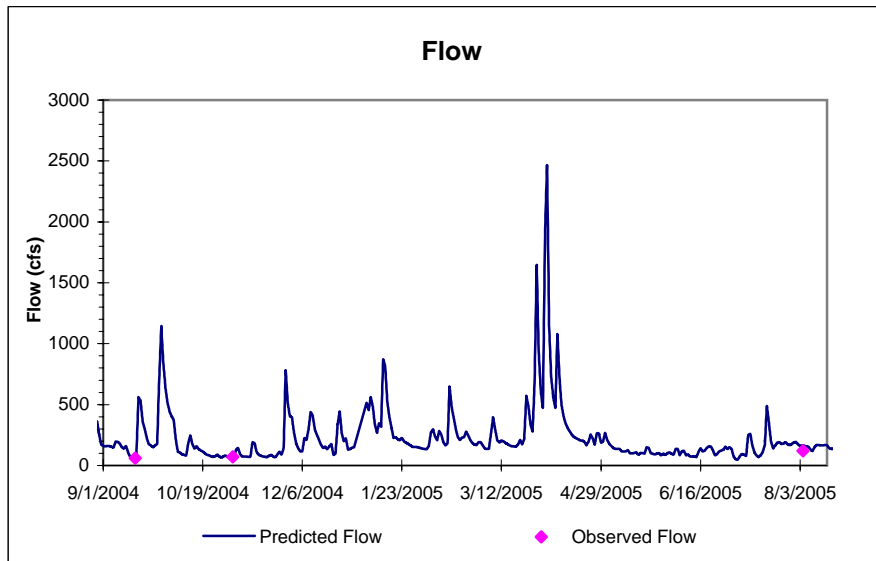
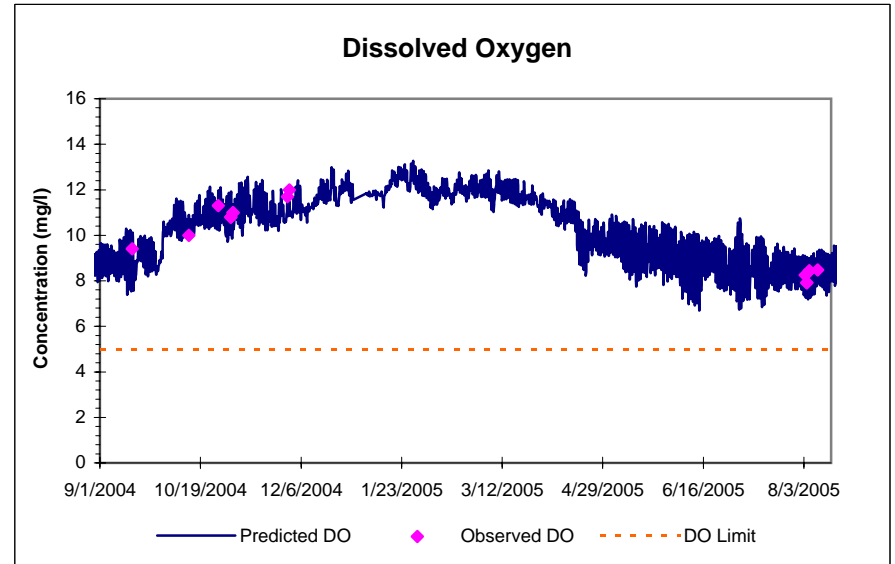
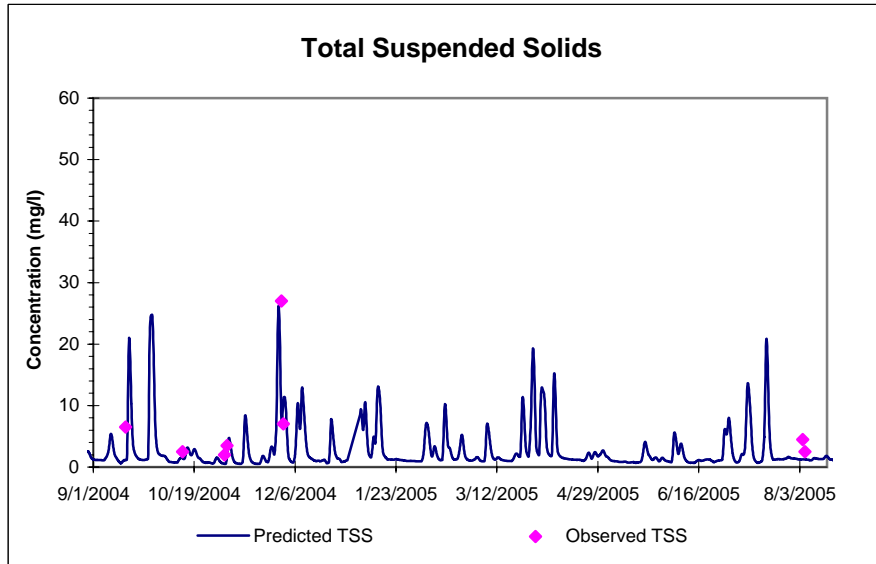
## Beaver Brook at Hamden Rd. in Clinton (BvB1)



## South Branch Raritan River Upstream of Clinton WTP (SBRR6)

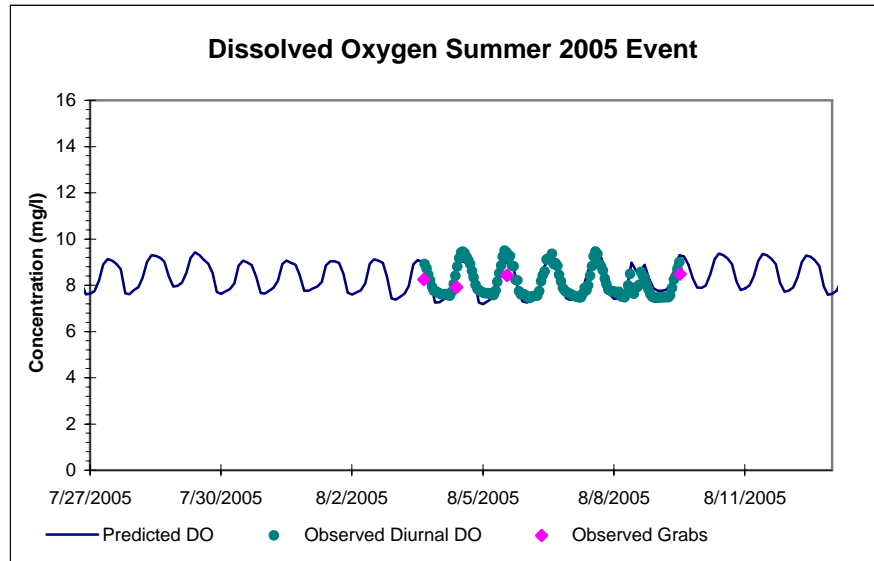


## South Branch Raritan River Upstream of Clinton WTP (SBRR6)

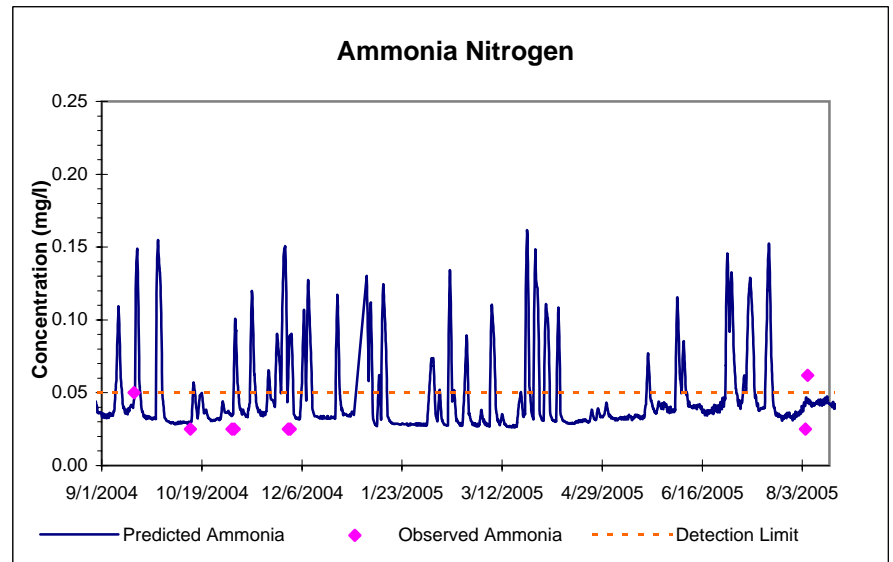
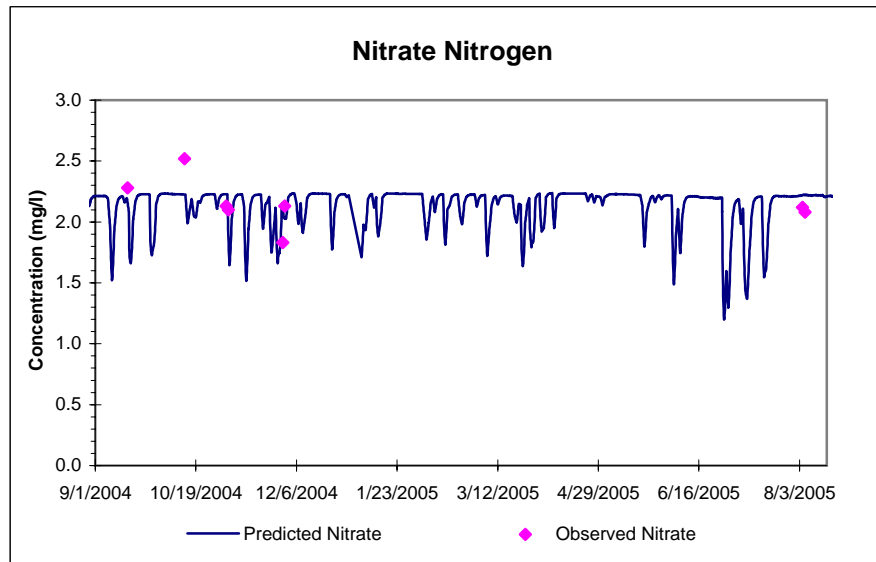
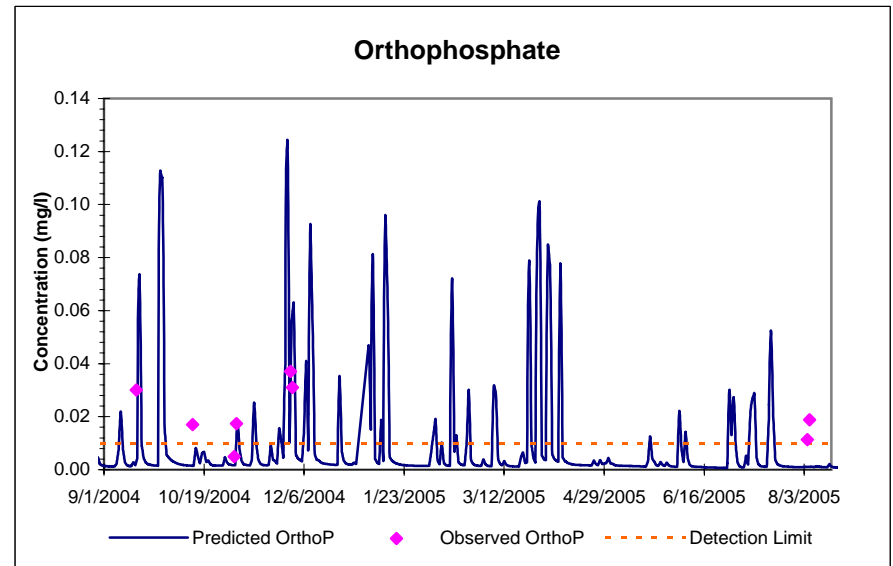
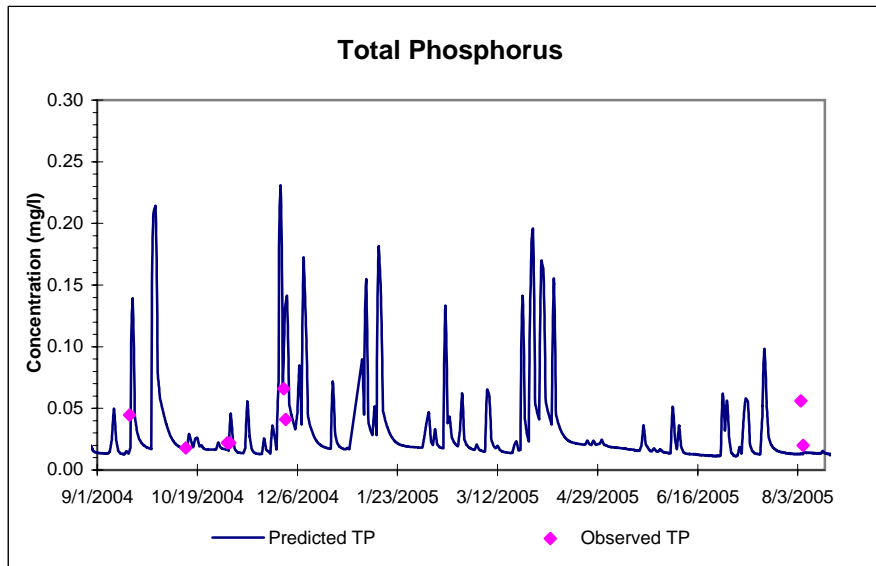




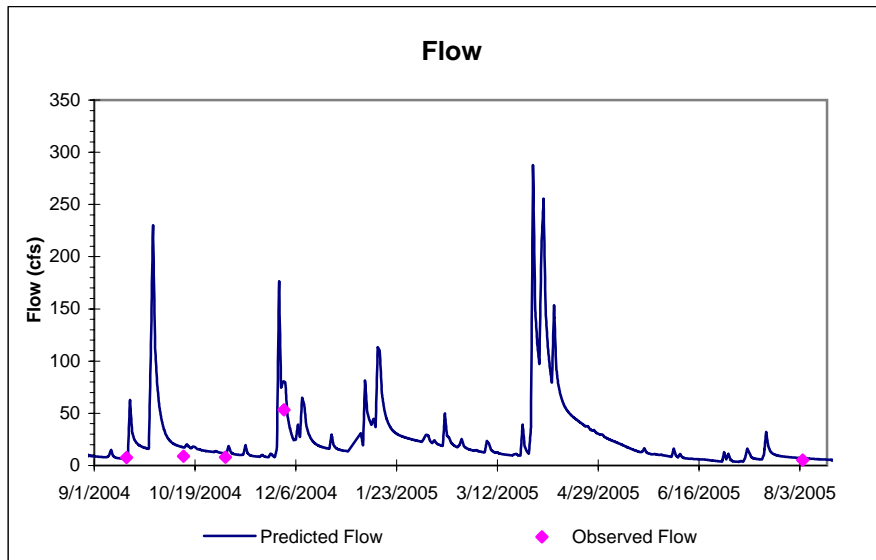
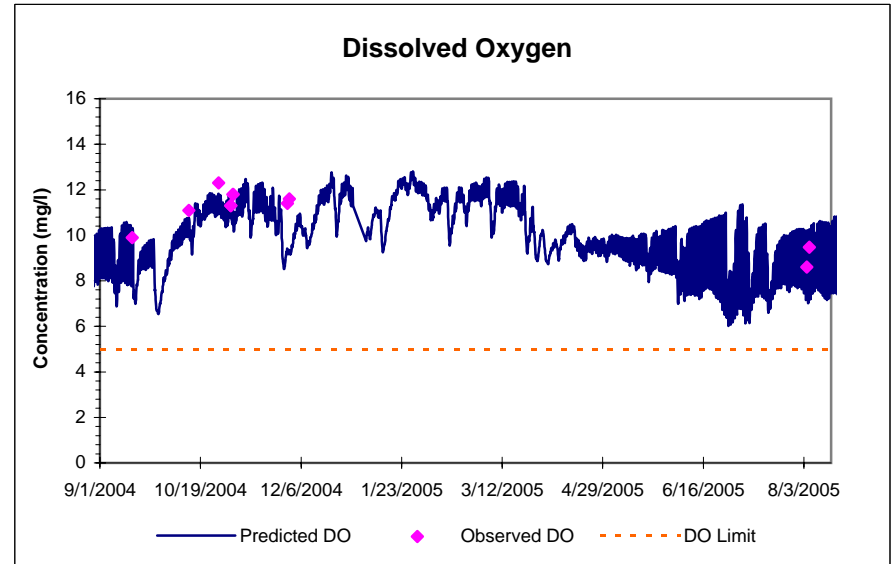
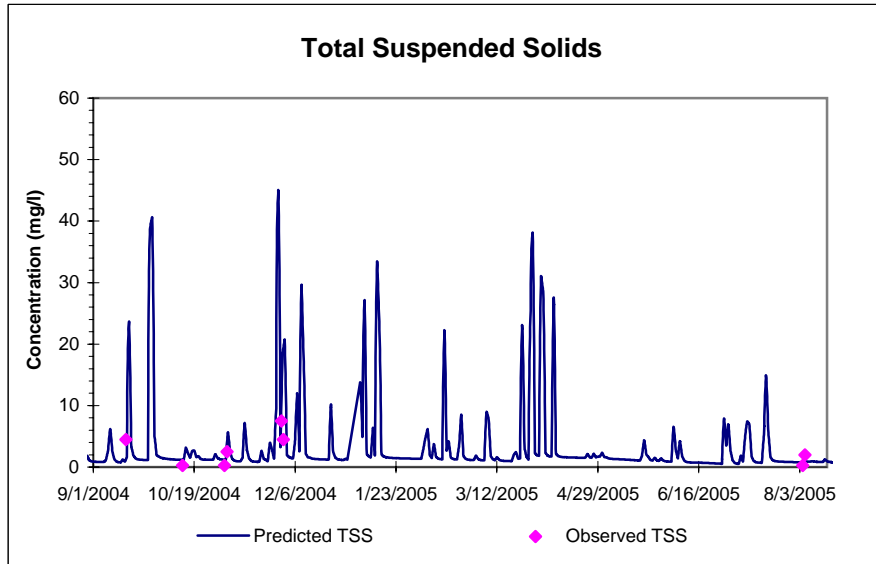
## South Branch Raritan River Upstream of Clinton WTP (SBRR6)



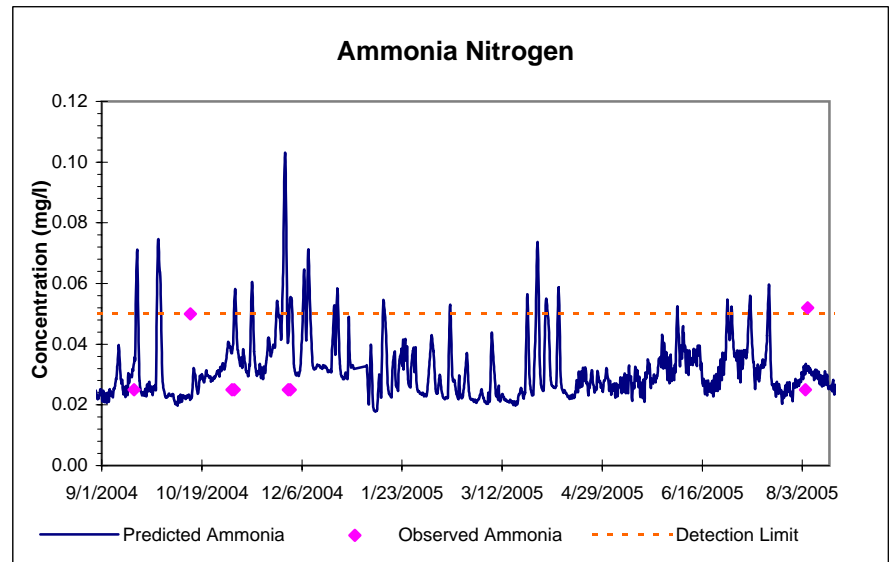
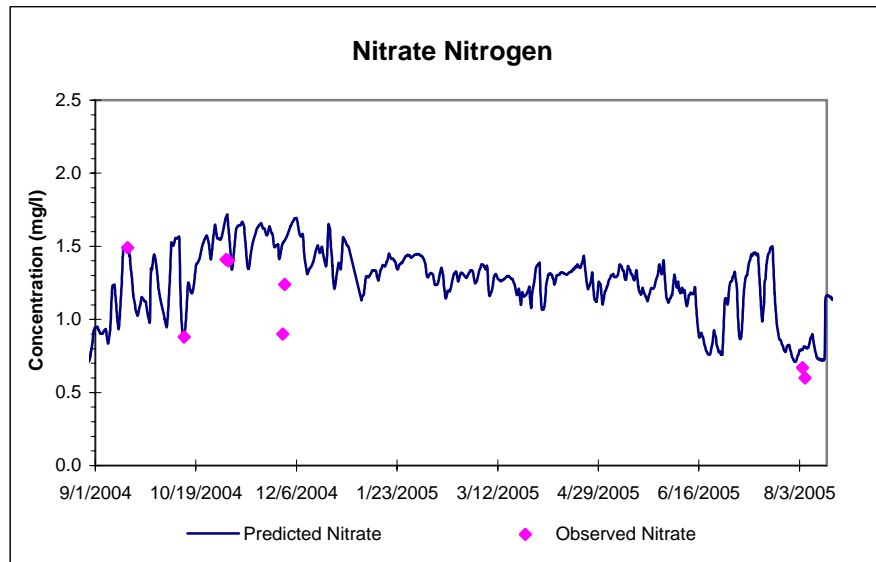
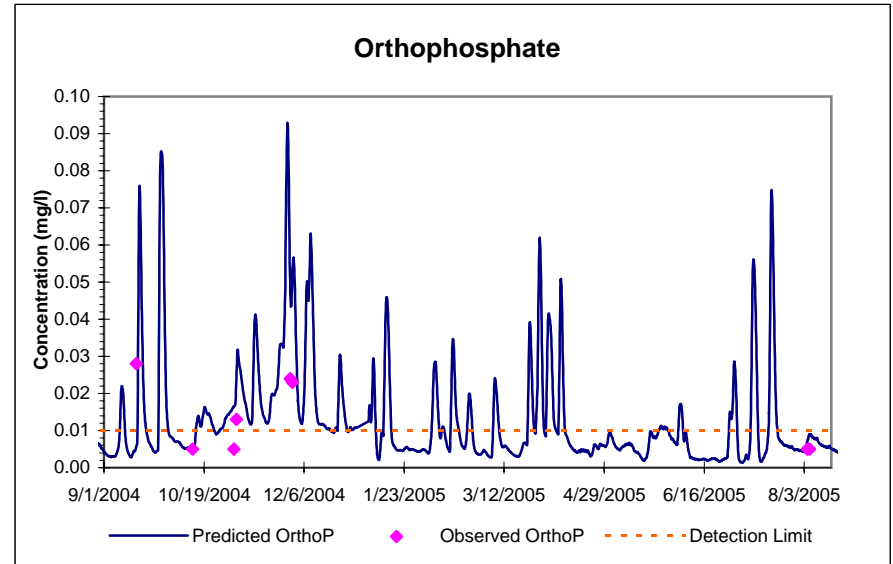
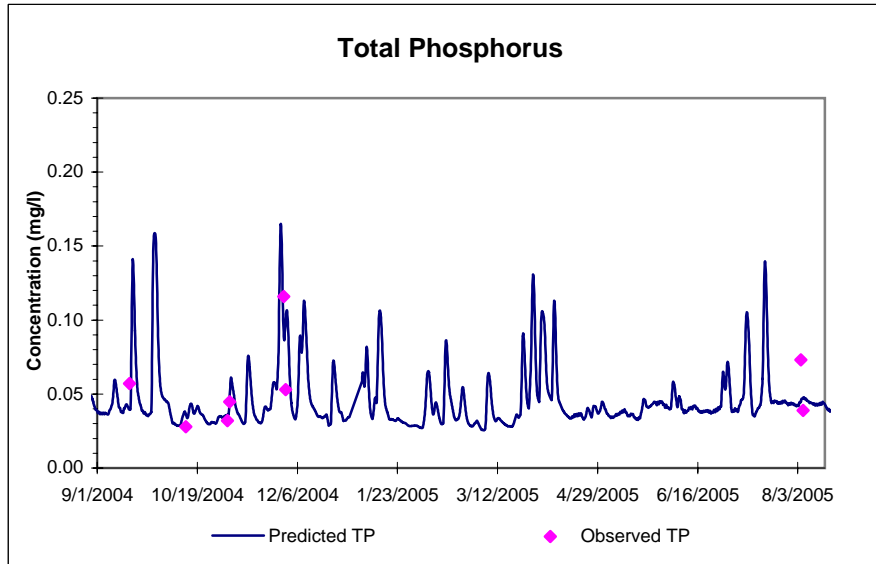
## Cakepoulin Creek at Lower Landsdown Rd. in Franklin Twp. (CC1)



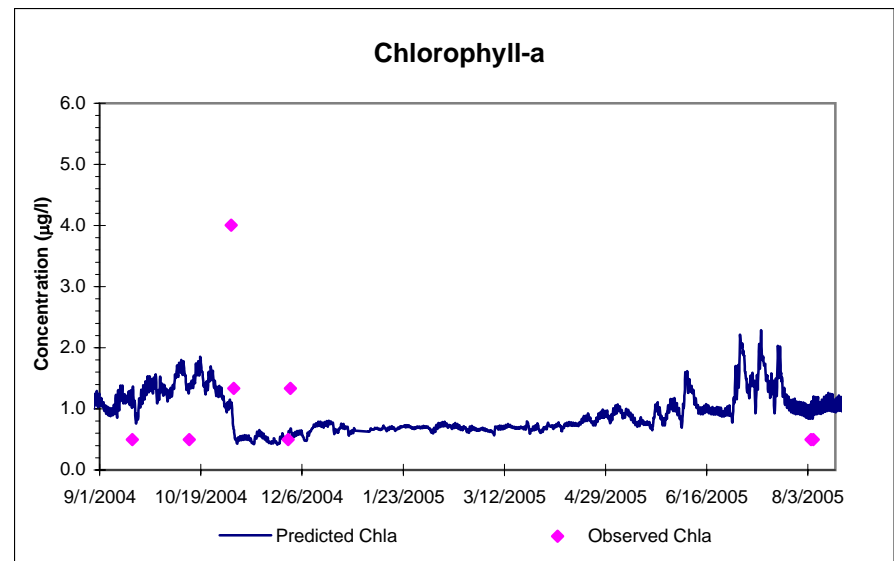
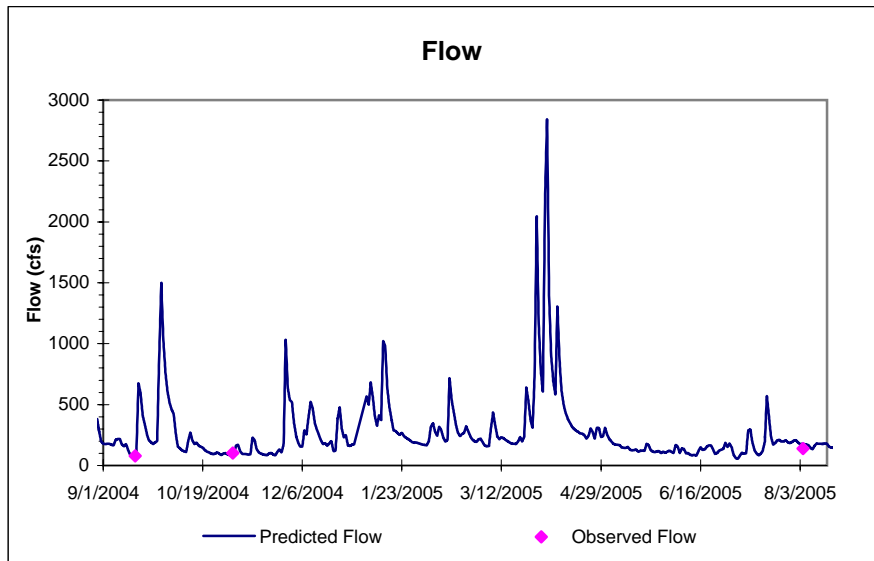
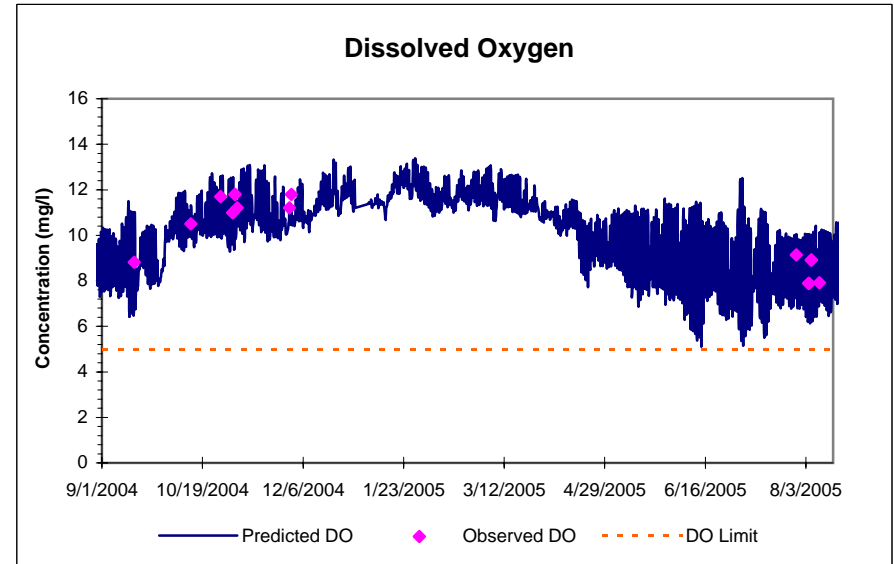
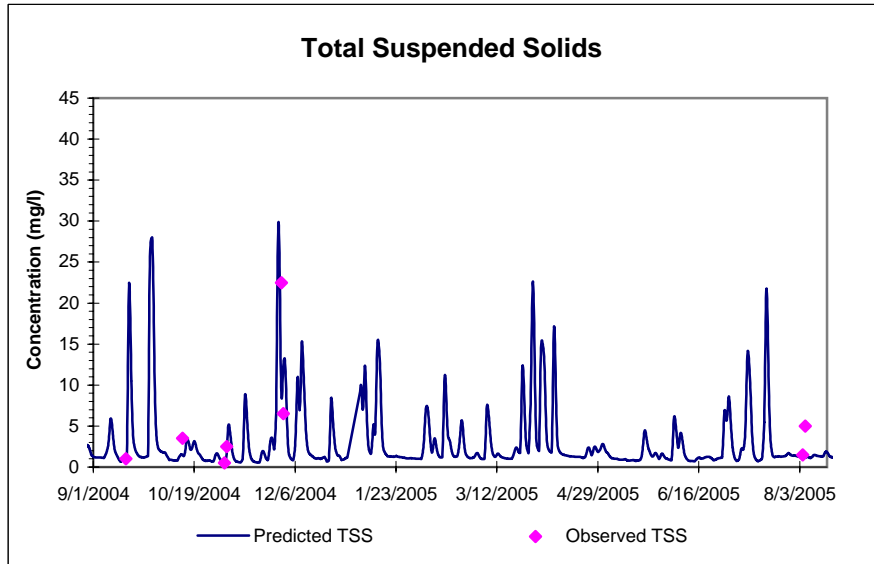
## Cakepoulin Creek at Lower Landsdown Rd. in Franklin Twp. (CC1)



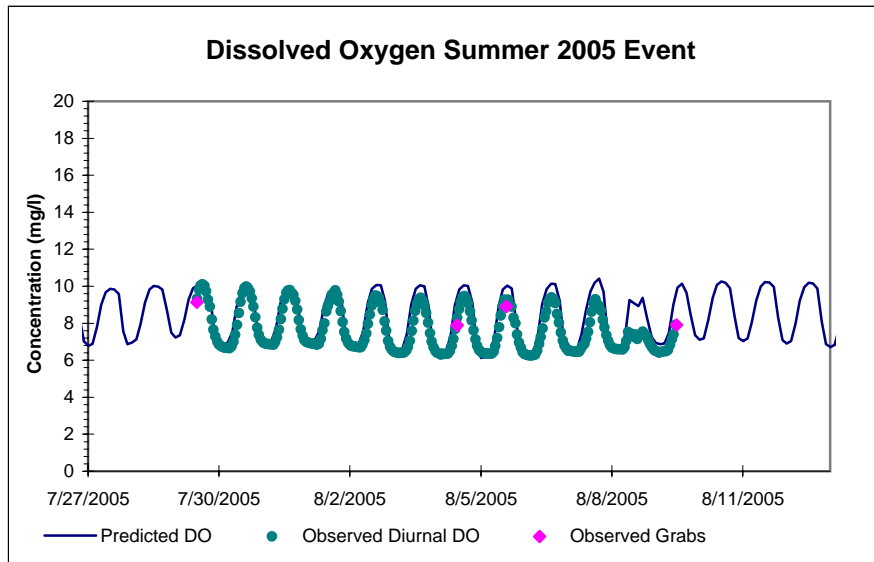
## South Branch Raritan River at Hamden Rd. in Landsdown (SBRR7)



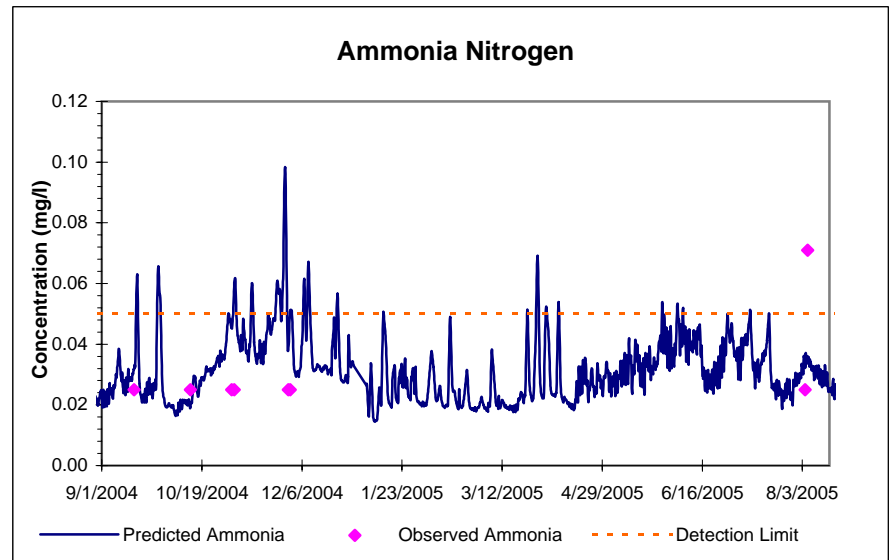
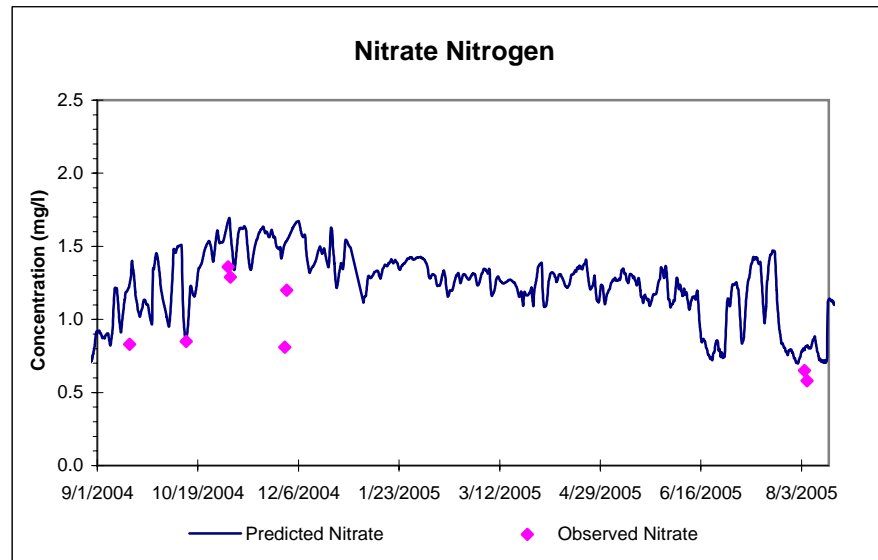
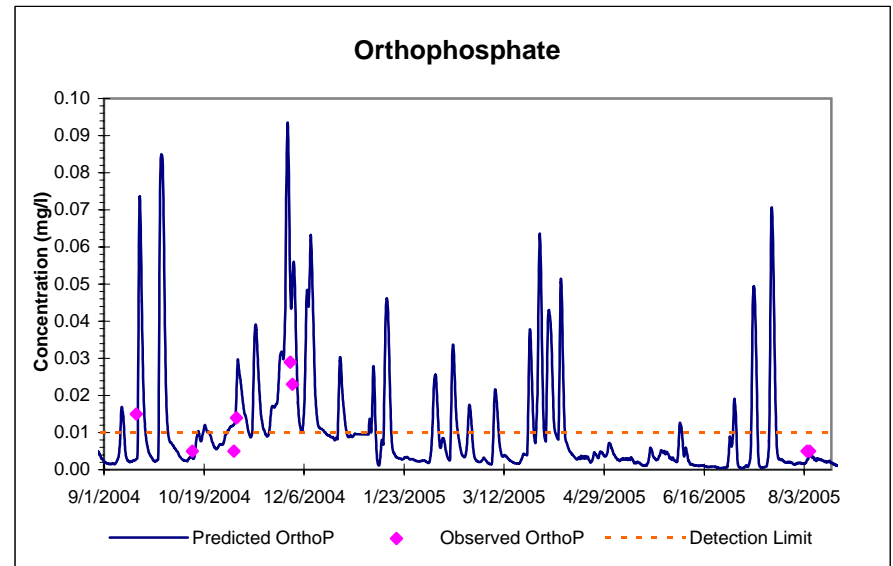
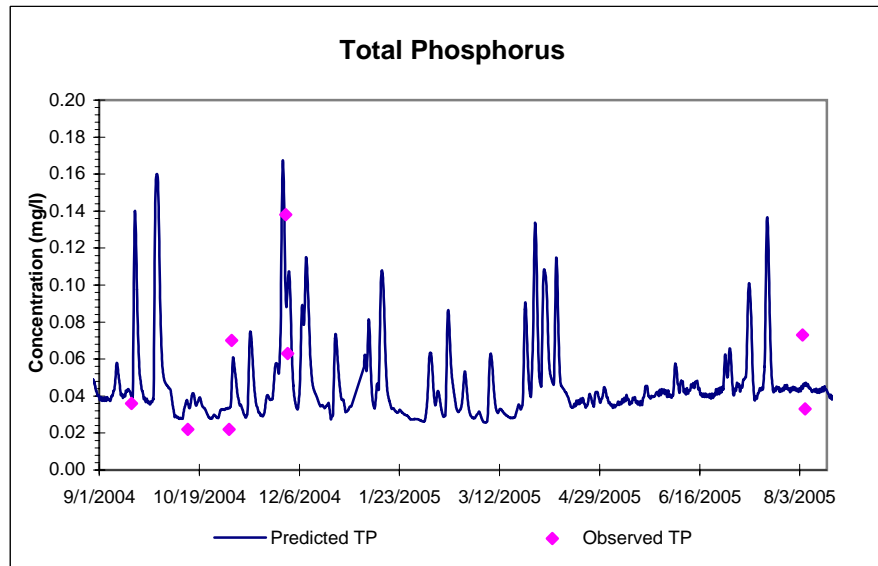
## South Branch Raritan River at Hamden Rd. in Landsdown (SBRR7)



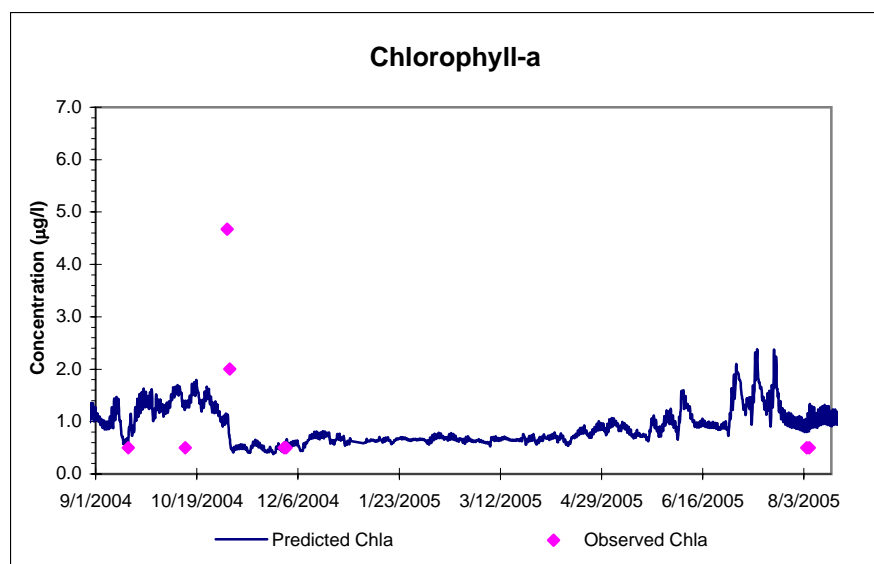
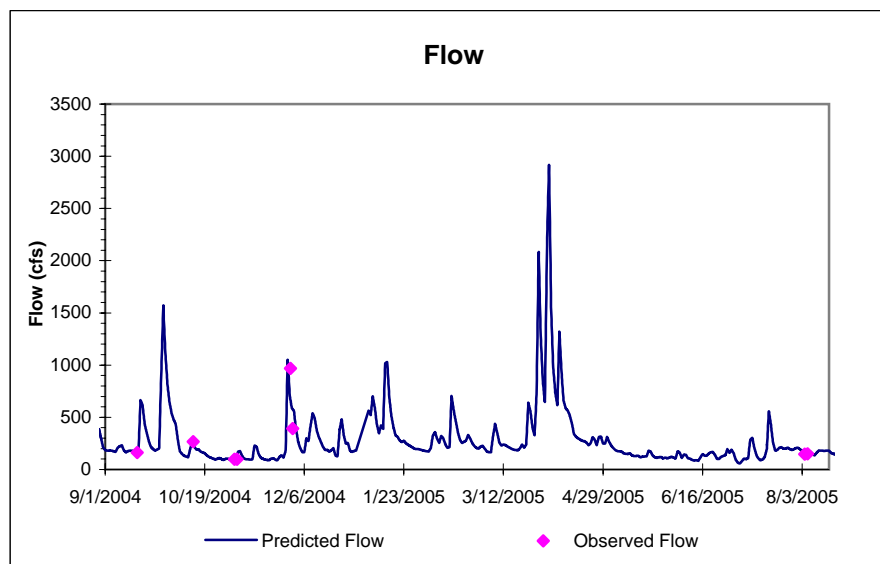
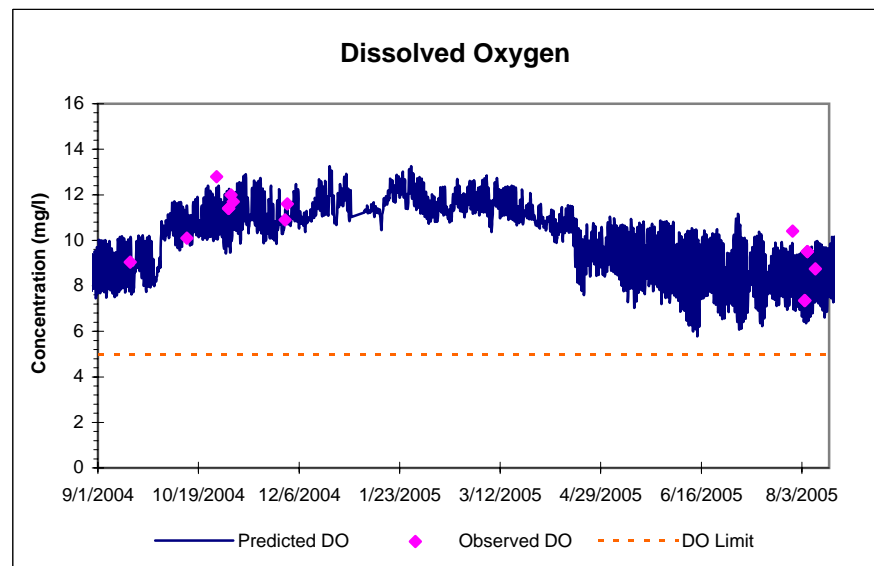
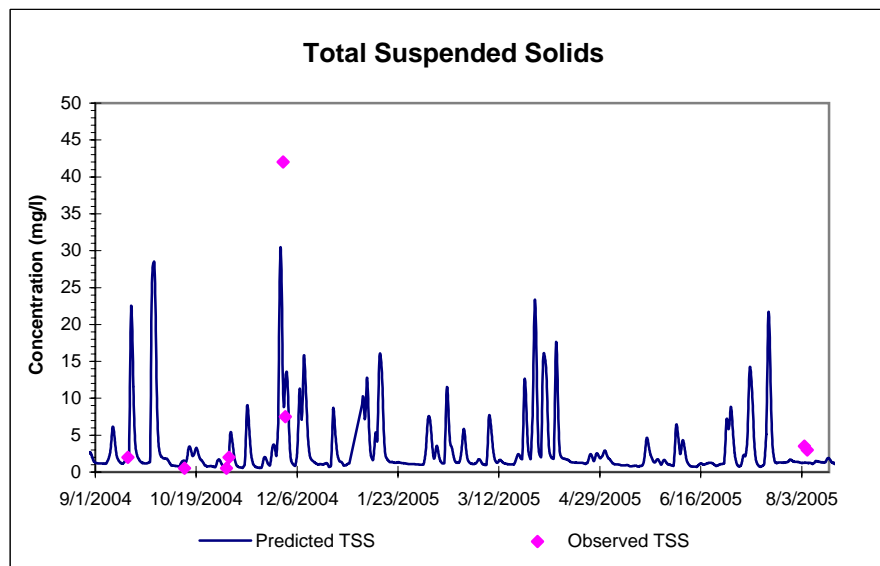
## South Branch Raritan River at Hamden Rd. in Landsdown (SBRR7)



## South Branch Raritan River at Stanton Rd. in Stanton Station (SBRR8, USGS 01397000)

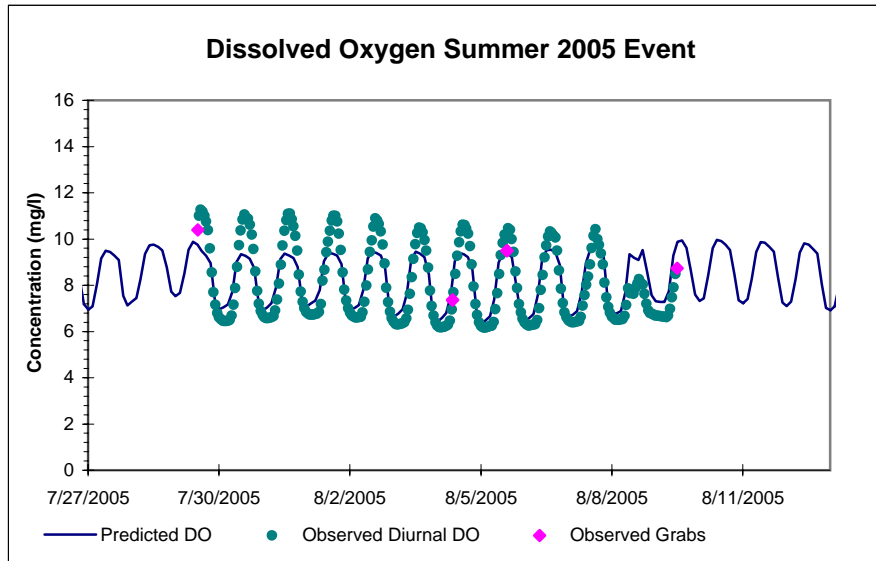


## South Branch Raritan River at Stanton Rd. in Stanton Station (SBRR8, USGS 01397000)

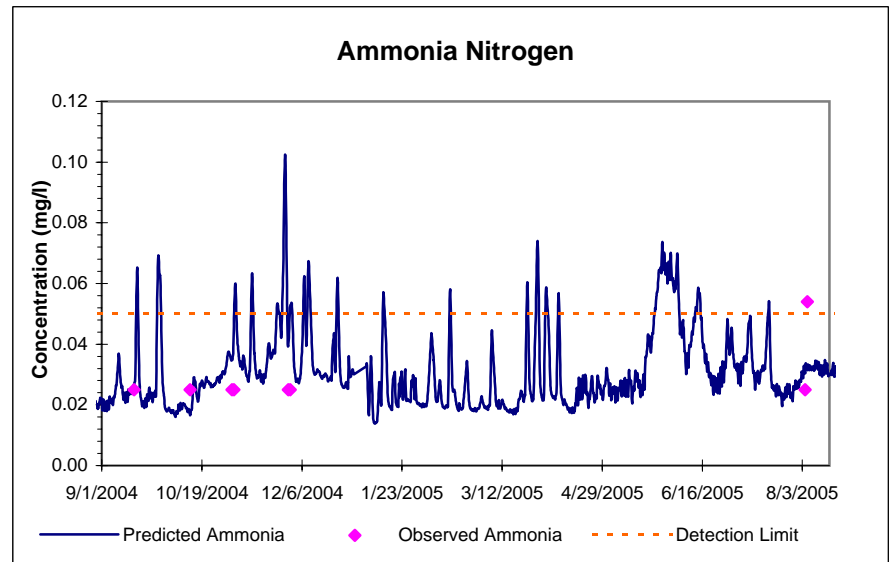
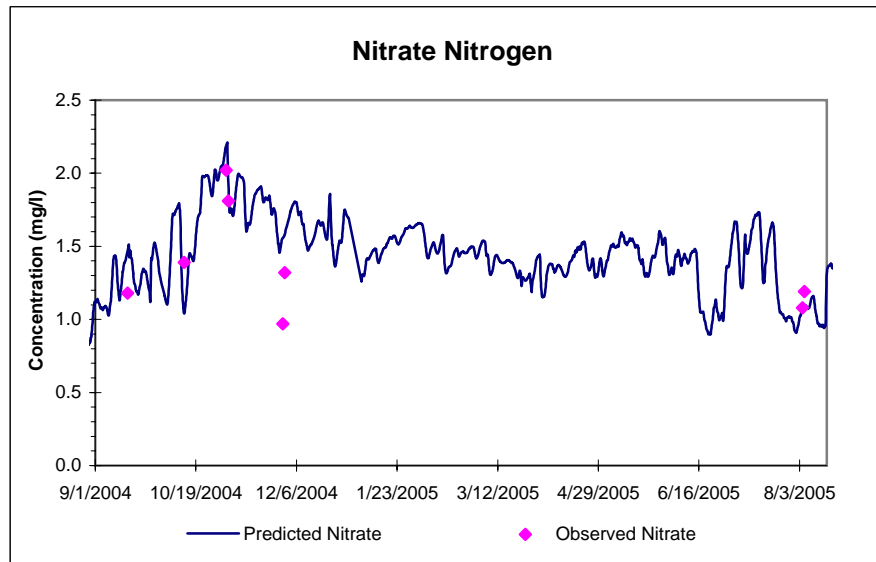
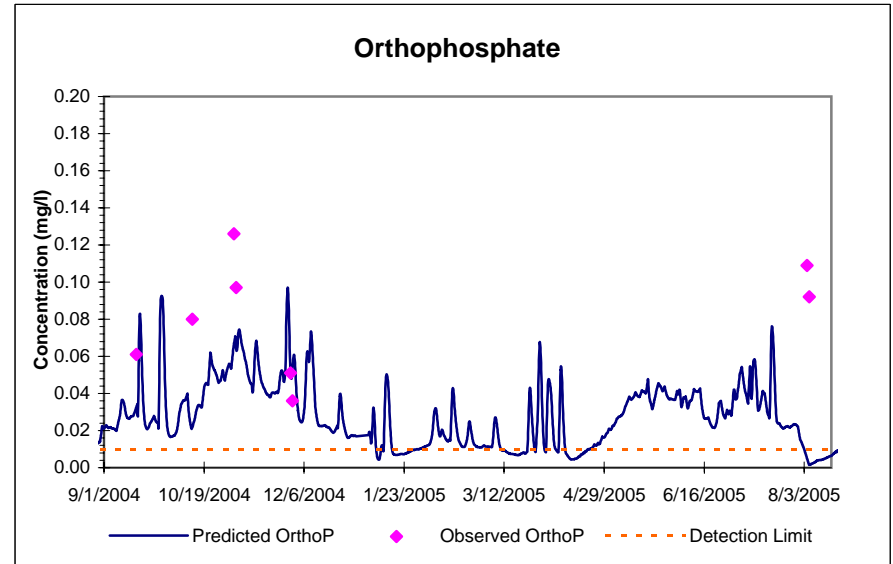
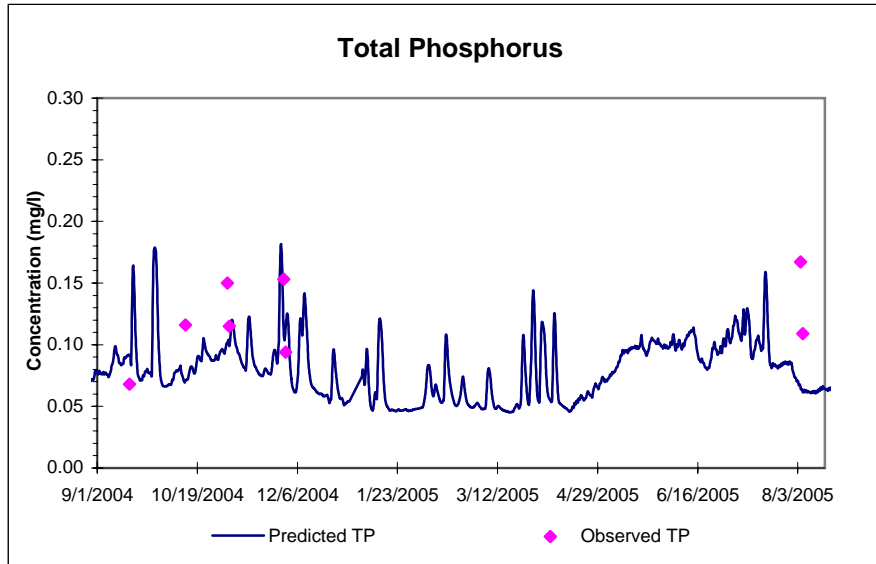




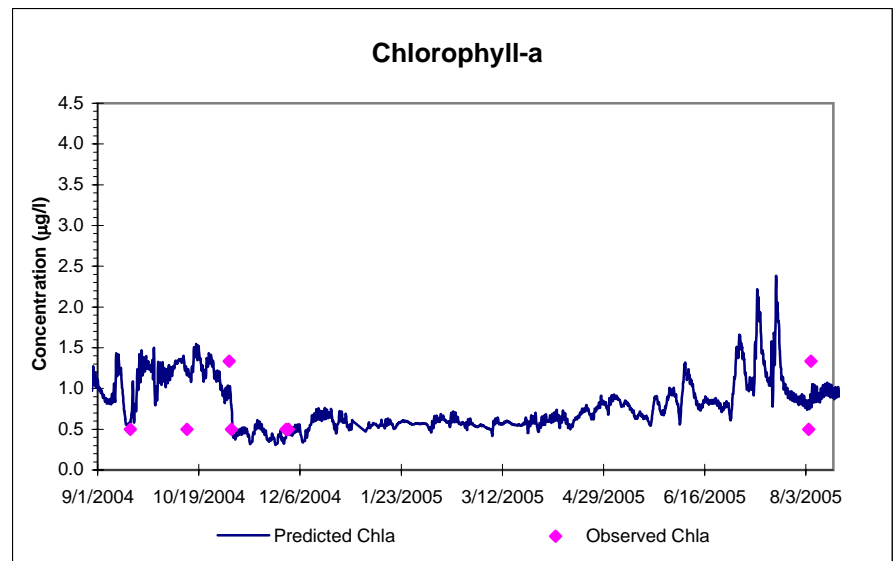
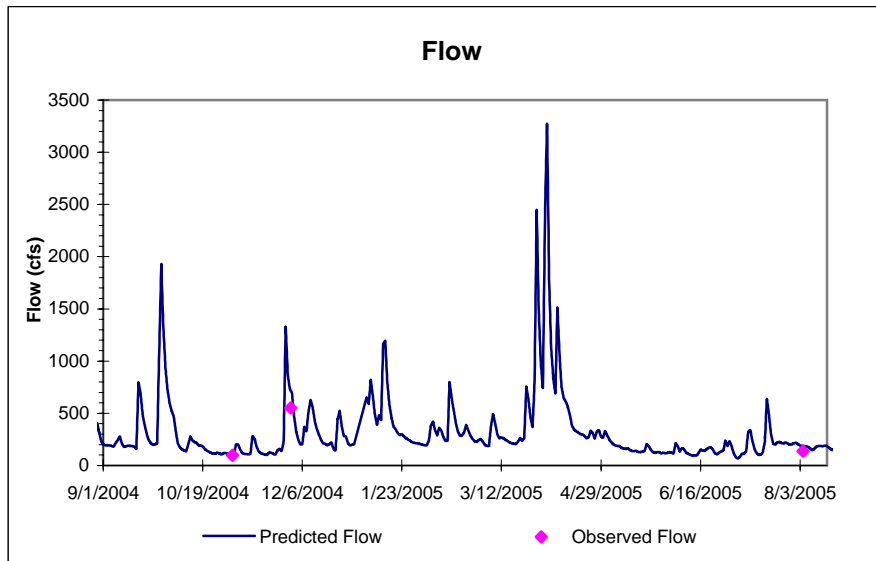
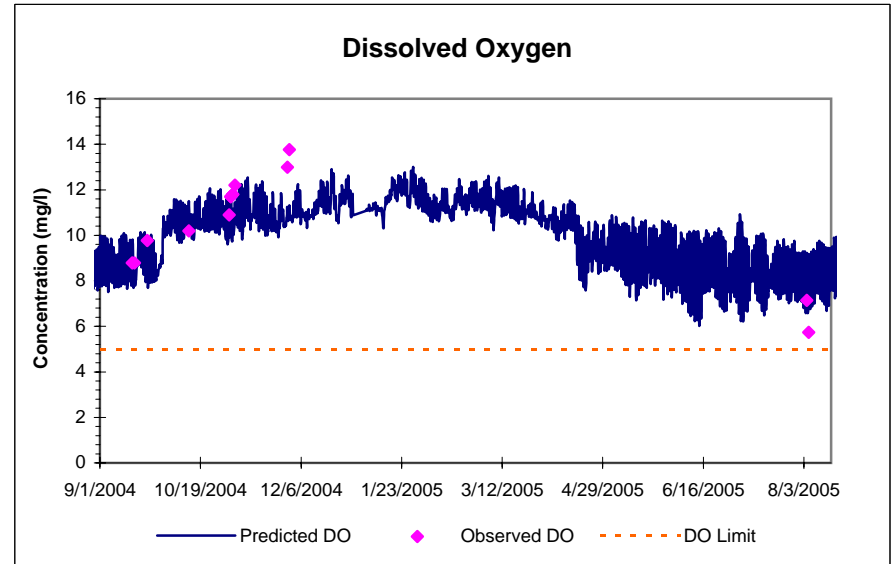
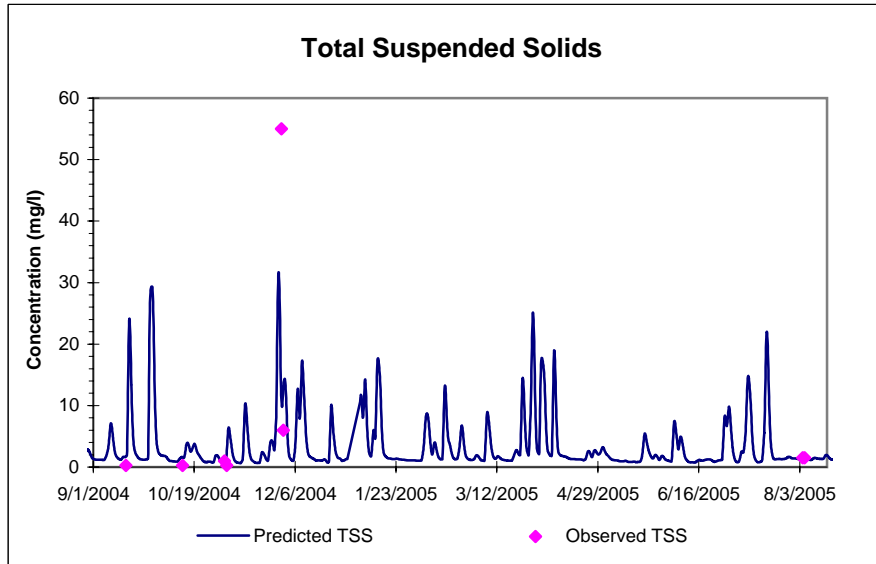
### South Branch Raritan River at Stanton Rd. in Stanton Station (SBRR8, USGS 01397000)



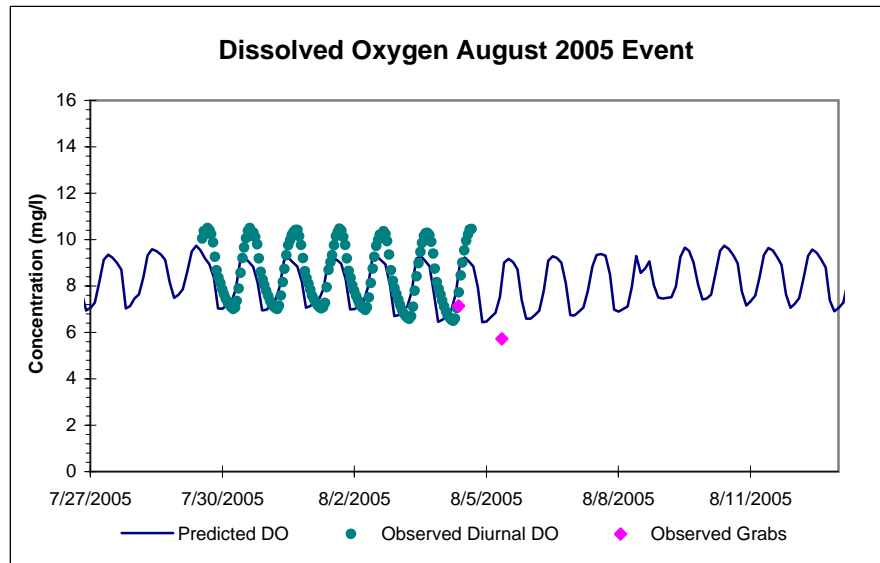
## South Branch Raritan River at Main Street in Three Bridges (SBRR9)



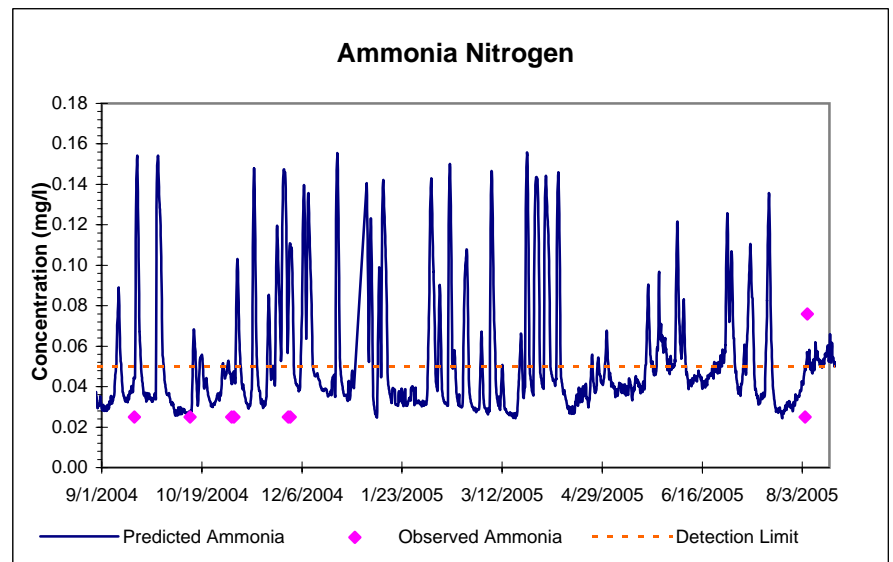
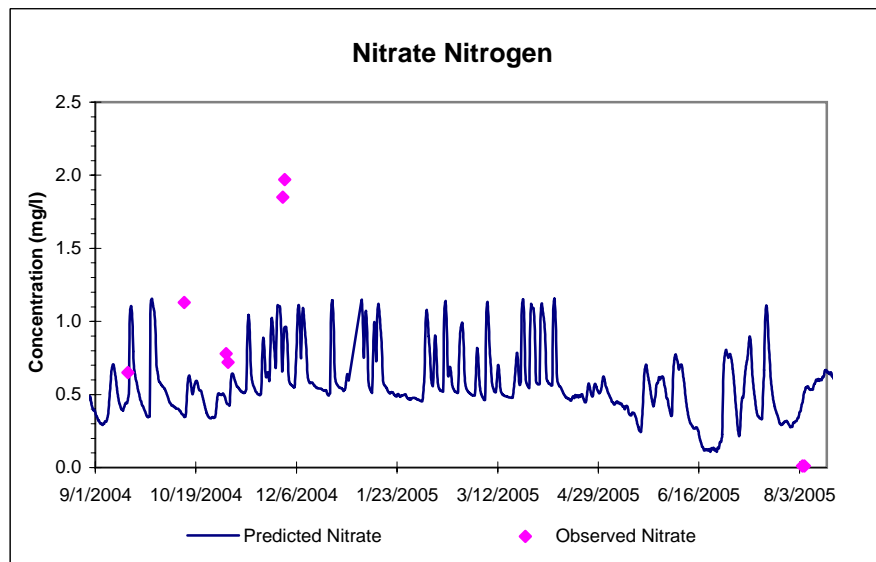
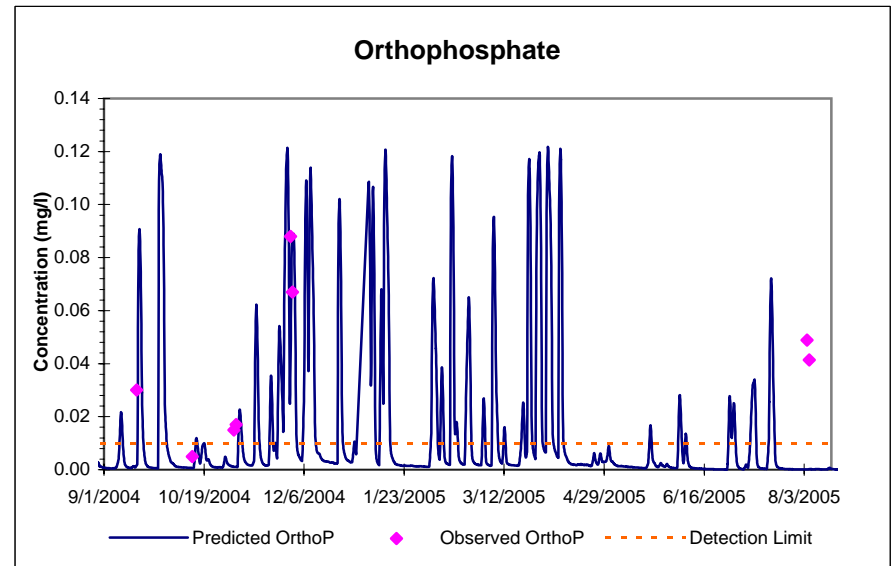
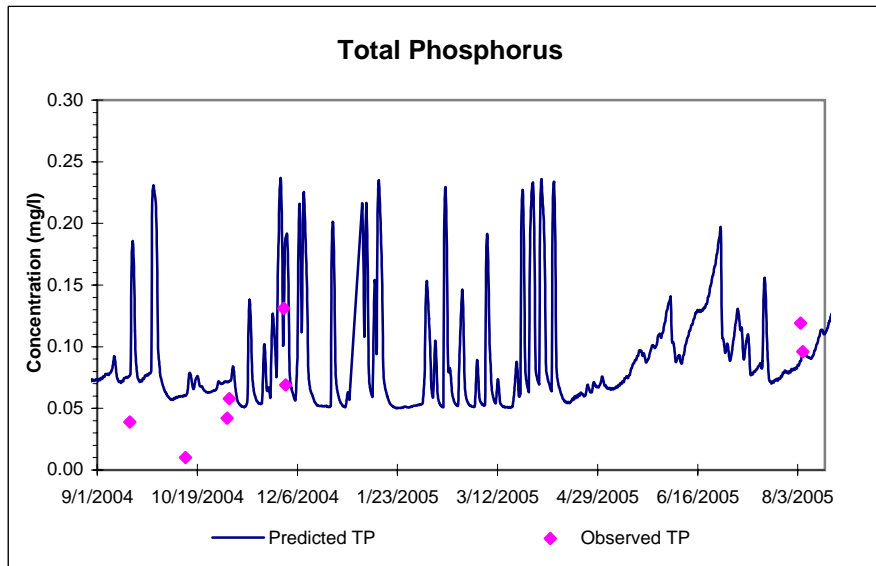
## South Branch Raritan River at Main Street in Three Bridges (SBRR9)



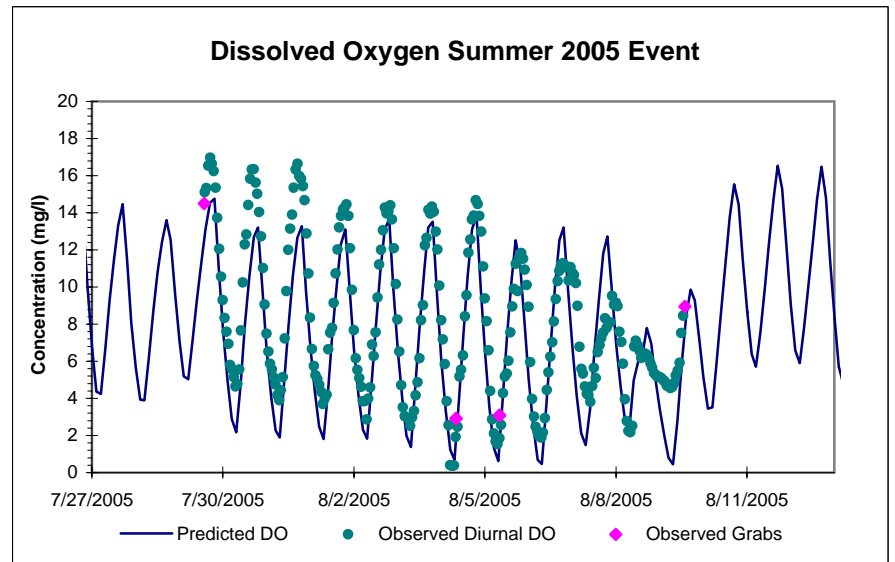
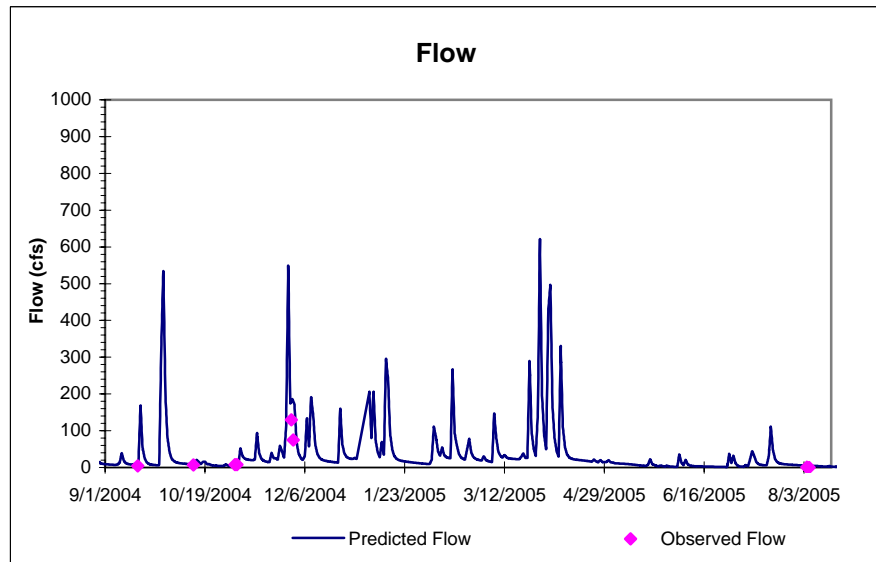
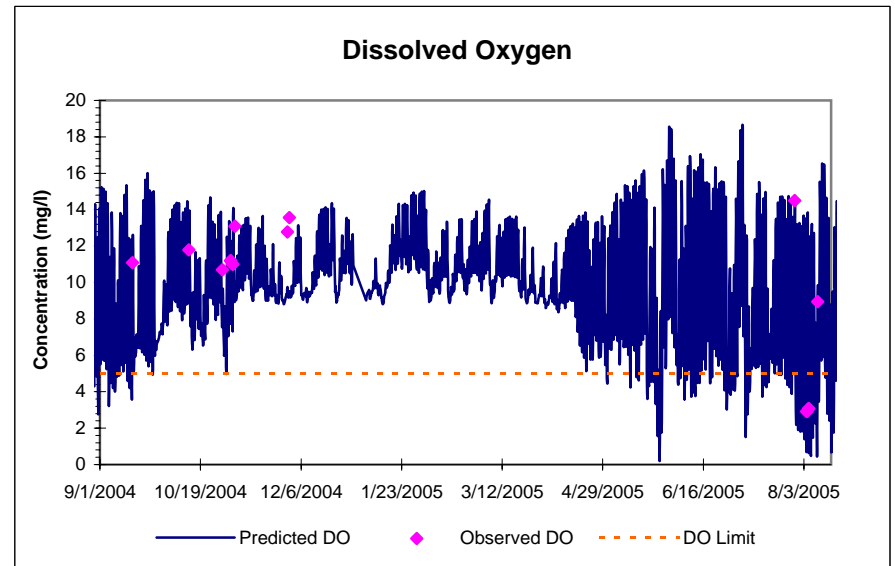
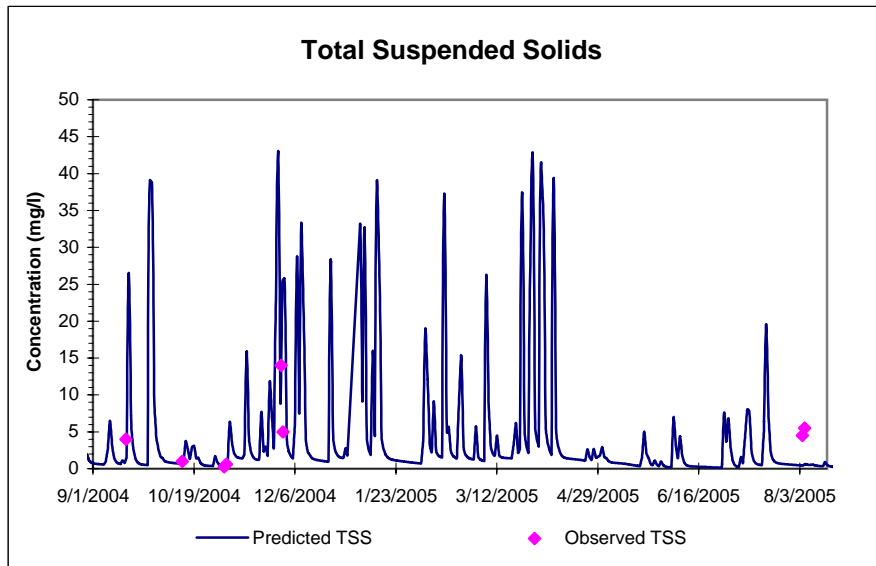
## South Branch Raritan River at Main Street in Three Bridges (SBRR9)



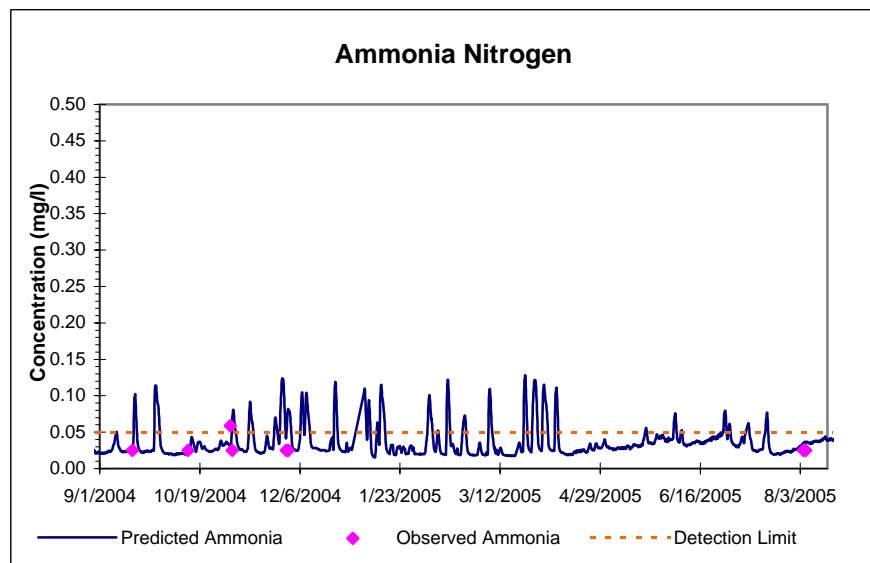
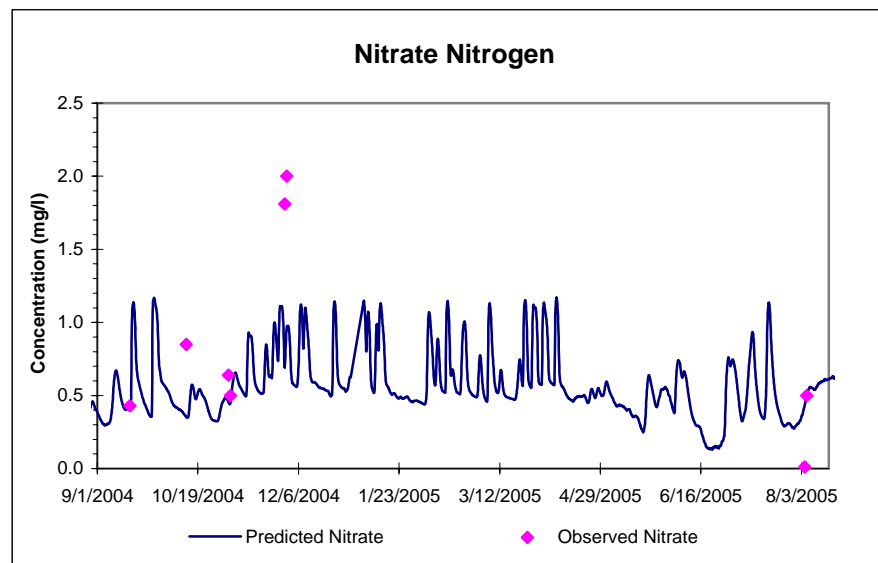
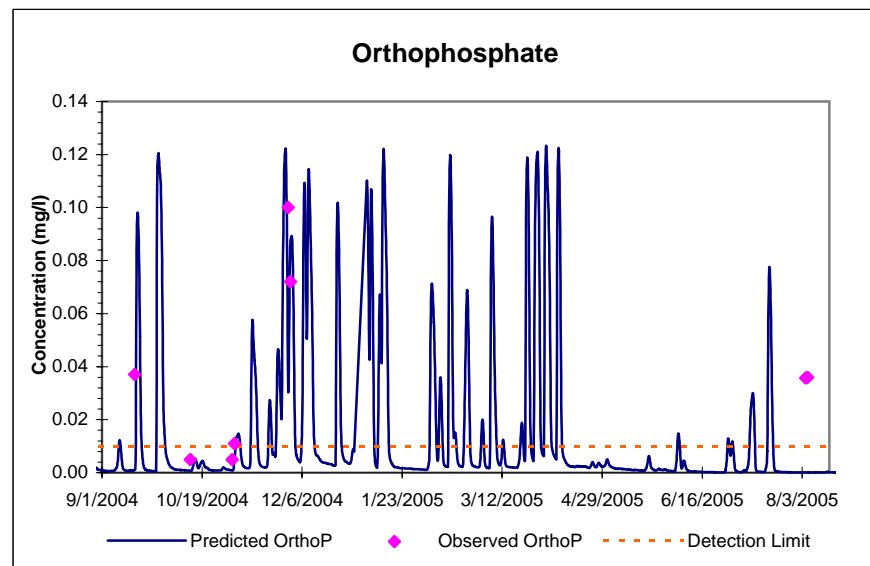
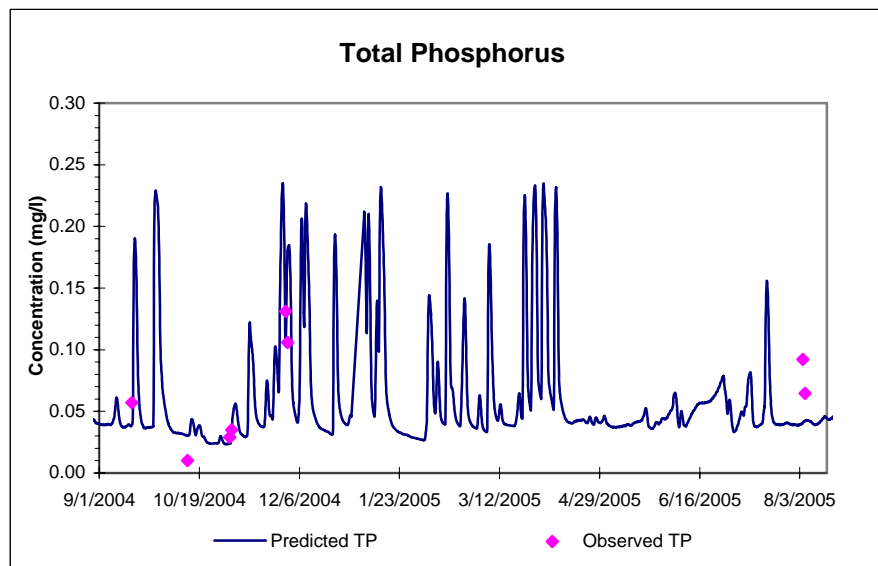
## Neshanic River at Reaville Rd. near Reaville (NR1, USGS 01398000)



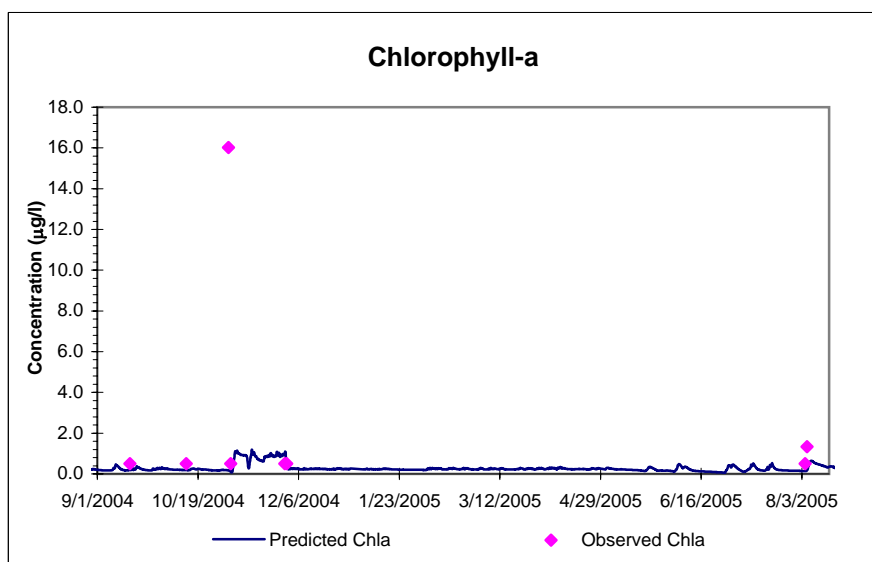
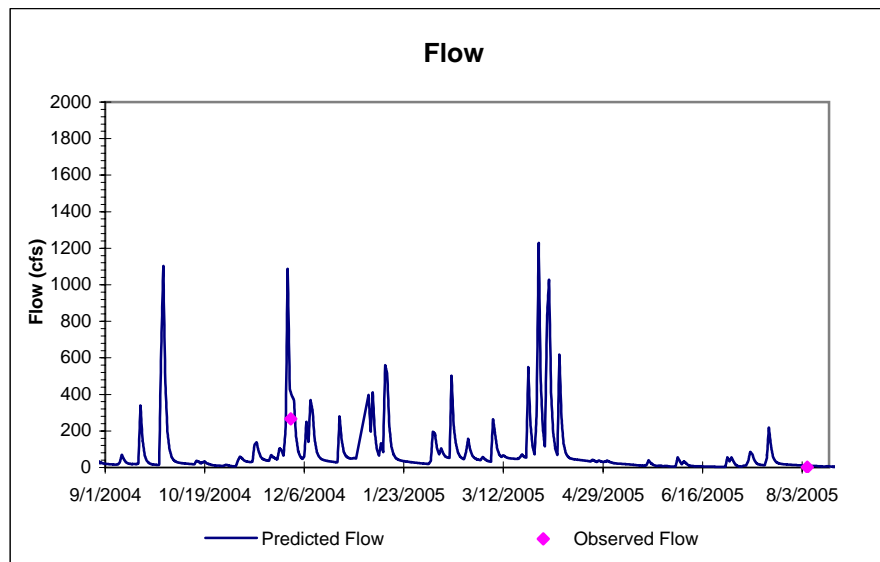
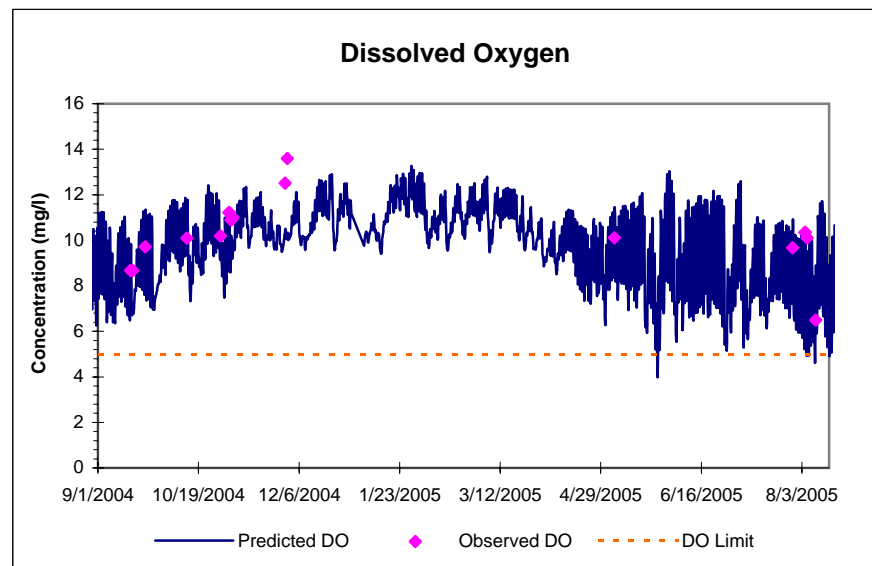
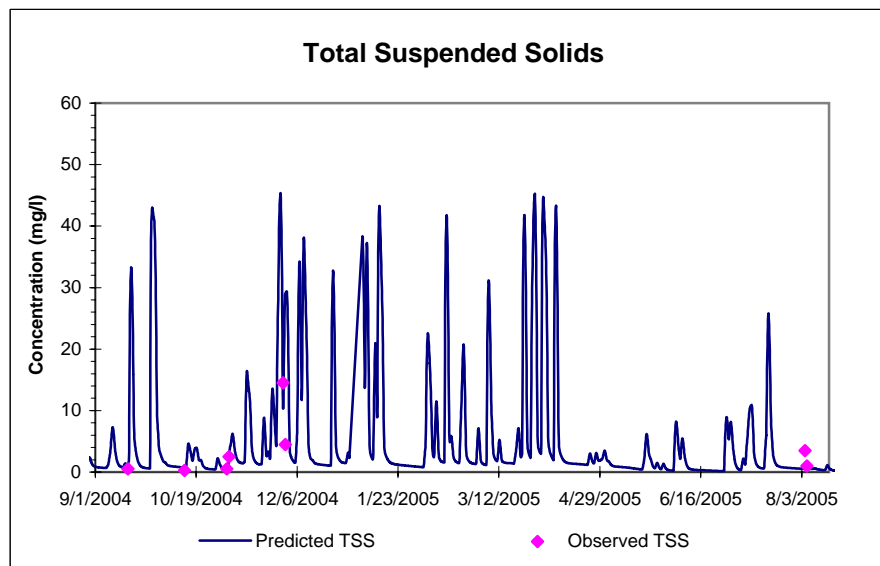
## Neshanic River at Reaville Rd. near Reaville (NR1, USGS 01398000)



## Neshanic River at Amwell Rd. in Hillsborough (NR2)

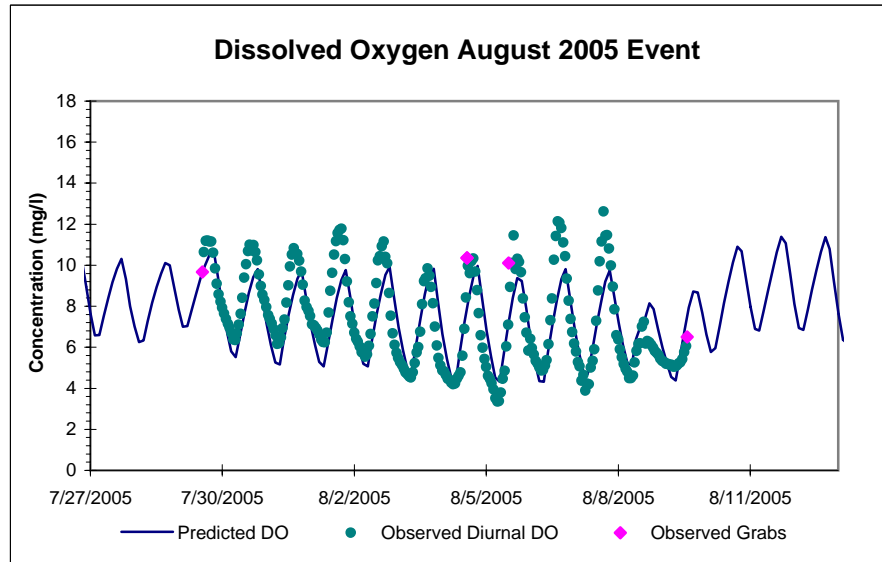


## Neshanic River at Amwell Rd. in Hillsborough (NR2)

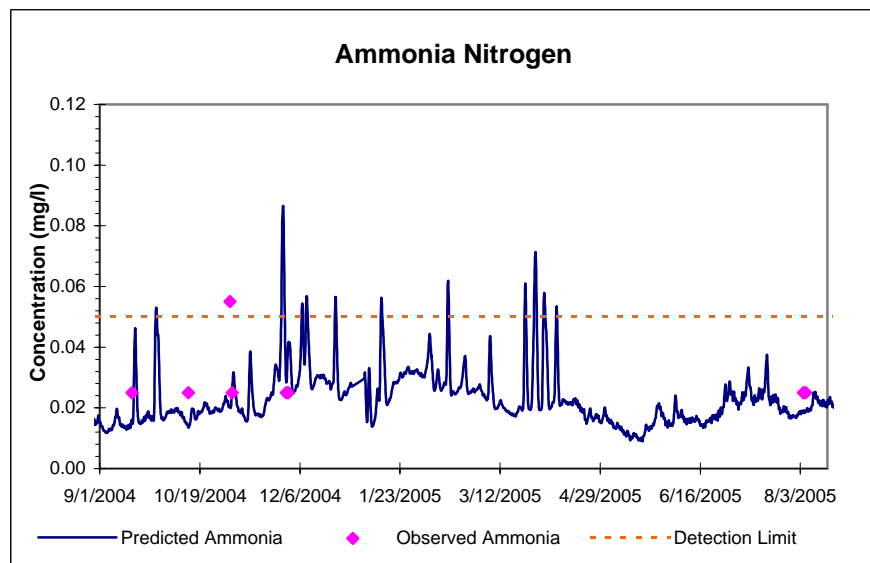
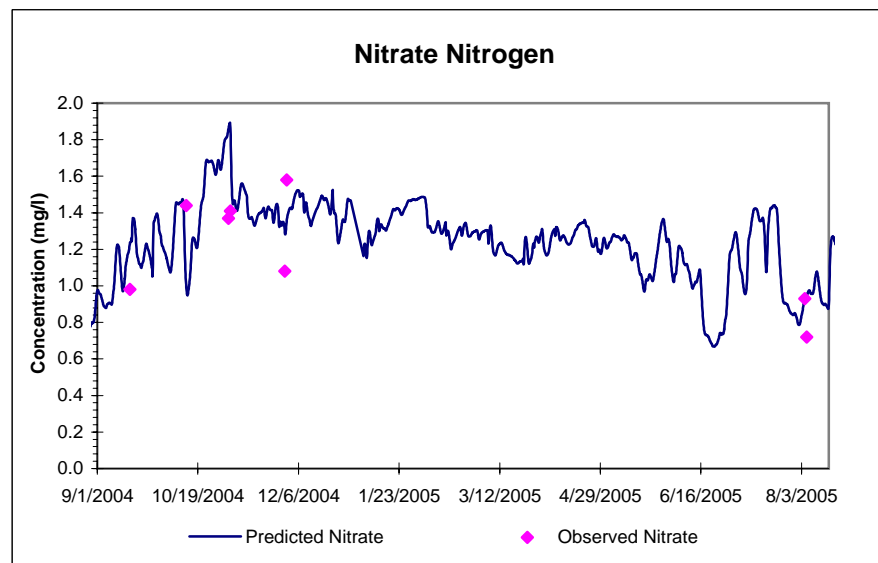
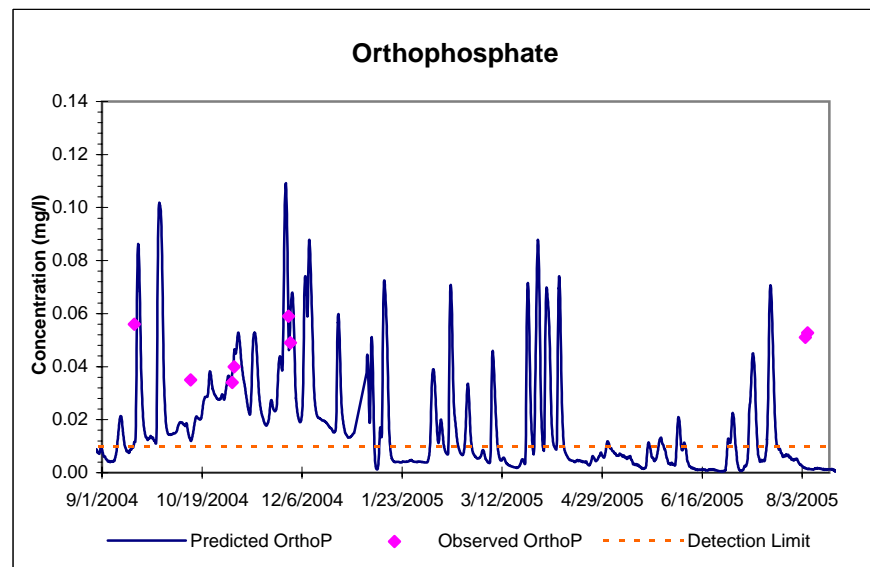
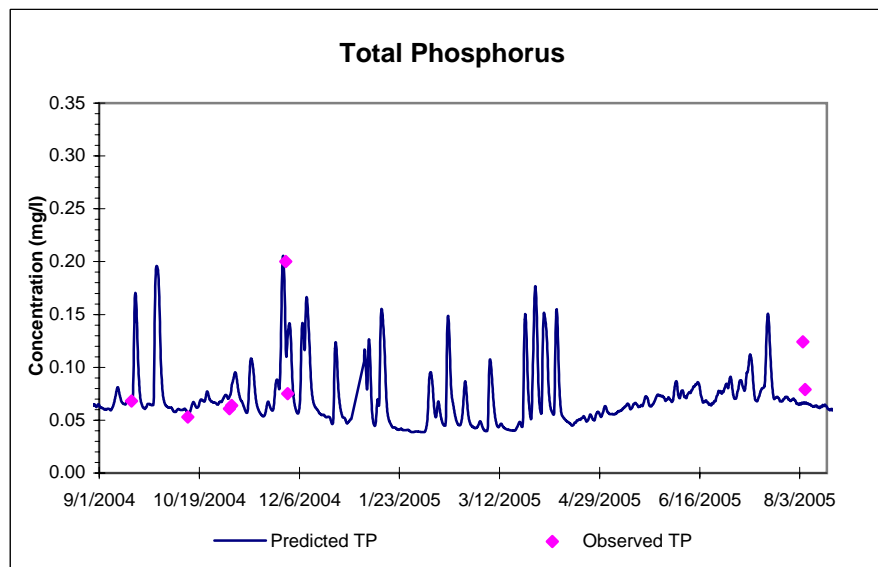




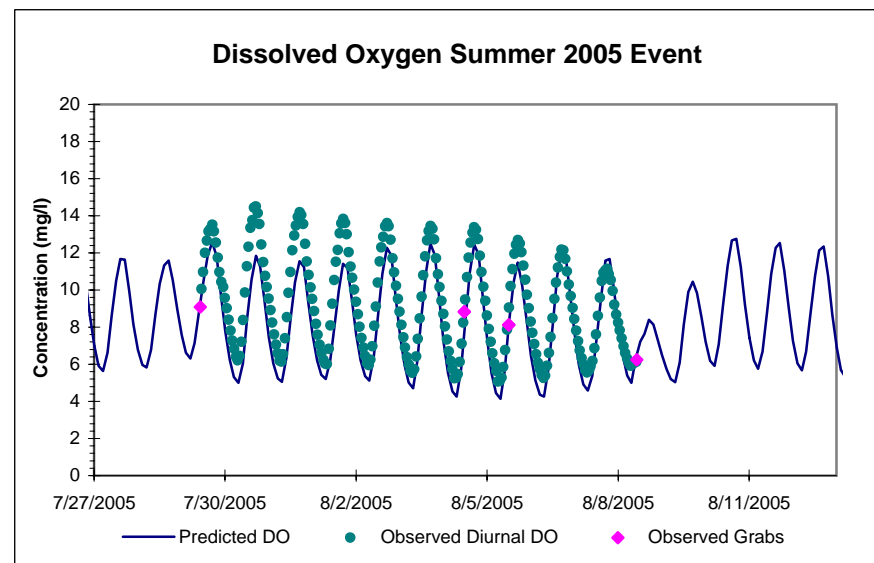
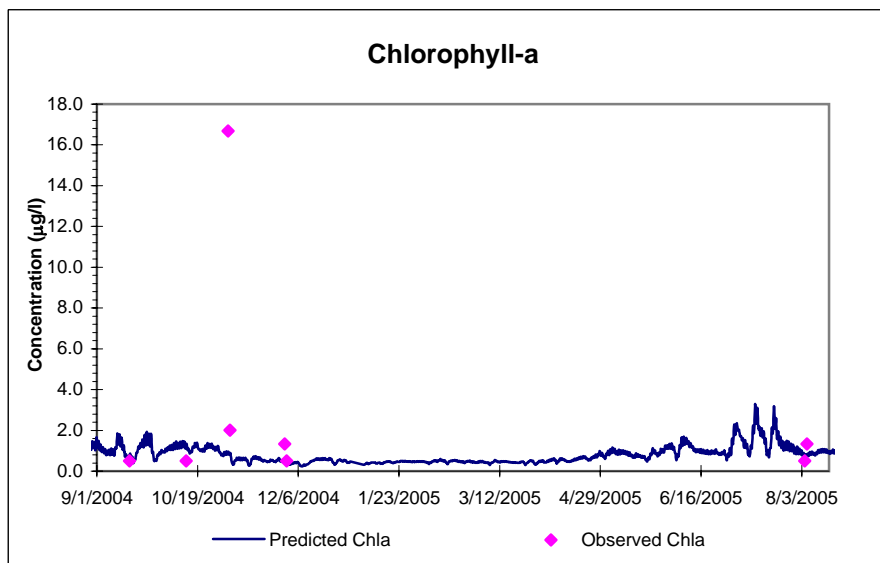
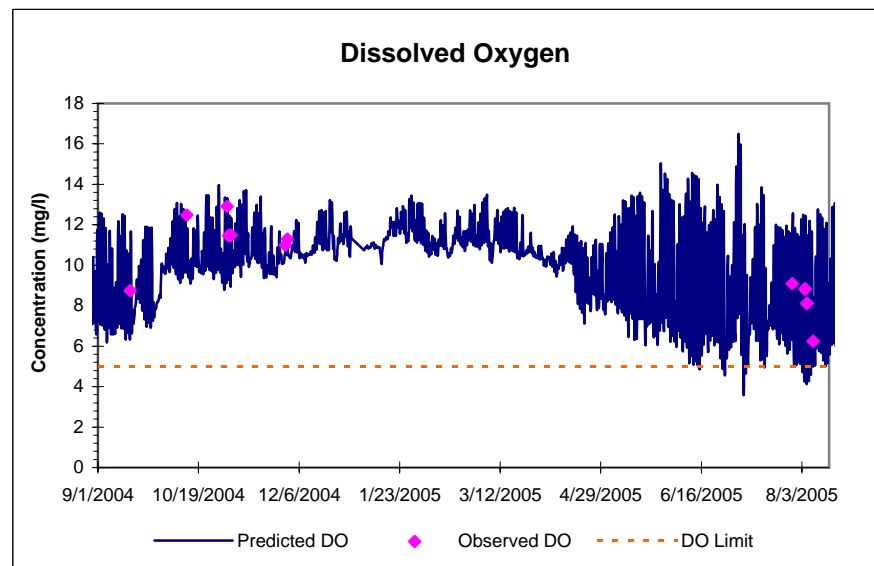
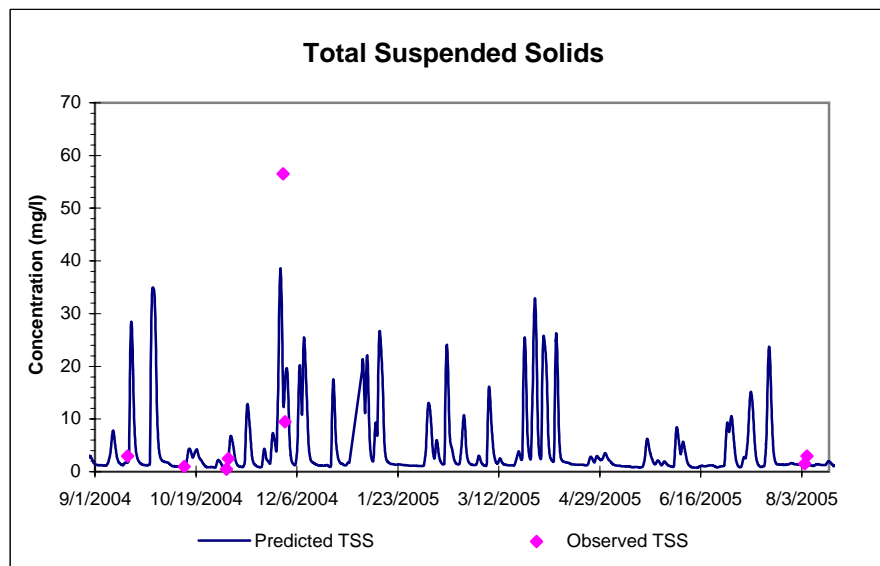
## Neshanic River at Amwell Rd. in Hillsborough (NR2)



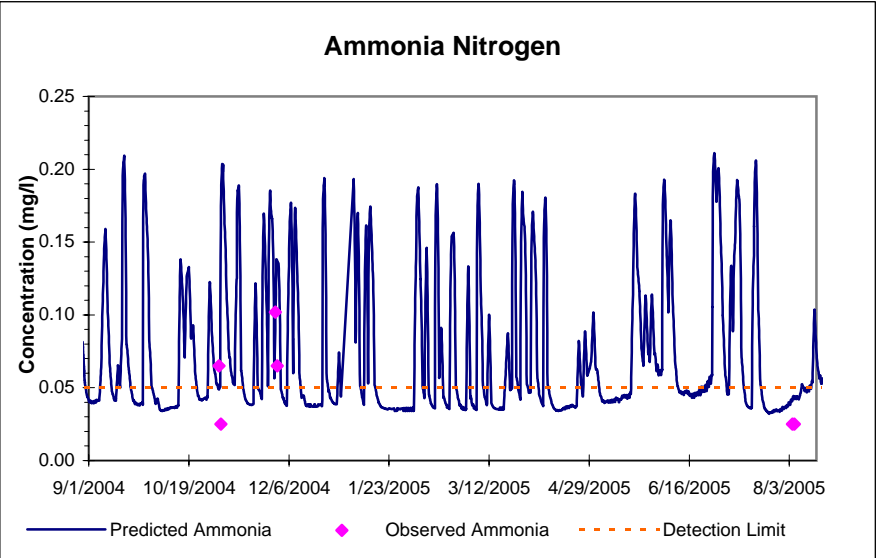
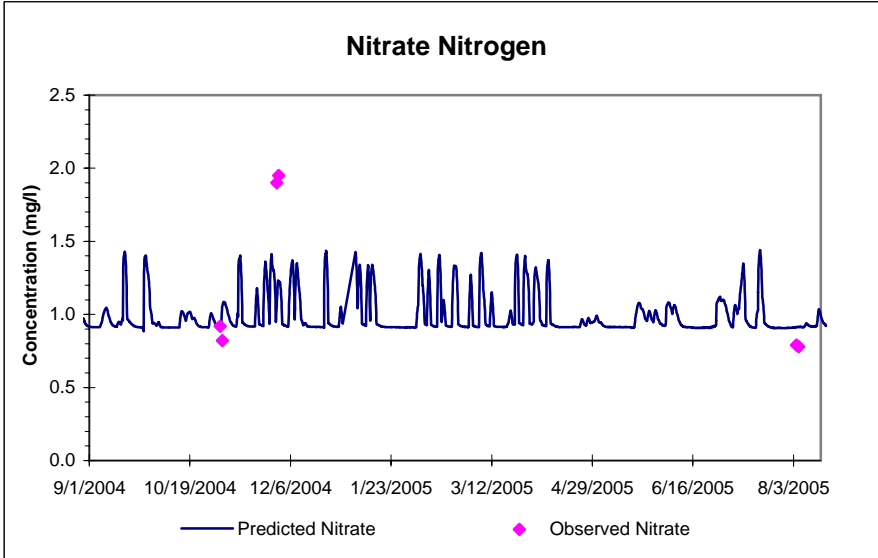
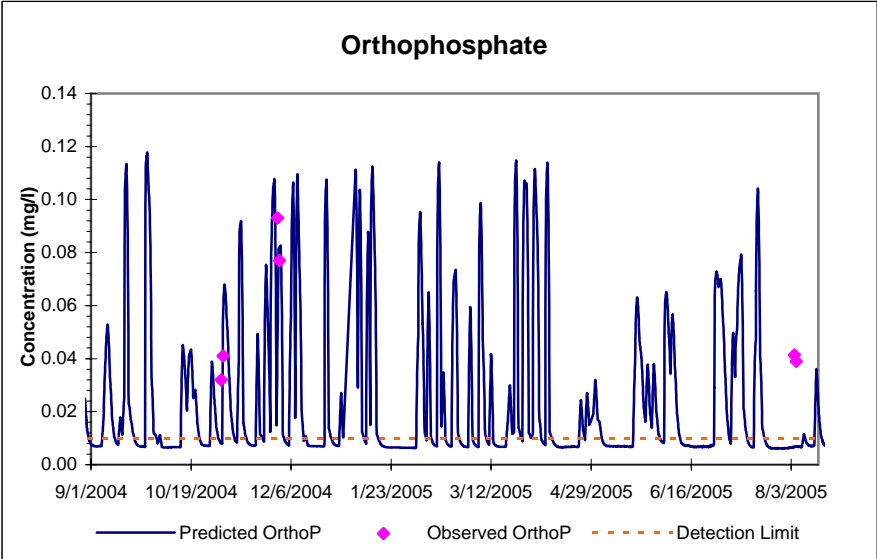
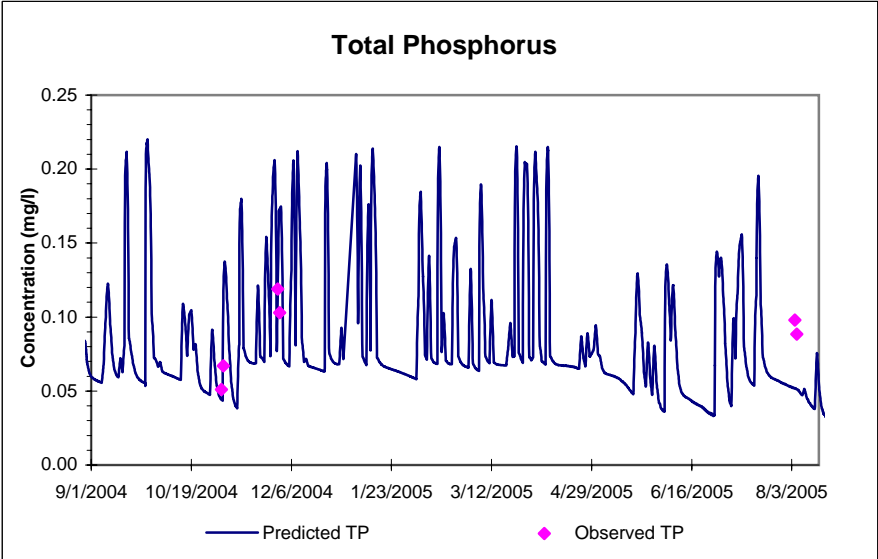
## South Branch Raritan River at Studdiford Dr. in South Branch (SBRR10, USGS 01398102)



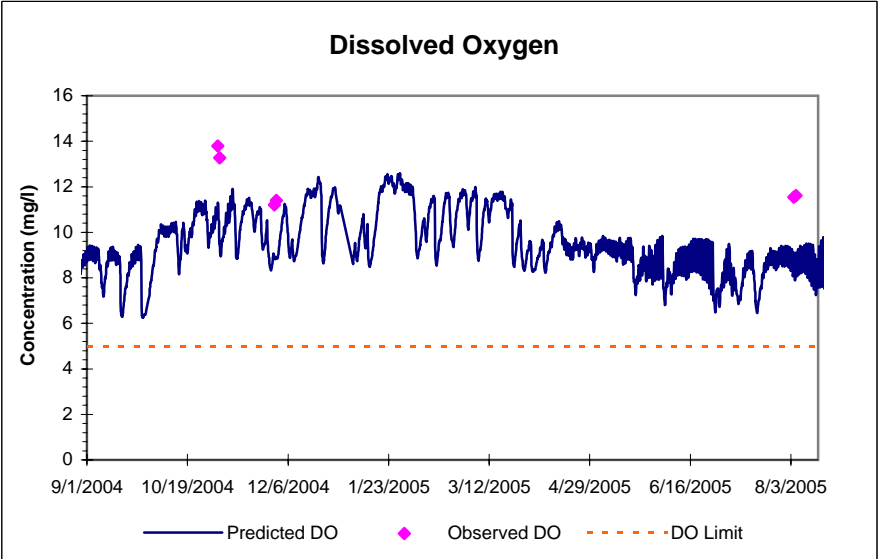
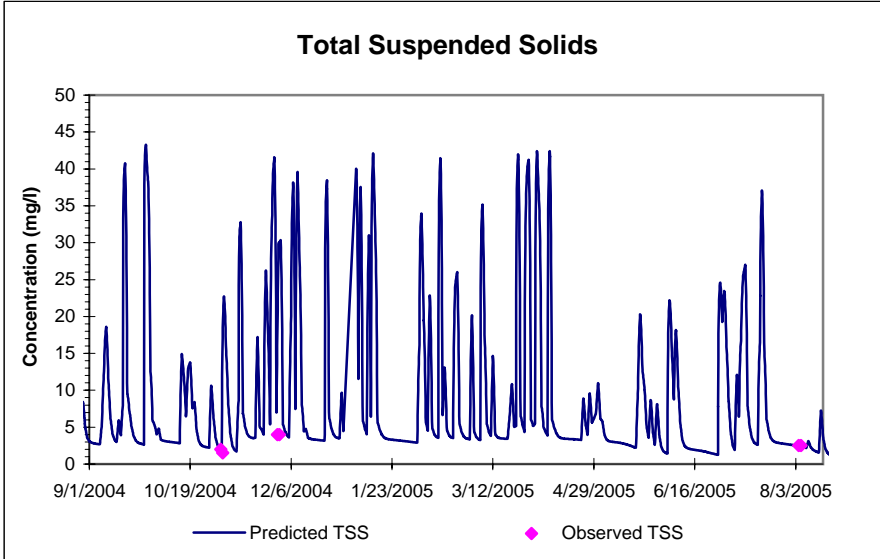
## South Branch Raritan River at Studdiford Dr. in South Branch (SBRR10, USGS 01398102)



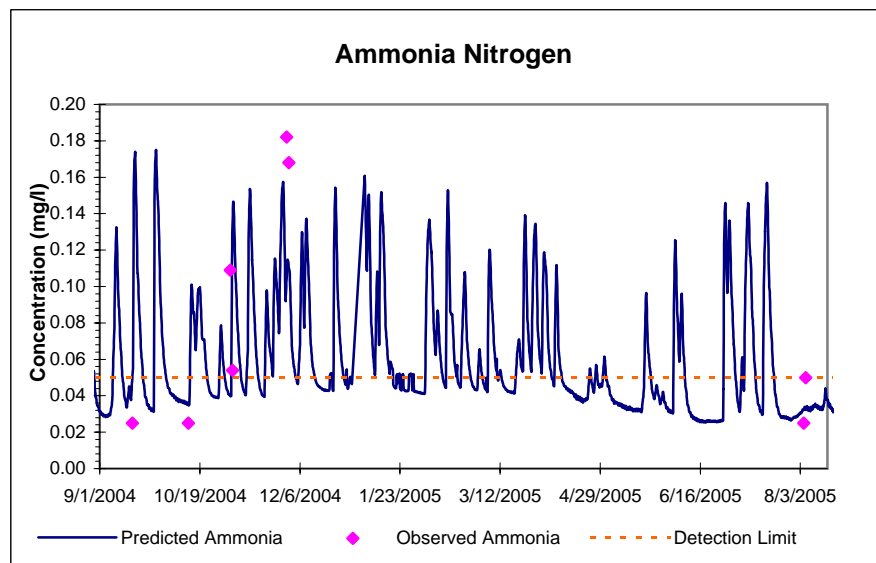
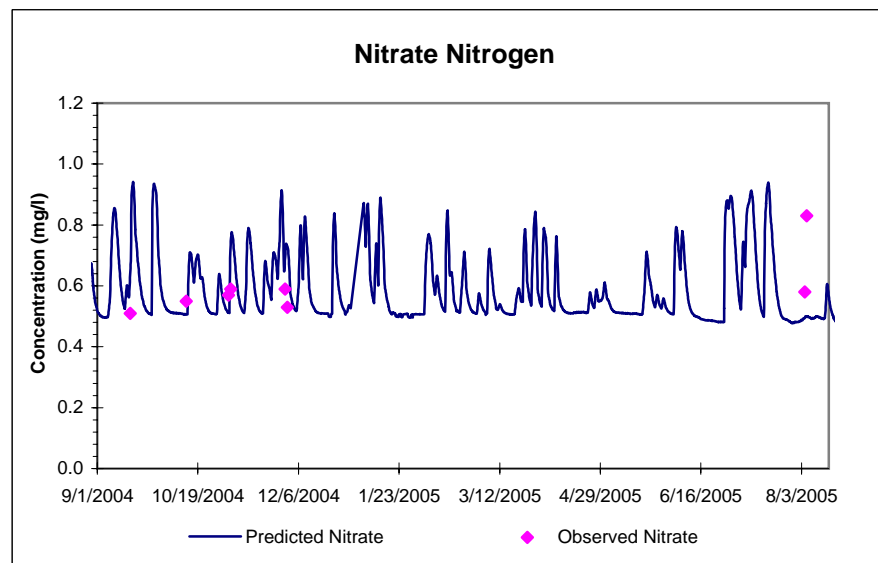
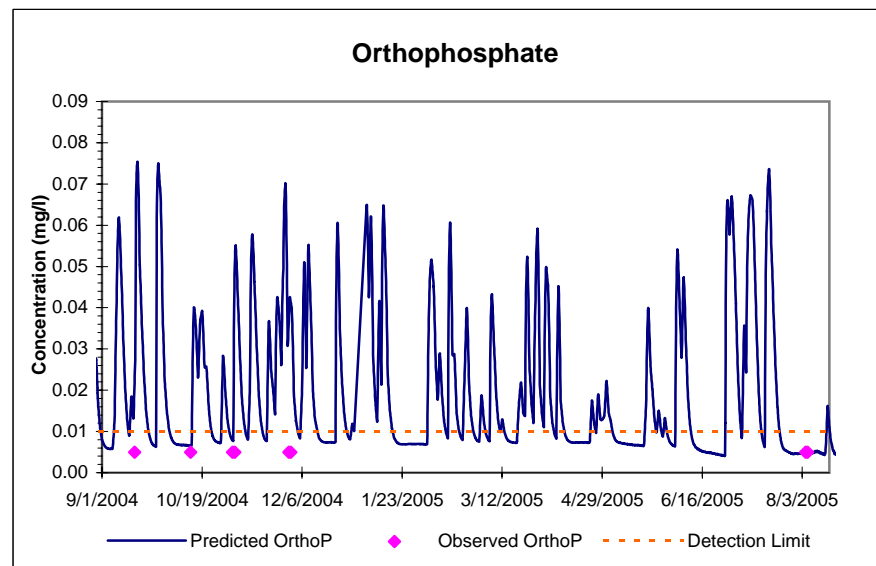
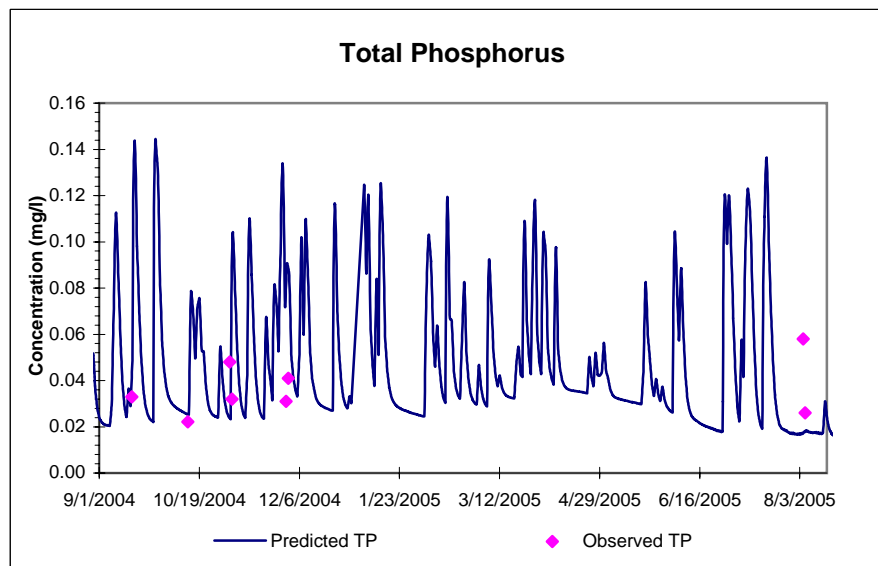
# Holland Brook at South Branch Rd. near South Branch (HB1)



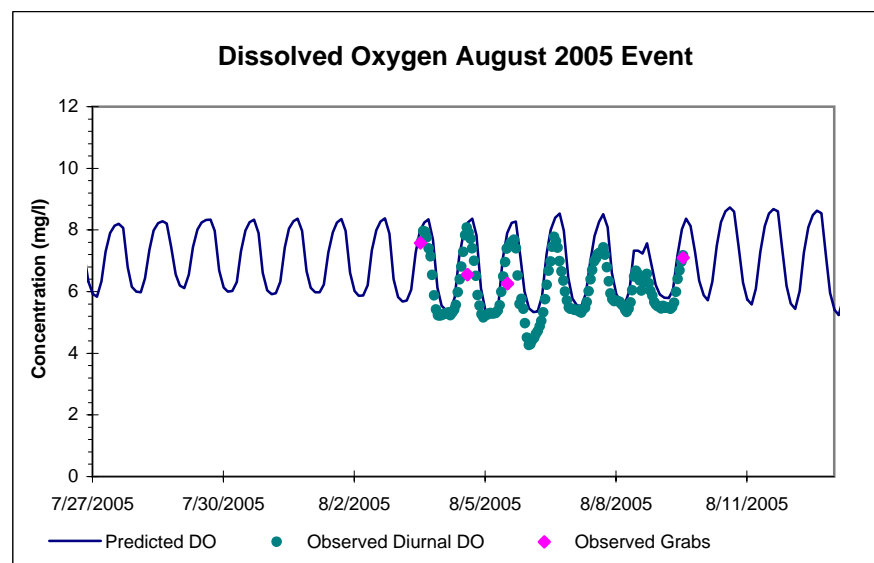
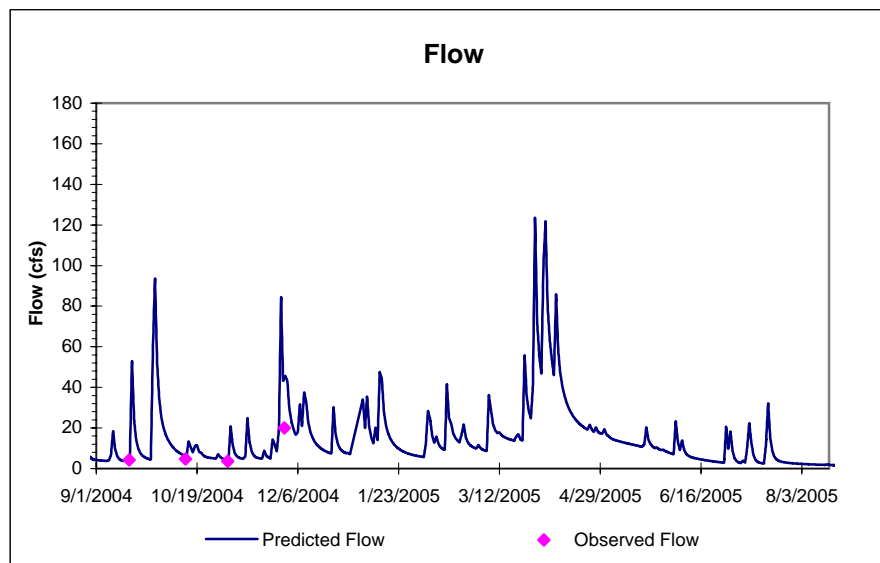
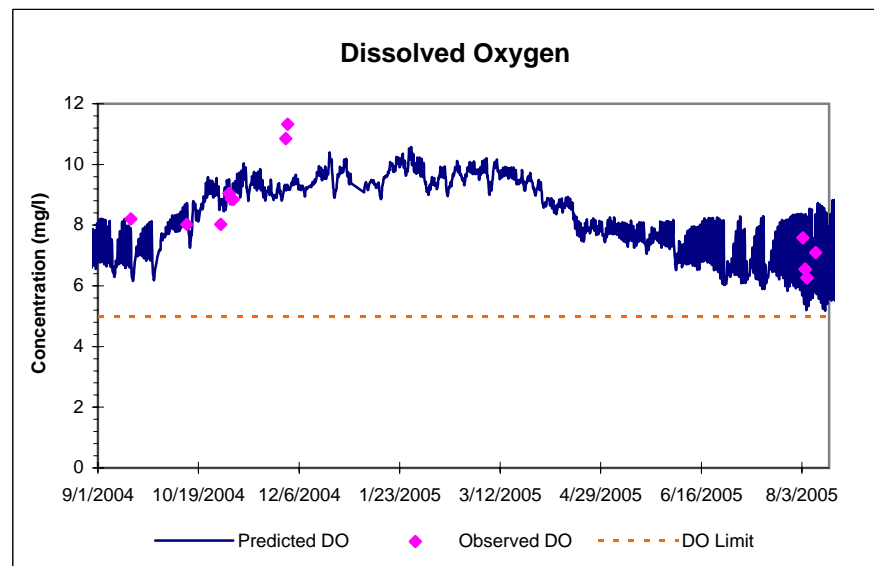
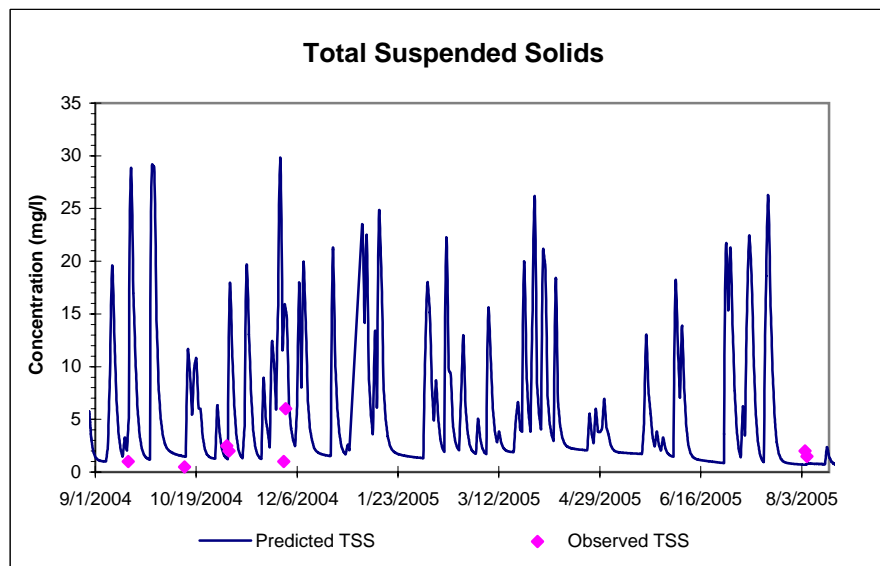
# Holland Brook at South Branch Rd. near South Branch (HB1)



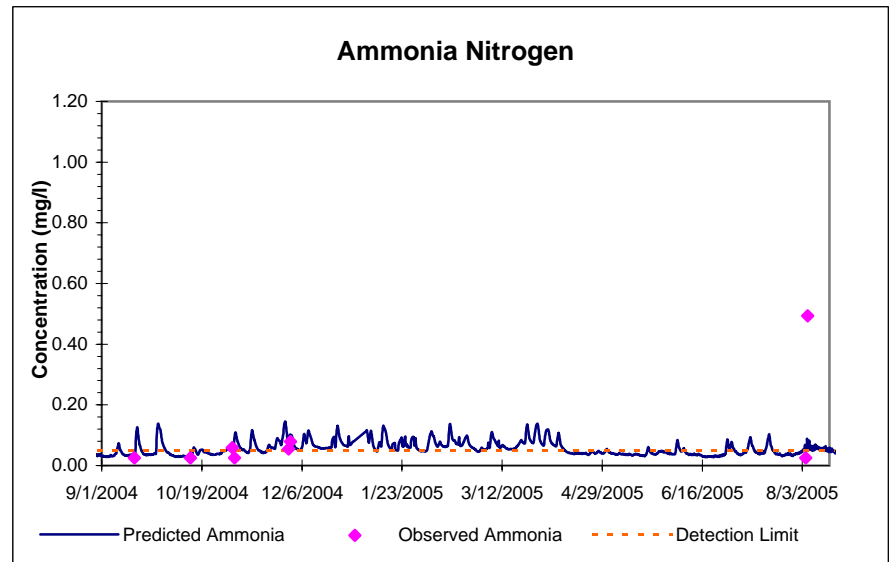
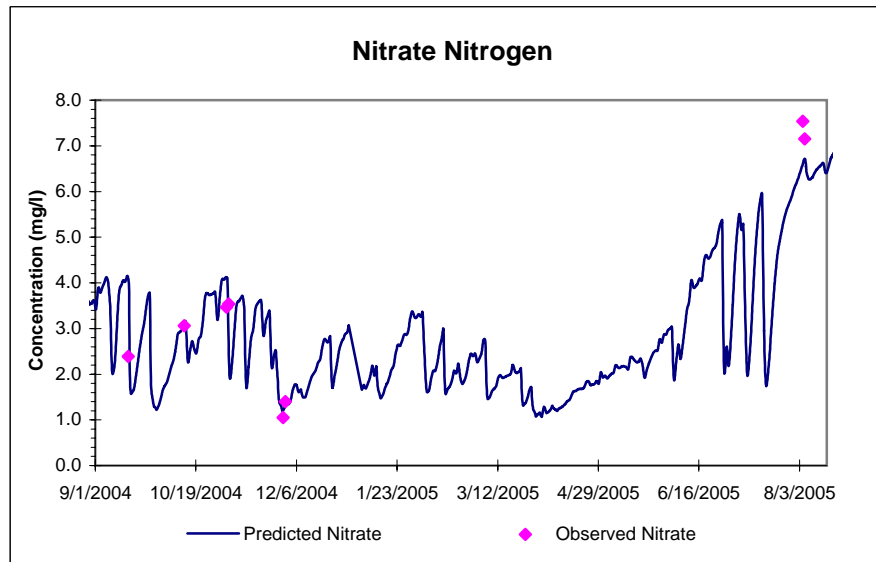
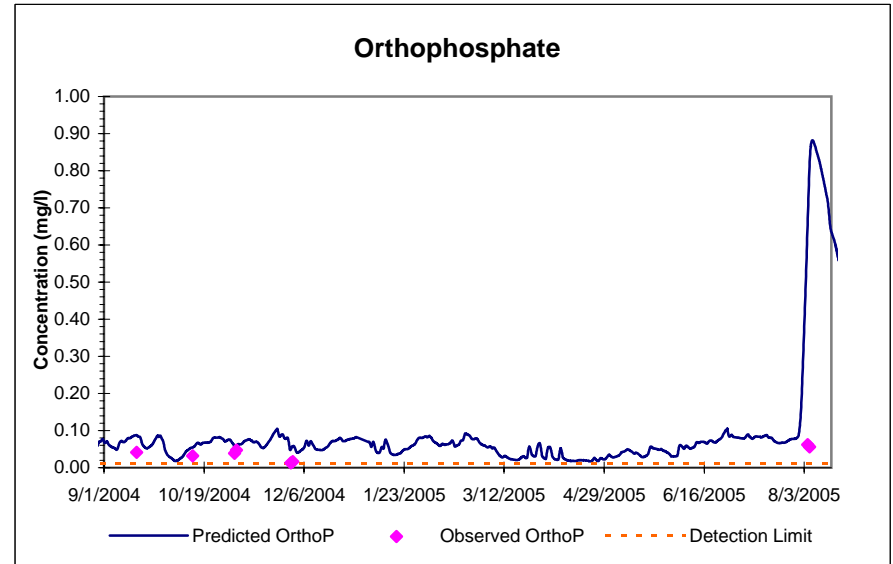
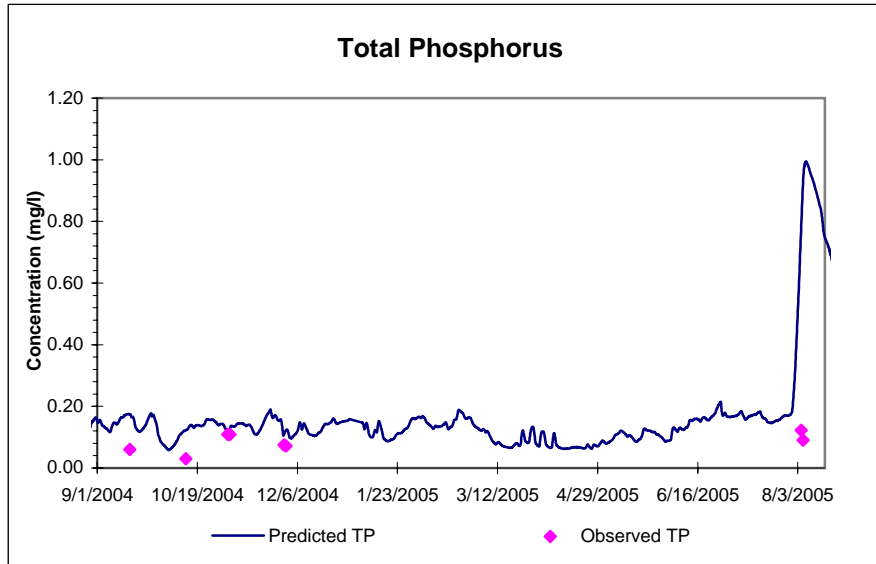
## Lamington River at Righter Road near Succasunna (LR1)



## Lamington River at Righter Road near Succasunna (LR1)

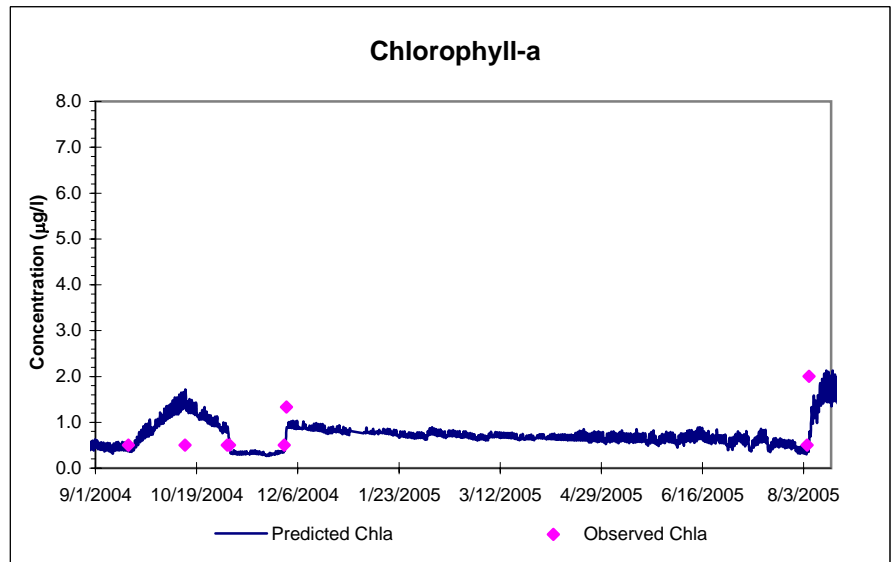
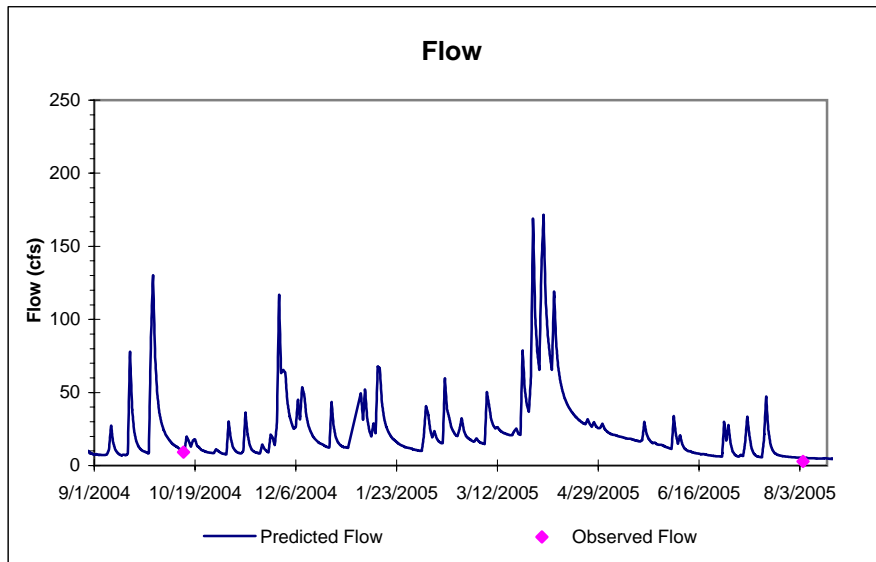
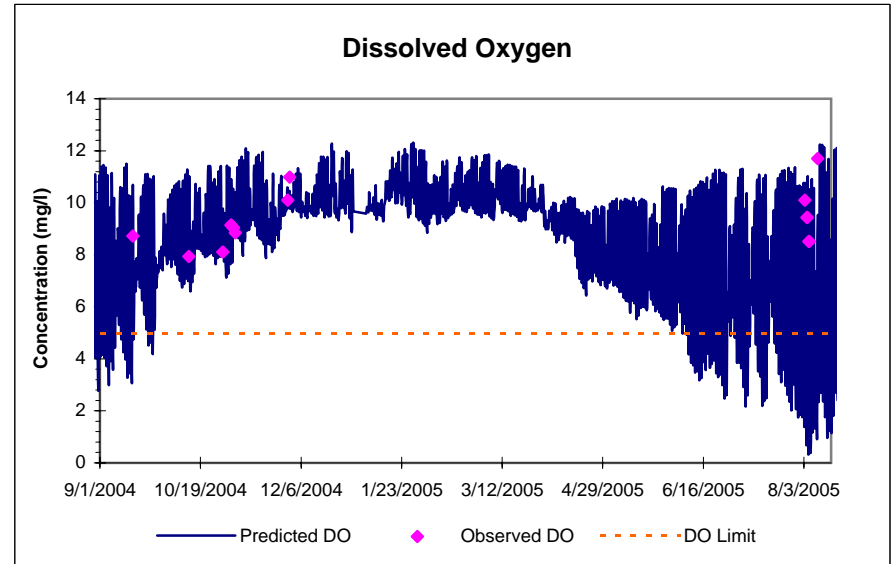
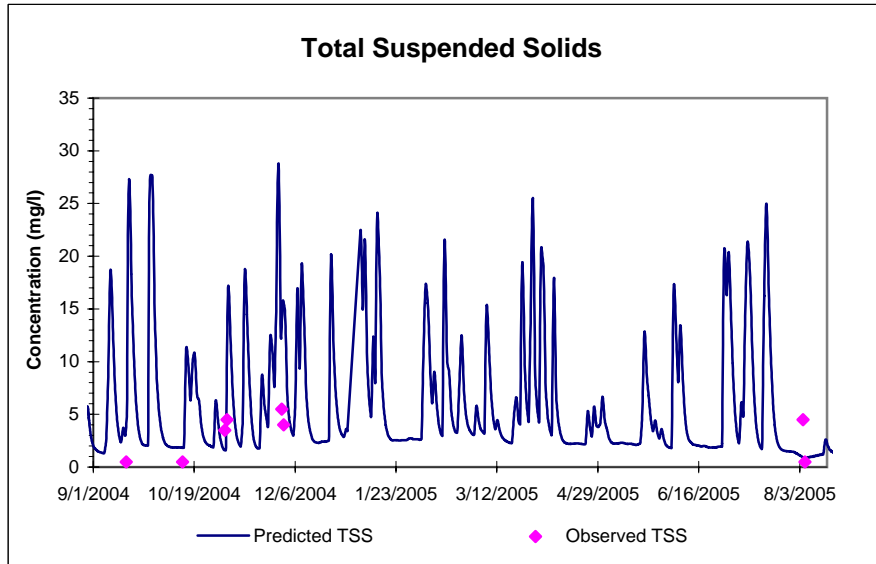


## Lamington River at Ironia Road Downstream of Roxbury STP (LR2)

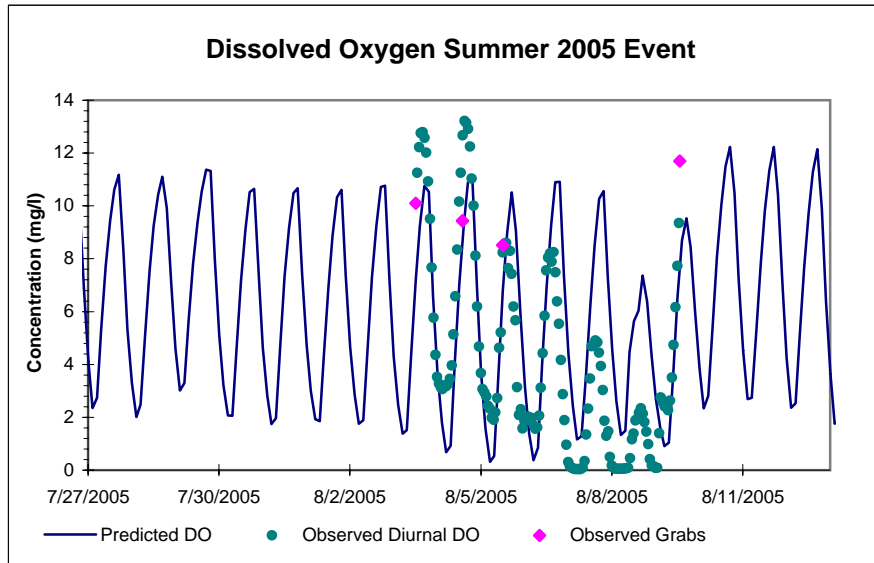




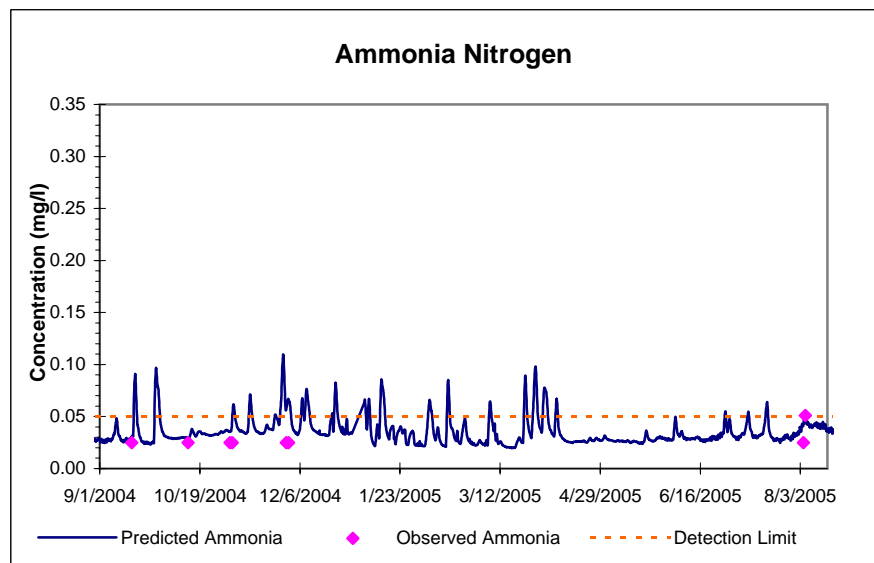
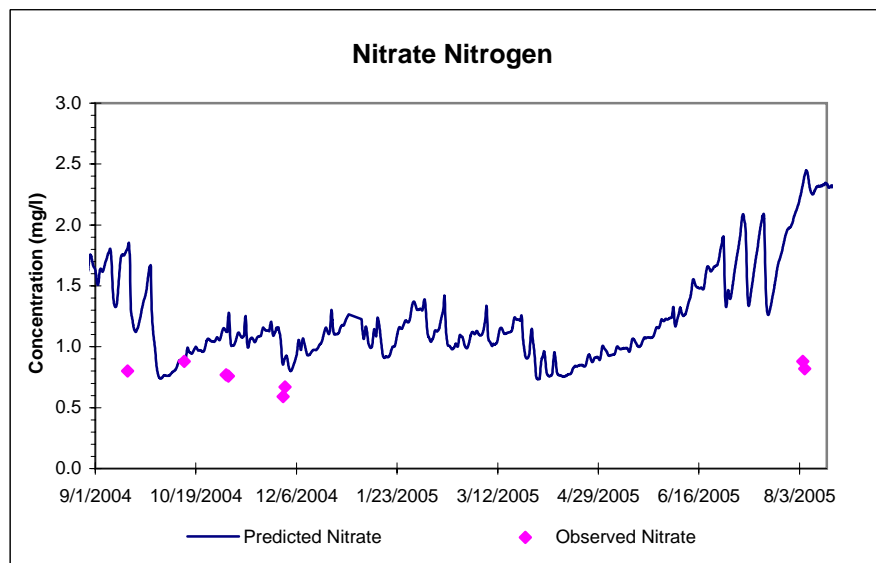
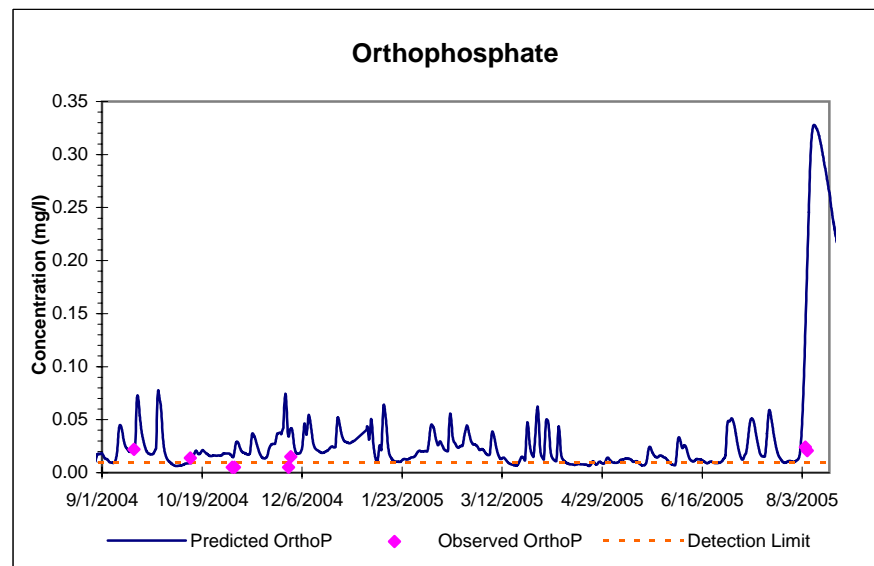
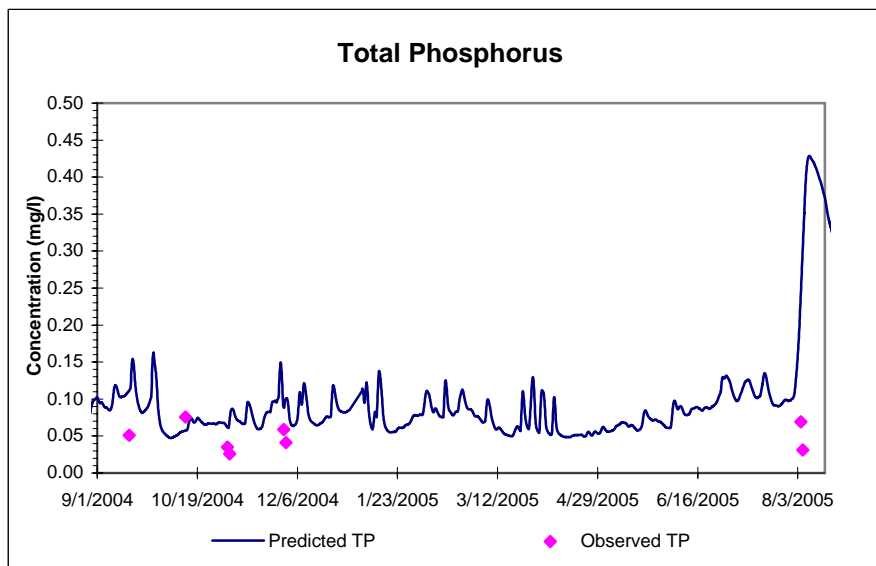
## Lamington River at Ironia Road Downstream of Roxbury STP (LR2)



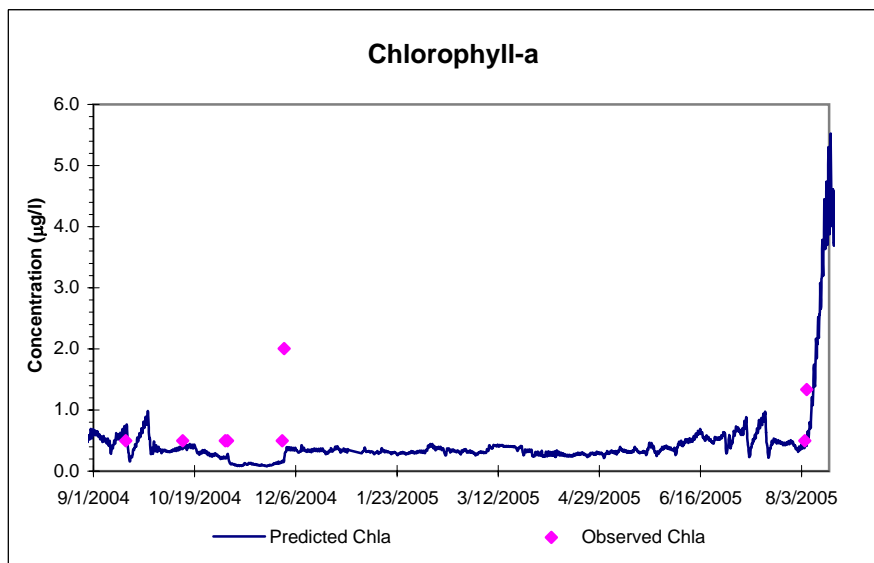
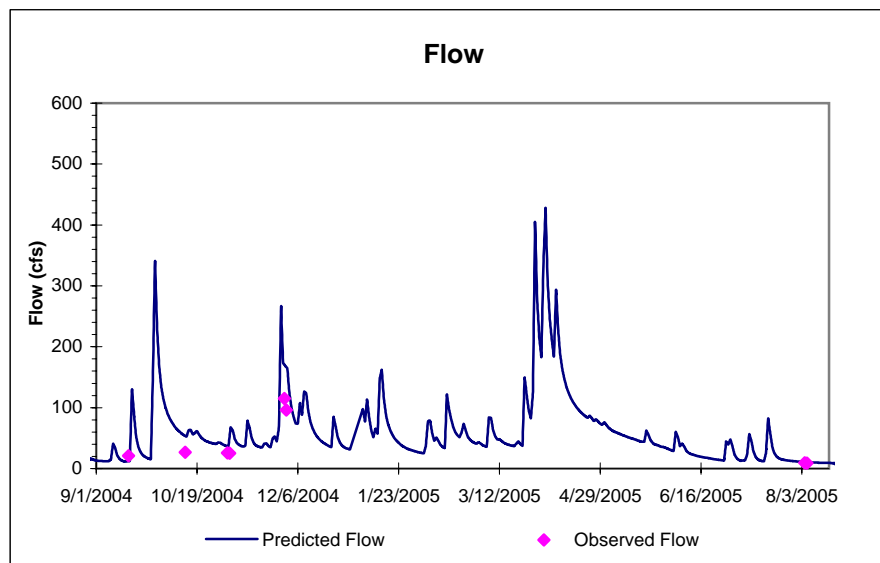
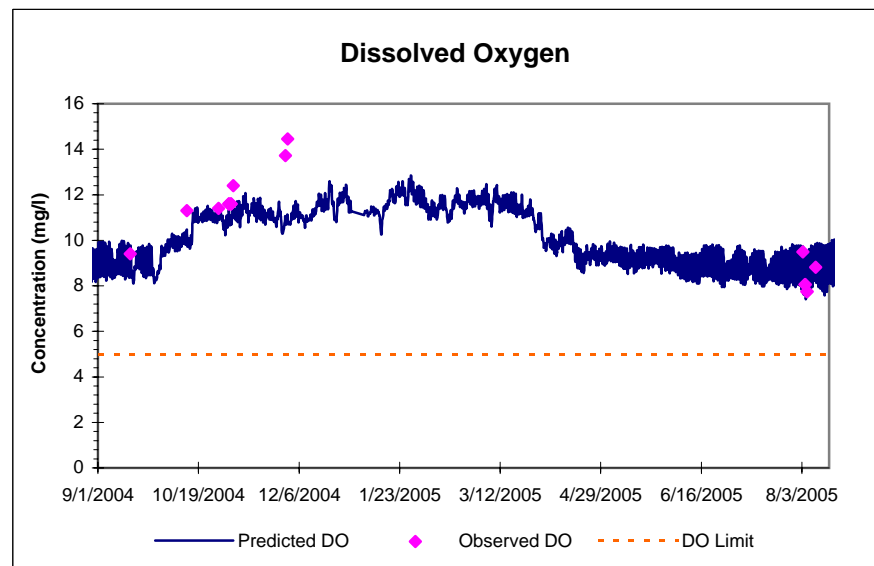
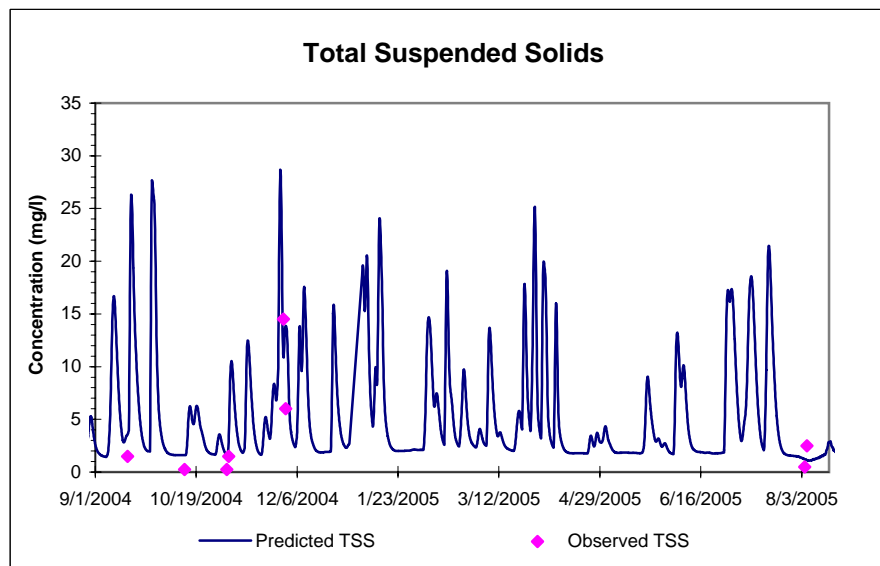
## Lamington River at Ironia Road Downstream of Roxbury STP (LR2)



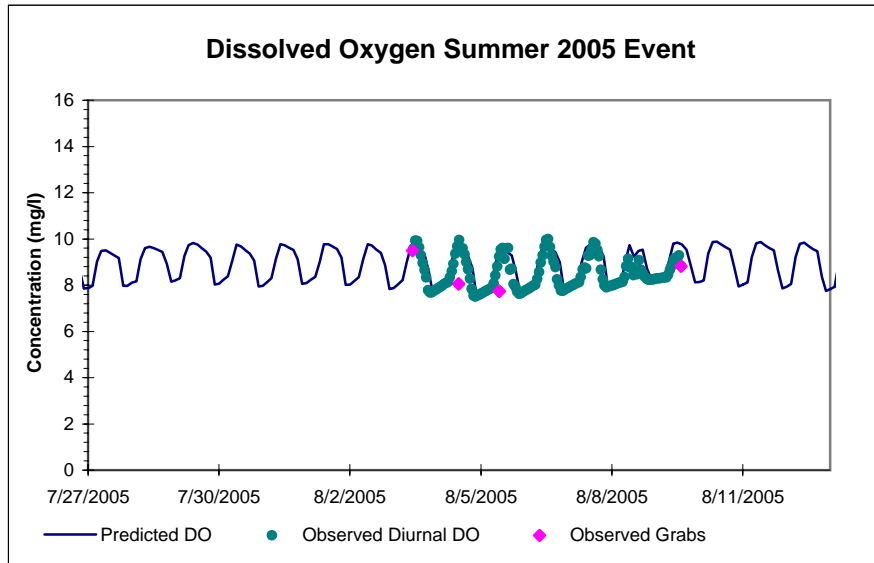
## Lamington River at Route 512 in Pottersville (LR3)



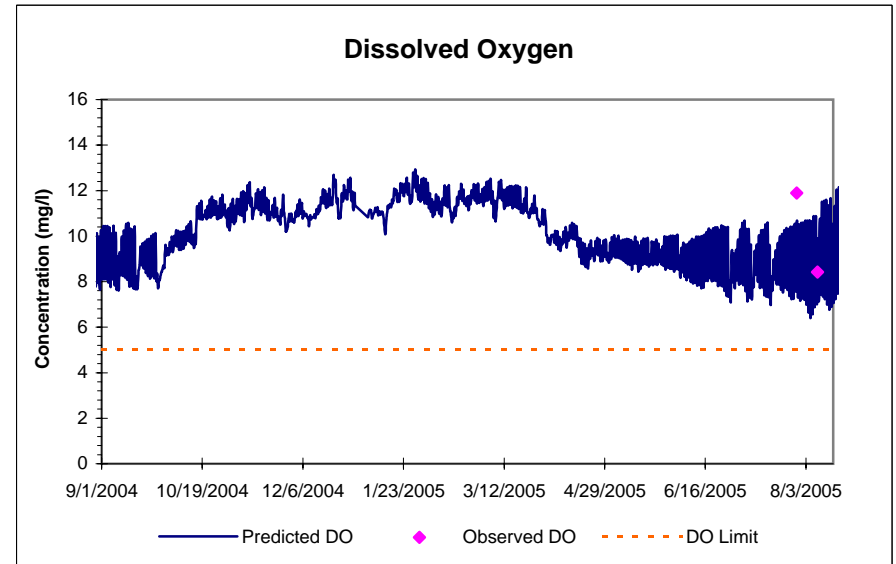
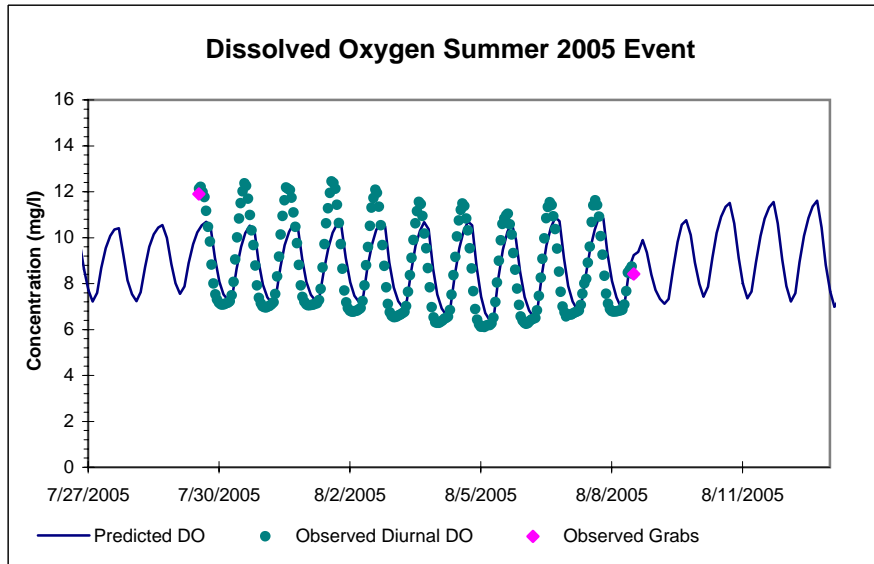
## Lamington River at Route 512 in Pottersville (LR3)



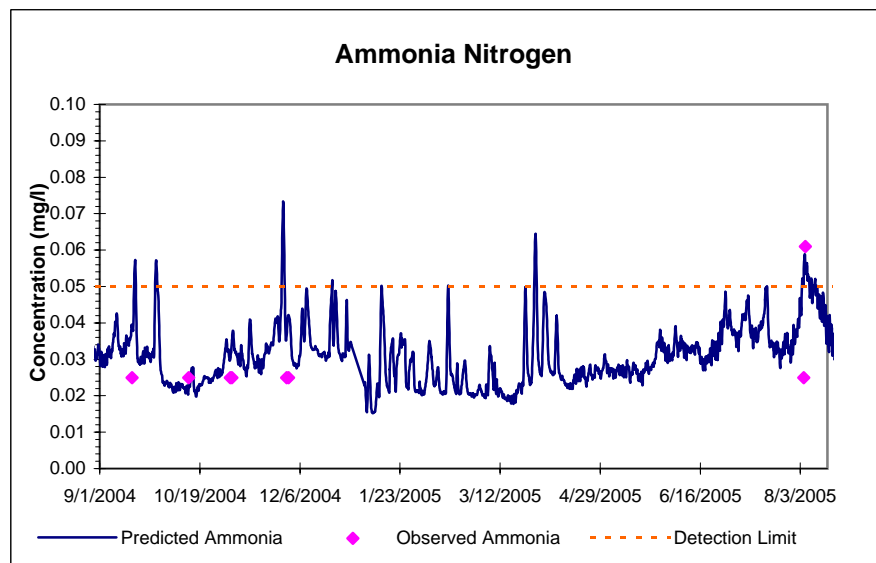
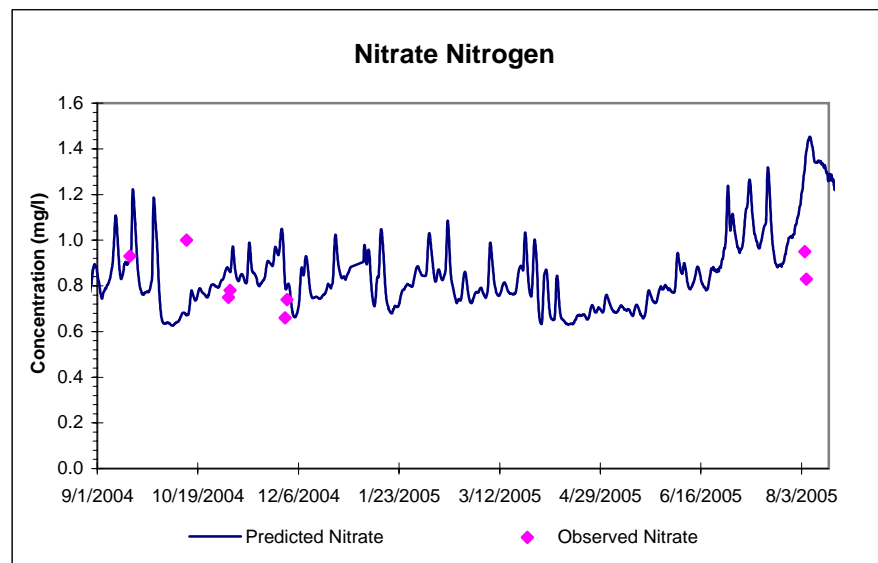
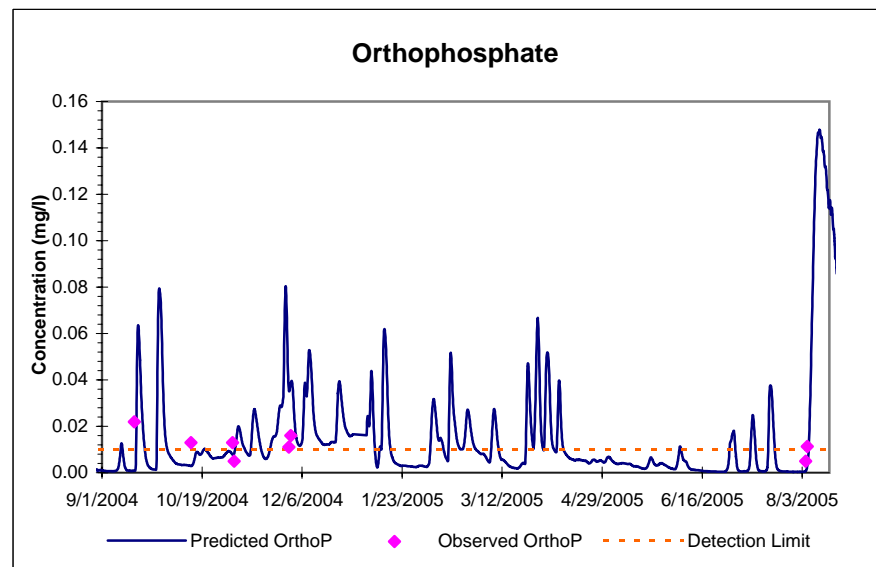
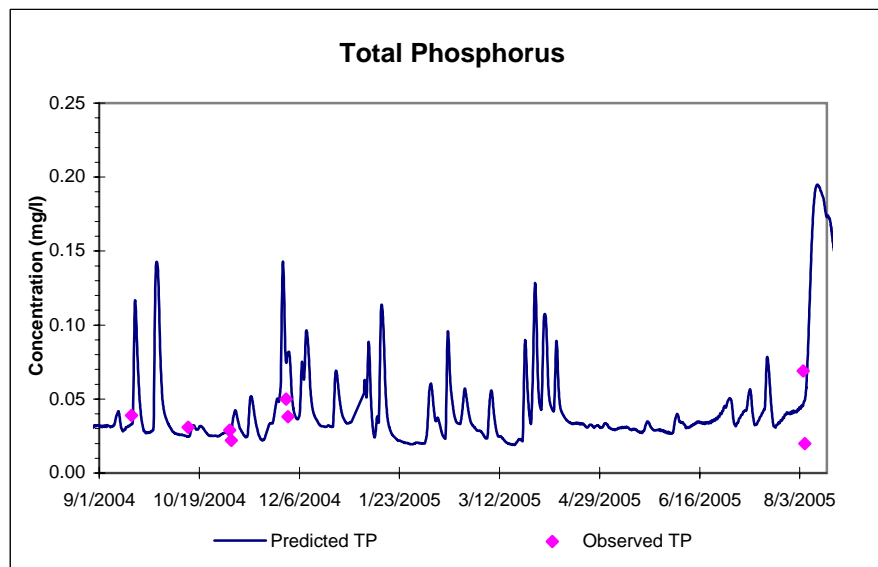
## Lamington River at Route 512 in Pottersville (LR3)



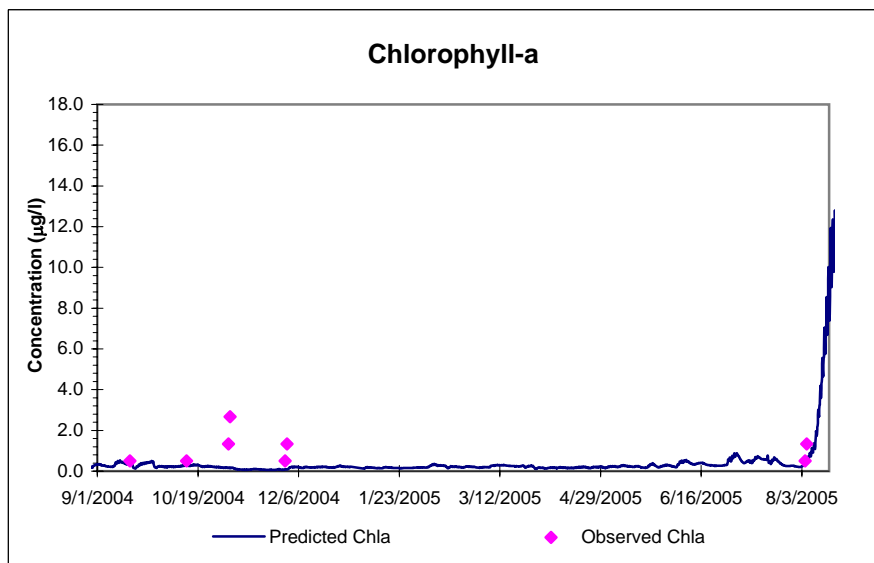
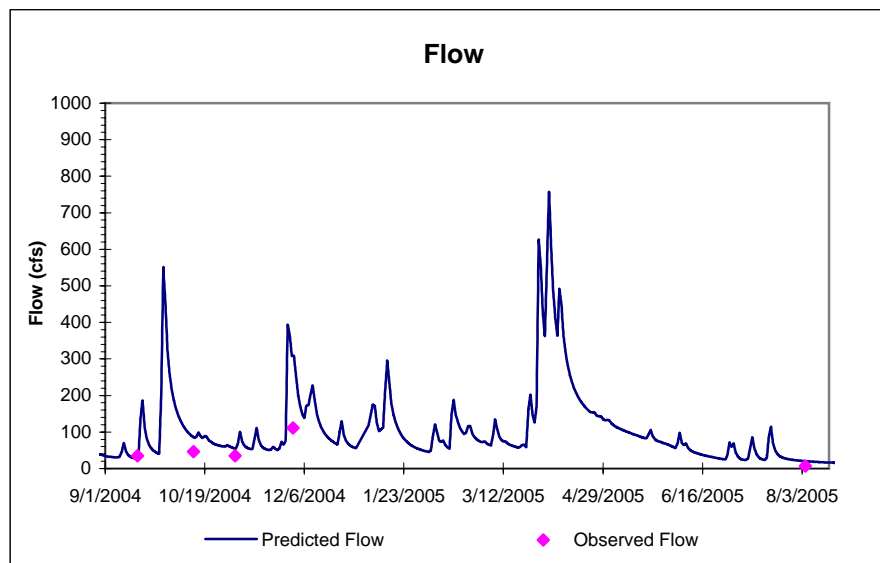
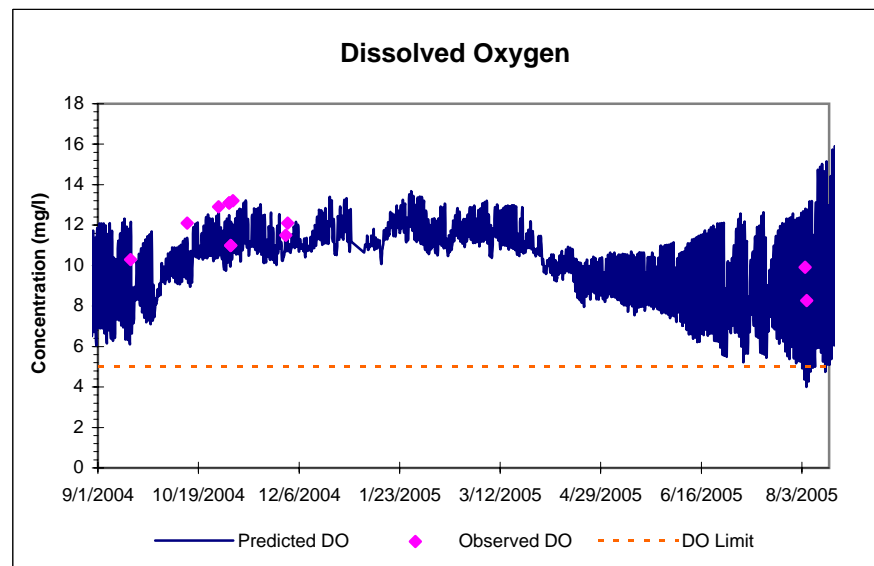
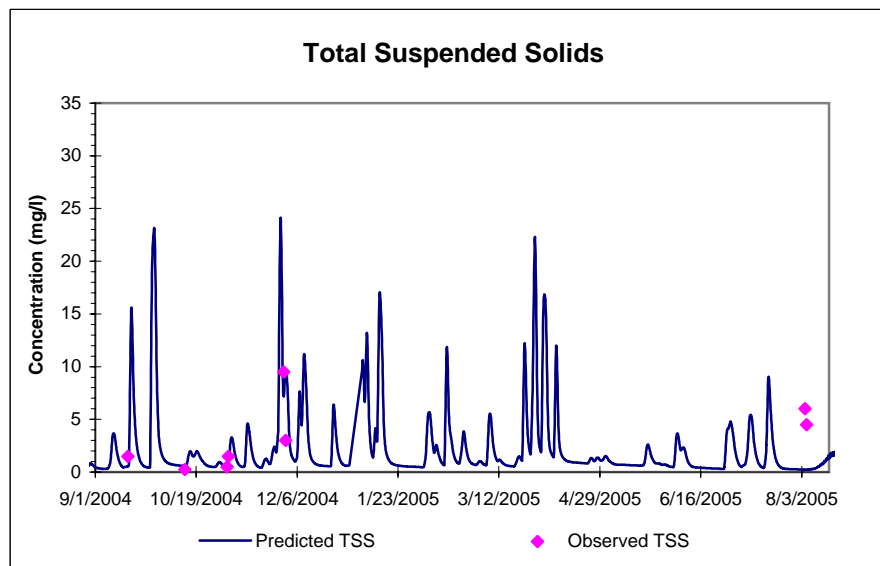
## Lamington River at Route 523 in Lamington (LR4u)



## Lamington River at River Road in Bedminster Twp. (LR4)

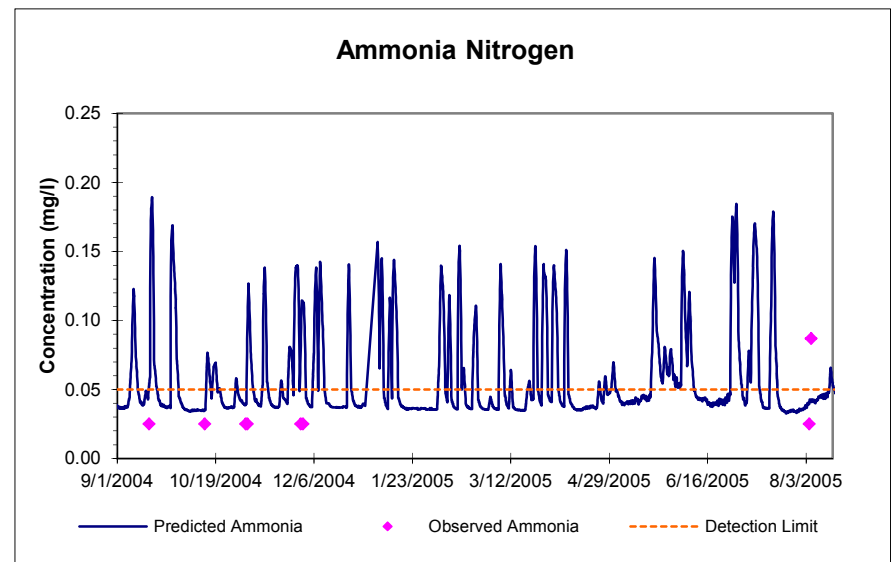
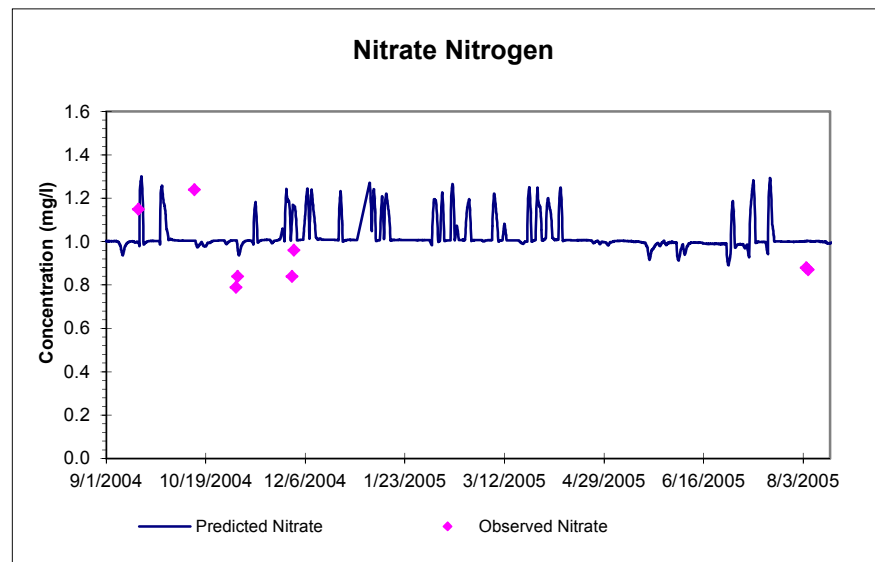
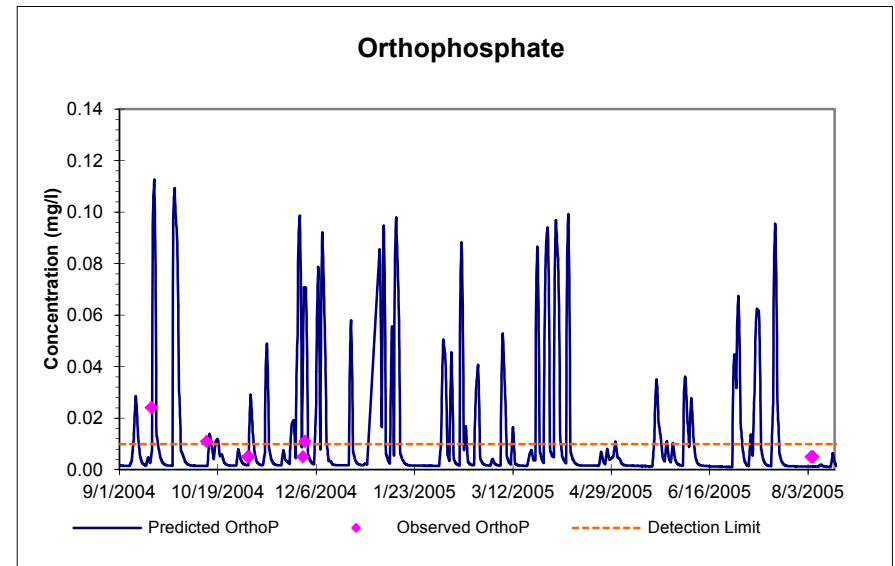
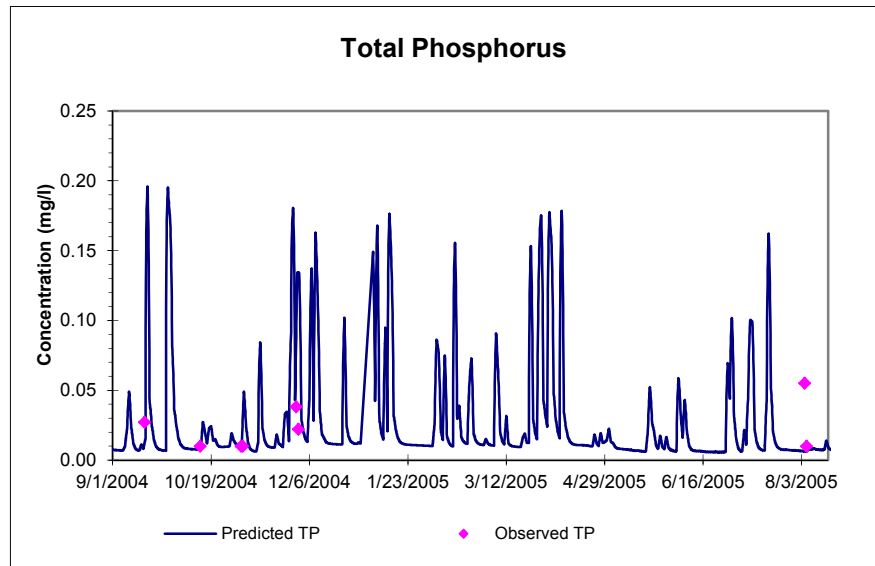


## Lamington River at River Road in Bedminster Twp. (LR4)

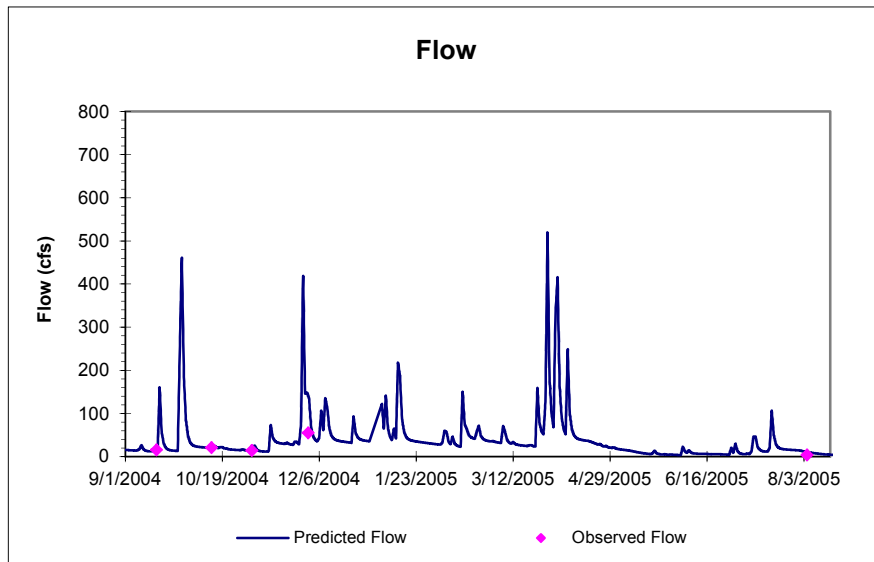
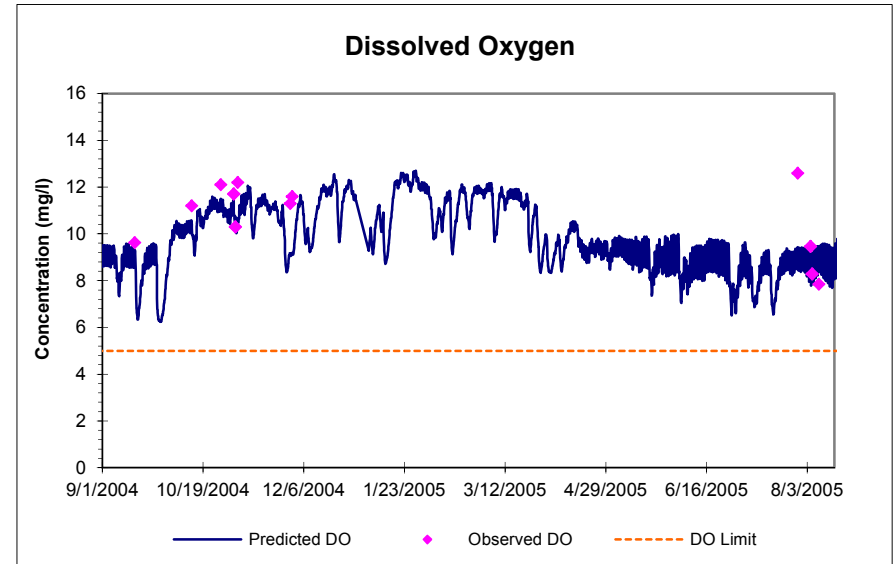
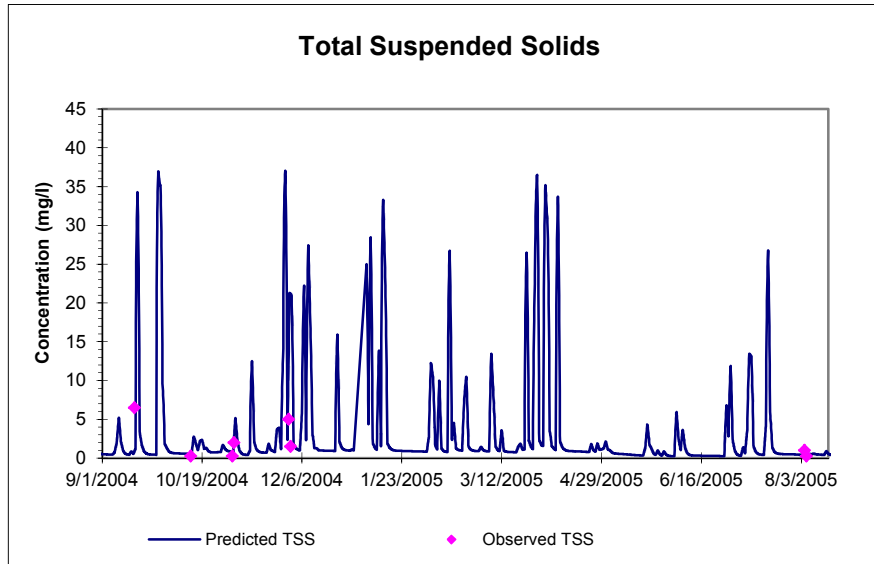




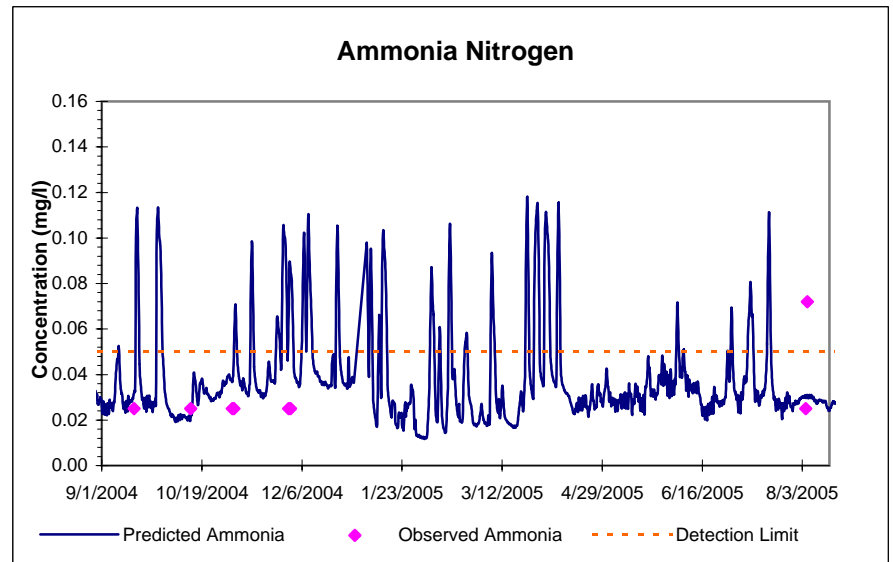
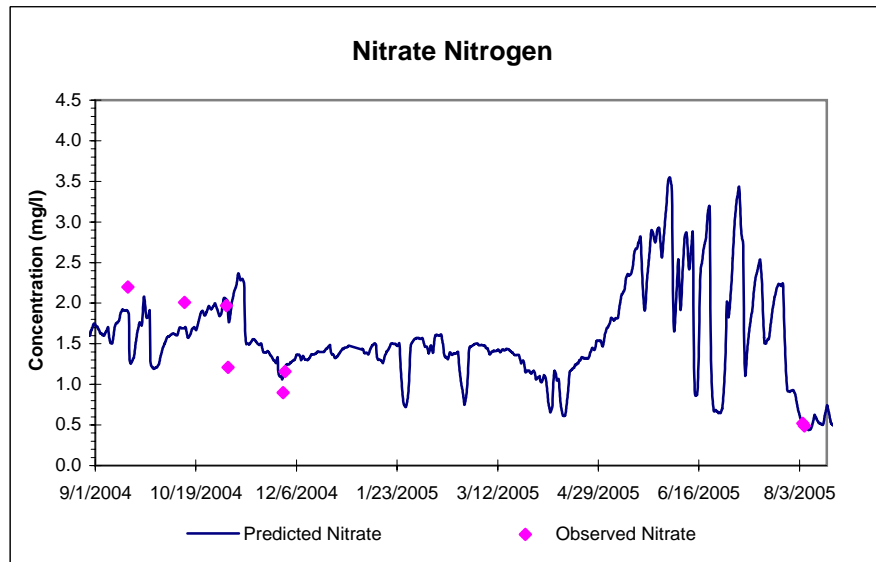
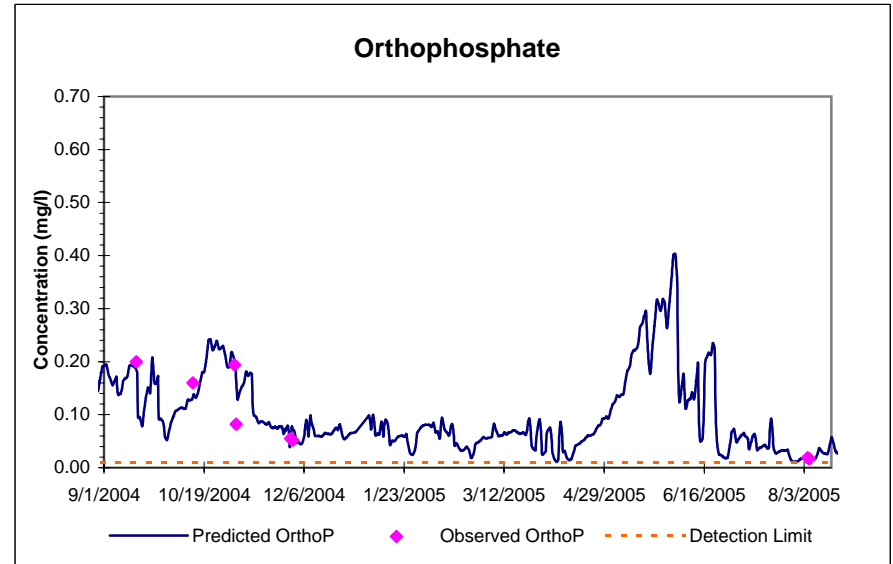
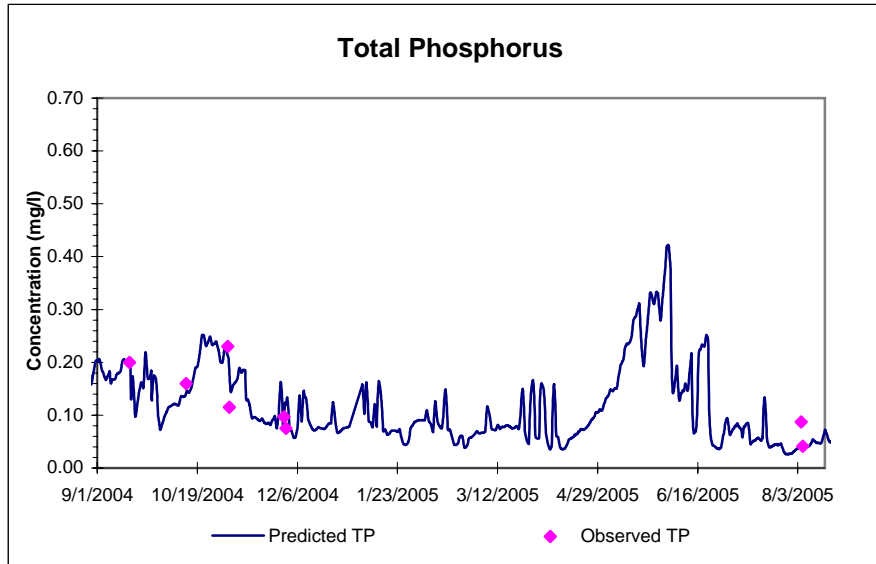
## North Branch Rockaway Creek at Route 523 in Readington Twp. (NBRC1)



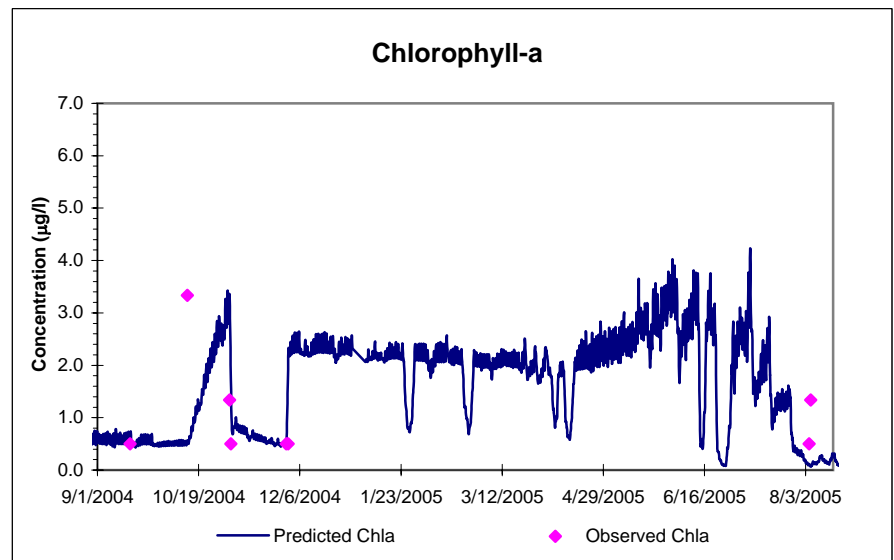
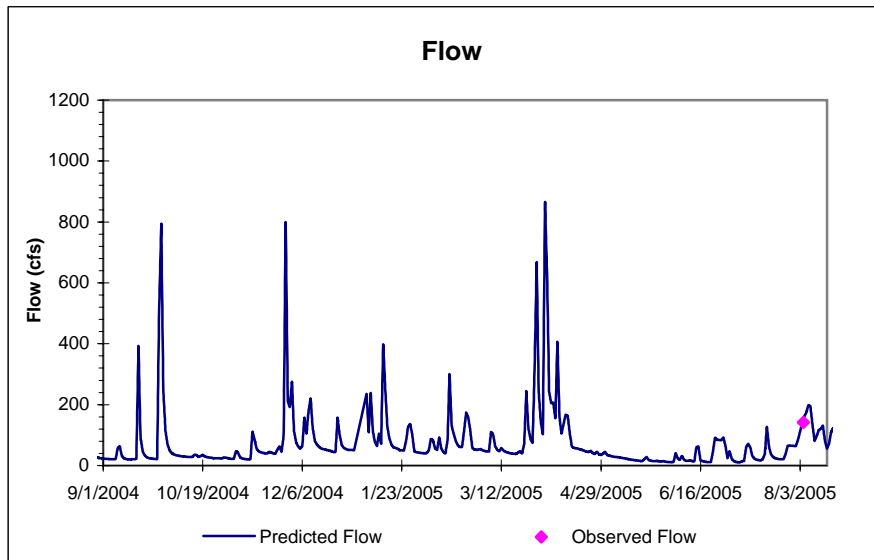
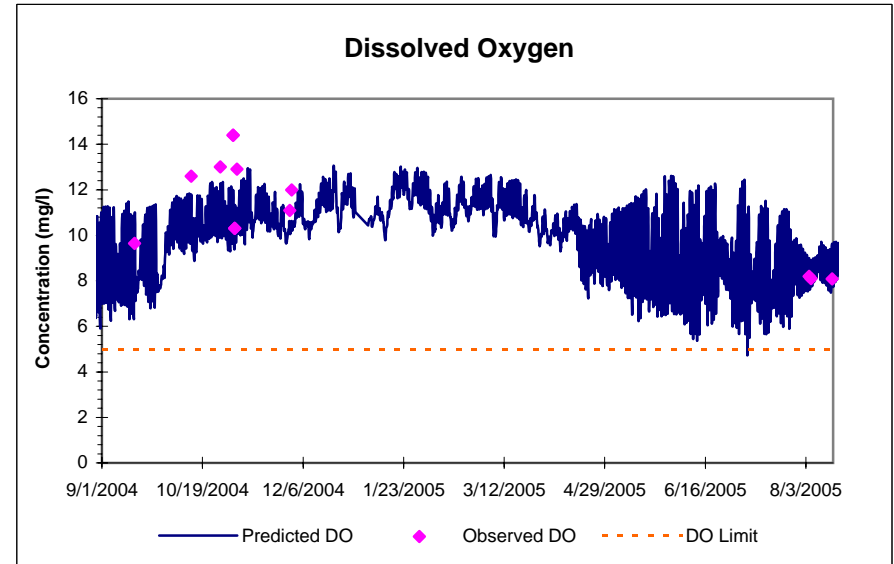
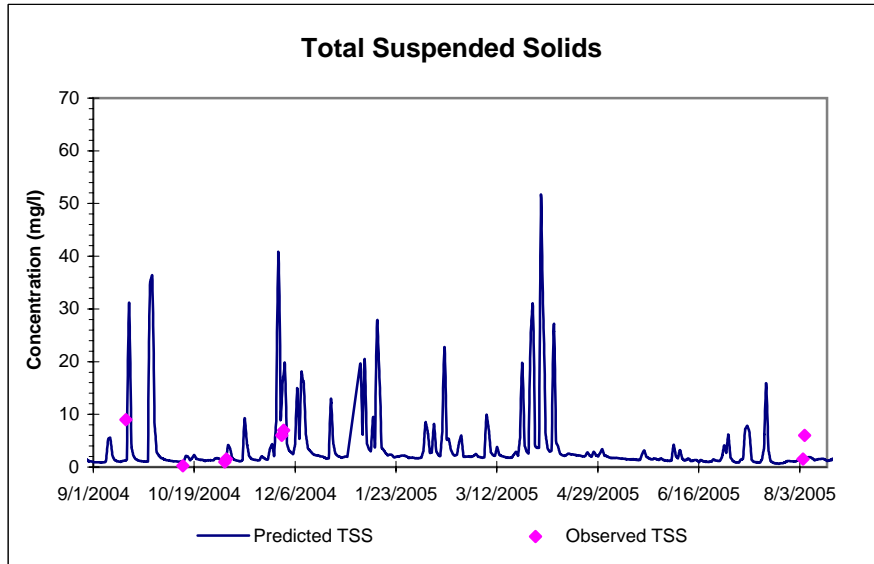
## North Branch Rockaway Creek at Route 523 in Readington Twp. (NBRC1)



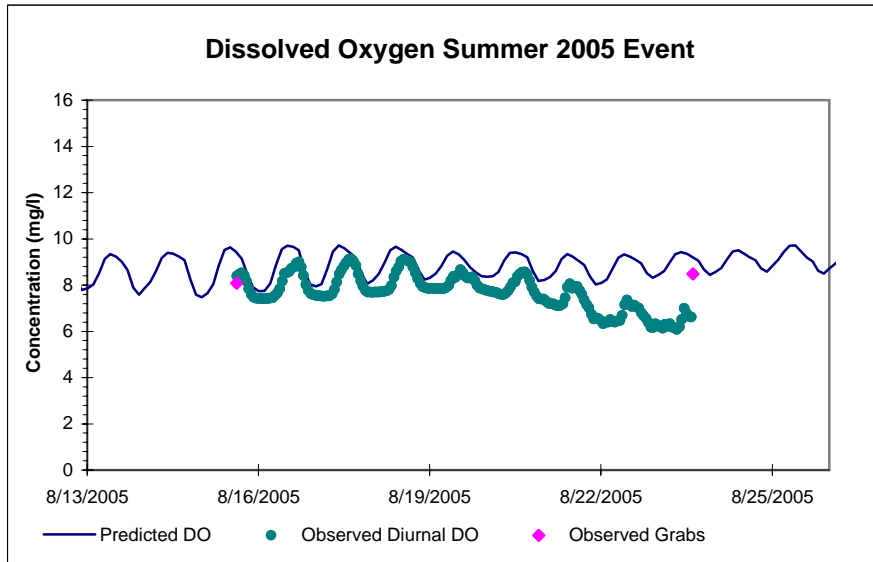
## Rockaway Creek at Lamington Road near Whitehouse (RC1, USGS 01399700)



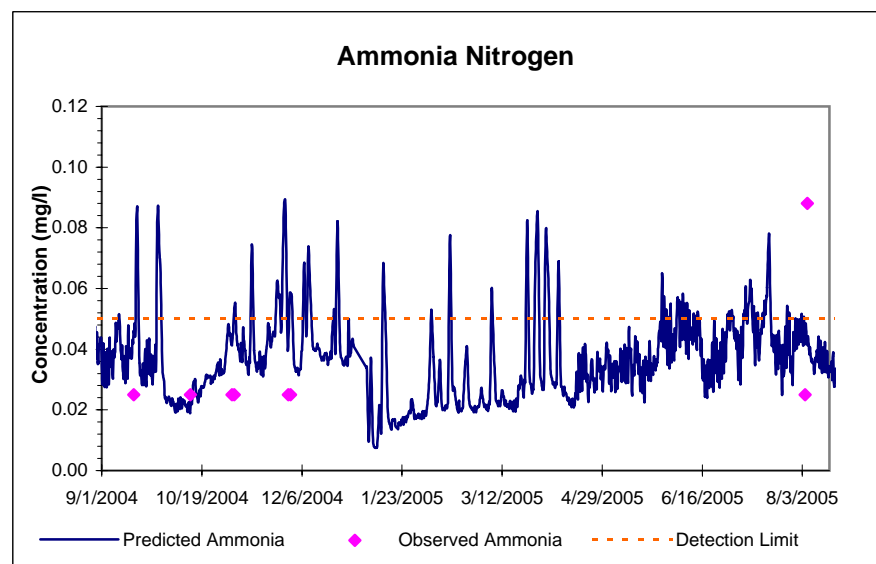
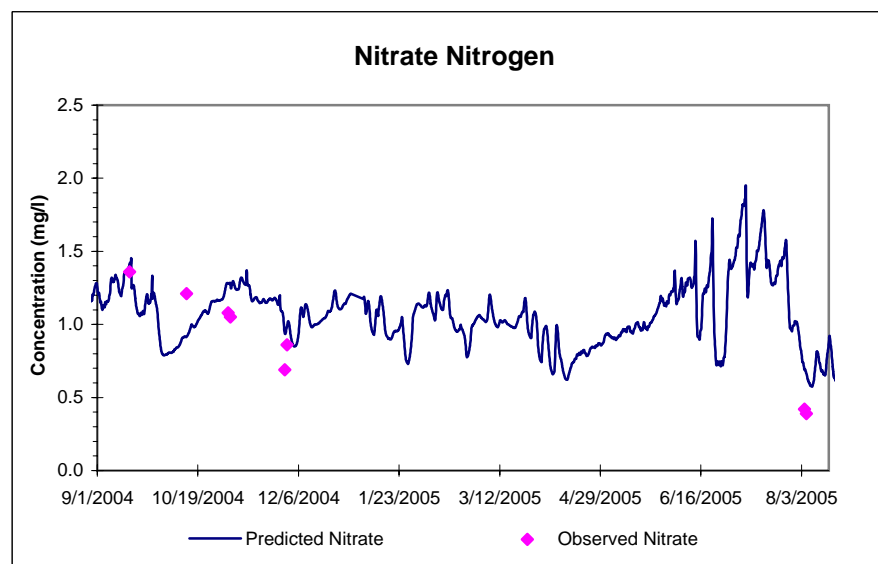
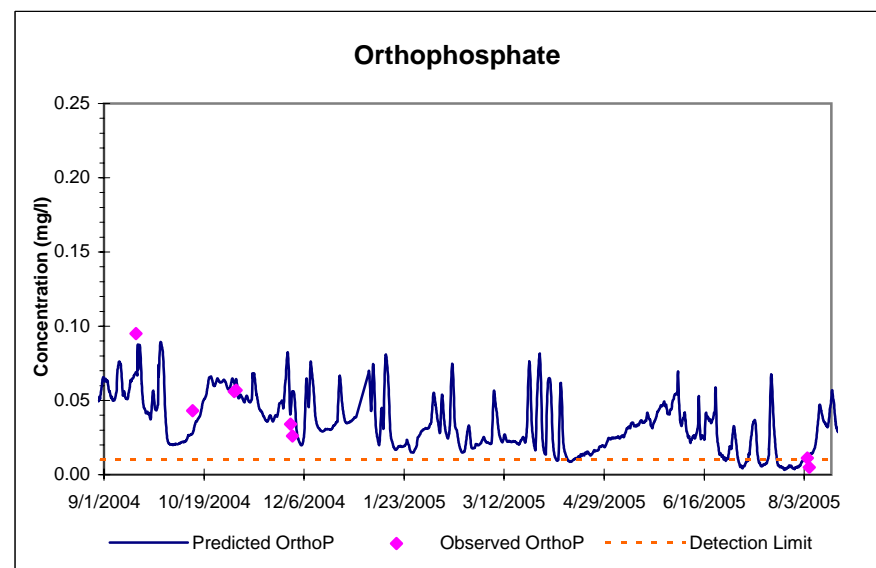
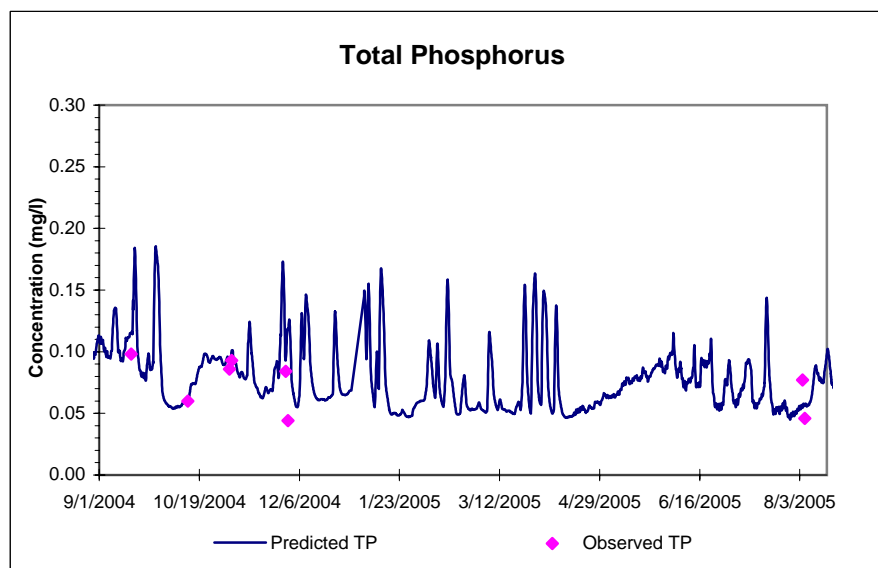
## Rockaway Creek at Lamington Road near Whitehouse (RC1, USGS 01399700)



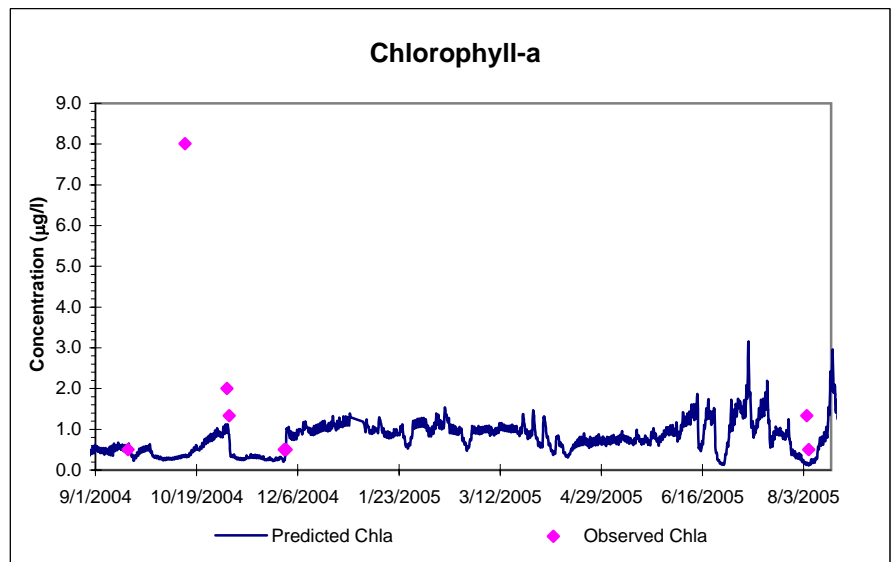
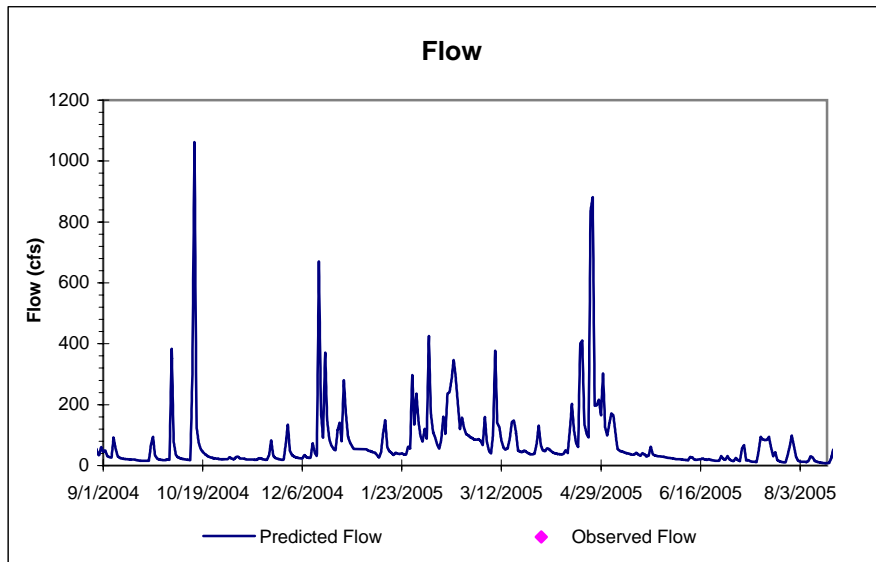
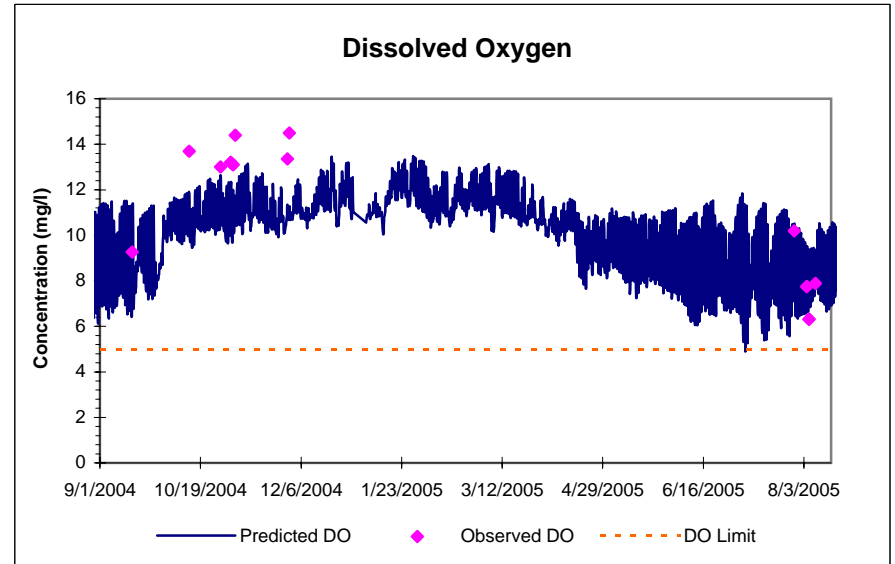
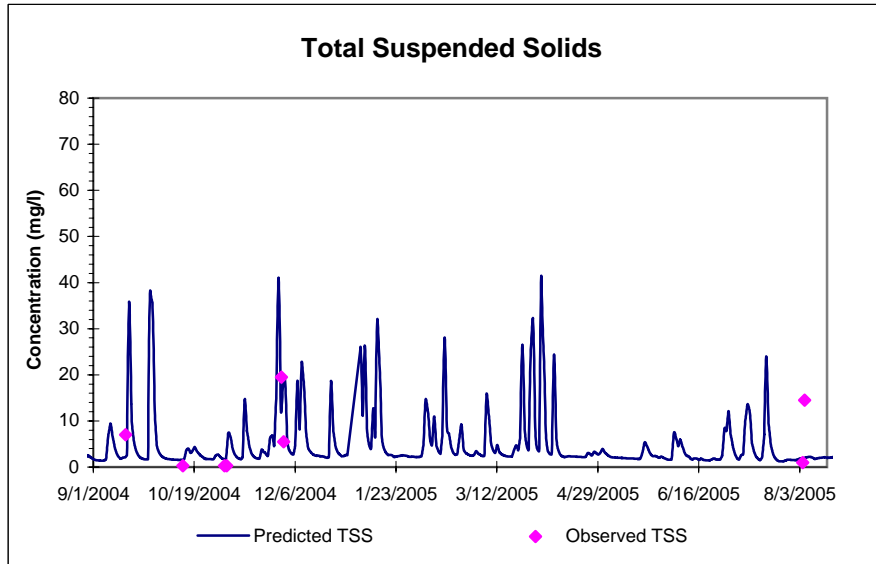
## Rockaway Creek at Lamington Road near Whitehouse (RC1, USGS 01399700)



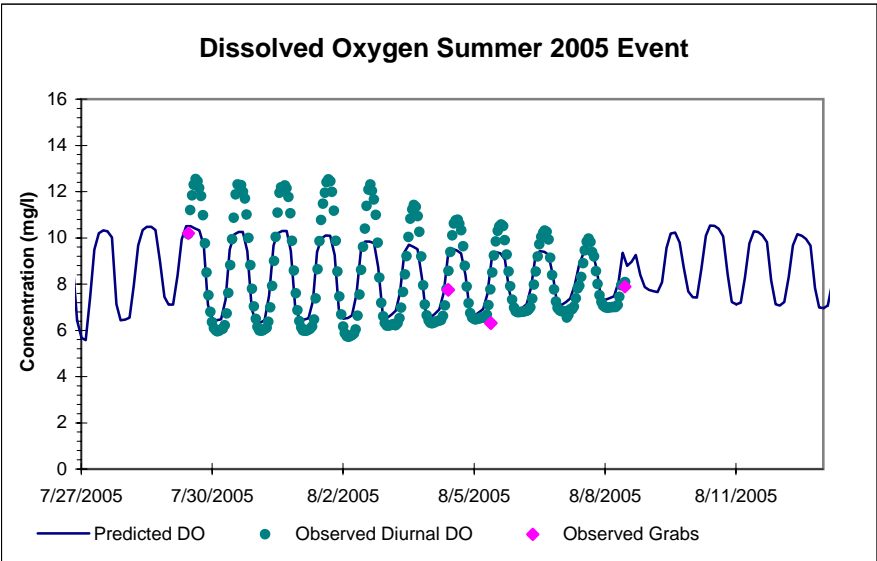
## Lamington River at Cowperthwaite Road in Burnt Mills (LR5)



## Lamington River at Cowperthwaite Road in Burnt Mills (LR5)

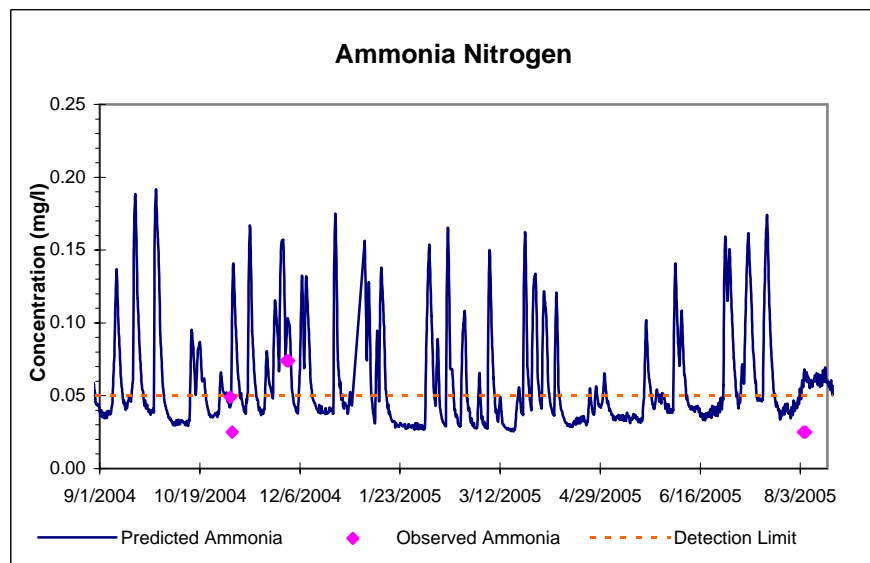
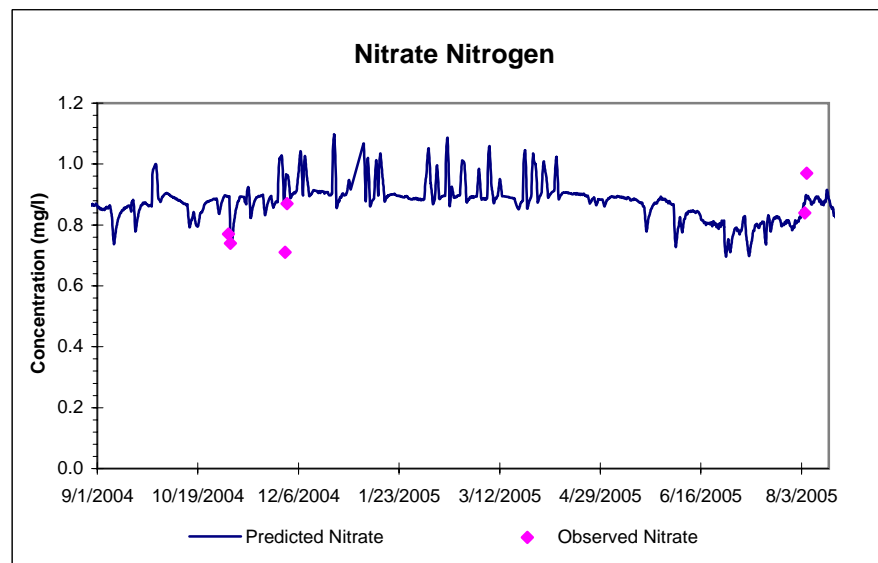
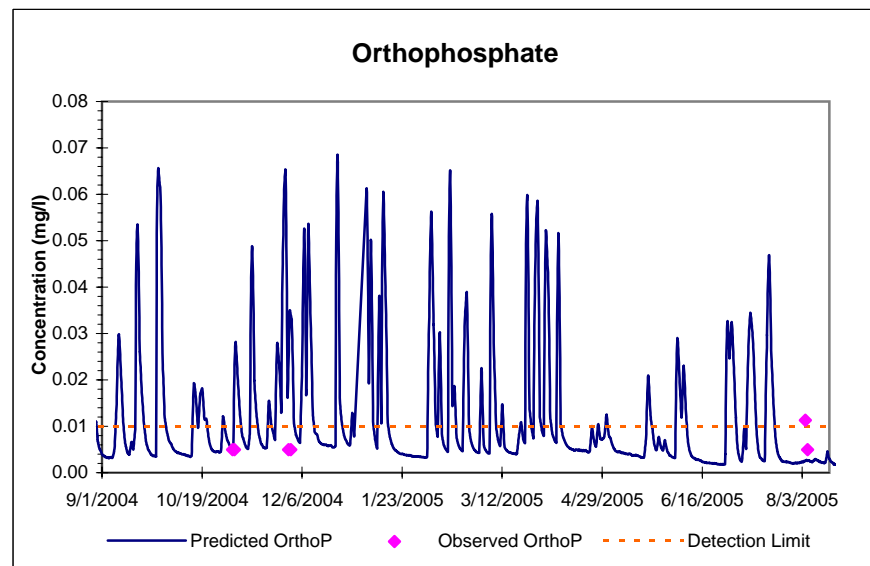
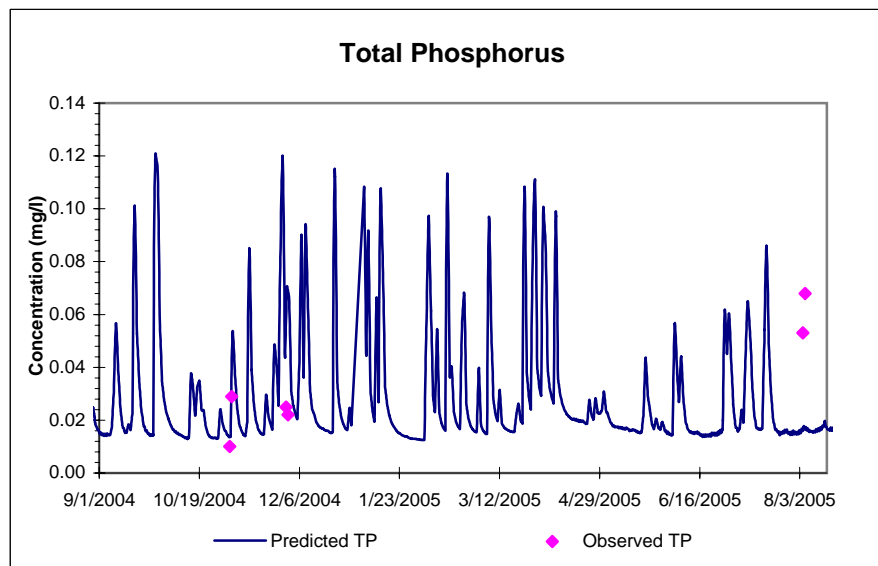


# Lamington River at Cowperthwaite Road in Burnt Mills (LR5)

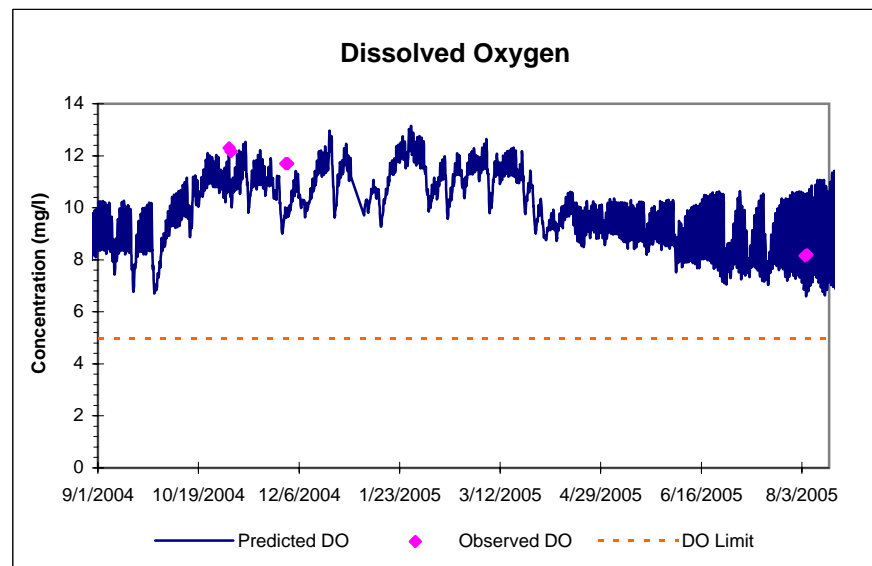
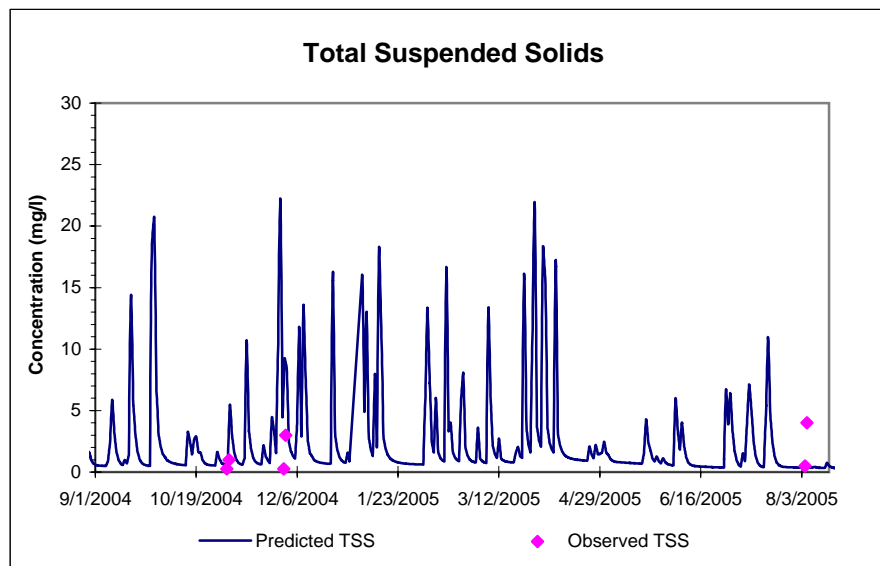




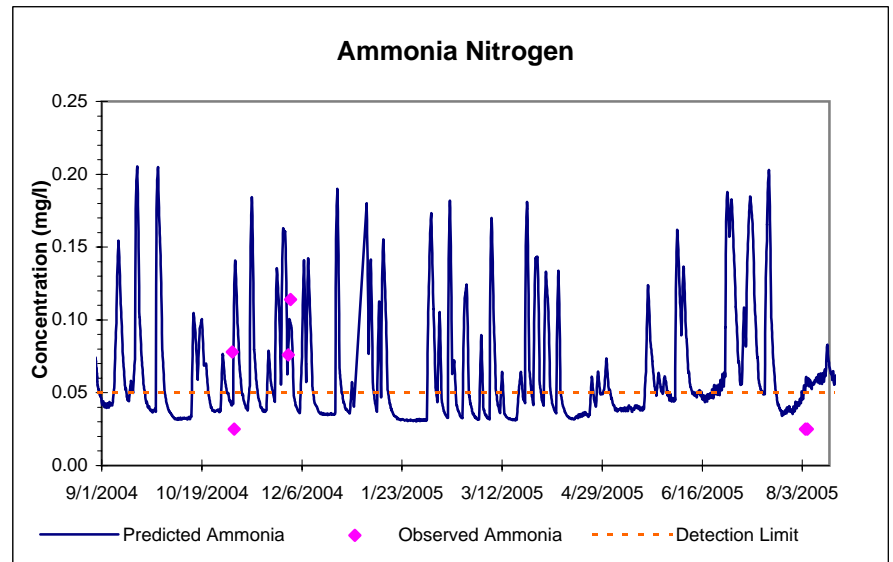
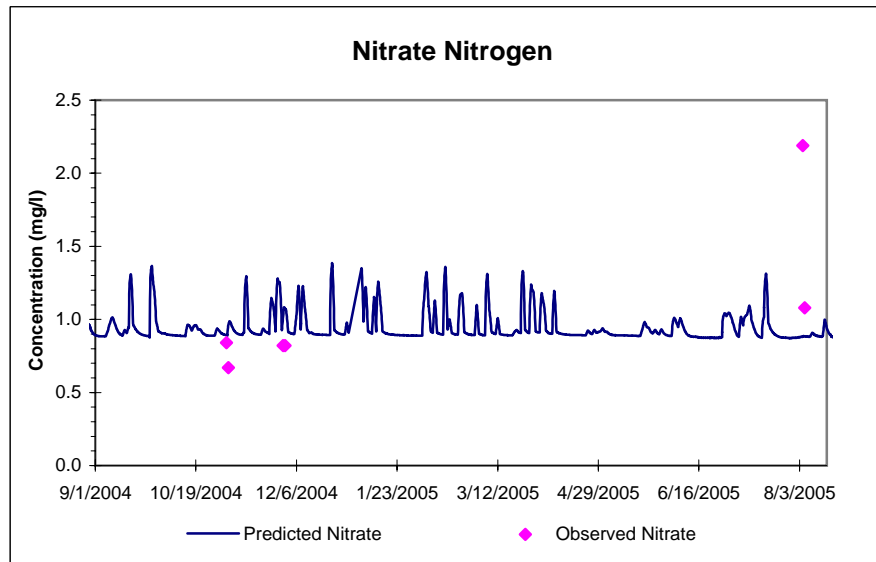
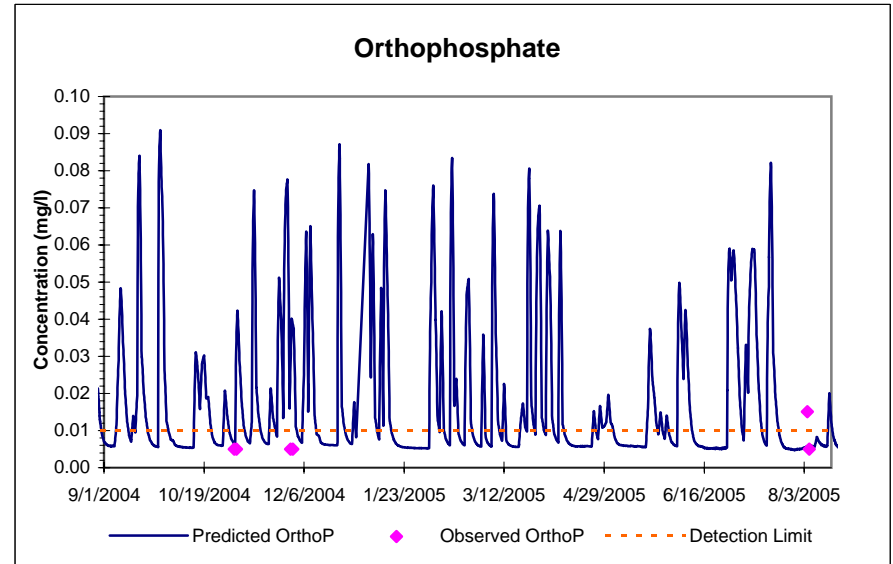
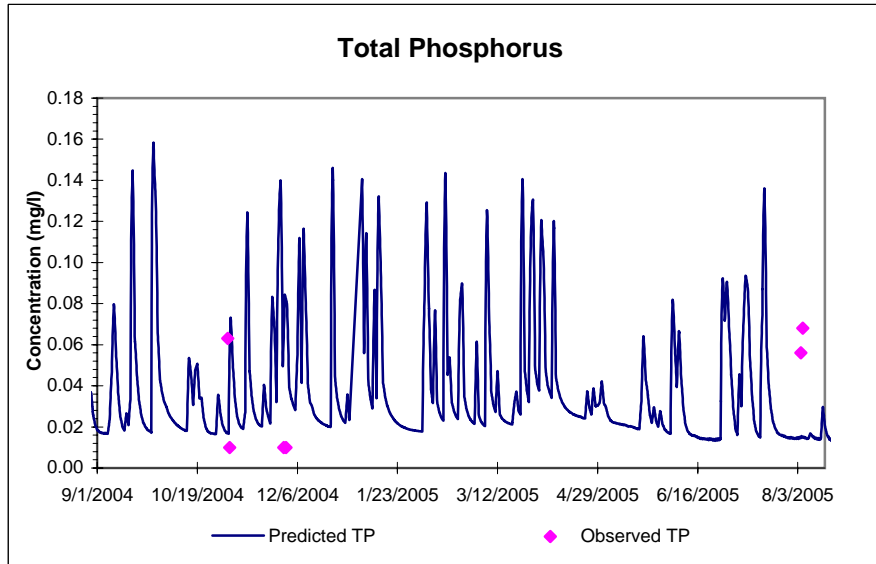
## India Brook at Mountainside Road in Mendham (IB1)



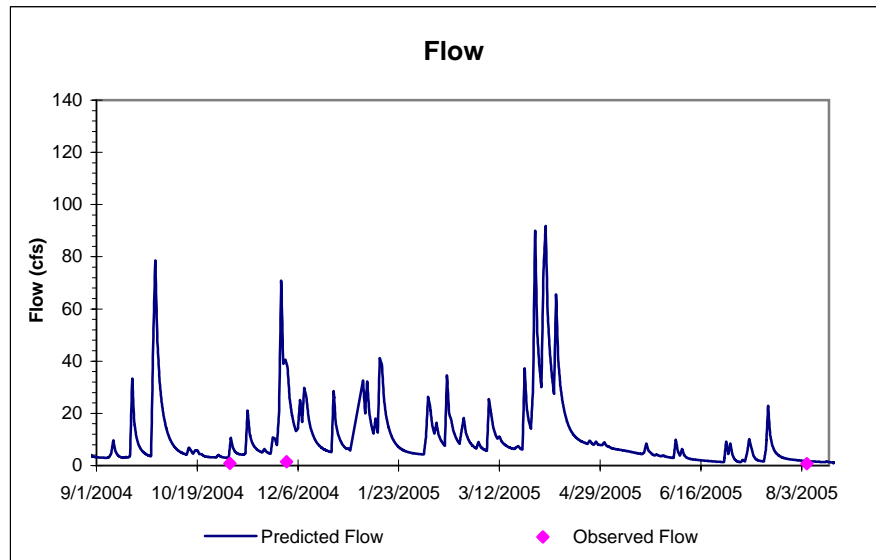
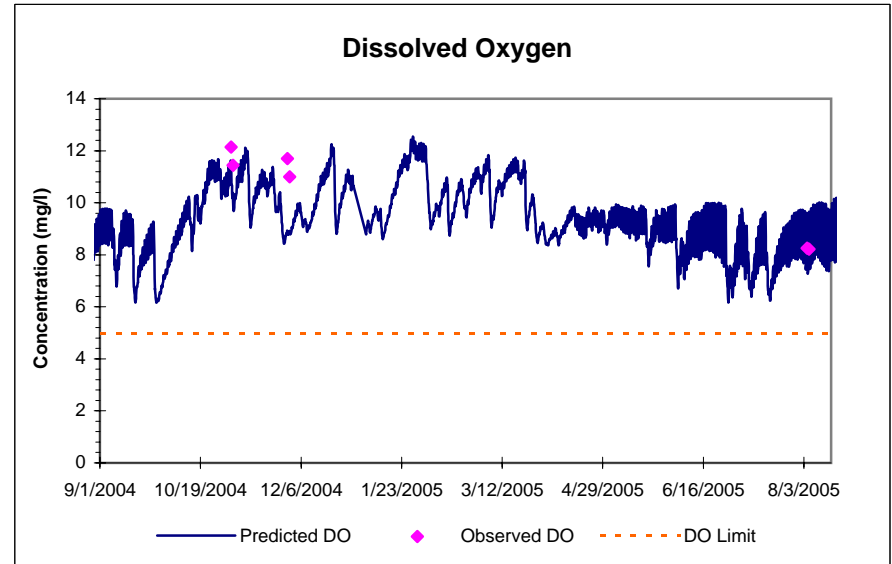
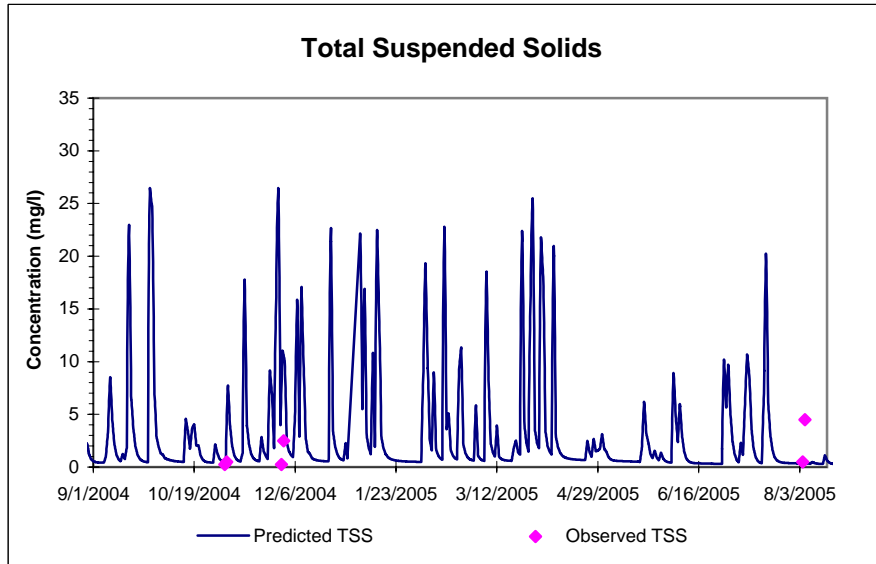
## India Brook at Mountainside Road in Mendham (IB1)



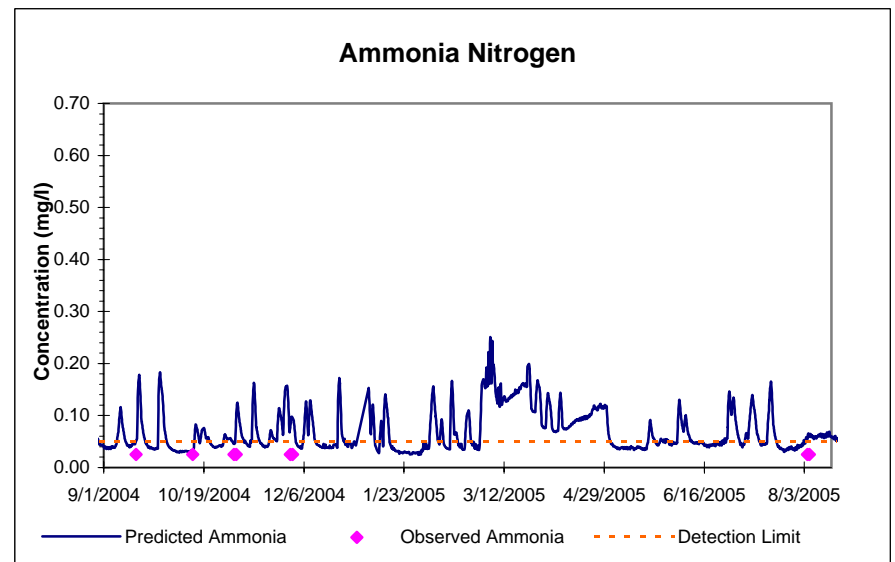
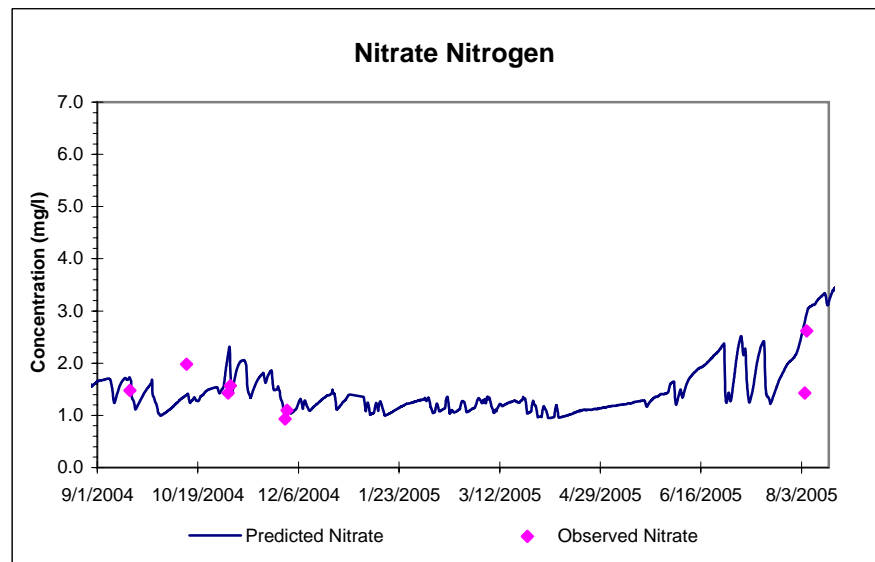
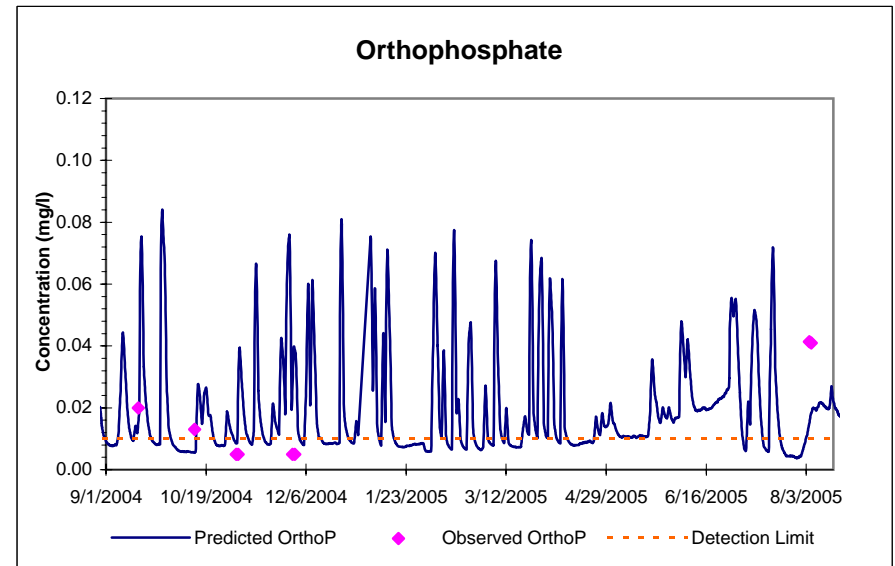
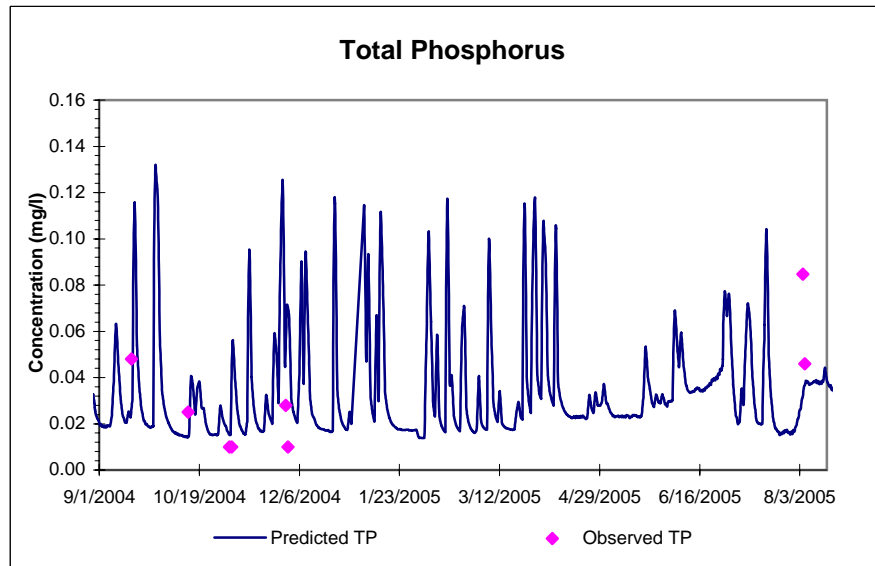
## Burnett Brook at Washington Tpk. (Route 24) in Chester (BuB1)



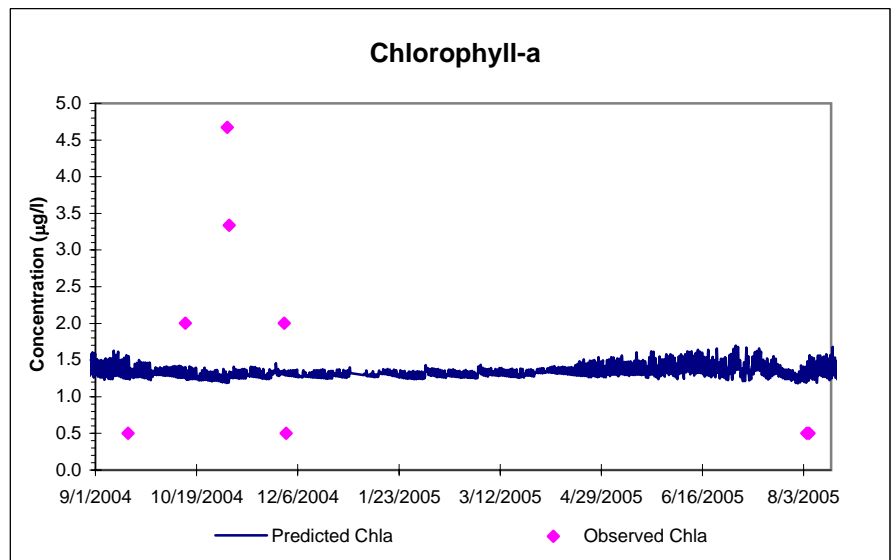
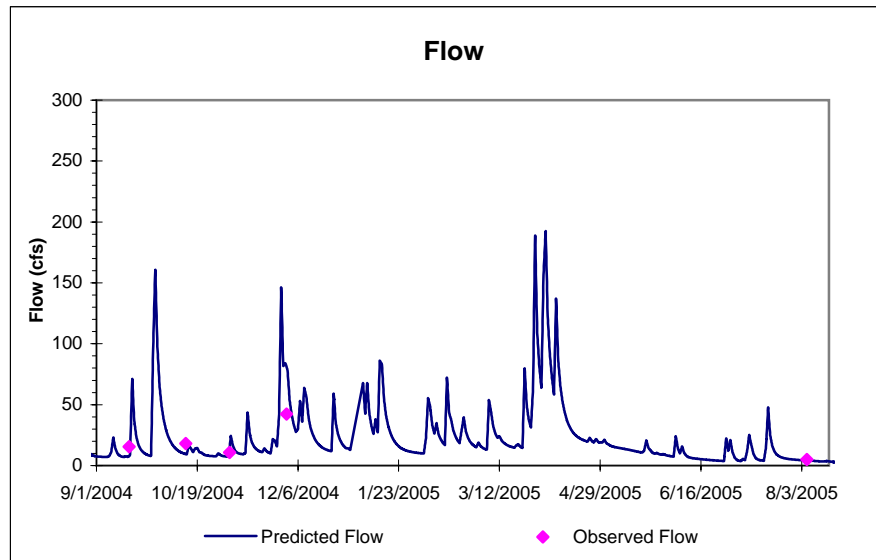
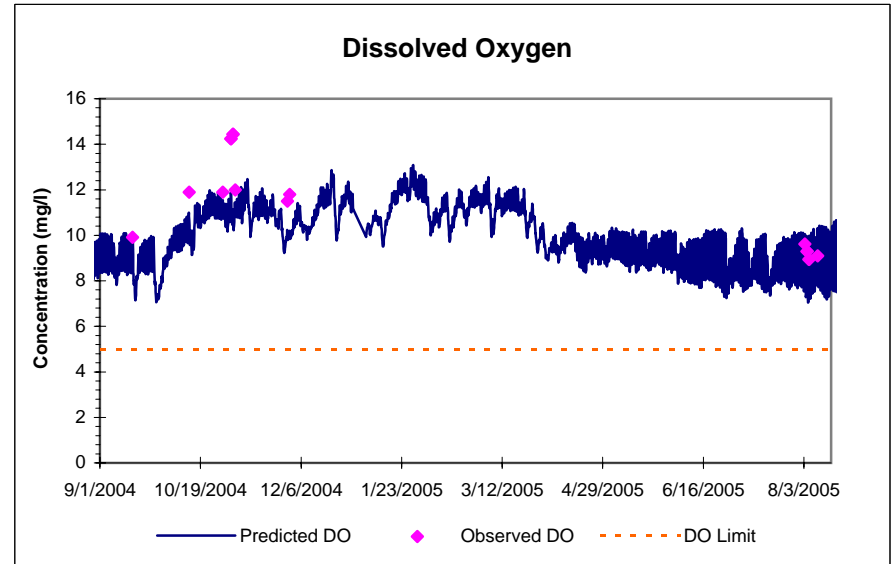
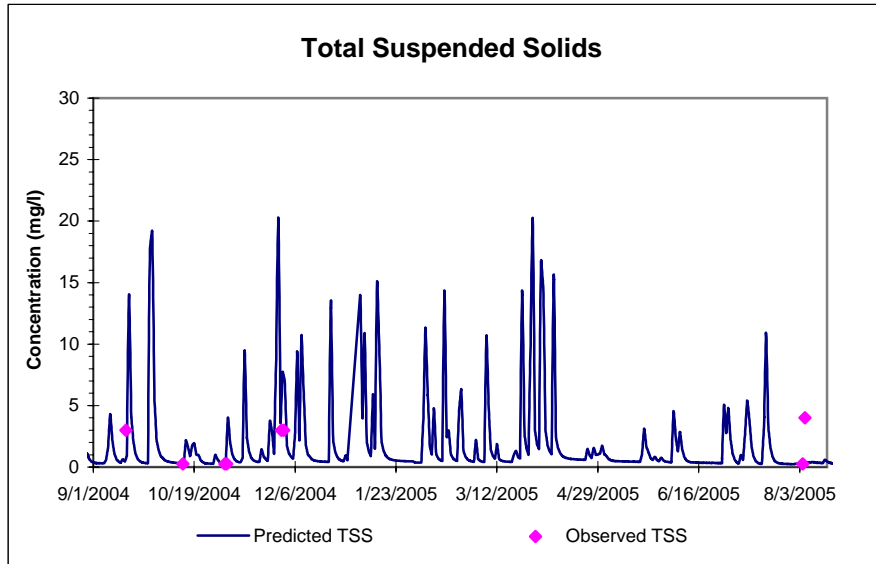
## Burnett Brook at Washington Tpk. (Route 24) in Chester (BuB1)



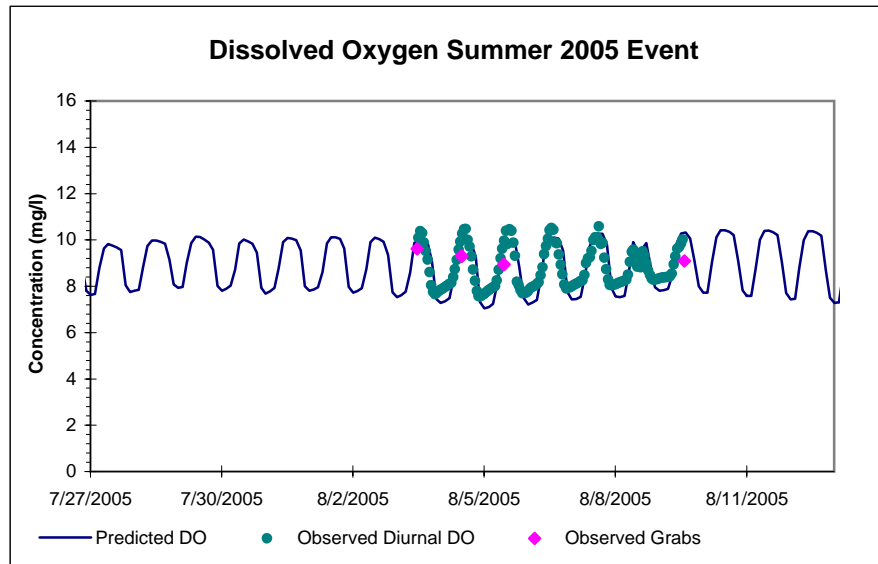
## North Branch Raritan River at Roxiticus Rd. in Mendham Twp. (NBRR1)



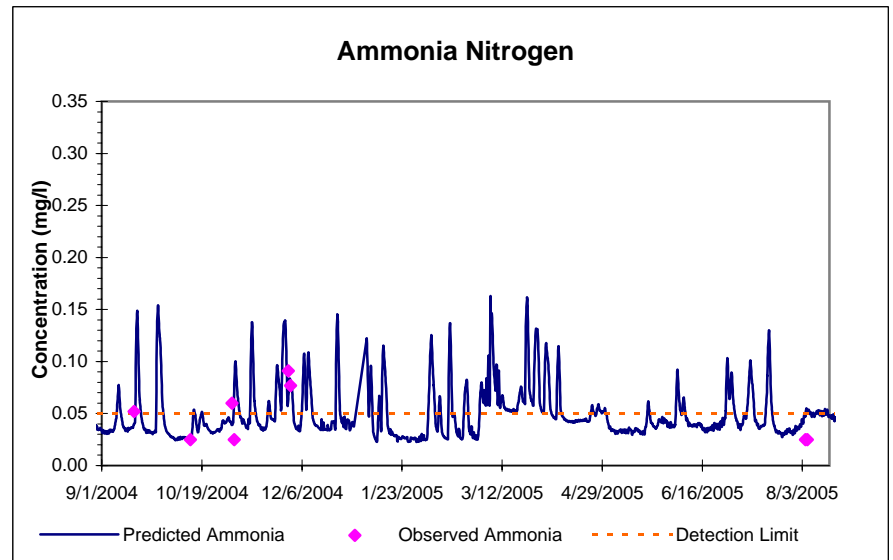
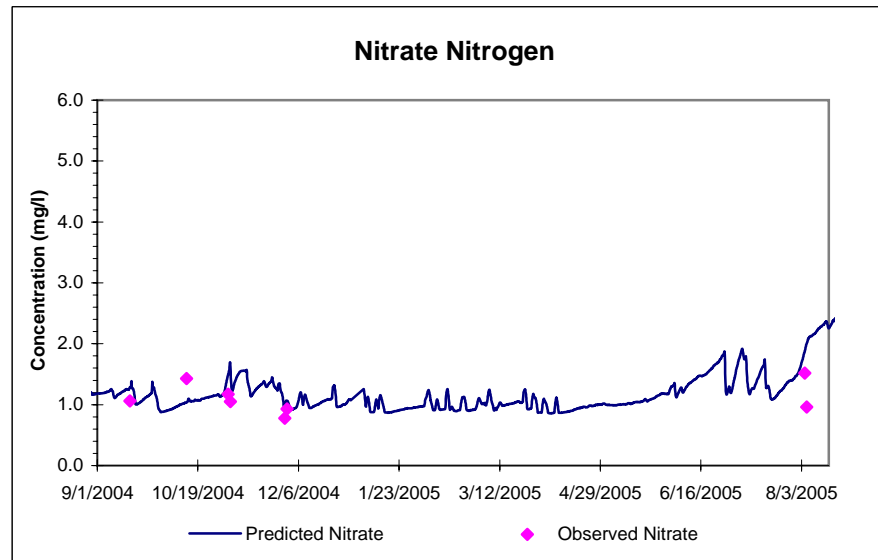
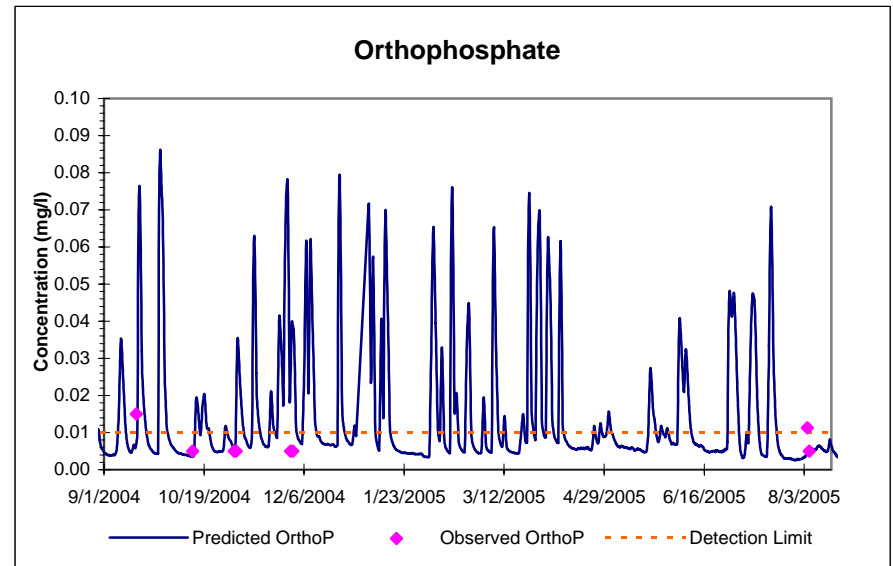
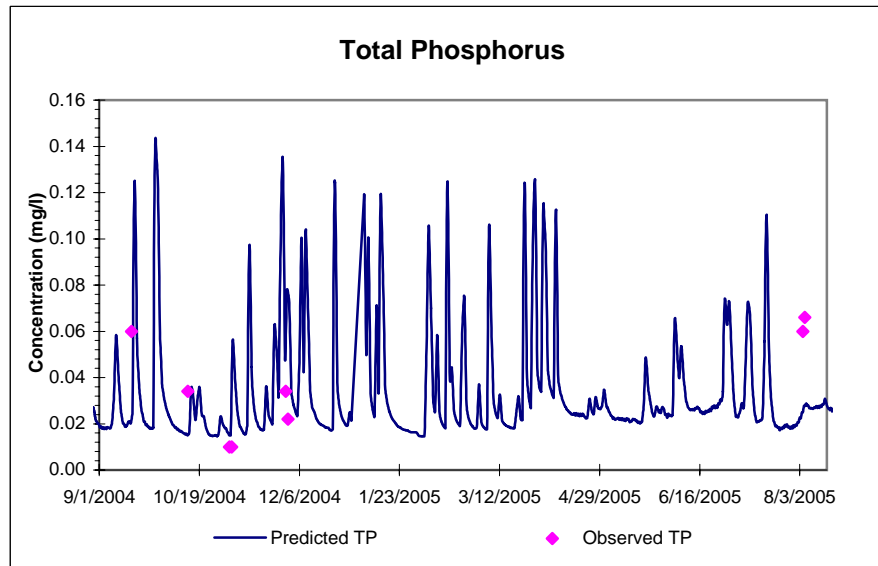
## North Branch Raritan River at Roxiticus Rd. in Mendham Twp. (NBRR1)



## North Branch Raritan River at Roxiticus Rd. in Mendham Twp. (NBRR1)

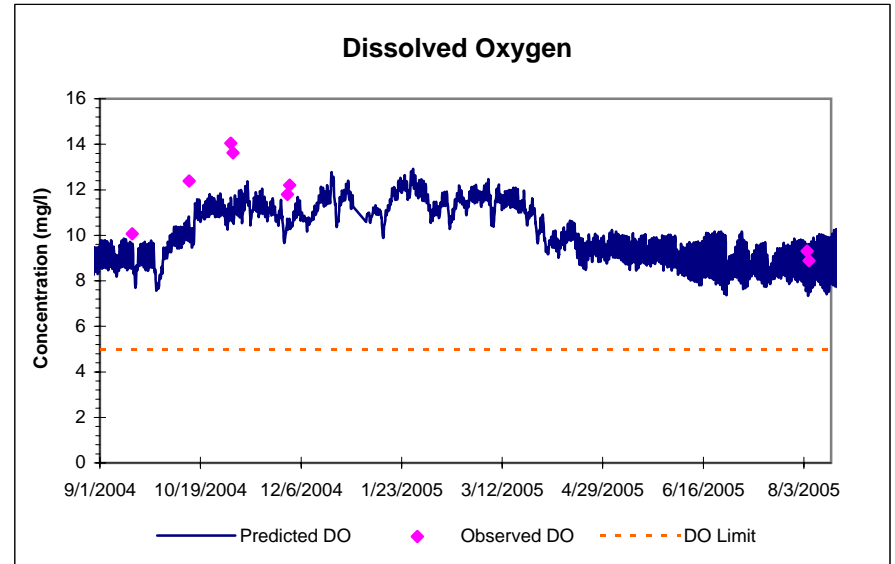
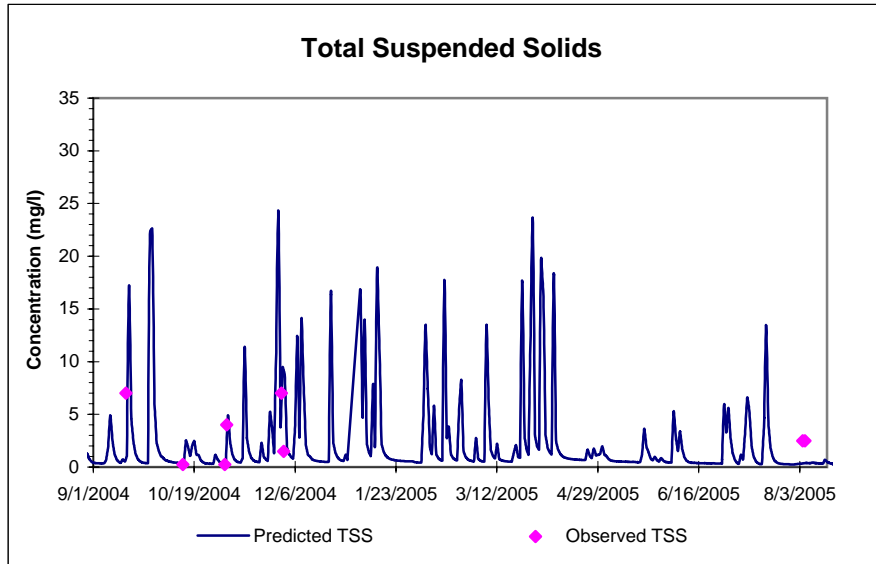


## North Branch Raritan River at Willow Ave. in Peapack-Gladstone (NBRR2)

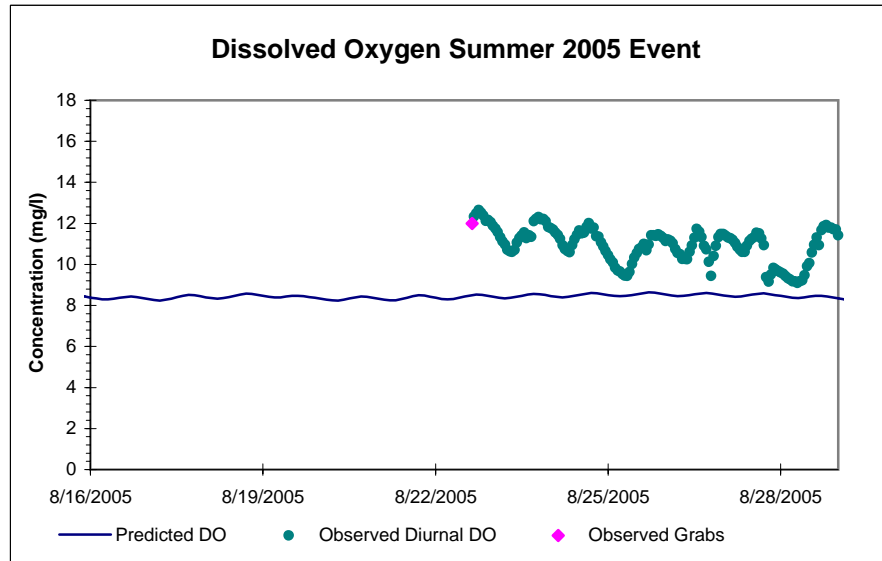




## North Branch Raritan River at Willow Ave. in Peapack-Gladstone (NBRR2)

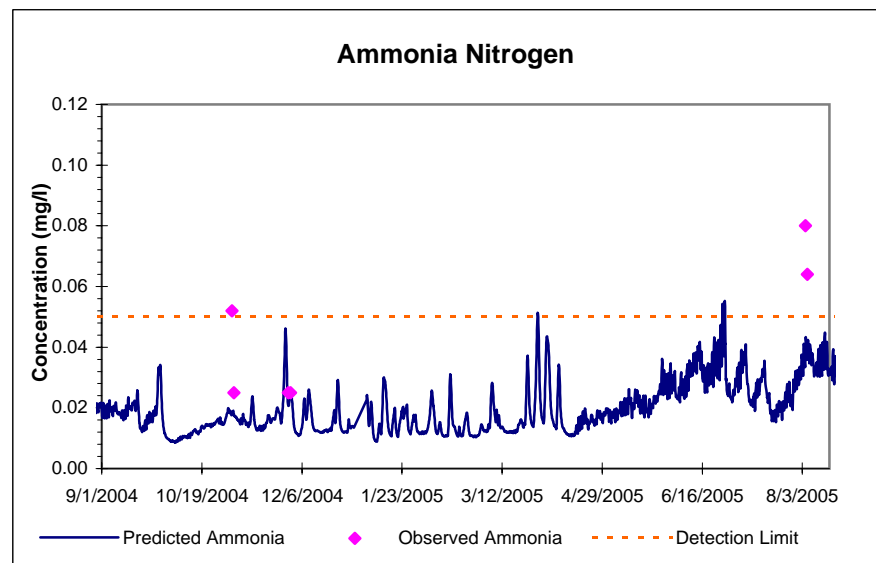
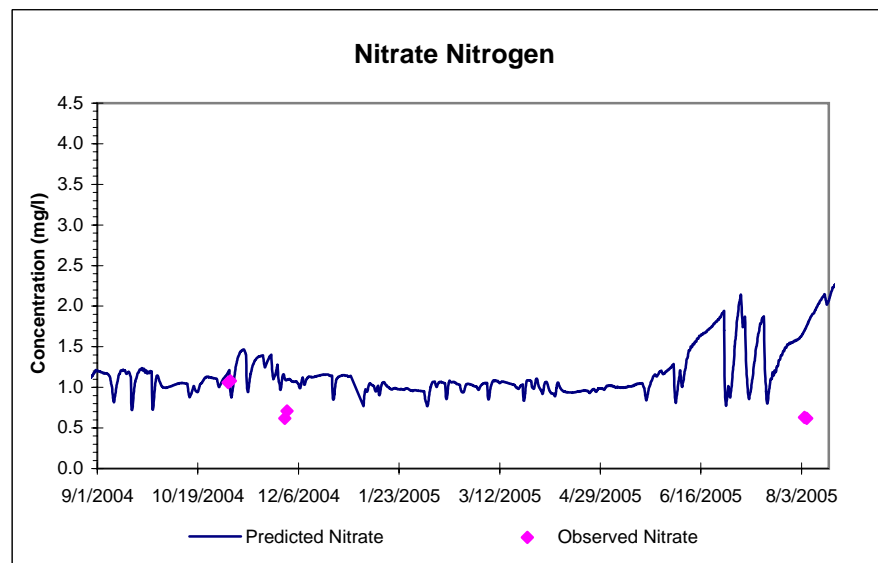
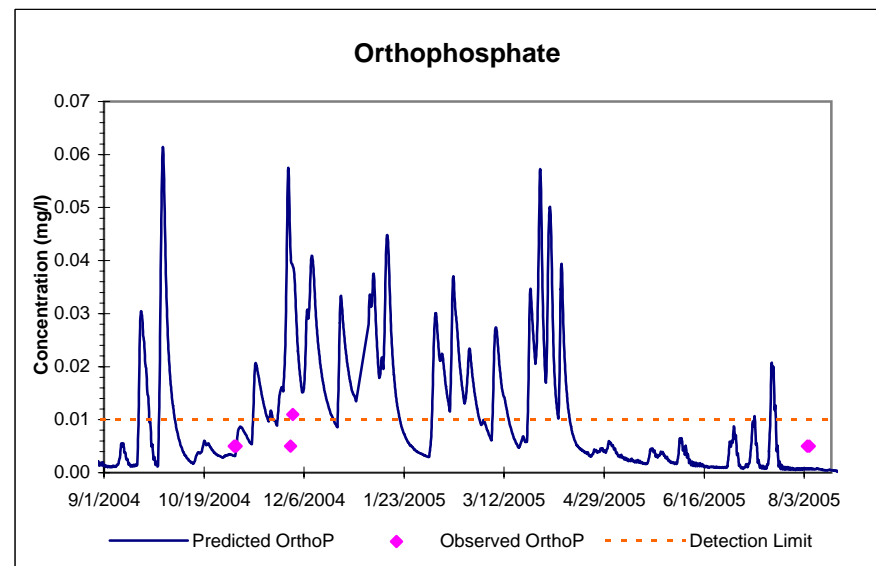
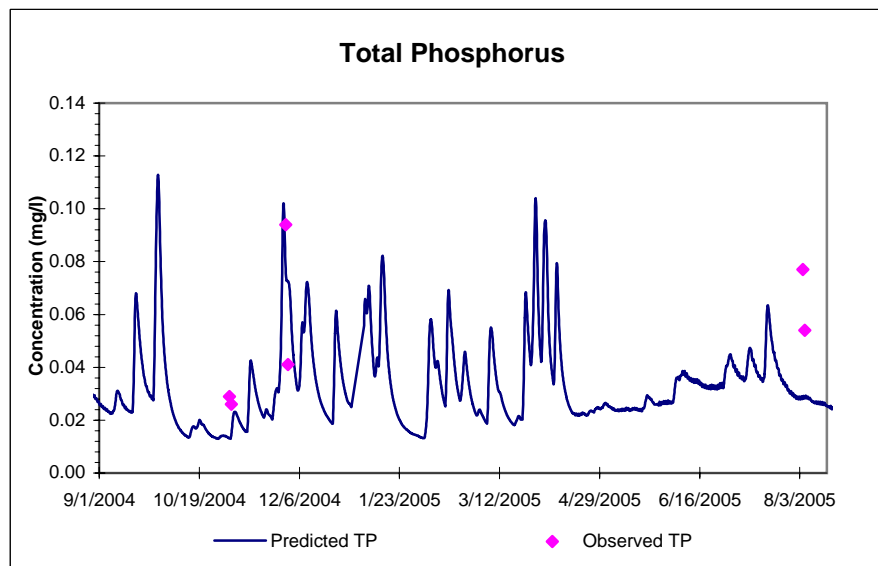


## North Branch Raritan River at Ravine Lake (NBRR3)

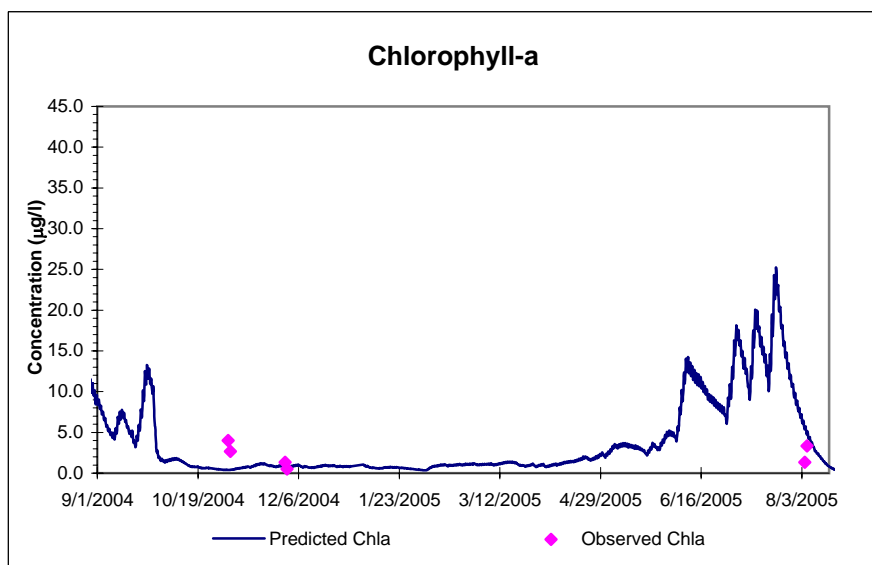
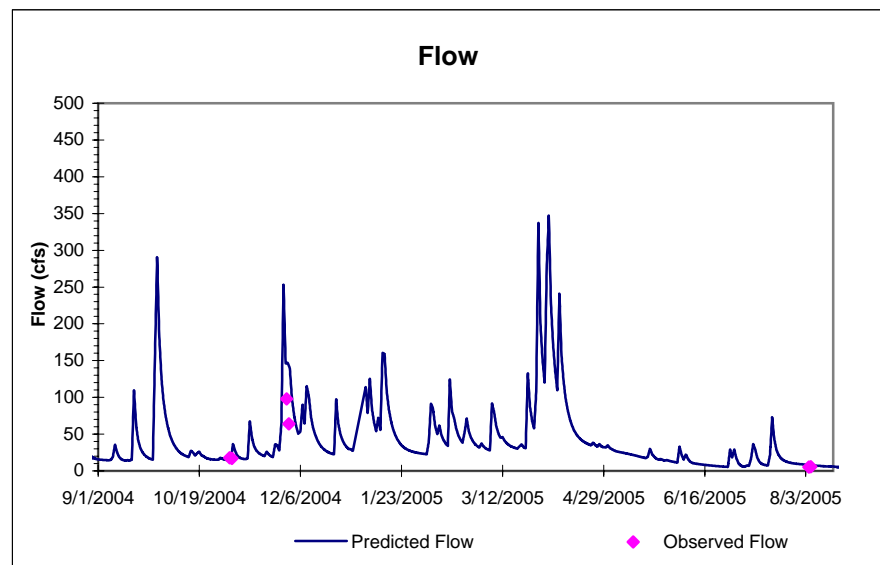
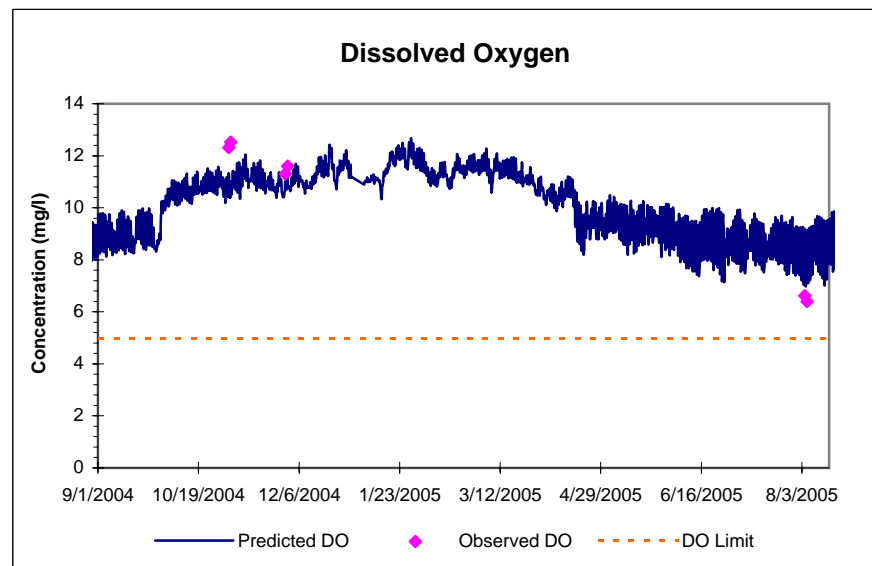
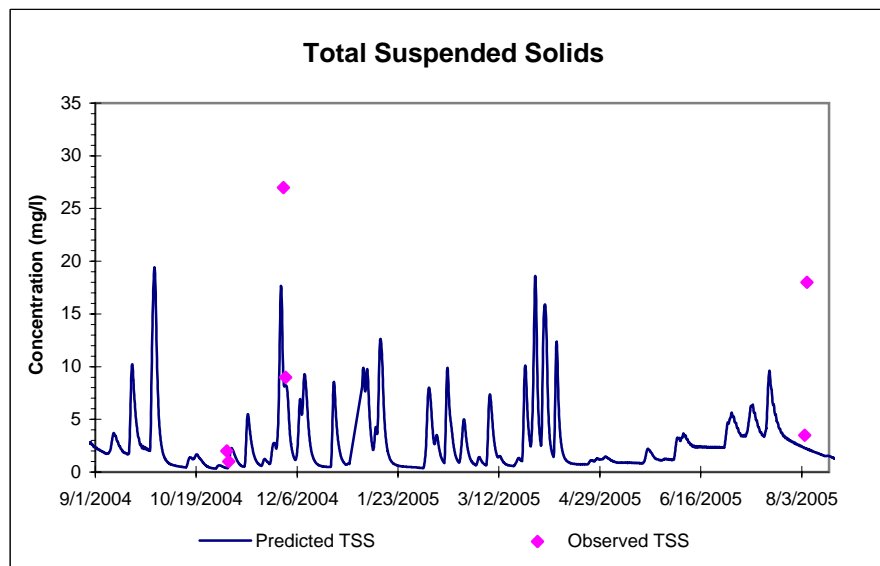


NOTE: DO was measured at a fixed depth in this lake. During summer periods, the lake exhibits stratification, whereas the model prediction assumes complete vertical mixing.

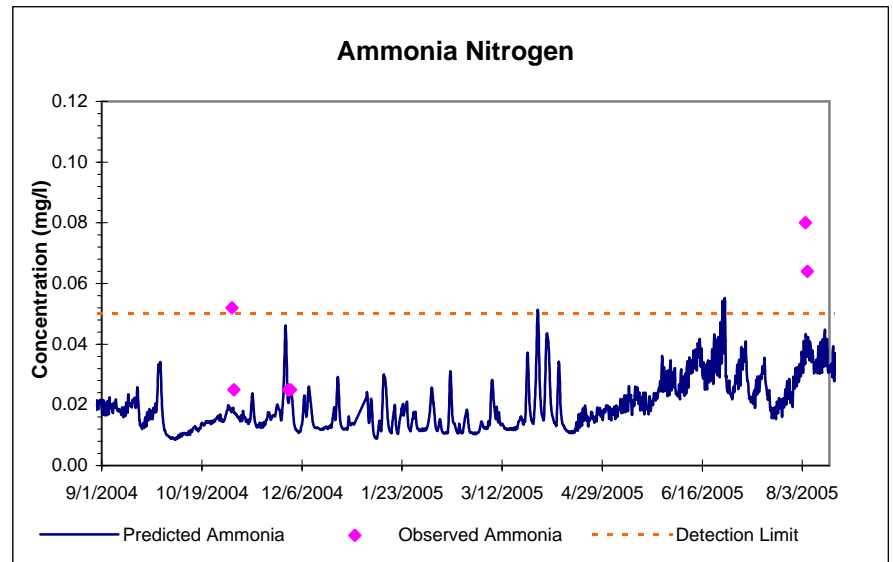
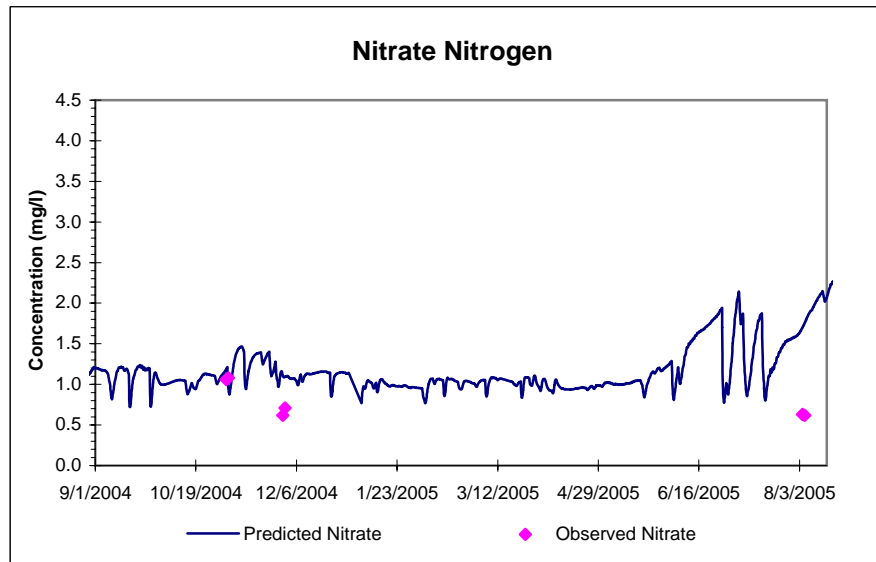
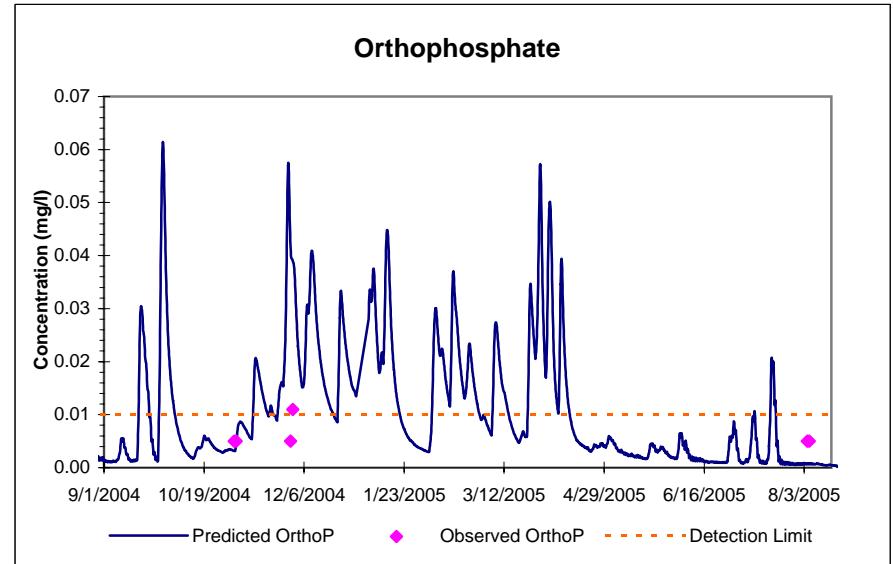
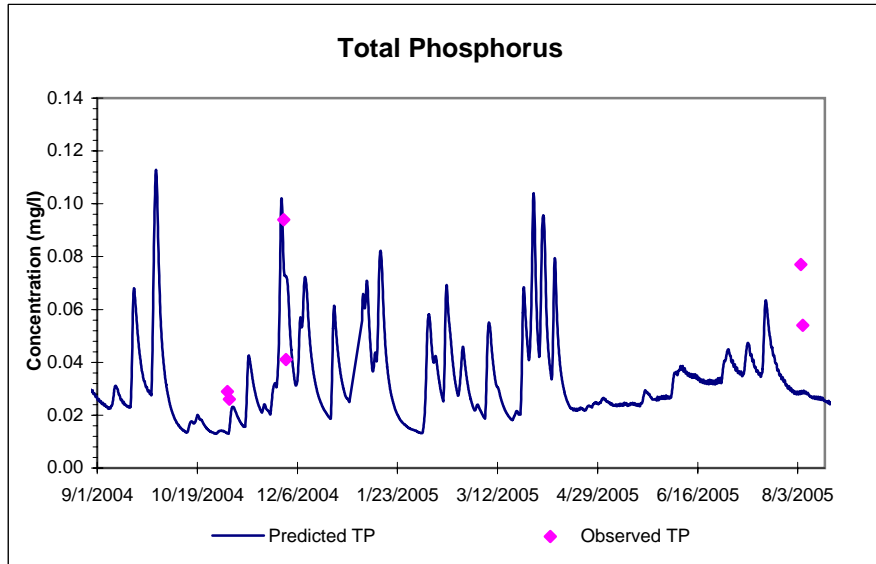
## North Branch Raritan River Downstream Ravine Lake (NBRR4)



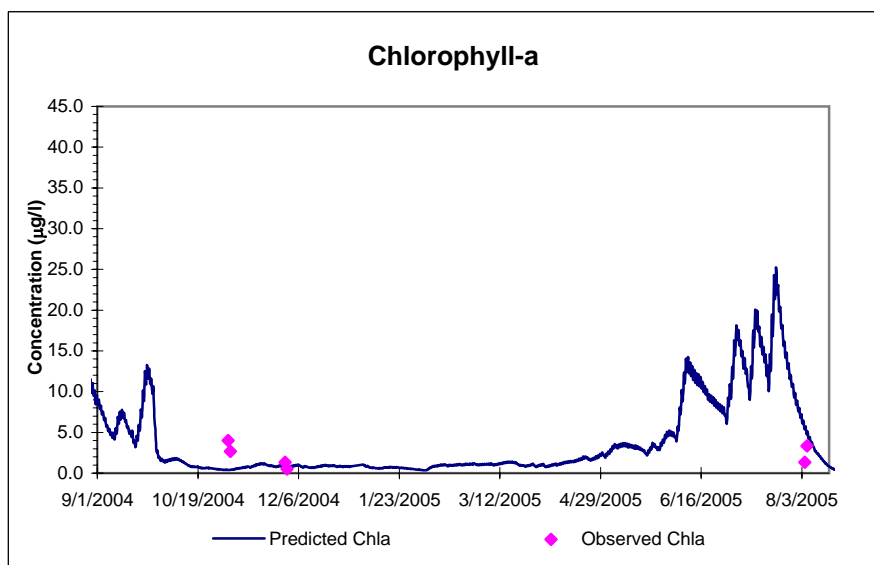
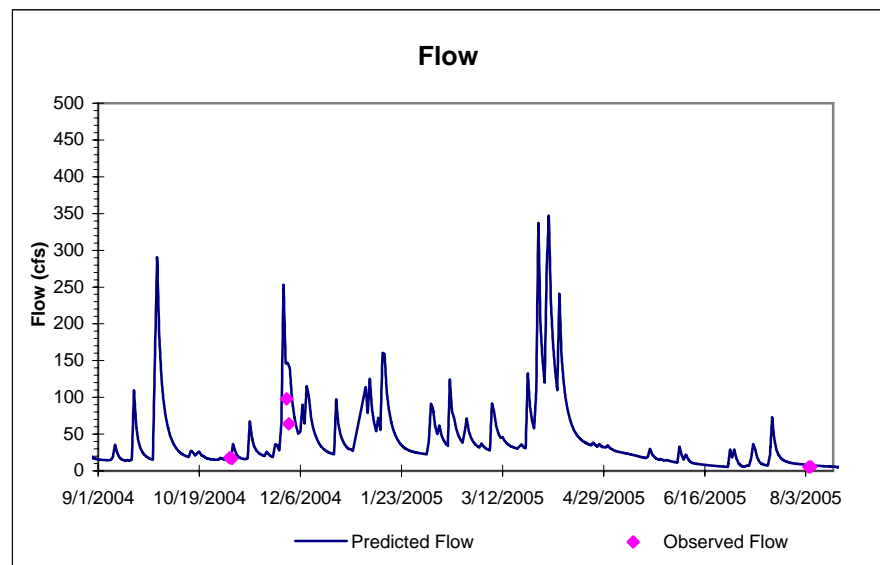
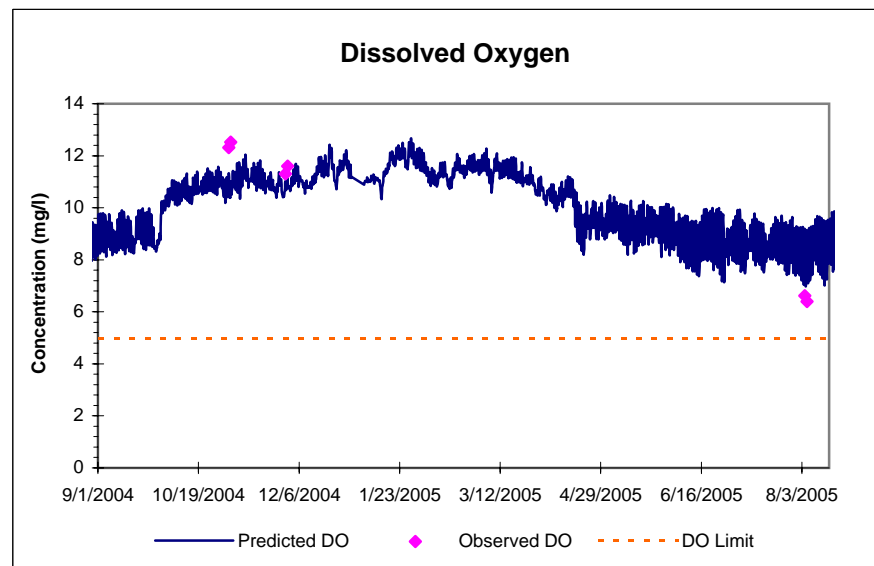
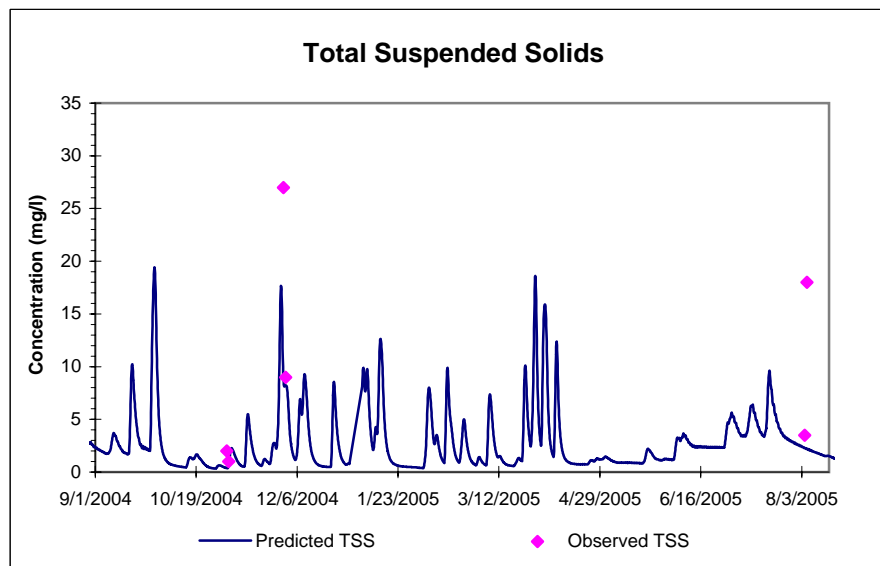
## North Branch Raritan River Downstream Ravine Lake (NBRR4)



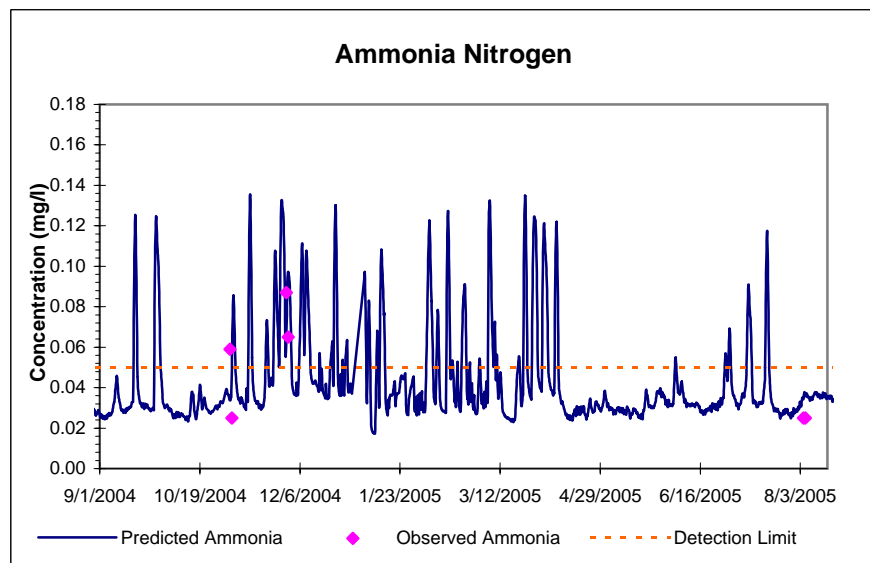
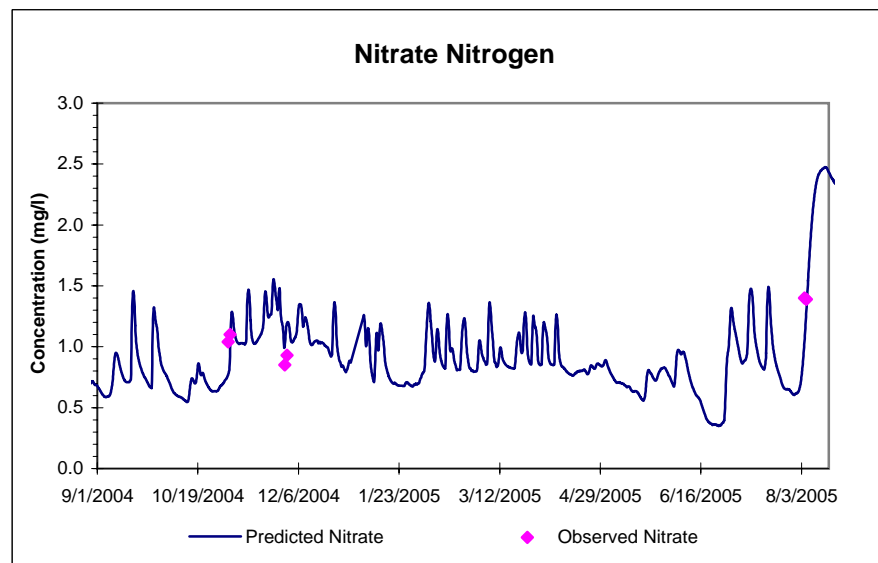
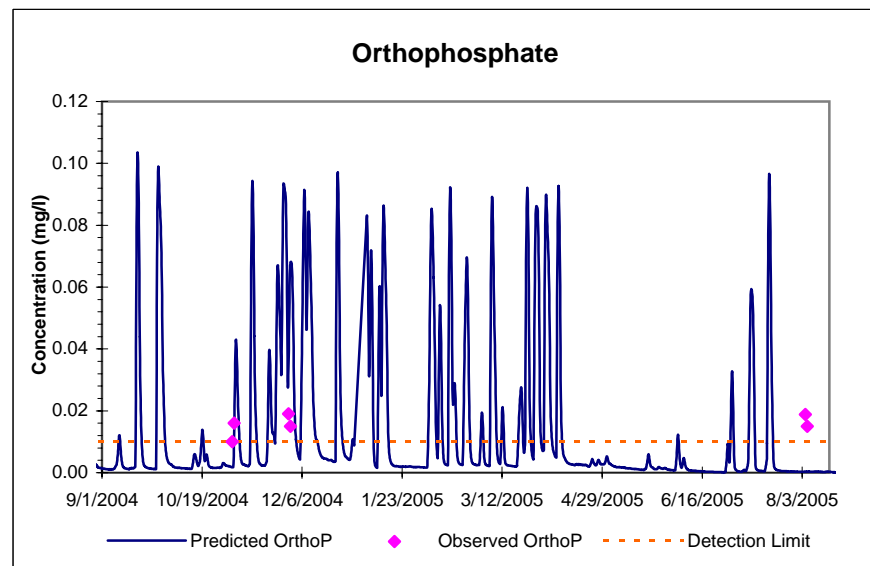
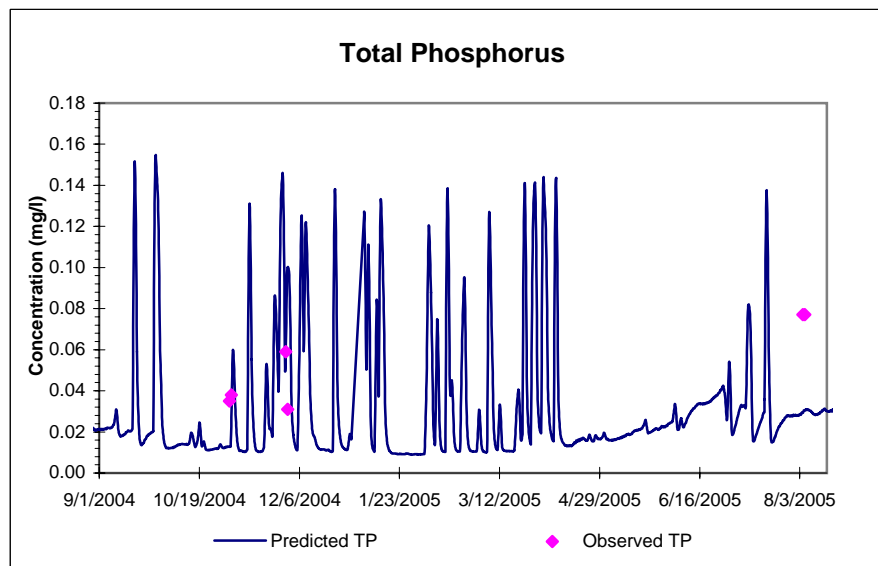
## North Branch Raritan River Downstream Ravine Lake (NBRR4)



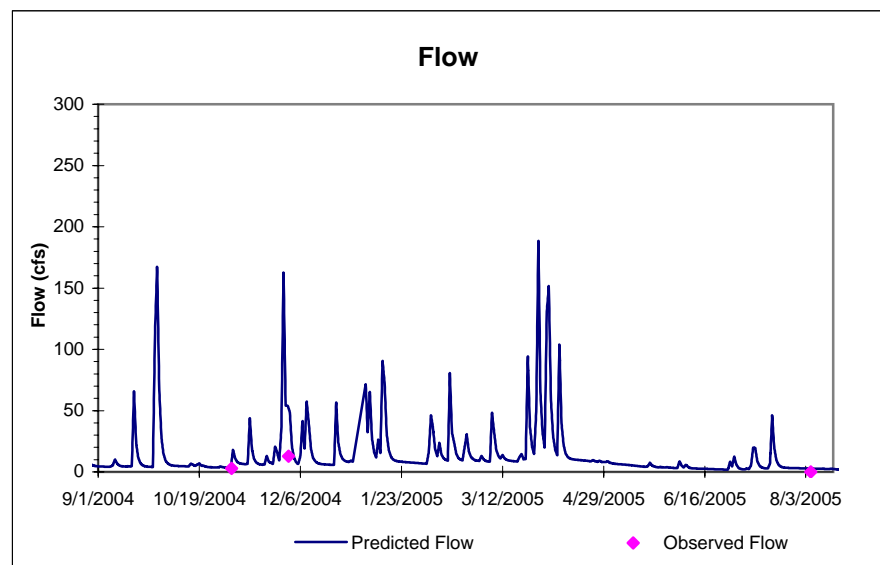
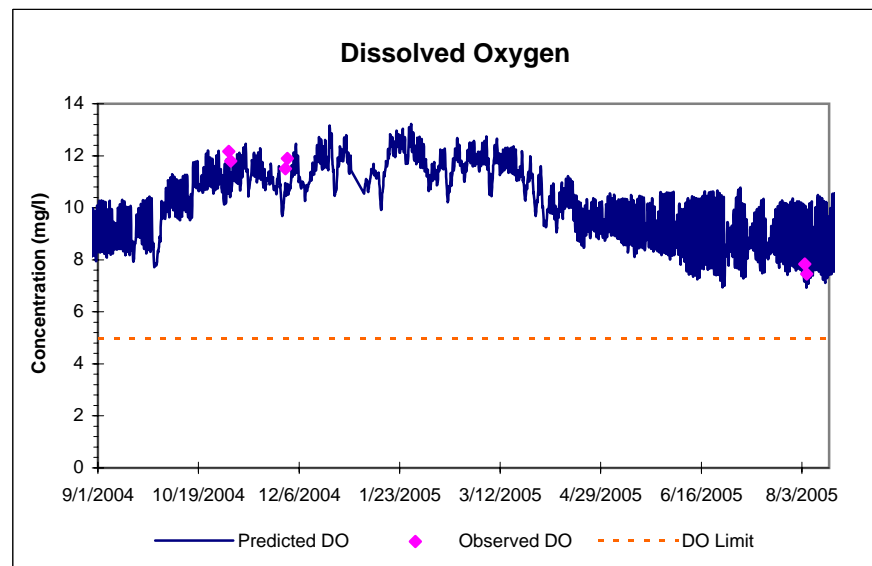
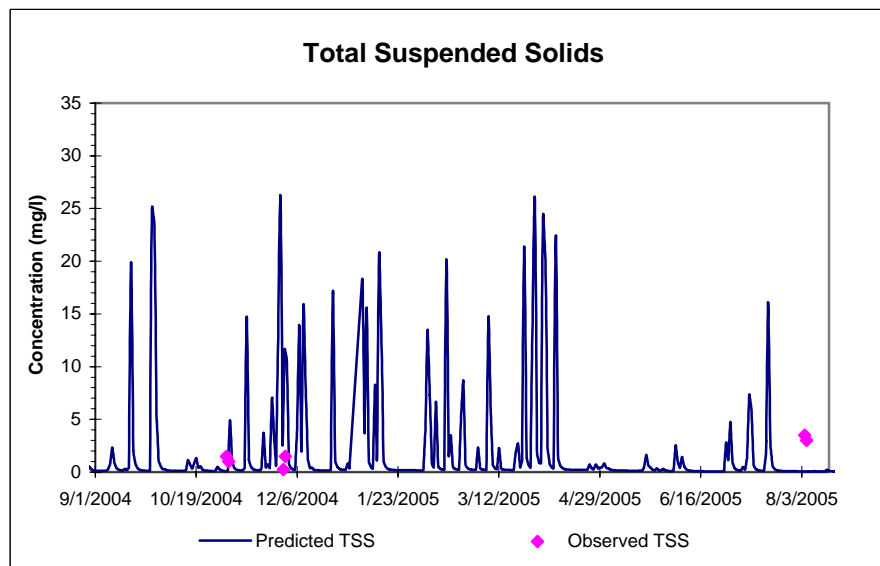
## North Branch Raritan River Downstream Ravine Lake (NBRR4)



## Mine Brook at Liberty Corner Rd. near Far Hills Station (MiB1)

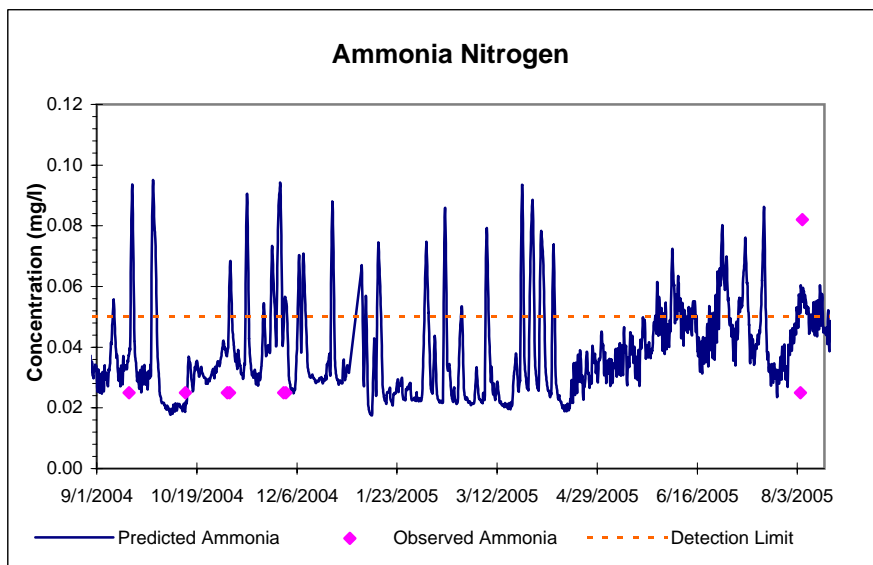
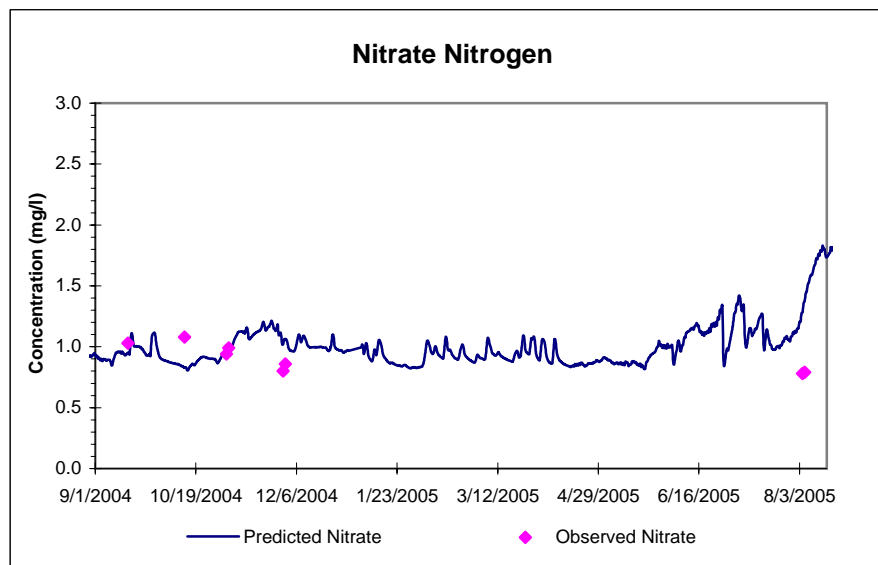
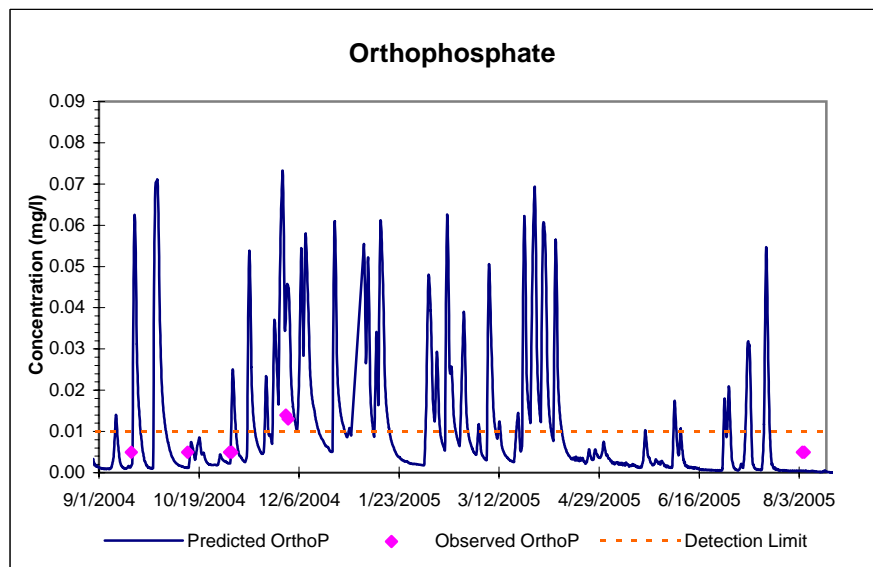
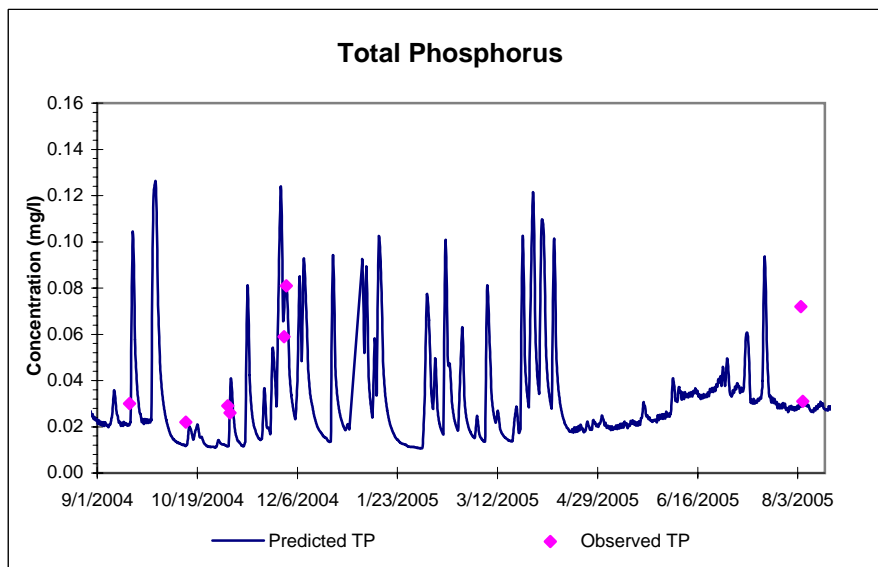


## Mine Brook at Liberty Corner Rd. near Far Hills Station (MiB1)

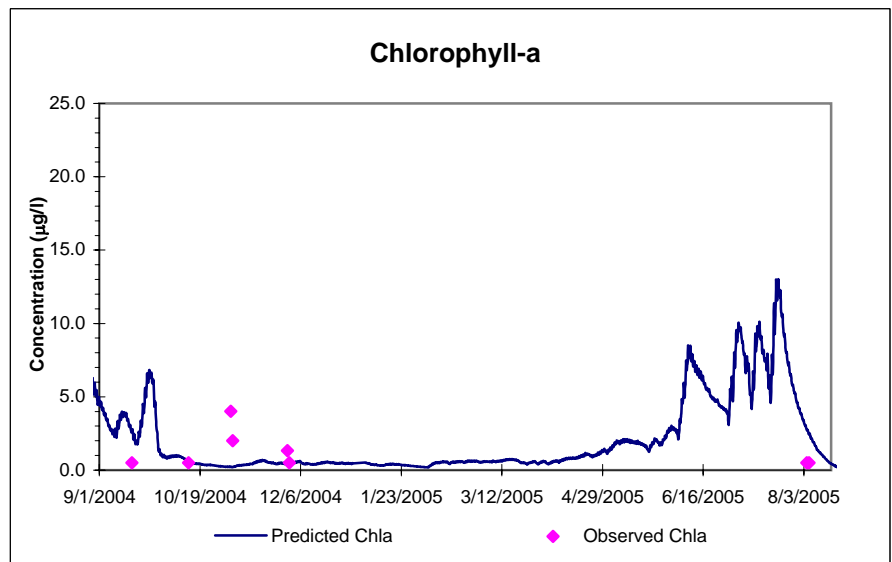
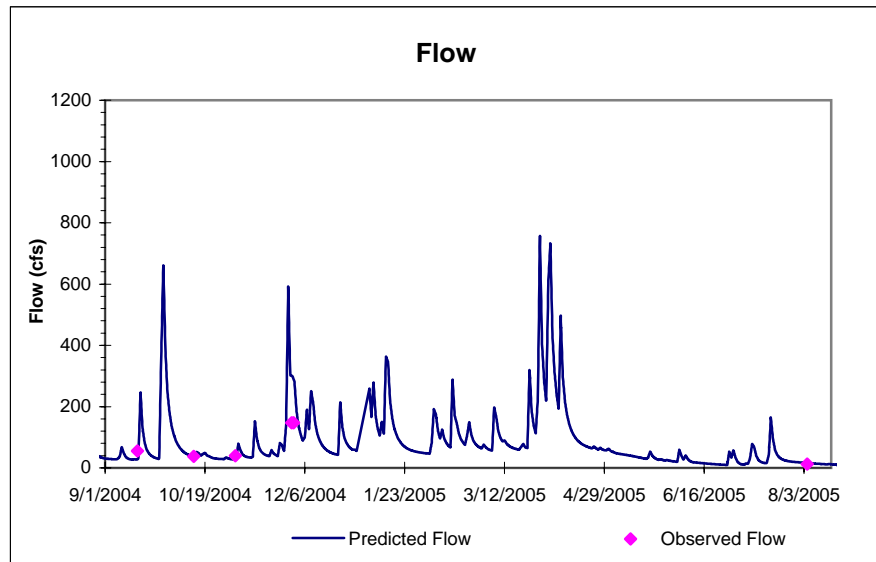
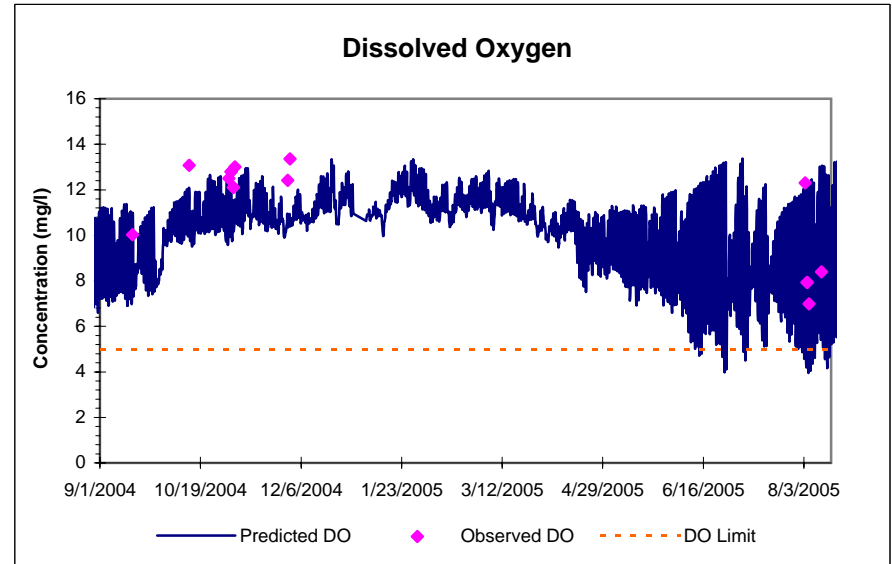
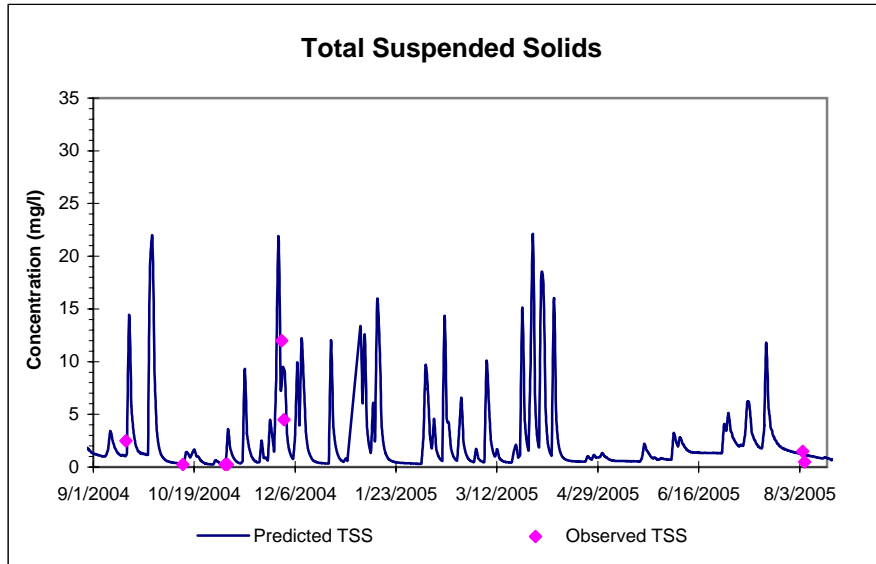




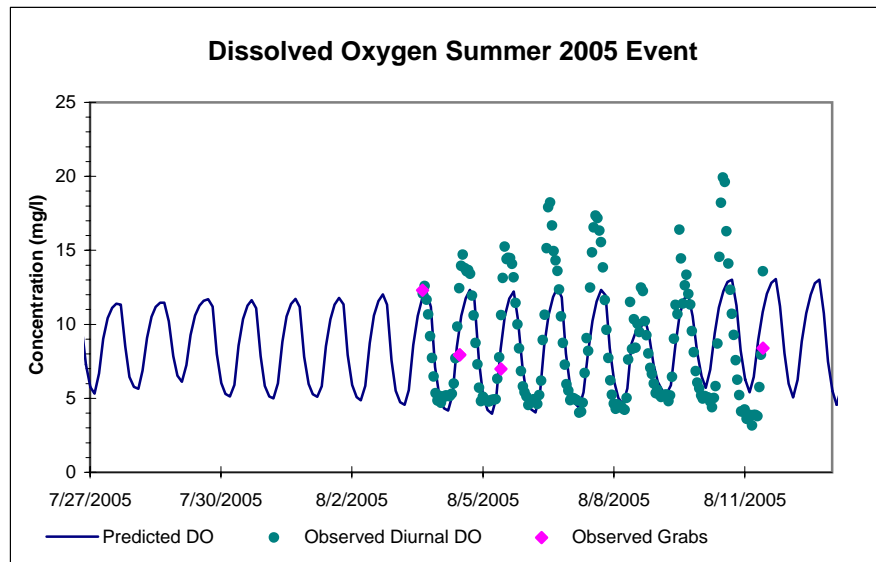
## North Branch Raritan River at Route 202/206 in Bedminster Twp. (NBRR5)



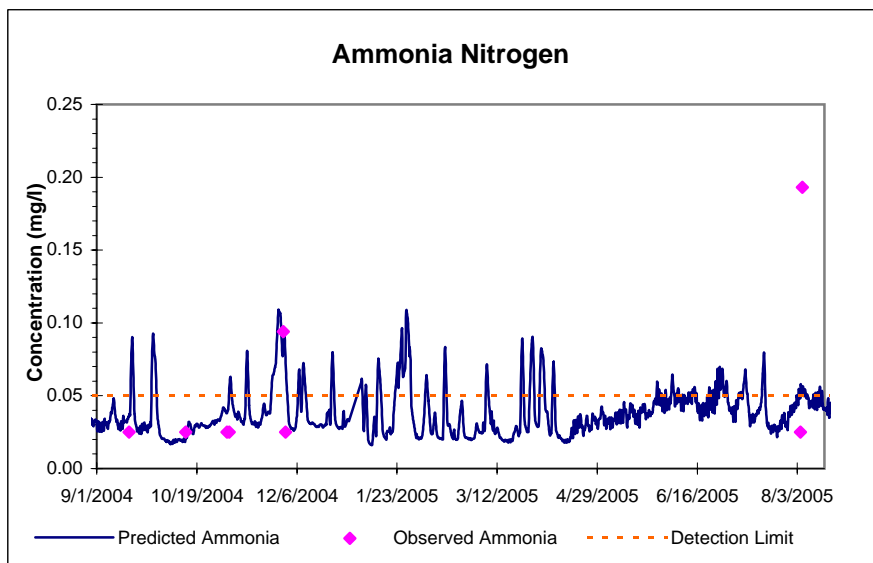
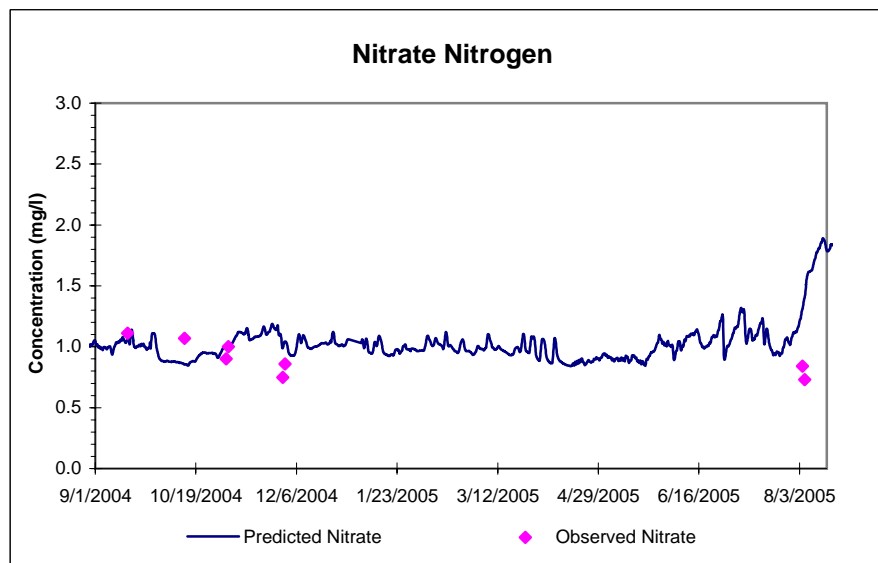
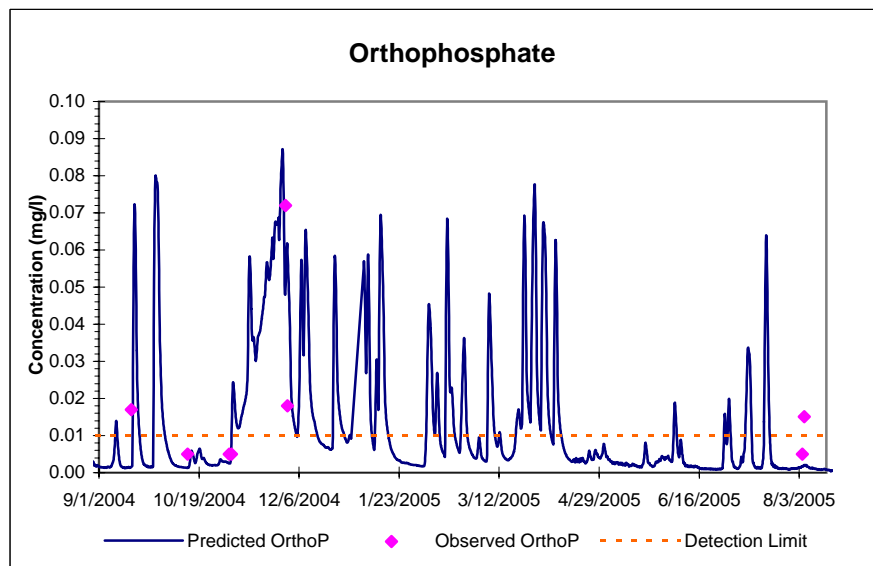
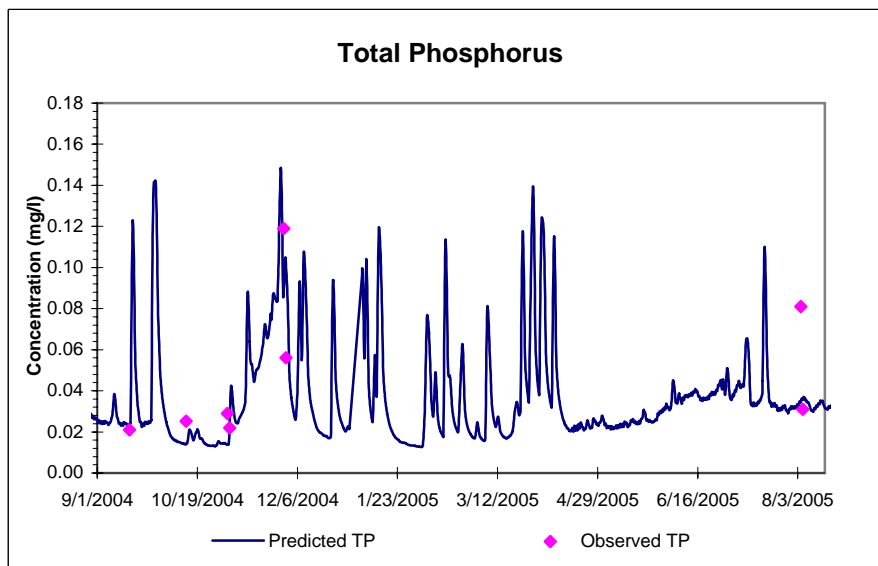
## North Branch Raritan River at Route 202/206 in Bedminster Twp. (NBRR5)



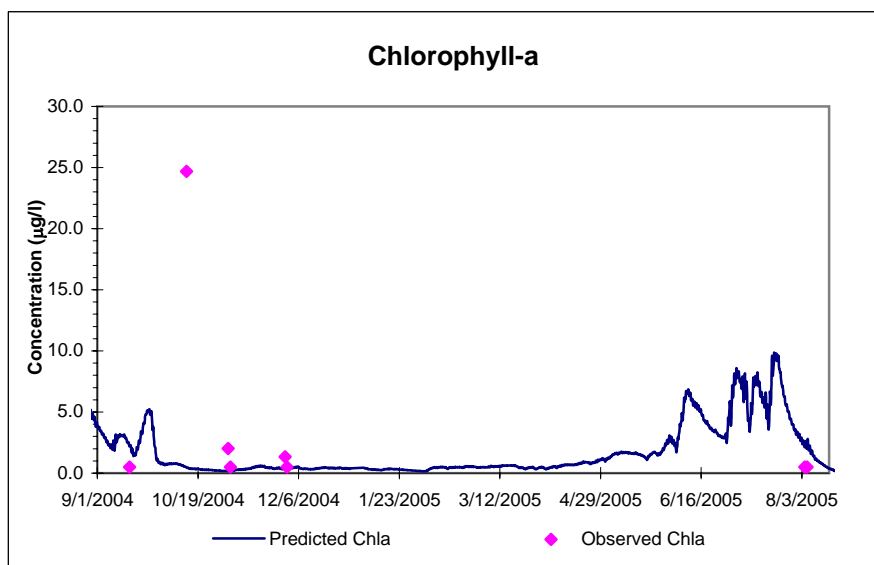
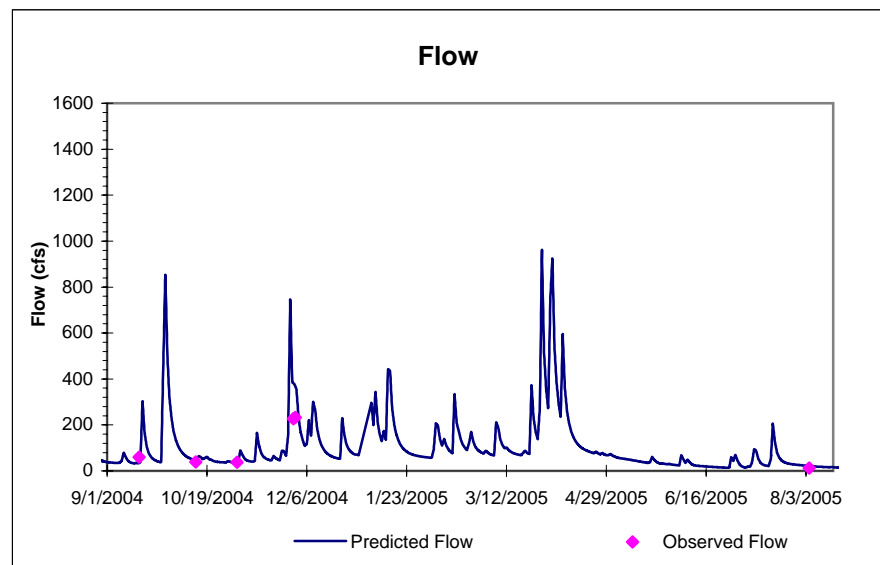
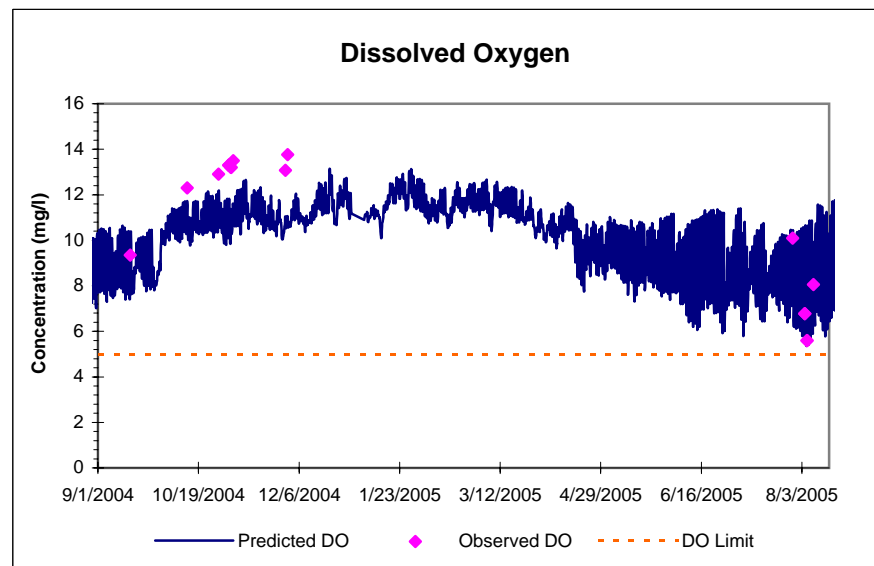
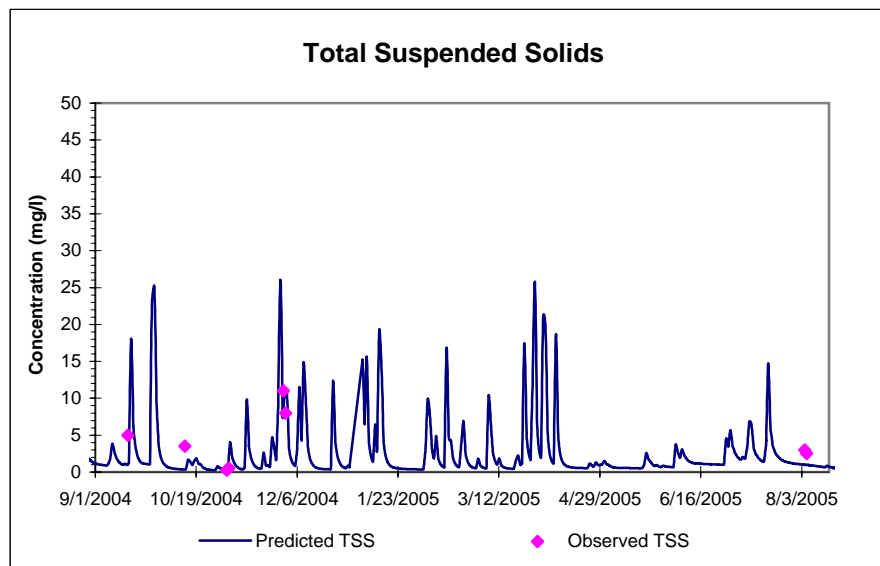
## North Branch Raritan River at Route 202/206 in Bedminster Twp. (NBRR5)



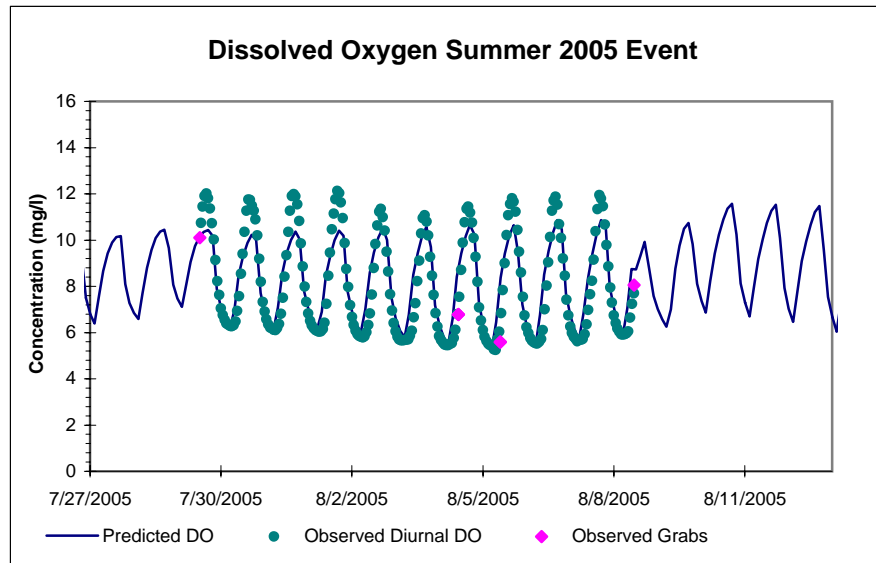
## North Branch Raritan River at Burnt Mills Rd. in Burnt Mills (NBRR6)



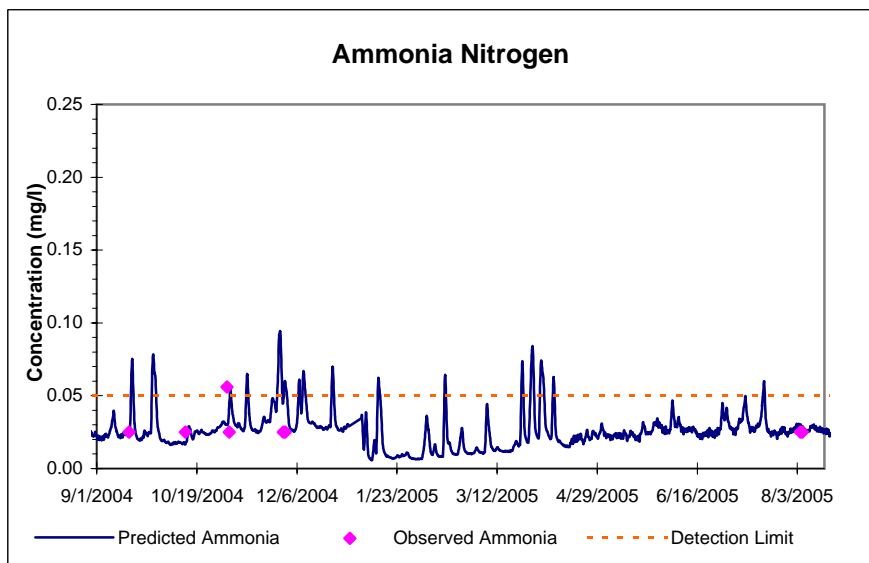
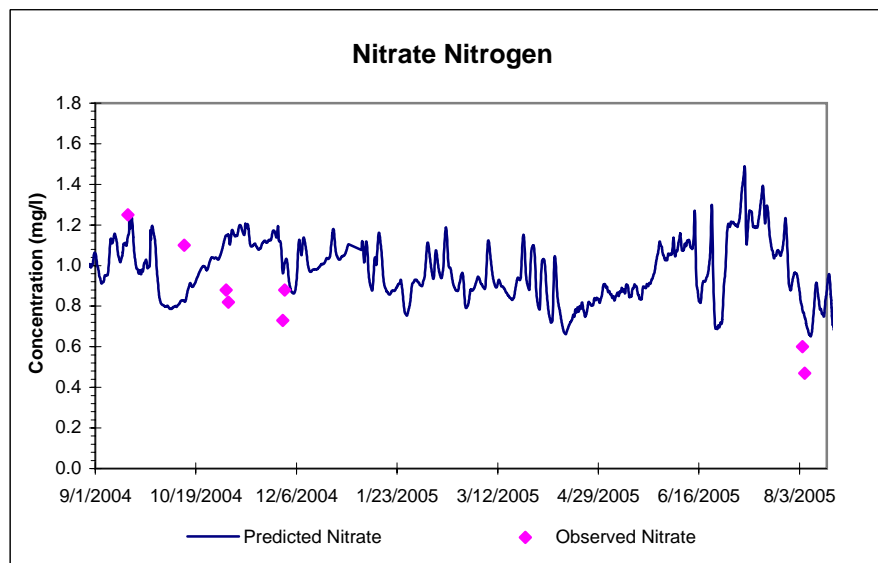
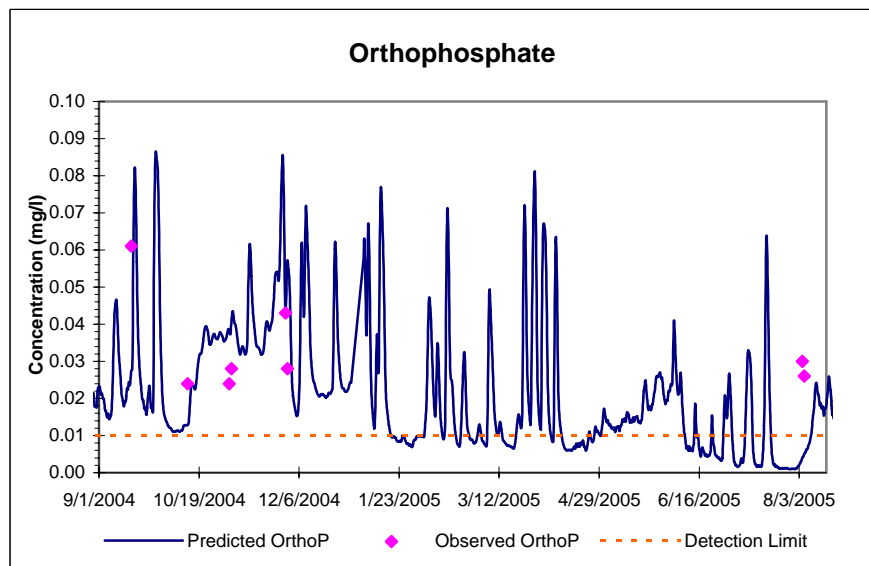
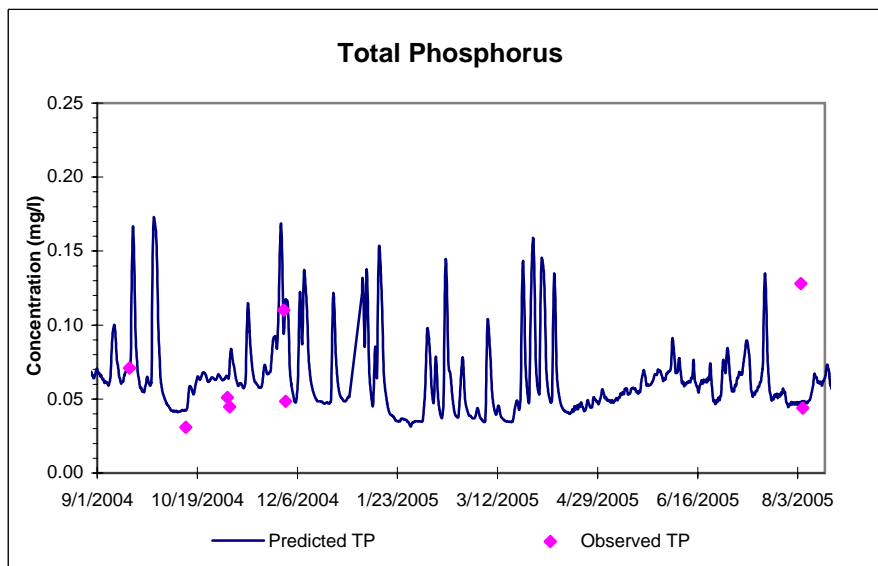
## North Branch Raritan River at Burnt Mills Rd. in Burnt Mills (NBRR6)



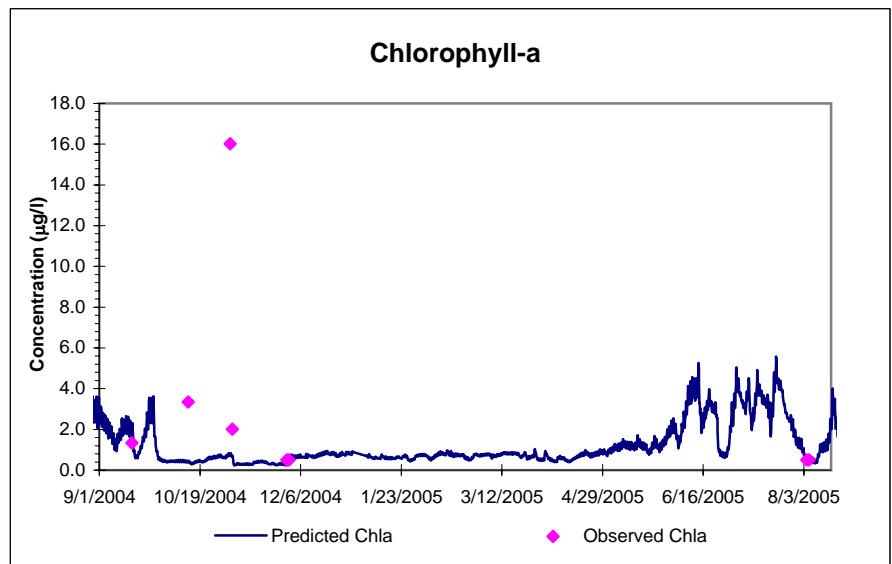
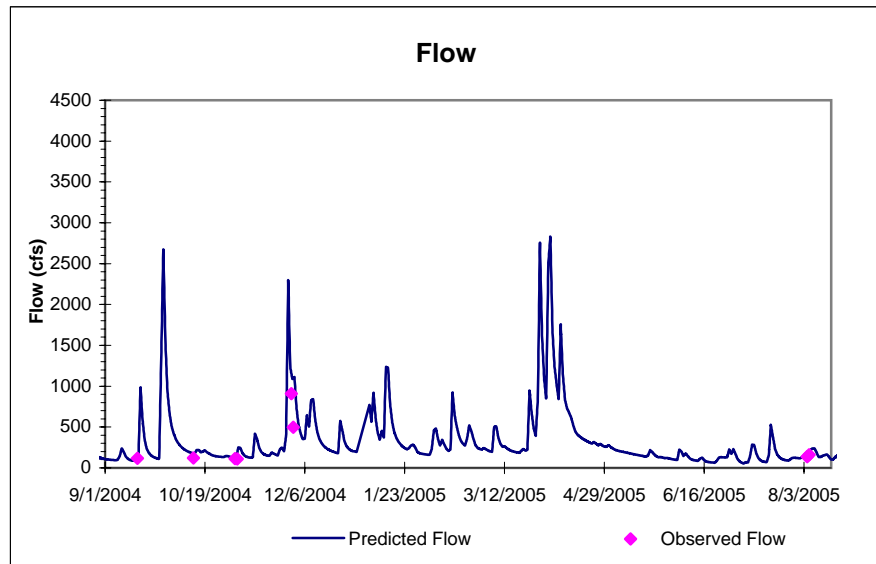
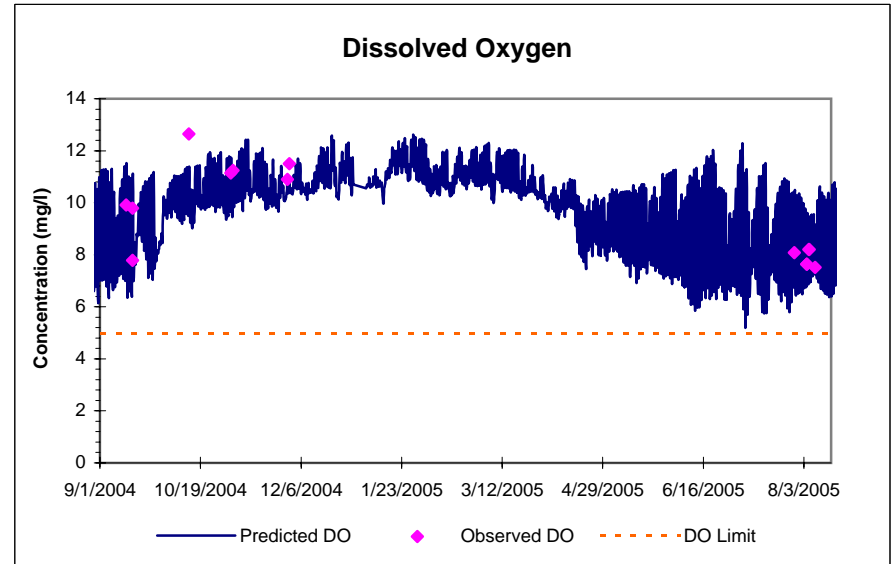
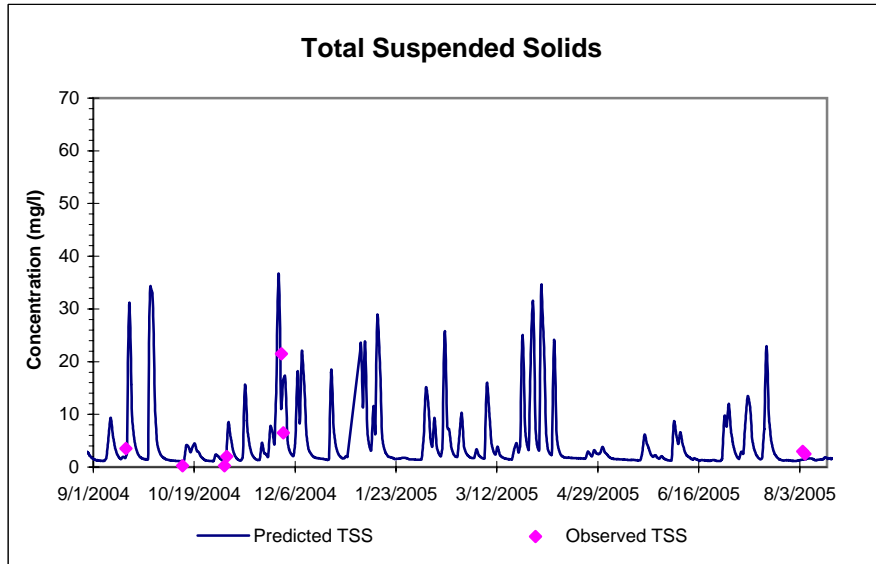
## North Branch Raritan River at Burnt Mills Rd. in Burnt Mills (NBRR6)



## North Branch Raritan River at Route 202 in Bridgewater (NBRR7, USGS 01400000)

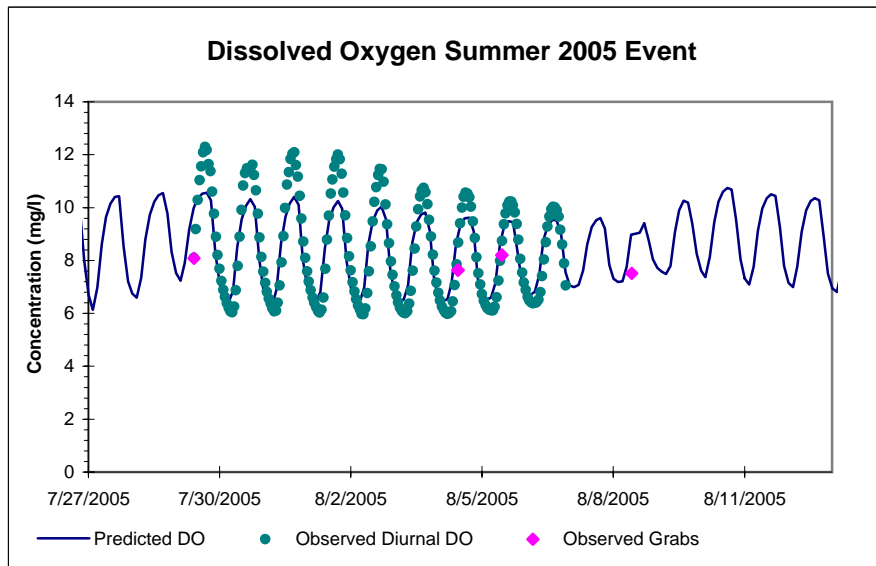


# North Branch Raritan River at Route 202 in Bridgewater (NBRR7, USGS 01400000)

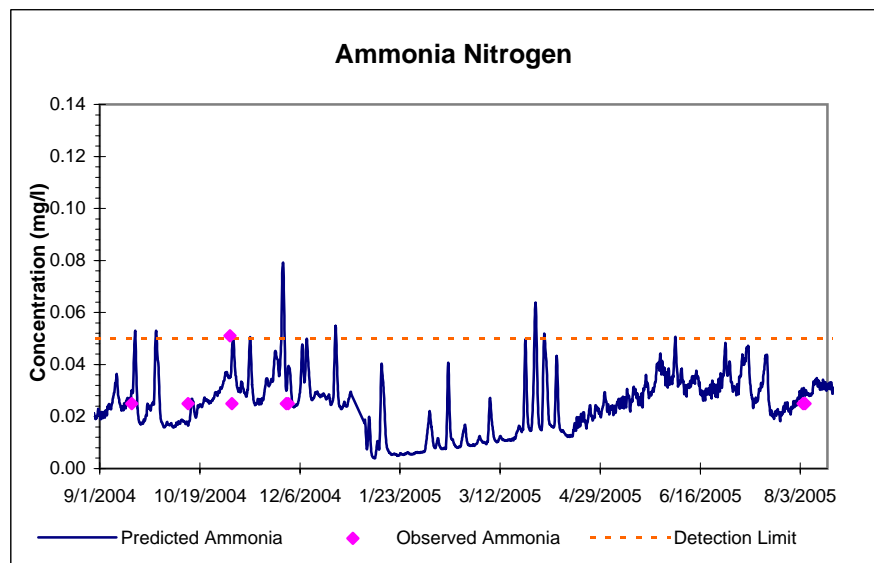
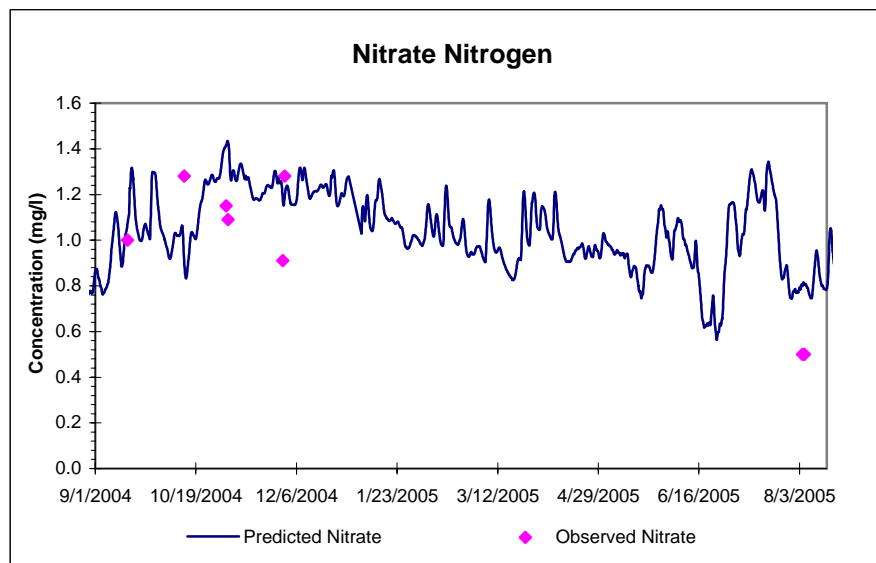
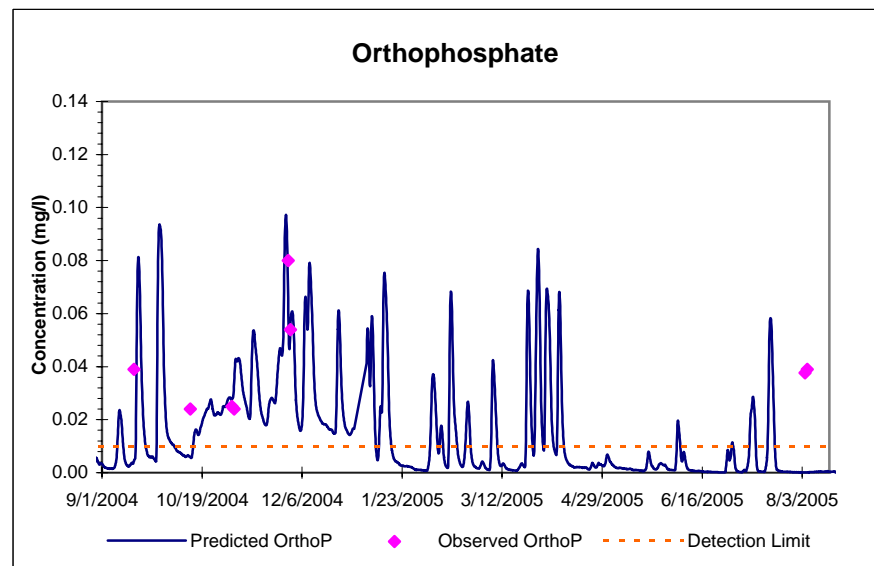
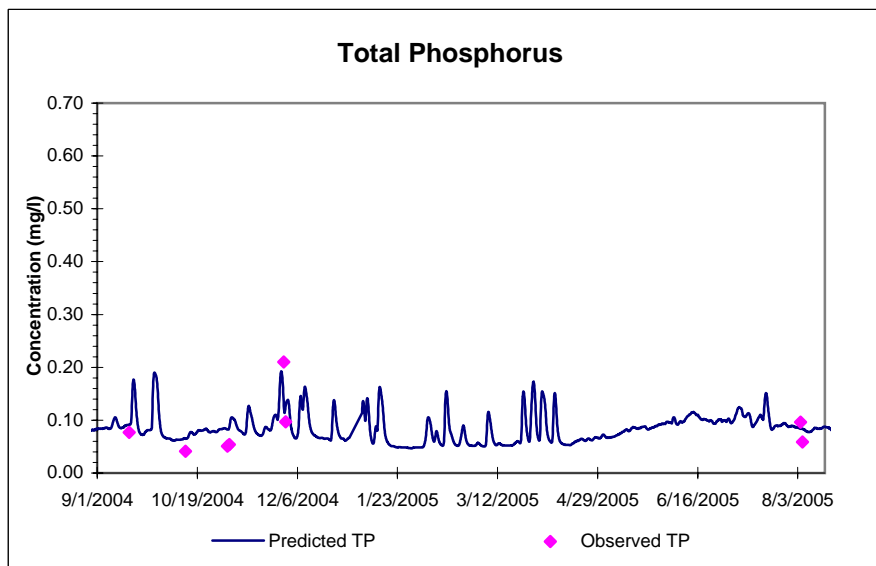




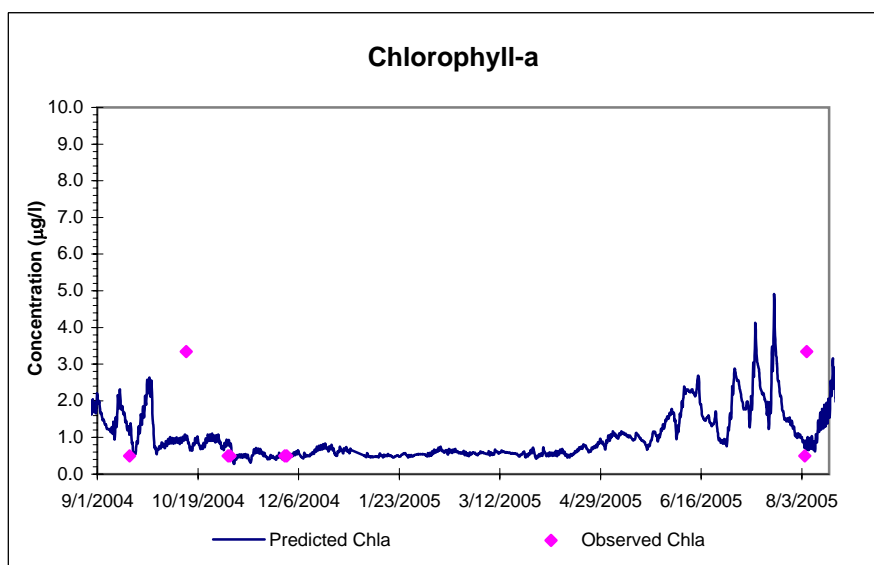
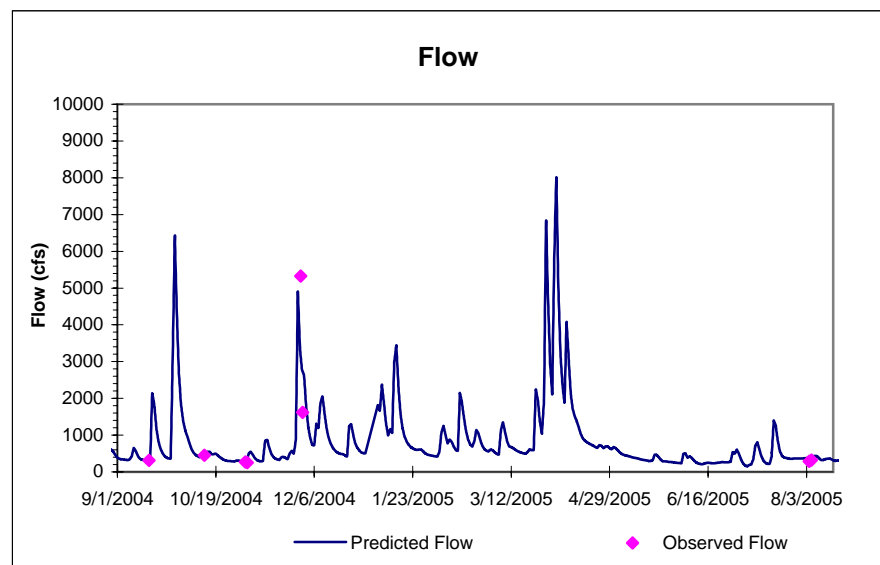
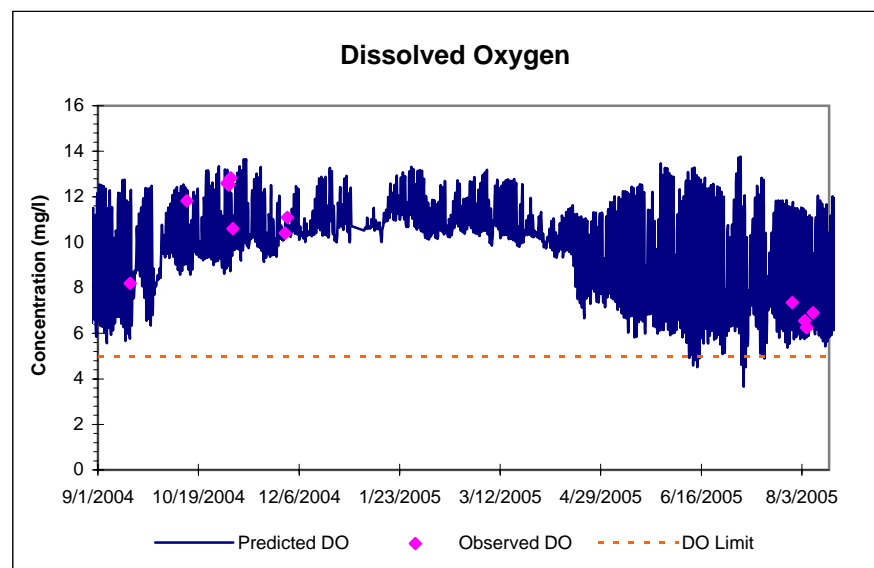
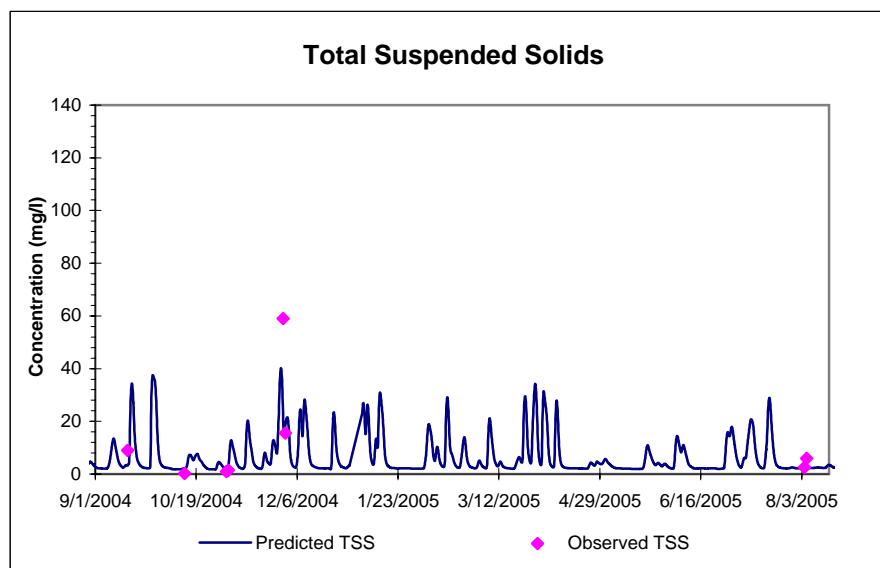
# North Branch Raritan River at Route 202 in Bridgewater (NBRR7, USGS 01400000)



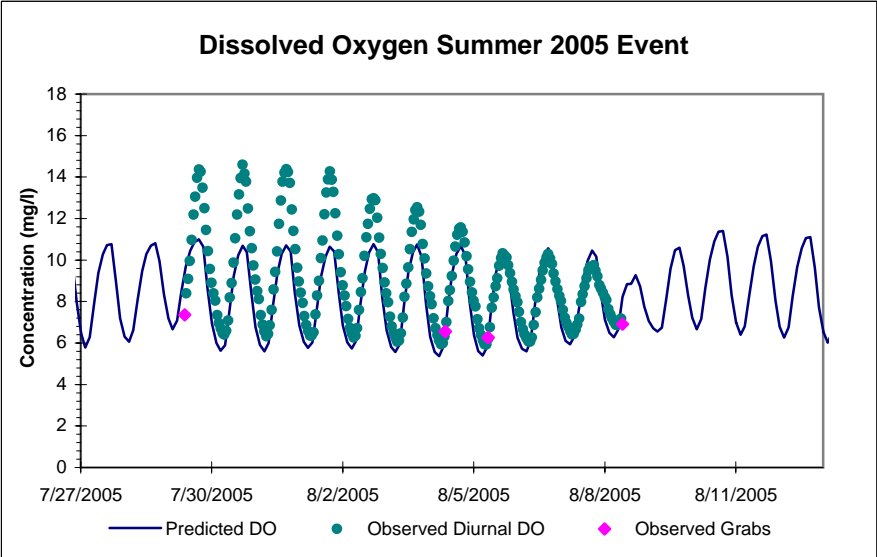
## Raritan River at Main Street in Manville (RR1, USGS 01400500)



## Raritan River at Main Street in Manville (RR1, USGS 01400500)

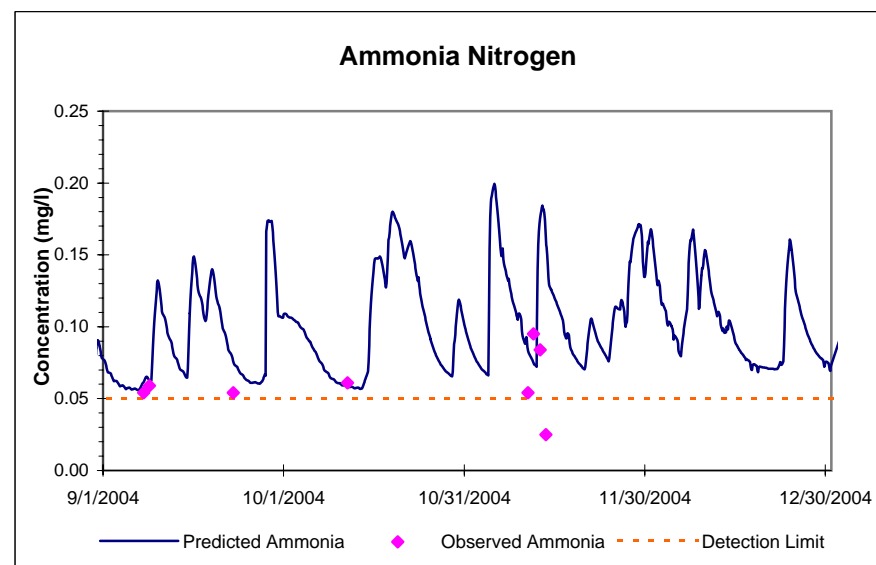
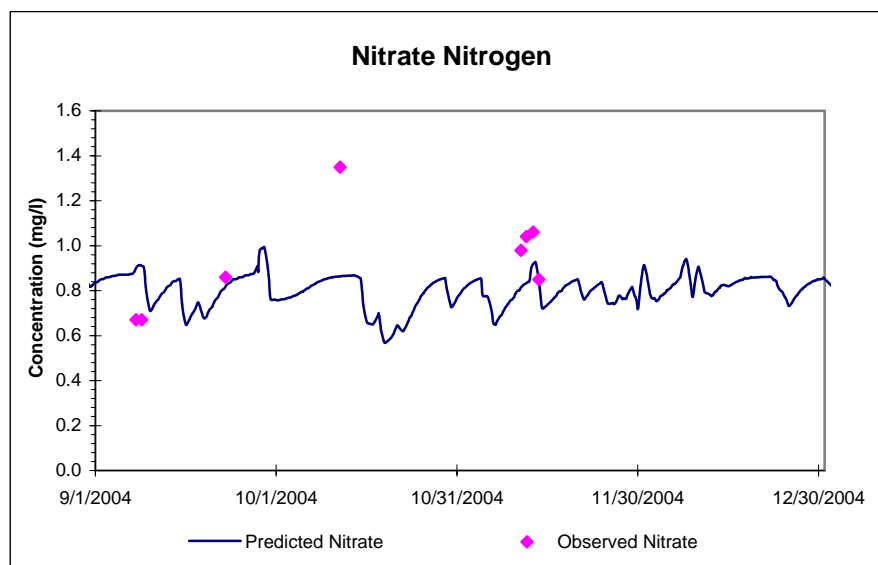
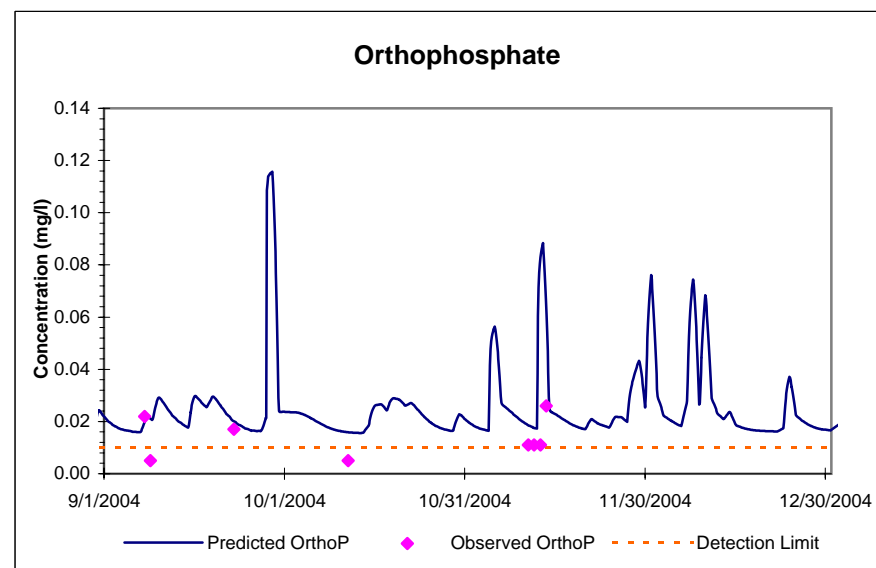
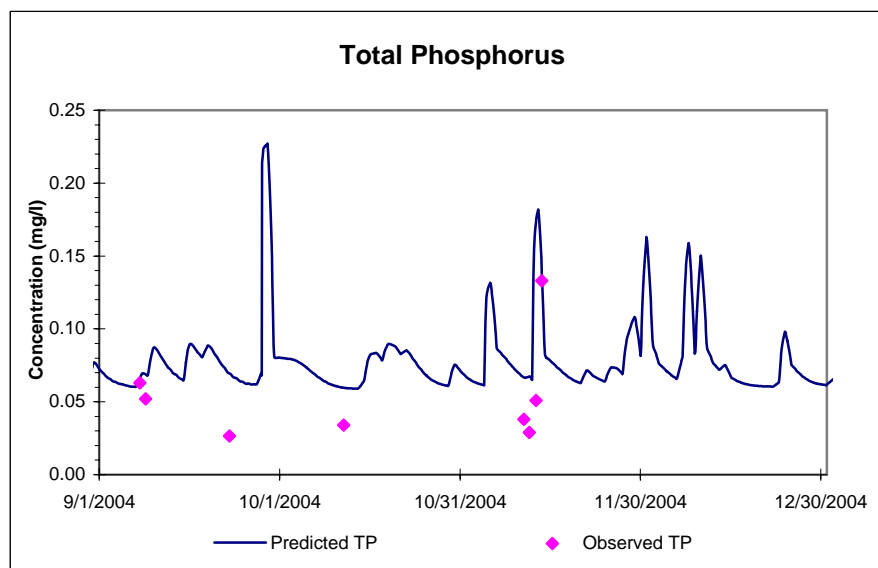


# Raritan River at Main Street in Manville (RR1, USGS 01400500)

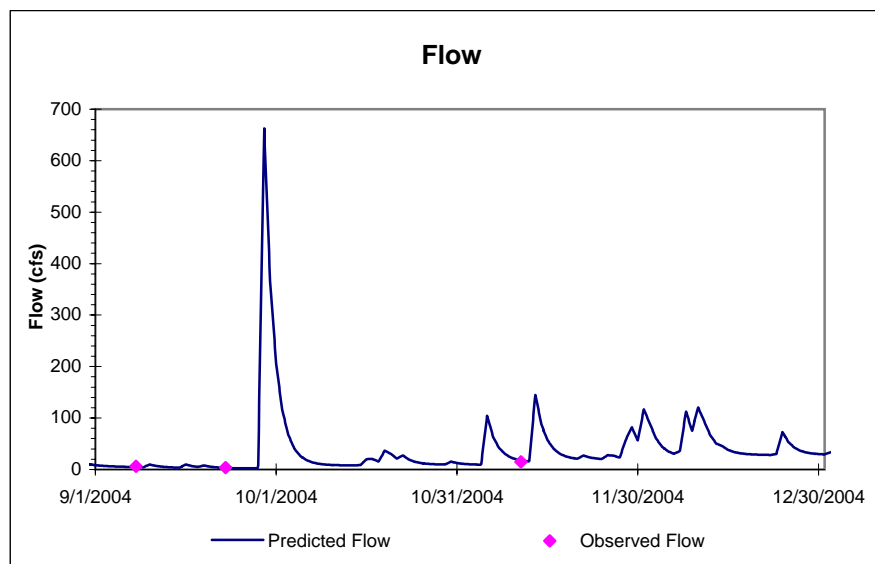
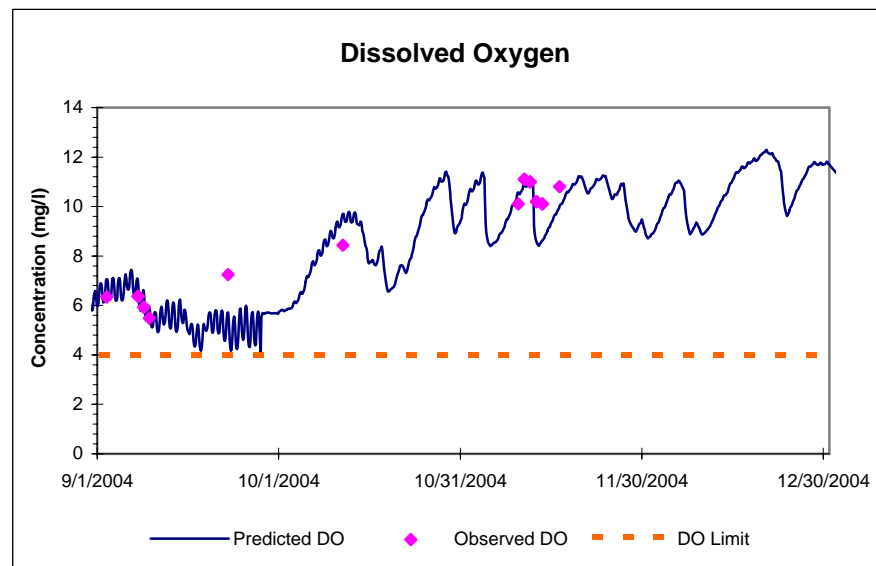
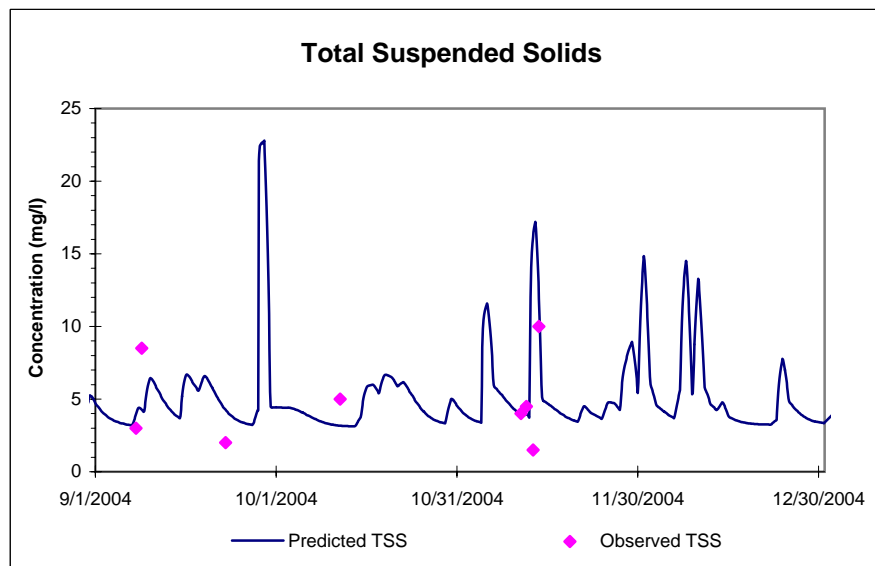


Upper Millstone River Watershed Area Model  
Water Quality Model Validation Graphs

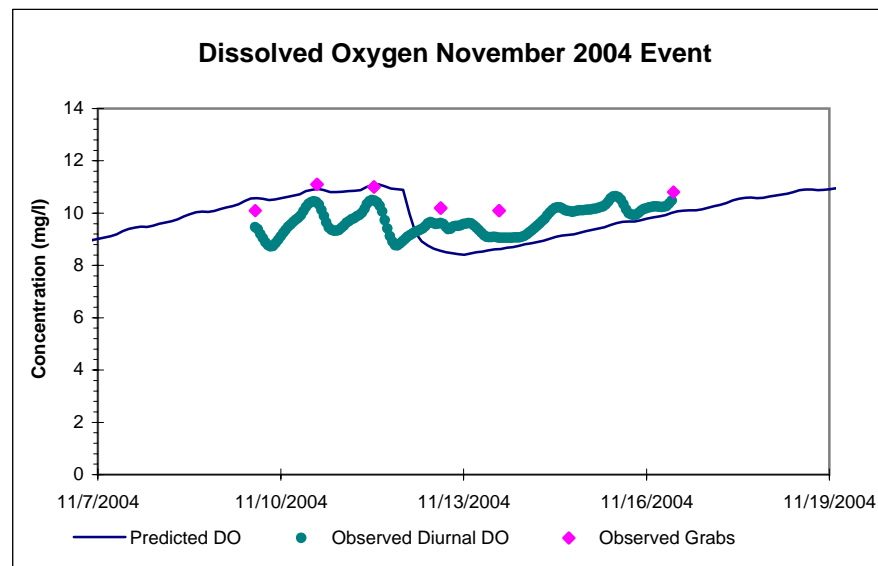
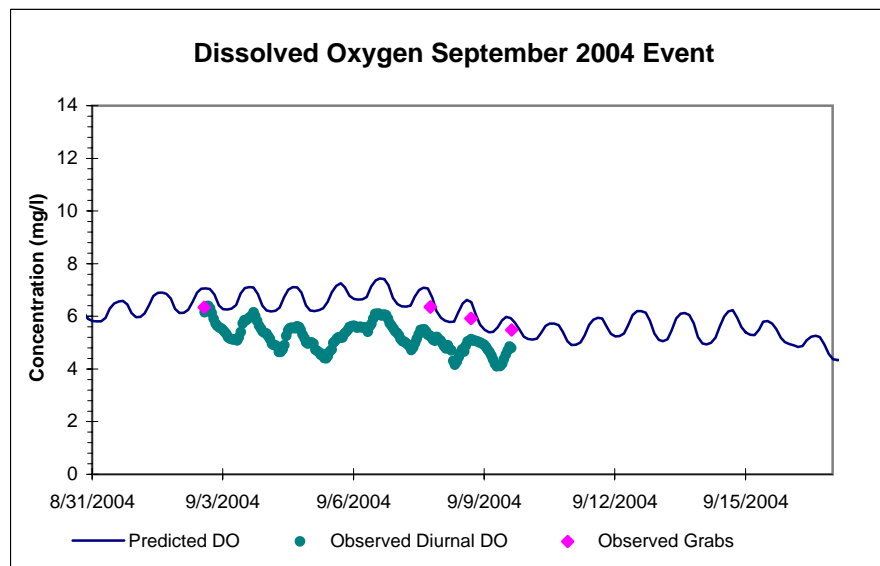
## Upper Millstone River at Old Cranbury Rd. in Millstone (UMR1)



## Upper Millstone River at Old Cranbury Rd. in Millstone (UMR1)

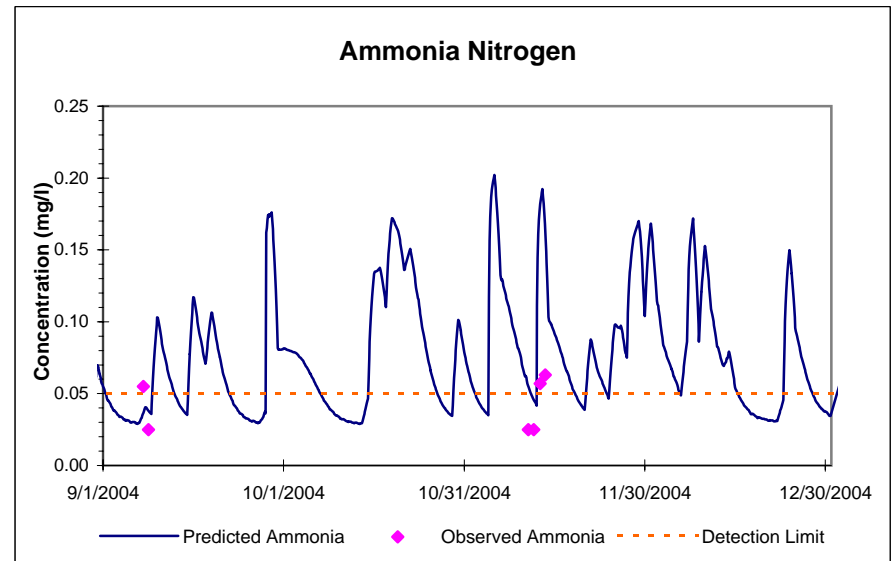
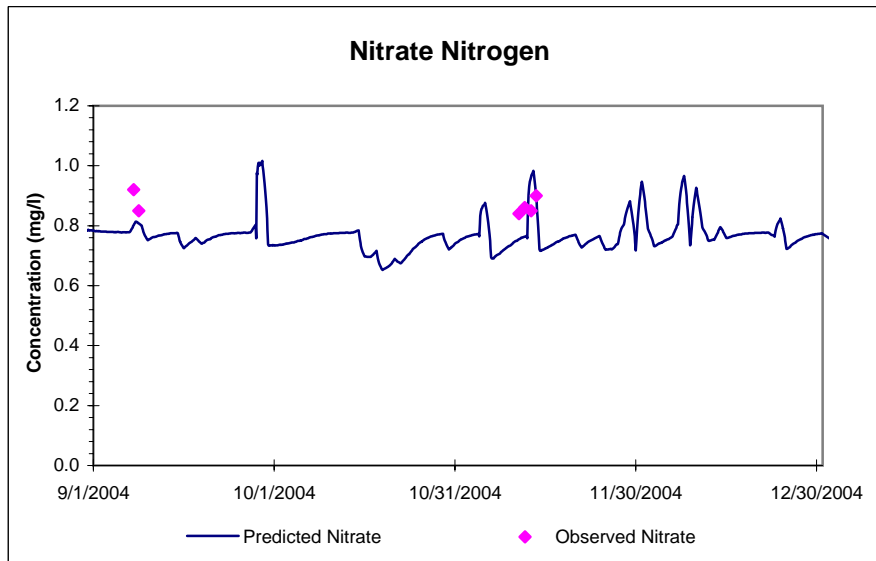
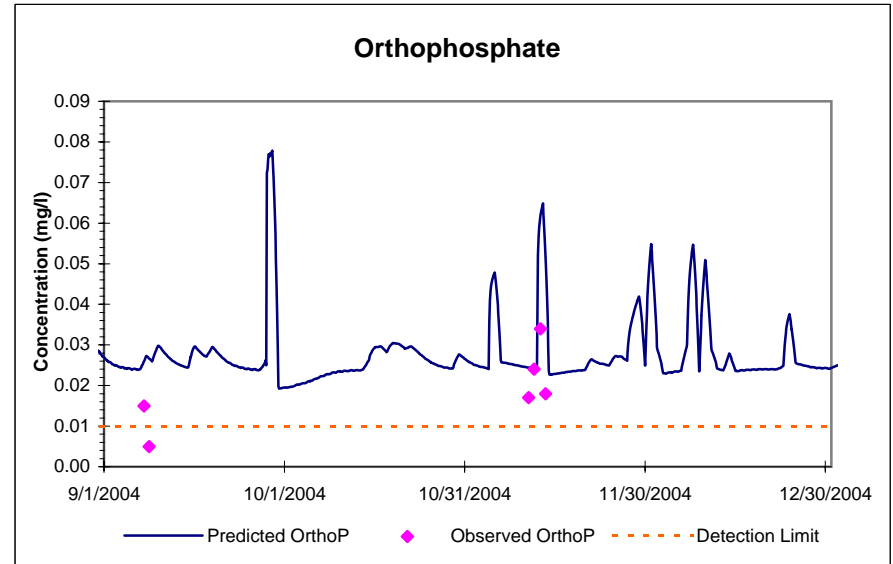
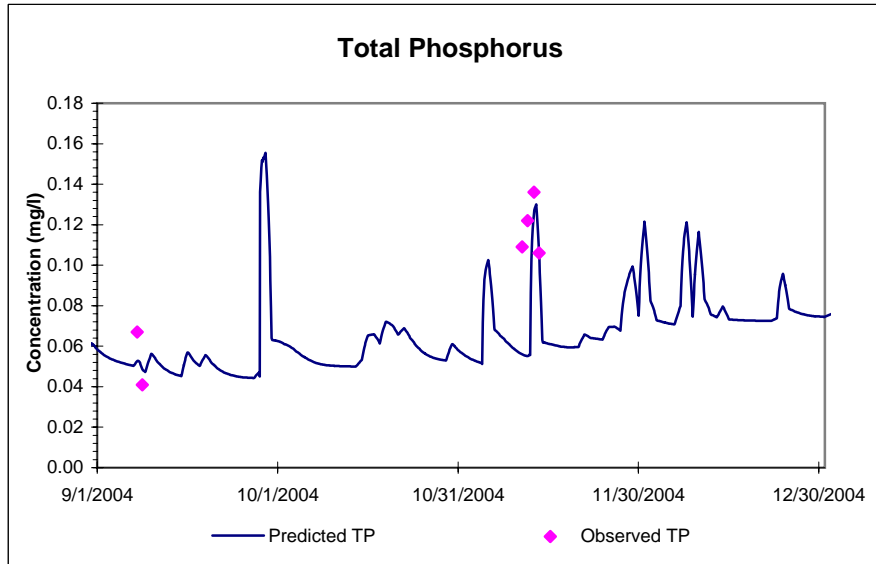


## Upper Millstone River at Old Cranbury Rd. in Millstone (UMR1)

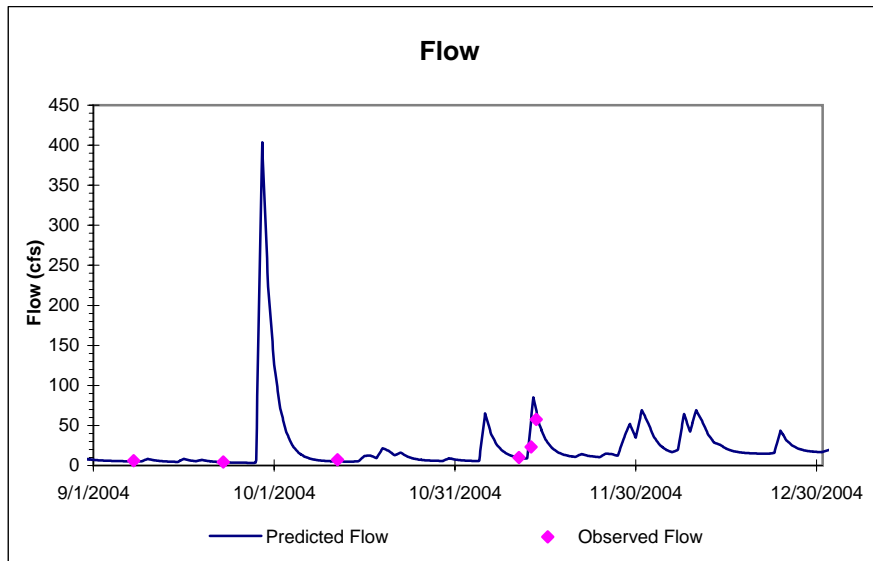
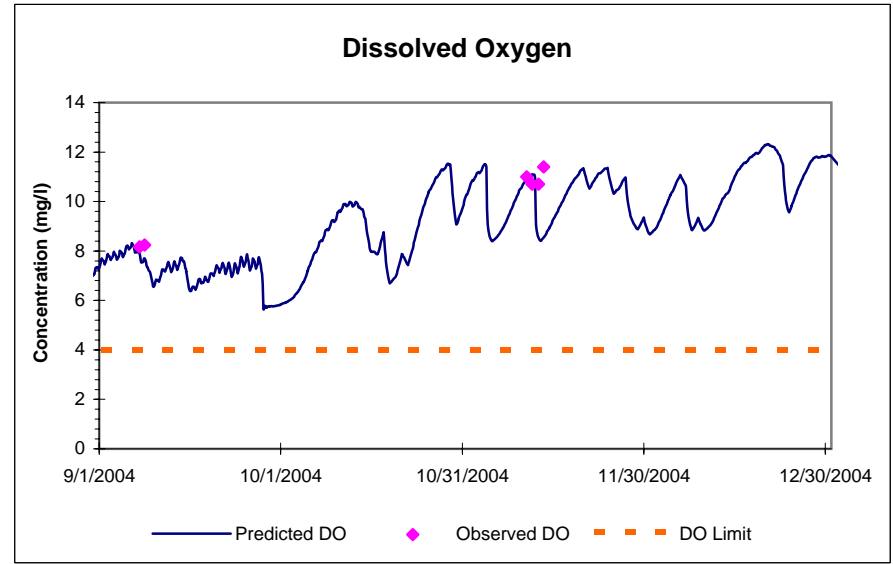
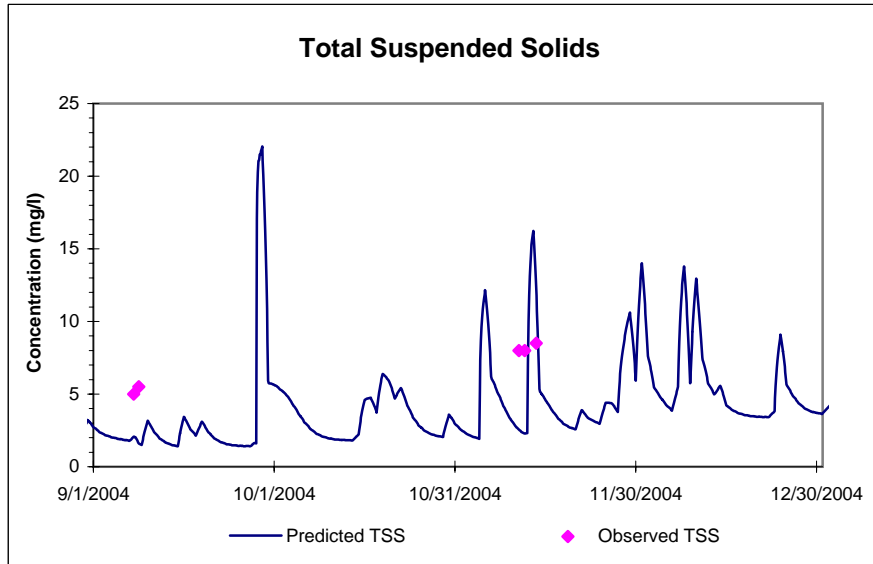




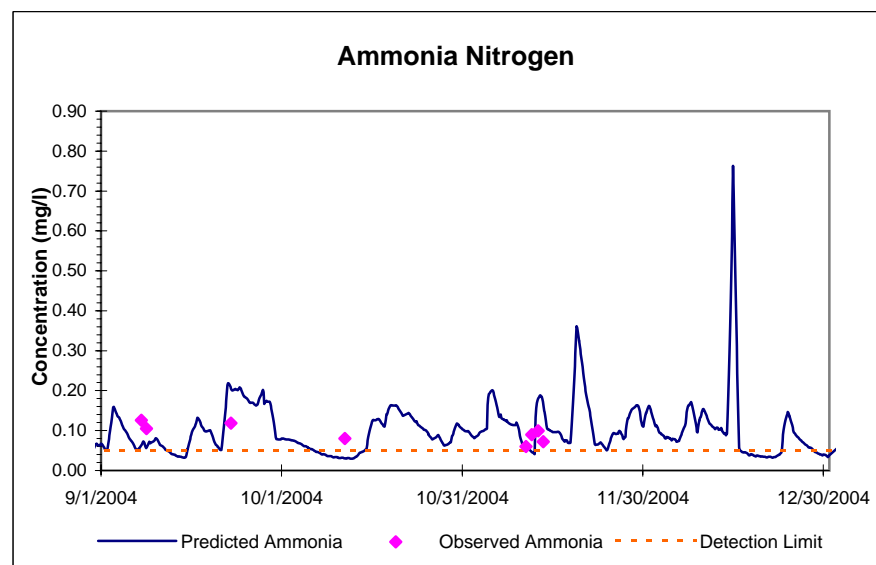
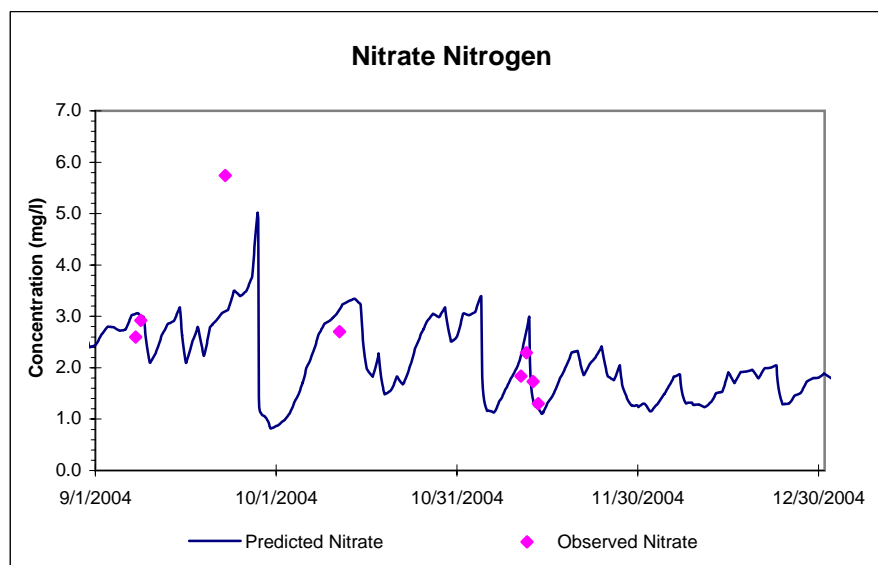
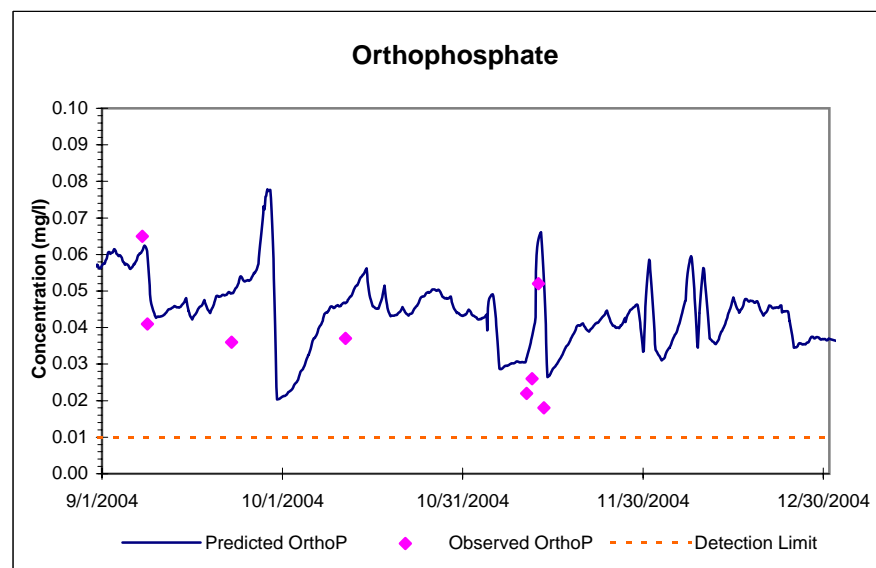
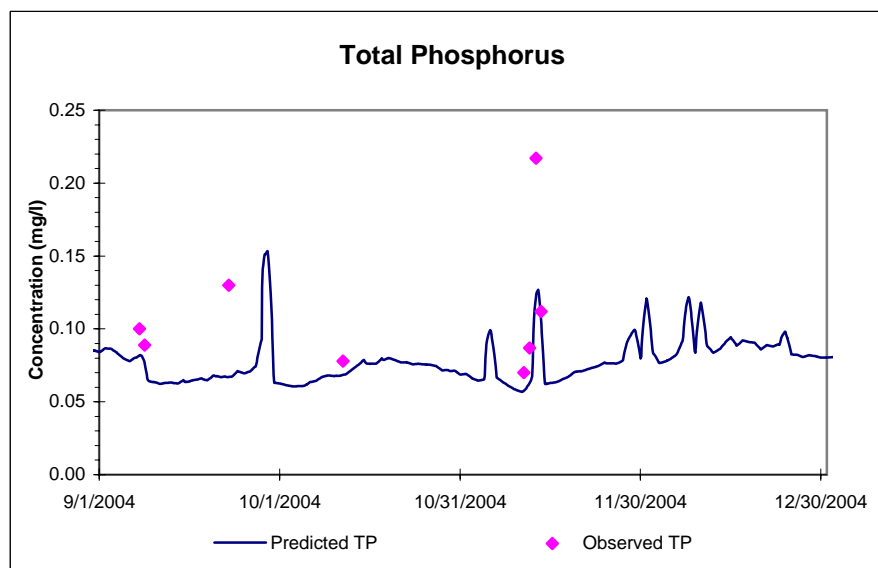
## Rocky Brook at Peddie Lake Outlet in Hightstown (RB3)



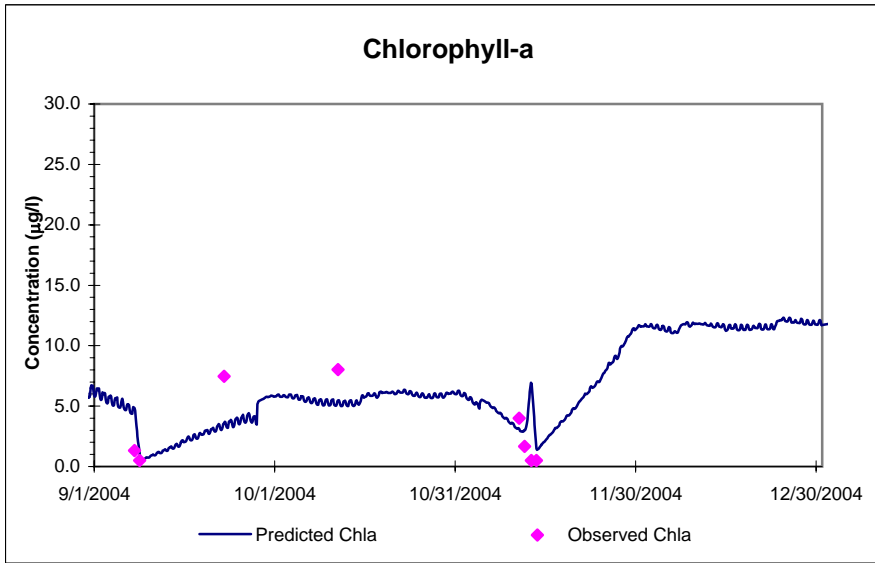
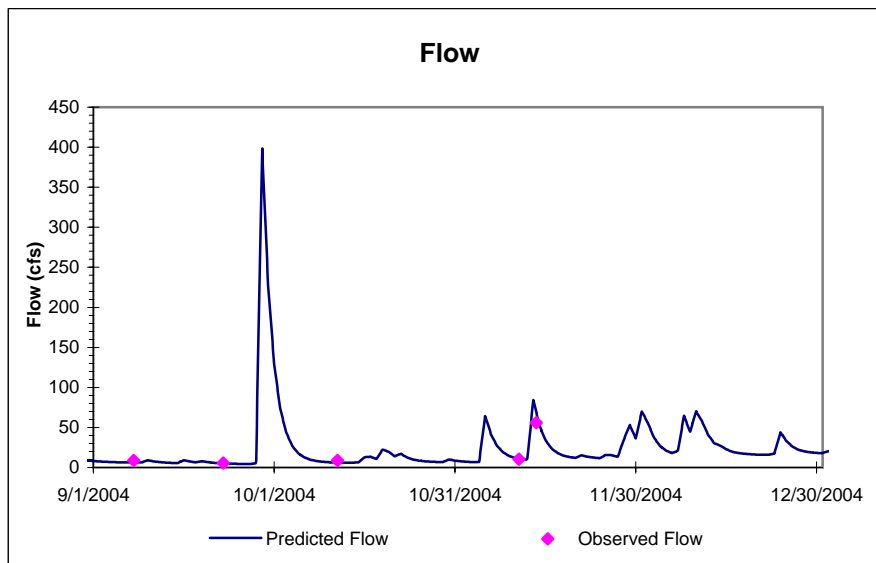
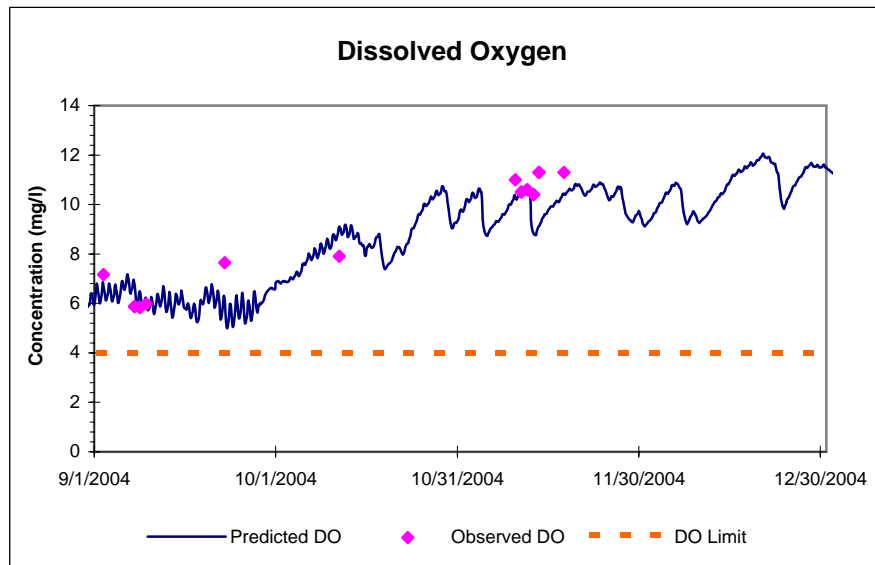
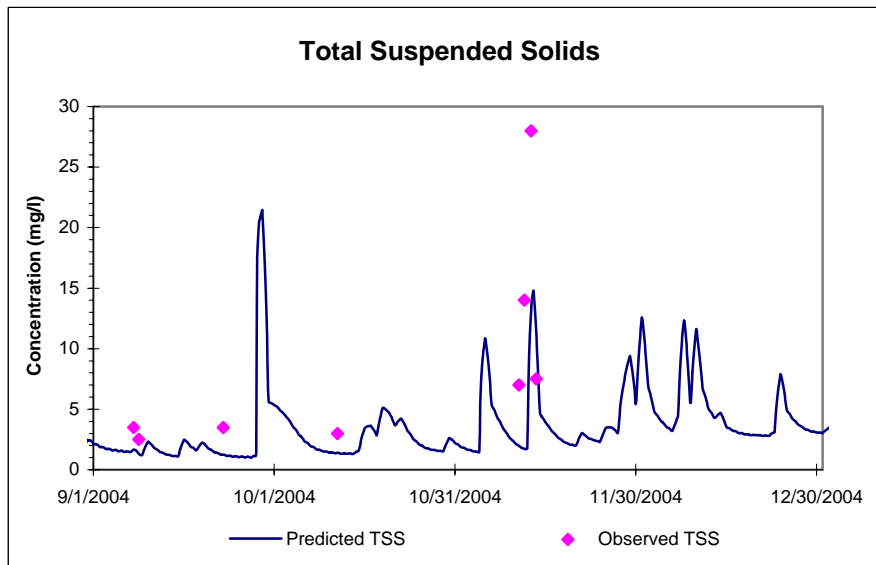
## Rocky Brook at Peddie Lake Outlet in Hightstown (RB3)



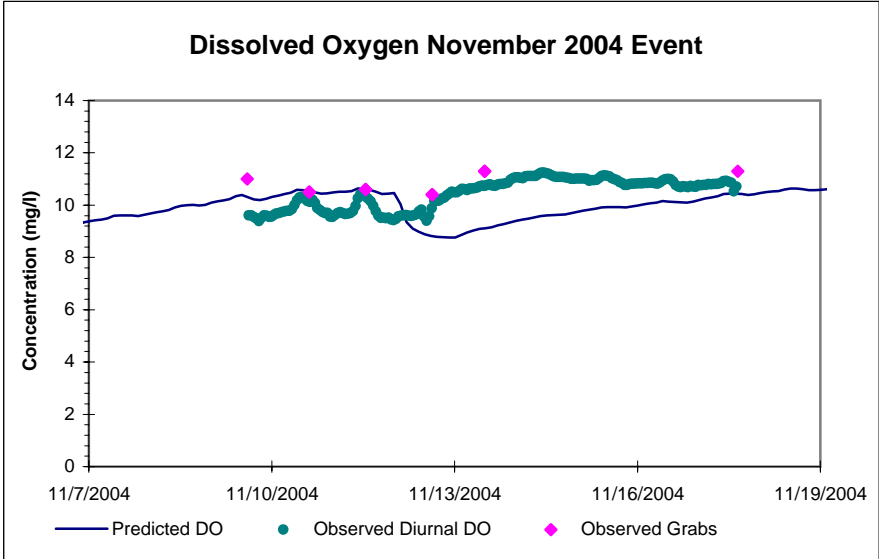
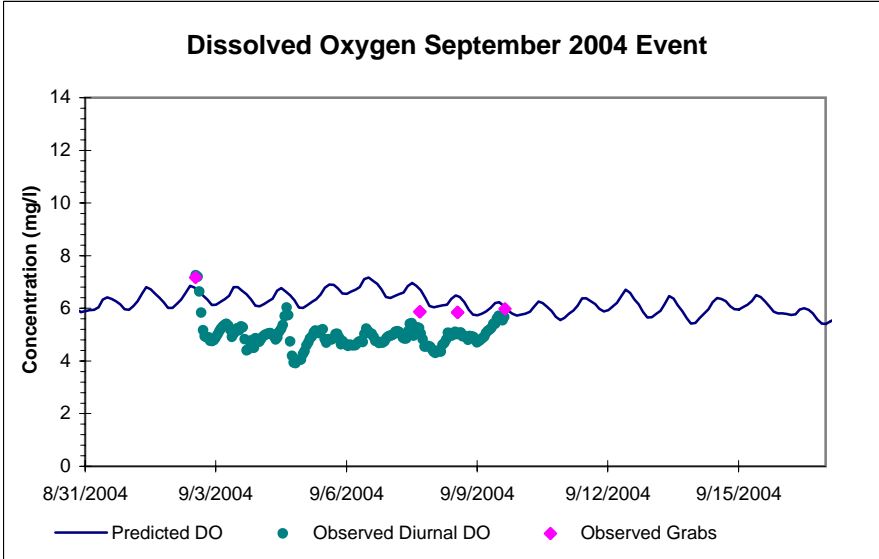
## Rocky Brook at Route 130 in East Windsor (RB4)



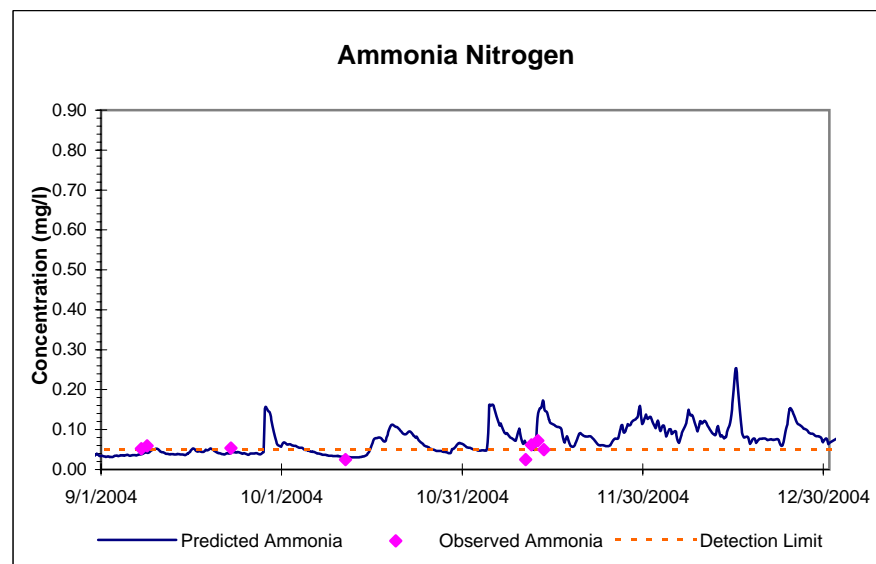
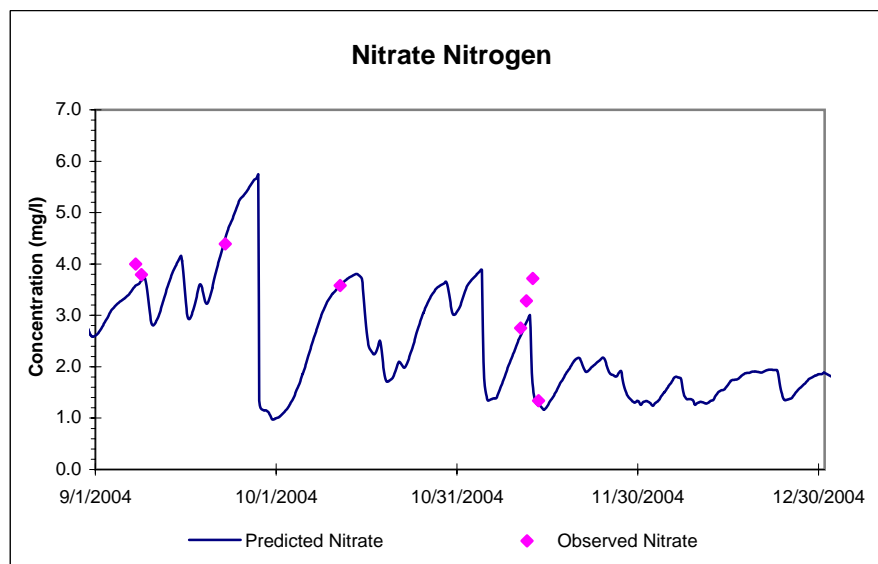
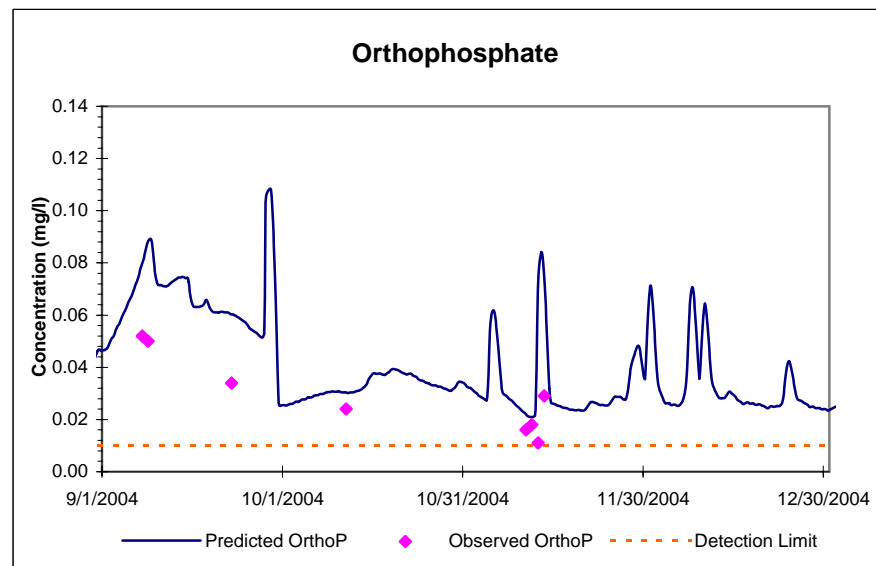
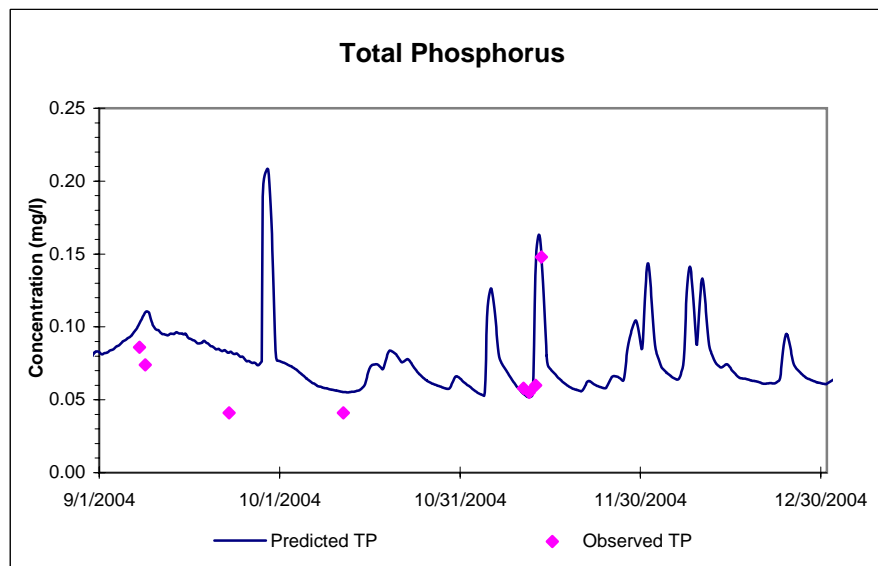
## Rocky Brook at Route 130 in East Windsor (RB4)



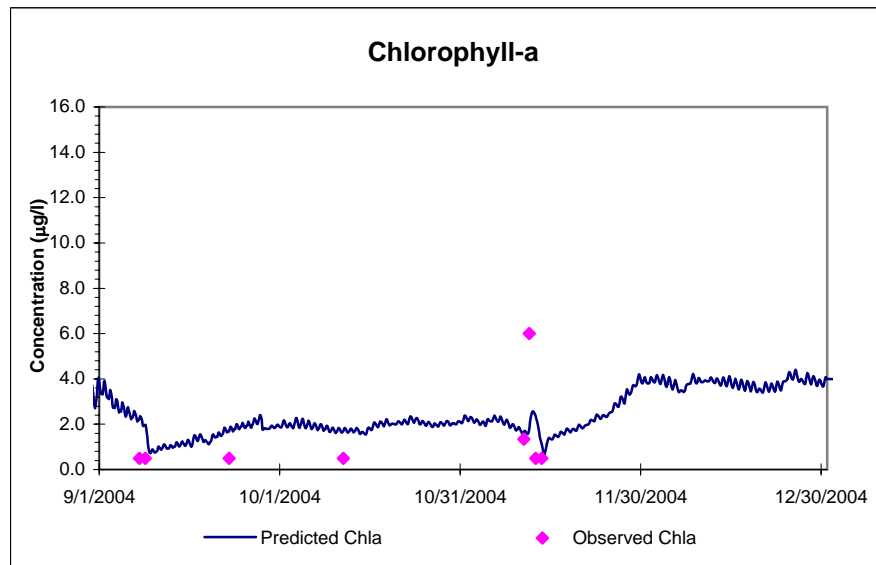
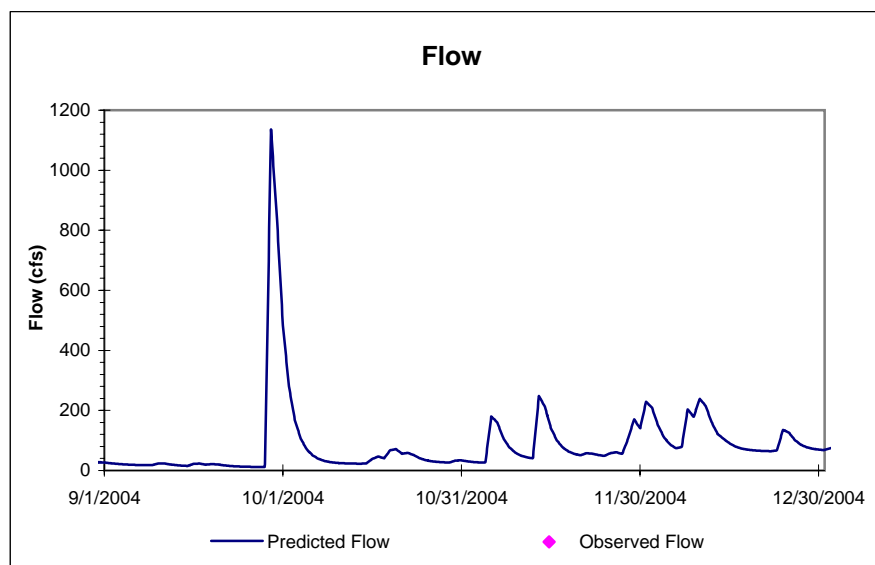
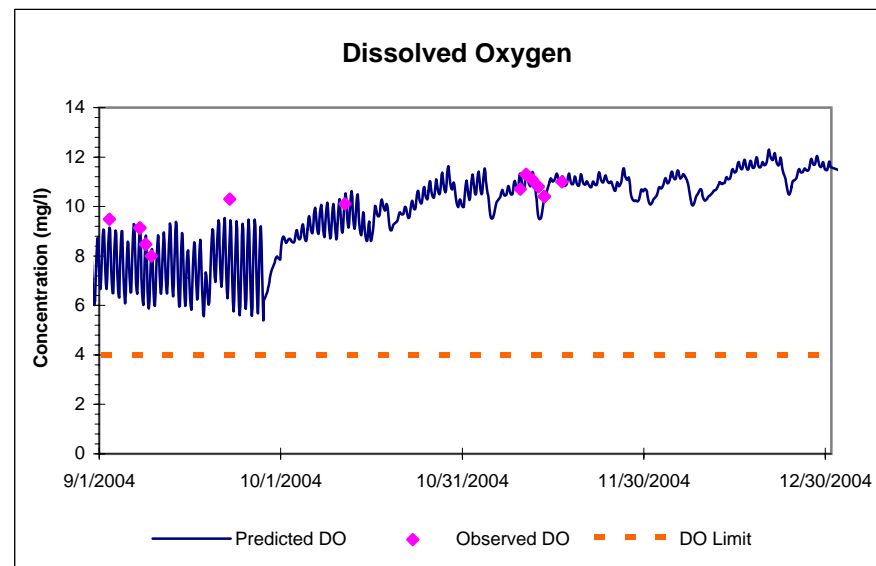
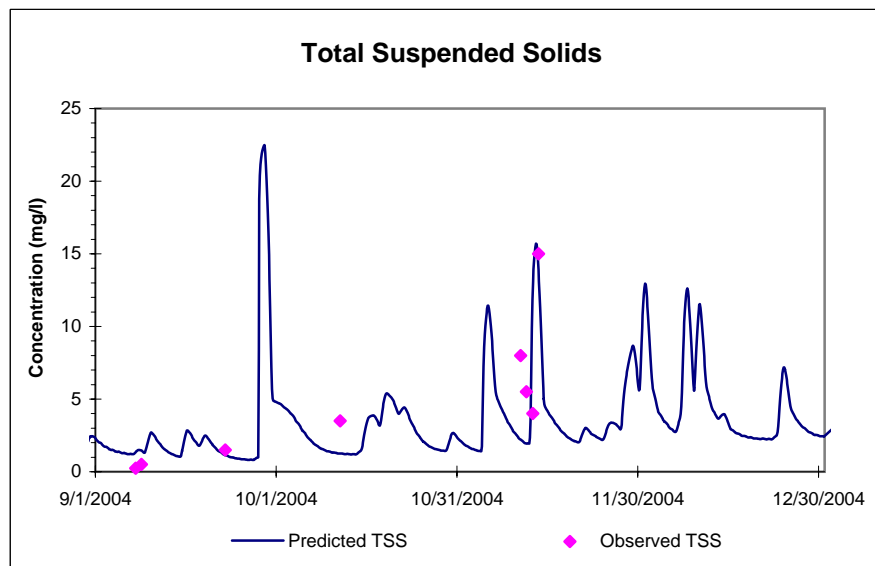
# Rocky Brook at Route 130 in East Windsor (RB4)



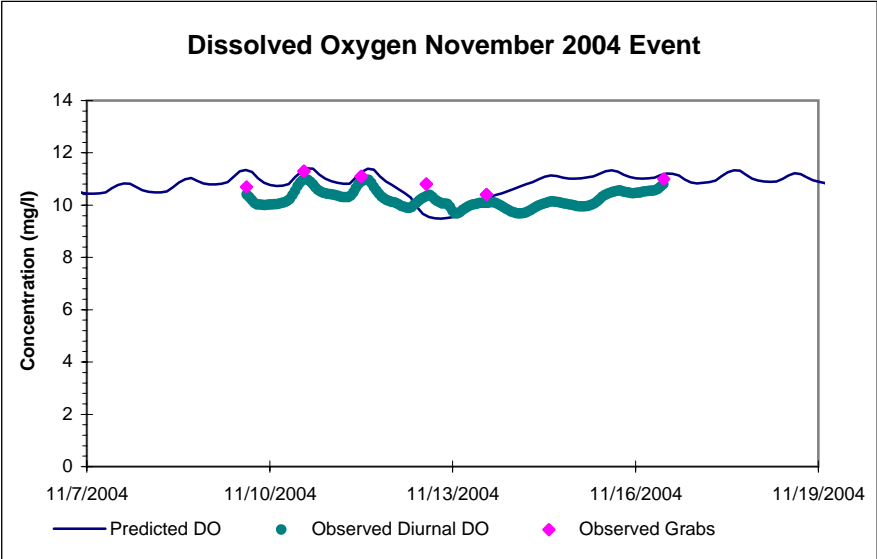
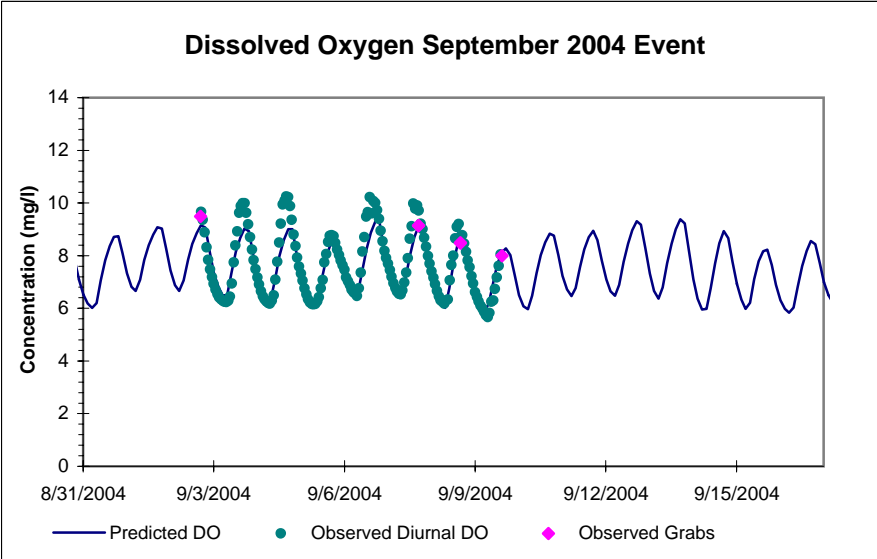
## Upper Millstone River at Cranbury Neck Rd. in Plainsboro (UMR2)



## Upper Millstone River at Cranbury Neck Rd. in Plainsboro (UMR2)

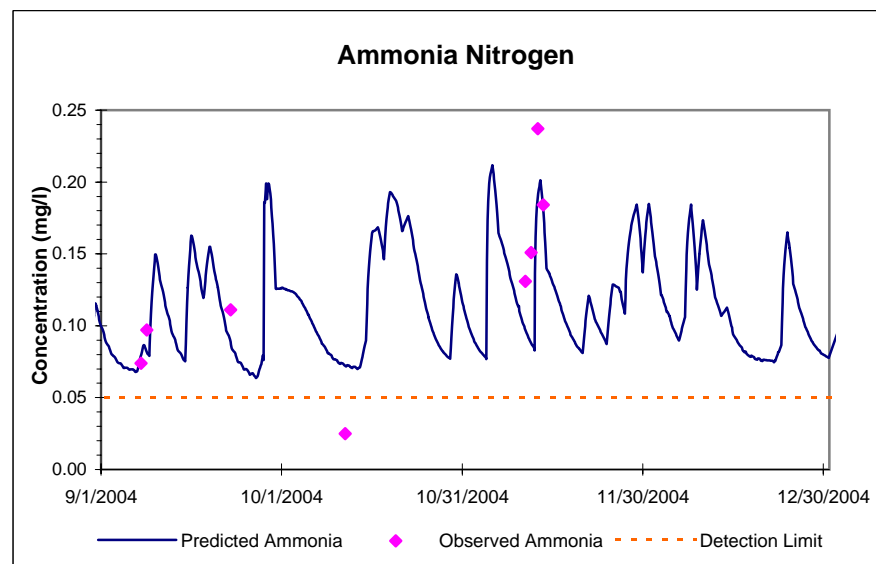
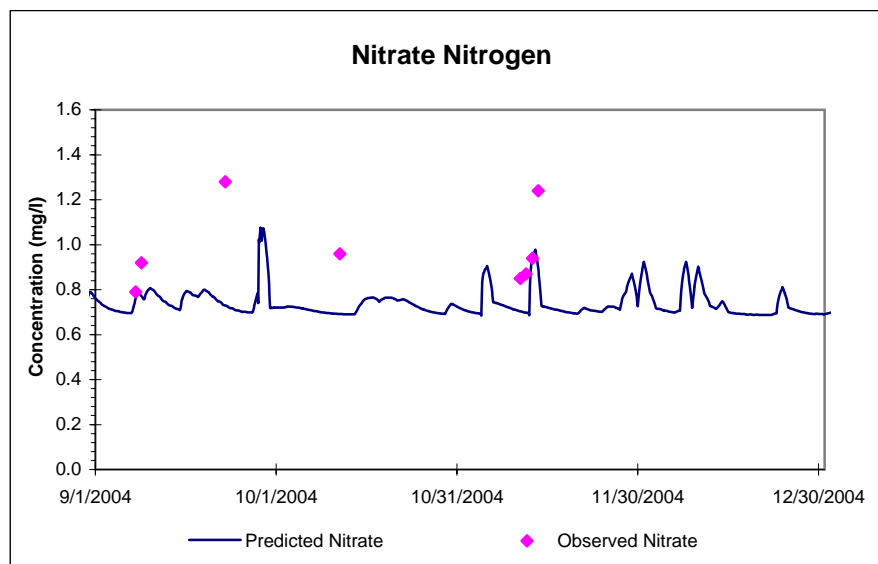
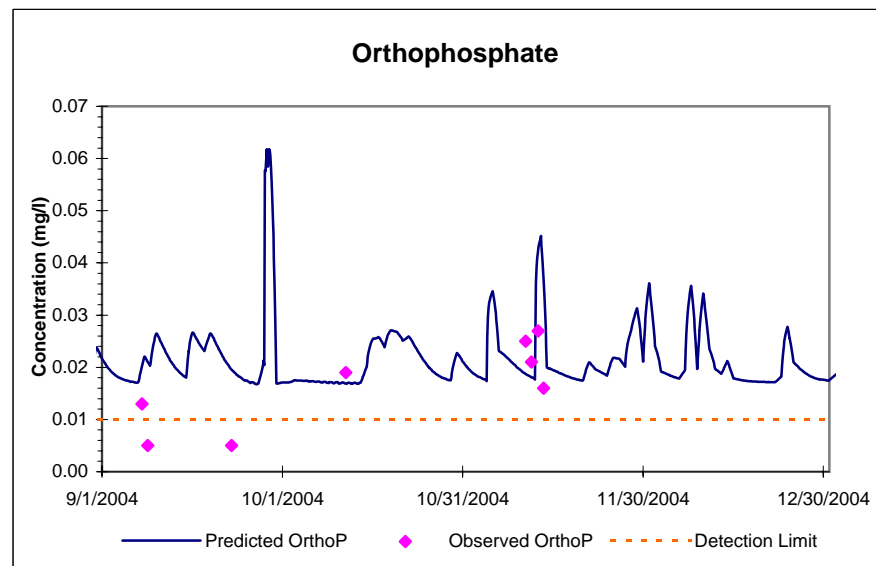
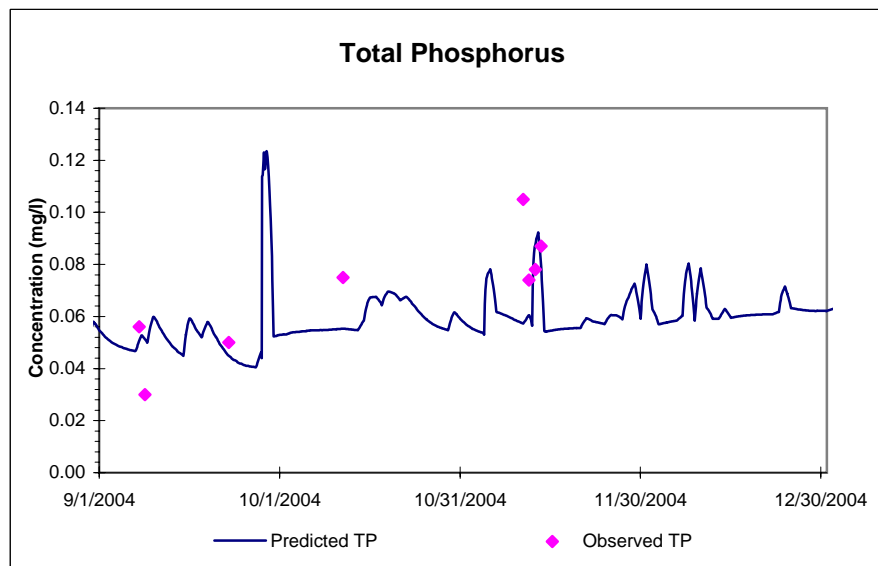


# Upper Millstone River at Cranbury Neck Rd. in Plainsboro (UMR2)

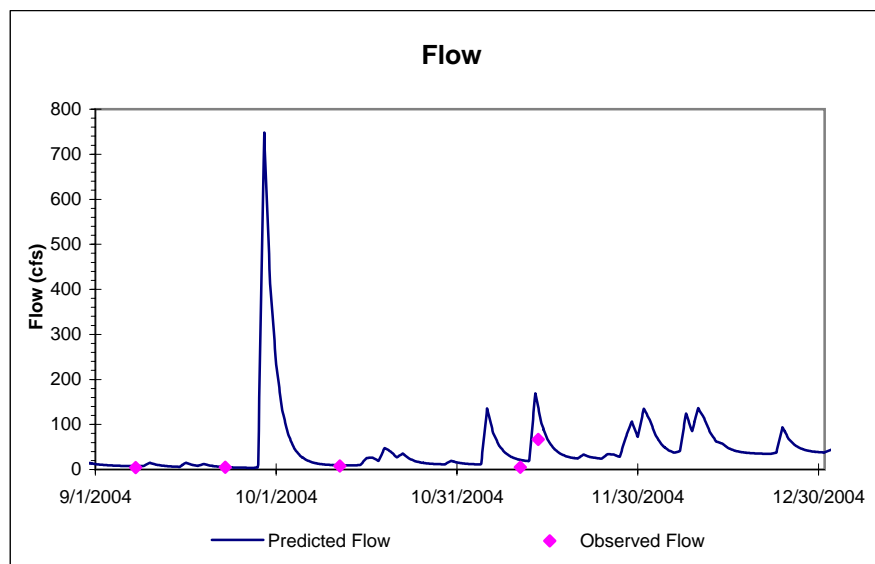
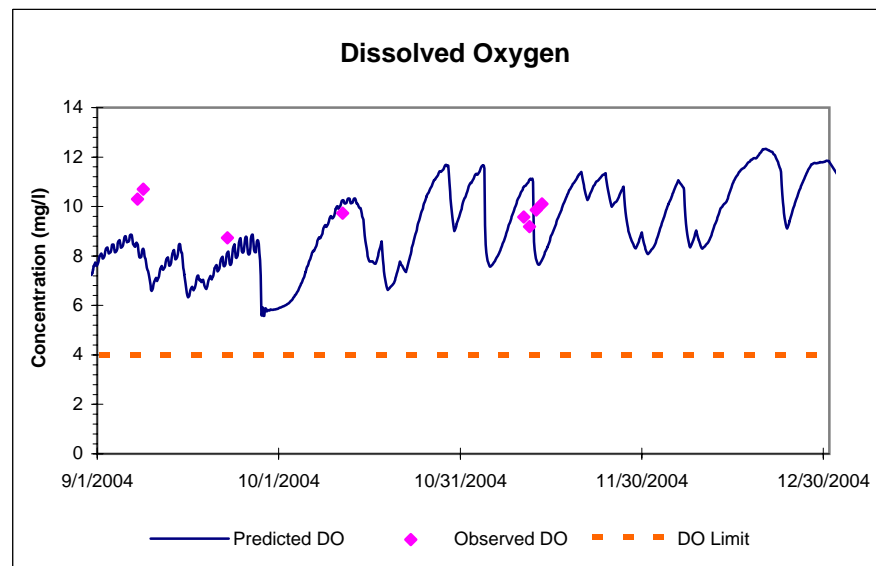
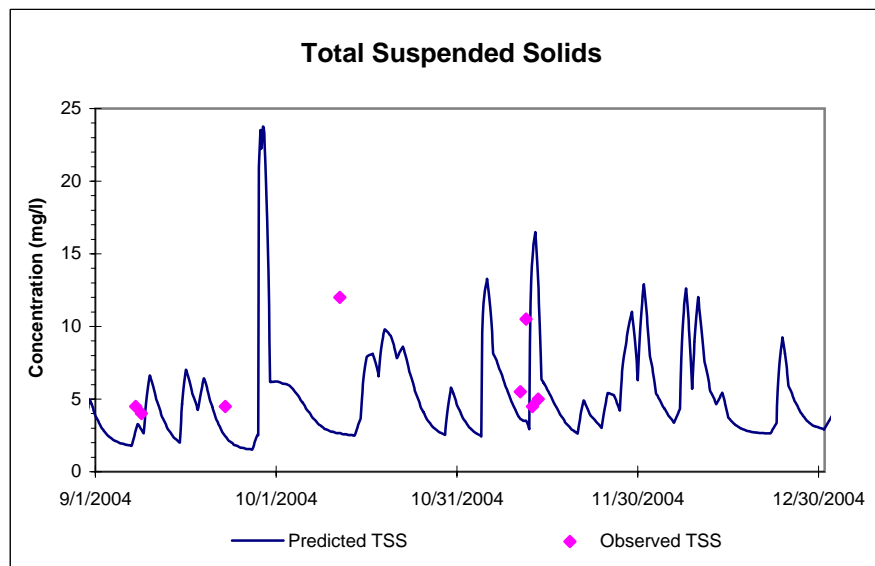




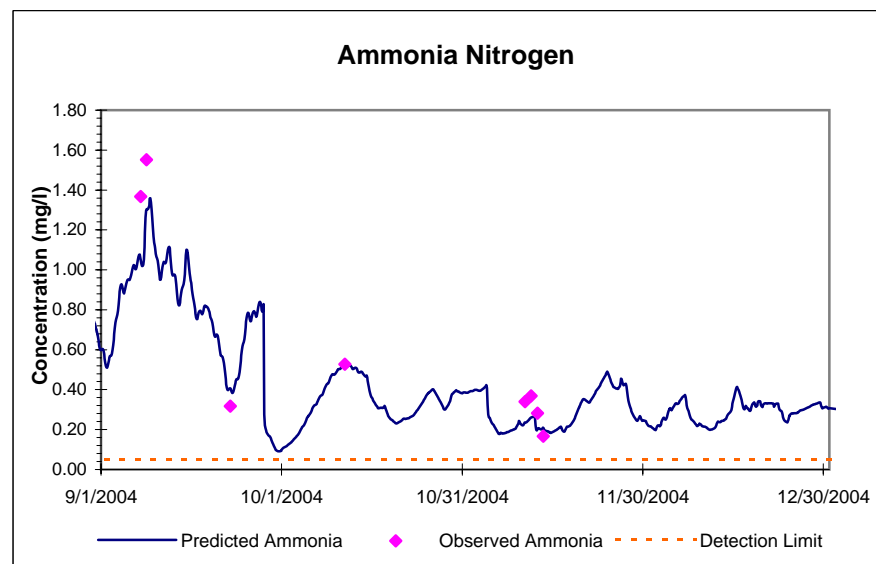
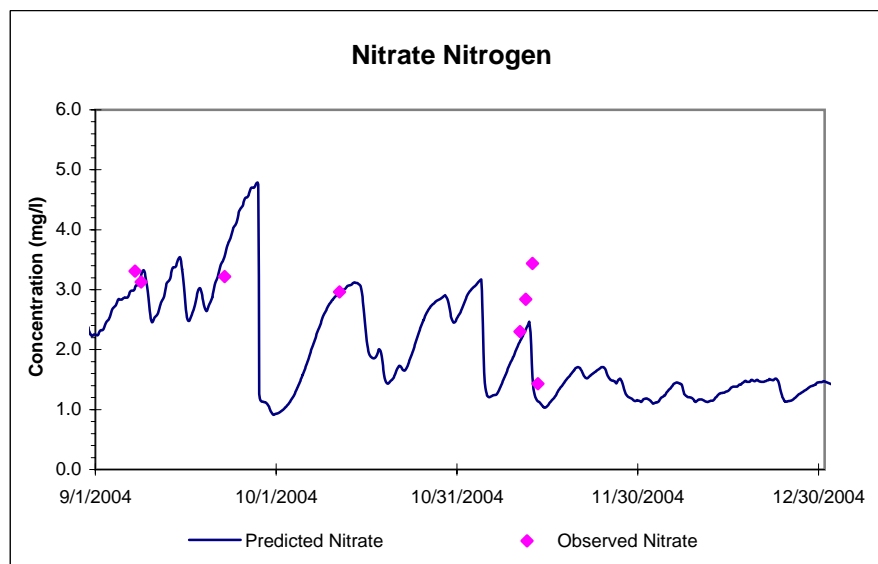
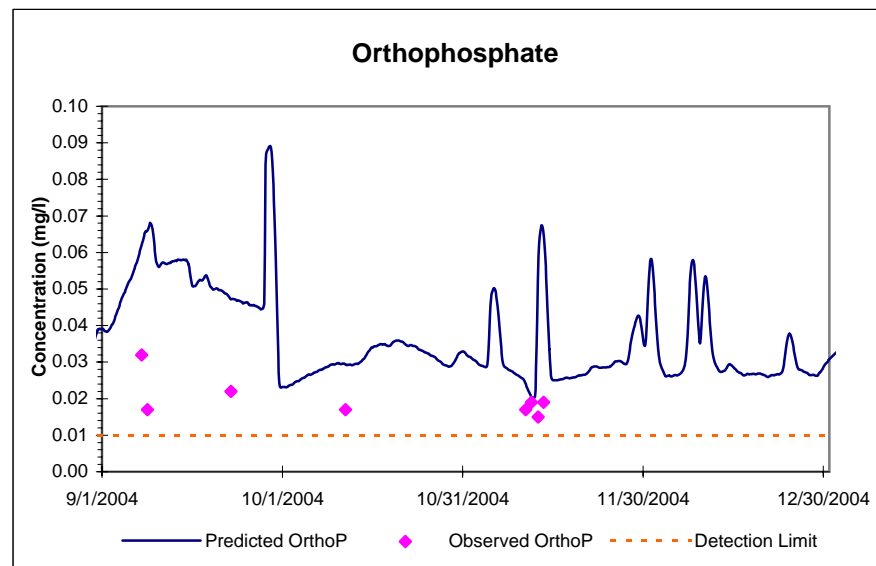
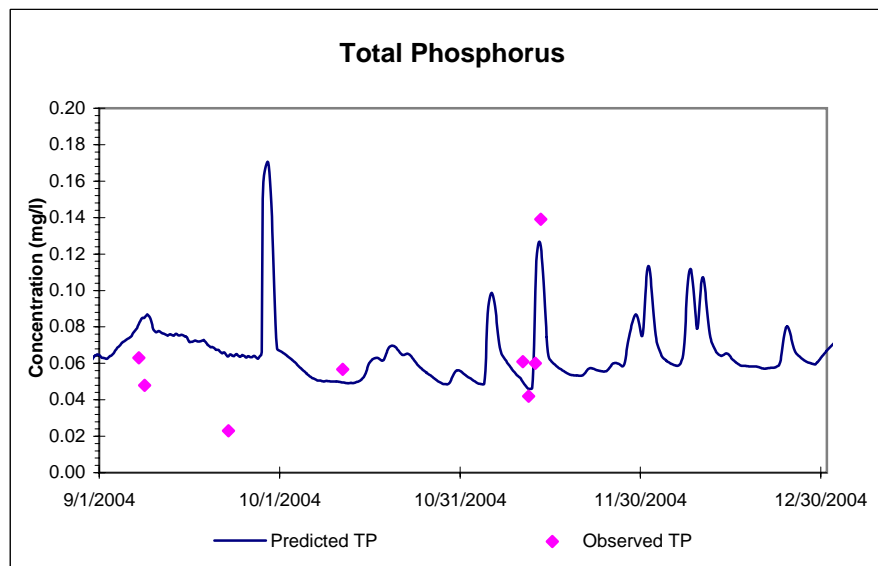
## Cranbury Brook at Plainsboro Pond Outlet (CB3)



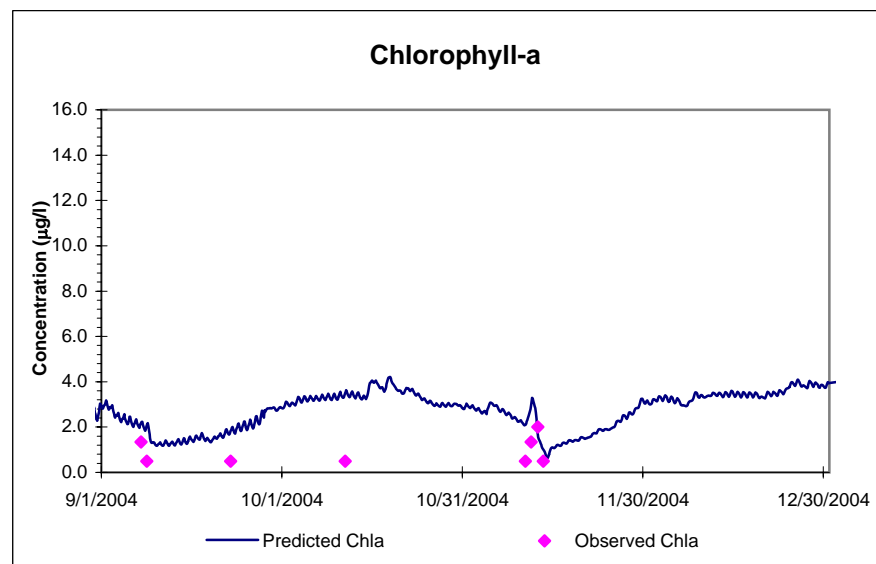
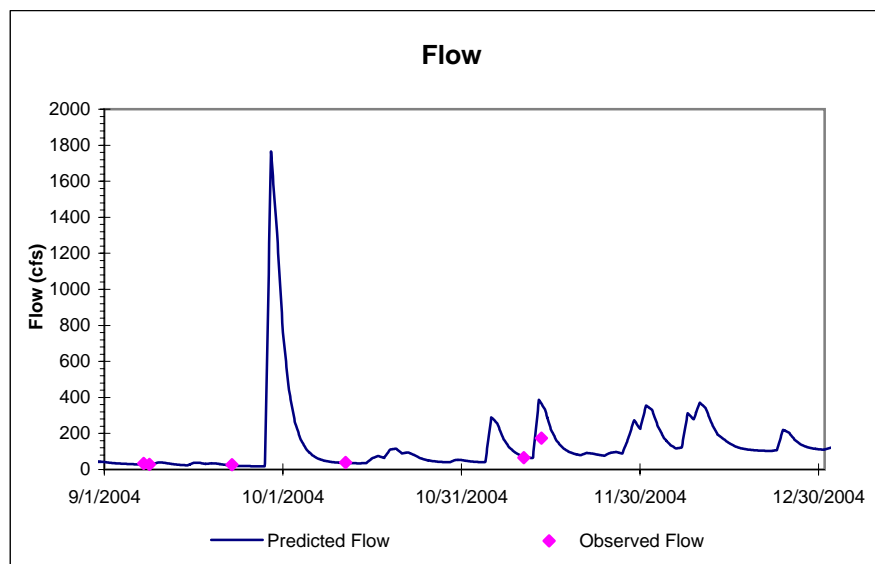
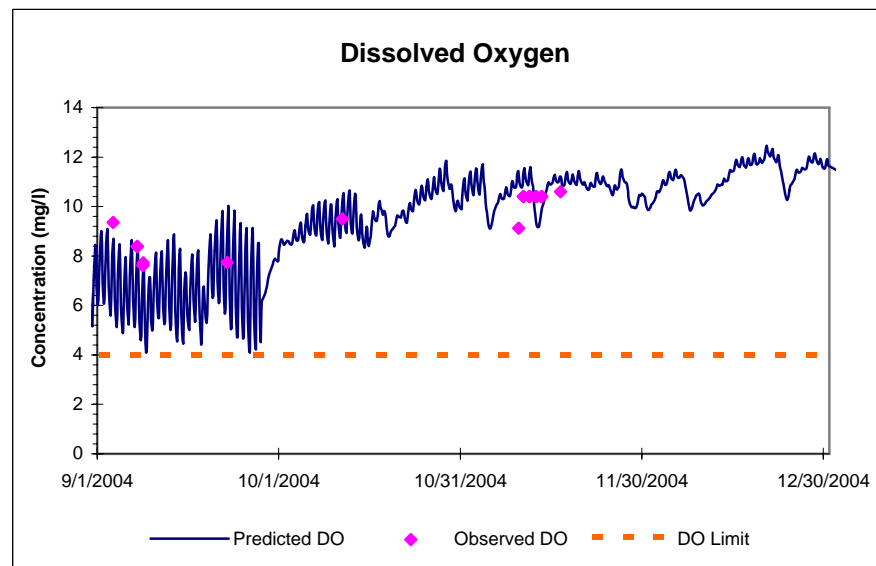
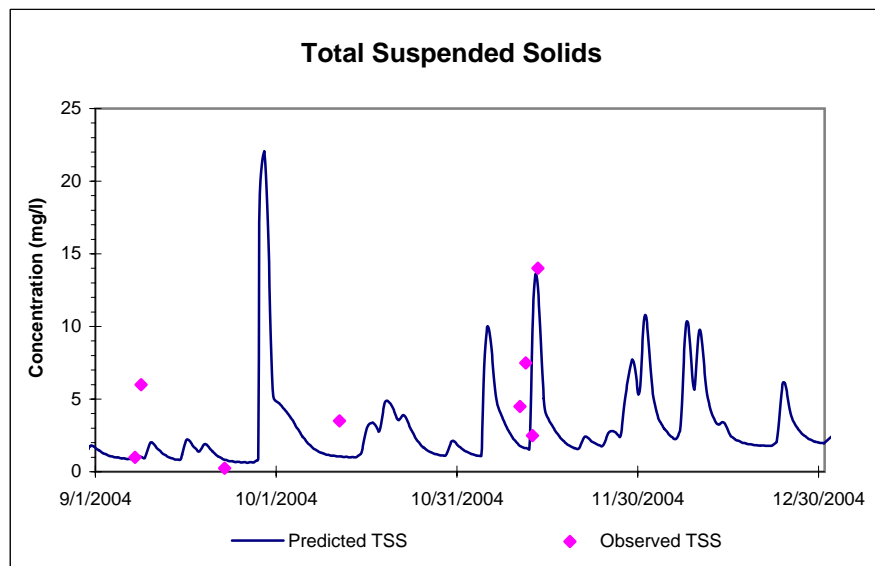
## Cranbury Brook at Plainsboro Pond Outlet (CB3)



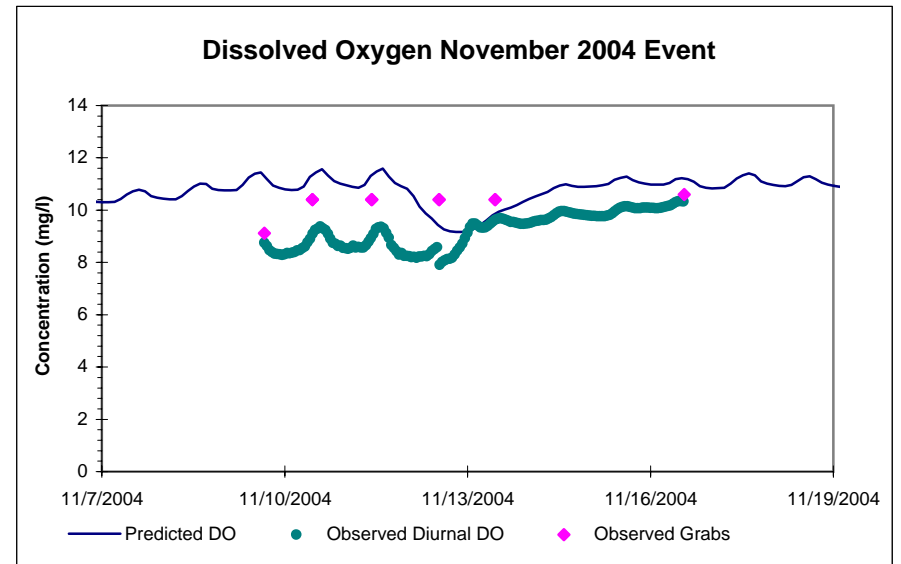
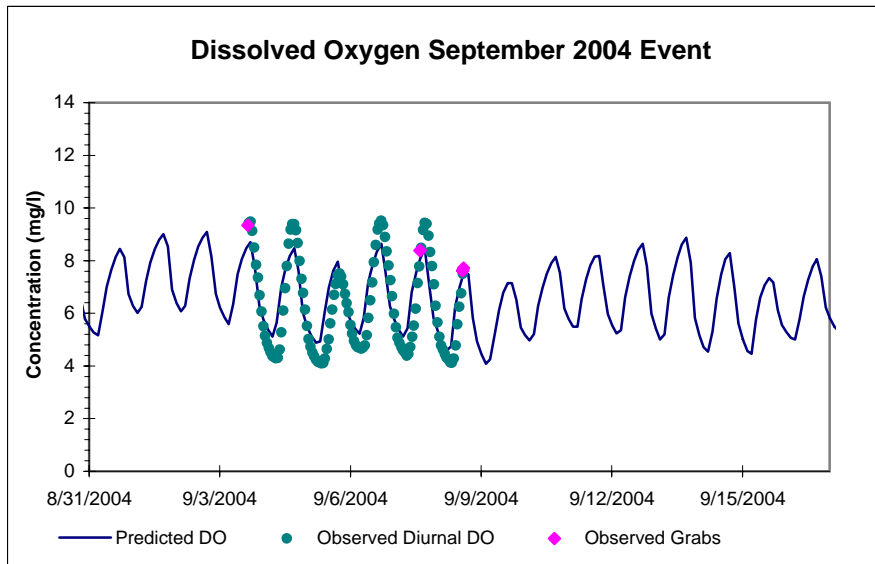
## Upper Millstone River Downstream of Railroad Crossing near Princeton Junction (UMR3)



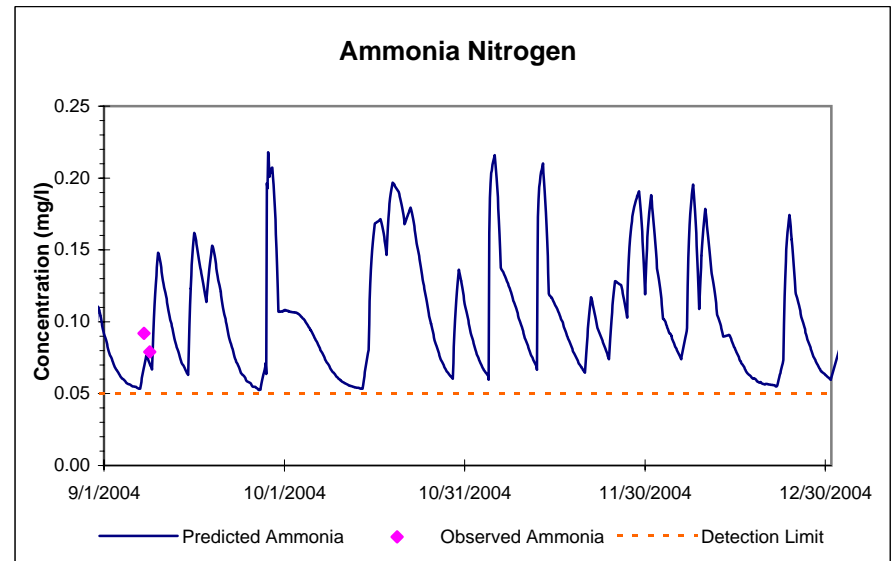
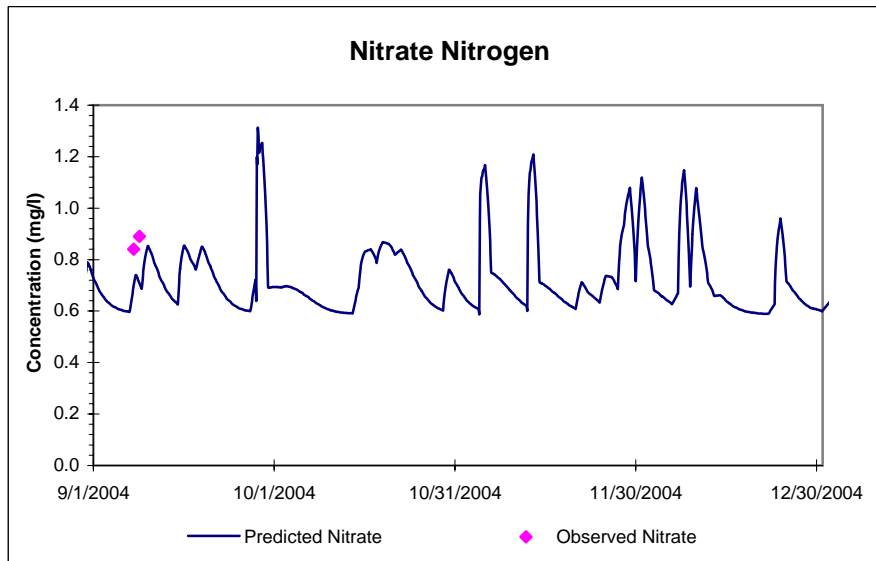
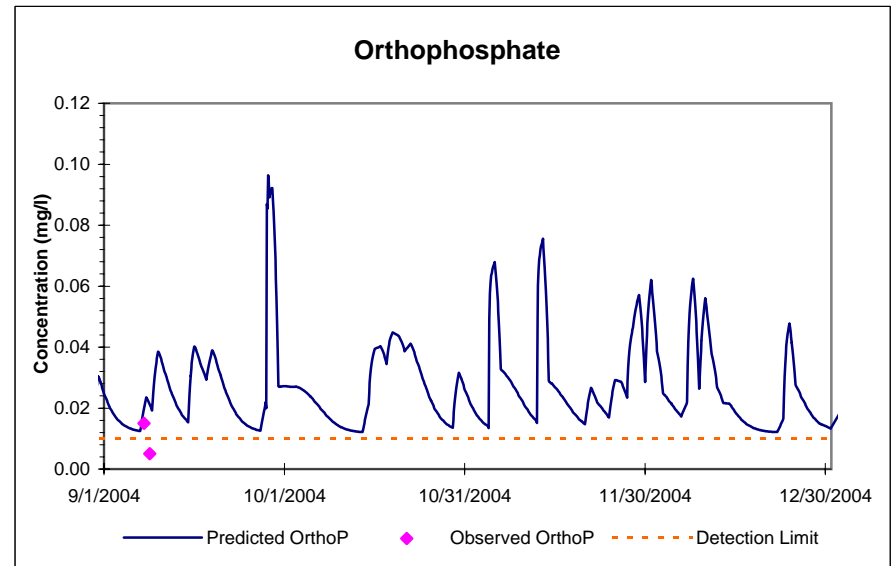
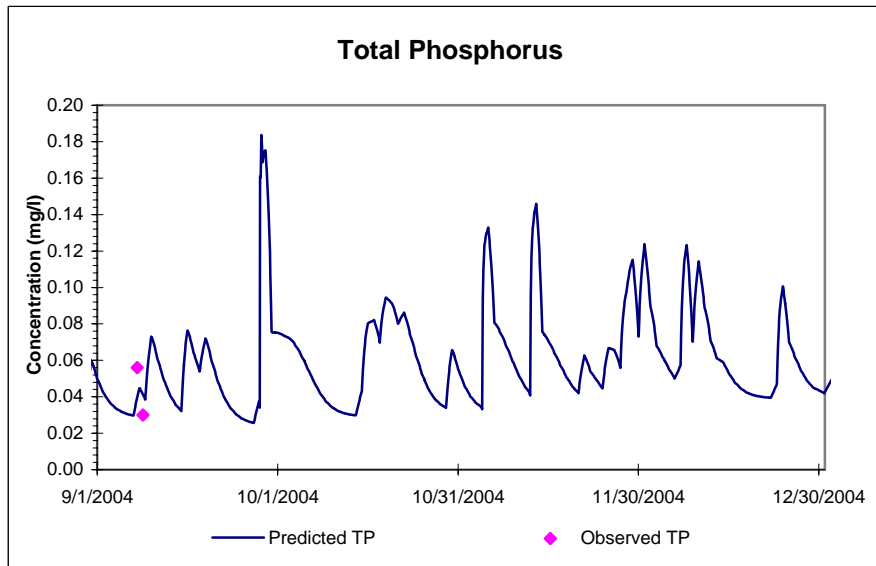
## Upper Millstone River Downstream of Railroad Crossing near Princeton Junction (UMR3)



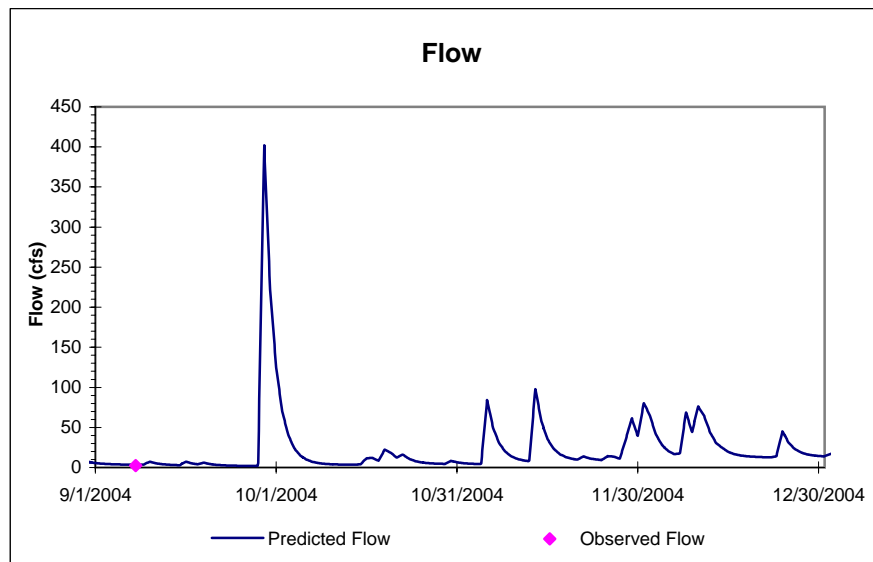
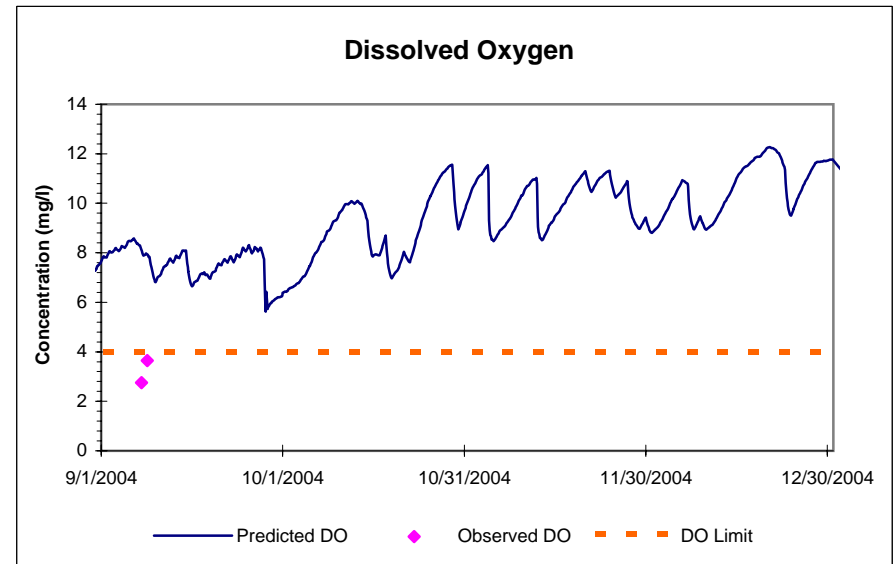
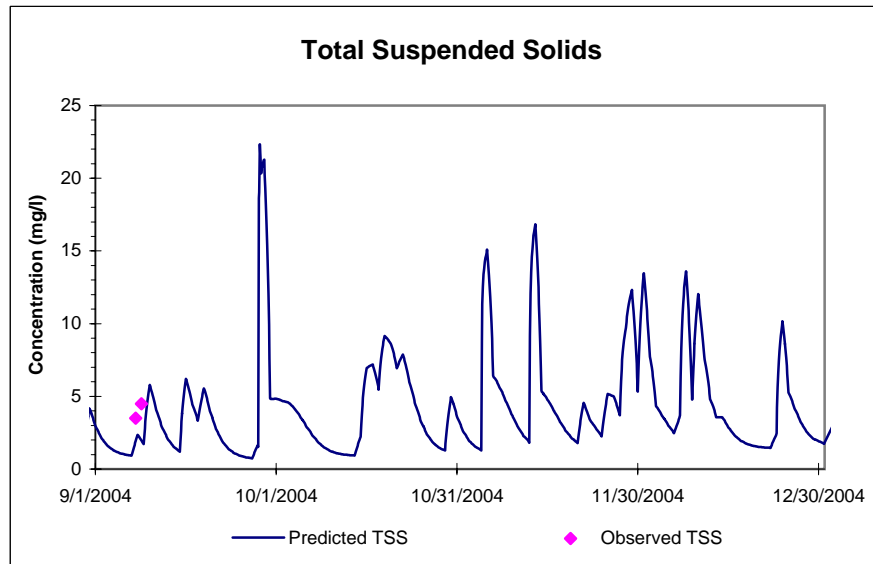
## Upper Millstone River Downstream of Railroad Crossing near Princeton Junction (UMR3)



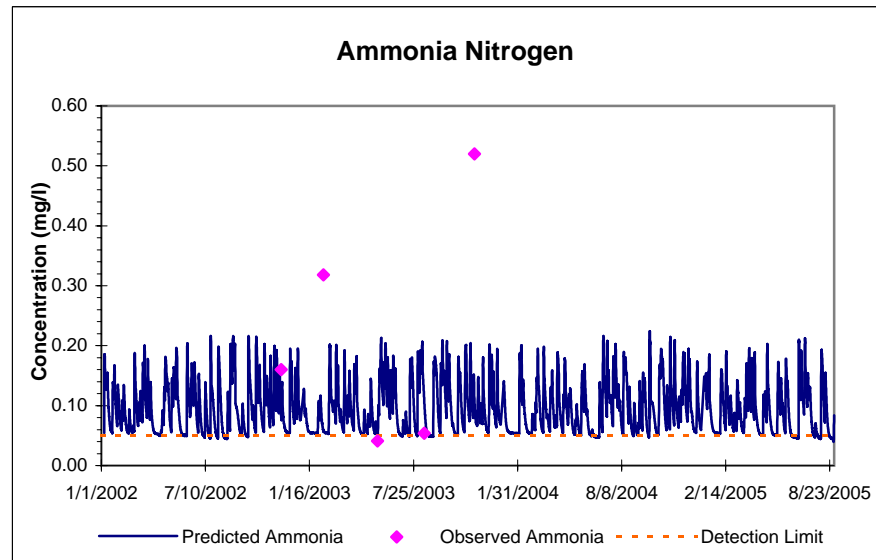
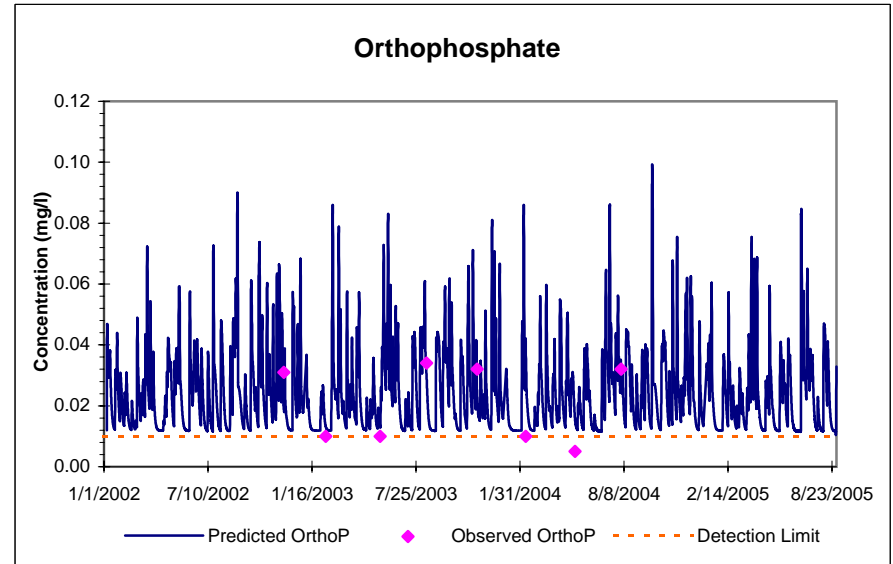
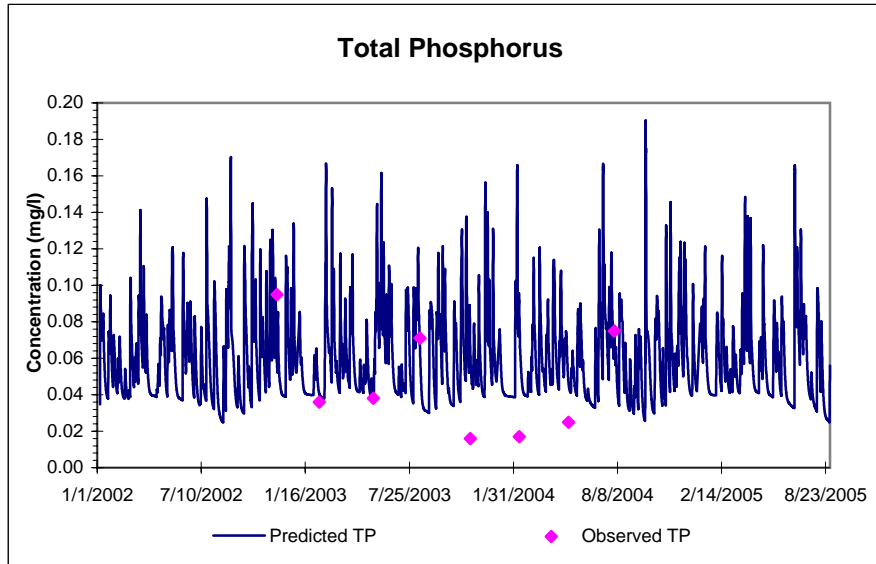
## Big Bear Brook at Grovers Mill Pond Outlet (BBB3)



## Big Bear Brook at Grovers Mill Pond Outlet (BBB3)

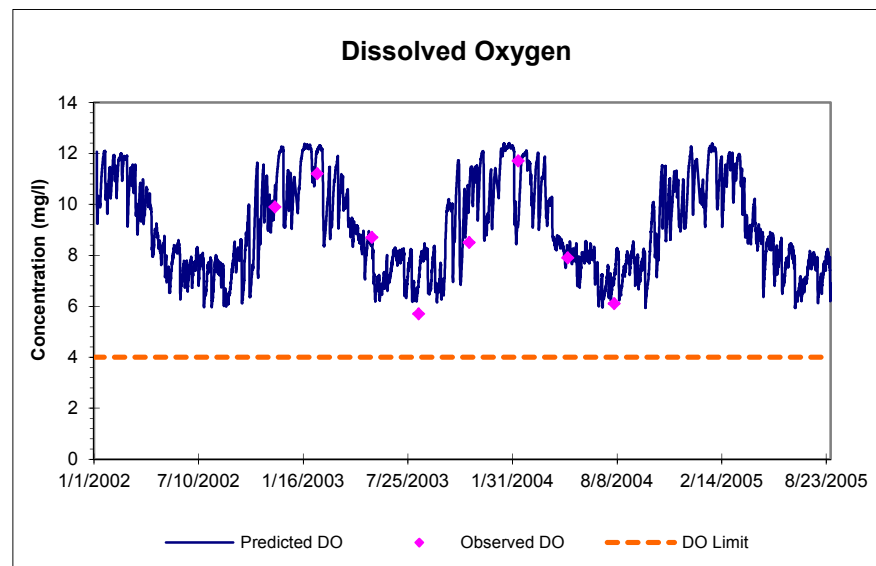
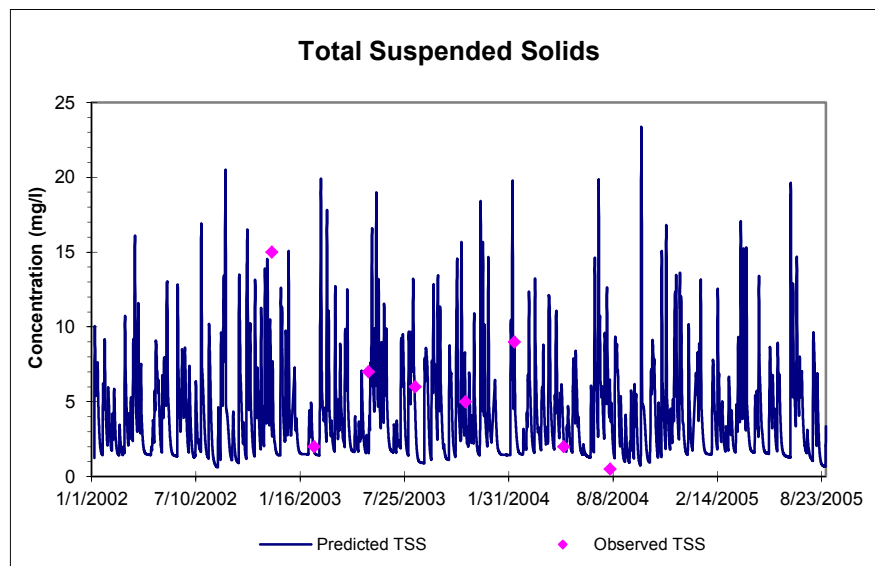


## Big Bear Brook at Cranbury Rd. near Grovers Mill

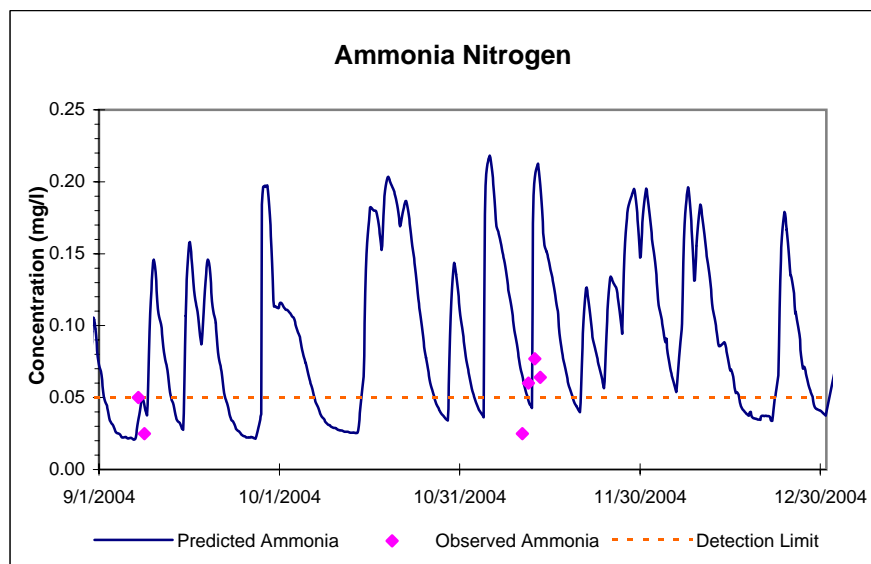
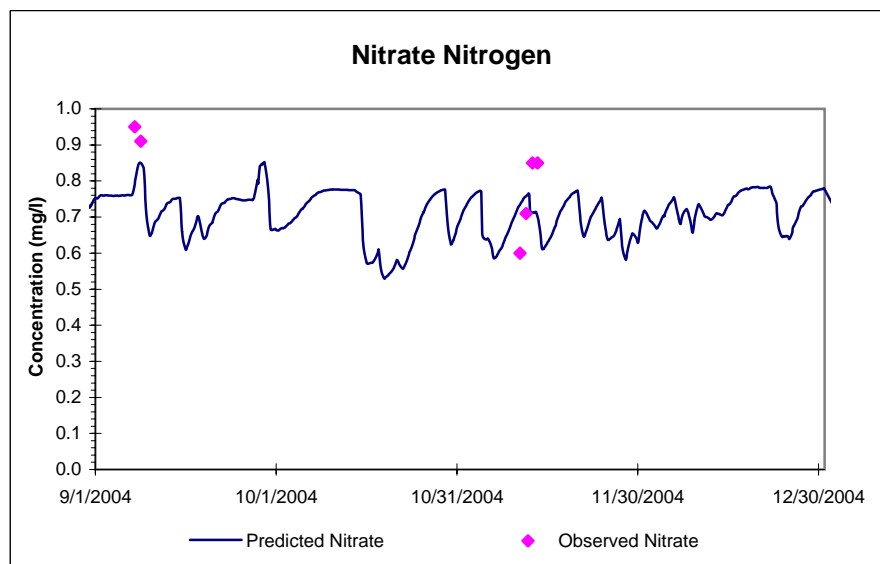
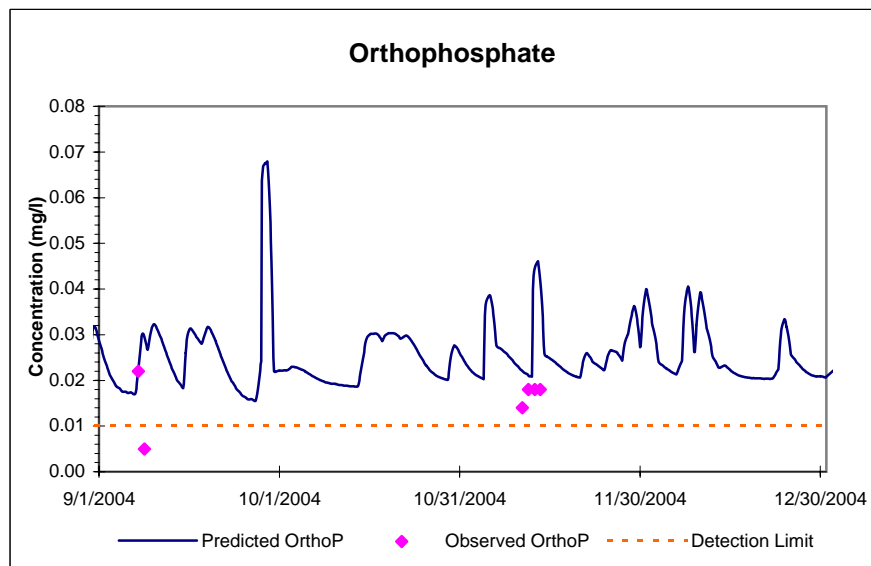
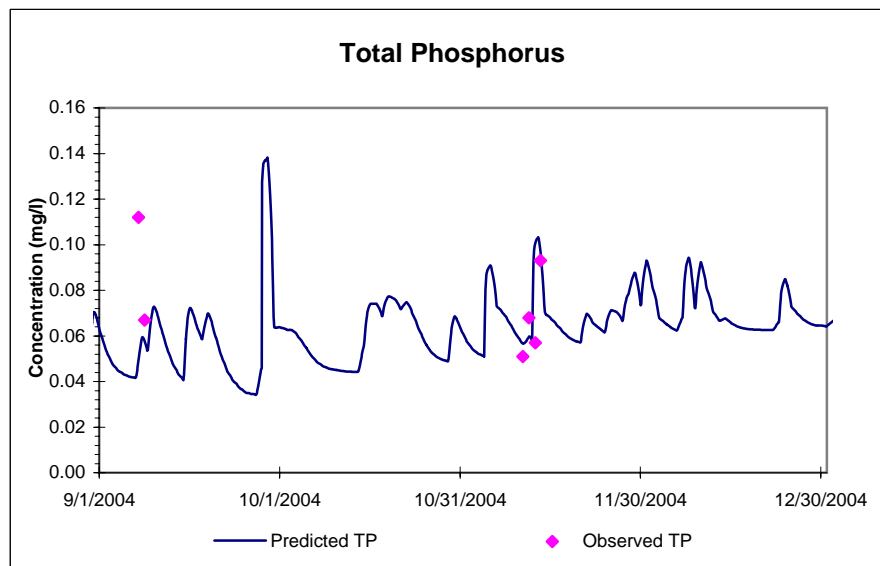




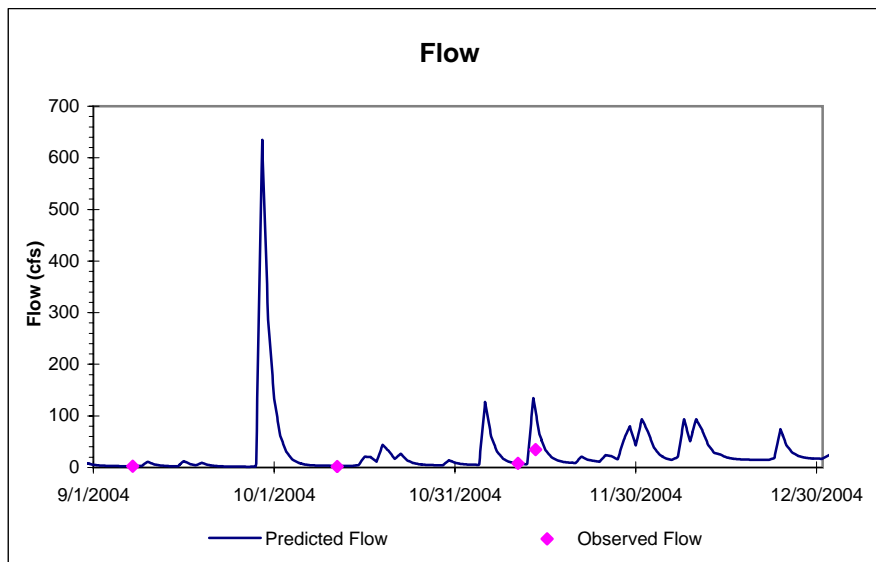
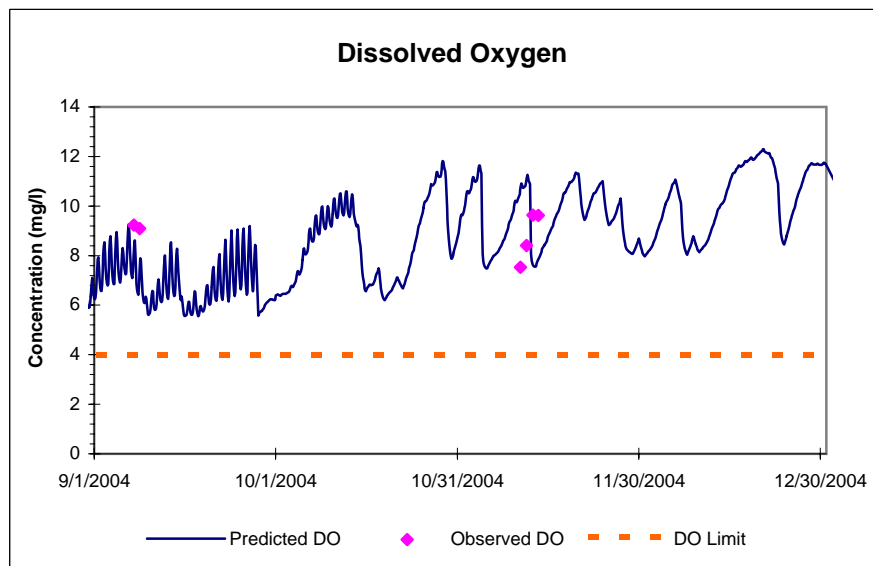
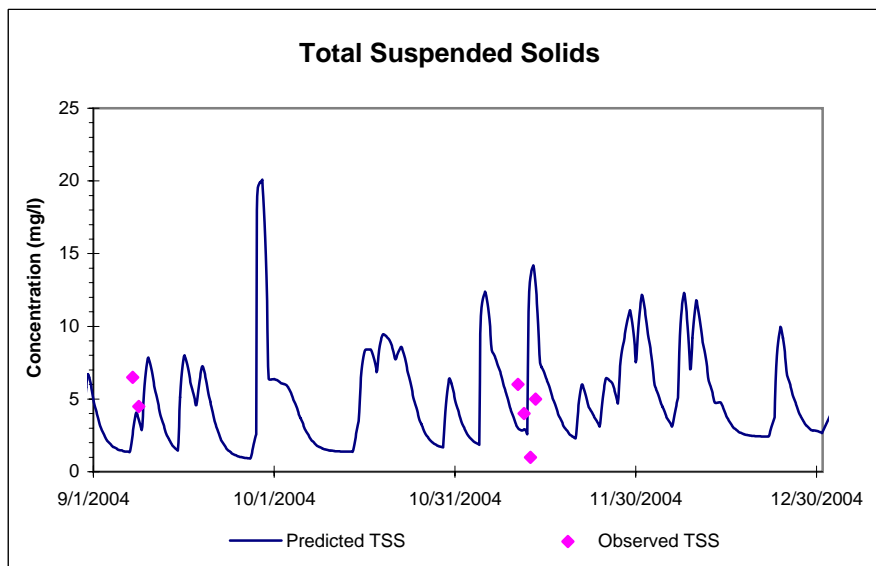
## Big Bear Brook at Cranbury Rd. near Grovers Mill



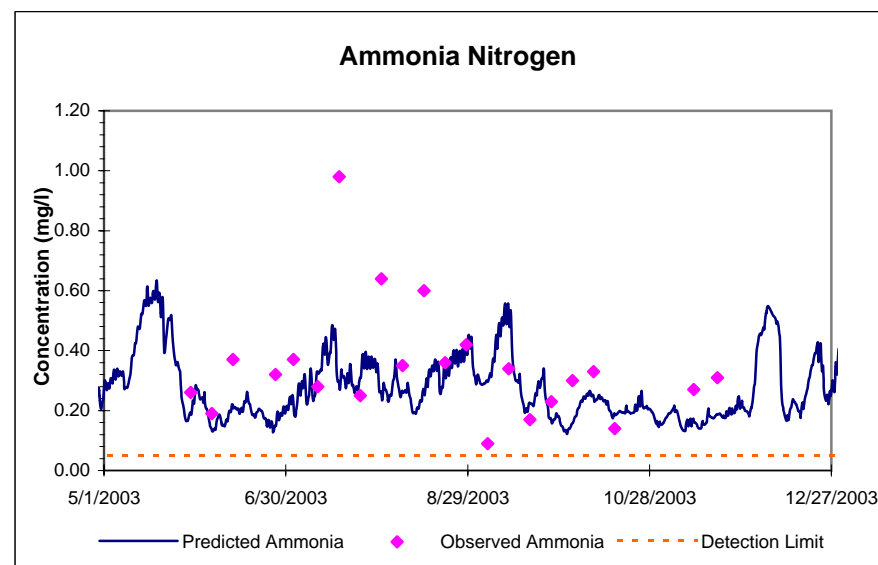
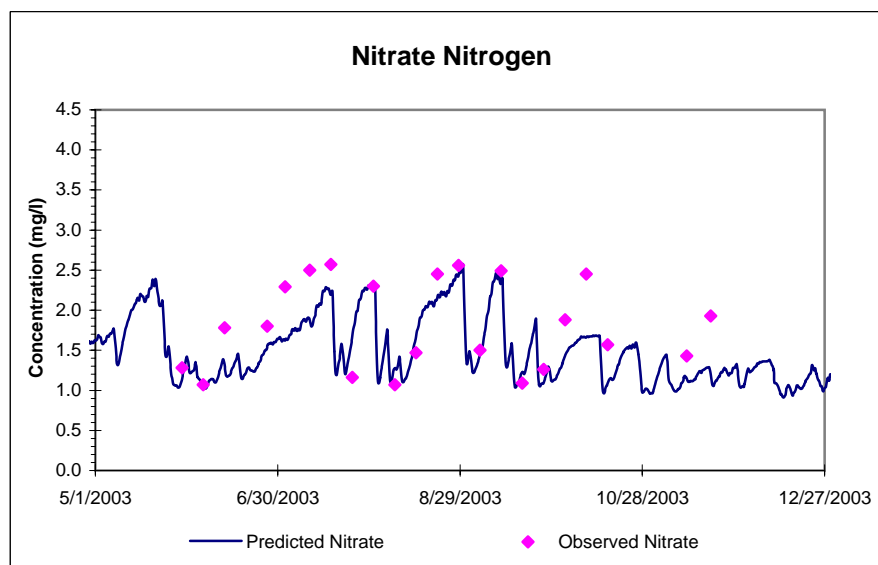
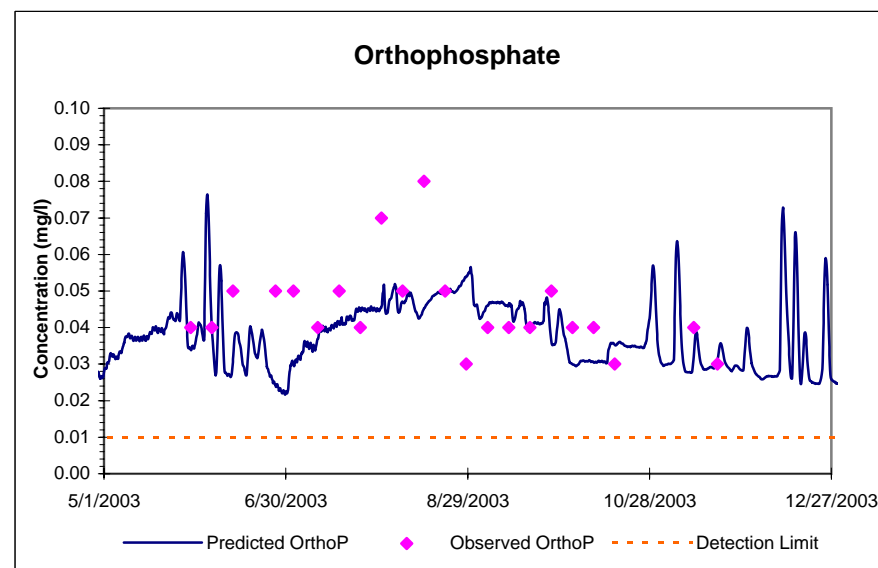
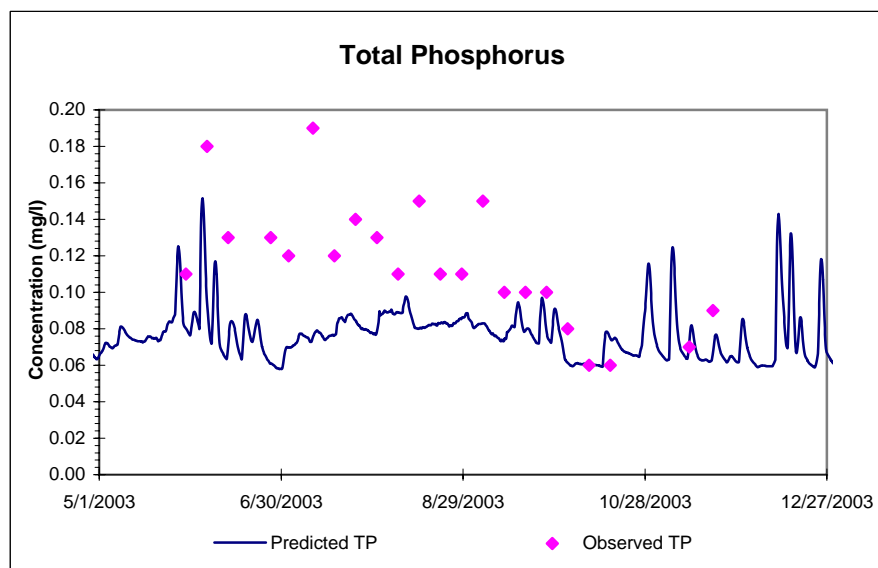
## Devils Brook at Gordon Pond Outlet in Plainsboro (DB3)



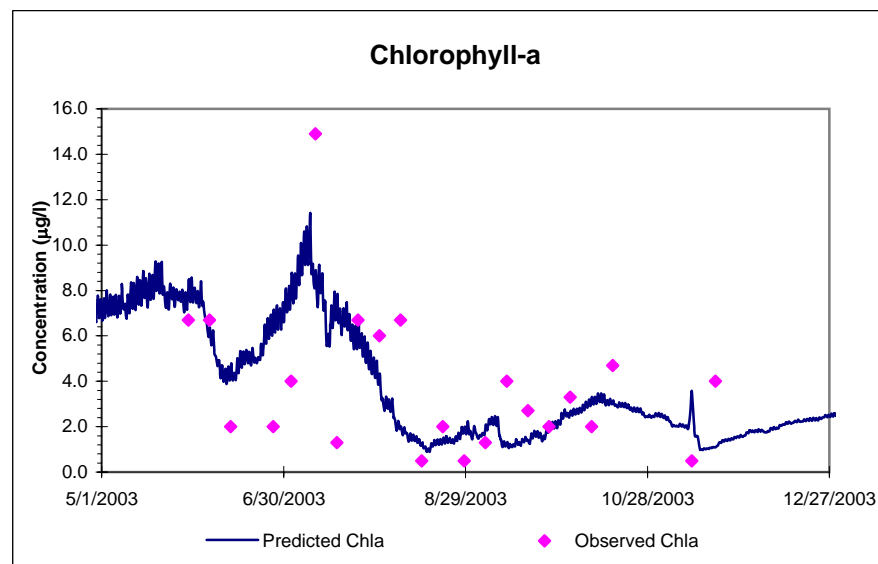
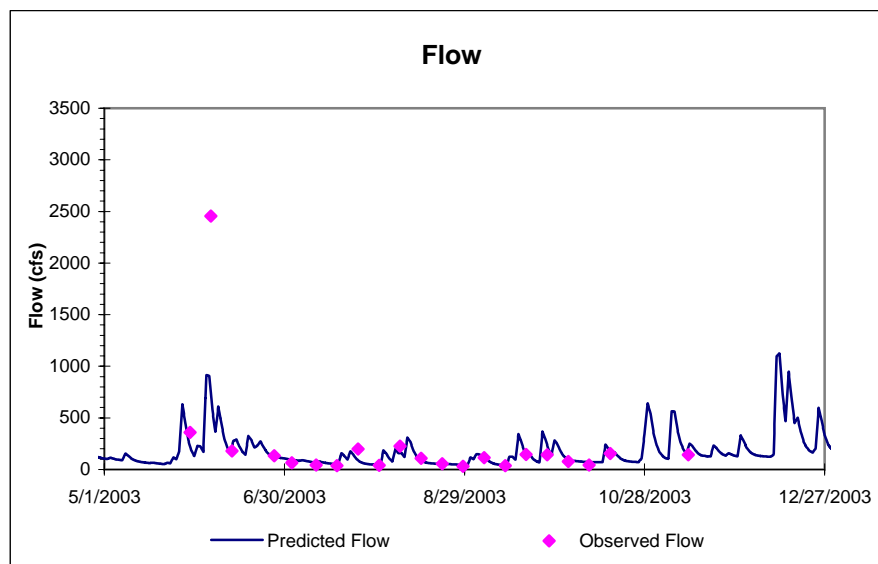
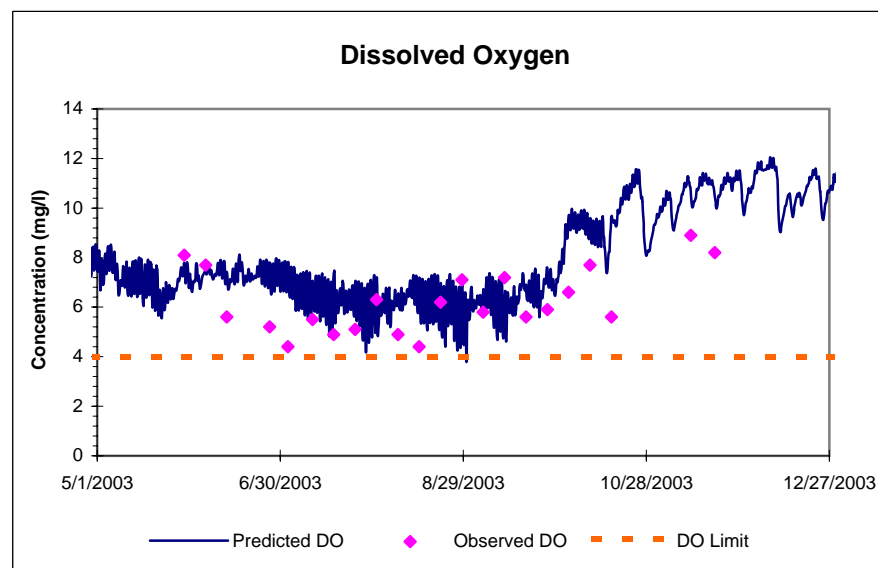
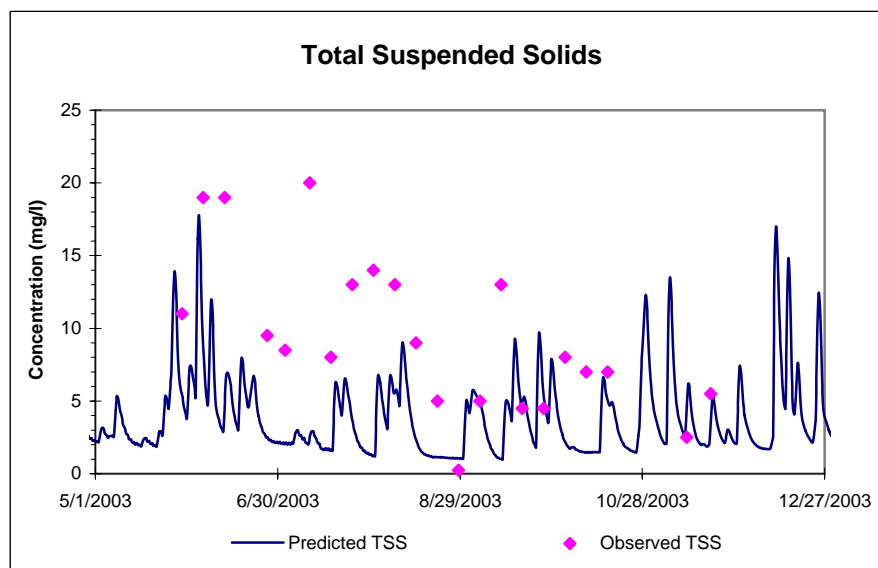
## Devils Brook at Gordon Pond Outlet in Plainsboro (DB3)



## Upper Millstone River at Route 1 (M1)

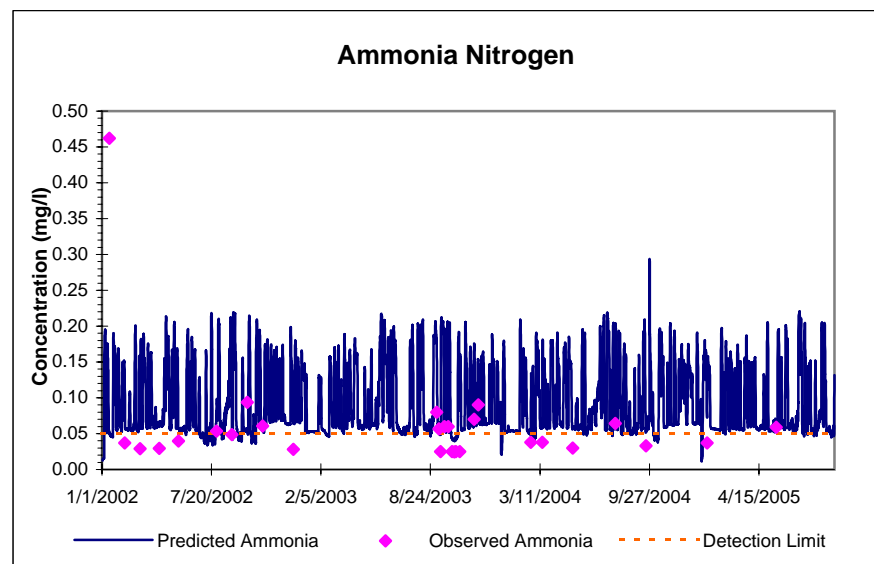
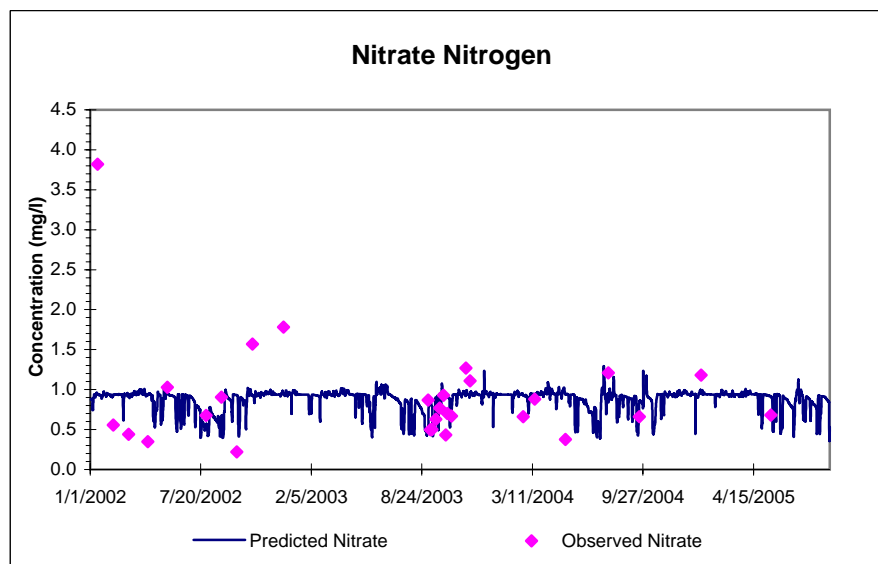
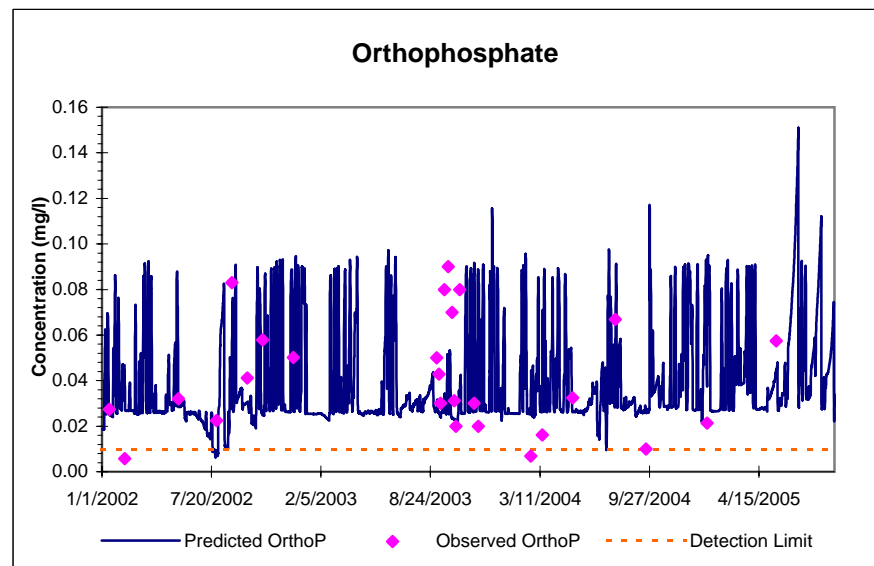
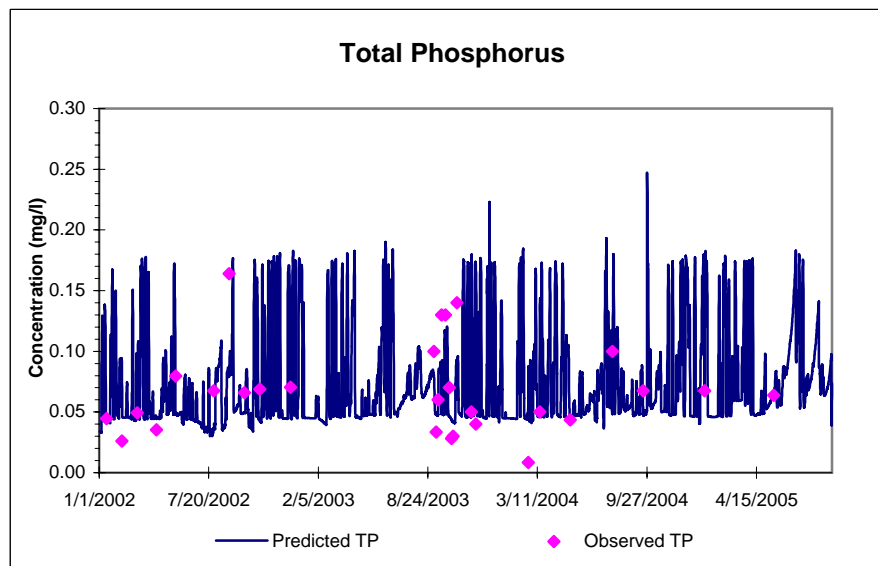


## Upper Millstone River at Route 1 (M1)

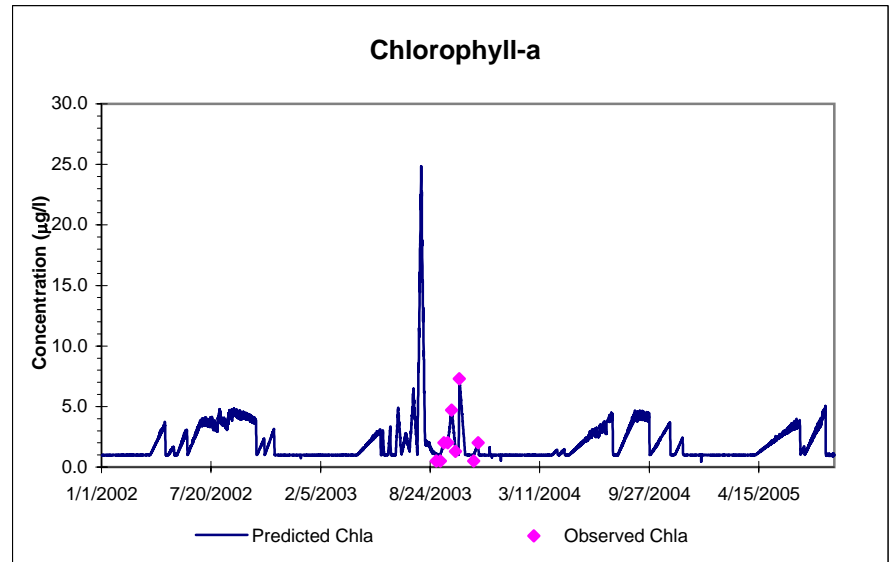
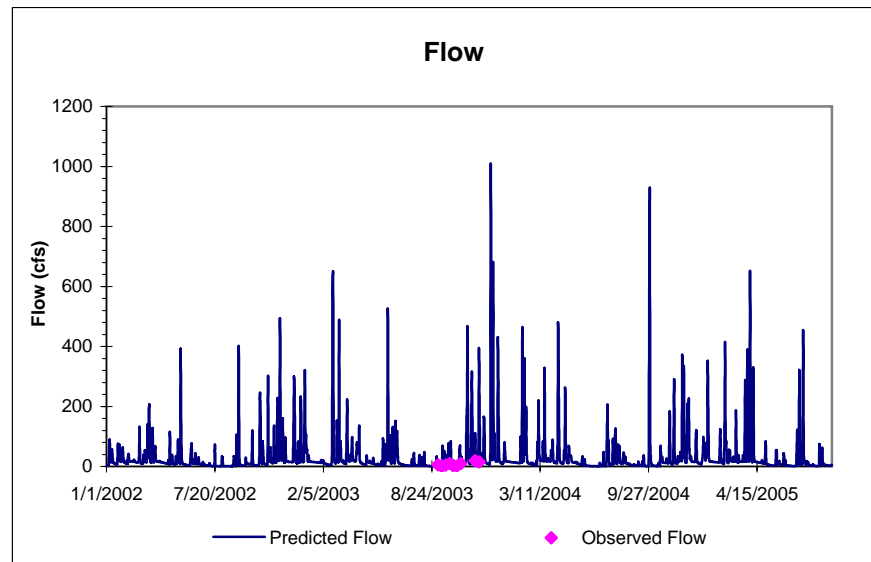
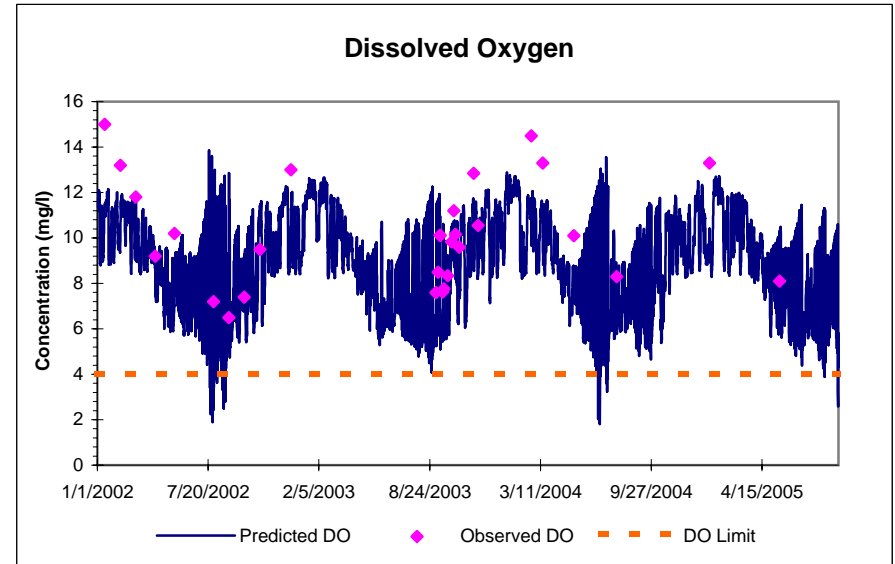
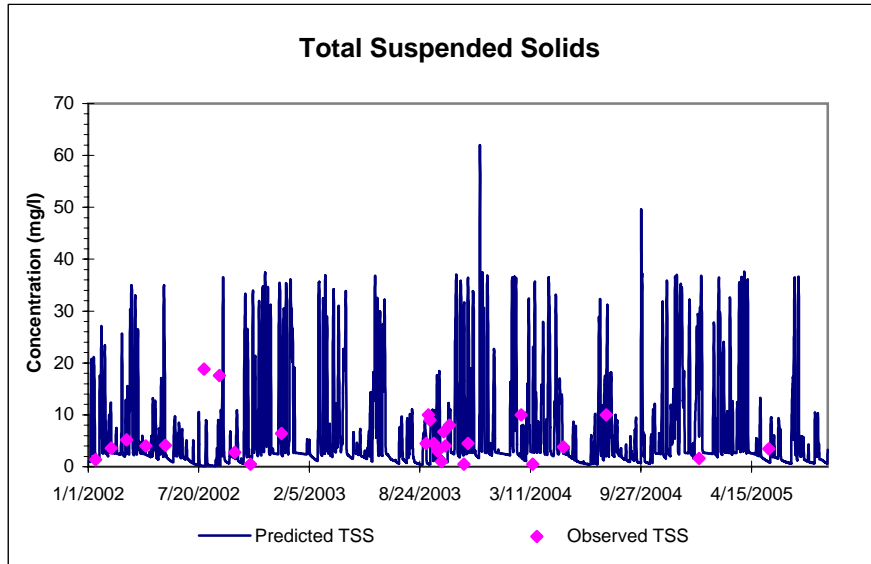


Stony Brook Watershed Area Model  
Water Quality Model Validation Graphs

## Stony Brook Upstream of SBRSA - Pennington STP (SB1)

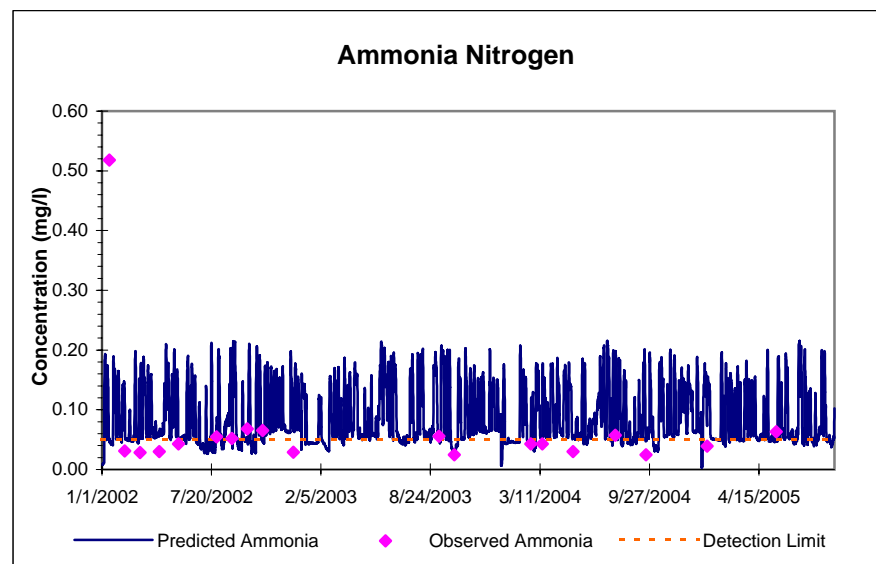
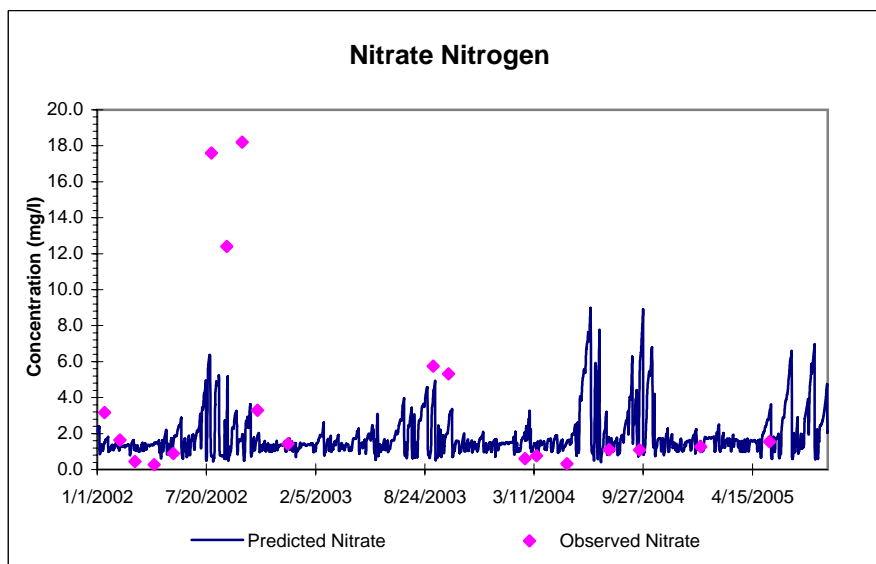
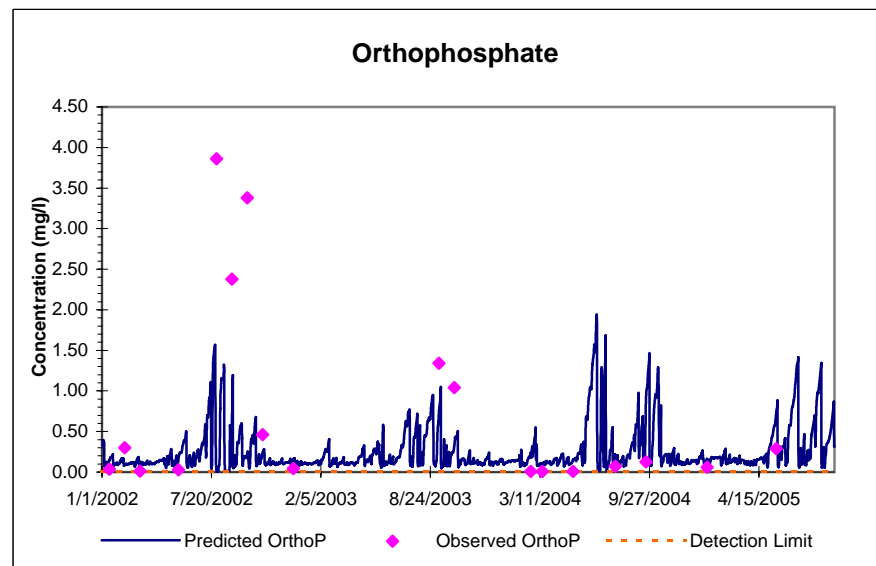
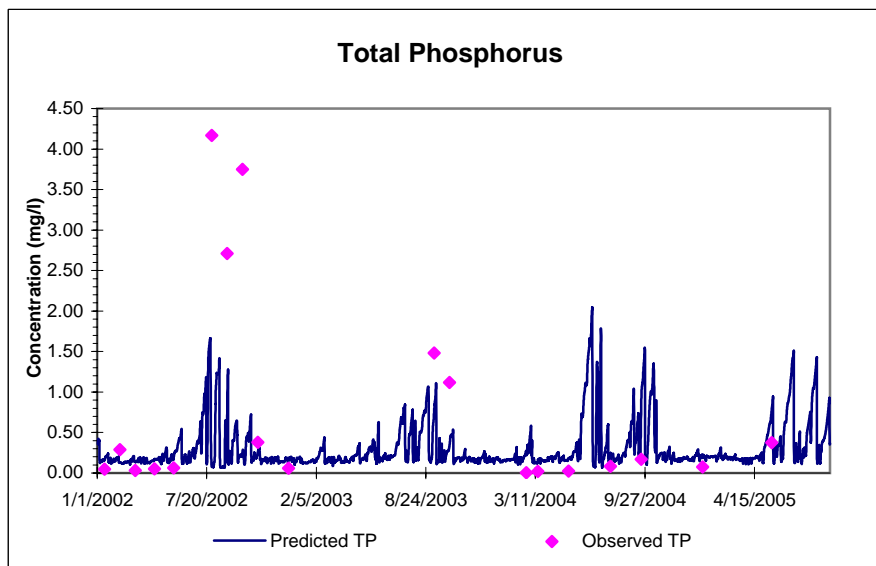


## Stony Brook Upstream of SBRSA - Pennington STP (SB1)

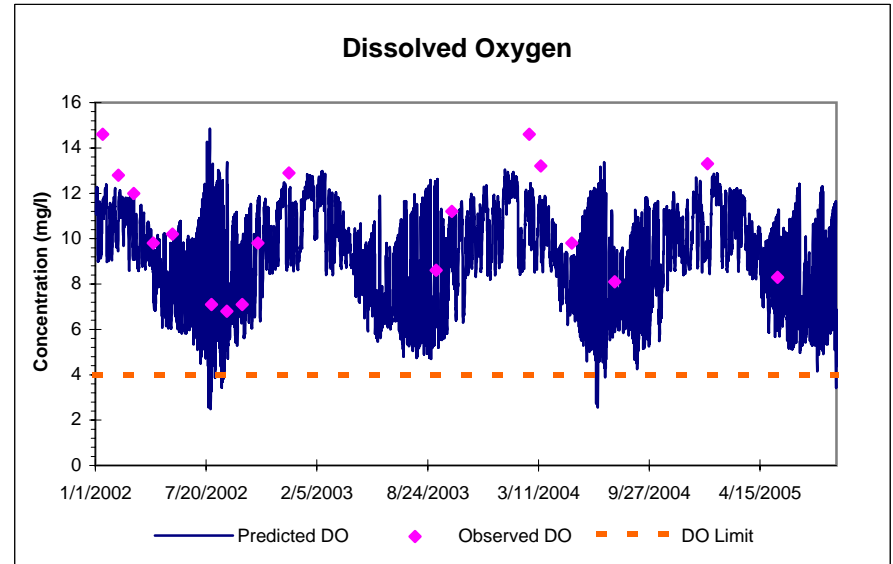
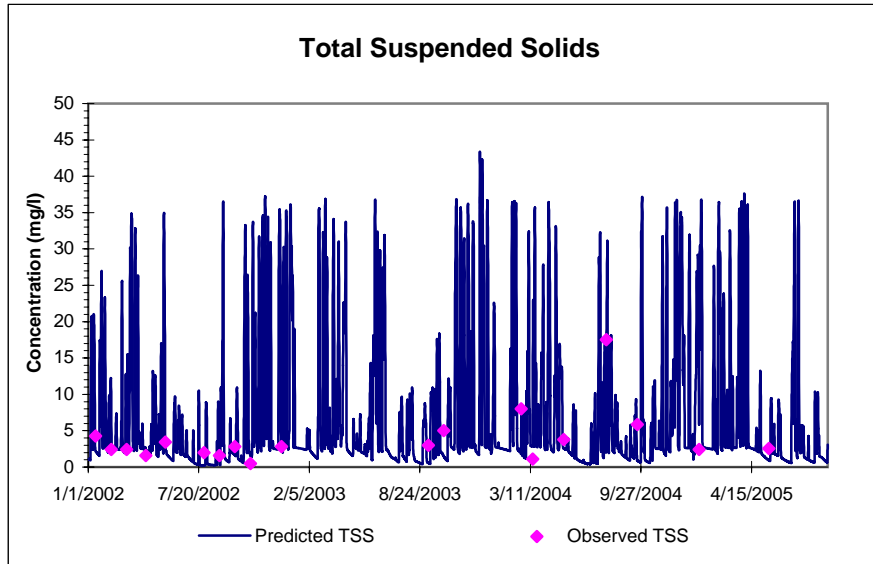




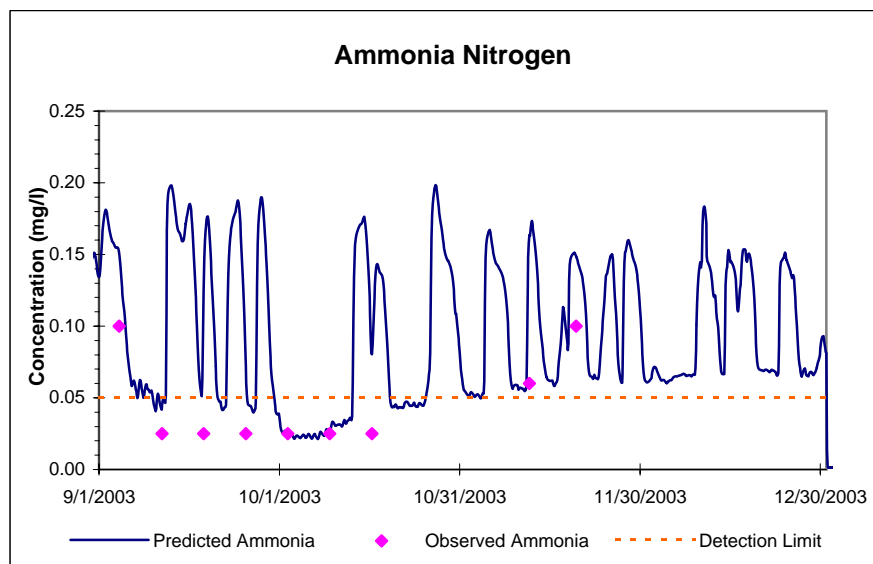
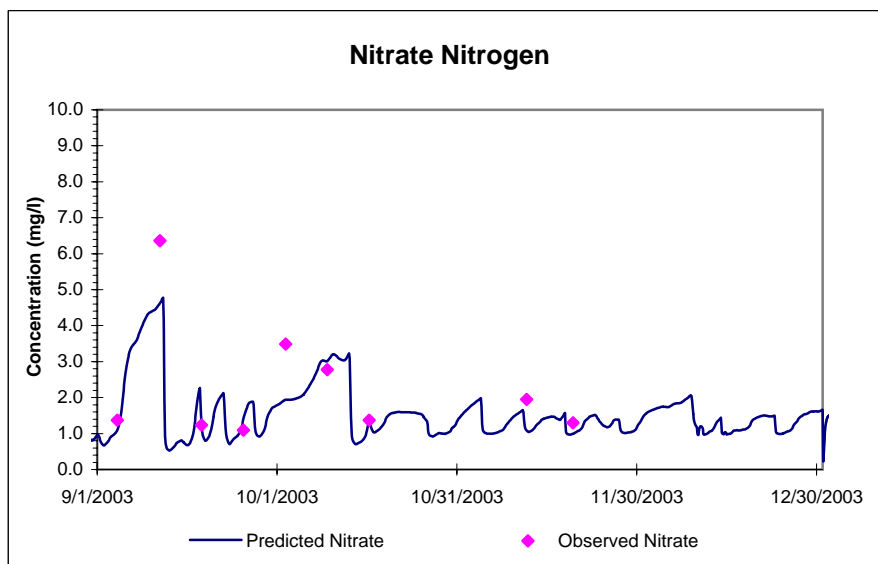
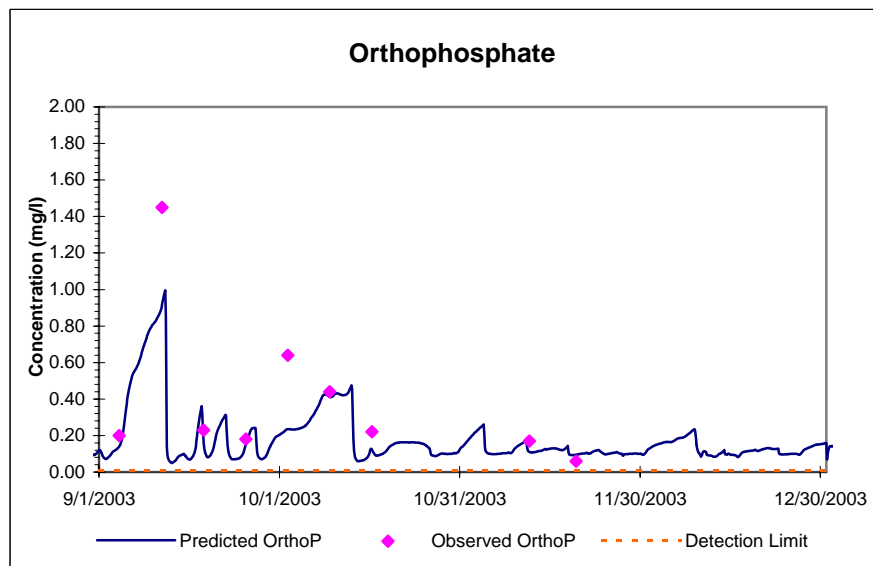
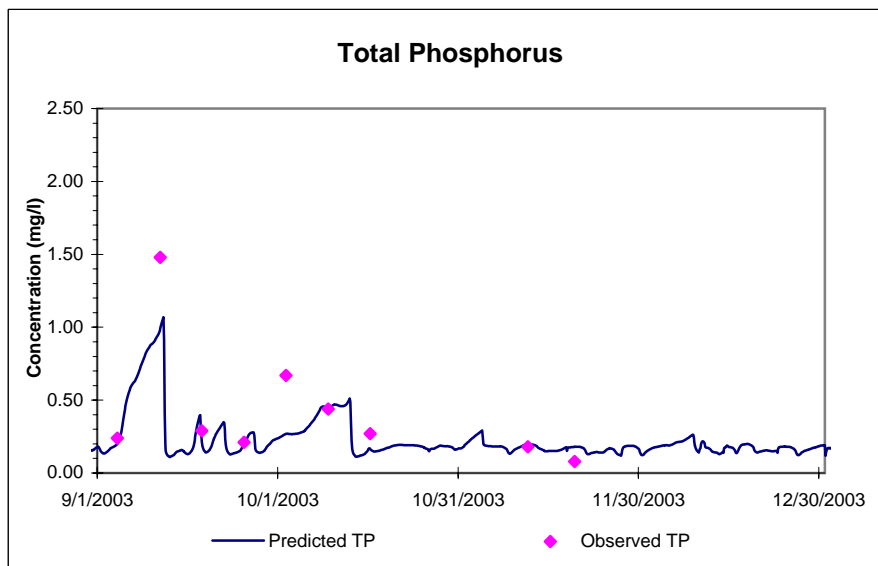
## Stony Brook Downstream of SBRSA - Pennington STP Discharge



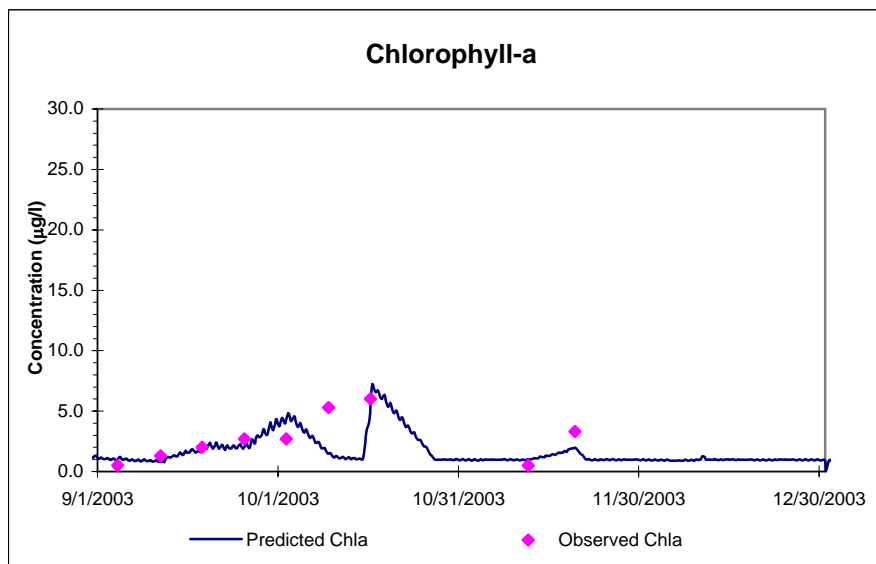
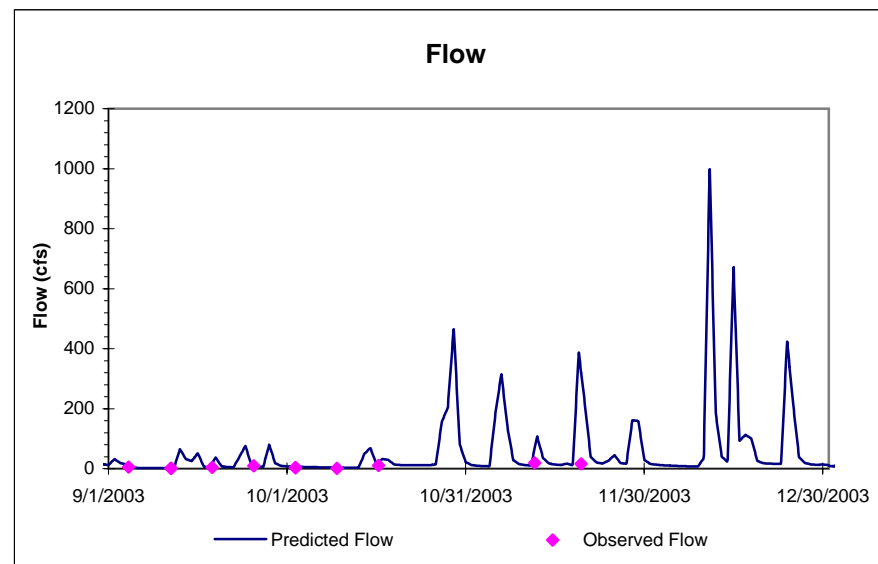
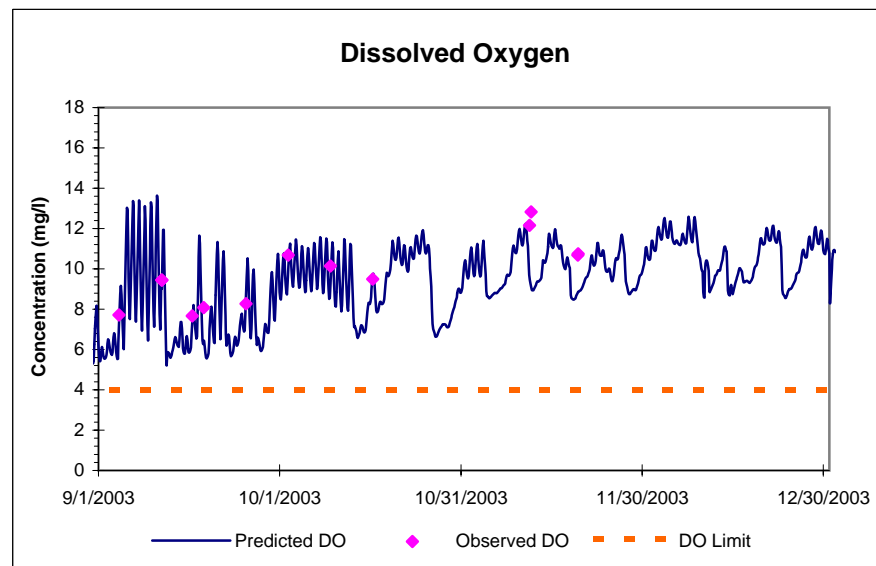
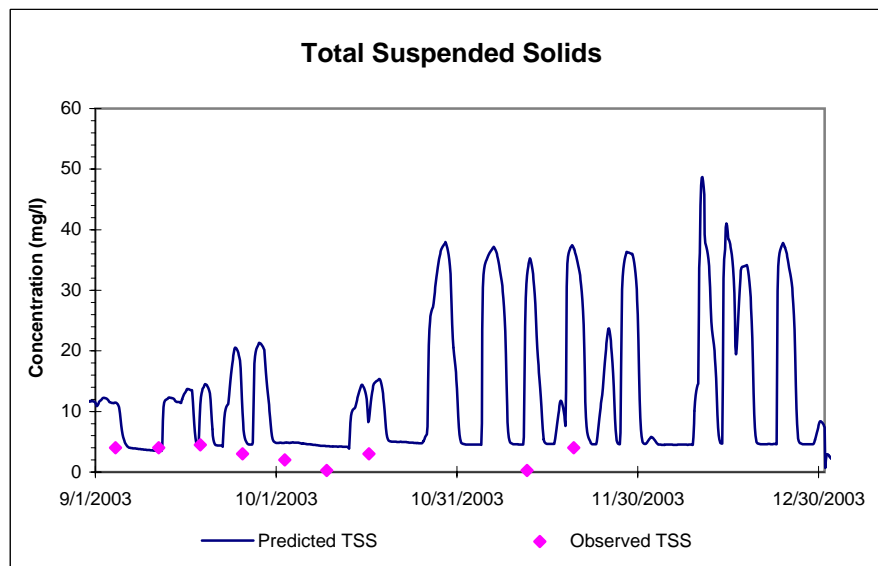
## Stony Brook Downstream of SBRSA - Pennington STP Discharge



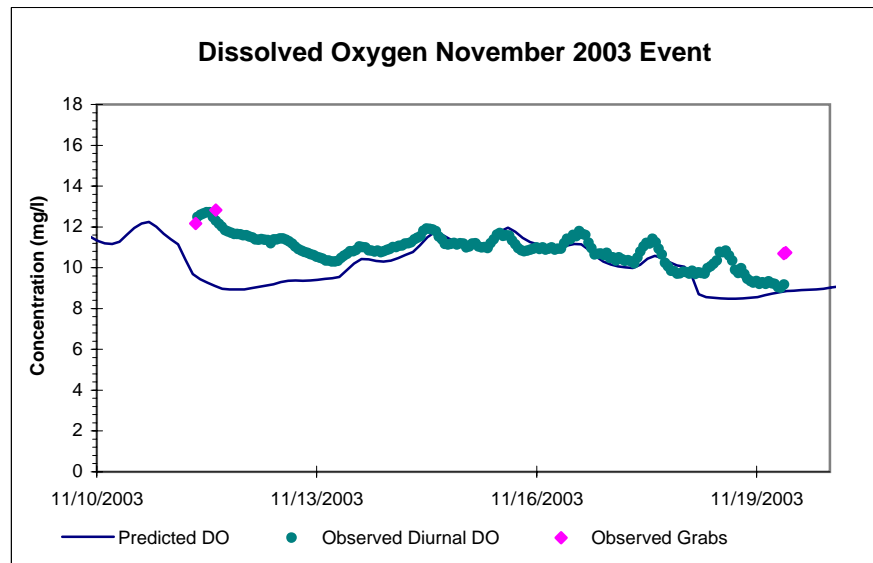
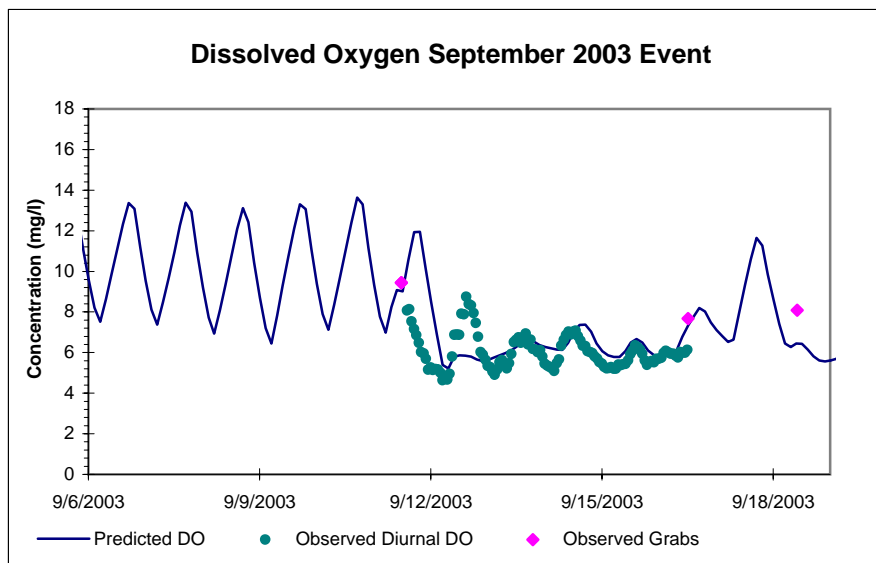
## Stony Brook at Delaware Avenue in Pennington (SB2)



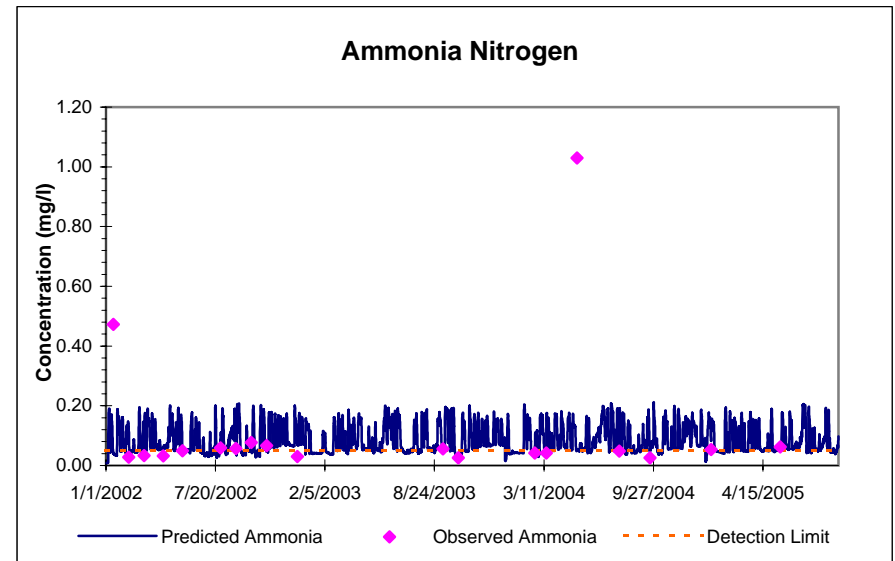
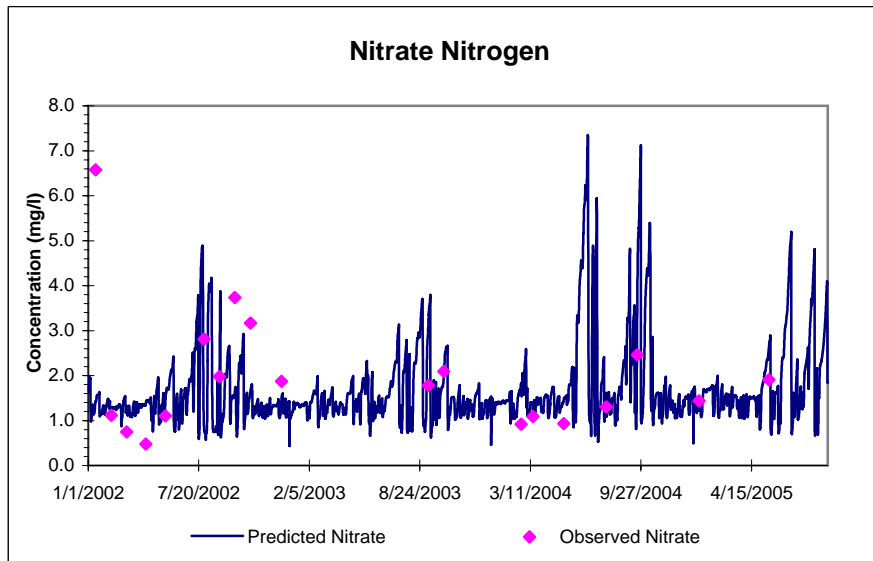
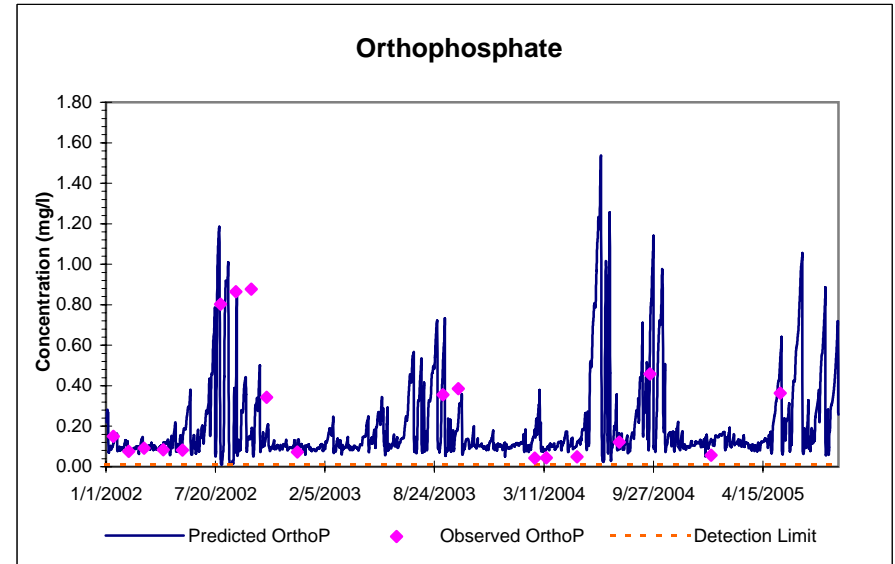
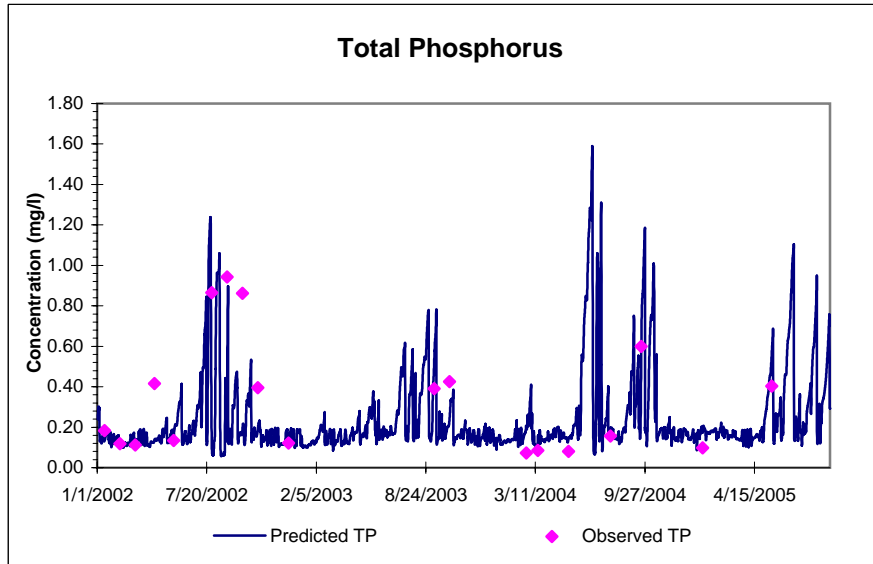
## Stony Brook at Delaware Avenue in Pennington (SB2)



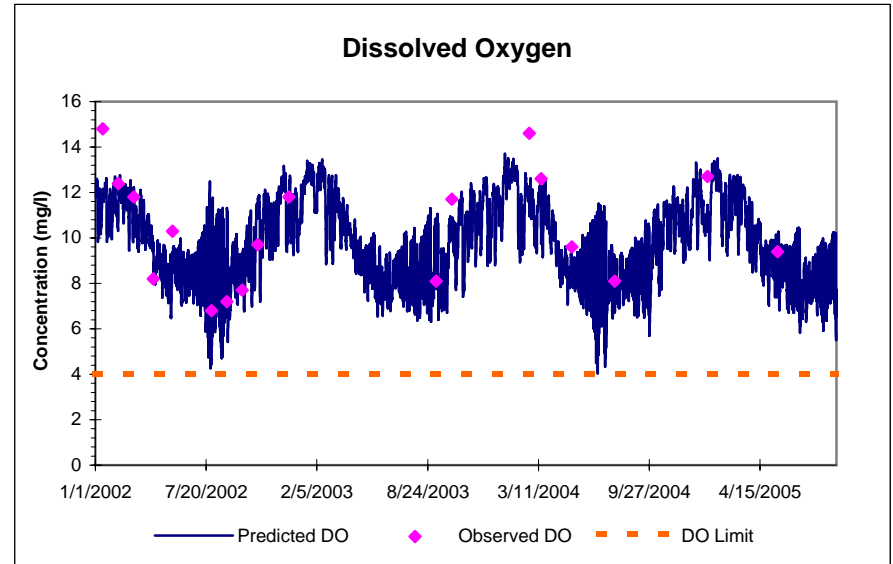
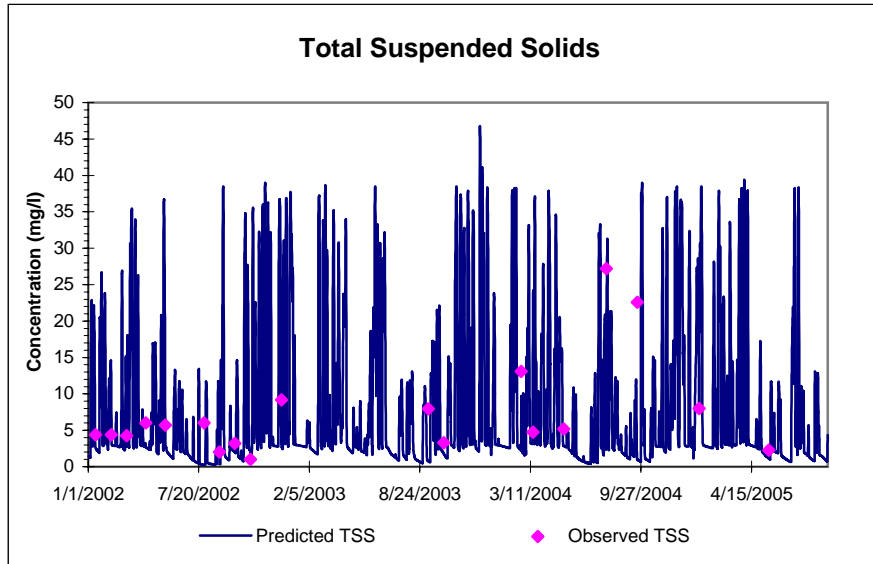
## Stony Brook at Delaware Avenue in Pennington (SB2)



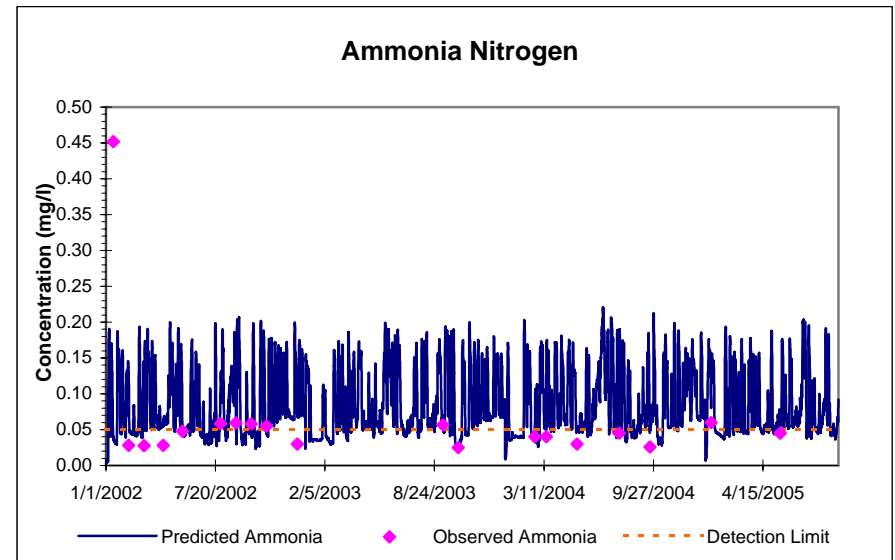
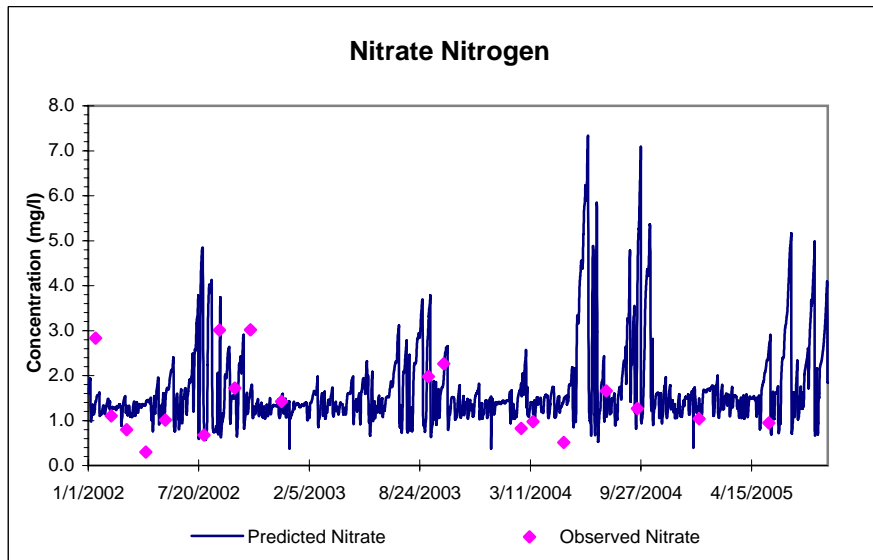
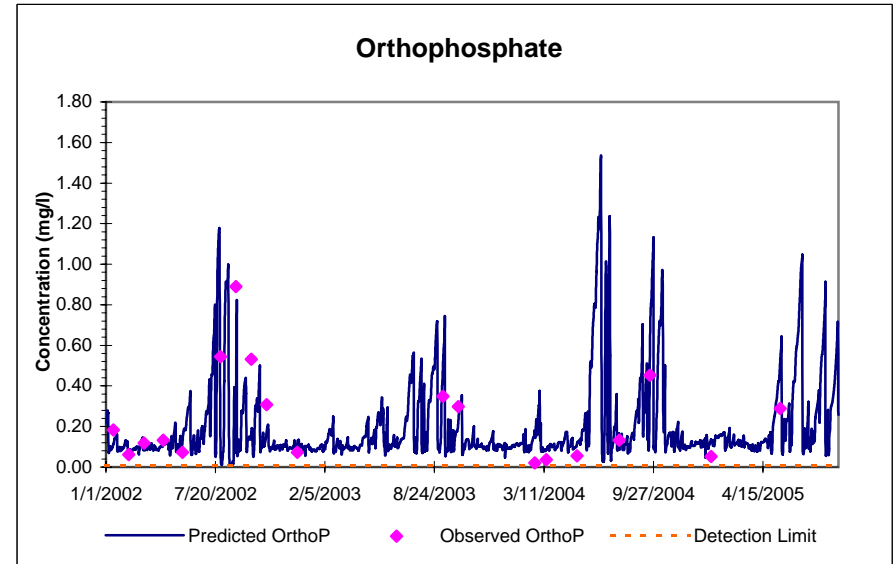
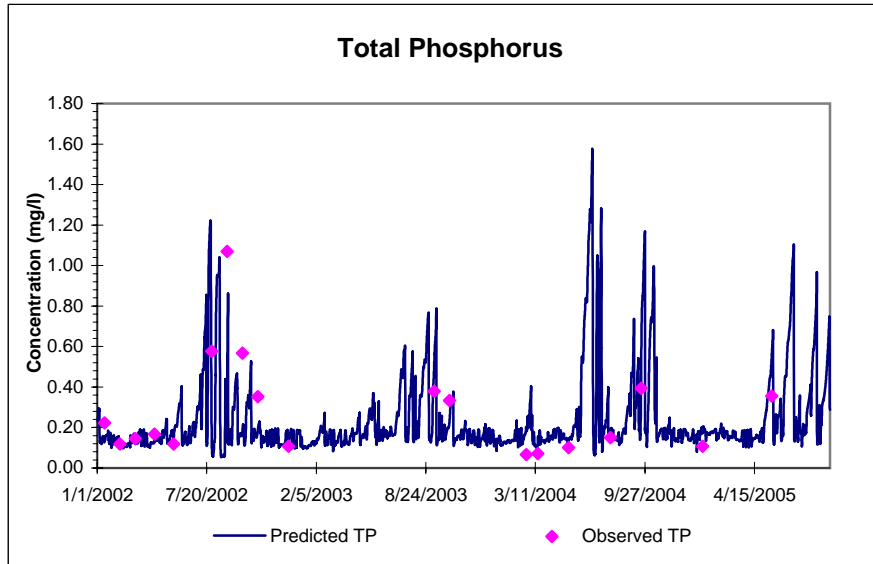
## Stony Brook at Old Mill Rd. in Pennington



# Stony Brook at Old Mill Rd. in Pennington

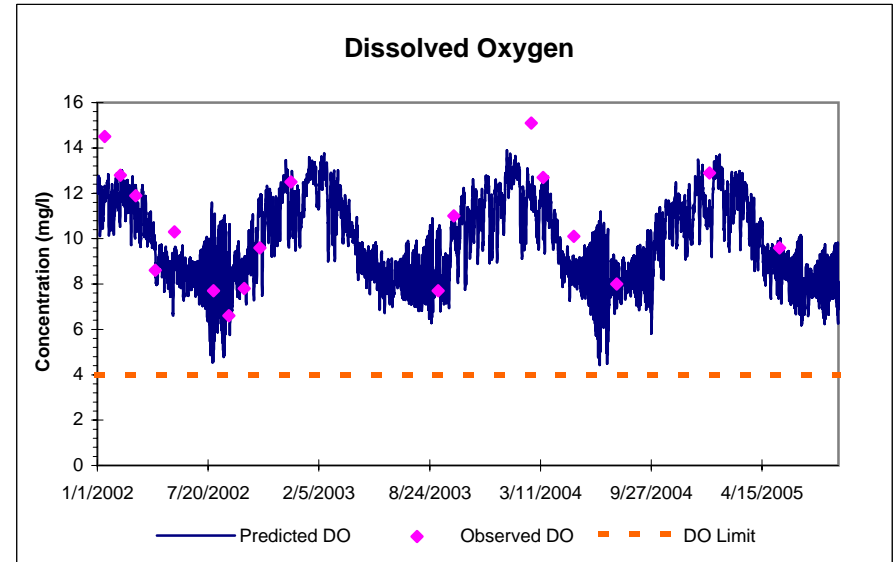
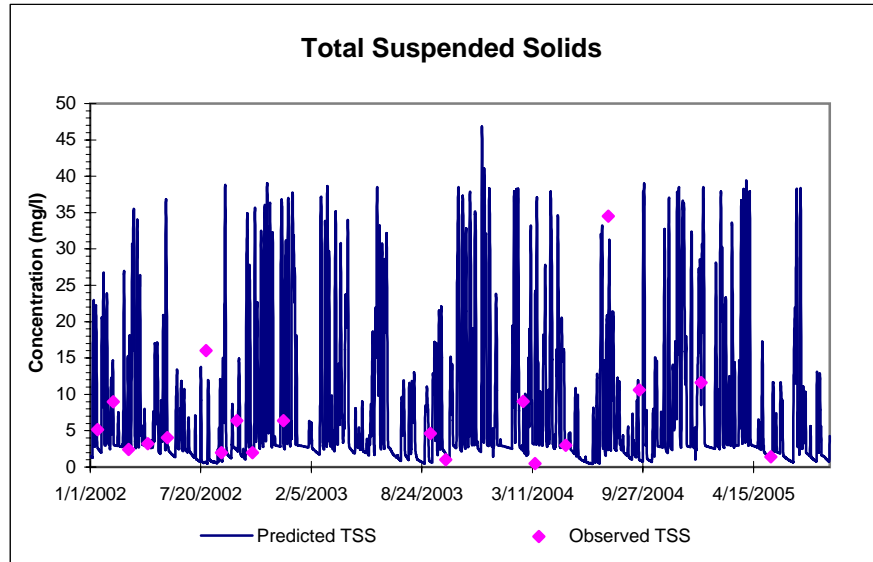


## Stony Brook at Rosedale Park in Hopewell

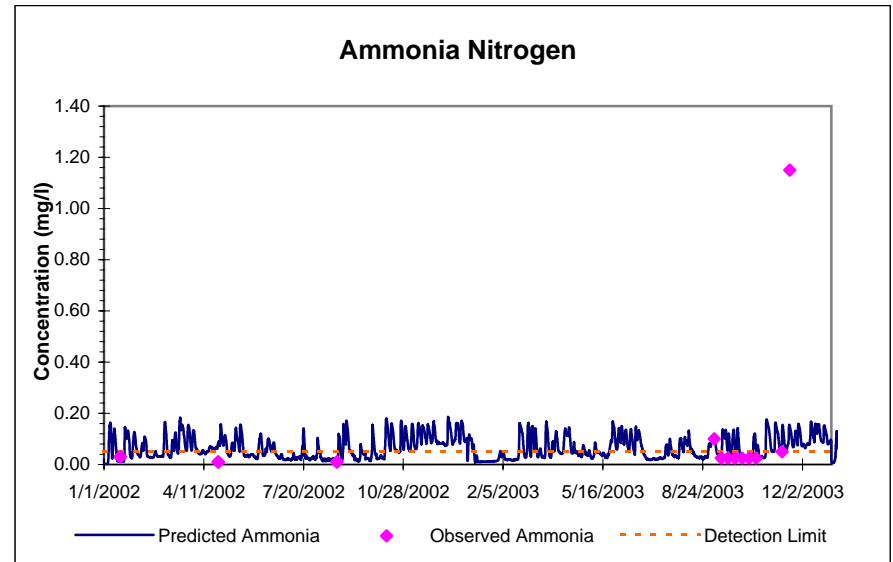
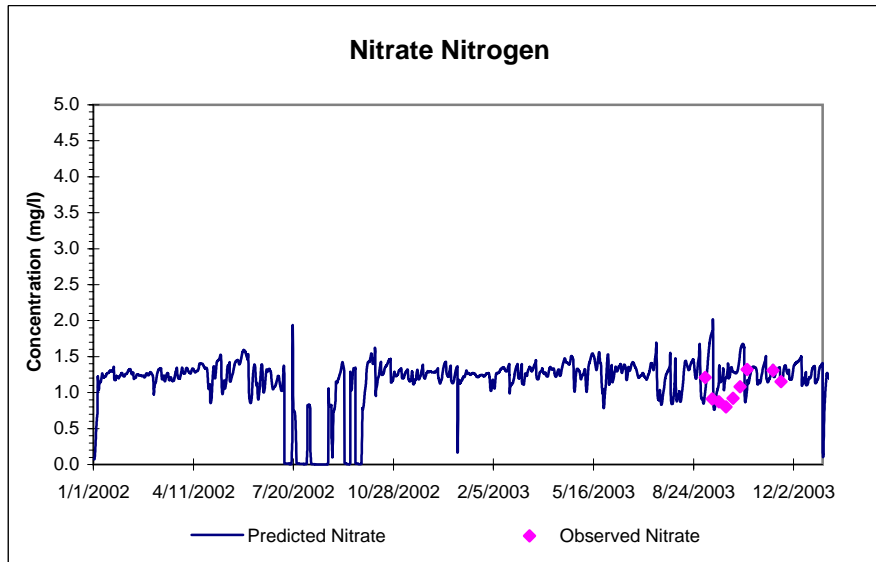
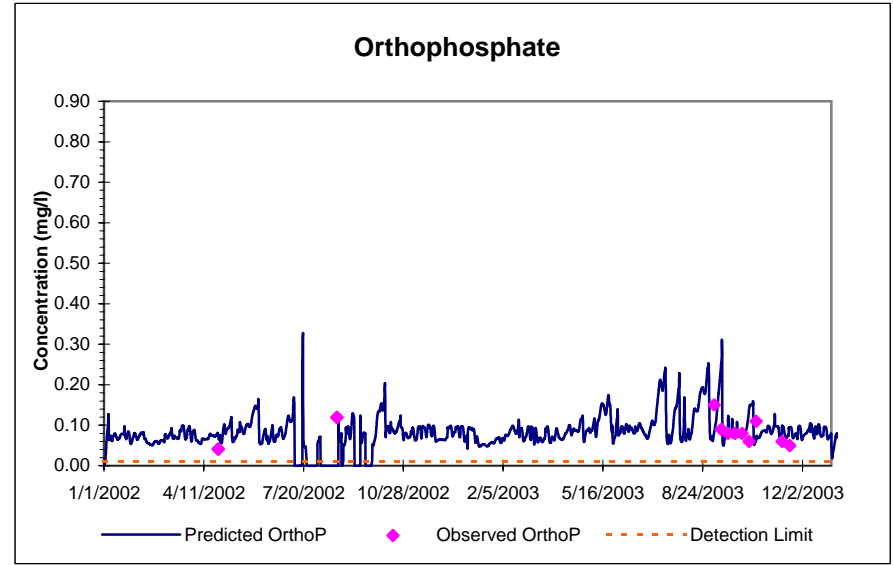
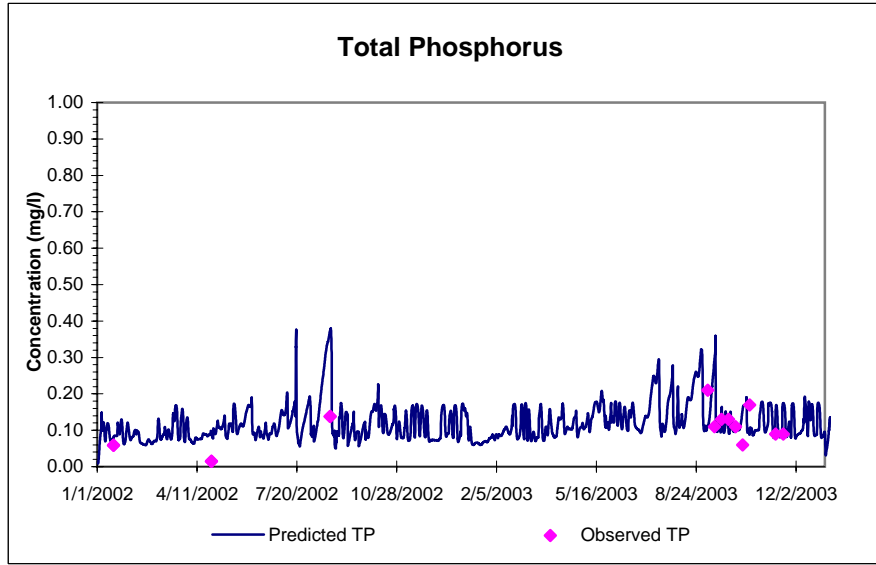




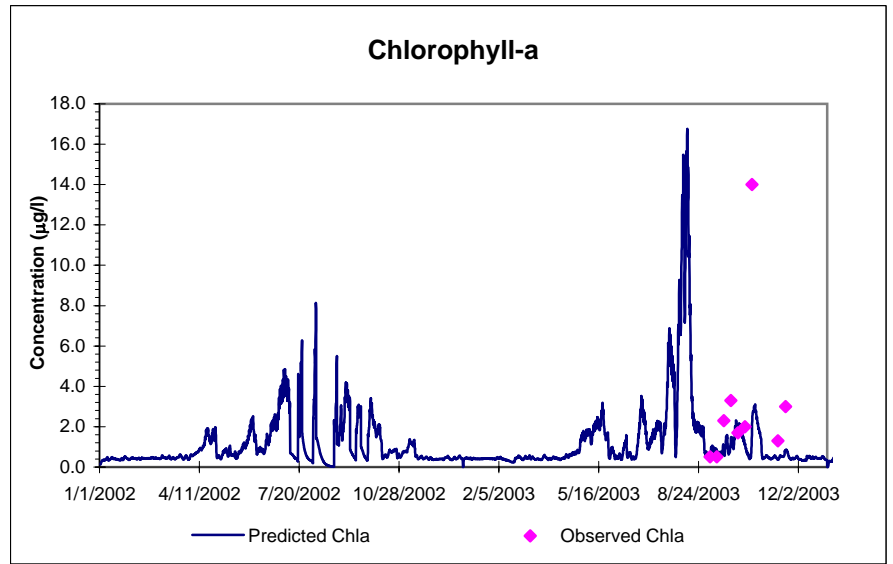
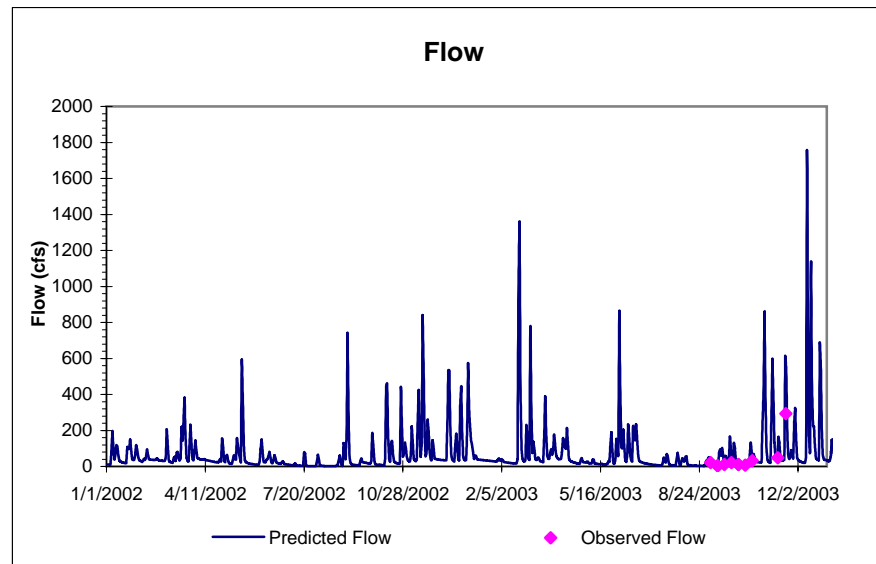
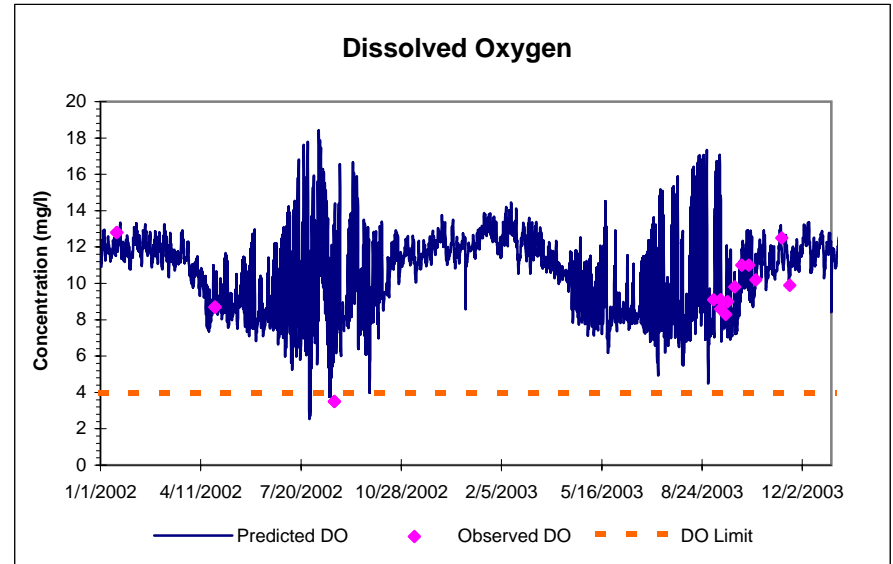
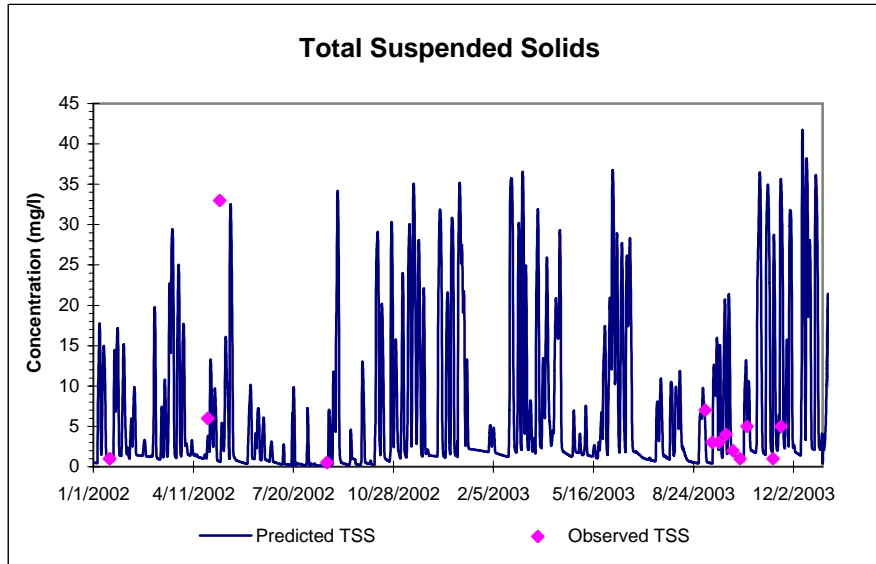
## Stony Brook at Rosedale Park in Hopewell



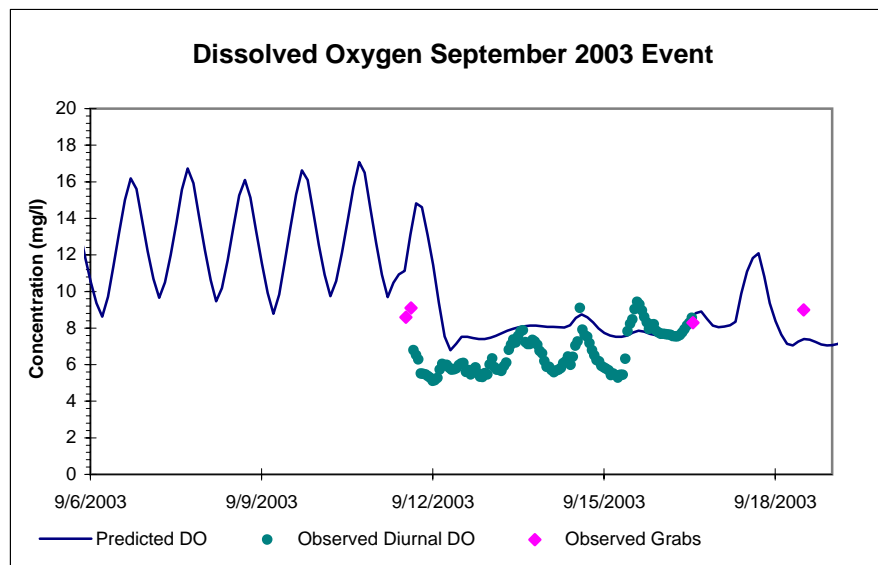
# Stony Brook at Route 206 in Princeton (SB3)



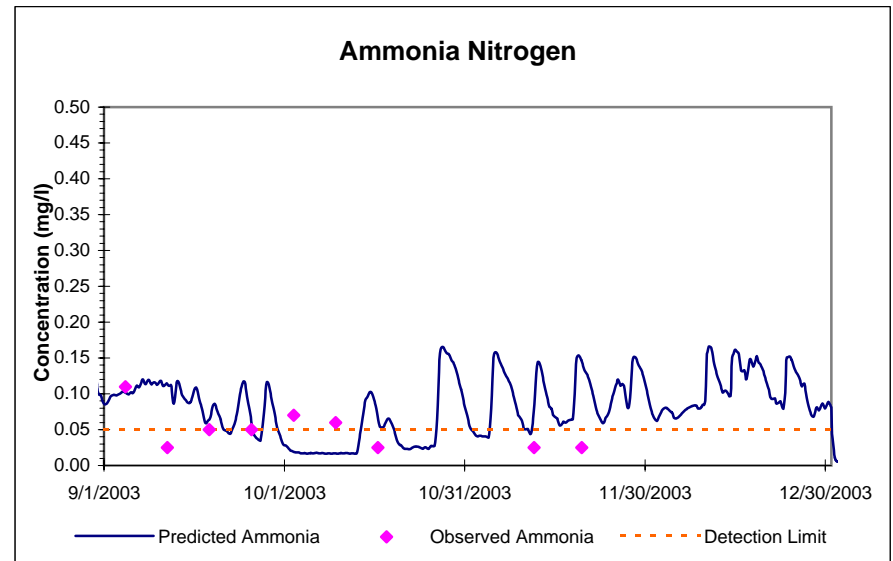
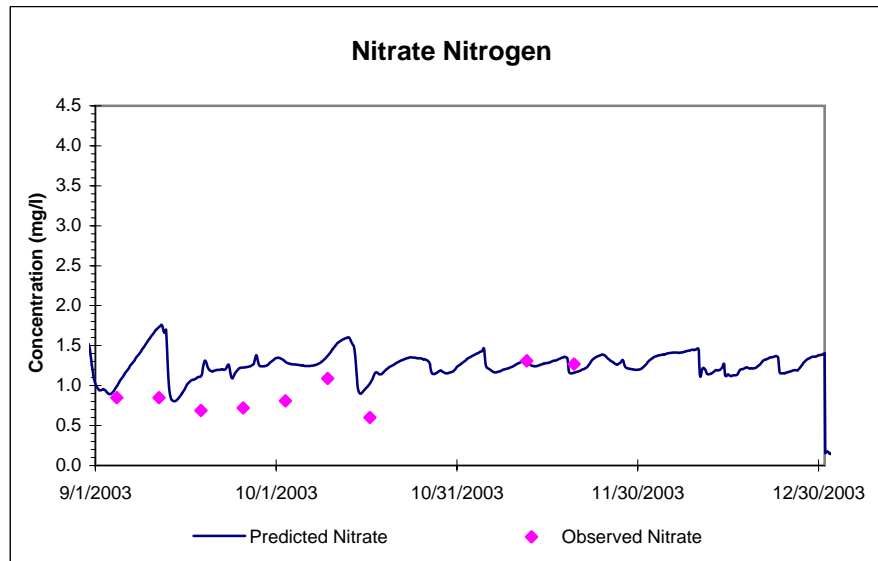
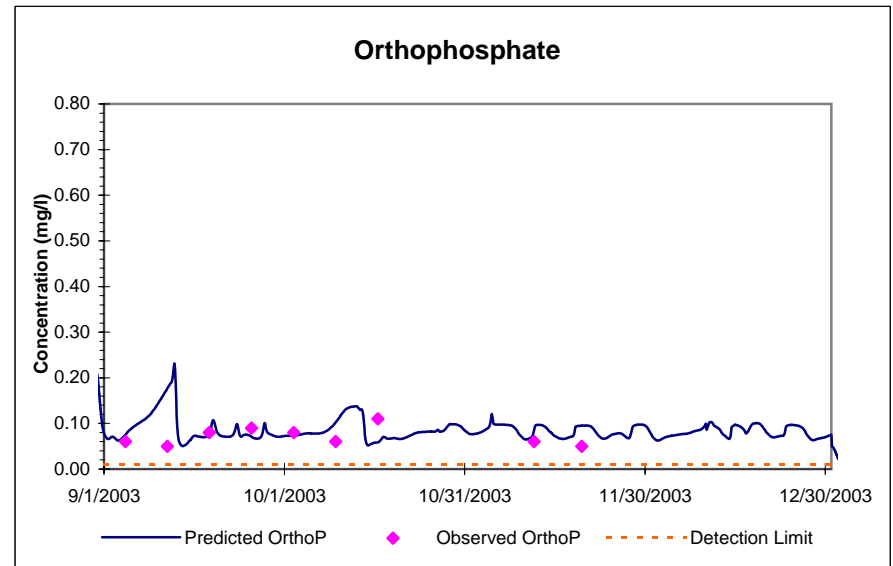
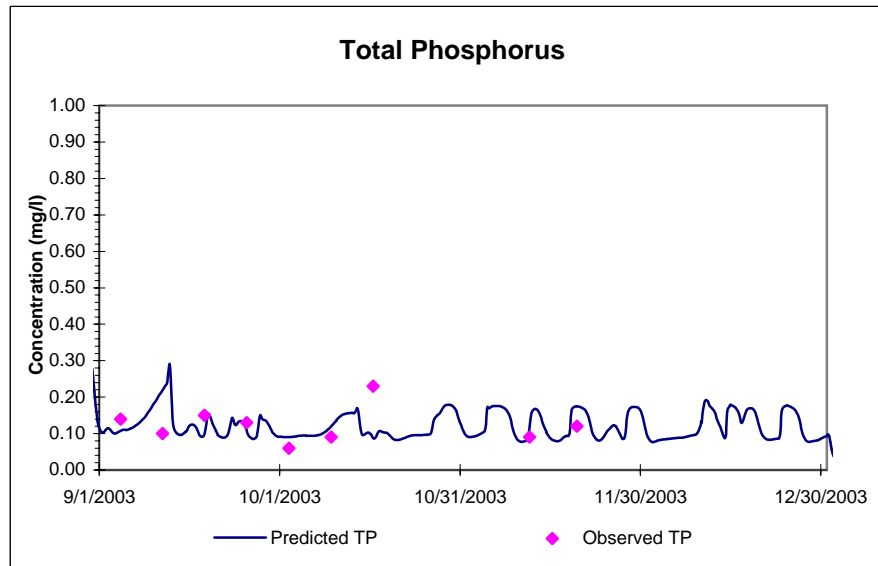
## Stony Brook at Route 206 in Princeton (SB3)



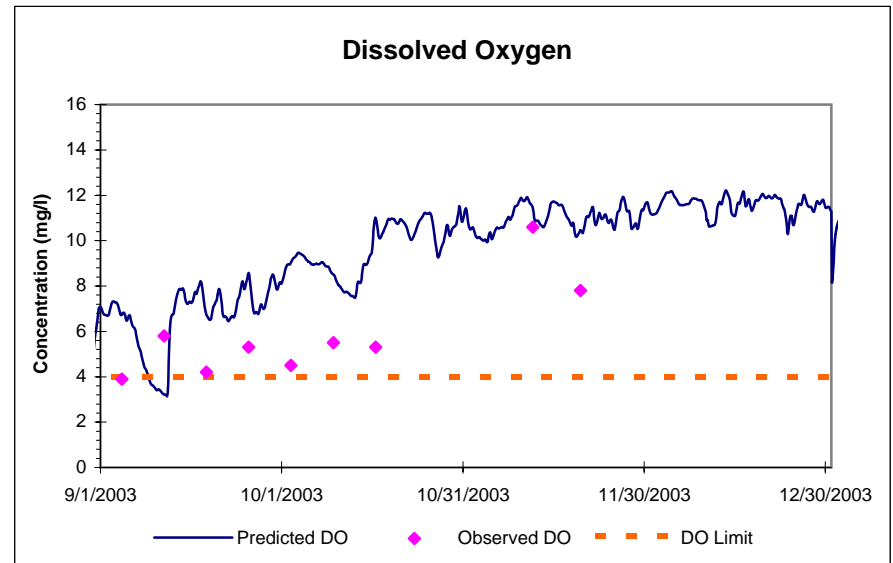
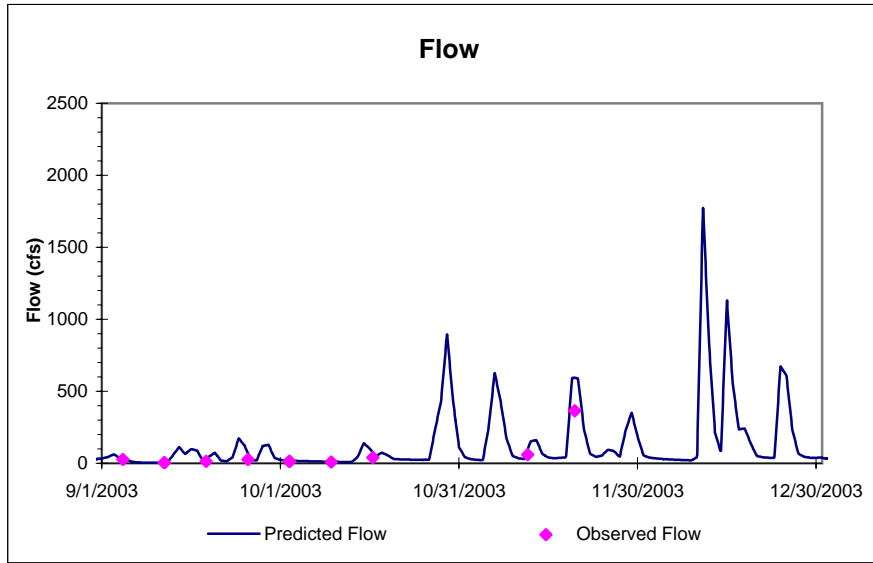
## Stony Brook at Route 206 in Princeton (SB3)



## Stony Brook at Alexander Road in Princeton (SB4)

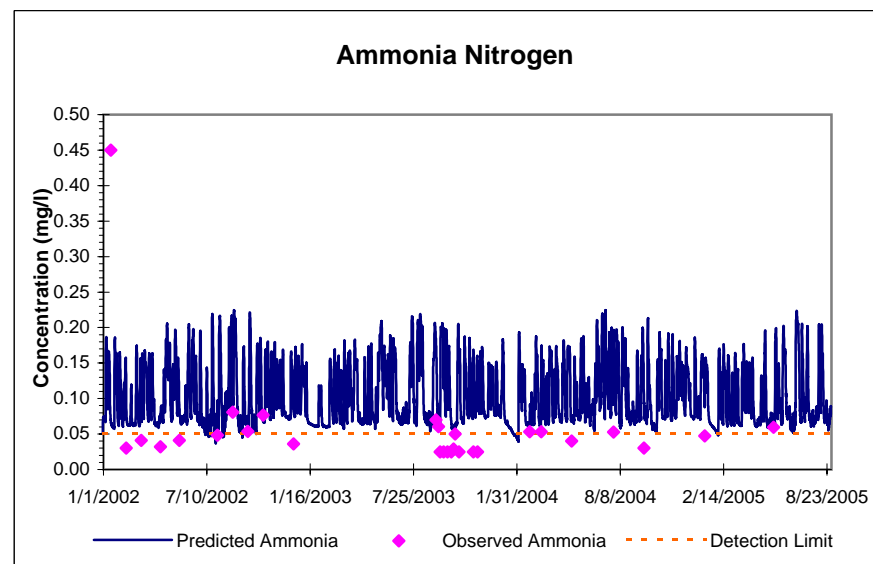
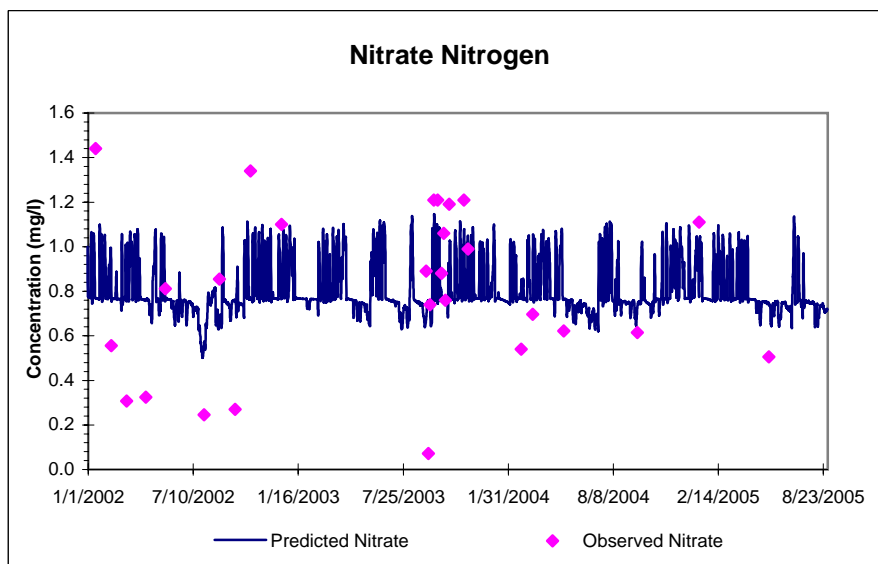
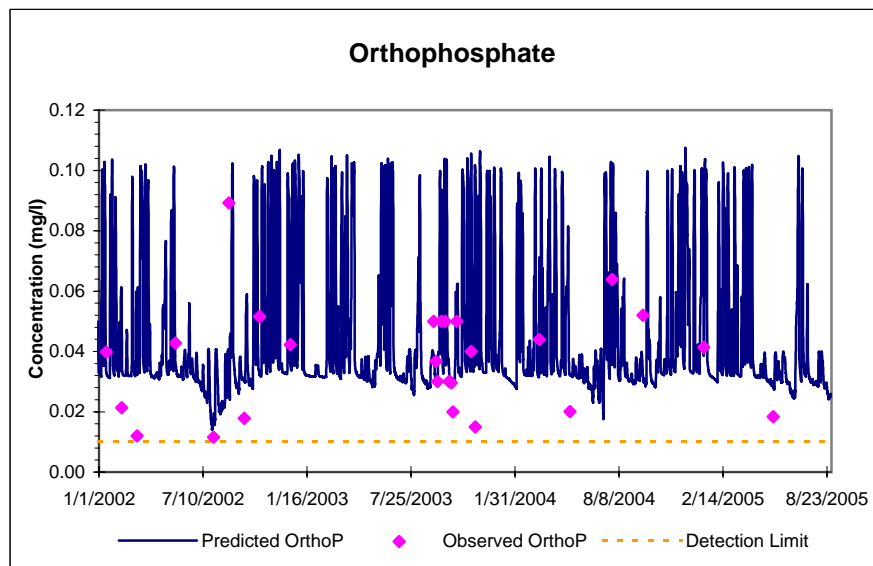
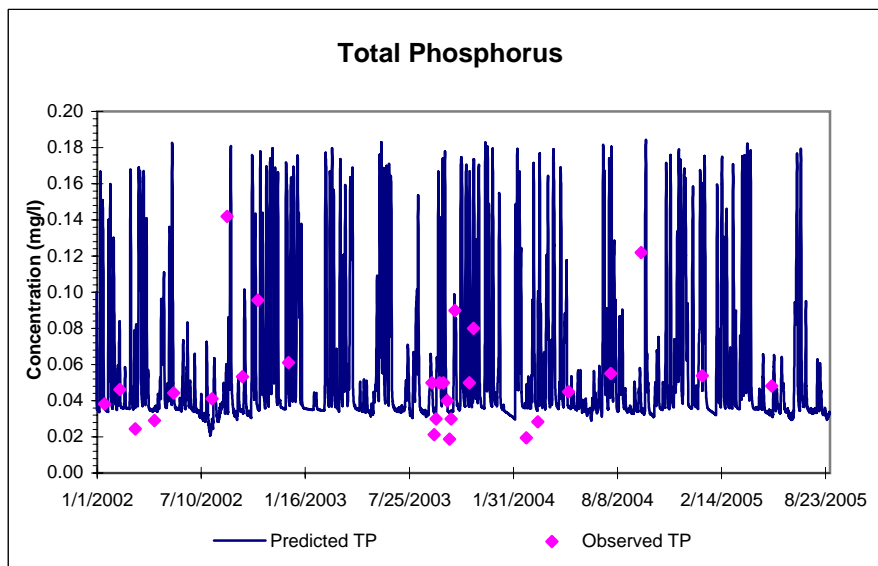


## Stony Brook at Alexander Road in Princeton (SB4)



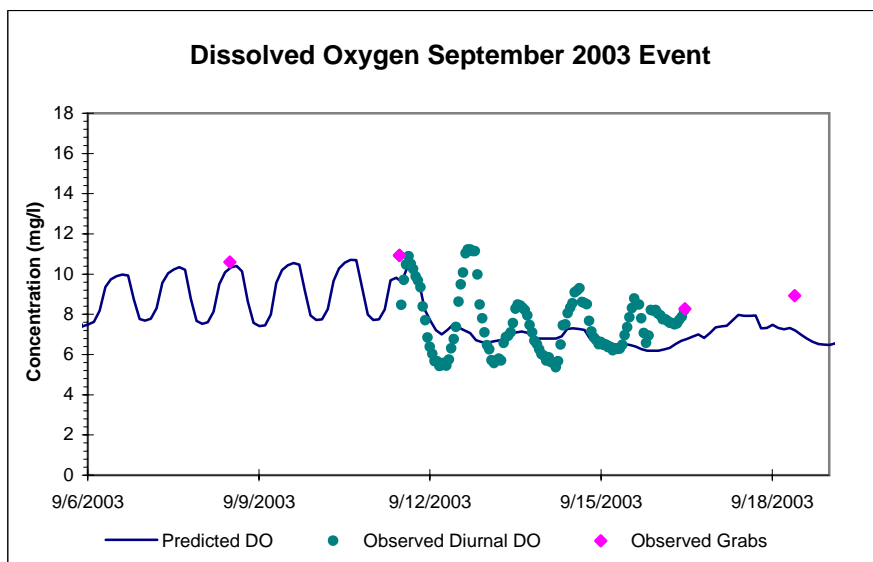
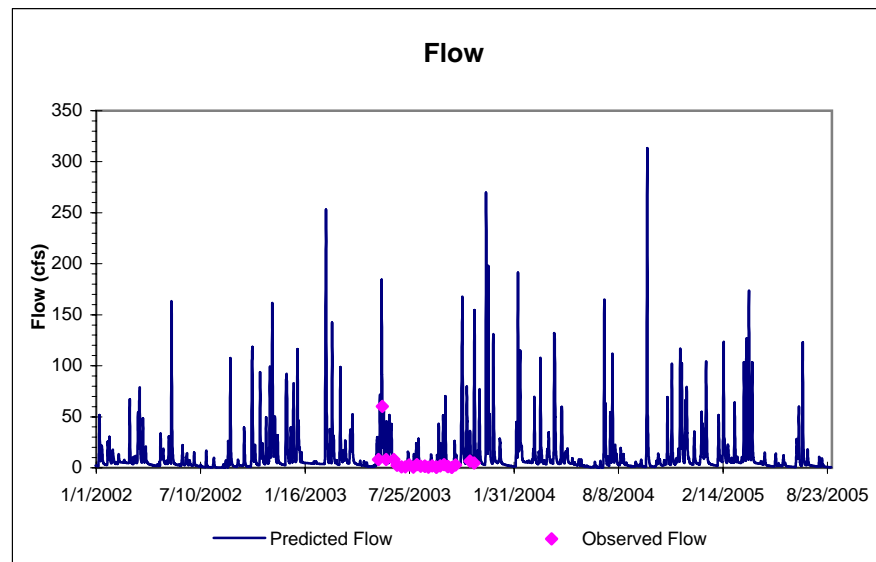
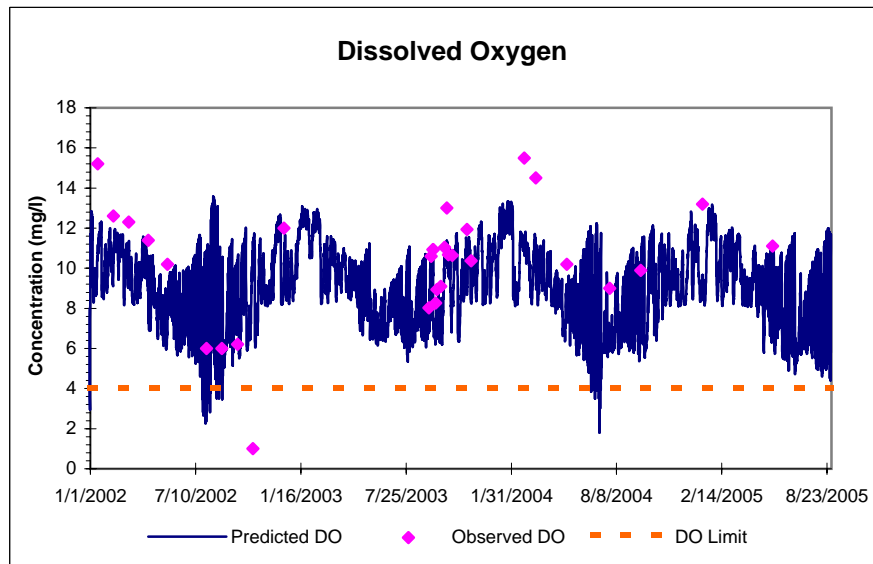
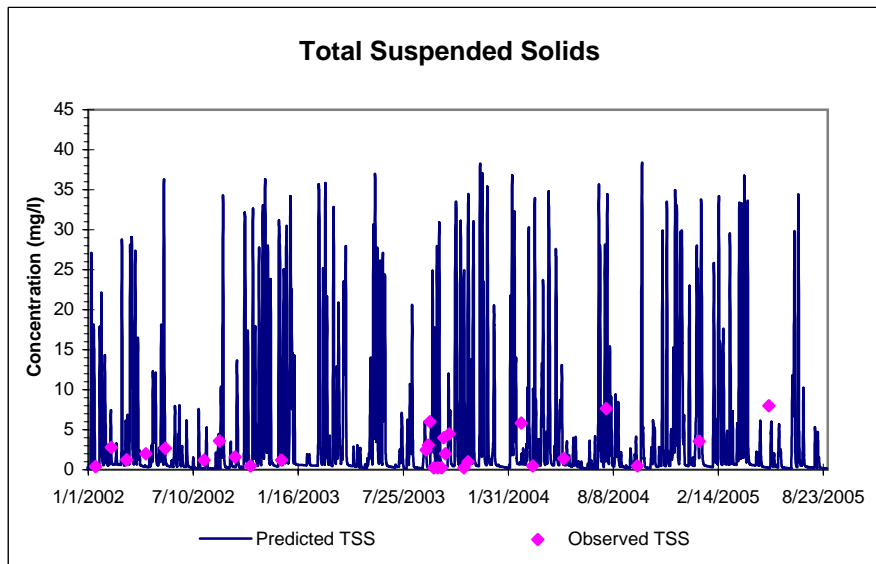
**Beden Brook / Lower Millstone River Watershed Area Model**  
Water Quality Model Validation Graphs

## Beden Brook at Aunt Molly Road in Hopewell (BB1)

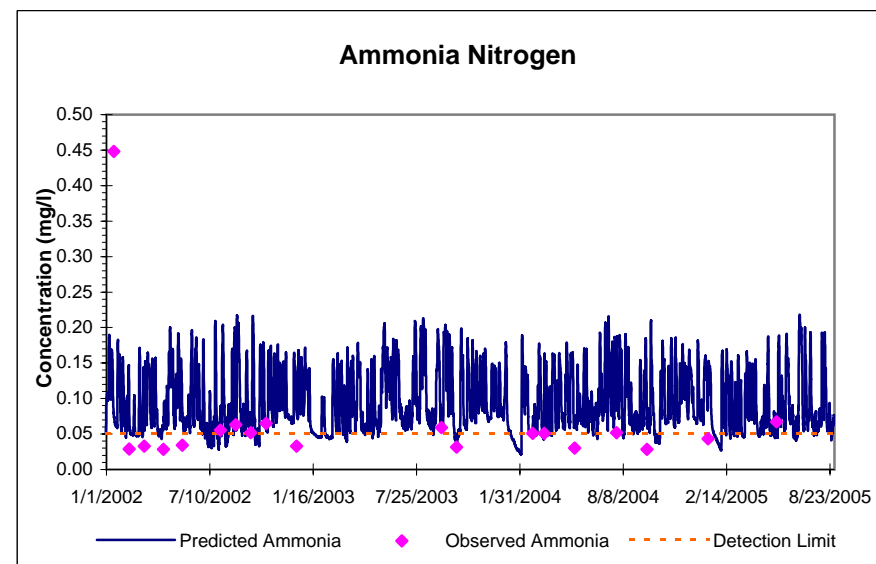
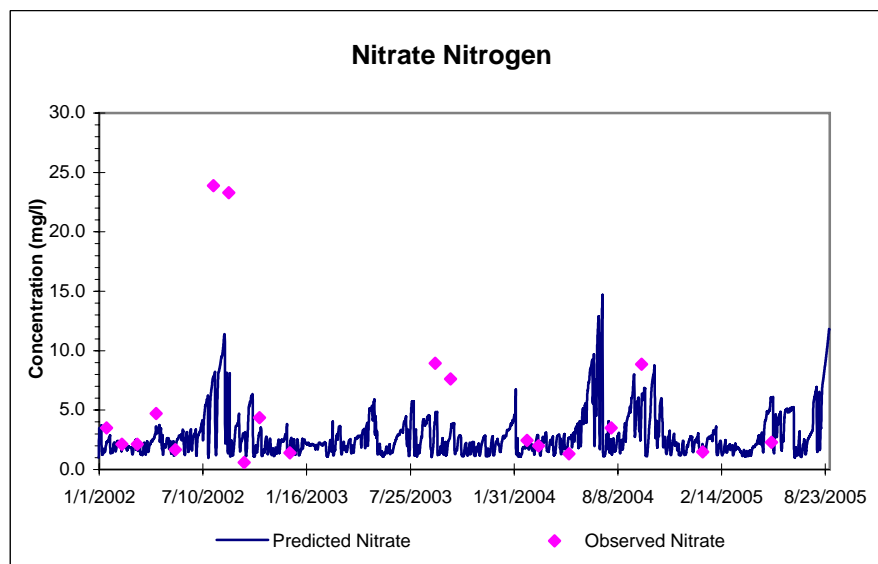
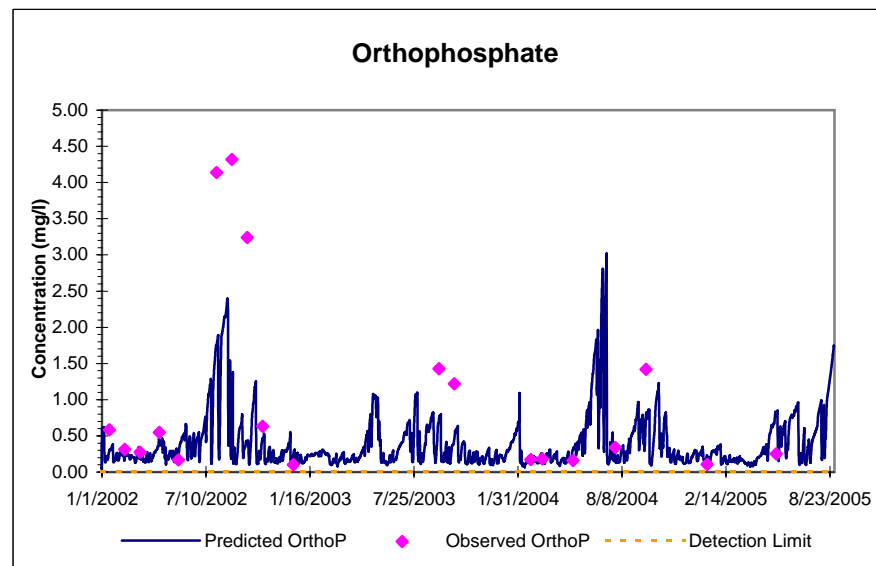
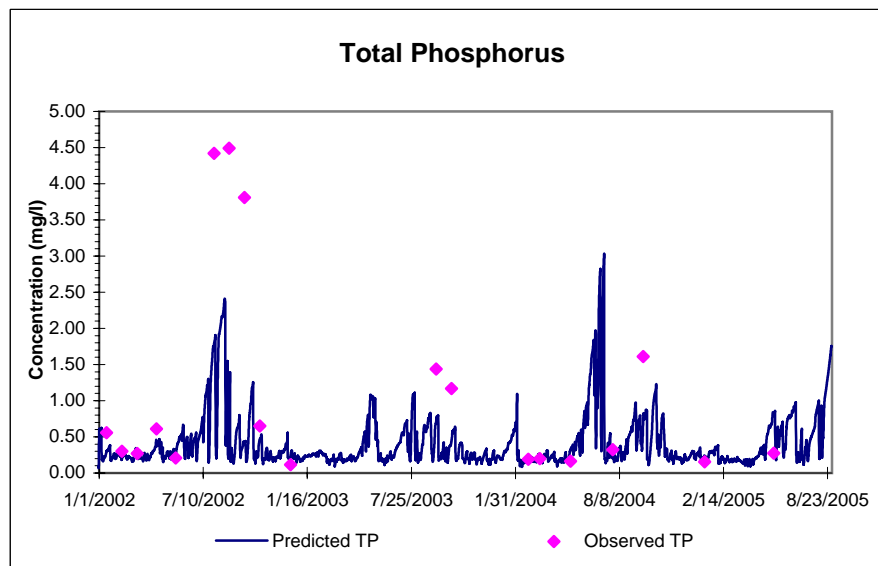




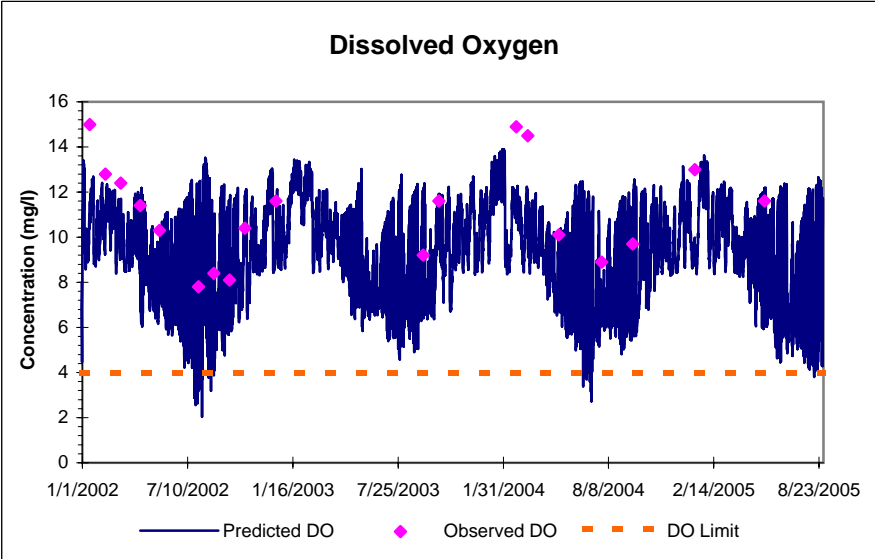
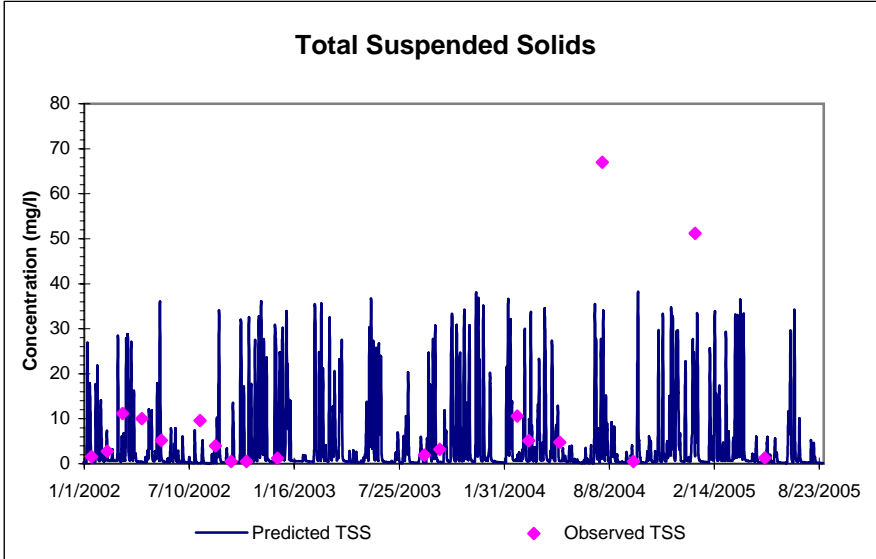
## Beden Brook at Aunt Molly Road in Hopewell (BB1)



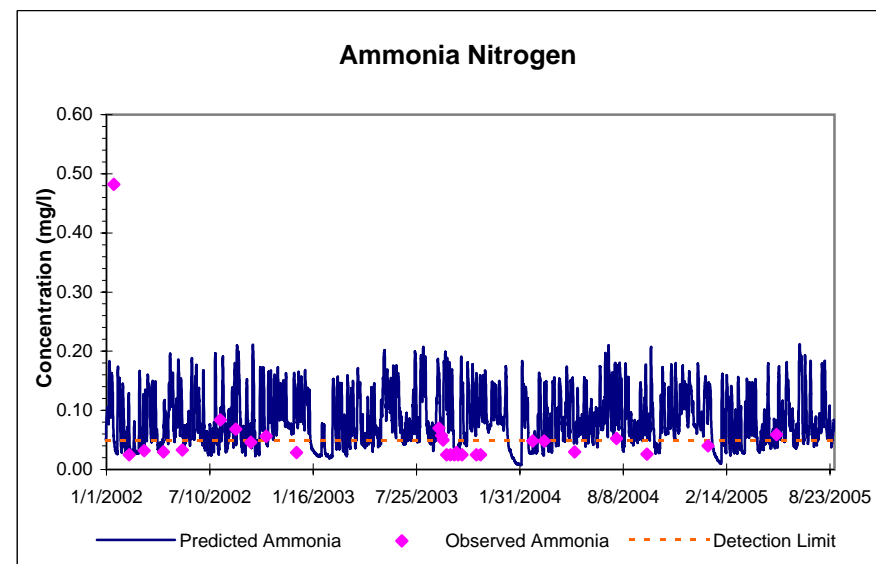
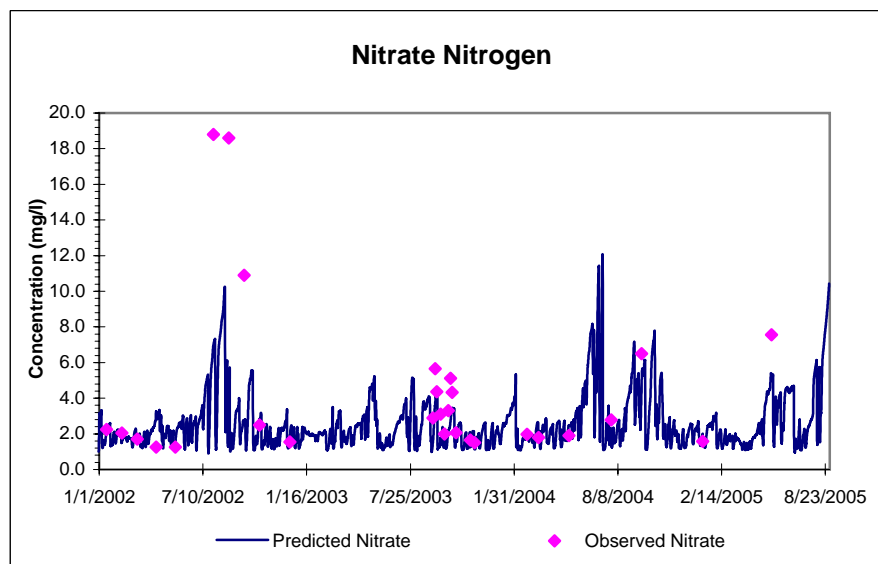
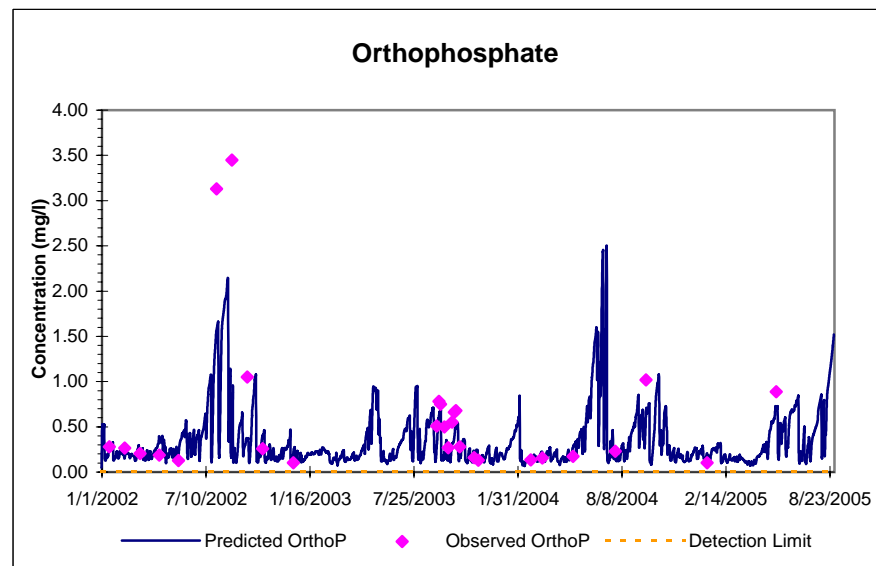
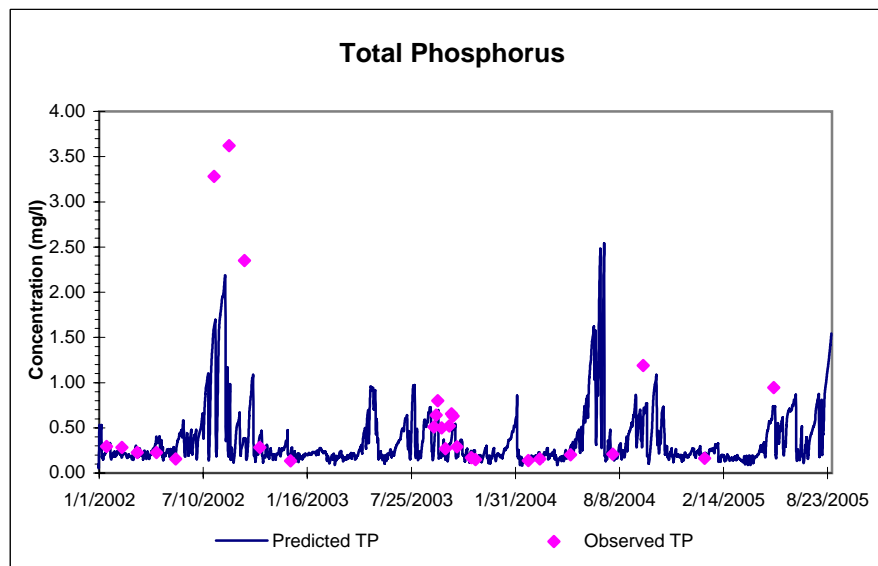
## Beden Brook Downstream of SBRSA-Hopewell STP



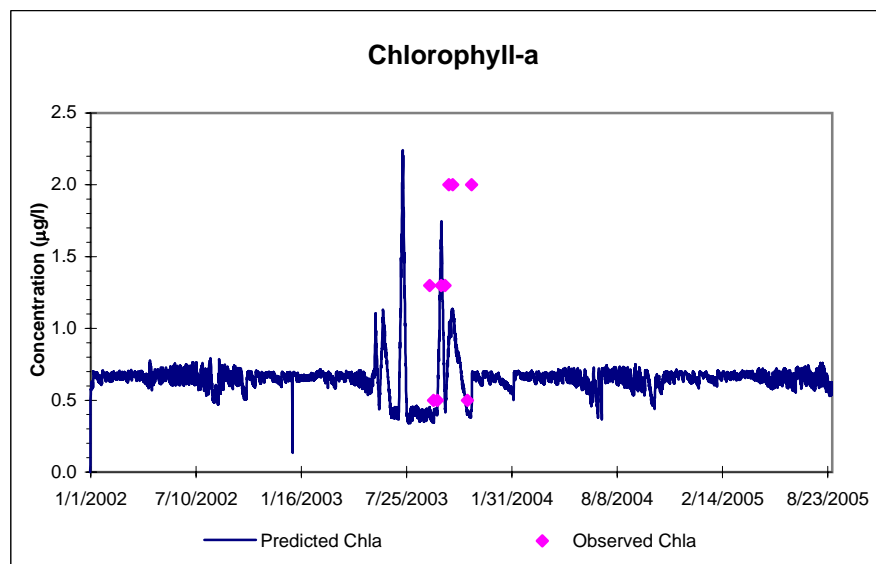
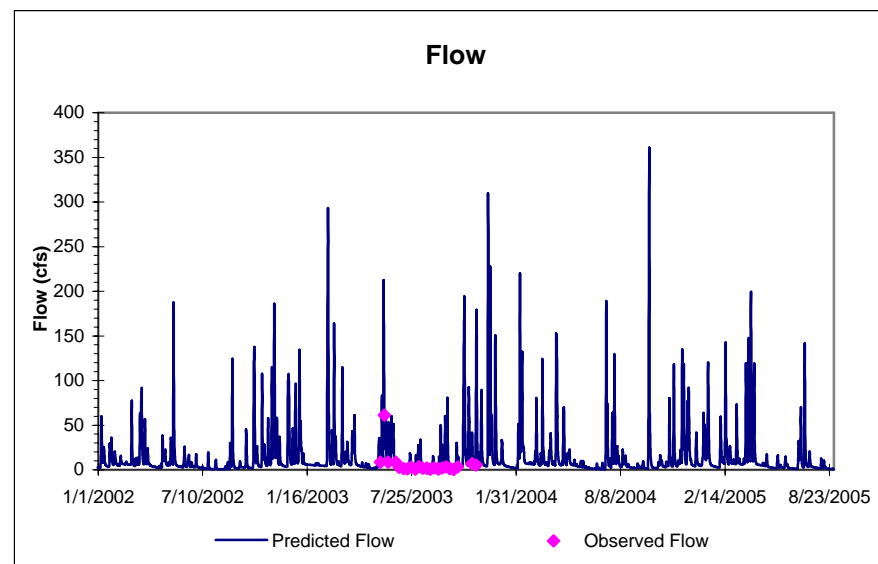
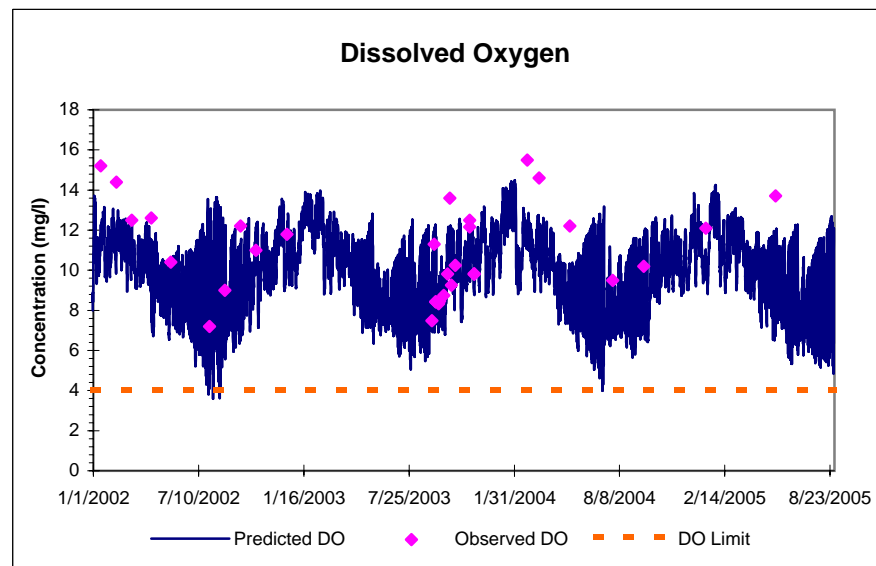
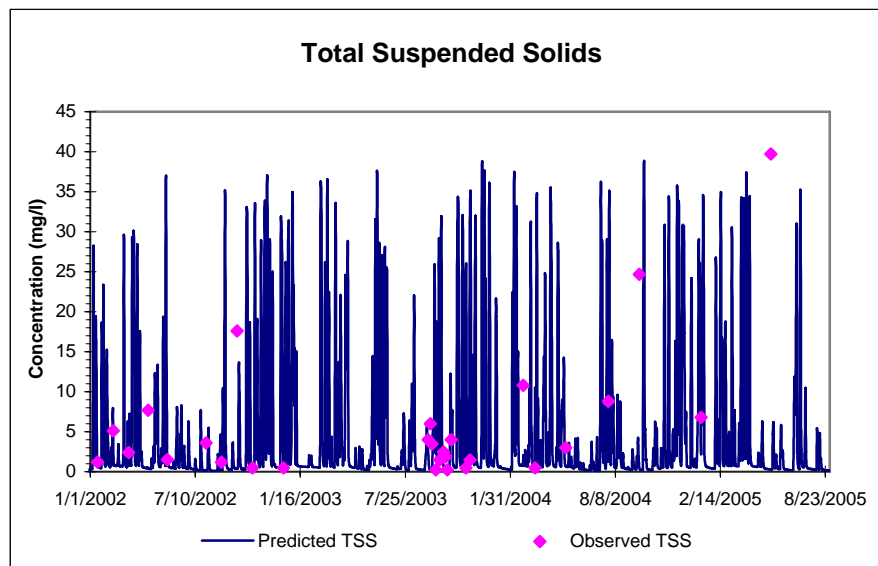
# Beden Brook Downstream of SBRSA-Hopewell STP



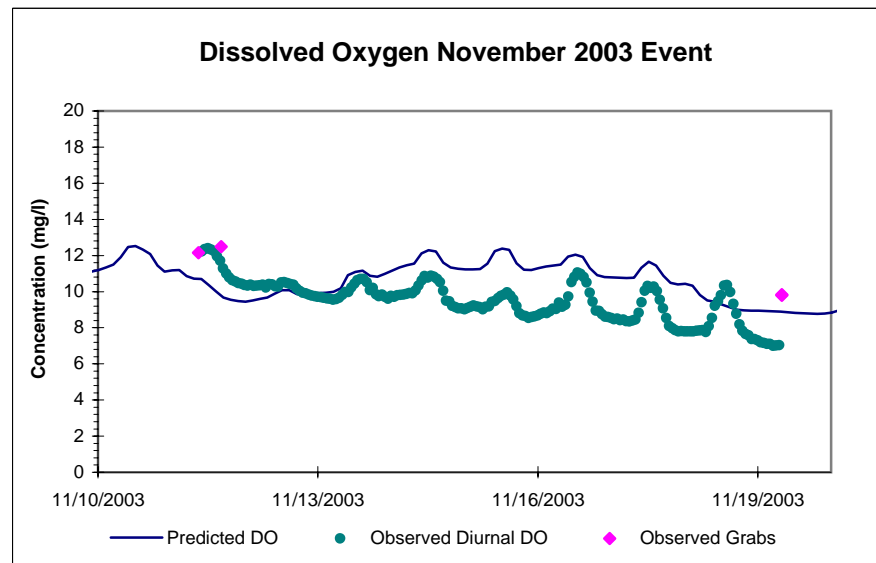
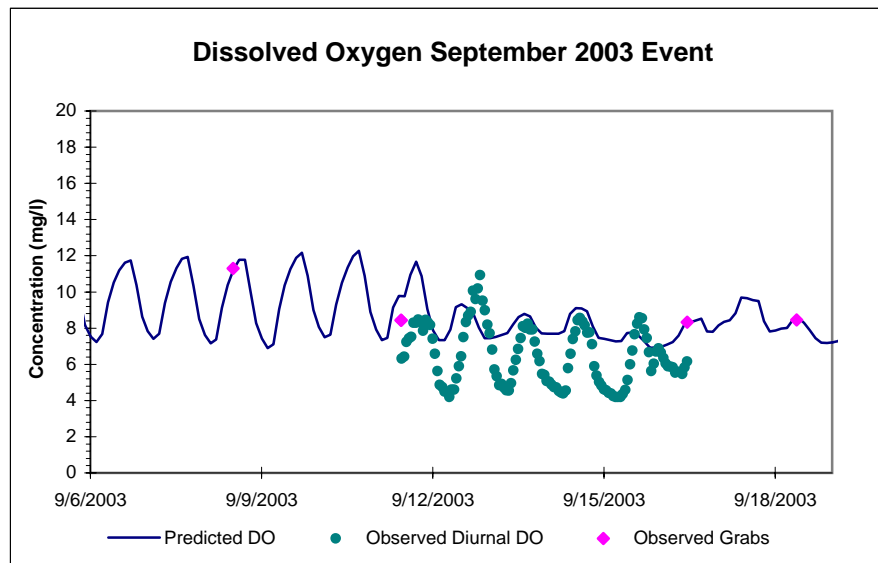
## Beden Brook at Province Line Rd. in Hopewell (BB2)



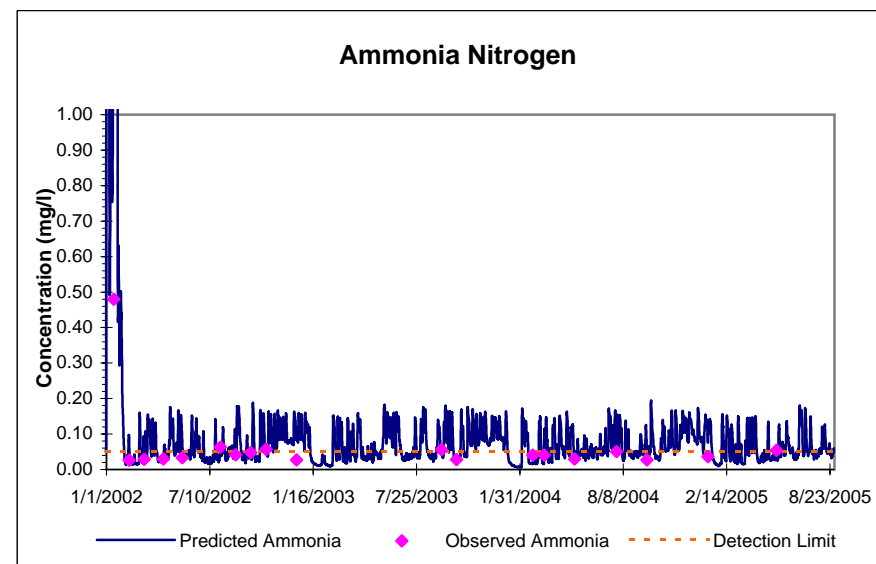
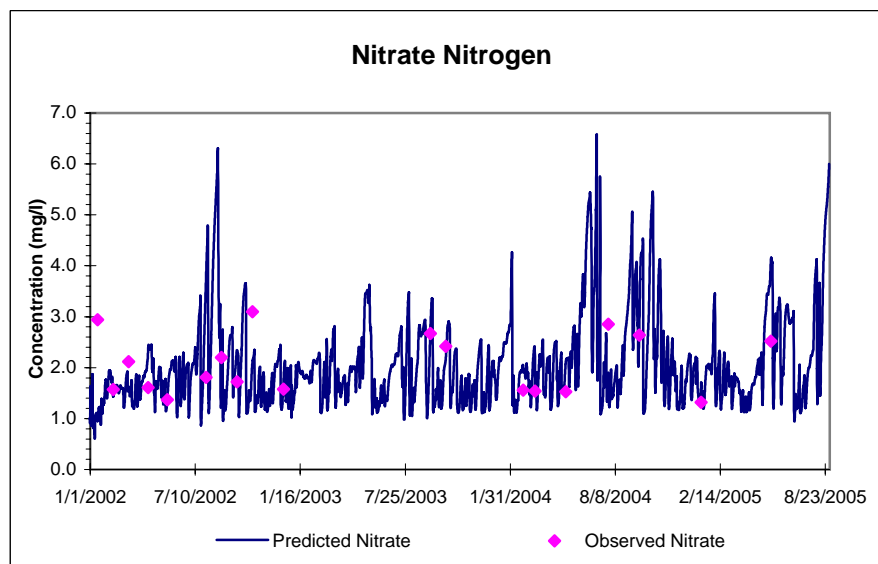
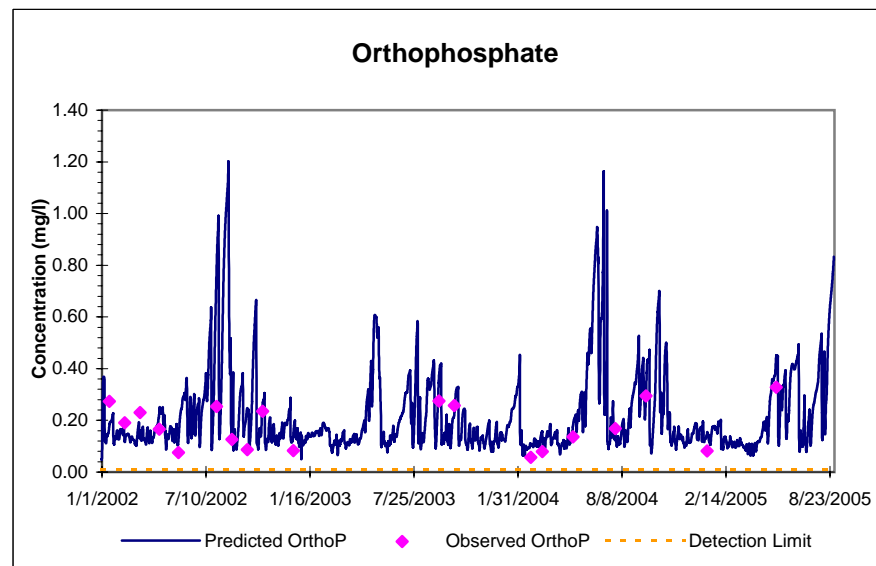
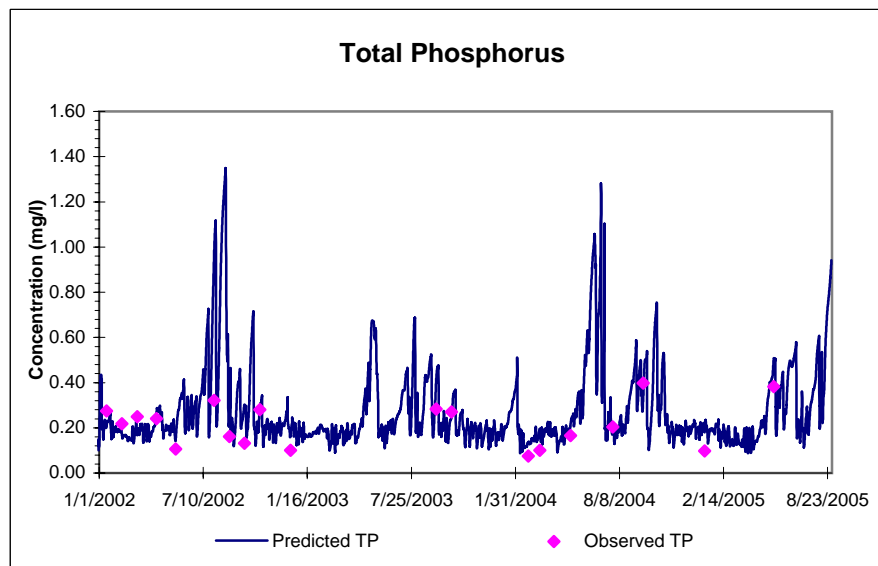
## Beden Brook at Province Line Rd. in Hopewell (BB2)



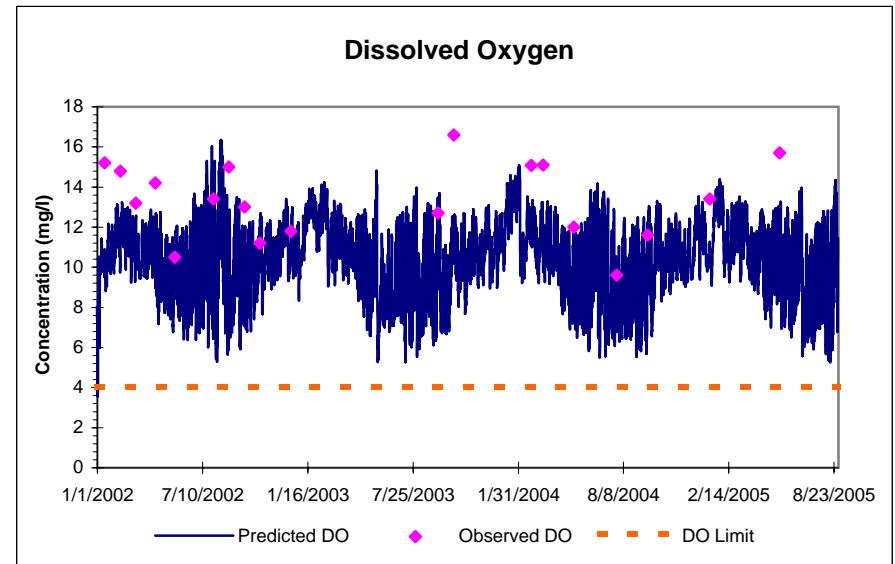
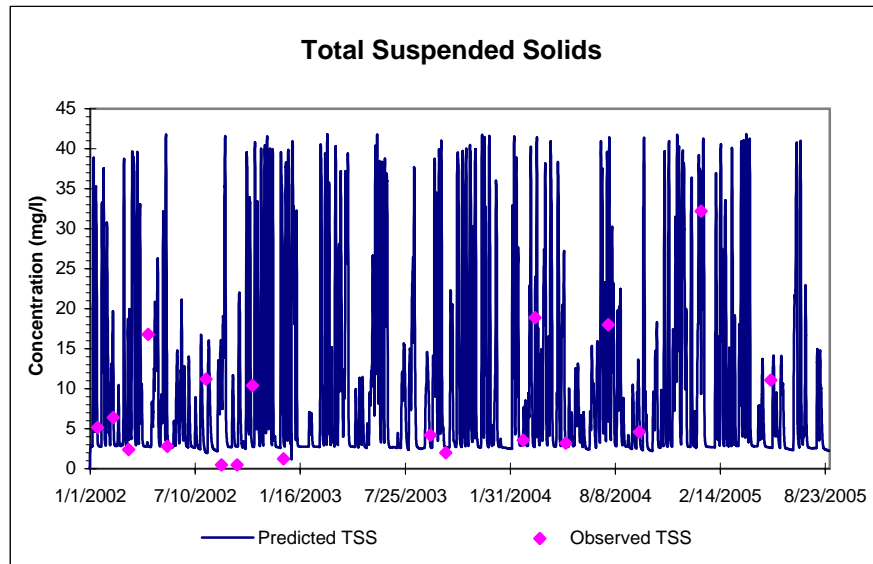
## Beden Brook at Province Line Rd. in Hopewell (BB2)



## Beden Brook at Great Rd. near Blawenburg

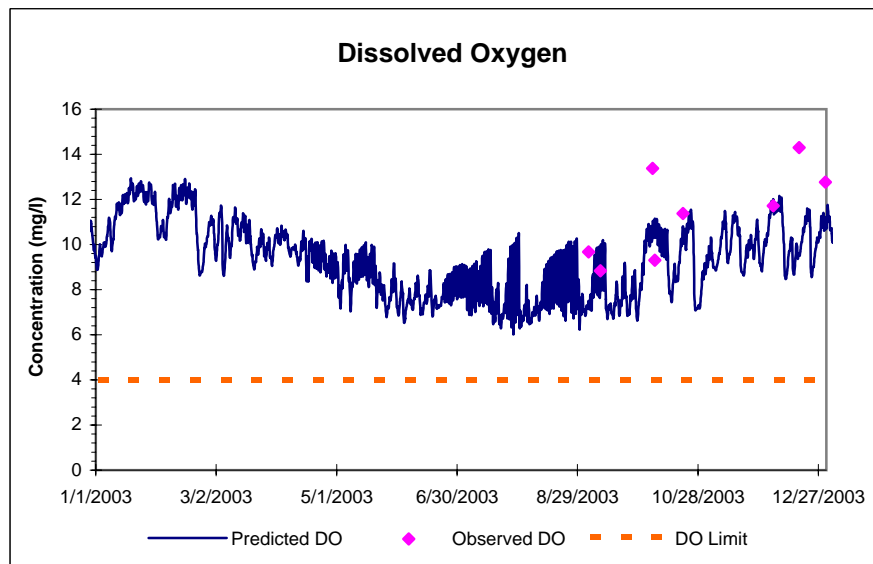
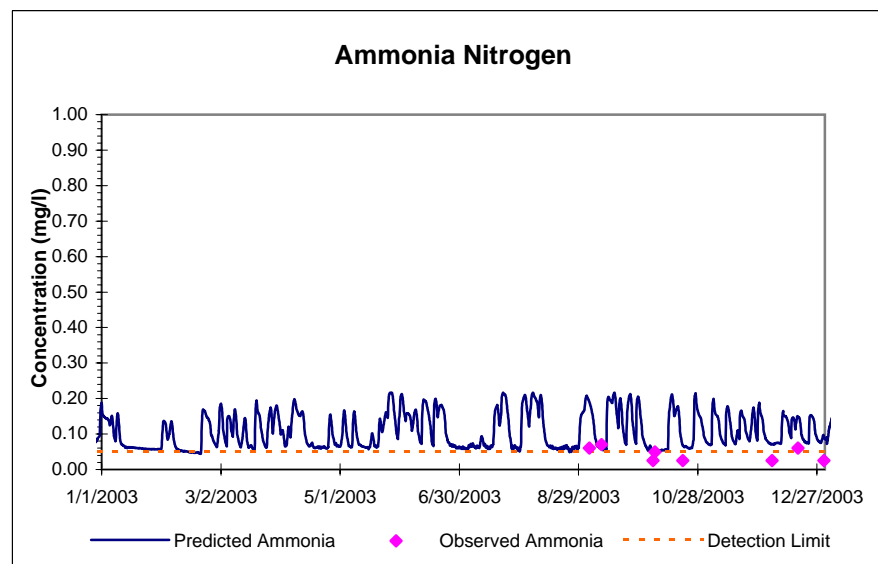
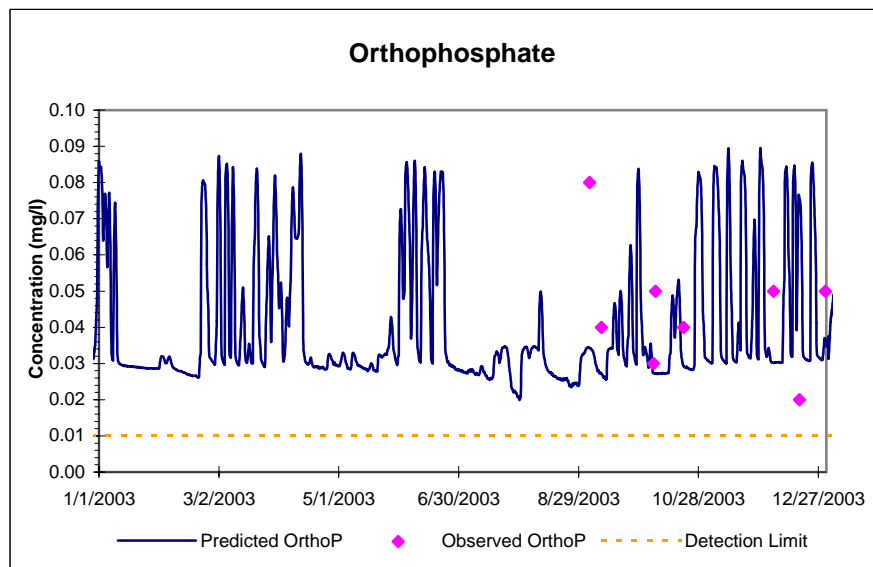
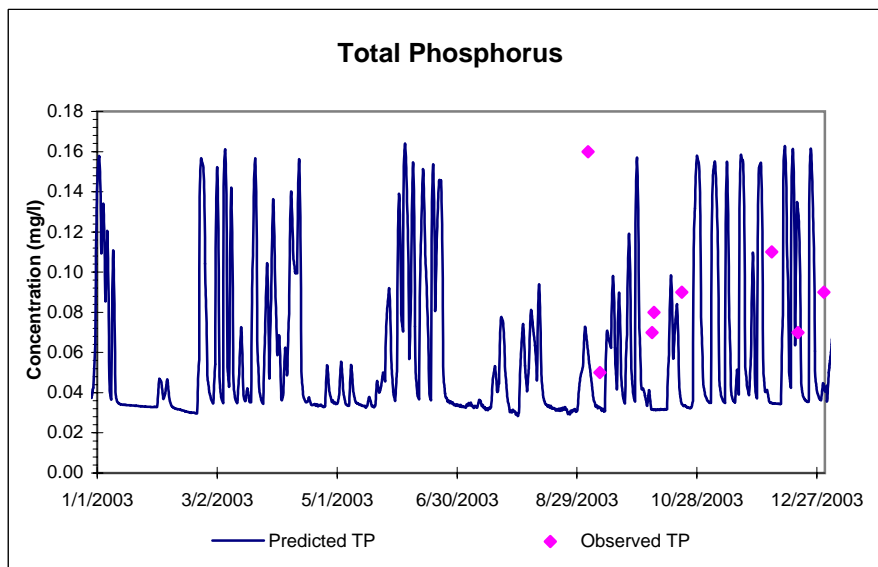


## Bedon Brook at Great Rd. near Blawenburg

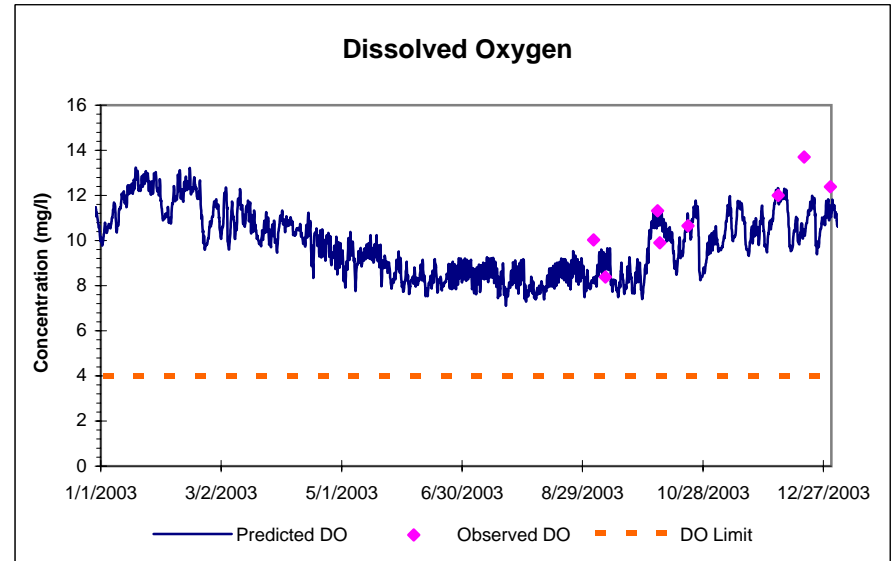
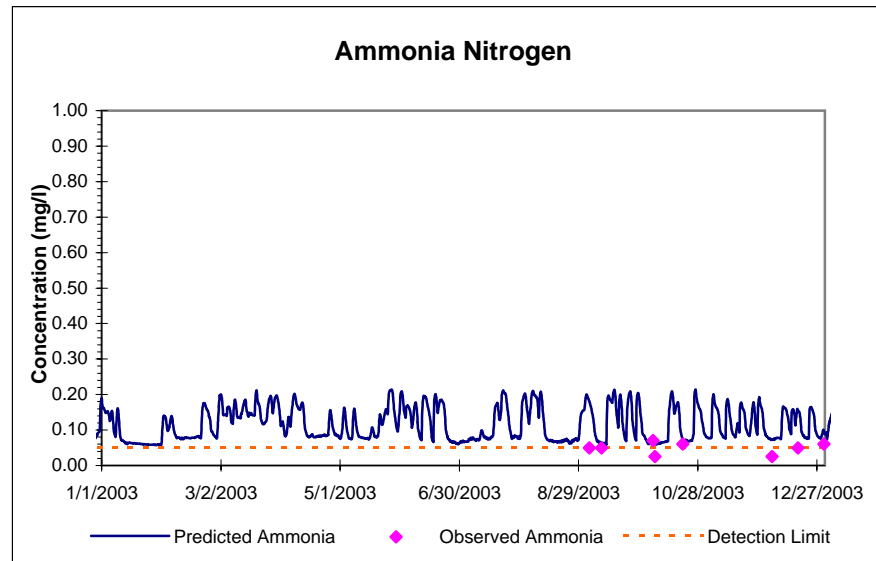
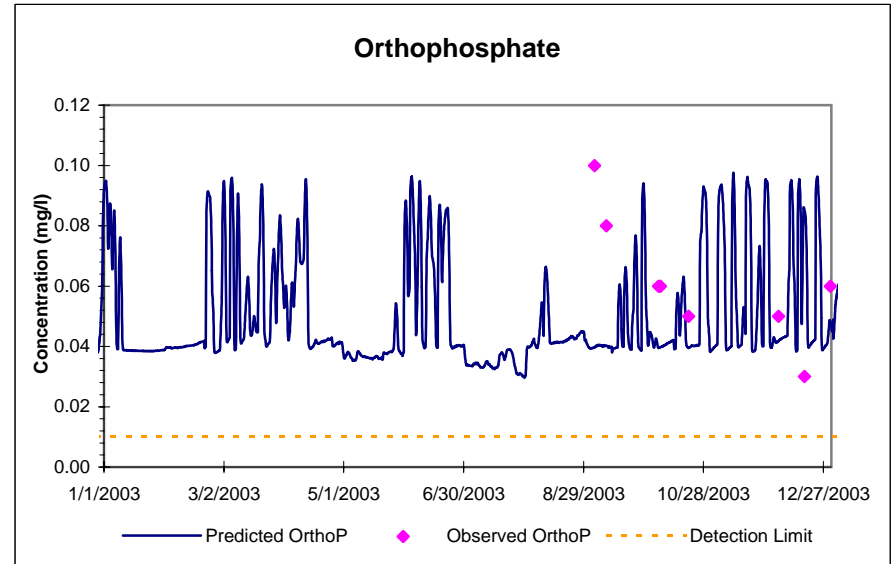
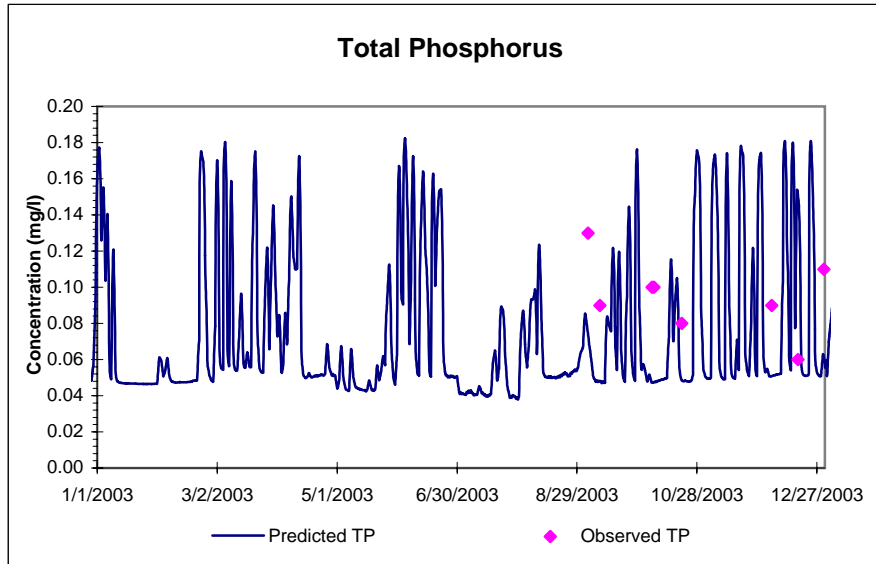




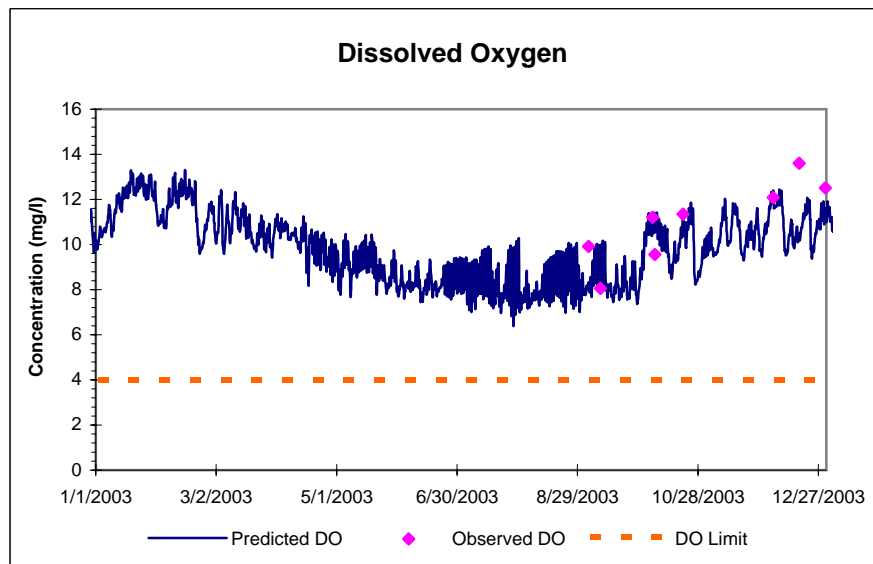
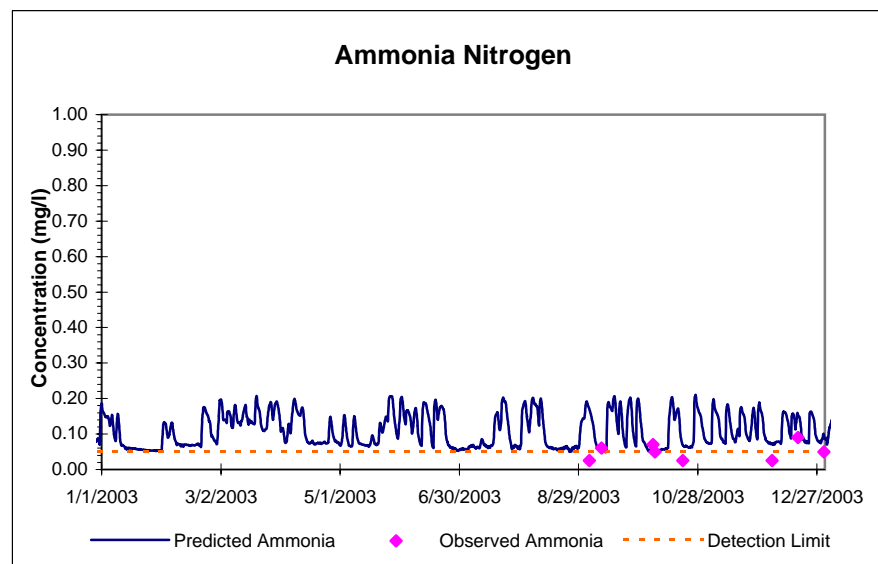
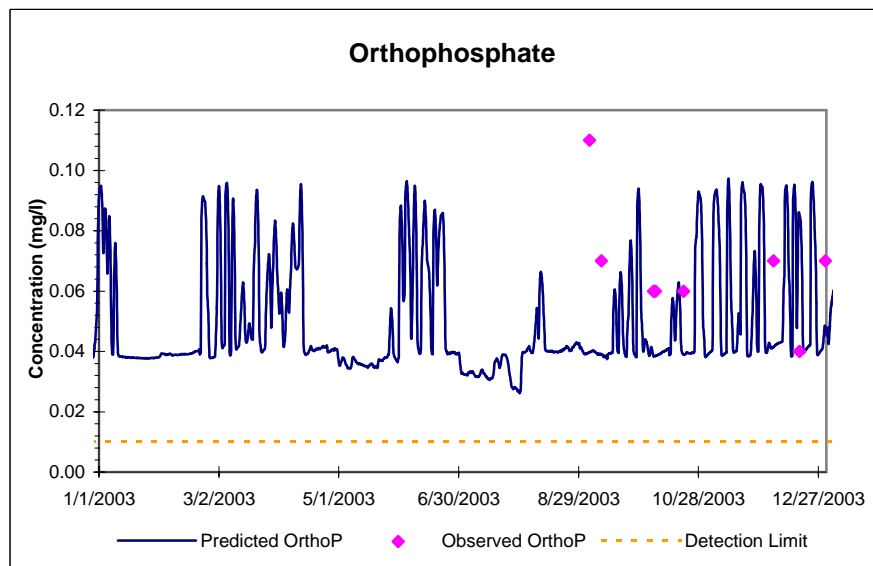
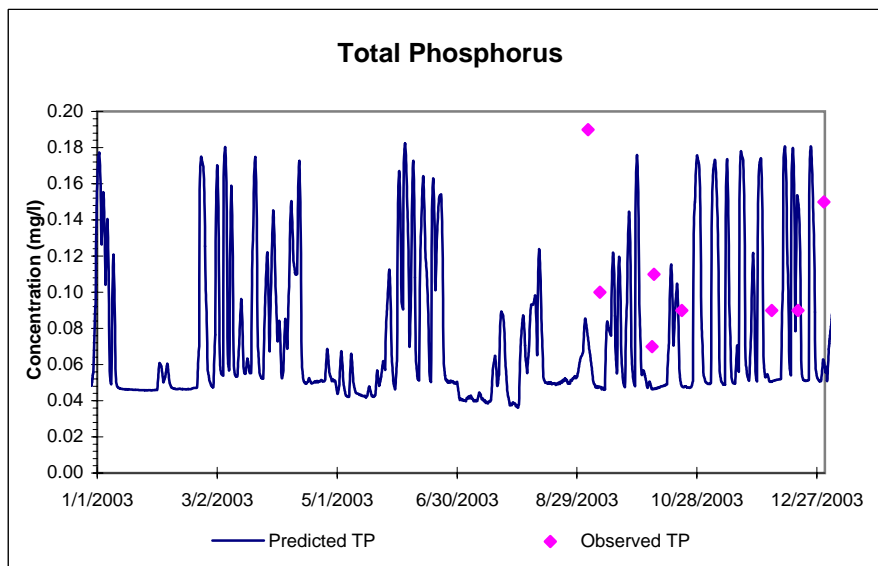
## Pike Run Upstream of Pike Brook STP in Montgomery



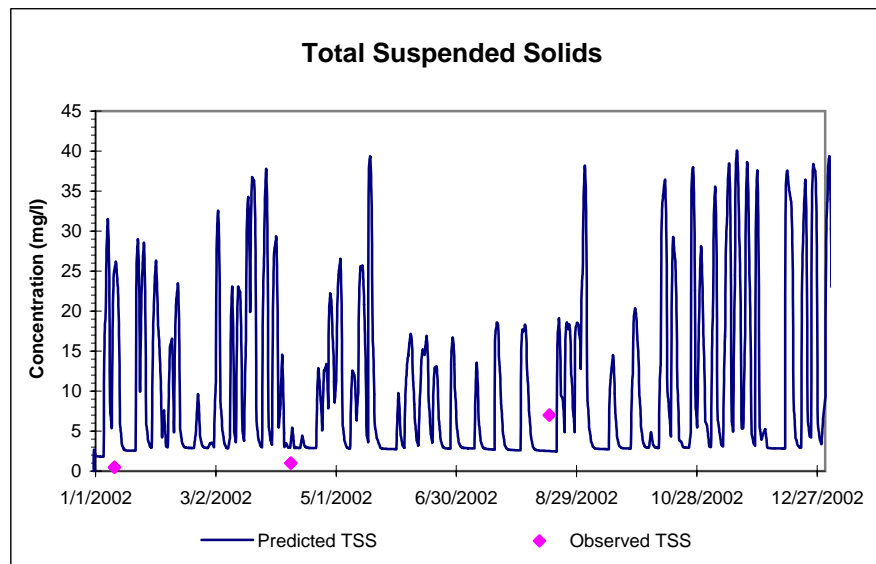
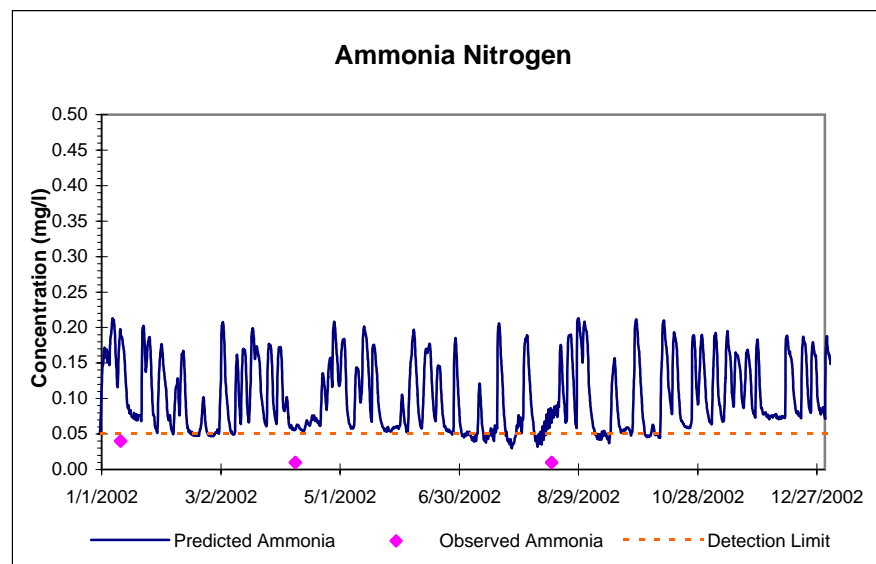
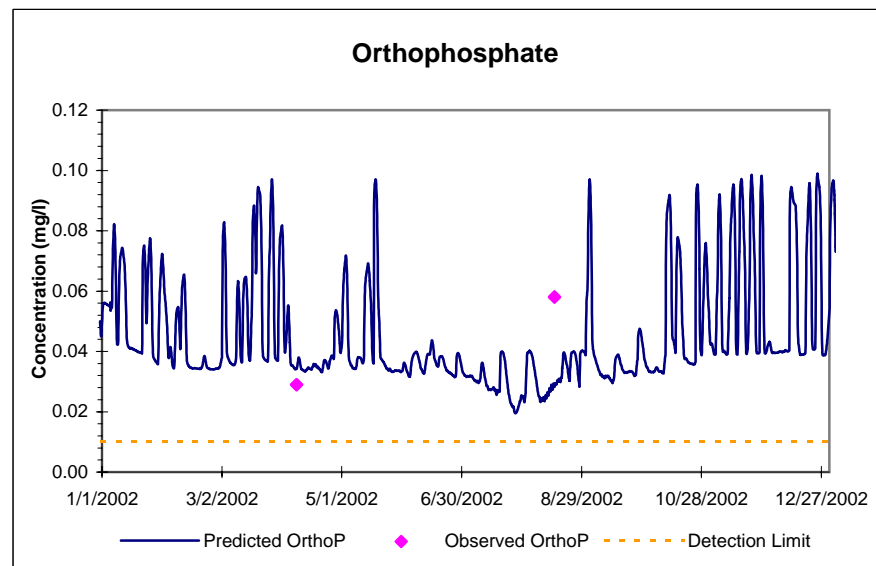
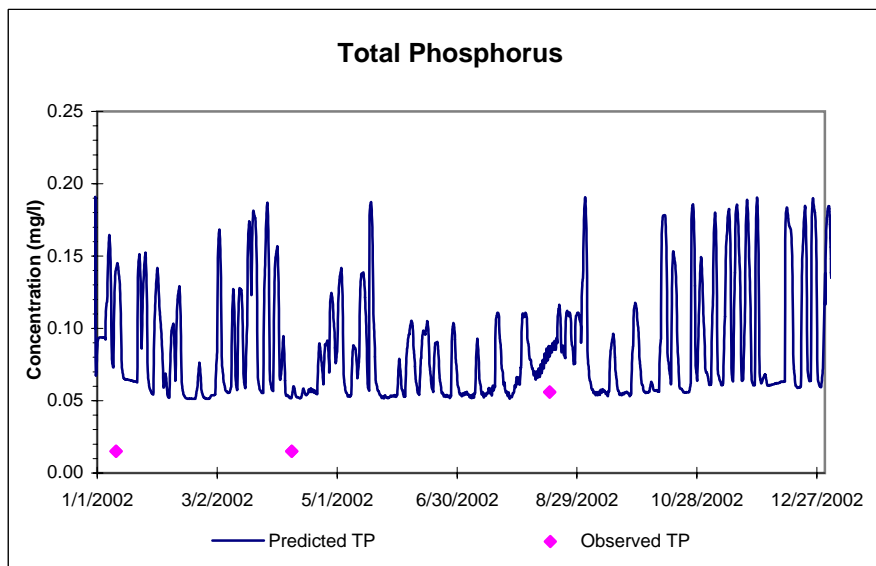
## Pike Brook upstream Oxbridge STP in Bridgepoint



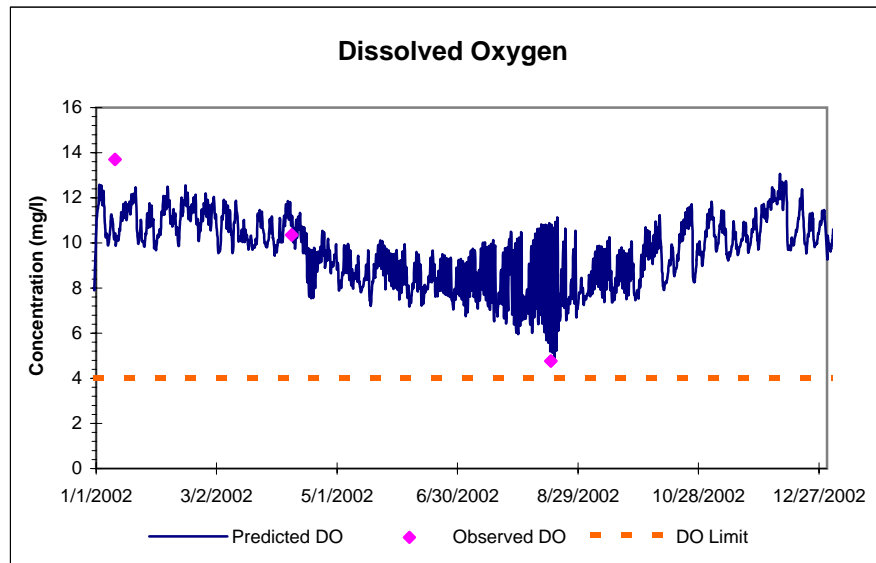
## Pike Brook Upstream of Beden Brook Confluence in Montgomery



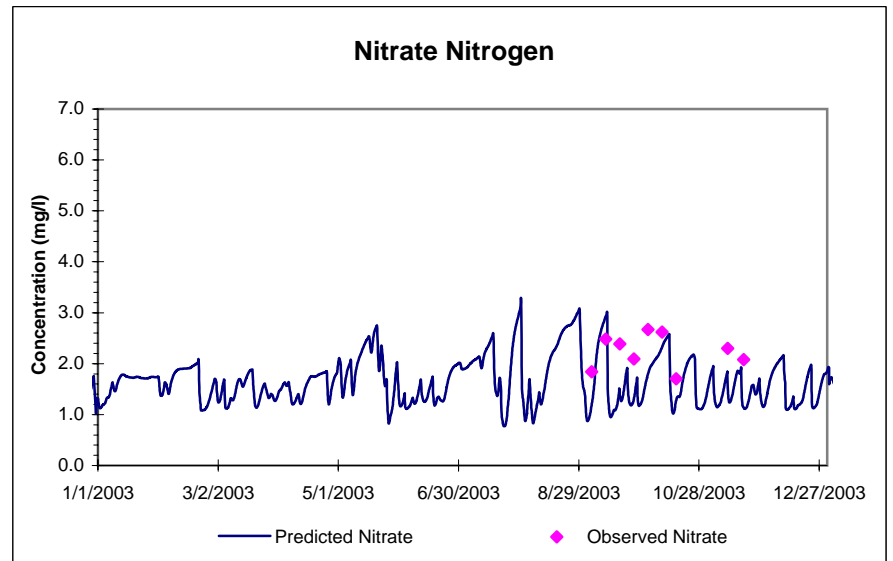
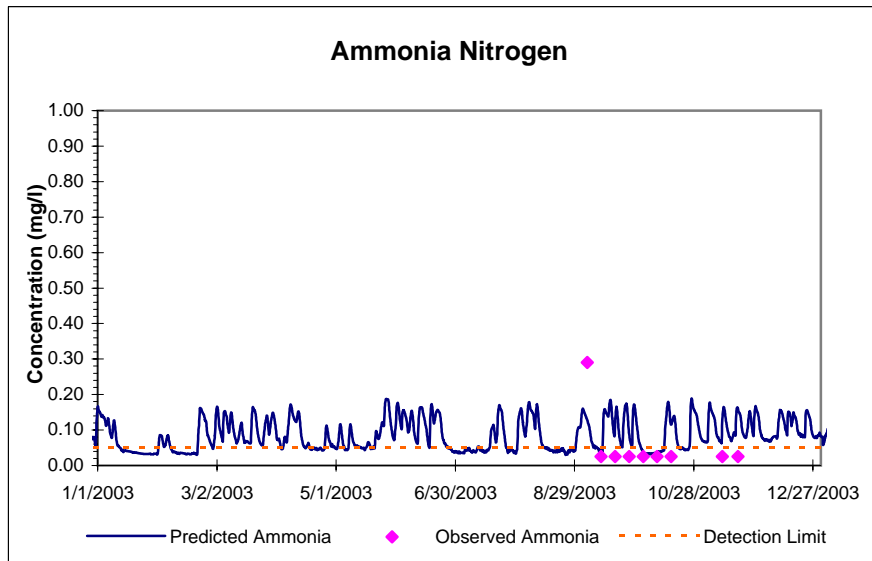
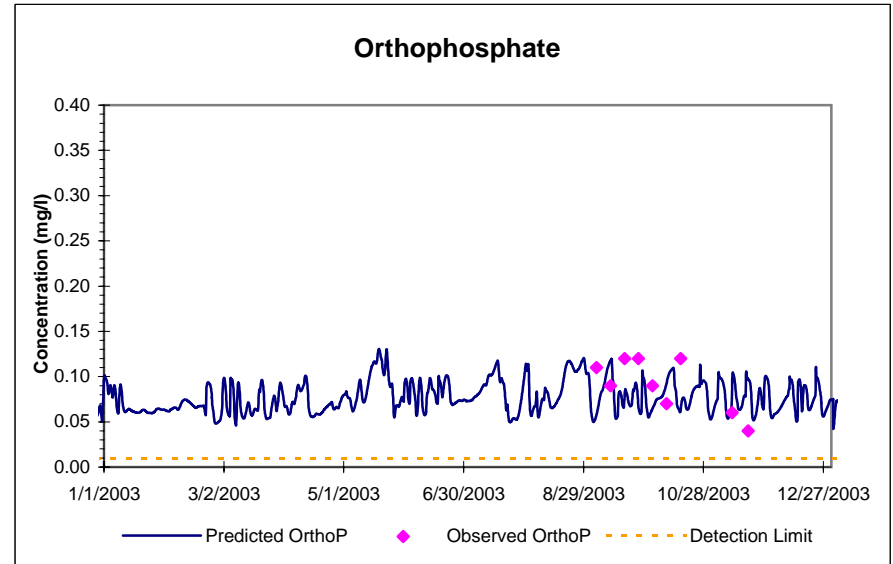
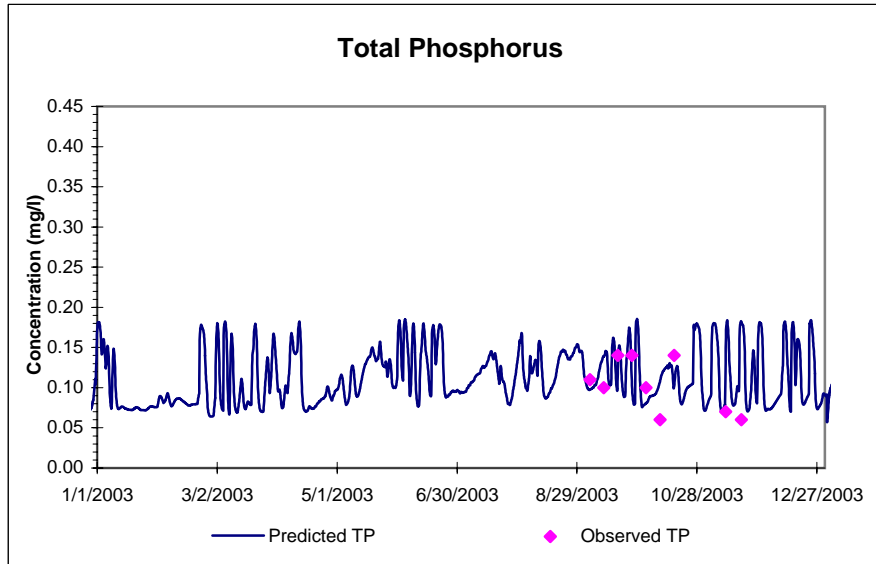
## Pike Run at River Rd. in Montgomery (USGS 01401700)



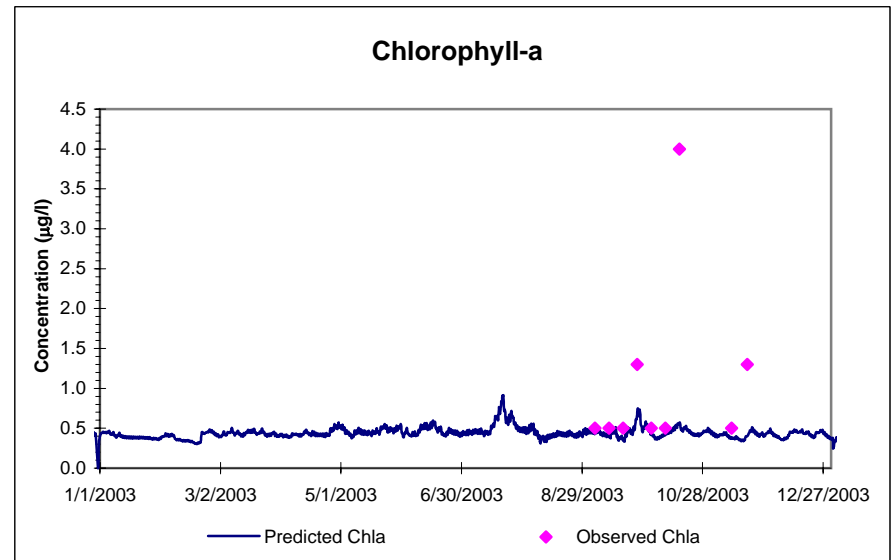
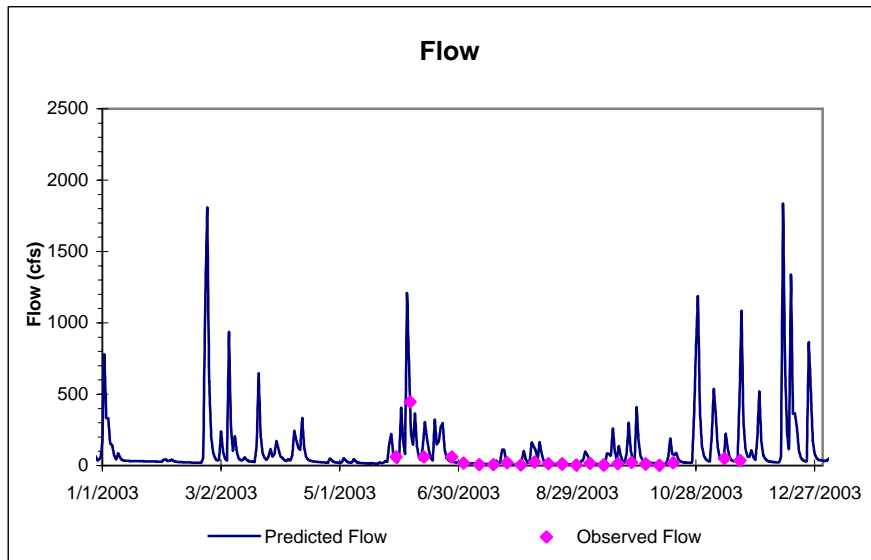
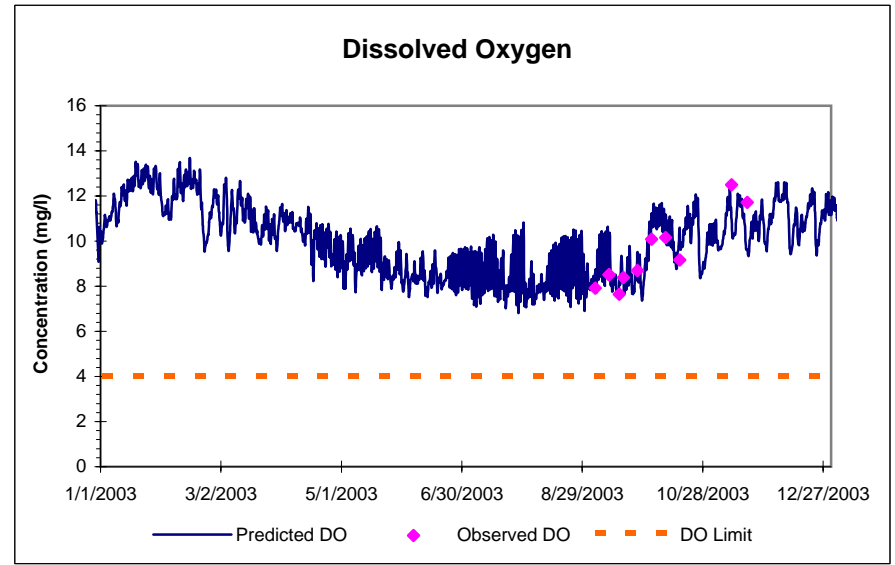
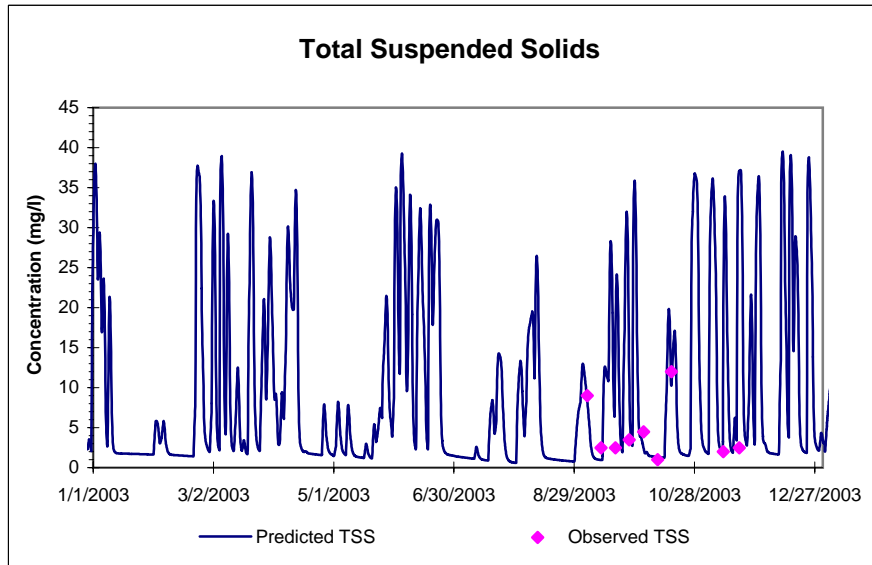
## Pike Run at River Rd. in Montgomery (USGS 01401700)



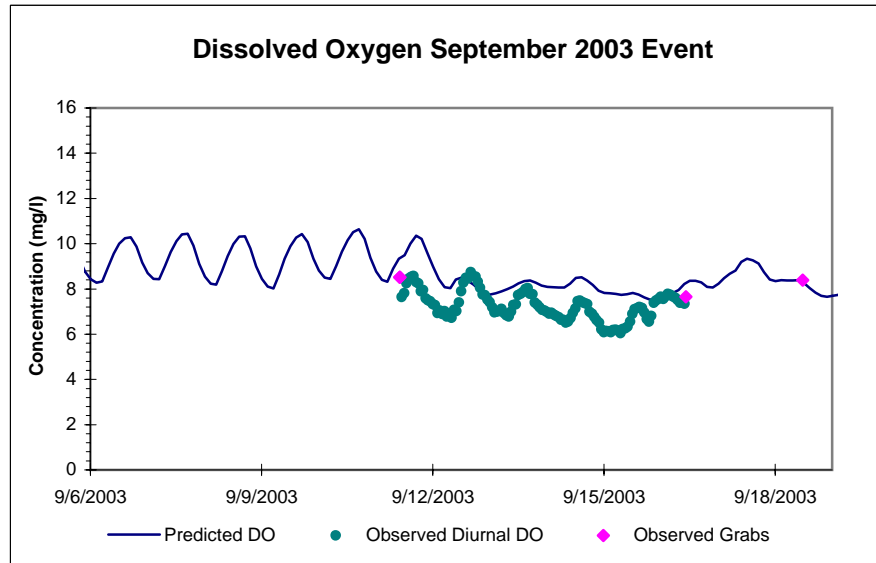
## Beden Brook Downstream of Pike Brook Confluence (BB3)



## Beden Brook Downstream of Pike Brook Confluence (BB3)

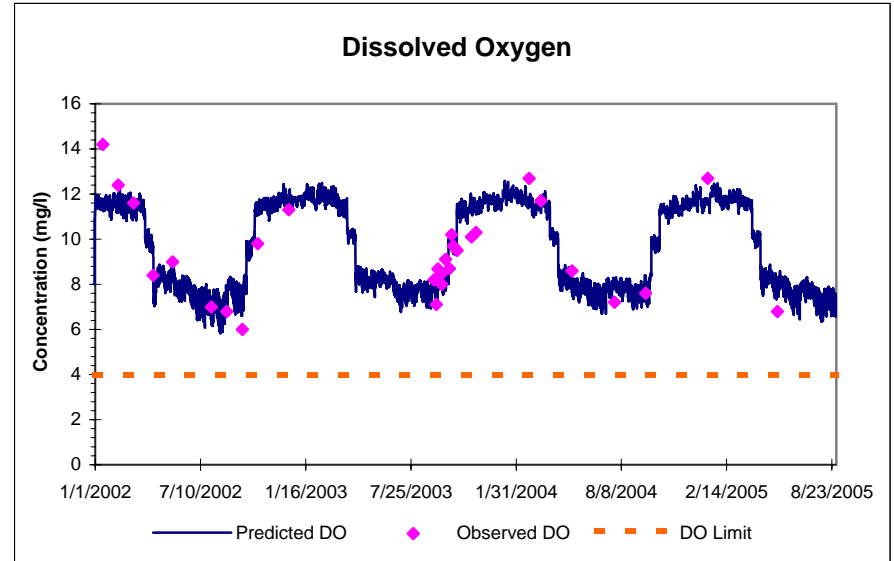
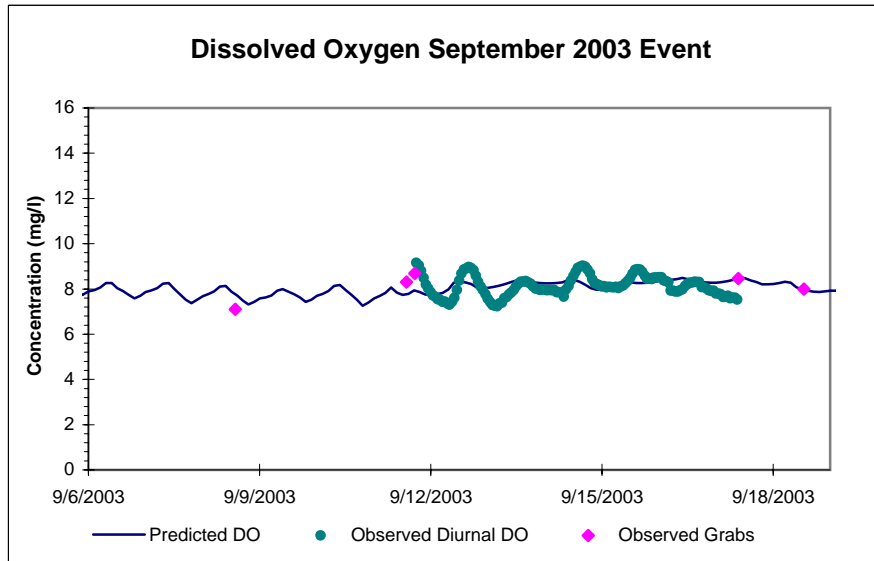


## Beden Brook Downstream of Pike Brook Confluence (BB3)

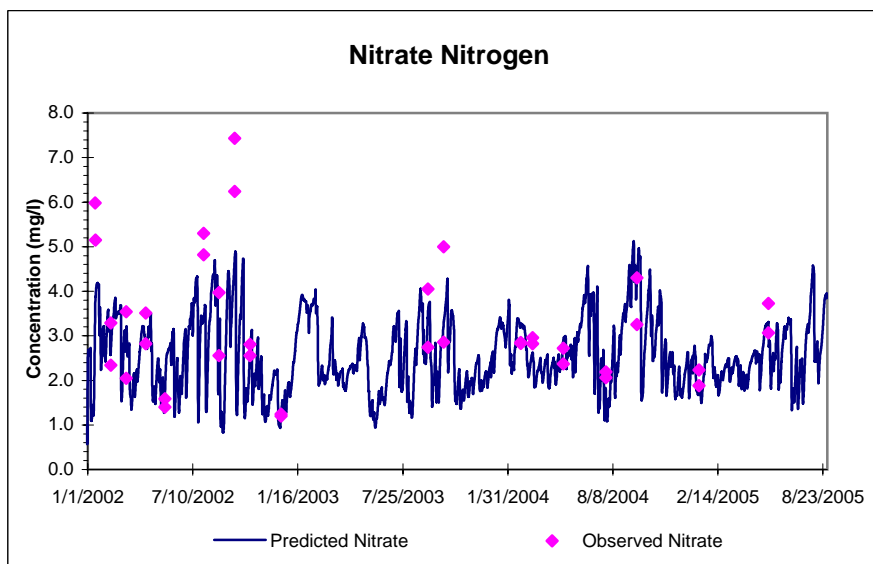
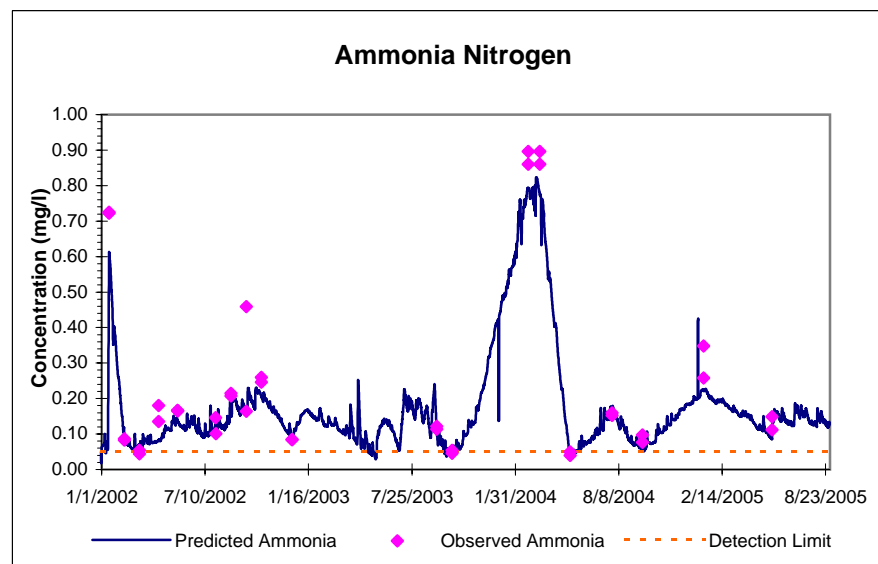
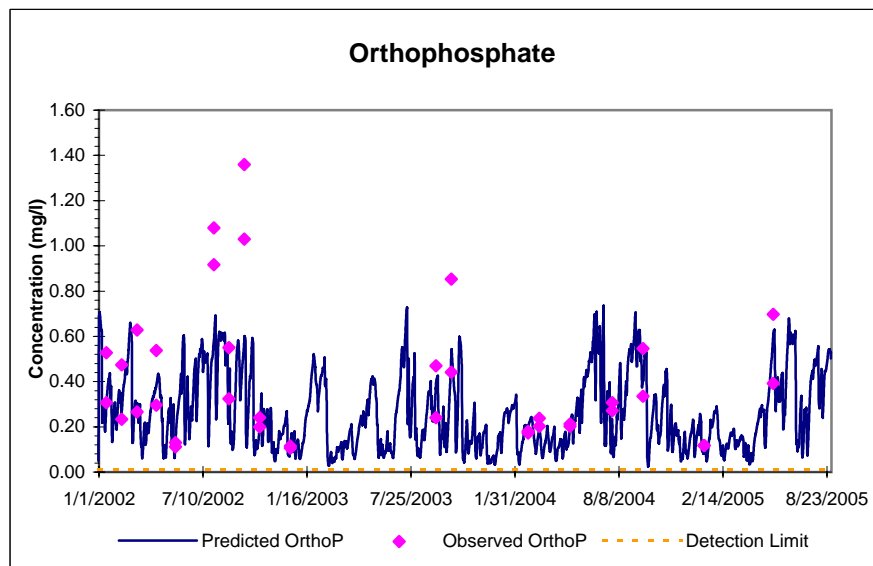
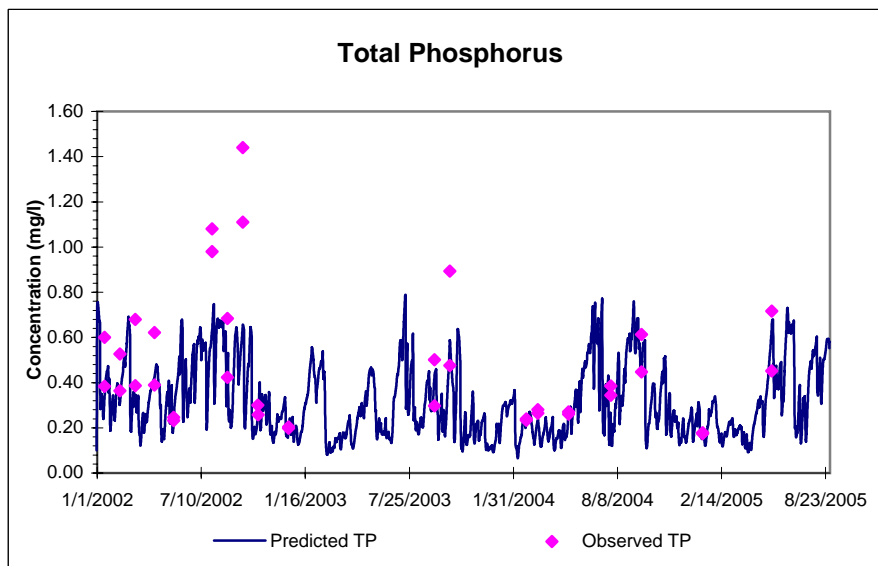




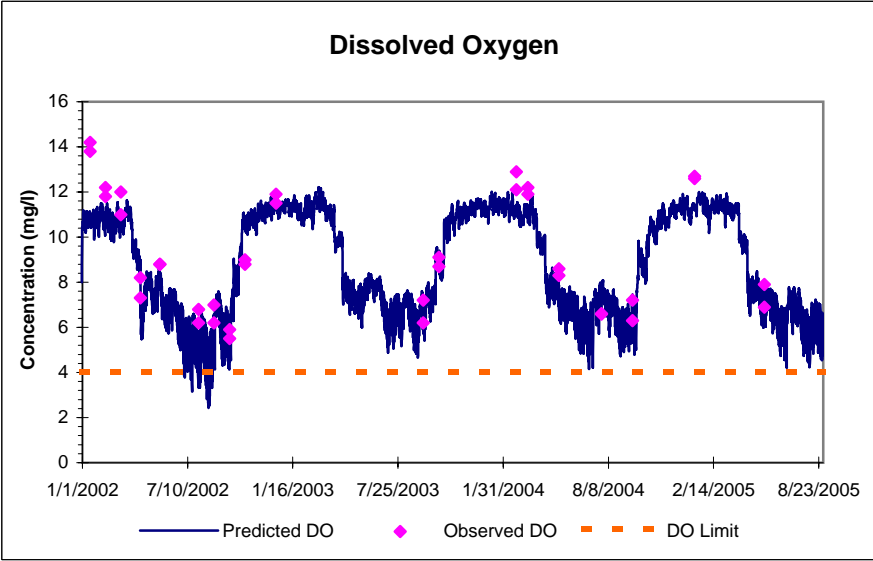
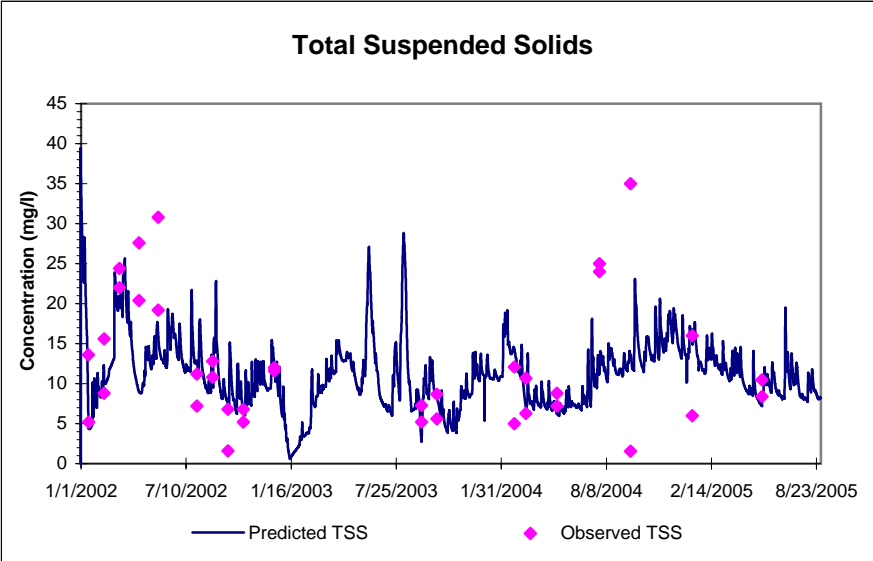
## Lower Millstone River Downstream of Carnegie Lake (M2)



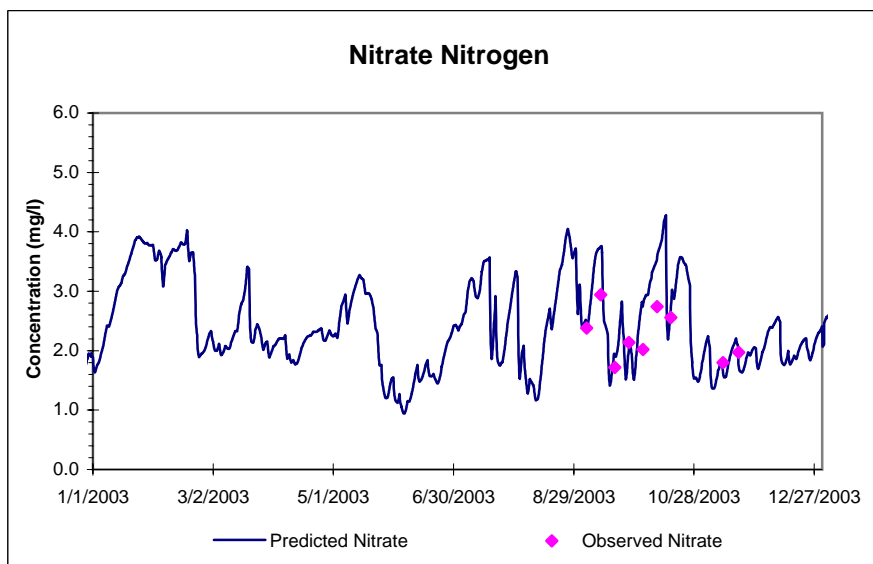
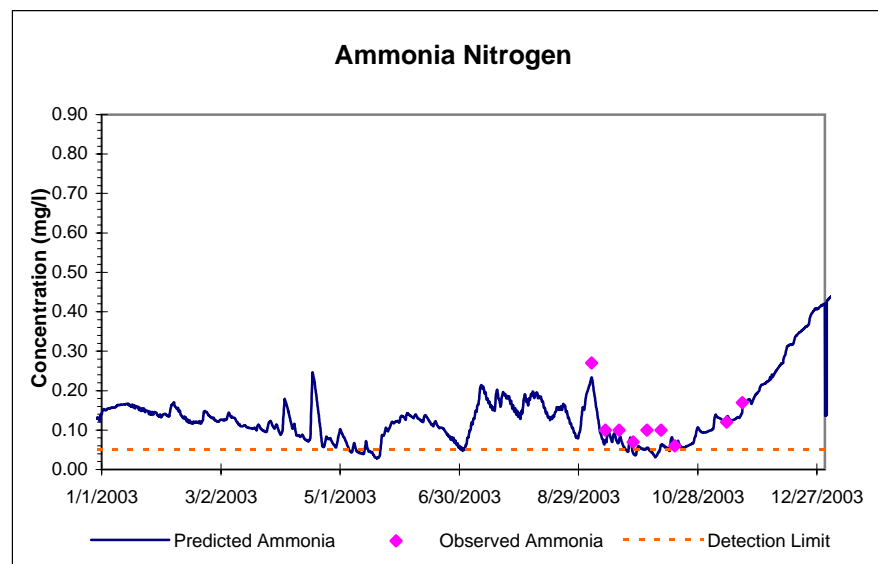
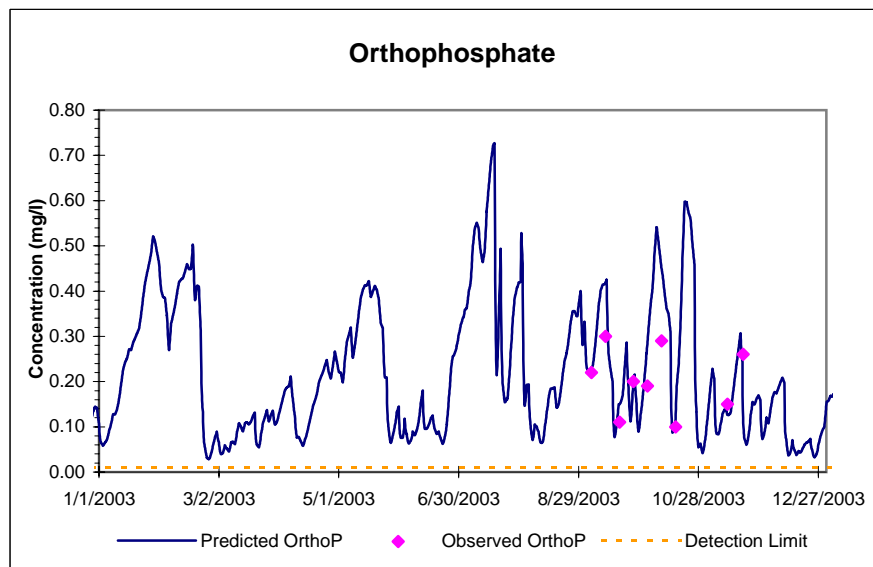
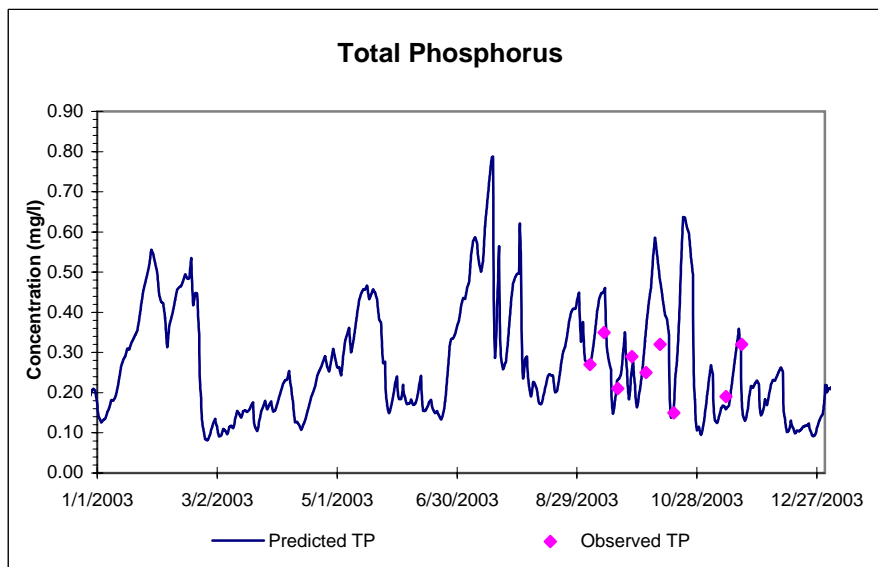
## Lower Millstone River Downstream of SBRSA - River Road STP Discharge



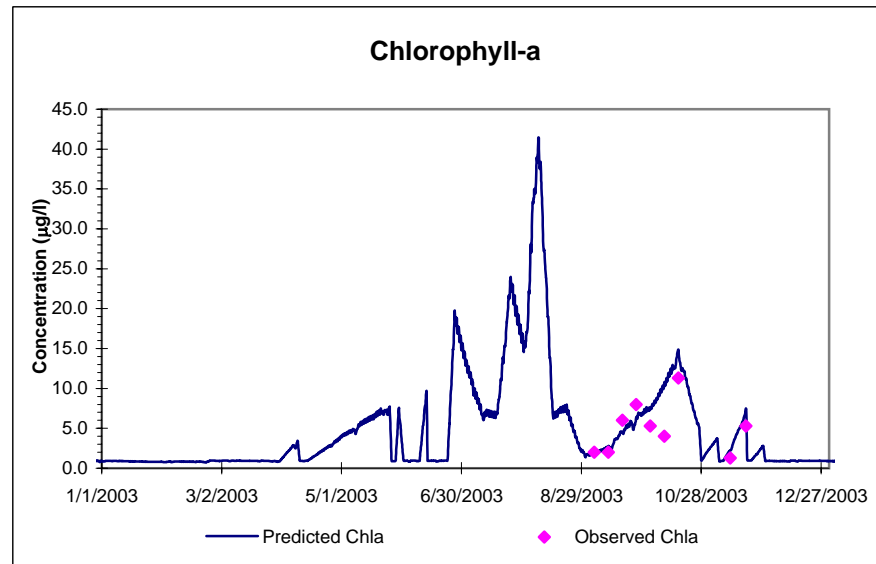
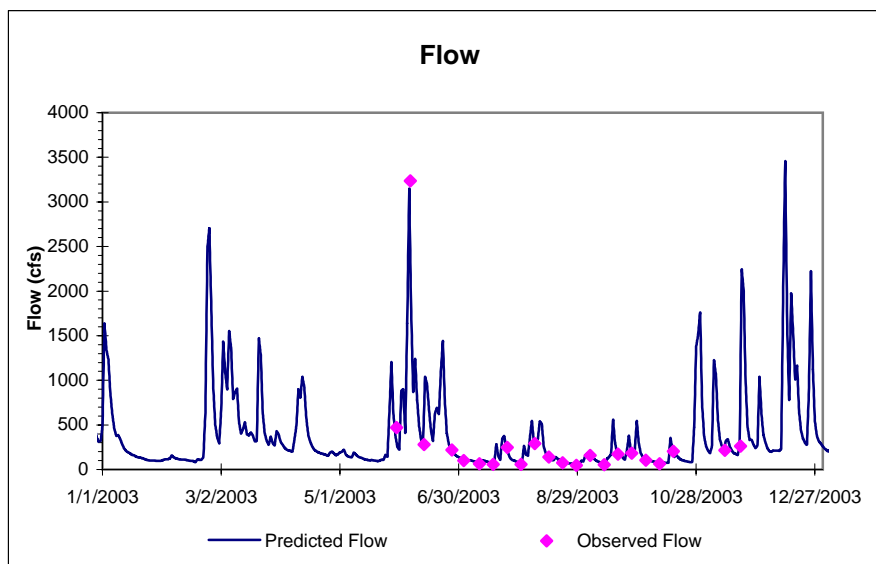
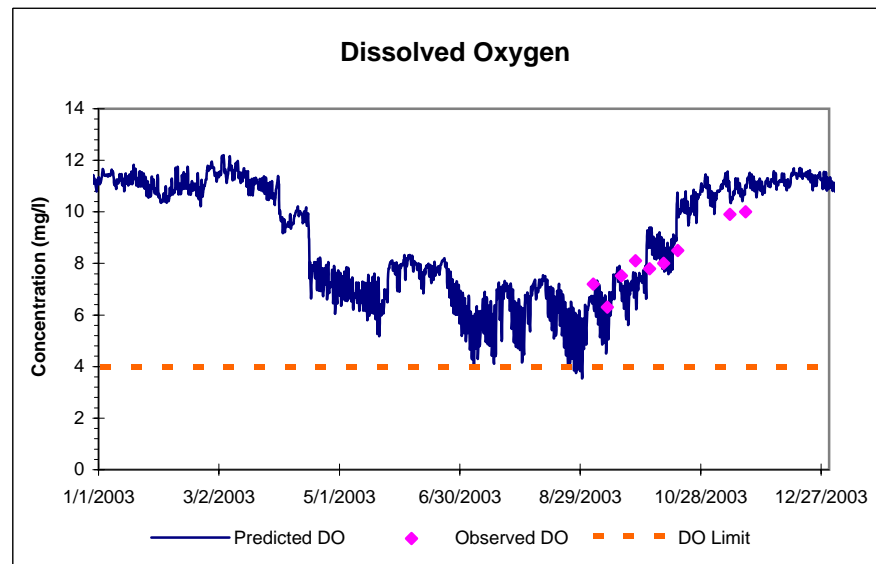
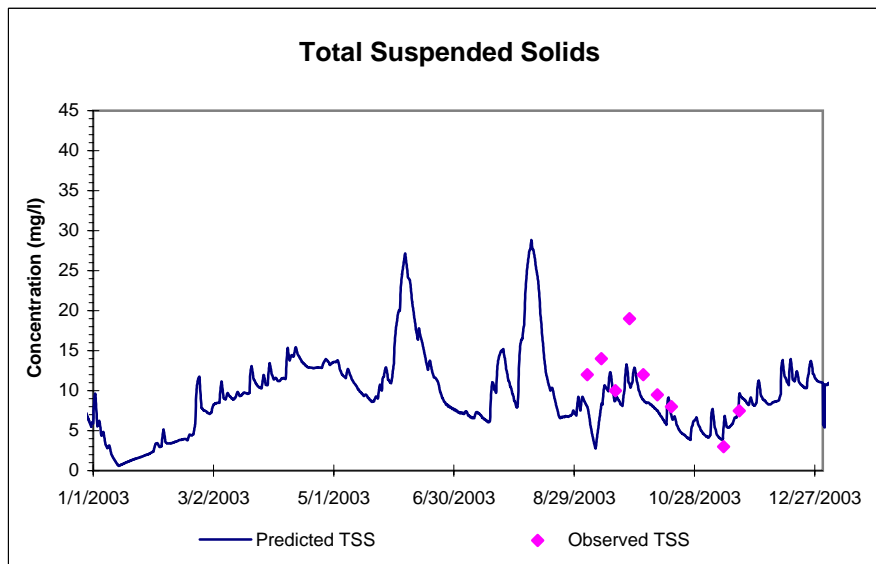
# Lower Millstone River Downstream of SBRSA - River Road STP Discharge



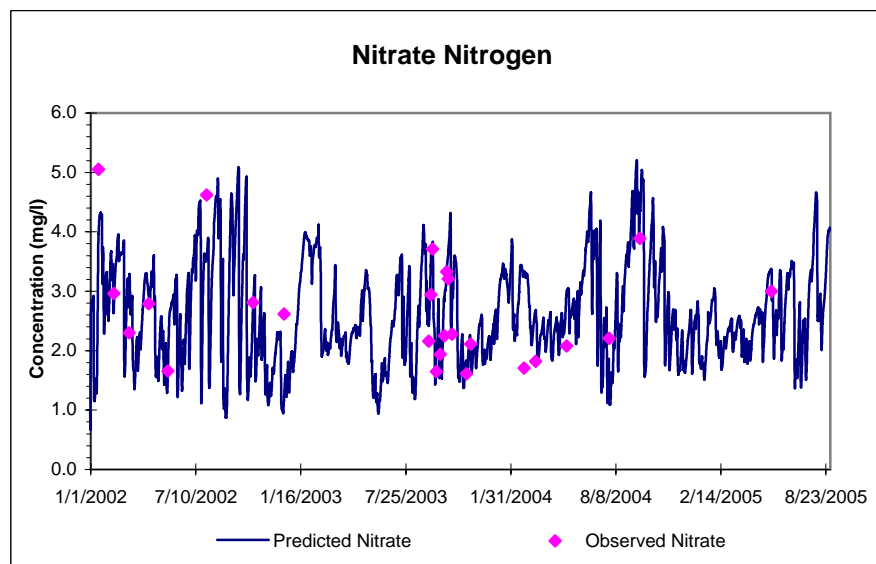
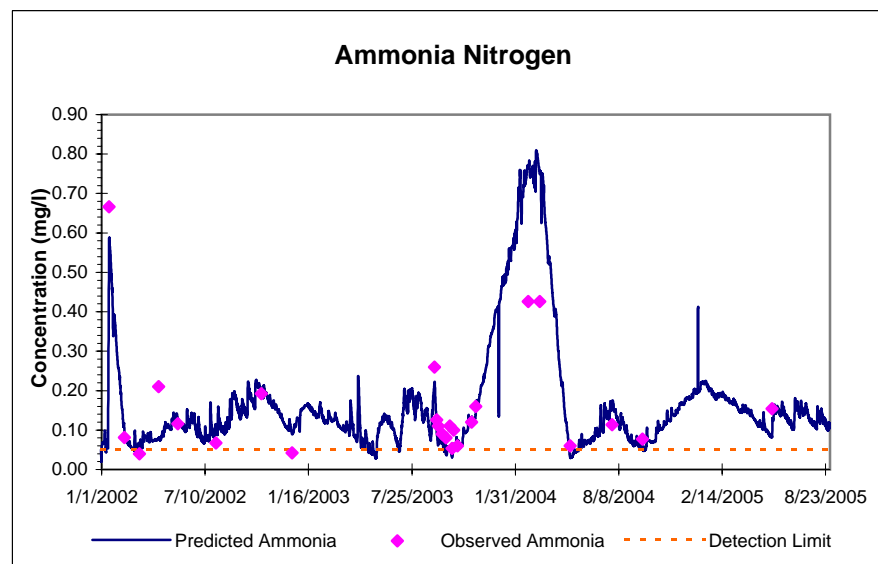
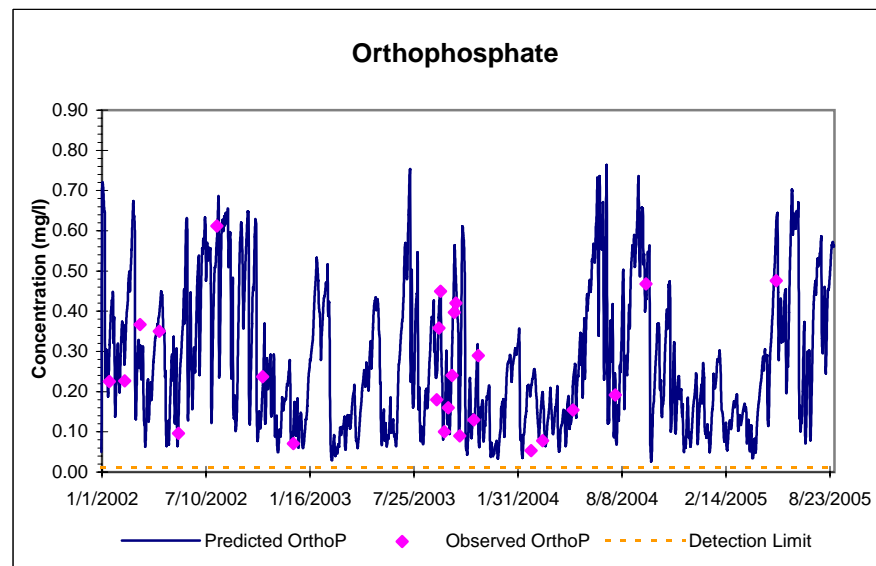
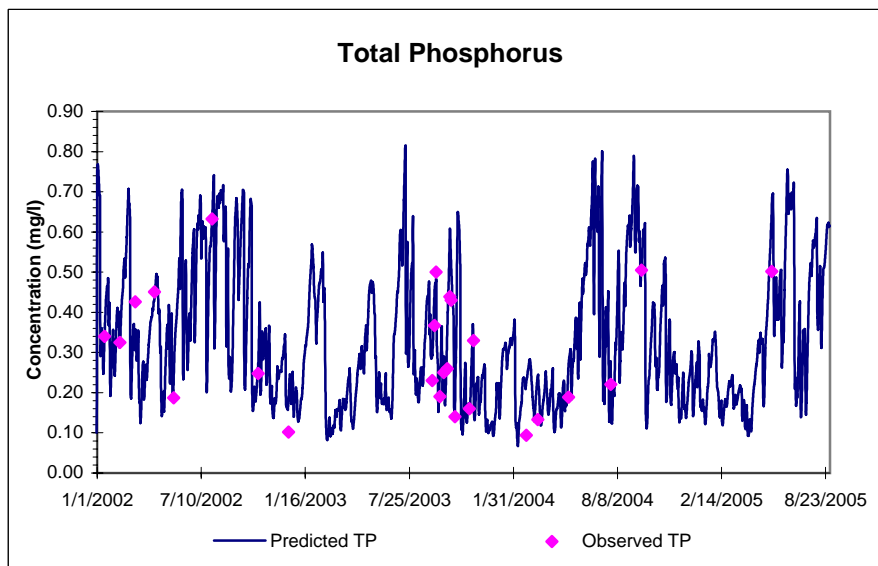
## Lower Millstone River Upstream of Montgomery Stage II STP (M3)



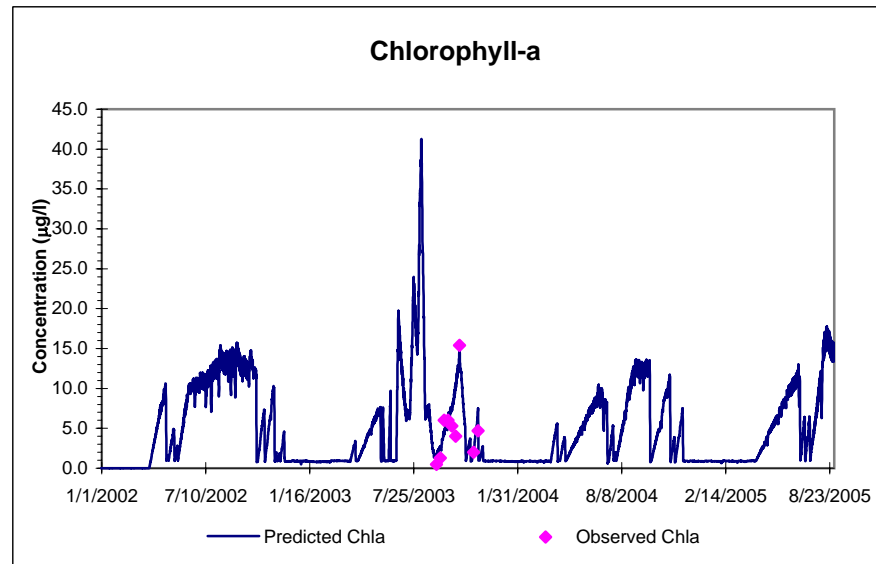
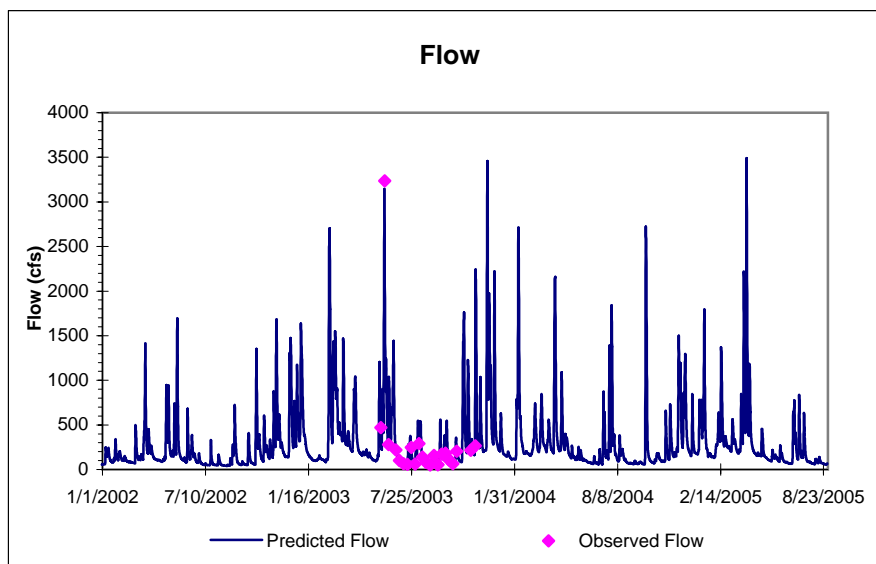
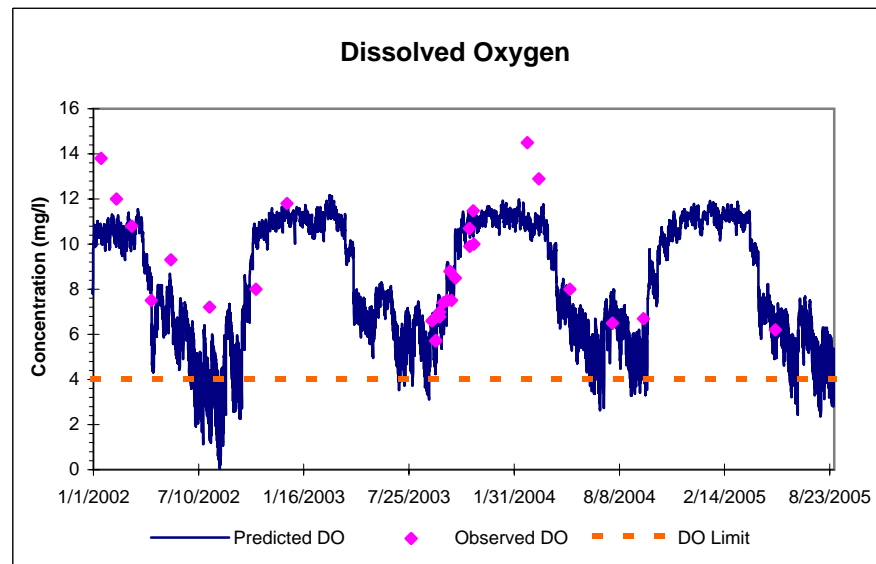
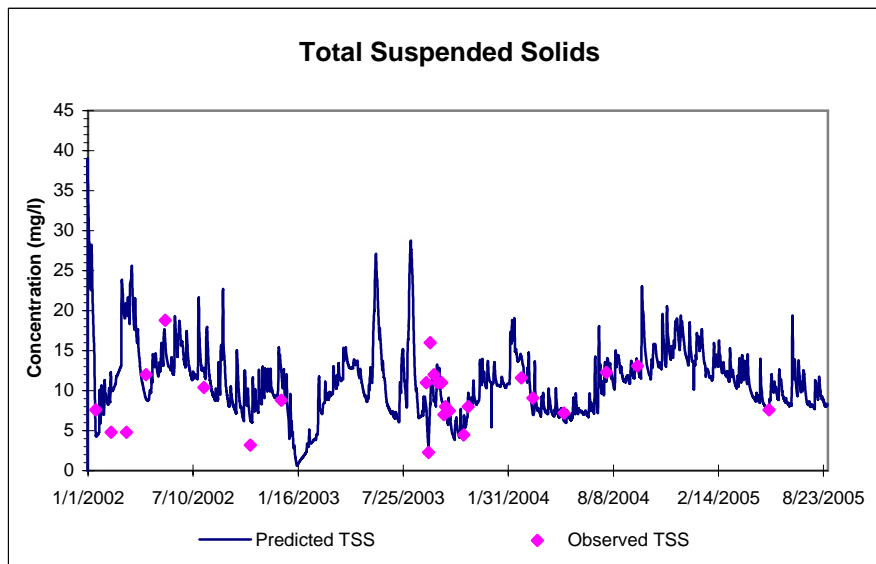
## Lower Millstone River Upstream of Montgomery Stage II STP (M3)



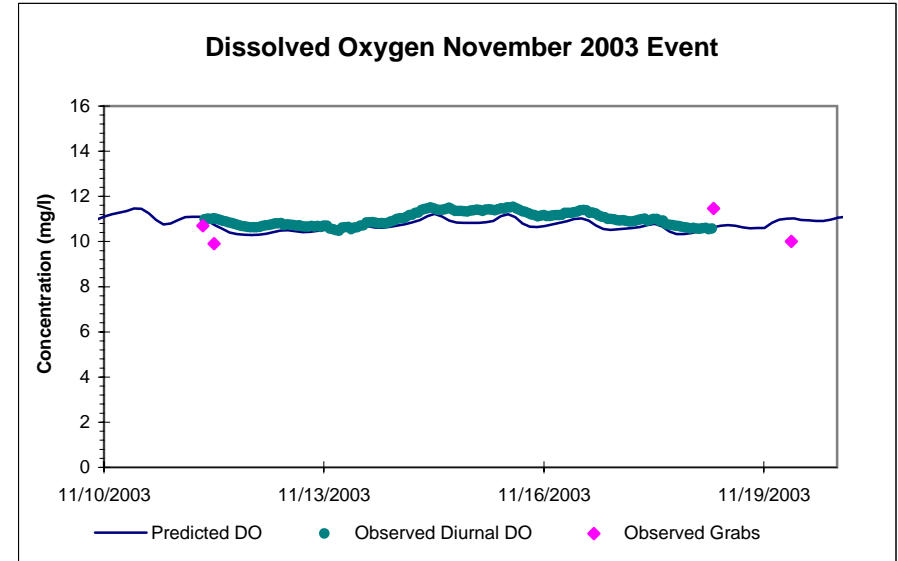
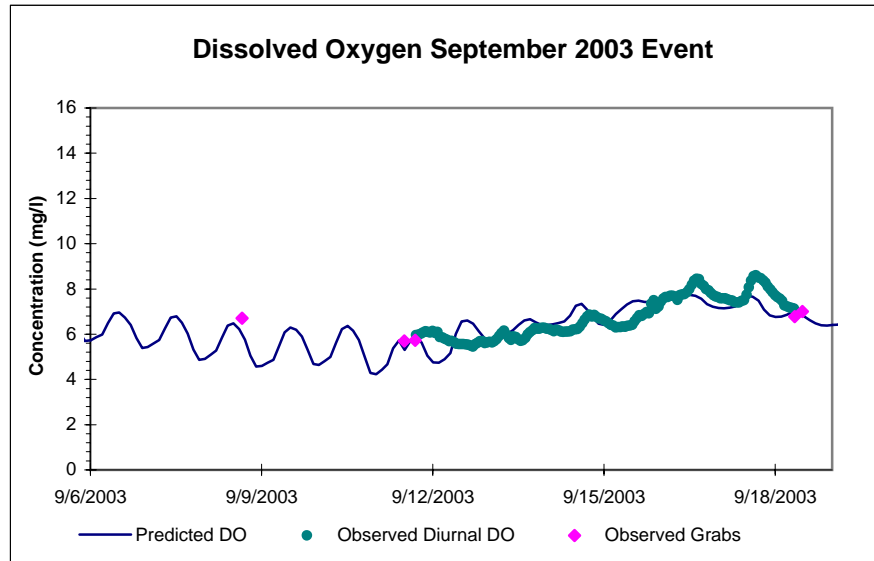
## Lower Millstone River at Route 518 in Rocky Hill (M4)



## Lower Millstone River at Route 518 in Rocky Hill (M4)

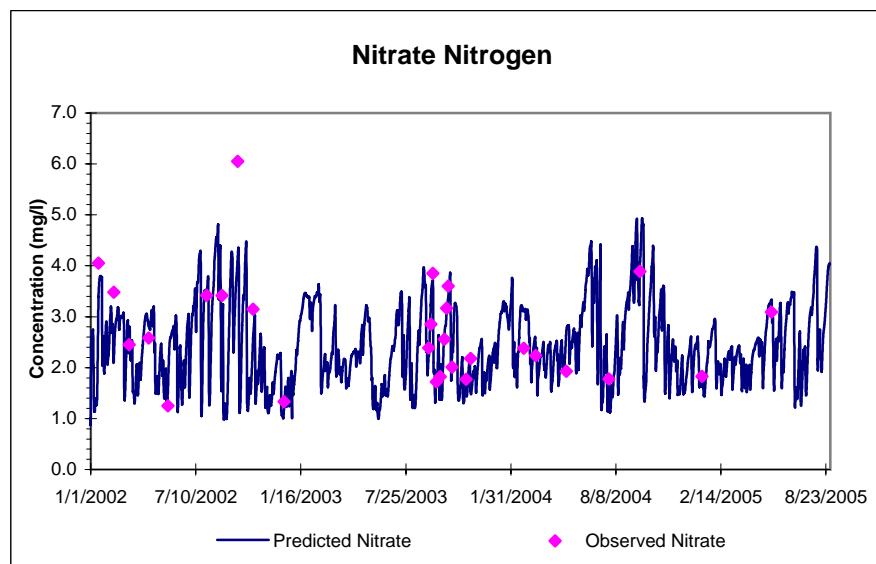
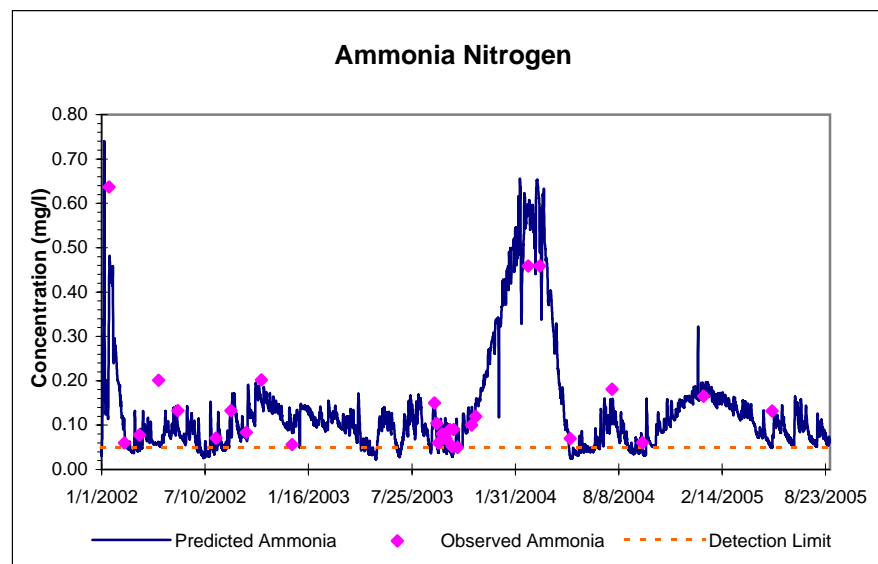
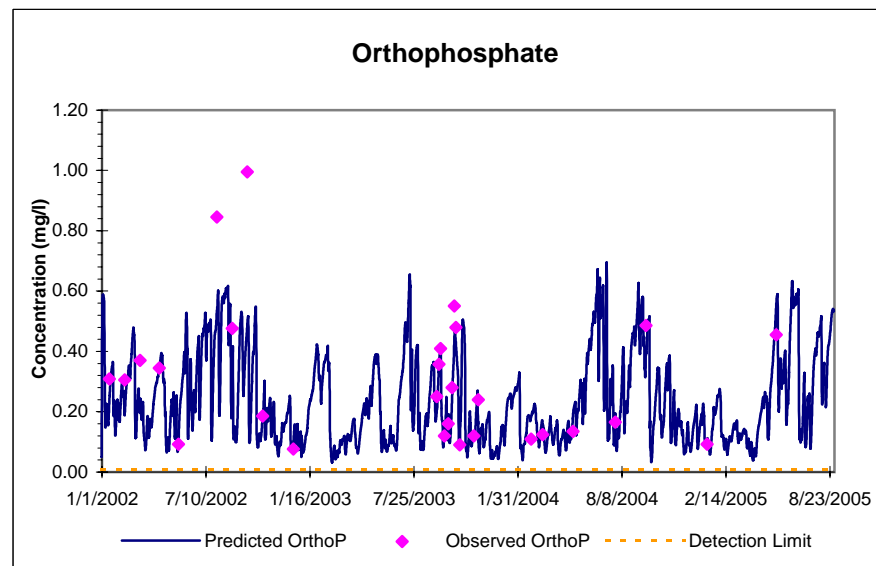
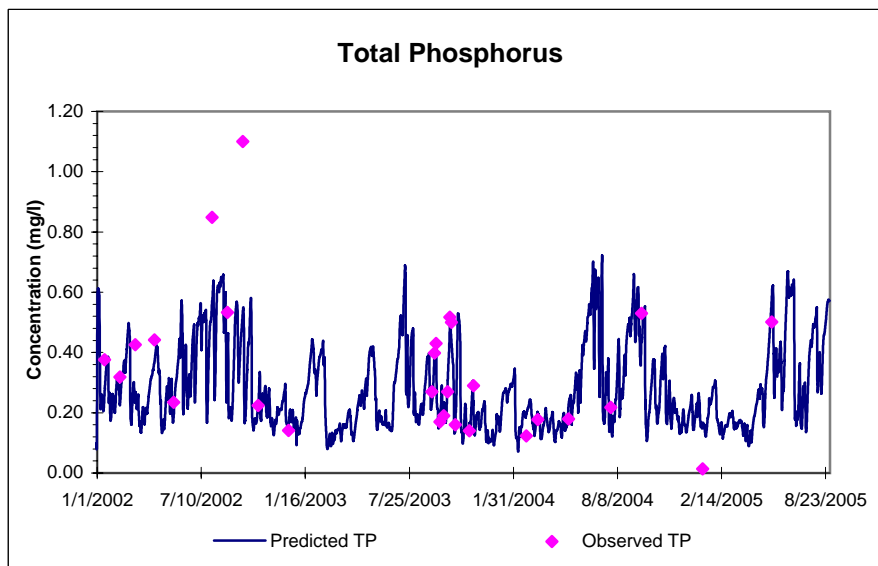


## Lower Millstone River at Route 518 in Rocky Hill (M4)

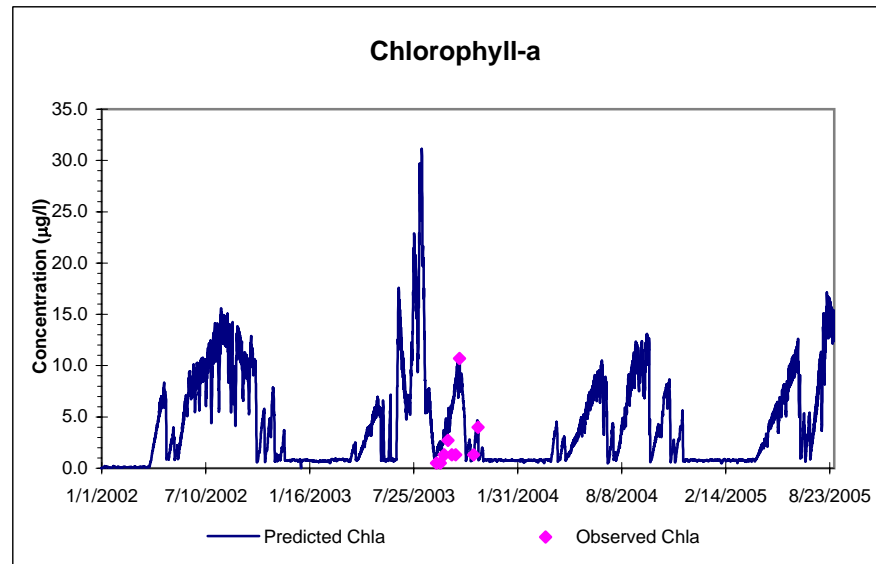
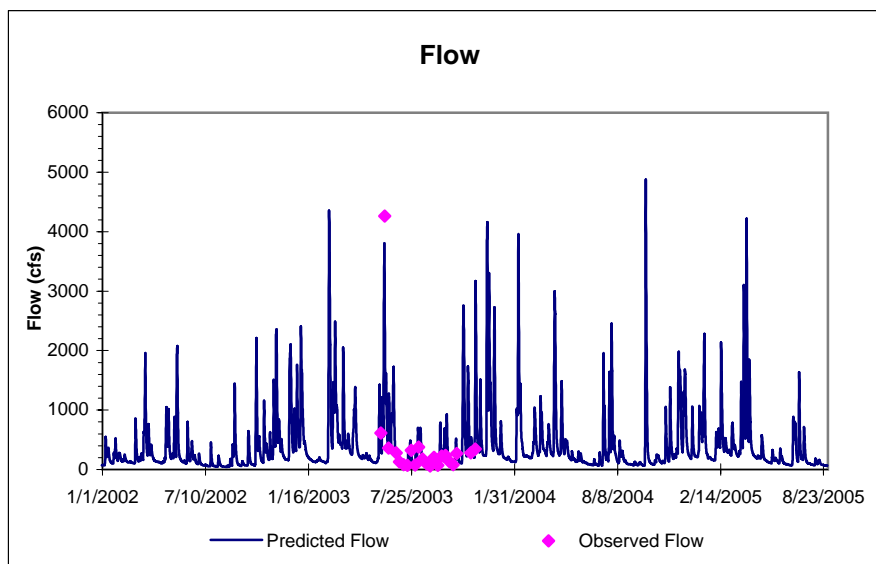
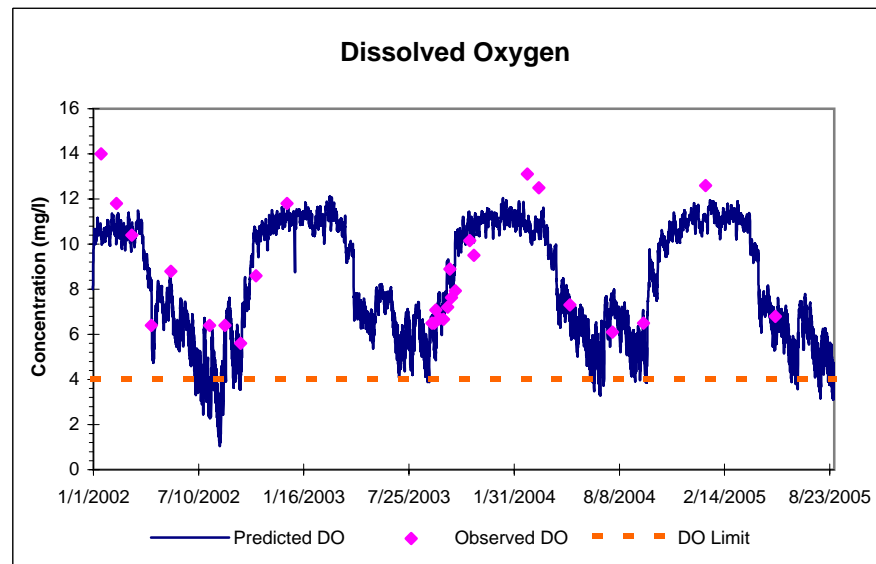
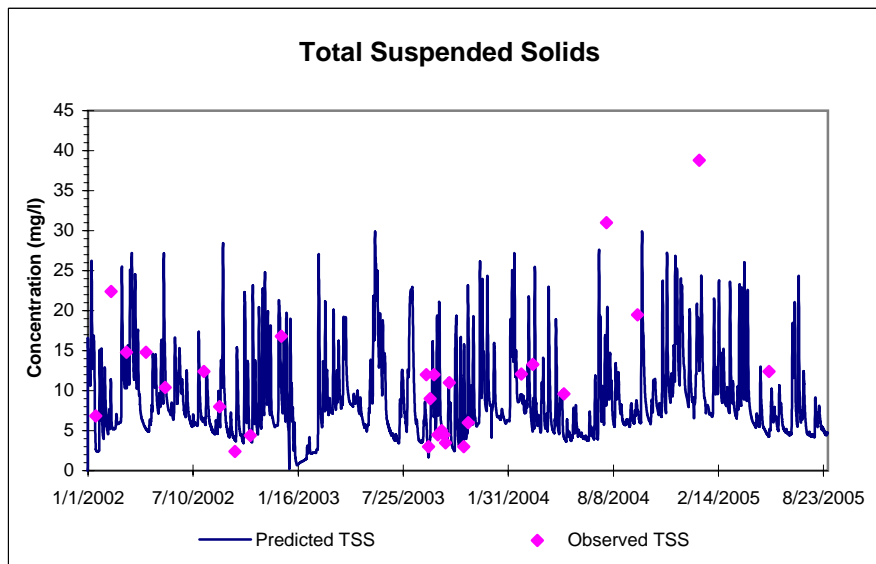




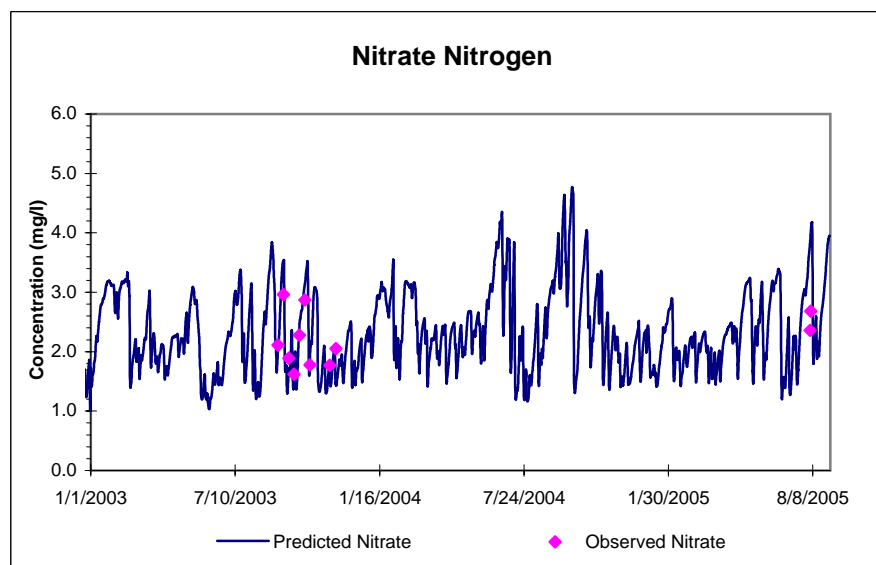
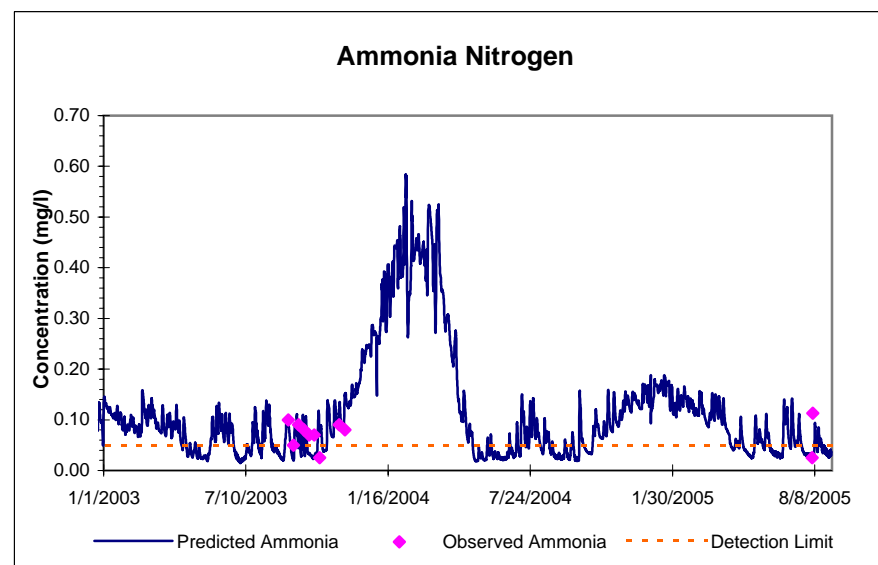
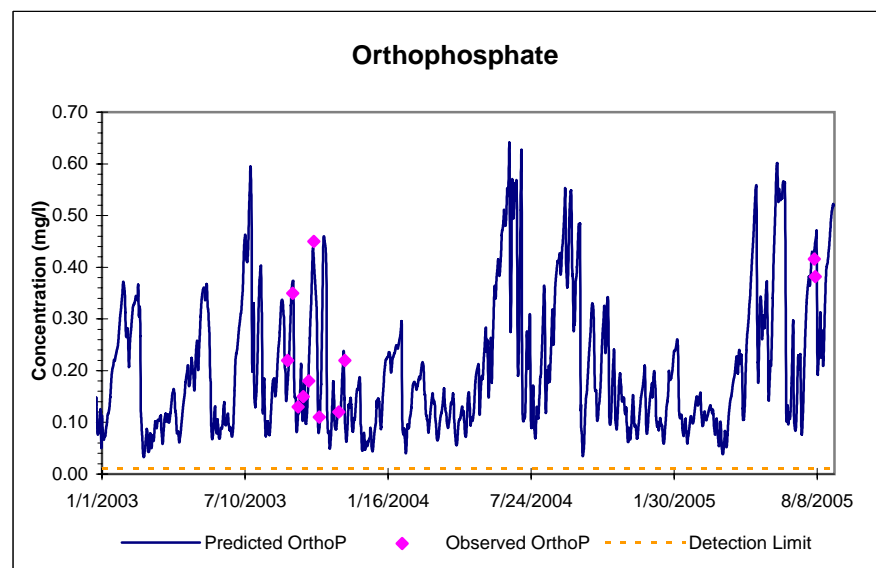
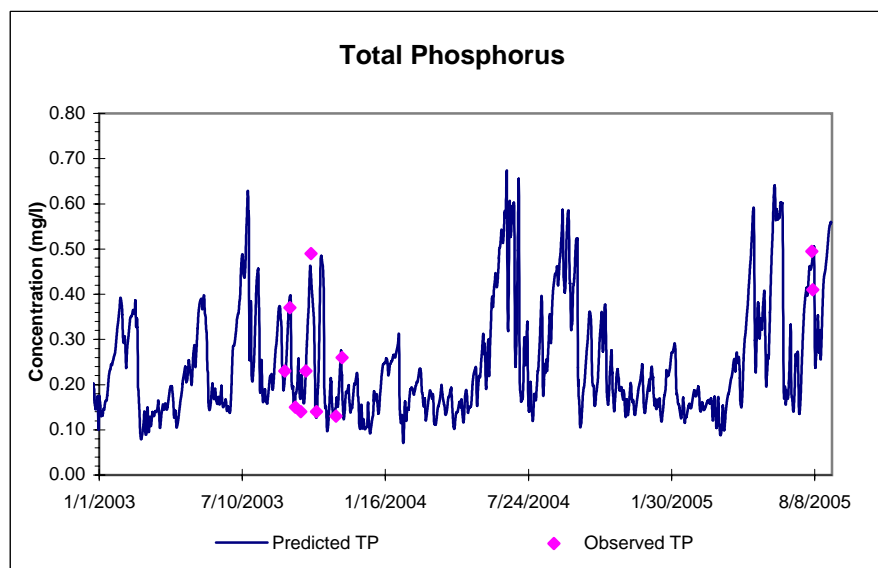
## Lower Millstone River at Griggstown Causeway (M5)



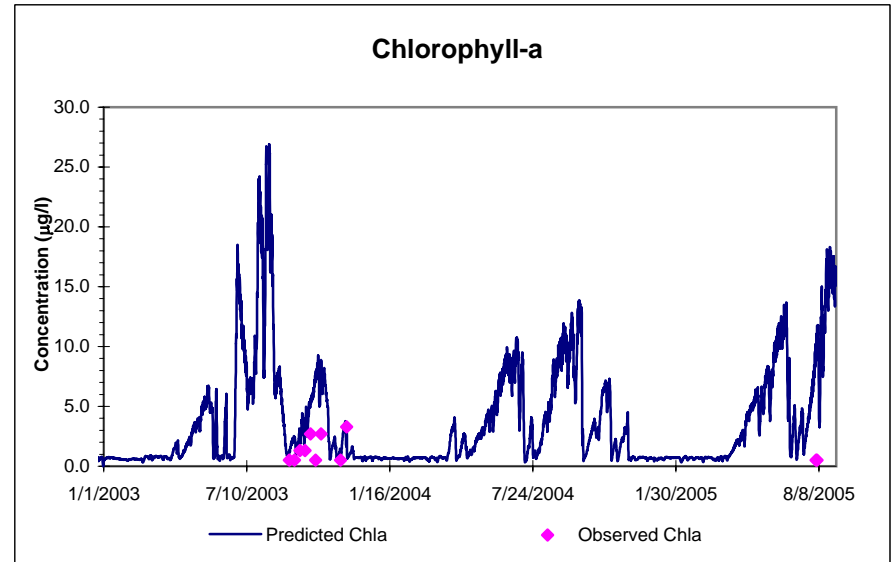
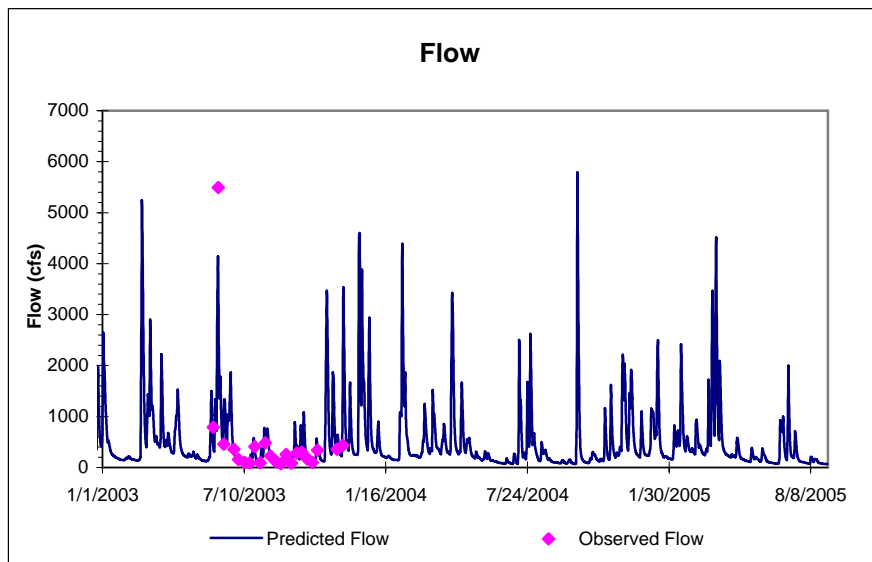
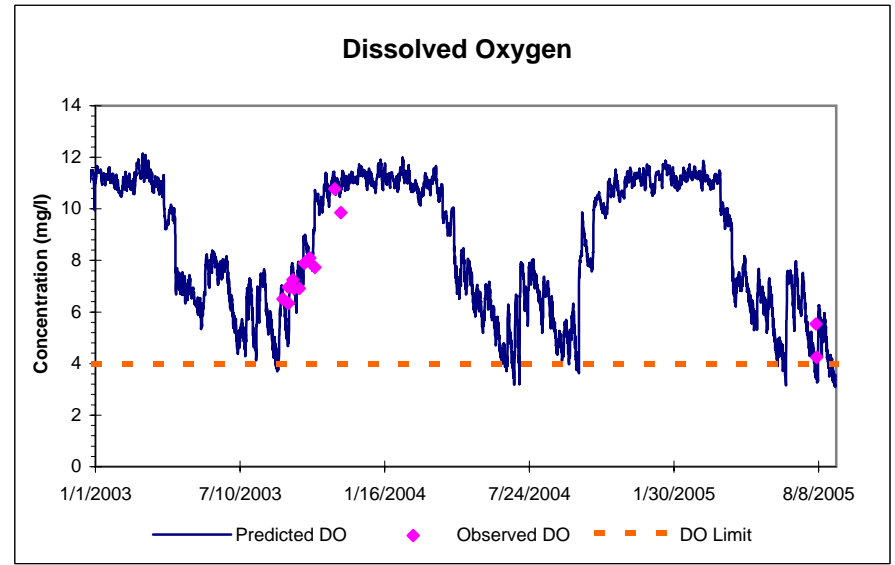
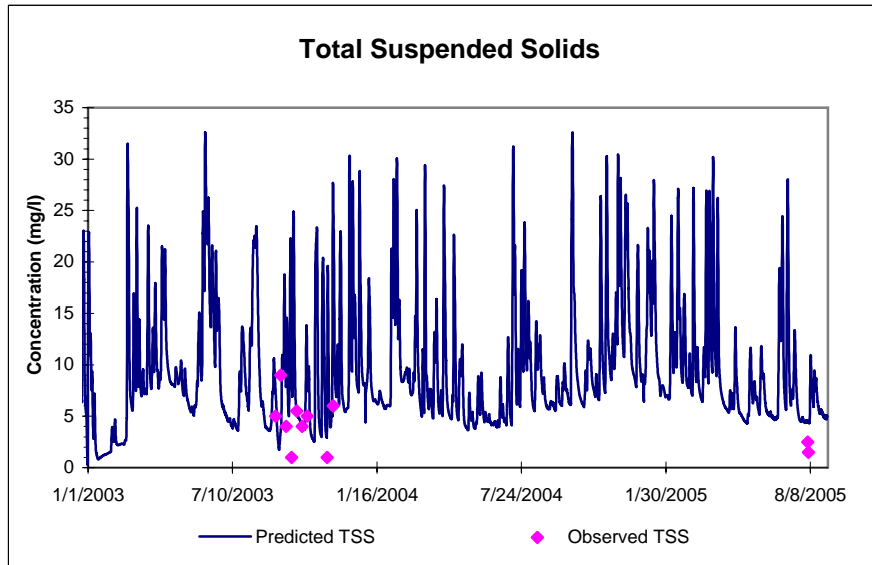
## Lower Millstone River at Griggstown Causeway (M5)



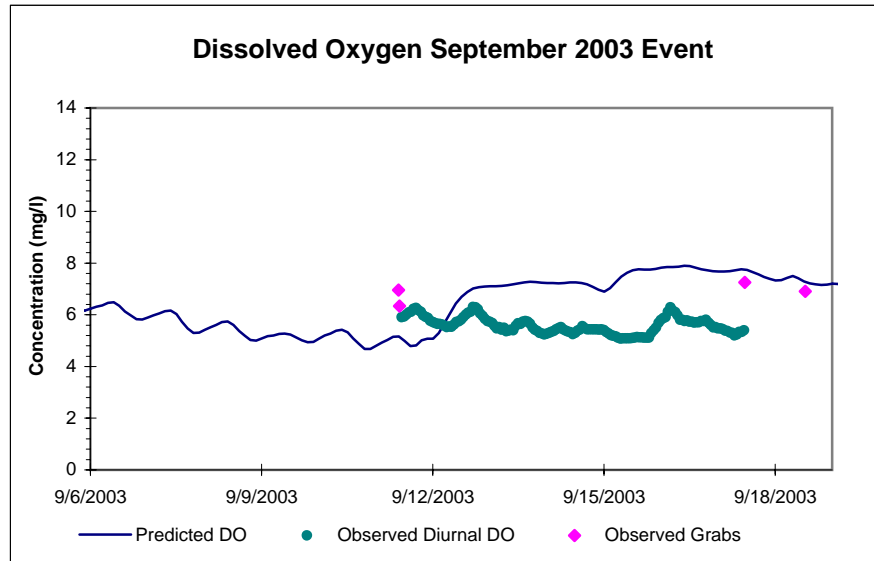
## Lower Millstone River at Manville Causeway (M7)



## Lower Millstone River at Manville Causeway (M7)

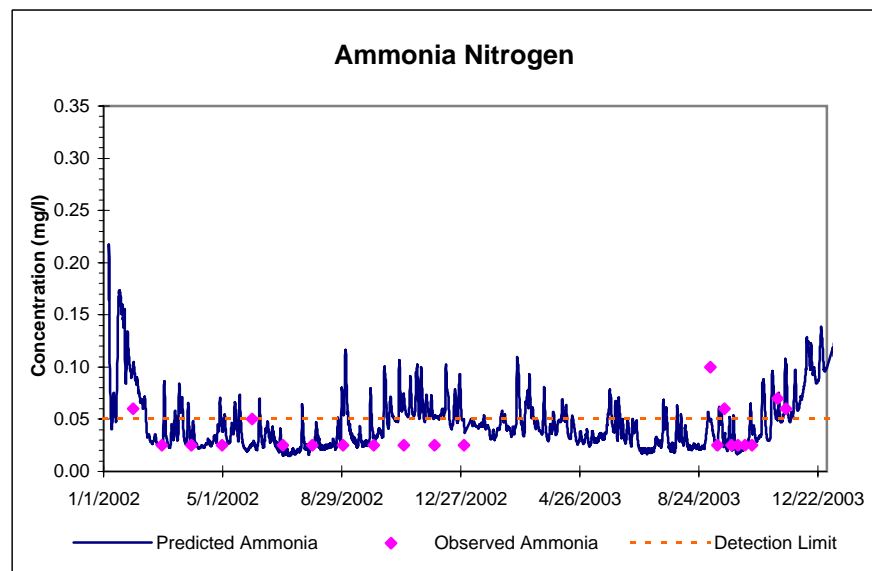
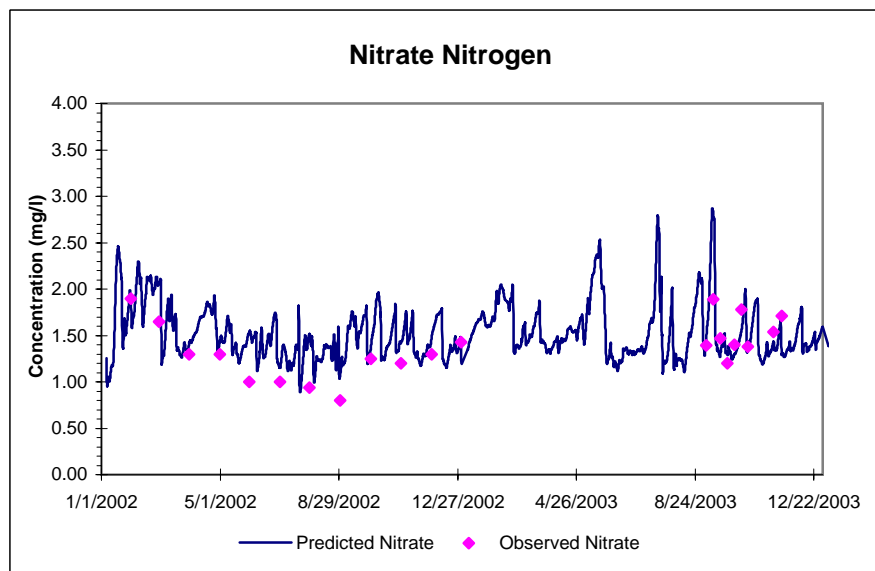
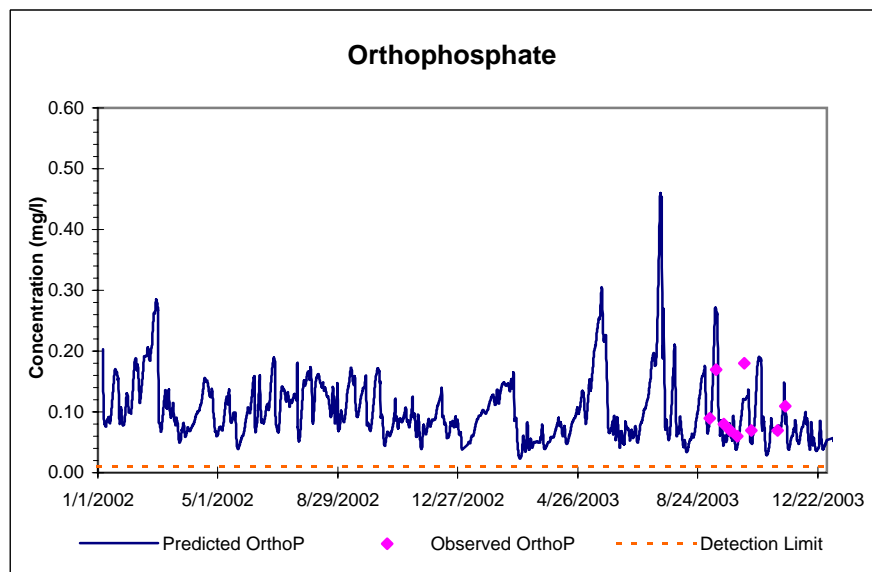
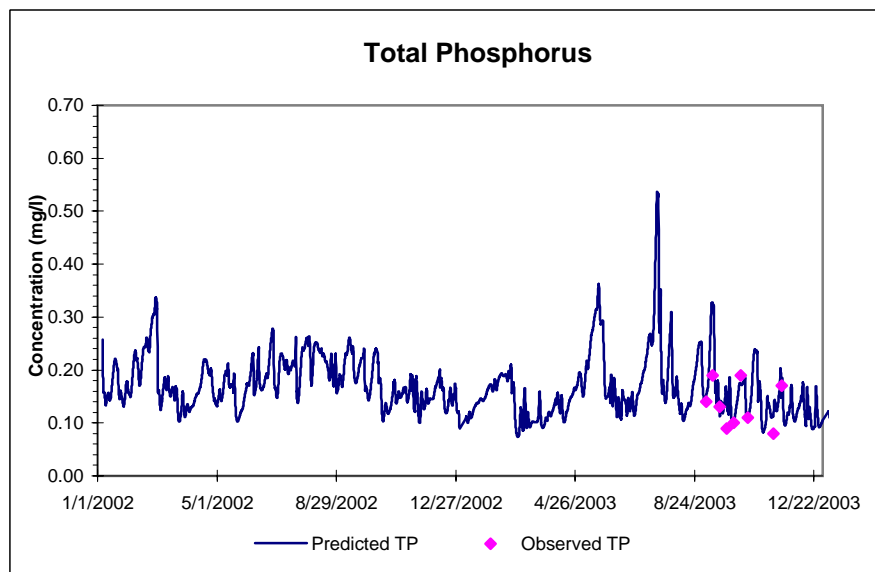


## Lower Millstone River at Manville Causeway (M7)

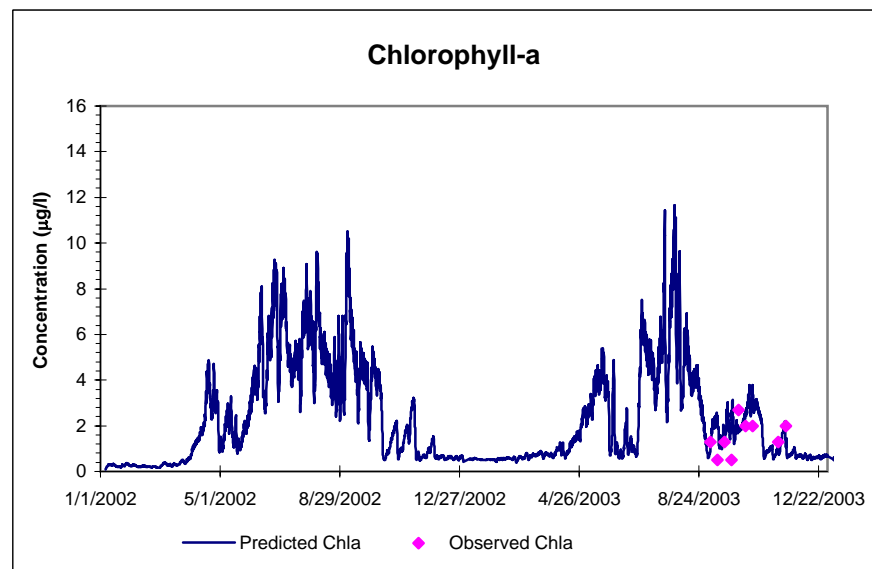
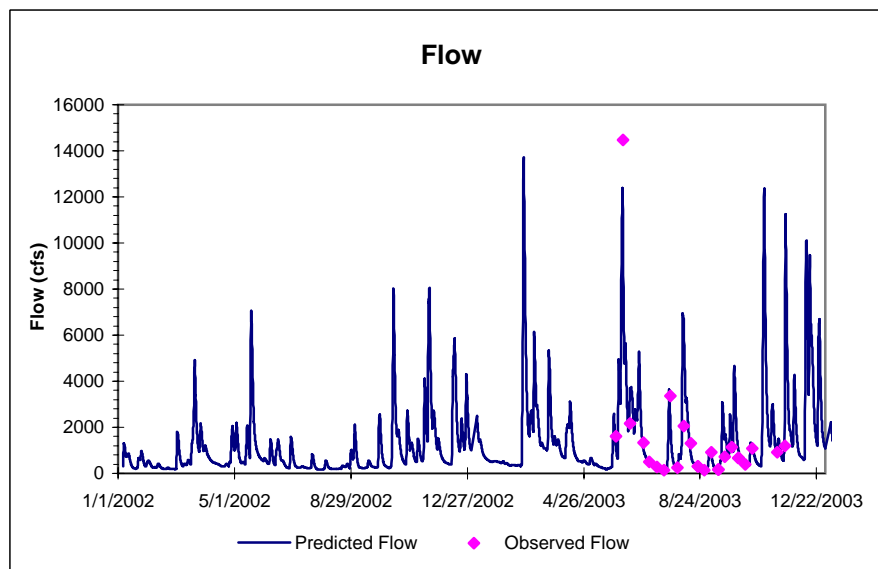
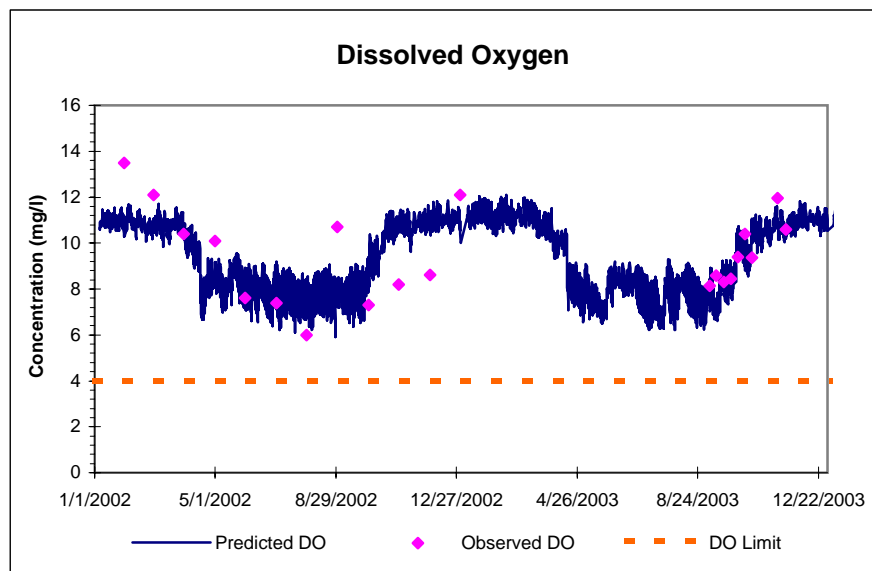
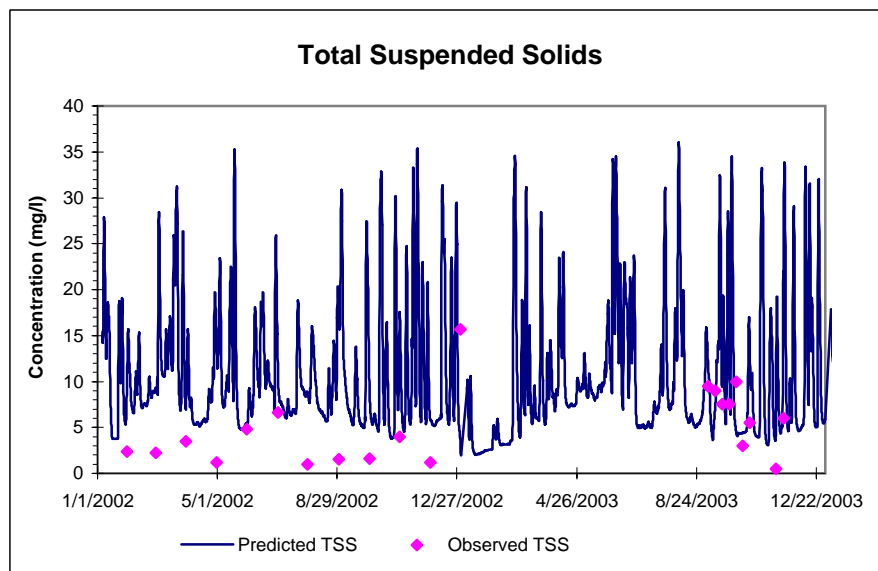


Mainstem Raritan River Watershed Area Model  
Water Quality Model Validation Graphs

## Raritan River Downstream Millstone River Confluence (R2)

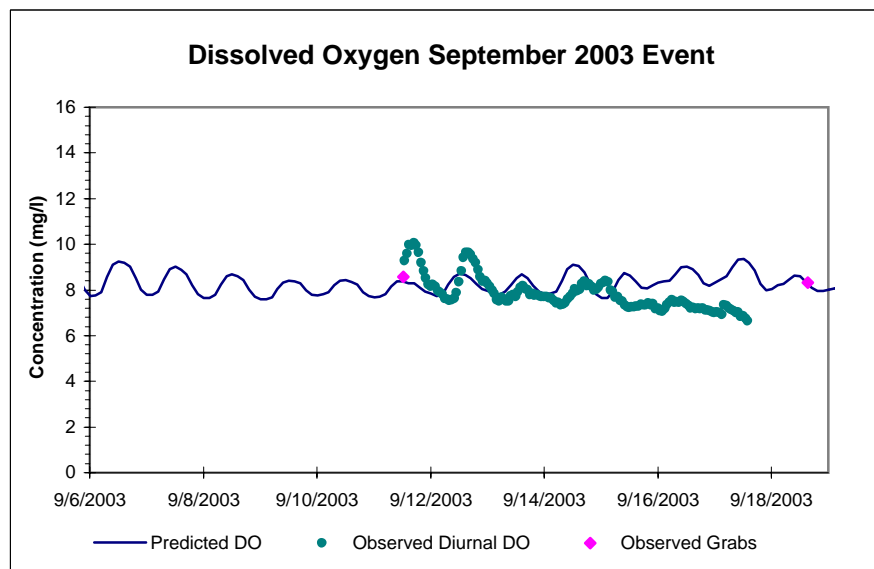


## Raritan River Downstream Millstone River Confluence (R2)

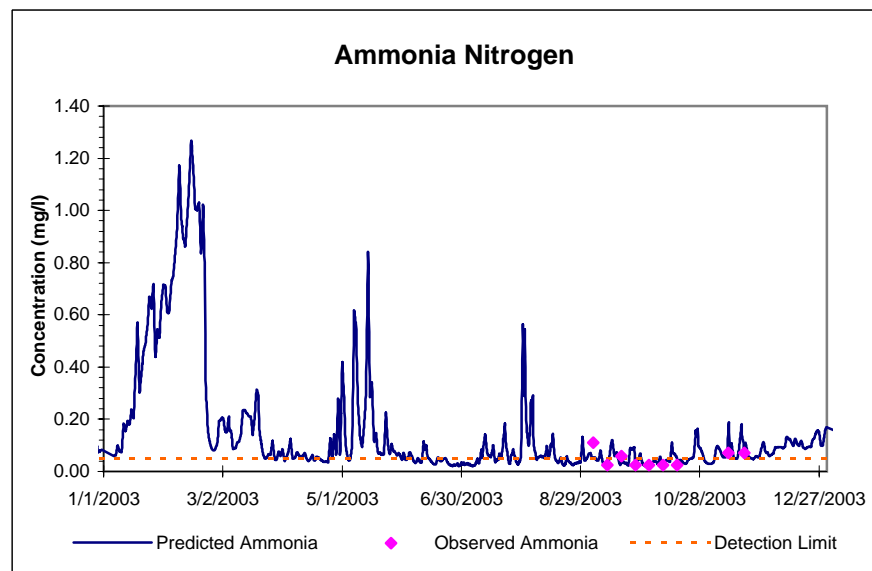
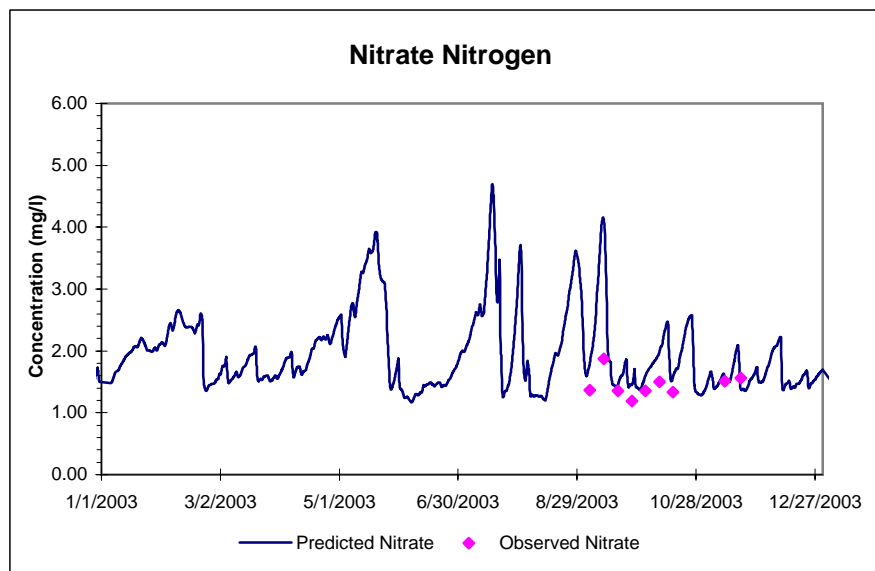
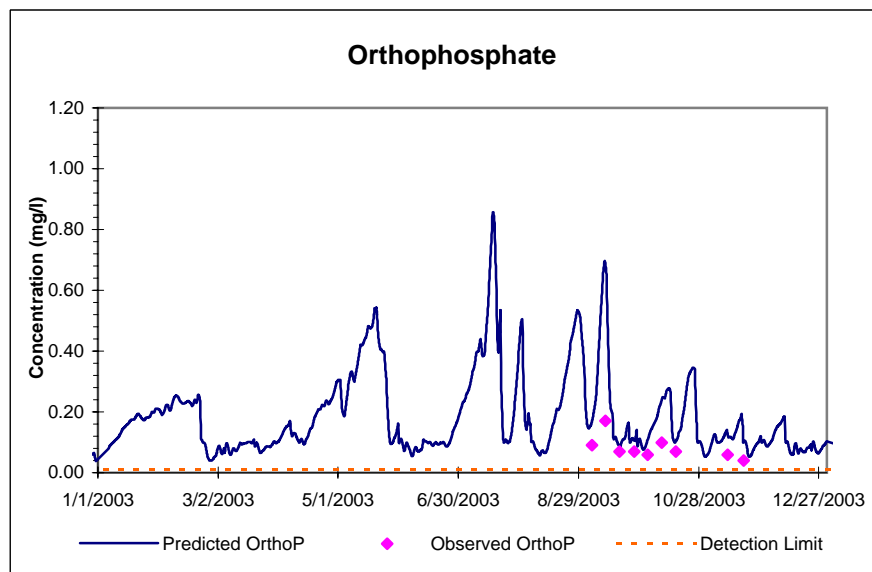
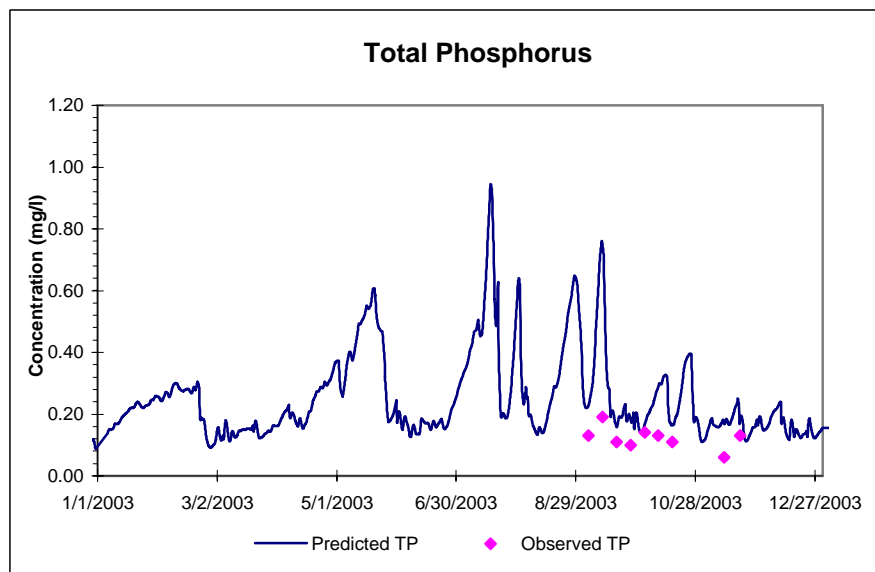




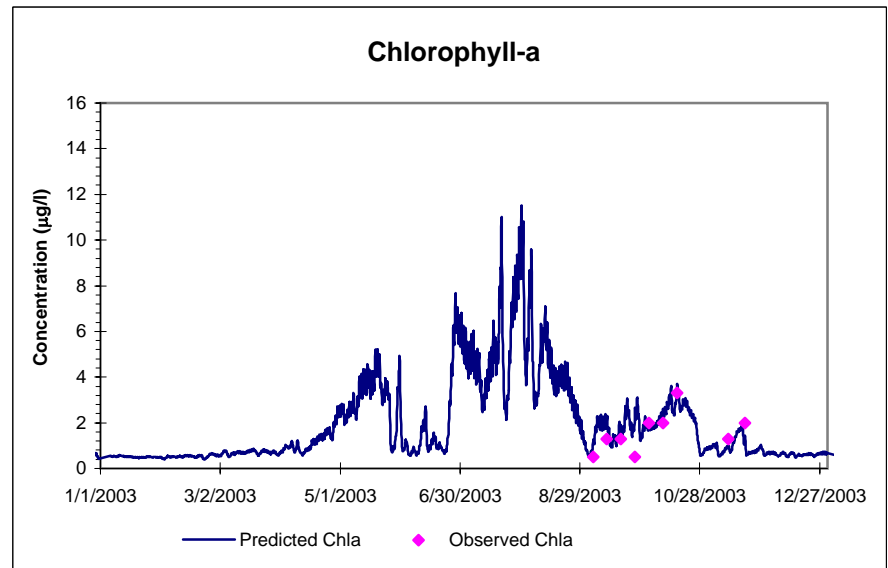
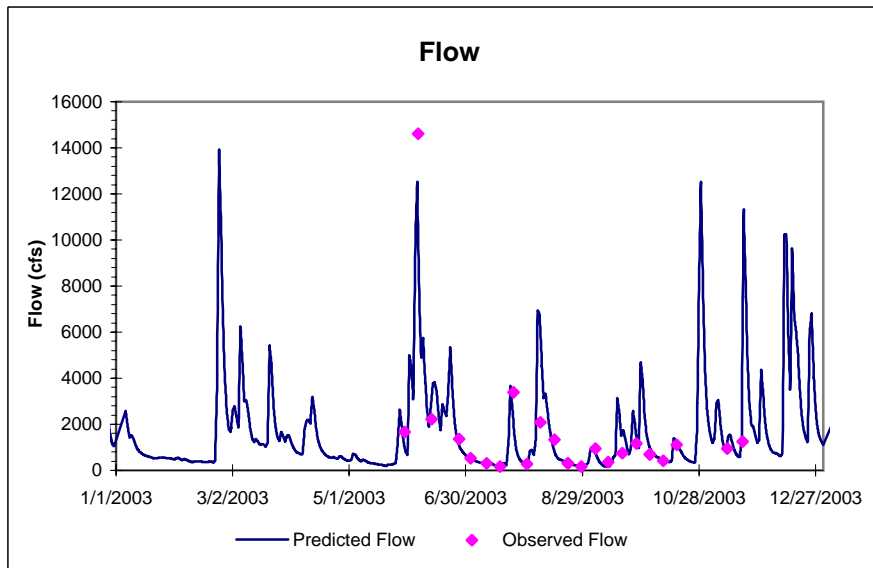
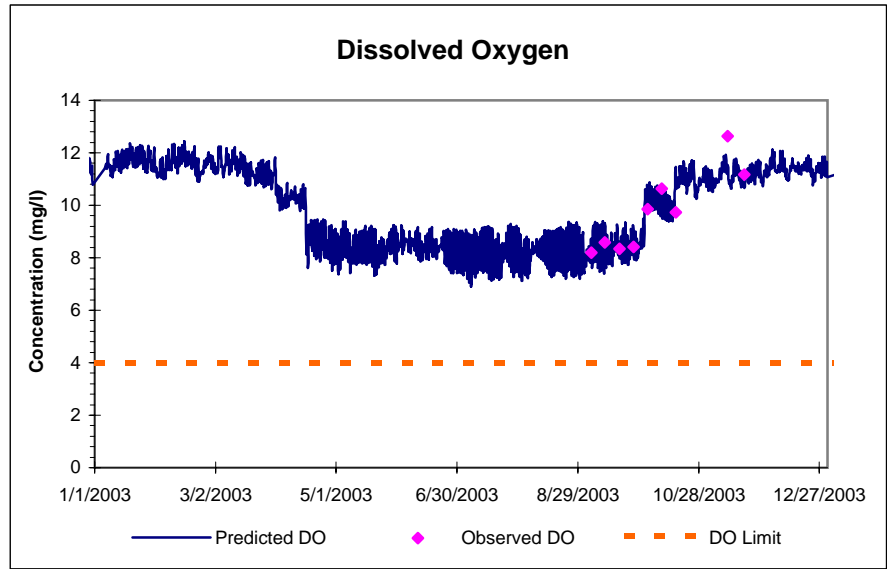
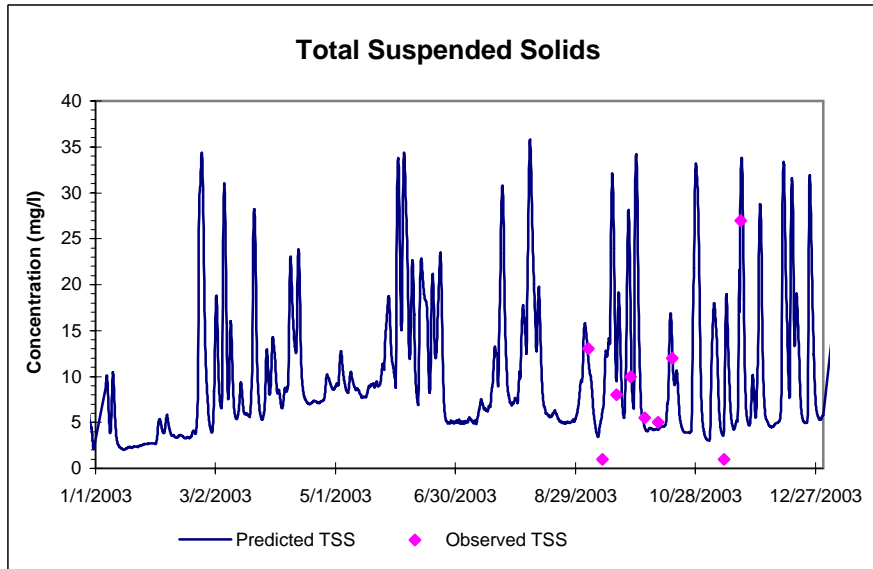
## Raritan River Downstream Millstone River Confluence (R2)



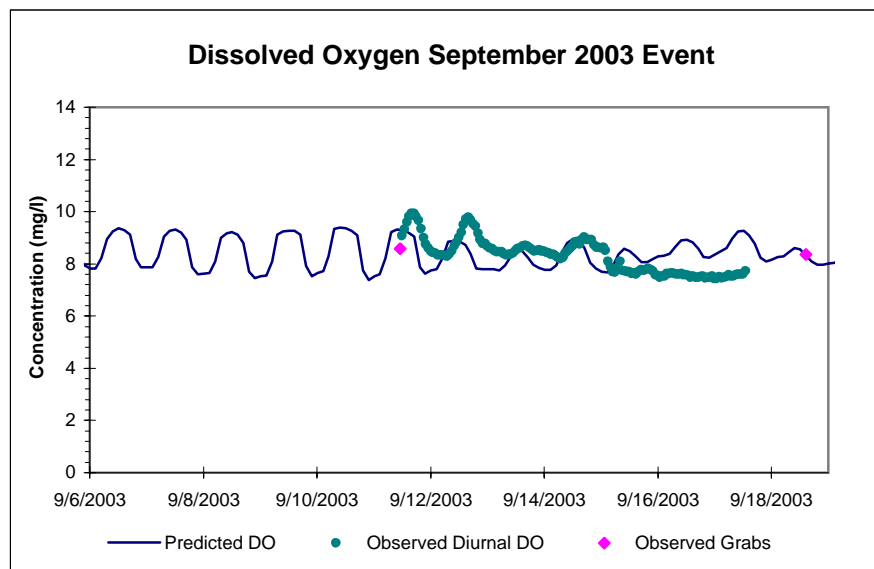
## Raritan River at Calco Dam near Bound Brook (USGS 01403060)



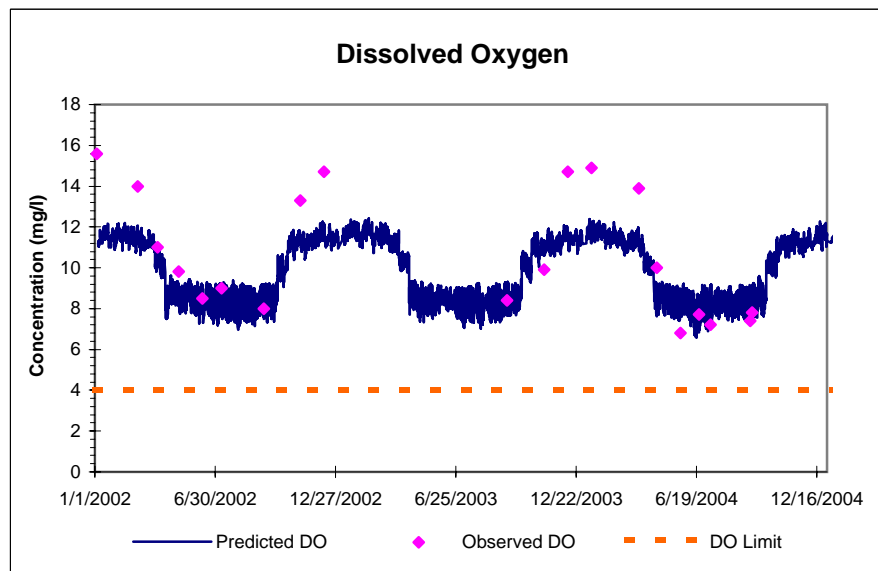
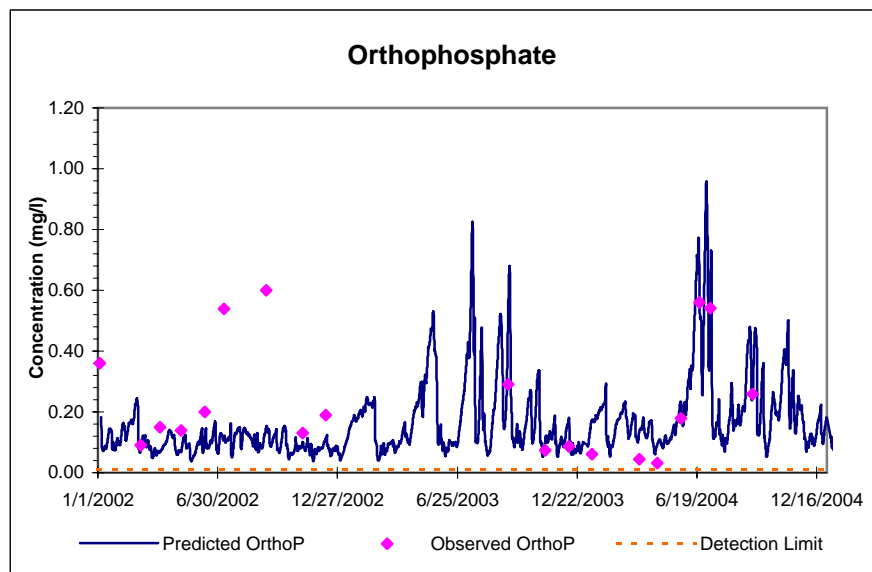
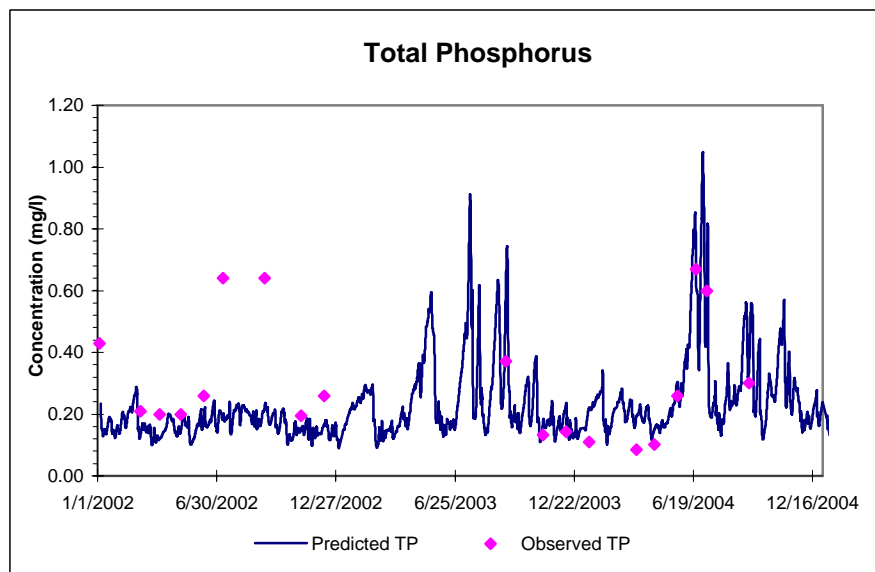
## Raritan River at Calco Dam near Bound Brook (USGS 01403060)



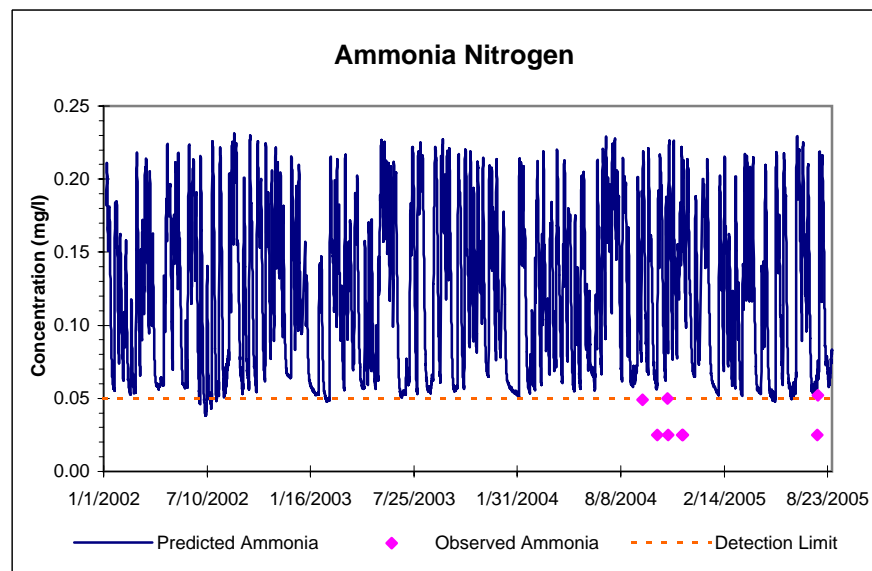
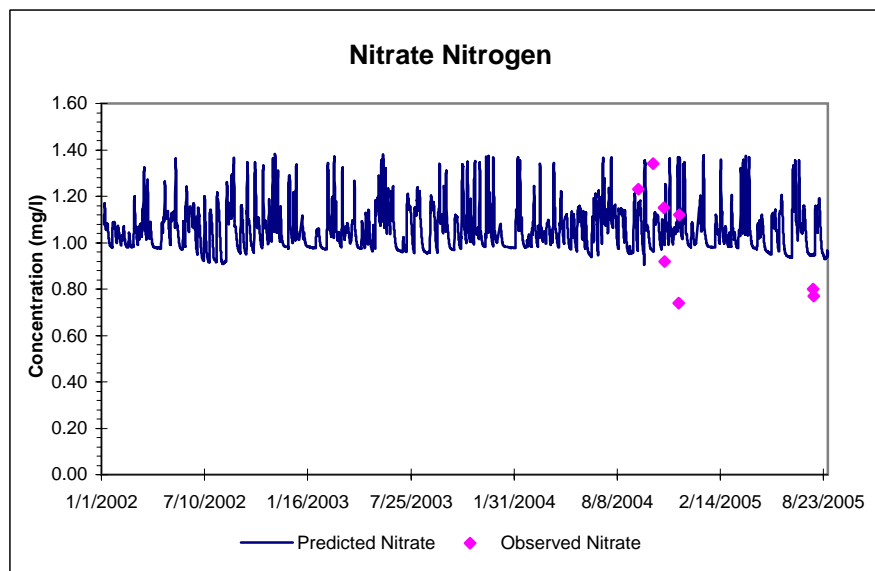
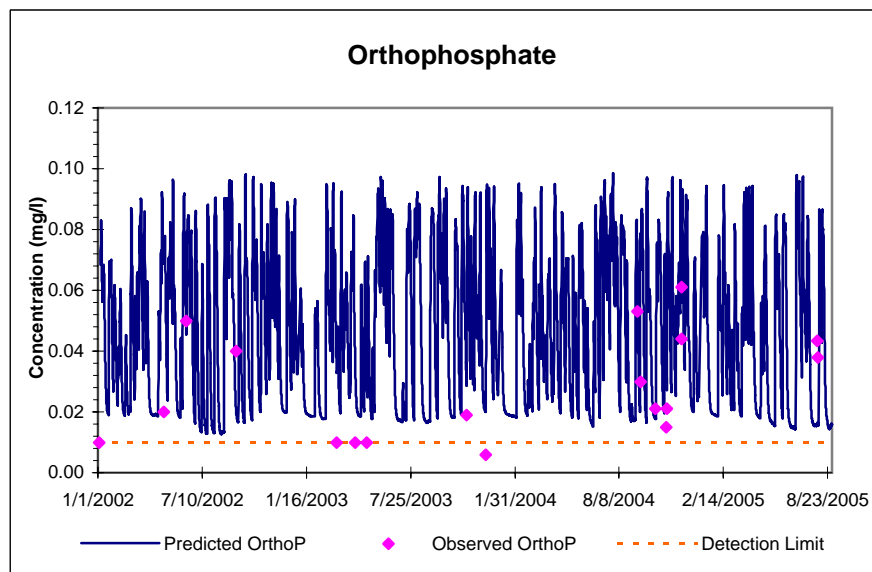
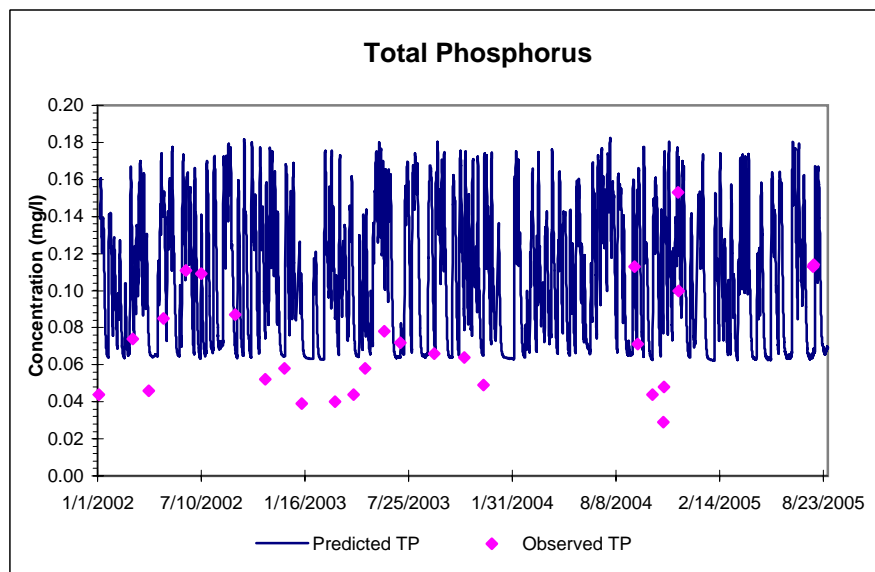
## Raritan River at Calco Dam near Bound Brook (USGS 01403060)



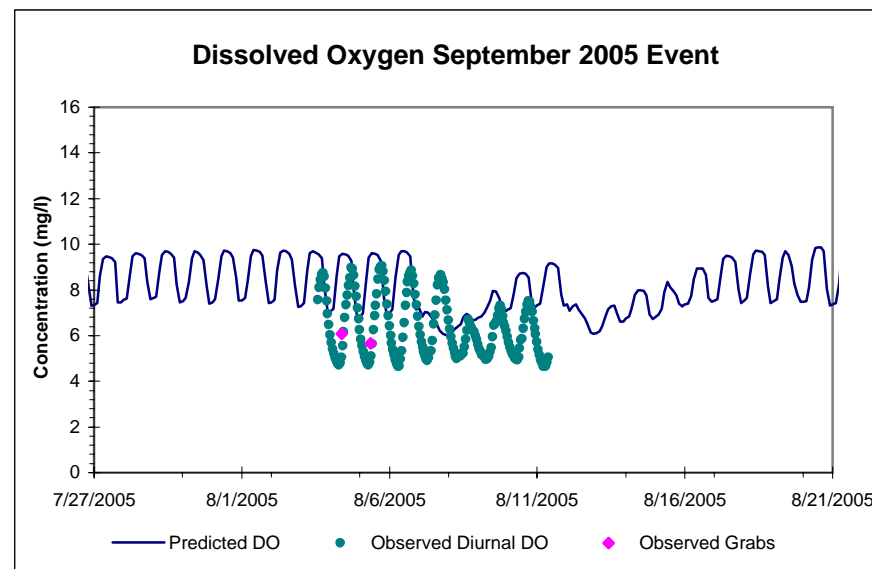
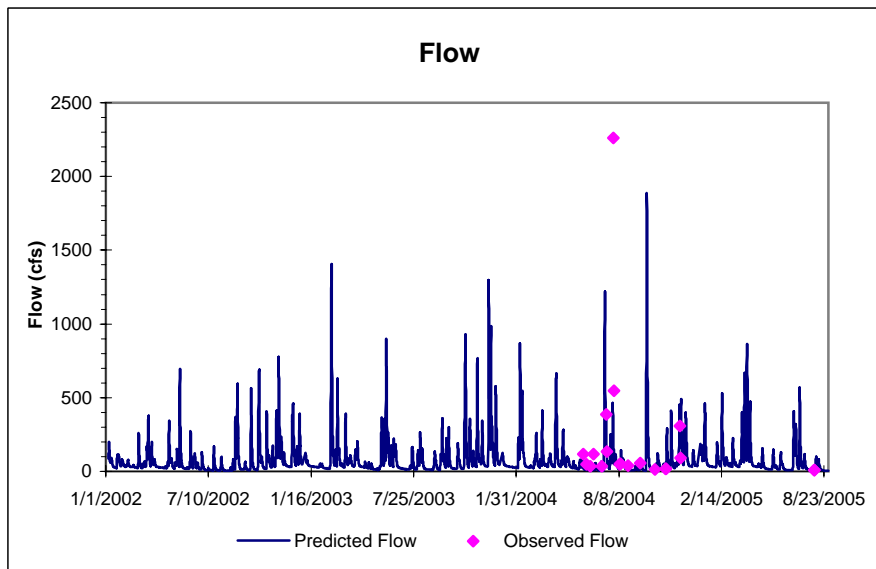
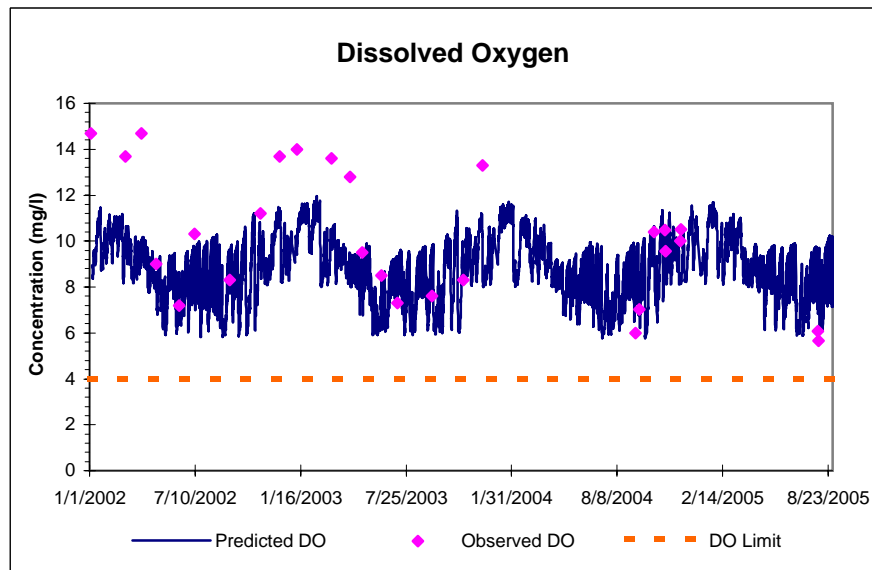
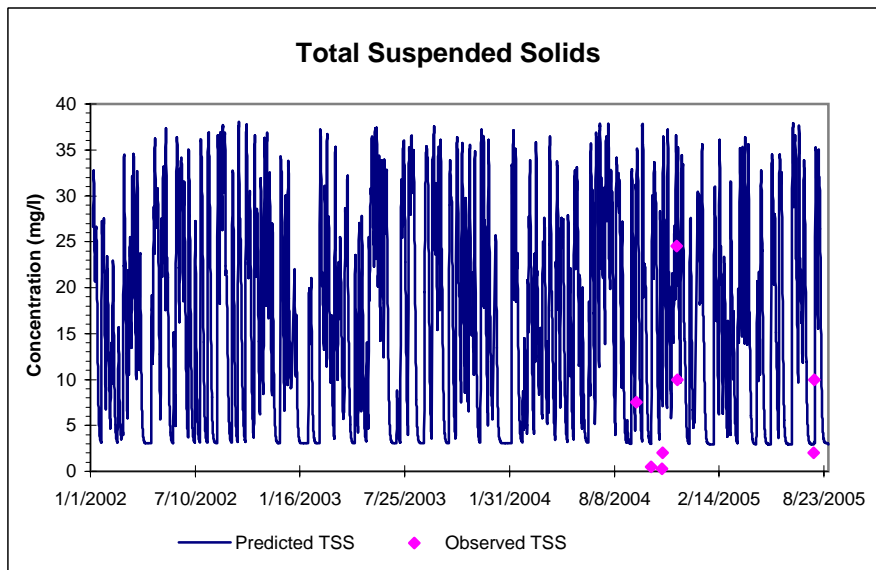
## Raritan River at Queens Bridge in South Bound Brook (USGS 01403900)



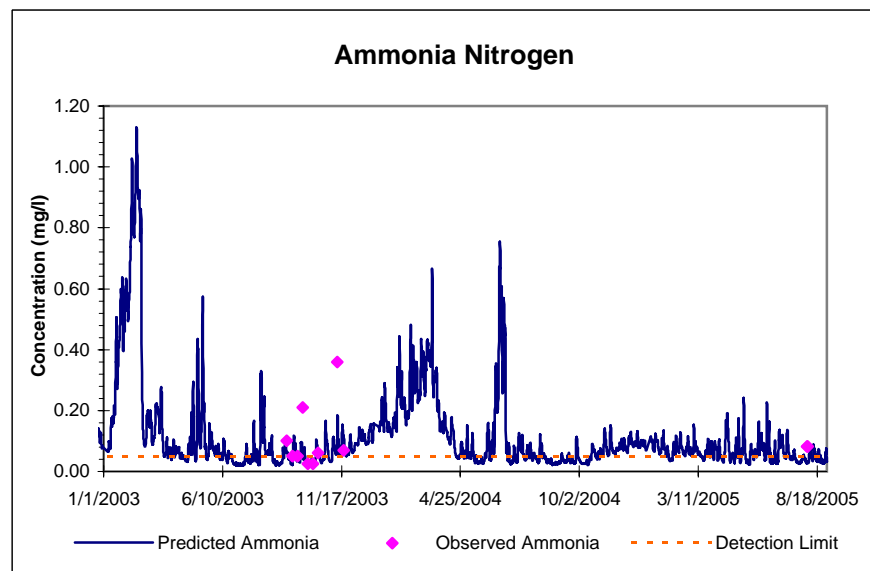
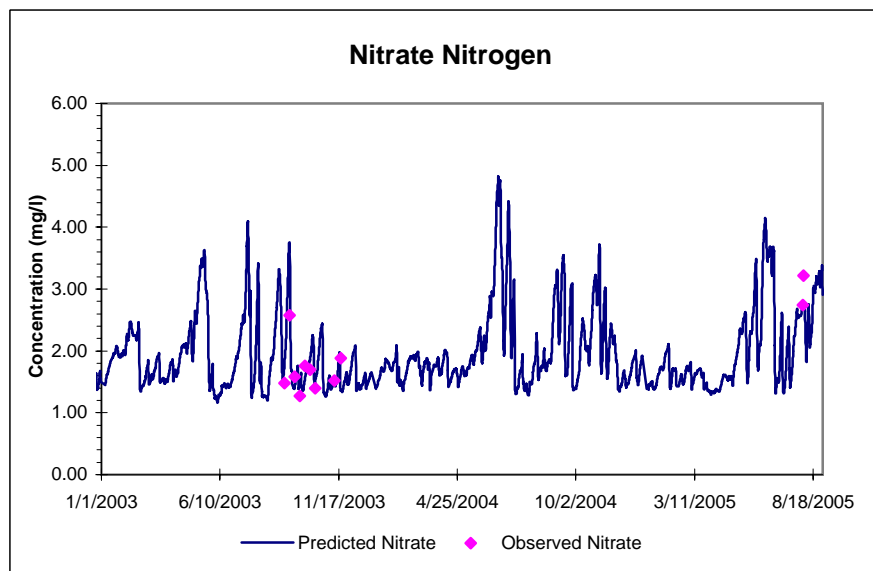
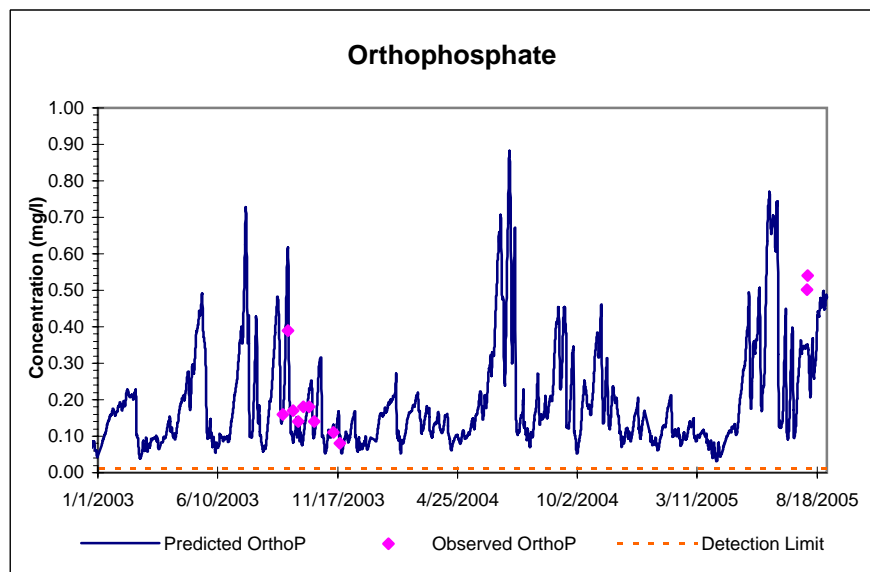
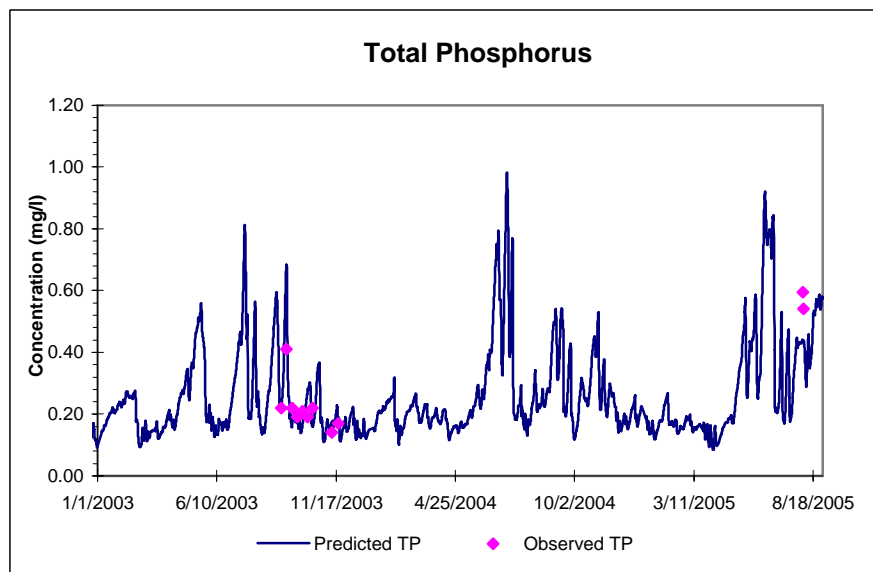
## Bound Brook at Greenbrook Rd. in Middlesex (GB1, USGS 01403900)



## Bound Brook at Greenbrook Rd. in Middlesex (GB1, USGS 01403900)

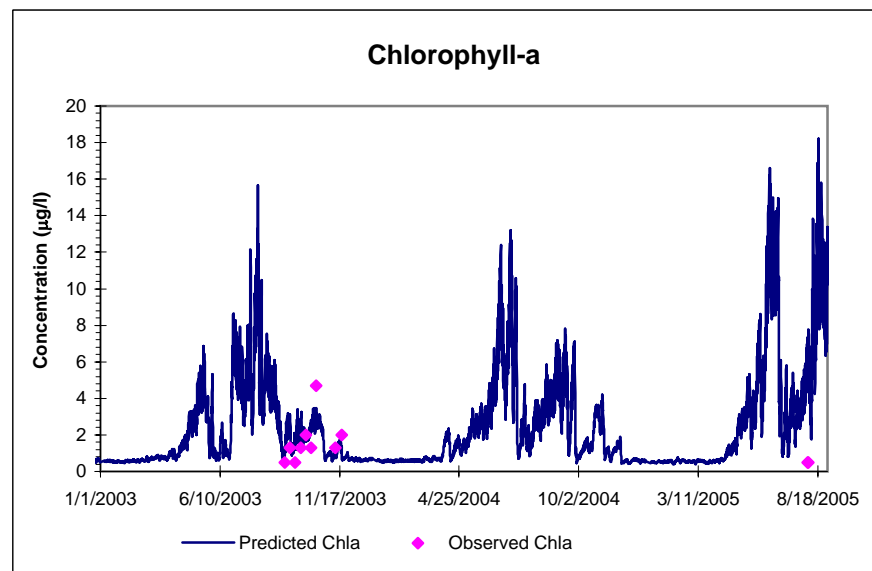
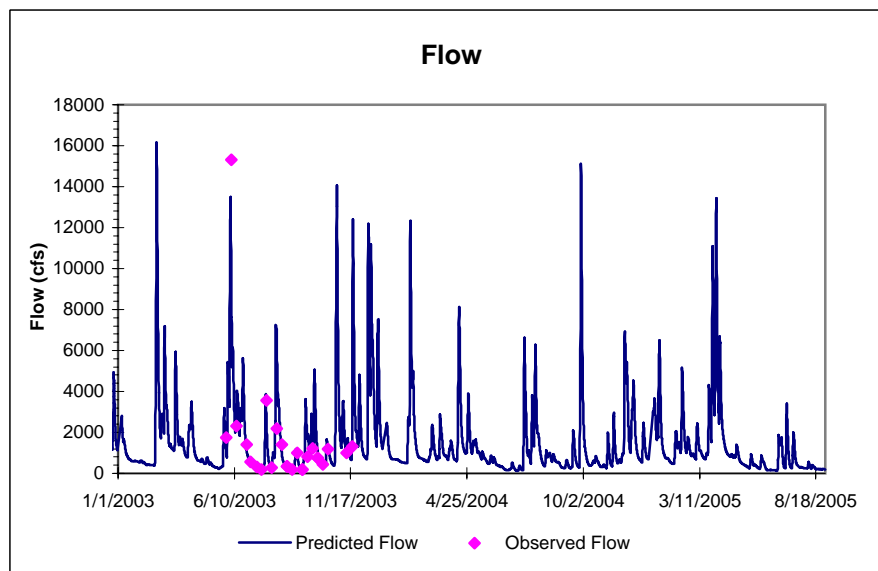
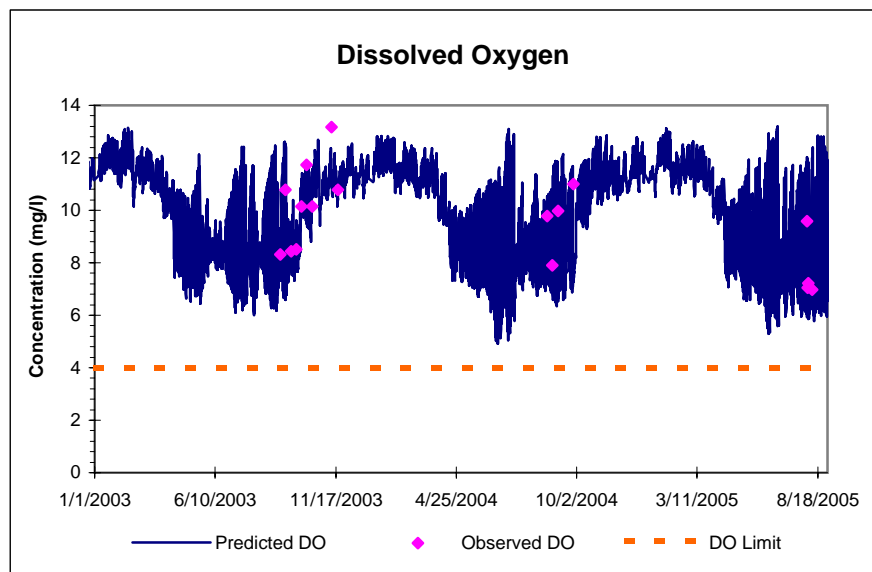
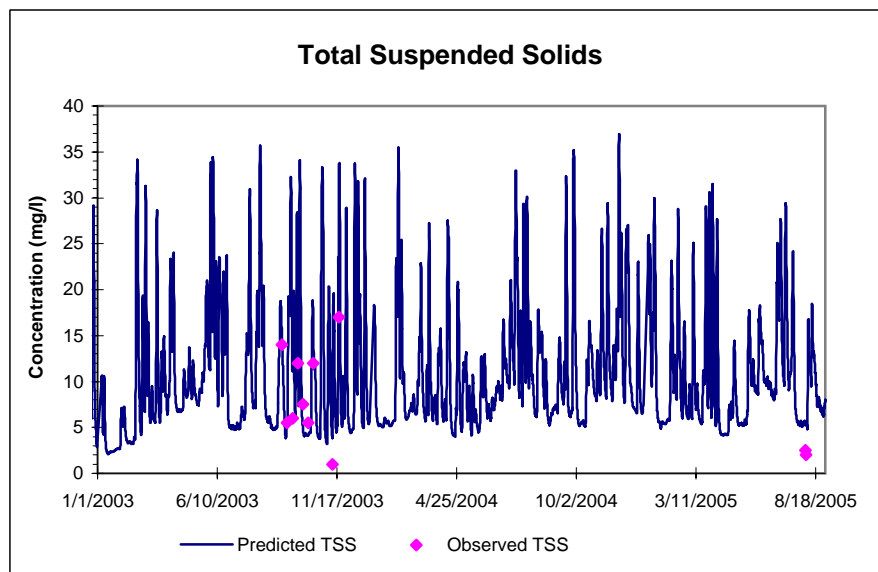


## Raritan River Upstream Fieldville Dam (R4)

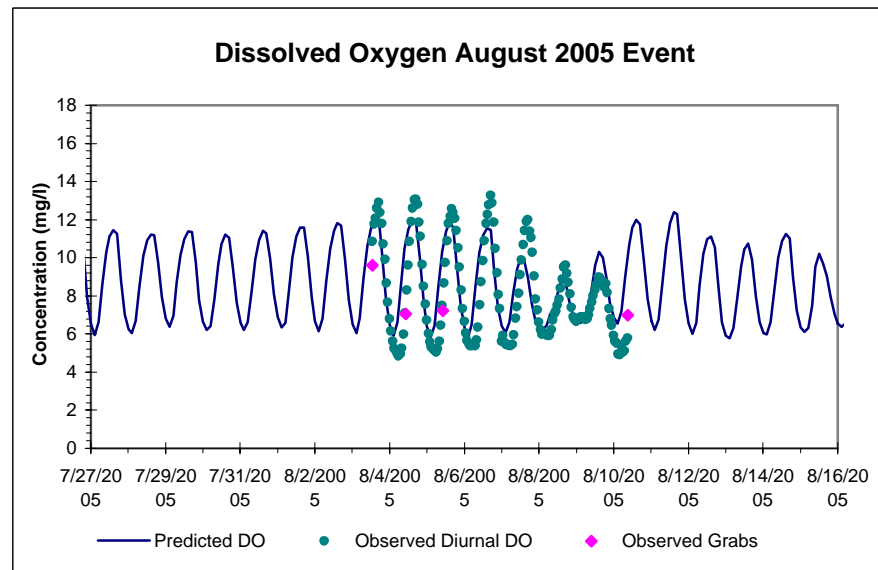
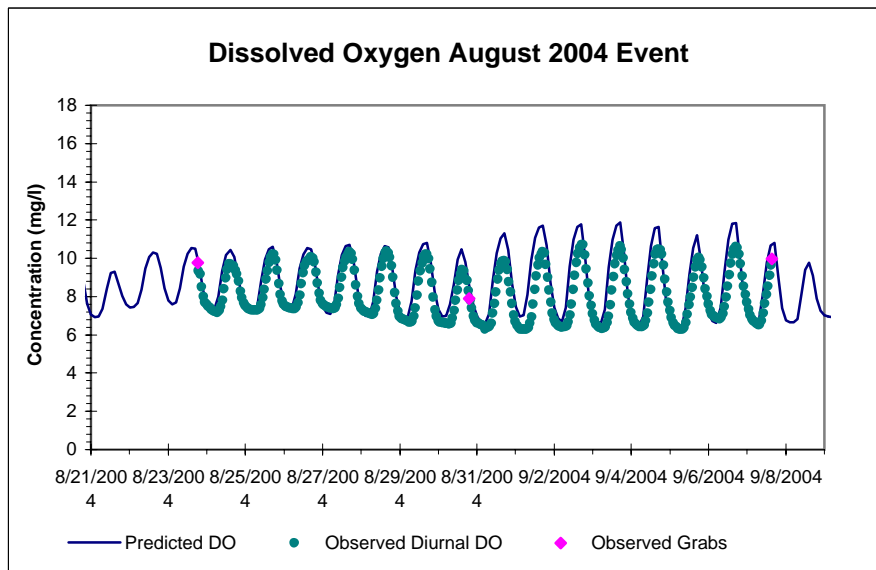
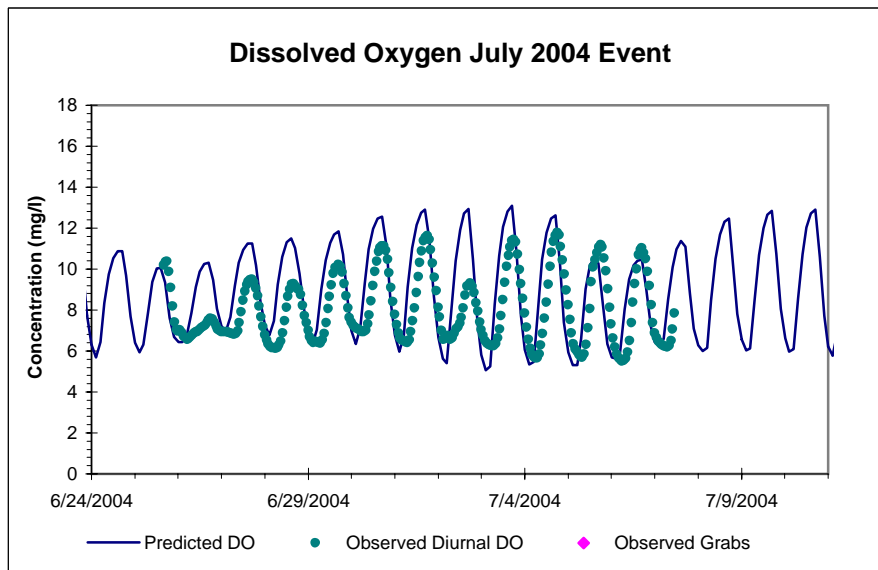
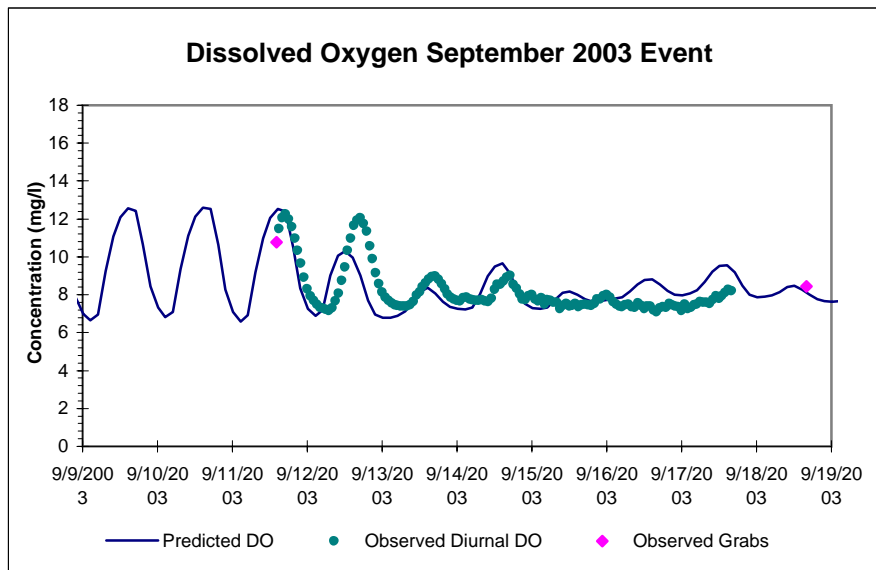




## Raritan River Upstream Fieldville Dam (R4)



## Raritan River Upstream Fieldville Dam (R4)



## **APPENDIX M**

Goodness of Fit Statistics

Goodness of Fit Graphs for TP and TSS  
Predicted vs Observed  
Residuals vs Flow  
Residuals vs Concentration

## Water Quality Model Goodness-of-Fit Statistics Ammonia-Nitrogen

Watershed	Branch Node	Description	# of Samples	Mean Predicted	Mean Observed	Mean Error	RMSE
North and South Branch Raritan River	1-1	South Branch Raritan River in Mount Olive (SBRR1)	10	0.07	0.04	-0.03	0.042
	2-1	Drakes Brook upstream of Mt. Olive STP (DkB1)	17	0.06	0.03	-0.03	0.047
	3-2	South Branch Raritan River near Four Bridges (SBRR2)	18	0.06	0.03	-0.02	0.045
	3-3	South Branch Raritan River Upstream Washington Township (SBR1)	20	0.05	0.04	-0.01	0.037
	3-4	South Branch Raritan River Downstream Schooley's Mt. STP (SBR2)	20	0.15	0.09	-0.06	0.089
	3-6	South Branch Raritan River Downstream Long Valley STP (SBR3)	20	0.09	0.07	-0.02	0.050
	3-12	South Branch Raritan River at Middle Valley (SBR4)	20	0.04	0.03	-0.01	0.028
	3-19	South Branch Raritan River at Solitude Lake (SBRR3 and SBRR4)	17	0.03	0.04	0.01	0.017
	3-20	South Branch Raritan River at High Bridge (SBRR5)	10	0.03	0.04	0.00	0.033
	4-5	Beaver Brook @ Hamden Road in Town of Clinton (BvB1)	18	0.05	0.03	-0.02	0.040
	5-1	South Branch Raritan River Upstream Clinton WTP (SBRR6)	18	0.03	0.03	0.00	0.016
	6-1	Cakepoulin Creek at Lower Lansdown Rd. (CC1)	18	0.05	0.03	-0.02	0.029
	7-1	South Branch Raritan River at Hamden Rd (SBRR7)	18	0.03	0.03	0.00	0.017
	7-7	South Branch Raritan River at Stanton Rd. (SBRR8)	18	0.03	0.03	-0.01	0.017
	7-14	South Branch Raritan River at Three Bridges (SBRR9)	18	0.03	0.04	0.00	0.019
	8-1	Neshanic River near Reaville (NR1)	18	0.05	0.03	-0.02	0.028
	8-5	Neshanic River at Hillsborough (NR2)	18	0.03	0.04	0.01	0.033
	9-7	South Branch Raritan River at Studdiford Rd. (SBRR10)	18	0.02	0.04	0.02	0.034
	10-1	Holland Brook at South Branch Road (HB1)	10	0.09	0.05	-0.04	0.061
	12-1	Lamington River Upstream Roxbury STP (LR1)	18	0.06	0.06	0.00	0.045
	12-3	Lamington River Downstream Roxbury STP (LR2)	18	0.05	0.05	0.00	0.032
	12-12	Lamington River in Pottersville (LR3)	18	0.04	0.03	-0.01	0.016
	12-19	Lamington River at River Road near Whitehouse (LR4)	18	0.03	0.03	0.00	0.017
	13-1	North Branch Rockaway Creek at Route 523 (NBRC1)	18	0.06	0.03	-0.03	0.040
	14-1	South Branch Rockaway Creek Downstream Cushetunk Lake (SBRC3)	10	0.06	0.08	0.02	0.040
	15-3	Rockaway Creek at Lamington Road near Whitehouse (RC1)	18	0.04	0.03	-0.01	0.022
	16-4	Lamington River at Cowperthwaite Road in Burnt Mills (LR5)	18	0.04	0.03	-0.01	0.019
	17-1	India Brook at Mountainside Road in Mendham (IB1)	10	0.08	0.04	-0.03	0.045
	18-1	Burnett Brook at Chester (BuB1)	10	0.07	0.05	-0.03	0.046
	19-1	North Branch Raritan River in Mendham Township (NBRR1)	18	0.06	0.03	-0.03	0.037
19-6	North Branch Raritan River Upstream of Ravine Lake (NBRR2)	18	0.05	0.04	-0.01	0.022	
19-8	North Branch Raritan River Downstream Ravine Lake (NBRR4)	10	0.02	0.05	0.03	0.047	
20-6	Mine Brook at Route 512 (MiB1)	10	0.05	0.05	0.00	0.033	
21-2	North Branch Raritan River at Route 202/206 (NBRR5)	18	0.04	0.03	-0.01	0.016	
21-8	North Branch Raritan River at Burnt Mills (NBRR6)	18	0.04	0.03	-0.01	0.018	
22-8	North Branch Raritan River Downstream Route 202 (NBRR7)	18	0.03	0.05	0.02	0.053	
23-7	Raritan River at Main Street in Manville (RR1)	18	0.03	0.04	0.02	0.034	
Upper Millstone River	1-1	Upper Millstone River at Old Cranbury Rd. (UMR1)	21	0.10	0.06	-0.04	0.056
	2-1	Rocky Brook Downstream Peddie Lake (RB3)	12	0.10	0.07	-0.03	0.055
	2-4	Rocky Brook at Route 130 (RB4)	21	0.09	0.12	0.03	0.070
	3-12	Upper Millstone River at Cranbury Neck Rd. (UMR2)	21	0.05	0.06	0.01	0.039
	4-1	Cranbury Brook at Plainsboro Pond Outlet (CB3)	21	0.12	0.10	-0.01	0.055
	5-1	Upper Millstone River Downstream Railroad Crossing in Plainsboro (UMR3)	21	0.46	0.57	0.11	0.272
	6-1	Big Bear Brook Downstream Grovers Mill Pond (BBB3)	8	0.13	0.08	-0.05	0.080
	8-1	Devils Brook Downstream Gordon Pond (DB3)	12	0.12	0.05	-0.06	0.076
Stony Brook	1-2	Stony Brook Upstream of SBRSA - Pennington STP (SB1)	27	0.09	0.07	-0.02	0.103
	1-4	Stony Brook at Delaware Avenue in Pennington (SB2)	22	0.08	0.07	-0.02	0.066
	1-21	Stony Brook at Route 206 in Princeton (SB3)	22	0.06	0.14	0.08	0.271
	1-29	Stony Brook at Alexander Road in Princeton (SB4)	22	0.13	0.11	-0.02	0.064
Beden Brook / Lower Millstone River	1-1	Beden Brook Upstream SBRSA-Hopewell STP (BB1)	27	0.11	0.06	-0.05	0.069
	1-4	Beden Brook Downstream SBRSA-Hopewell STP (BB2)	27	0.09	0.06	-0.03	0.058
	3-1	Beden Brook Downstream Pike Brook Confluence (BB3)	22	0.09	0.08	-0.01	0.060
	4-1	Lower Millstone River Downstream Carnegie Lake (M2)	27	0.13	0.13	0.01	0.009
	4-7	Lower Millstone River Downstream SBRSA - River Road STP (M3)	22	0.12	0.15	0.03	0.053
	4-8	Lower Millstone River Downstream Montgomery - Stage II STP (M4)	27	0.11	0.14	0.03	0.055
	5-5	Lower Millstone River at Griggstown (M5)	27	0.08	0.10	0.02	0.043
	5-12	Lower Millstone River at Blackwells Mills (M6)	31	0.07	0.11	0.04	0.088
	5-18	Lower Millstone River at Manville (M7)	21	0.06	0.11	0.05	0.072
Mainstem Raritan River	3-2	Raritan River Downstream Millstone River Confluence (R2)	28	0.03	0.08	0.05	0.115
	3-5	Raritan River @ I-287 bridge (R3)	22	0.07	0.09	0.02	0.126
	4-1	Green Brook (Bound Brook) at Greenbrook Rd. (GB1)	18	0.13	0.07	-0.07	0.100
	5-3	Raritan River Upstream Fieldville Dam (R4)	22	0.06	0.15	0.09	0.192

## Water Quality Model Goodness-of-Fit Statistics Nitrate-Nitrogen

Watershed	Branch Node	Description	# of Samples	Mean Predicted	Mean Observed	Mean Error	RMSE
North and South Branch Raritan River	1-1	South Branch Raritan River in Mount Olive (SBRR1)	10	1.36	1.16	-0.20	0.362
	2-1	Drakes Brook upstream of Mt. Olive STP (DkB1)	17	0.90	0.87	-0.03	0.205
	3-2	South Branch Raritan River near Four Bridges (SBRR2)	18	1.47	1.34	-0.14	0.452
	3-3	South Branch Raritan River Upstream Washington Township (SBR1)	20	1.50	1.49	-0.01	0.188
	3-4	South Branch Raritan River Downstream Schooley's Mt. STP (SBR2)	20	1.61	1.63	0.02	0.271
	3-6	South Branch Raritan River Downstream Long Valley STP (SBR3)	20	1.61	1.64	0.03	0.274
	3-12	South Branch Raritan River at Middle Valley (SBR4)	20	1.52	1.66	0.14	0.221
	3-19	South Branch Raritan River at Solitude Lake (SBRR3 and SBRR4)	17	1.45	1.32	-0.13	0.277
	3-20	South Branch Raritan River at High Bridge (SBRR5)	10	1.47	1.17	-0.30	0.370
	4-5	Beaver Brook @ Hamden Road in Town of Clinton (BvB1)	18	1.60	1.70	0.10	0.215
	5-1	South Branch Raritan River Upstream Clinton WTP (SBRR6)	18	1.19	0.95	-0.25	0.302
	6-1	Cakepoulin Creek at Lower Lansdown Rd. (CC1)	18	2.15	2.17	0.01	0.231
	7-1	South Branch Raritan River at Hamden Rd (SBRR7)	18	1.35	1.12	-0.23	0.272
	7-7	South Branch Raritan River at Stanton Rd. (SBRR8)	18	1.31	1.05	-0.26	0.321
	7-14	South Branch Raritan River at Three Bridges (SBRR9)	18	1.51	1.49	-0.01	0.372
	8-1	Neshanic River near Reaville (NR1)	18	0.52	1.01	0.49	0.591
	8-5	Neshanic River at Hillsborough (NR2)	18	0.54	0.96	0.42	0.567
	9-7	South Branch Raritan River at Studdiford Rd. (SBRR10)	18	1.28	1.19	-0.09	0.241
	10-1	Holland Brook at South Branch Road (HB1)	9	1.03	1.48	0.45	0.628
	12-1	Lamington River Upstream Roxbury STP (LR1)	18	0.60	0.43	-0.16	0.209
	12-3	Lamington River Downstream Roxbury STP (LR2)	18	2.82	2.53	-0.29	0.652
	12-12	Lamington River in Pottersville (LR3)	18	1.27	0.63	-0.64	0.722
	12-19	Lamington River at River Road near Whitehouse (LR4)	18	0.83	0.71	-0.11	0.230
	13-1	North Branch Rockaway Creek at Route 523 (NBRC1)	18	1.03	0.99	-0.03	0.200
	14-1	South Branch Rockaway Creek Downstream Cushetunk Lake (SBRC3)	10	0.86	0.85	-0.01	0.032
	15-3	Rockaway Creek at Lamington Road near Whitehouse (RC1)	18	1.62	1.46	-0.16	0.414
	16-4	Lamington River at Cowperthwaite Road in Burnt Mills (LR5)	18	1.15	0.98	-0.17	0.241
	17-1	India Brook at Mountainside Road in Mendham (IB1)	10	0.89	0.78	-0.11	0.227
	18-1	Burnett Brook at Chester (BuB1)	10	0.97	0.90	-0.07	0.256
	19-1	North Branch Raritan River in Mendham Township (NBRR1)	18	1.56	1.65	0.08	0.402
19-6	North Branch Raritan River Upstream of Ravine Lake (NBRR2)	18	1.23	1.03	-0.20	0.314	
19-8	North Branch Raritan River Downstream Ravine Lake (NBRR4)	10	1.15	0.80	-0.35	0.425	
20-6	Mine Brook at Route 512 (MiB1)	10	0.96	0.92	-0.04	0.295	
21-2	North Branch Raritan River at Route 202/206 (NBRR5)	18	0.99	0.91	-0.08	0.203	
21-8	North Branch Raritan River at Burnt Mills (NBRR6)	18	1.01	0.89	-0.12	0.200	
22-8	North Branch Raritan River Downstream Route 202 (NBRR7)	18	1.03	0.88	-0.15	0.226	
23-7	Raritan River at Main Street in Manville (RR1)	18	1.10	0.98	-0.12	0.213	
Upper Millstone River	1-1	Upper Millstone River at Old Cranbury Rd. (UMR1)	21	0.81	0.88	0.07	0.178
	2-1	Rocky Brook Downstream Peddie Lake (RB3)	12	0.79	0.82	0.03	0.154
	2-4	Rocky Brook at Route 130 (RB4)	21	2.13	2.40	0.27	0.774
	3-12	Upper Millstone River at Cranbury Neck Rd. (UMR2)	21	2.42	2.80	0.38	0.736
	4-1	Cranbury Brook at Plainsboro Pond Outlet (CB3)	21	0.76	0.77	0.01	0.318
	5-1	Upper Millstone River Downstream Railroad Crossing in Plainsboro (UMR3)	21	2.05	2.29	0.23	0.553
	6-1	Big Bear Brook Downstream Grovers Mill Pond (BBB3)	8	0.81	0.76	-0.04	0.286
	8-1	Devils Brook Downstream Gordon Pond (DB3)	12	0.71	0.78	0.07	0.117
Stony Brook	1-2	Stony Brook Upstream of SBRSA - Pennington STP (SB1)	27	0.83	0.78	-0.05	0.357
	1-4	Stony Brook at Delaware Avenue in Pennington (SB2)	22	2.09	2.39	0.30	1.237
	1-21	Stony Brook at Route 206 in Princeton (SB3)	22	1.30	0.91	-0.39	0.526
	1-29	Stony Brook at Alexander Road in Princeton (SB4)	22	1.27	0.95	-0.32	0.418
Beden Brook / Lower Millstone River	1-1	Beden Brook Upstream SBRSA-Hopewell STP (BB1)	27	0.81	0.92	0.11	0.328
	1-4	Beden Brook Downstream SBRSA-Hopewell STP (BB2)	27	2.51	2.82	0.31	1.028
	3-1	Beden Brook Downstream Pike Brook Confluence (BB3)	22	1.79	2.01	0.22	0.562
	4-1	Lower Millstone River Downstream Carnegie Lake (M2)	27	1.24	1.24	0.00	0.012
	4-7	Lower Millstone River Downstream SBRSA - River Road STP (M3)	22	2.42	2.07	-0.35	0.532
	4-8	Lower Millstone River Downstream Montgomery - Stage II STP (M4)	27	2.57	2.32	-0.25	0.352
	5-5	Lower Millstone River at Griggstown (M5)	27	2.43	2.36	-0.07	0.262
	5-12	Lower Millstone River at Blackwells Mills (M6)	27	2.38	2.17	-0.20	0.395
	5-18	Lower Millstone River at Manville (M7)	21	2.25	2.04	-0.21	0.447
Mainstem Raritan River	3-2	Raritan River Downstream Millstone River Confluence (R2)	28	1.53	1.39	-0.14	0.355
	3-5	Raritan River @ I-287 bridge (R3)	22	2.07	1.38	-0.70	1.017
	4-1	Green Brook (Bound Brook) at Greenbrook Rd. (GB1)	18	1.09	1.03	-0.06	0.230
	5-3	Raritan River Upstream Fieldville Dam (R4)	22	1.95	1.66	-0.29	0.526

## Water Quality Model Goodness-of-Fit Statistics OrthoPhosphorus

Watershed	Branch Node	Description	# of Samples	Mean Predicted	Mean Observed	Mean Error	RMSE
North and South Branch Raritan River	1-1	South Branch Raritan River in Mount Olive (SBRR1)	10	0.02	0.02	-0.01	0.019
	2-1	Drakes Brook upstream of Mt. Olive STP (DkB1)	17	0.02	0.01	-0.01	0.018
	3-2	South Branch Raritan River near Four Bridges (SBRR2)	18	0.02	0.02	0.00	0.024
	3-3	South Branch Raritan River Upstream Washington Township (SBR1)	20	0.01	0.02	0.00	0.030
	3-4	South Branch Raritan River Downstream Schooley's Mt. STP (SBR2)	20	0.08	0.07	-0.01	0.030
	3-6	South Branch Raritan River Downstream Long Valley STP (SBR3)	20	0.06	0.08	0.02	0.030
	3-12	South Branch Raritan River at Middle Valley (SBR4)	20	0.04	0.04	0.00	0.015
	3-19	South Branch Raritan River at Solitude Lake (SBRR3 and SBRR4)	17	0.02	0.03	0.00	0.021
	3-20	South Branch Raritan River at High Bridge (SBRR5)	10	0.03	0.03	-0.01	0.020
	4-5	Beaver Brook @ Hamden Road in Town of Clinton (BvB1)	18	0.02	0.04	0.02	0.031
	5-1	South Branch Raritan River Upstream Clinton WTP (SBRR6)	18	0.02	0.02	0.00	0.015
	6-1	Cakepoulin Creek at Lower Lansdown Rd. (CC1)	18	0.01	0.02	0.01	0.021
	7-1	South Branch Raritan River at Hamden Rd (SBRR7)	18	0.02	0.02	0.00	0.015
	7-7	South Branch Raritan River at Stanton Rd. (SBRR8)	19	0.02	0.02	0.00	0.017
	7-14	South Branch Raritan River at Three Bridges (SBRR9)	18	0.04	0.08	0.04	0.065
	8-1	Neshanic River near Reaville (NR1)	20	0.01	0.04	0.03	0.039
	8-5	Neshanic River at Hillsborough (NR2)	18	0.02	0.05	0.03	0.042
	9-7	South Branch Raritan River at Studdiford Rd. (SBRR10)	21	0.02	0.05	0.02	0.031
	10-1	Holland Brook at South Branch Road (HB1)	10	0.04	0.07	0.03	0.046
	12-1	Lamington River Upstream Roxbury STP (LR1)	18	0.02	0.01	-0.02	0.022
	12-3	Lamington River Downstream Roxbury STP (LR2)	21	0.05	0.04	0.00	0.033
	12-12	Lamington River in Pottersville (LR3)	18	0.02	0.02	0.00	0.015
	12-19	Lamington River at River Road near Whitehouse (LR4)	18	0.01	0.02	0.00	0.013
	13-1	North Branch Rockaway Creek at Route 523 (NBRC1)	18	0.01	0.01	0.00	0.021
	14-1	South Branch Rockaway Creek Downstream Cushetunk Lake (SBRC3)	10	0.03	0.03	0.00	0.004
	15-3	Rockaway Creek at Lamington Road near Whitehouse (RC1)	18	0.16	0.11	-0.05	0.120
	16-4	Lamington River at Cowperthwaite Road in Burnt Mills (LR5)	18	0.06	0.05	-0.01	0.023
	17-1	India Brook at Mountainside Road in Mendham (IB1)	10	0.02	0.01	-0.01	0.016
	18-1	Burnett Brook at Chester (BuB1)	10	0.02	0.01	-0.01	0.021
	19-1	North Branch Raritan River in Mendham Township (NBRR1)	18	0.02	0.01	0.00	0.018
19-6	North Branch Raritan River Upstream of Ravine Lake (NBRR2)	18	0.01	0.01	0.00	0.014	
19-8	North Branch Raritan River Downstream Ravine Lake (NBRR4)	10	0.02	0.01	-0.02	0.023	
20-6	Mine Brook at Route 512 (MiB1)	10	0.02	0.02	0.00	0.024	
21-2	North Branch Raritan River at Route 202/206 (NBRR5)	18	0.01	0.01	0.00	0.012	
21-8	North Branch Raritan River at Burnt Mills (NBRR6)	18	0.01	0.02	0.01	0.015	
22-8	North Branch Raritan River Downstream Route 202 (NBRR7)	21	0.03	0.04	0.01	0.020	
23-7	Raritan River at Main Street in Manville (RR1)	18	0.02	0.05	0.02	0.032	
Upper Millstone River	1-1	Upper Millstone River at Old Cranbury Rd. (UMR1)	21	0.03	0.02	0.00	0.019
	2-1	Rocky Brook Downstream Peddie Lake (RB3)	12	0.03	0.02	-0.02	0.021
	2-4	Rocky Brook at Route 130 (RB4)	21	0.05	0.04	-0.01	0.018
	3-12	Upper Millstone River at Cranbury Neck Rd. (UMR2)	23	0.05	0.05	-0.01	0.021
	4-1	Cranbury Brook at Plainsboro Pond Outlet (CB3)	21	0.02	0.02	-0.01	0.013
	5-1	Upper Millstone River Downstream Railroad Crossing in Plainsboro (UMR3)	21	0.05	0.04	-0.01	0.023
	6-1	Big Bear Brook Downstream Grovers Mill Pond (BBB3)	8	0.04	0.02	-0.02	0.019
	8-1	Devils Brook Downstream Gordon Pond (DB3)	12	0.03	0.02	-0.01	0.018
Stony Brook	1-2	Stony Brook Upstream of SBRSA - Pennington STP (SB1)	27	0.04	0.04	0.00	0.023
	1-4	Stony Brook at Delaware Avenue in Pennington (SB2)	22	0.33	0.42	0.08	1.678
	1-21	Stony Brook at Route 206 in Princeton (SB3)	22	0.12	0.07	-0.05	0.168
	1-29	Stony Brook at Alexander Road in Princeton (SB4)	22	0.11	0.07	-0.03	0.074
Beden Brook / Lower Millstone River	1-1	Beden Brook Upstream SBRSA-Hopewell STP (BB1)	27	0.04	0.04	-0.01	0.025
	1-4	Beden Brook Downstream SBRSA-Hopewell STP (BB2)	27	0.36	0.42	0.06	0.156
	3-1	Beden Brook Downstream Pike Brook Confluence (BB3)	22	0.08	0.08	0.00	0.035
	4-1	Lower Millstone River Downstream Carnegie Lake (M2)	27	0.02	0.02	0.00	0.001
	4-7	Lower Millstone River Downstream SBRSA - River Road STP (M3)	22	0.26	0.21	-0.05	0.097
	4-8	Lower Millstone River Downstream Montgomery - Stage II STP (M4)	27	0.29	0.25	-0.05	0.078
	5-5	Lower Millstone River at Griggstown (M5)	27	0.25	0.26	0.01	0.058
	5-12	Lower Millstone River at Blackwells Mills (M6)	31	0.23	0.23	0.00	0.065
	5-18	Lower Millstone River at Manville (M7)	21	0.23	0.22	0.00	0.051
Mainstem Raritan River	3-2	Raritan River Downstream Millstone River Confluence (R2)	22	0.11	0.10	-0.02	0.081
	3-5	Raritan River @ I-287 bridge (R3)	22	0.24	0.10	-0.14	0.984
	3-8	Raritan River at Queens Bridge (1403900)	9	0.21	0.11	-0.10	0.133
	4-1	Green Brook (Bound Brook) at Greenbrook Rd. (GB1)	23	0.05	0.03	-0.02	0.014
	5-3	Raritan River Upstream Fieldville Dam (R4)	22	0.21	0.18	-0.03	0.217

## Water Quality Model Goodness-of-Fit Statistics Total Phosphorus

Watershed	Branch Node	Description	# of Samples	Mean Predicted	Mean Observed	Mean Error	RMSE
North and South Branch Raritan River	1-1	South Branch Raritan River in Mount Olive (SBRR1)	10	0.06	0.05	-0.01	0.02
	2-1	Drakes Brook upstream of Mt. Olive STP (DkB1)	17	0.05	0.04	-0.01	0.03
	3-2	South Branch Raritan River near Four Bridges (SBRR2)	18	0.05	0.04	-0.01	0.02
	3-3	South Branch Raritan River Upstream Washington Township (SBR1)	20	0.05	0.04	-0.01	0.04
	3-4	South Branch Raritan River Downstream Schooley's Mt. STP (SBR2)	20	0.12	0.10	-0.02	0.04
	3-6	South Branch Raritan River Downstream Long Valley STP (SBR3)	20	0.11	0.11	0.00	0.03
	3-12	South Branch Raritan River at Middle Valley (SBR4)	20	0.09	0.07	-0.02	0.03
	3-19	South Branch Raritan River at Solitude Lake (SBRR3 and SBRR4)	17	0.05	0.07	0.01	0.03
	3-20	South Branch Raritan River at High Bridge (SBRR5)	10	0.06	0.07	0.01	0.03
	4-5	Beaver Brook @ Hamden Road in Town of Clinton (BvB1)	18	0.04	0.08	0.03	0.06
	5-1	South Branch Raritan River Upstream Clinton WTP (SBRR6)	18	0.05	0.06	0.00	0.03
	6-1	Cakepoulin Creek at Lower Lansdown Rd. (CC1)	18	0.04	0.05	0.00	0.04
	7-1	South Branch Raritan River at Hamden Rd (SBRR7)	18	0.05	0.06	0.01	0.03
	7-7	South Branch Raritan River at Stanton Rd. (SBRR8)	19	0.06	0.06	0.00	0.03
	7-14	South Branch Raritan River at Three Bridges (SBRR9)	18	0.09	0.13	0.04	0.07
	8-1	Neshanic River near Reaville (NR1)	20	0.10	0.08	-0.02	0.05
	8-5	Neshanic River at Hillsborough (NR2)	18	0.07	0.09	0.02	0.04
	9-7	South Branch Raritan River at Studdiford Rd. (SBRR10)	21	0.08	0.09	0.02	0.05
	10-1	Holland Brook at South Branch Road (HB1)	10	0.10	0.10	0.00	0.04
	12-1	Lamington River Upstream Roxbury STP (LR1)	18	0.05	0.04	-0.01	0.04
	12-3	Lamington River Downstream Roxbury STP (LR2)	21	0.12	0.10	-0.02	0.05
	12-12	Lamington River in Pottersville (LR3)	18	0.09	0.05	-0.03	0.04
	12-19	Lamington River at River Road near Whitehouse (LR4)	18	0.04	0.05	0.00	0.02
	13-1	North Branch Rockaway Creek at Route 523 (NBRC1)	18	0.03	0.03	0.00	0.03
	14-1	South Branch Rockaway Creek Downstream Cushetunk Lake (SBRC3)	10	0.11	0.11	0.00	0.01
	15-3	Rockaway Creek at Lamington Road near Whitehouse (RC1)	18	0.18	0.15	-0.03	0.12
	16-4	Lamington River at Cowperthwaite Road in Burnt Mills (LR5)	18	0.11	0.10	-0.01	0.05
	17-1	India Brook at Mountainside Road in Mendham (IB1)	10	0.04	0.03	-0.01	0.02
	18-1	Burnett Brook at Chester (BuB1)	10	0.05	0.03	-0.02	0.04
	19-1	North Branch Raritan River in Mendham Township (NBRR1)	18	0.03	0.04	0.00	0.02
	19-6	North Branch Raritan River Upstream of Ravine Lake (NBRR2)	18	0.03	0.04	0.01	0.03
	19-8	North Branch Raritan River Downstream Ravine Lake (NBRR4)	10	0.05	0.06	0.01	0.02
	20-6	Mine Brook at Route 512 (MiB1)	10	0.04	0.05	0.01	0.04
21-2	North Branch Raritan River at Route 202/206 (NBRR5)	18	0.03	0.04	0.01	0.02	
21-8	North Branch Raritan River at Burnt Mills (NBRR6)	18	0.04	0.05	0.01	0.03	
22-8	North Branch Raritan River Downstream Route 202 (NBRR7)	21	0.08	0.08	0.00	0.04	
23-7	Raritan River at Main Street in Manville (RR1)	18	0.10	0.15	0.04	0.15	
Upper Millstone River	1-1	Upper Millstone River at Old Cranbury Rd. (UMR1)	21	0.09	0.08	-0.01	0.03
	2-1	Rocky Brook Downstream Peddie Lake (RB3)	12	0.08	0.09	0.01	0.03
	2-4	Rocky Brook at Route 130 (RB4)	21	0.08	0.10	0.02	0.04
	3-12	Upper Millstone River at Cranbury Neck Rd. (UMR2)	24	0.10	0.09	-0.01	0.03
	4-1	Cranbury Brook at Plainsboro Pond Outlet (CB3)	21	0.06	0.07	0.01	0.03
	5-1	Upper Millstone River Downstream Railroad Crossing in Plainsboro (UMR3)	21	0.08	0.09	0.01	0.03
	6-1	Big Bear Brook Downstream Grovers Mill Pond (BBB3)	8	0.08	0.07	-0.01	0.03
	8-1	Devils Brook Downstream Gordon Pond (DB3)	12	0.08	0.08	0.01	0.03
Stony Brook	1-2	Stony Brook Upstream of SBRSA - Pennington STP (SB1)	27	0.07	0.07	0.00	0.05
	1-4	Stony Brook at Delaware Avenue in Pennington (SB2)	22	0.40	0.47	0.07	0.26
	1-21	Stony Brook at Route 206 in Princeton (SB3)	22	0.16	0.12	-0.05	0.10
	1-29	Stony Brook at Alexander Road in Princeton (SB4)	22	0.15	0.17	0.02	0.13
Beden Brook / Lower Millstone River	1-1	Beden Brook Upstream SBRSA-Hopewell STP (BB1)	27	0.06	0.05	-0.01	0.03
	1-4	Beden Brook Downstream SBRSA-Hopewell STP (BB2)	27	0.38	0.43	0.05	0.14
	3-1	Beden Brook Downstream Pike Brook Confluence (BB3)	22	0.12	0.11	-0.01	0.04
	4-1	Lower Millstone River Downstream Carnegie Lake (M2)	27	0.08	0.09	0.00	0.01
	4-7	Lower Millstone River Downstream SBRSA - River Road STP (M3)	22	0.33	0.28	-0.04	0.09
	4-8	Lower Millstone River Downstream Montgomery - Stage II STP (M4)	27	0.36	0.33	-0.03	0.08
	5-5	Lower Millstone River at Griggstown (M5)	27	0.30	0.31	0.01	0.04
	5-12	Lower Millstone River at Blackwells Mills (M6)	31	0.28	0.27	-0.01	0.05
	5-18	Lower Millstone River at Manville (M7)	21	0.27	0.26	-0.01	0.06
Mainstem Raritan River	3-2	Raritan River Downstream Millstone River Confluence (R2)	22	0.19	0.15	-0.03	0.08
	3-5	Raritan River @ I-287 bridge (R3)	22	0.32	0.15	-0.16	0.24
	3-8	Raritan River at Queens Bridge (1403900)	9	0.27	0.18	-0.09	0.11
	4-1	Green Brook (Bound Brook) at Greenbrook Rd. (GB1)	24	0.11	0.08	-0.03	0.05
	5-3	Raritan River Upstream Fieldville Dam (R4)	22	0.29	0.24	-0.05	0.12

## Water Quality Model Goodness-of-Fit Statistics Total Suspended Solids

Watershed	Branch Node	Description	# of Samples	Mean Predicted	Mean Observed	Mean Error	RMSE
North and South Branch Raritan River	1-1	South Branch Raritan River in Mount Olive (SBRR1)	10	7.6	5.0	-2.6	4.5
	2-1	Drakes Brook upstream of Mt. Olive STP (DkB1)	17	5.9	3.2	-2.7	5.2
	3-2	South Branch Raritan River near Four Bridges (SBRR2)	18	5.1	5.8	0.8	3.6
	3-3	South Branch Raritan River Upstream Washington Township (SBR1)	20	4.9	4.2	-0.7	7.3
	3-4	South Branch Raritan River Downstream Schooley's Mt. STP (SBR2)	20	4.9	4.1	-0.8	7.4
	3-6	South Branch Raritan River Downstream Long Valley STP (SBR3)	20	4.9	3.9	-1.0	7.7
	3-12	South Branch Raritan River at Middle Valley (SBR4)	20	4.7	4.0	-0.6	7.6
	3-19	South Branch Raritan River at Solitude Lake (SBRR3 and SBRR4)	17	2.8	7.4	4.5	8.3
	3-20	South Branch Raritan River at High Bridge (SBRR5)	10	4.8	10.1	5.2	7.0
	4-5	Beaver Brook @ Hamden Road in Town of Clinton (BvB1)	18	3.1	8.6	5.5	14.1
	5-1	South Branch Raritan River Upstream Clinton WTP (SBRR6)	18	3.6	9.7	6.1	11.0
	6-1	Cakepoulin Creek at Lower Lansdown Rd. (CC1)	18	4.4	4.8	0.4	5.0
	7-1	South Branch Raritan River at Hamden Rd (SBRR7)	18	4.0	9.4	5.5	9.1
	7-7	South Branch Raritan River at Stanton Rd. (SBRR8)	19	4.1	10.0	5.9	10.5
	7-14	South Branch Raritan River at Three Bridges (SBRR9)	18	4.6	12.2	7.6	14.7
	8-1	Neshanic River near Reaville (NR1)	20	4.6	7.2	2.6	7.8
	8-5	Neshanic River at Hillsborough (NR2)	18	6.0	6.5	0.5	7.5
	9-7	South Branch Raritan River at Studdiford Rd. (SBRR10)	21	5.4	13.9	8.5	16.0
	10-1	Holland Brook at South Branch Road (HB1)	10	13.0	11.9	-1.1	12.9
	12-1	Lamington River Upstream Roxbury STP (LR1)	18	6.3	4.1	-2.2	6.4
	12-3	Lamington River Downstream Roxbury STP (LR2)	21	6.1	4.9	-1.2	6.4
	12-12	Lamington River in Pottersville (LR3)	18	6.0	6.0	0.0	2.7
	12-19	Lamington River at River Road near Whitehouse (LR4)	18	2.8	5.4	2.6	5.2
	13-1	North Branch Rockaway Creek at Route 523 (NBRC1)	18	4.1	4.6	0.6	5.7
	14-1	South Branch Rockaway Creek Downstream Cushetunk Lake (SBRC3)	10	34.9	34.6	-0.4	4.3
	15-3	Rockaway Creek at Lamington Road near Whitehouse (RC1)	18	5.4	11.1	5.7	11.8
	16-4	Lamington River at Cowperthwaite Road in Burnt Mills (LR5)	18	6.5	11.9	5.4	12.9
	17-1	India Brook at Mountainside Road in Mendham (IB1)	10	4.1	4.3	0.2	3.6
	18-1	Burnett Brook at Chester (BuB1)	10	4.9	2.3	-2.5	3.9
	19-1	North Branch Raritan River in Mendham Township (NBRR1)	18	2.0	3.6	1.6	3.2
19-6	North Branch Raritan River Upstream of Ravine Lake (NBRR2)	18	2.4	3.6	1.3	3.0	
19-8	North Branch Raritan River Downstream Ravine Lake (NBRR4)	10	5.4	10.0	4.6	8.5	
20-6	Mine Brook at Route 512 (MiB1)	10	3.7	4.3	0.6	5.0	
21-2	North Branch Raritan River at Route 202/206 (NBRR5)	18	2.9	5.6	2.7	5.7	
21-8	North Branch Raritan River at Burnt Mills (NBRR6)	18	3.1	7.3	4.2	8.2	
22-8	North Branch Raritan River Downstream Route 202 (NBRR7)	21	5.6	12.9	7.3	14.6	
23-7	Raritan River at Main Street in Manville (RR1)	18	8.3	26.0	17.7	34.5	
Upper Millstone River	1-1	Upper Millstone River at Old Cranbury Rd. (UMR1)	21	6.0	5.8	-0.3	3.9
	2-1	Rocky Brook Downstream Peddie Lake (RB3)	11	5.9	7.0	1.1	4.6
	2-4	Rocky Brook at Route 130 (RB4)	21	4.1	6.6	2.5	5.7
	3-12	Upper Millstone River at Cranbury Neck Rd. (UMR2)	24	4.1	5.3	1.2	3.7
	4-1	Cranbury Brook at Plainsboro Pond Outlet (CB3)	21	6.0	5.1	-0.9	4.9
	5-1	Upper Millstone River Downstream Railroad Crossing in Plainsboro (UMR3)	21	3.8	4.1	0.3	2.5
	6-1	Big Bear Brook Downstream Grovers Mill Pond (BBB3)	8	6.5	4.2	-2.3	4.5
	8-1	Devils Brook Downstream Gordon Pond (DB3)	12	7.7	5.6	-2.1	4.7
Stony Brook	1-2	Stony Brook Upstream of SBRSA - Pennington STP (SB1)	27	6.0	5.4	-0.6	8.5
	1-4	Stony Brook at Delaware Avenue in Pennington (SB2)	22	10.6	5.0	-5.6	11.2
	1-21	Stony Brook at Route 206 in Princeton (SB3)	22	6.9	5.4	-1.6	8.1
Beden Brook / Lower Millstone River	1-1	Beden Brook Upstream SBRSA-Hopewell STP (BB1)	27	4.7	4.7	0.0	11.2
	1-4	Beden Brook Downstream SBRSA-Hopewell STP (BB2)	27	4.9	4.5	-0.4	8.4
	3-1	Beden Brook Downstream Pike Brook Confluence (BB3)	22	9.5	7.5	-2.0	9.3
	4-1	Lower Millstone River Downstream Carnegie Lake (M2)	27	10.6	12.2	1.5	2.2
	4-7	Lower Millstone River Downstream SBRSA - River Road STP (M3)	22	10.7	11.0	0.2	3.2
	4-8	Lower Millstone River Downstream Montgomery - Stage II STP (M4)	27	10.0	10.1	0.1	3.2
	5-5	Lower Millstone River at Griggstown (M5)	27	8.2	10.0	1.8	5.3
	5-12	Lower Millstone River at Blackwells Mills (M6)	31	8.9	9.2	0.3	6.4
	5-18	Lower Millstone River at Manville (M7)	21	9.9	7.9	-2.0	5.8
Mainstem Raritan River	3-2	Raritan River Downstream Millstone River Confluence (R2)	28	10.86	15.33	4.47	25.411
	3-5	Raritan River @ I-287 bridge (R3)	22	11.63	17.82	6.19	23.793
	4-1	Green Brook (Bound Brook) at Greenbrook Rd. (GB1)	18	18.64	8.98	-9.66	13.140
	5-3	Raritan River Upstream Fieldville Dam (R4)	22	12.29	13.36	1.07	11.631



## Water Quality Model Goodness-of-Fit Statistics Dissolved Oxygen (Grab Data)

Watershed	Branch Node	Description	# of Samples	Mean Predicted	Mean Observed	Mean Error	RMSE
North and South Branch Raritan River	2-1	Drakes Brook upstream of Mt. Olive STP (DkB1)	22	8.5	9.2	0.7	1.44
	3-2	South Branch Raritan River near Four Bridges (SBRR2)	22	9.2	9.6	0.4	0.93
	3-3	South Branch Raritan River Upstream Washington Township (SBR1)	22	9.1	9.1	0.0	0.71
	3-4	South Branch Raritan River Downstream Schooley's Mt. STP (SBR2)	22	9.3	9.1	-0.2	0.72
	3-6	South Branch Raritan River Downstream Long Valley STP (SBR3)	22	9.2	9.1	-0.1	0.74
	3-12	South Branch Raritan River at Middle Valley (SBR4)	20	10.2	9.9	-0.3	1.08
	3-19	South Branch Raritan River at Solitude Lake (SBRR3 and SBRR4)	22	9.0	9.4	0.4	1.31
	3-20	South Branch Raritan River at High Bridge (SBRR5)	10	10.2	10.1	-0.1	0.42
	4-5	Beaver Brook @ Hamden Road in Town of Clinton (BvB1)	22	10.3	10.4	0.2	1.50
	5-1	South Branch Raritan River Upstream Clinton WTP (SBRR6)	22	9.6	9.4	-0.2	0.64
	6-1	Cakepoulin Creek at Lower Lansdown Rd. (CC1)	22	9.2	9.6	0.4	0.94
	7-1	South Branch Raritan River at Hamden Rd (SBRR7)	23	9.8	9.5	-0.3	0.84
	7-7	South Branch Raritan River at Stanton Rd. (SBRR8)	23	9.7	9.4	-0.3	0.93
	7-14	South Branch Raritan River at Three Bridges (SBRR9)	23	9.6	9.8	0.3	1.14
	8-1	Neshanic River near Reaville (NR1)	26	9.4	10.8	1.4	3.27
	8-5	Neshanic River at Hillsborough (NR2)	24	9.5	9.6	0.1	1.69
	9-7	South Branch Raritan River at Studdiford Rd. (SBRR10)	24	9.5	10.0	0.5	1.95
	12-1	Lamington River Upstream Roxbury STP (LR1)	23	8.0	8.1	0.1	1.00
	12-3	Lamington River Downstream Roxbury STP (LR2)	26	9.3	8.3	-1.0	1.58
	12-12	Lamington River in Pottersville (LR3)	22	9.9	10.2	0.3	1.03
	12-19	Lamington River at River Road near Whitehouse (LR4)	21	10.4	10.8	0.4	1.35
	13-1	North Branch Rockaway Creek at Route 523 (NBRC1)	22	9.3	10.1	0.7	1.06
	15-3	Rockaway Creek at Lamington Road near Whitehouse (RC1)	22	9.9	10.2	0.3	1.08
	16-4	Lamington River at Cowperthwaite Road in Burnt Mills (LR5)	22	10.3	10.7	0.4	1.55
	19-1	North Branch Raritan River in Mendham Township (NBRR1)	22	9.9	10.4	0.5	1.04
	19-6	North Branch Raritan River Upstream of Ravine Lake (NBRR2)	18	9.8	10.5	0.6	1.05
	19-8	North Branch Raritan River Downstream Ravine Lake (NBRR4)	10	10.0	10.0	-0.1	0.95
21-2	North Branch Raritan River at Route 202/206 (NBRR5)	23	10.5	10.6	0.1	1.12	
21-8	North Branch Raritan River at Burnt Mills (NBRR6)	23	10.0	10.4	0.4	1.25	
22-8	North Branch Raritan River Downstream Route 202 (NBRR7)	22	10.3	9.8	-0.5	1.47	
23-7	Raritan River at Main Street in Manville (RR1)	22	9.7	9.8	0.1	1.41	
Upper Millstone River	1-1	Upper Millstone River at Old Cranbury Rd. (UMR1)	26	7.2	7.4	0.1	0.86
	2-4	Rocky Brook at Route 130 (RB4)	26	7.4	7.7	0.3	0.84
	3-12	Upper Millstone River at Cranbury Neck Rd. (UMR2)	31	8.6	8.6	0.1	1.19
	5-1	Upper Millstone River Downstream Railroad Crossing in Plainsboro (UMR3)	26	8.6	7.9	-0.6	1.09
Stony Brook	1-2	Stony Brook Upstream of SBRSA - Pennington STP (SB1)	30	7.7	8.6	0.8	1.49
	1-4	Stony Brook at Delaware Avenue in Pennington (SB2)	25	7.8	8.4	0.6	1.53
	1-21	Stony Brook at Route 206 in Princeton (SB3)	26	10.1	9.1	-1.1	2.24
Beden Brook / Lower Millstone River	1-1	Beden Brook Upstream SBRSA-Hopewell STP (BB1)	30	8.5	9.7	1.2	1.83
	1-4	Beden Brook Downstream SBRSA-Hopewell STP (BB2)	30	9.2	9.2	0.0	1.97
	3-1	Beden Brook Downstream Pike Brook Confluence (BB3)	25	8.9	8.7	-0.2	1.11
	4-1	Lower Millstone River Downstream Carnegie Lake (M2)	31	8.5	8.4	0.0	0.89
	4-7	Lower Millstone River Downstream SBRSA - River Road STP (M3)	22	7.2	7.3	0.2	0.90
	4-8	Lower Millstone River Downstream Montgomery - Stage II STP (M4)	31	7.0	7.4	0.5	1.55
	5-5	Lower Millstone River at Griggstown (M5)	27	7.2	7.3	0.2	1.26
	5-12	Lower Millstone River at Blackwells Mills (M6)	31	7.6	7.4	-0.2	1.35
	5-18	Lower Millstone River at Manville (M7)	24	6.8	6.6	-0.2	0.93
Mainstem Raritan River	3-2	Raritan River Downstream Millstone River Confluence (R2)	28	9.2	9.0	-0.2	1.12
	3-5	Raritan River @ I-287 bridge (R3)	22	9.5	8.8	-0.7	0.93
	3-8	Raritan River at Queens Bridge (1403900)	9	10.1	11.0	0.9	1.81
	4-1	Green Brook (Bound Brook) at Greenbrook Rd. (GB1)	25	8.4	8.4	0.0	2.16
	5-3	Raritan River Upstream Fieldville Dam (R4)	22	10.2	9.5	-0.7	1.37

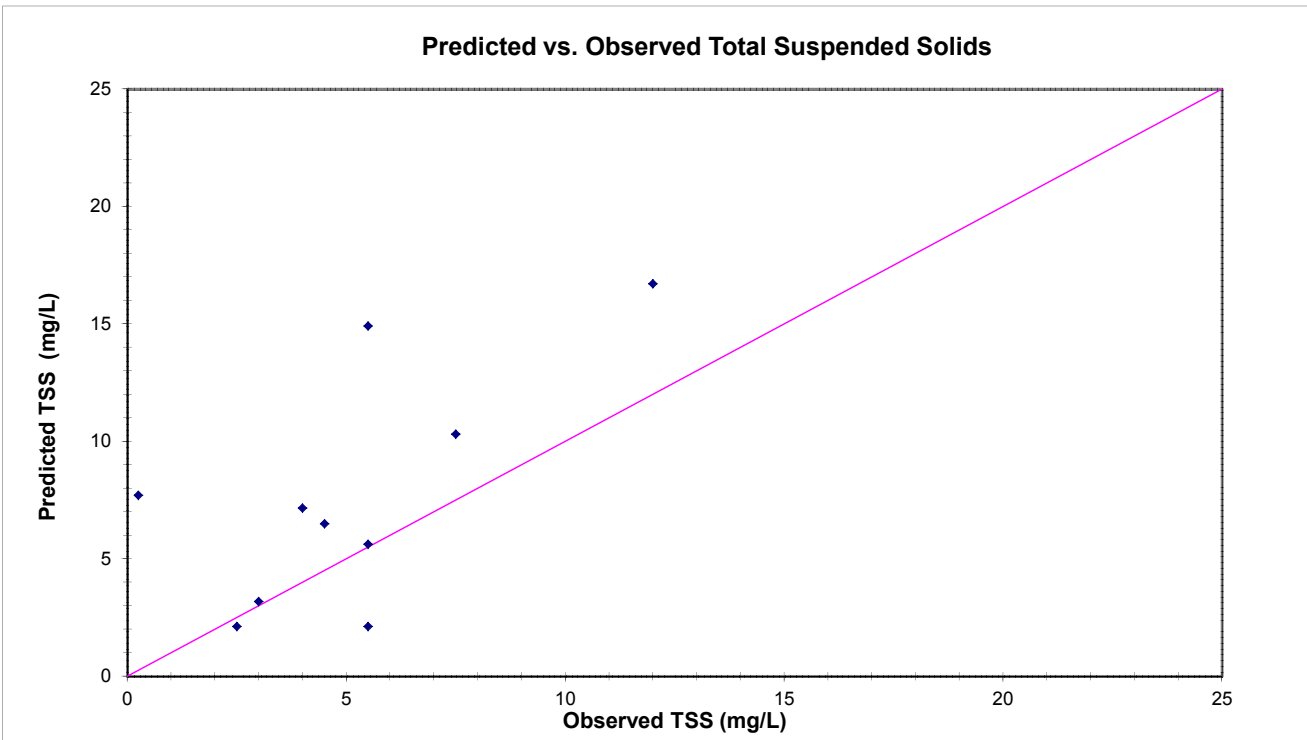
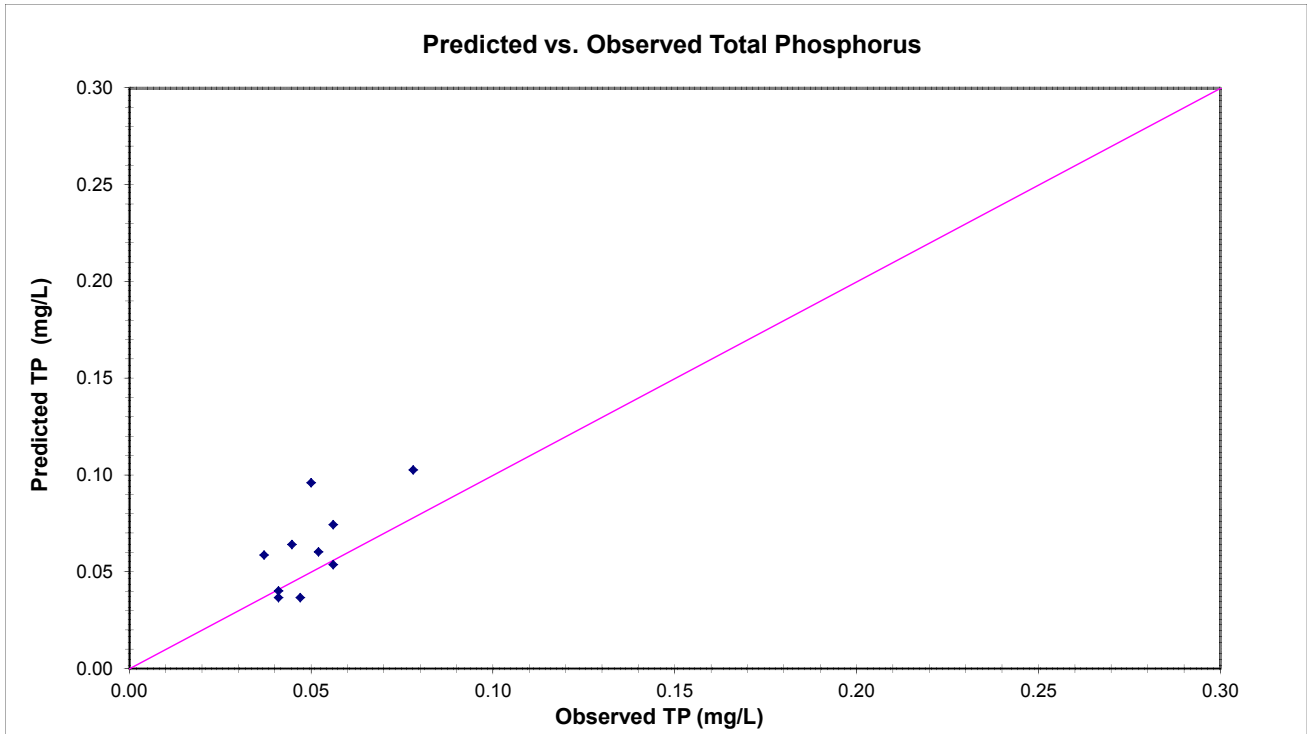
## Water Quality Model Goodness-of-Fit Statistics Diurnal Dissolved Oxygen Peaks

Watershed	Branch Node	Description	# of Samples	Mean Predicted	Mean Observed	Mean Error	Mean % Error	Mean Abs. % Error
North and South Branch Raritan River	3-12	South Branch Raritan River at Middle Valley (SBR4)	45	12.3	12.2	-0.17	-2.4%	9.7%
	9-7	South Branch Raritan River at Studdiford Rd. (SBRR10)	28	10.8	11.9	1.03	6.6%	11.8%
	16-4	Lamington River at Cowperthwaite Road in Burnt Mills (LR5)	25	9.8	10.5	0.78	6.1%	11.0%

North South Branch Raritan River Watershed Area Model

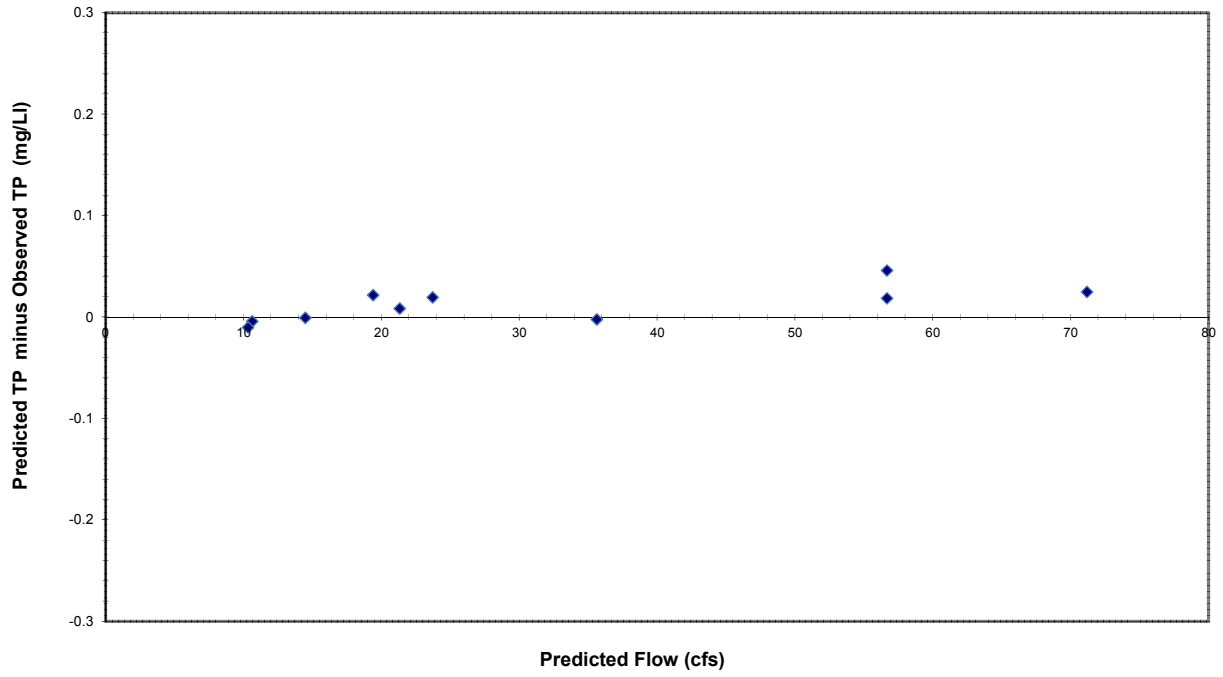
Goodness of Fit Graphs for TP and TSS  
Predicted vs Observed  
Residuals vs Flow  
Residuals vs Concentration

### South Branch Raritan River in Mount Olive (SBRR1)

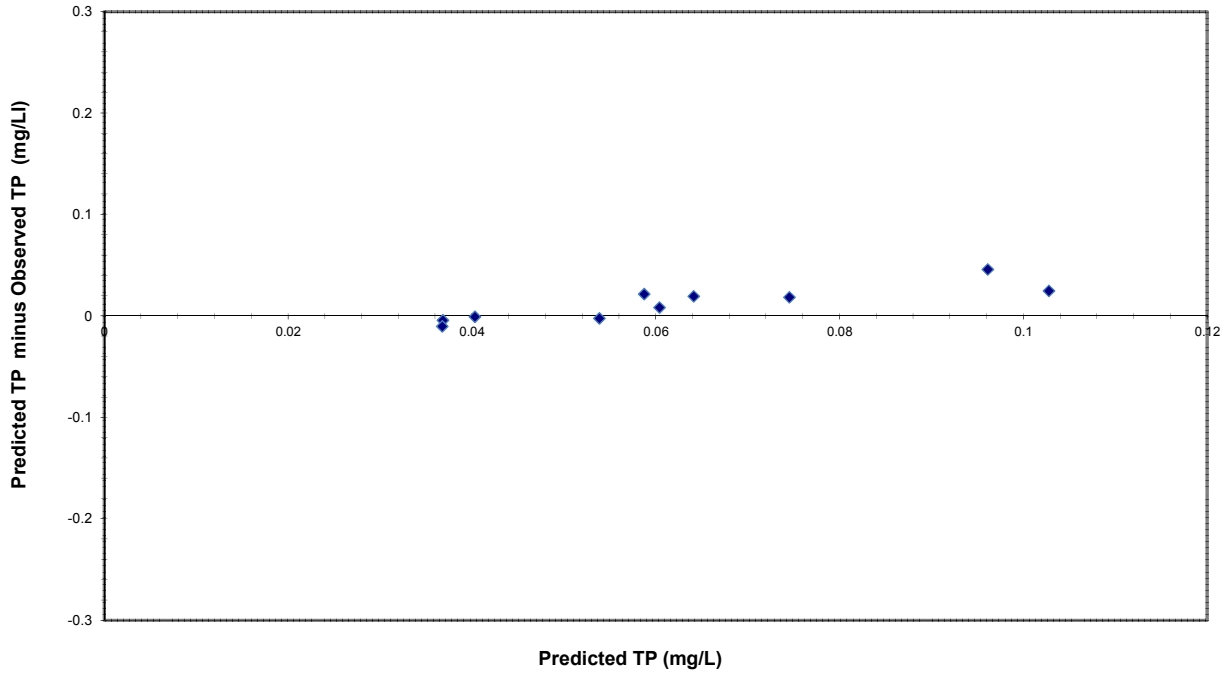


South Branch Raritan River in Mount Olive (SBRR1)

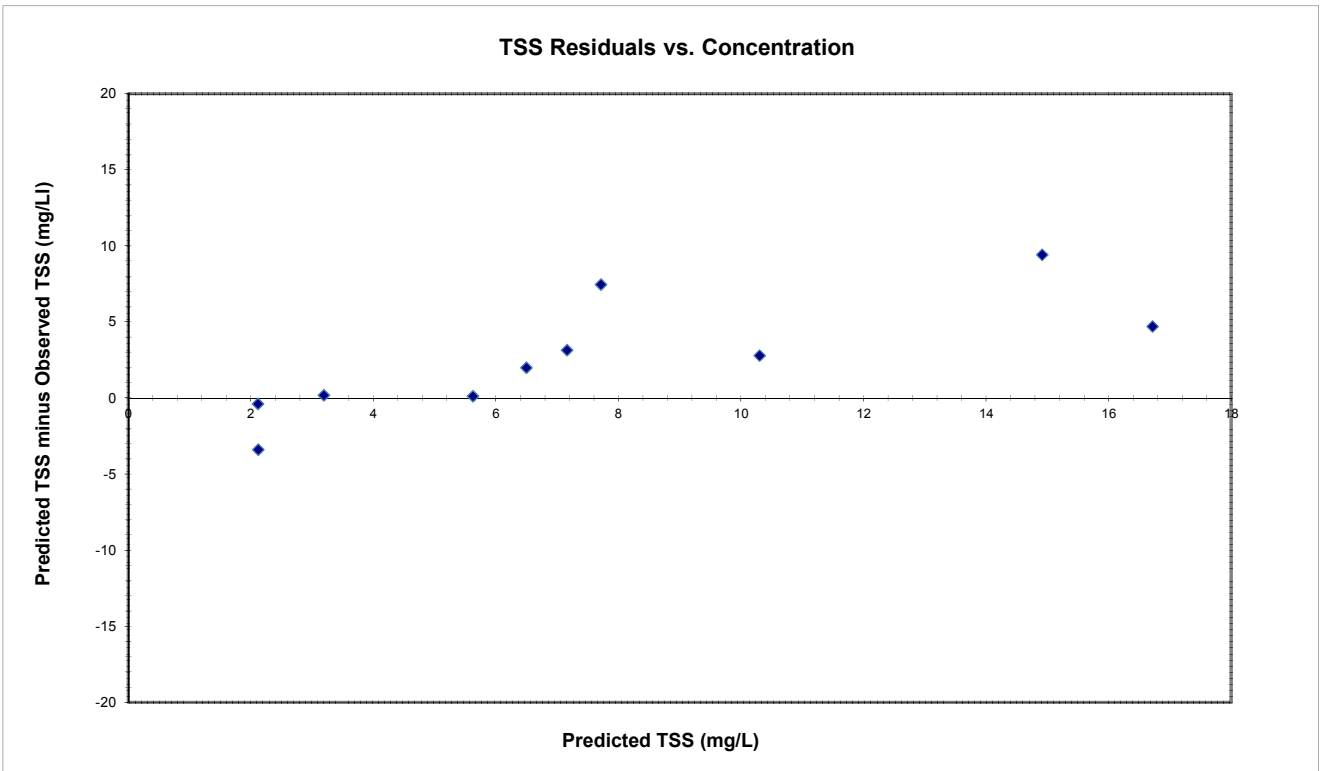
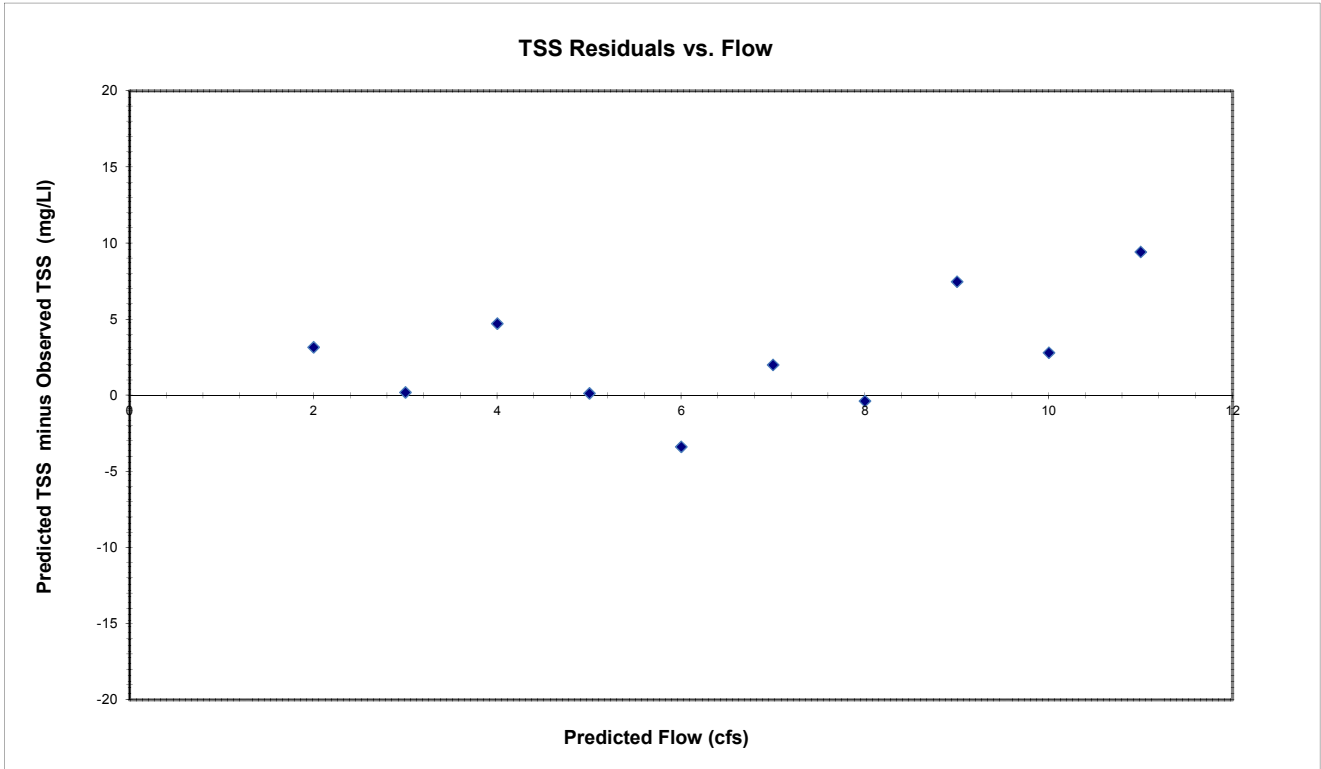
Total Phosphorus Residuals vs. Flow



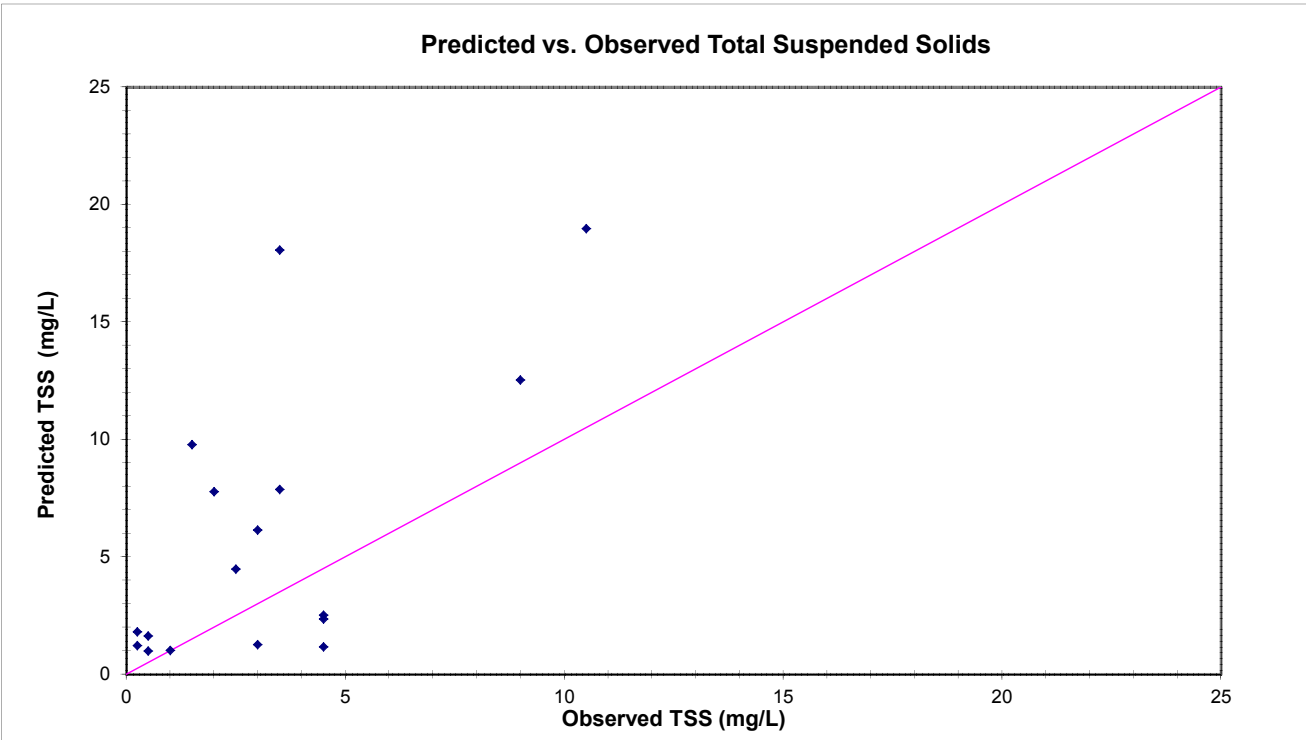
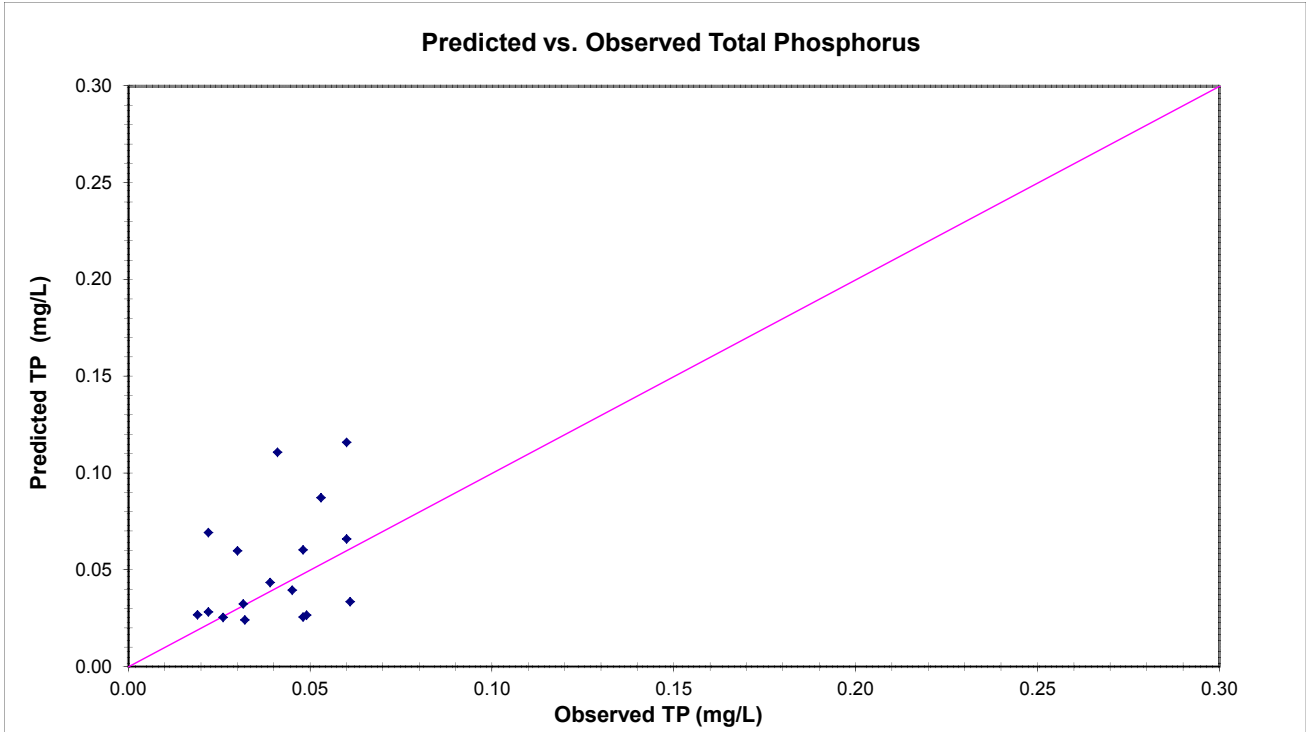
Total Phosphorus Residuals vs. Concentration



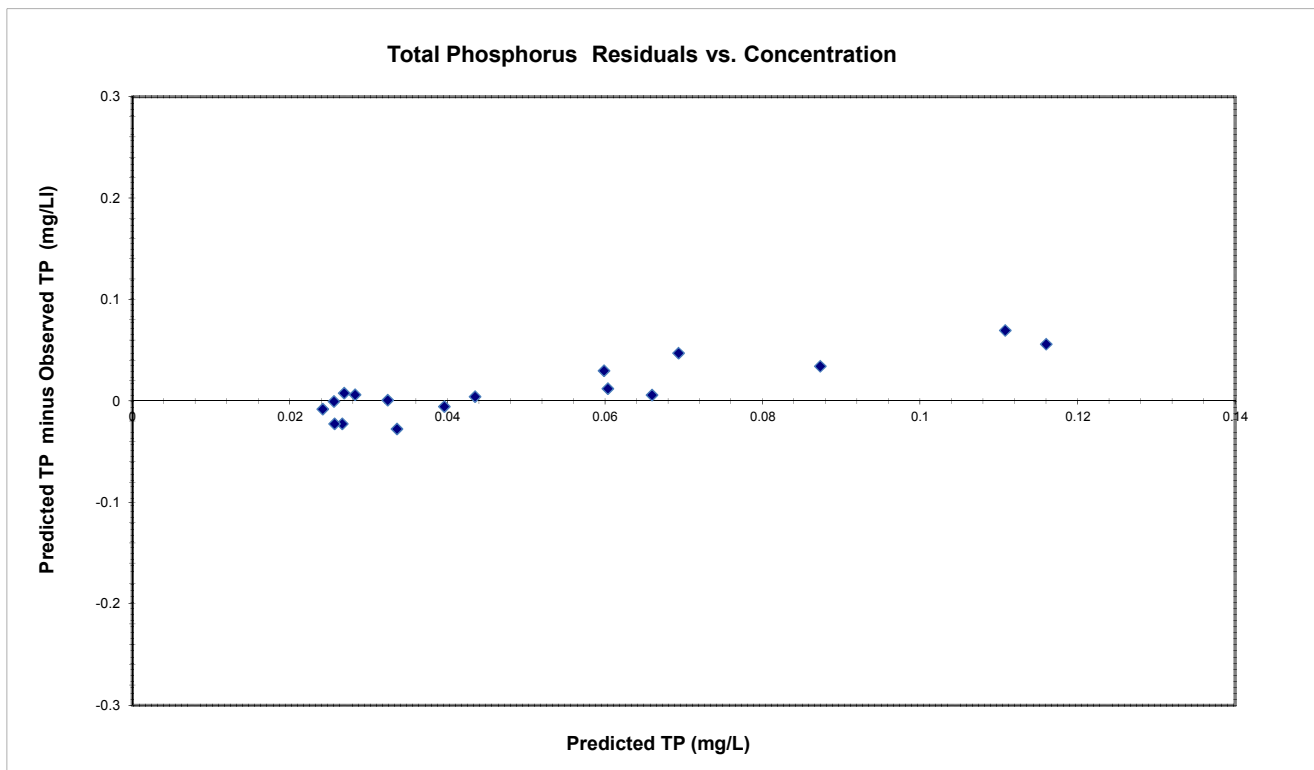
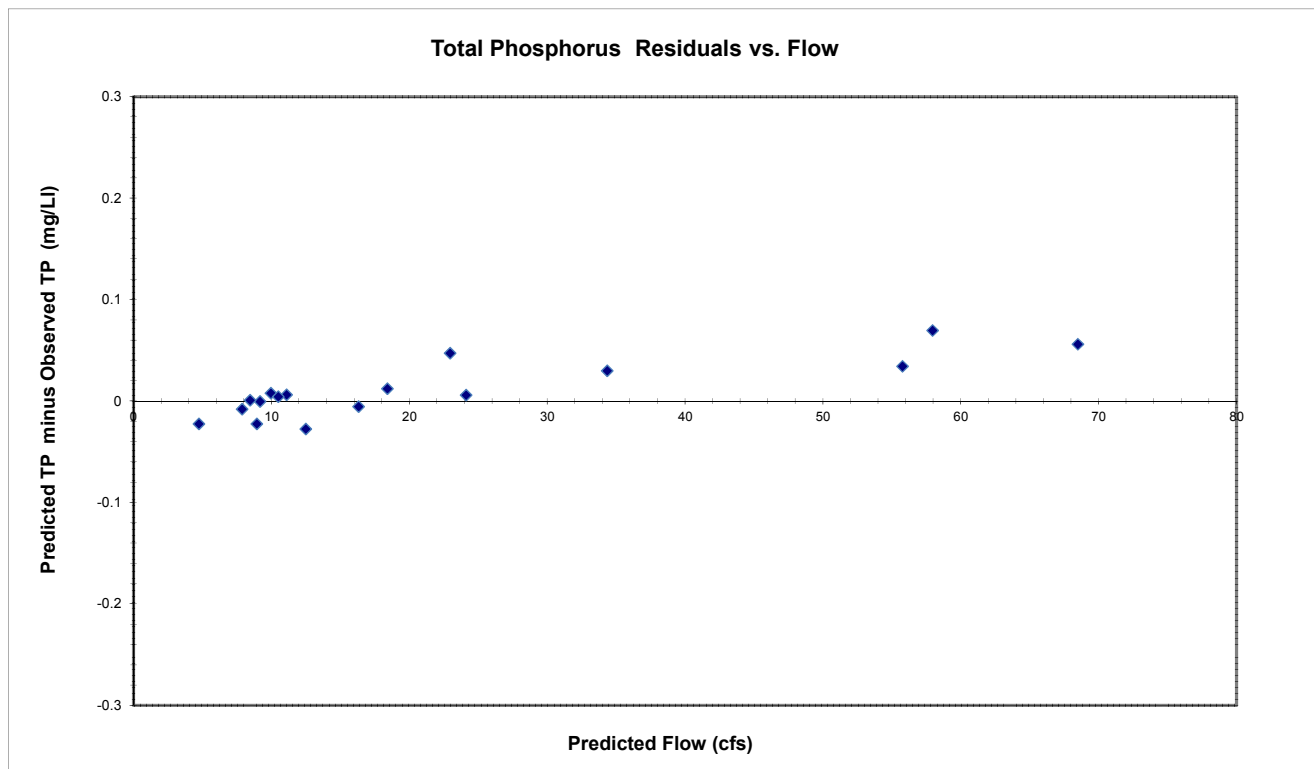
### South Branch Raritan River in Mount Olive (SBRR1)



### Drakes Brook upstream of Mt. Olive STP (DkB1)

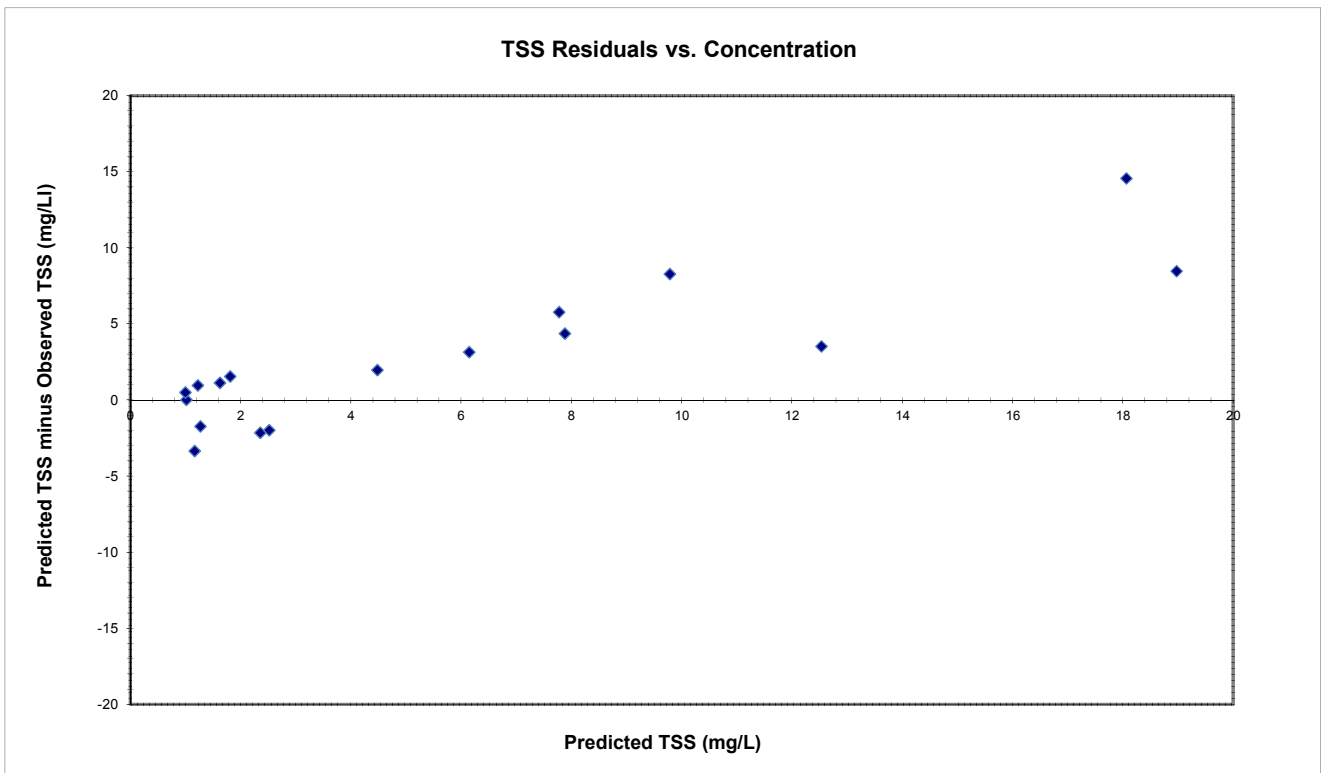
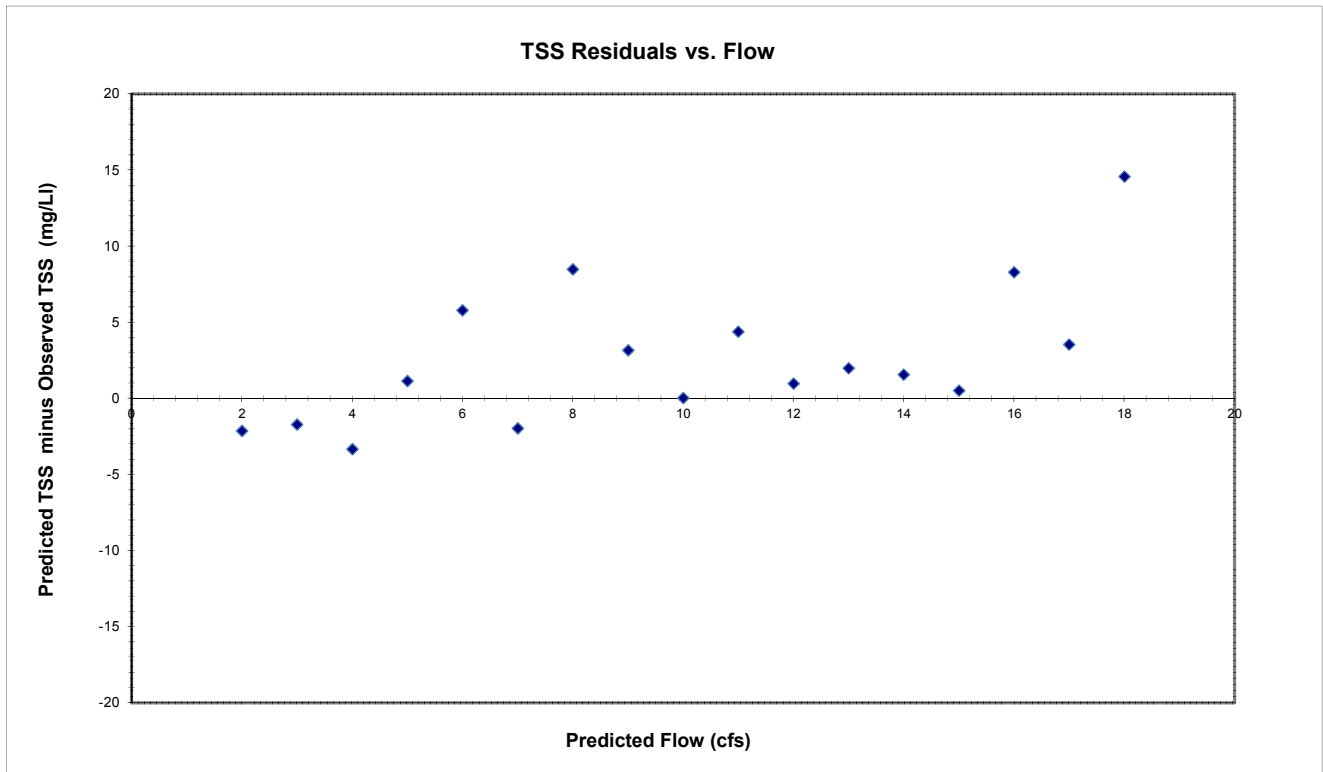


### Drakes Brook upstream of Mt. Olive STP (DkB1)

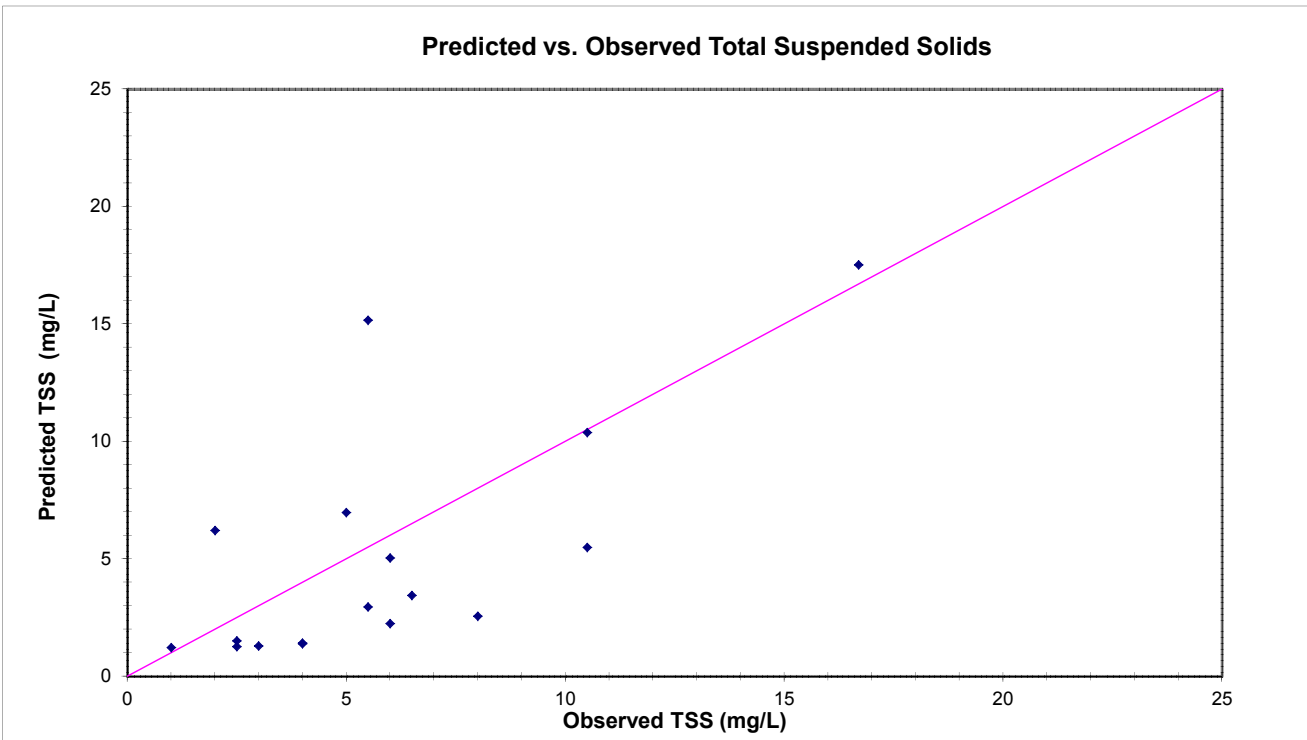
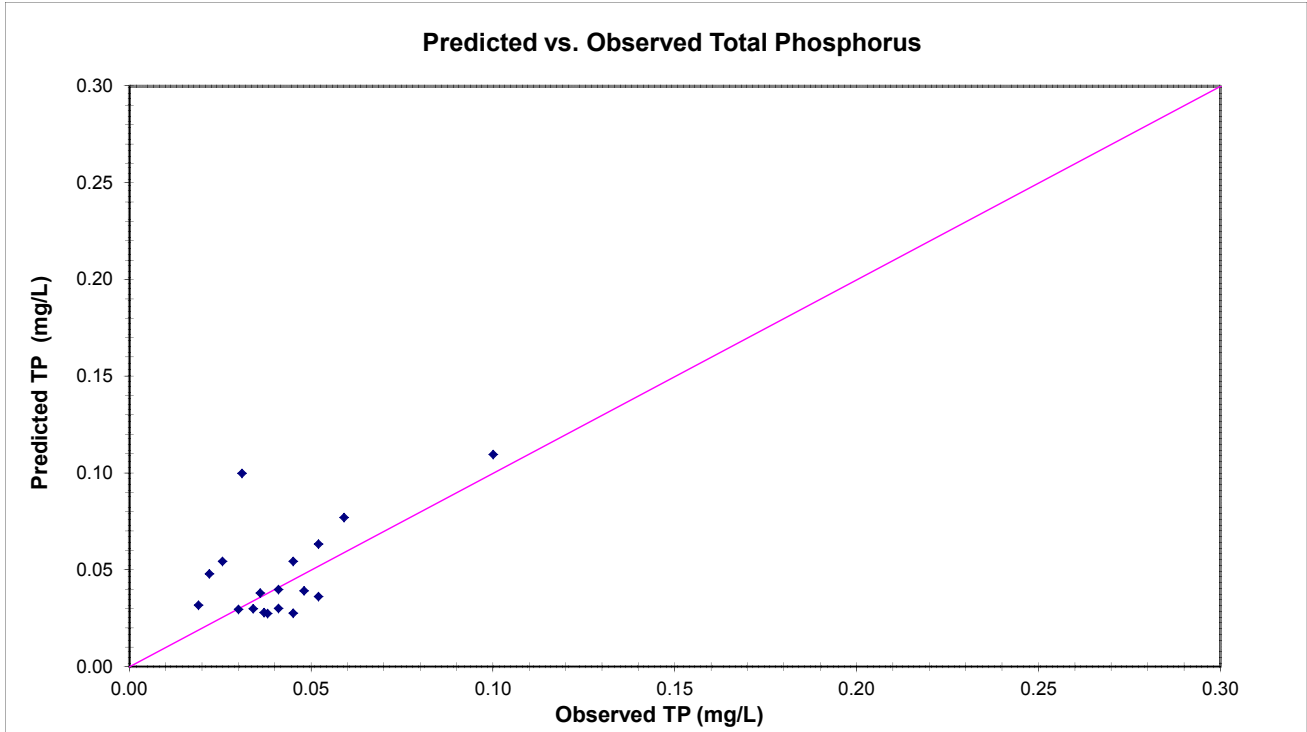




### Drakes Brook upstream of Mt. Olive STP (DKB1)

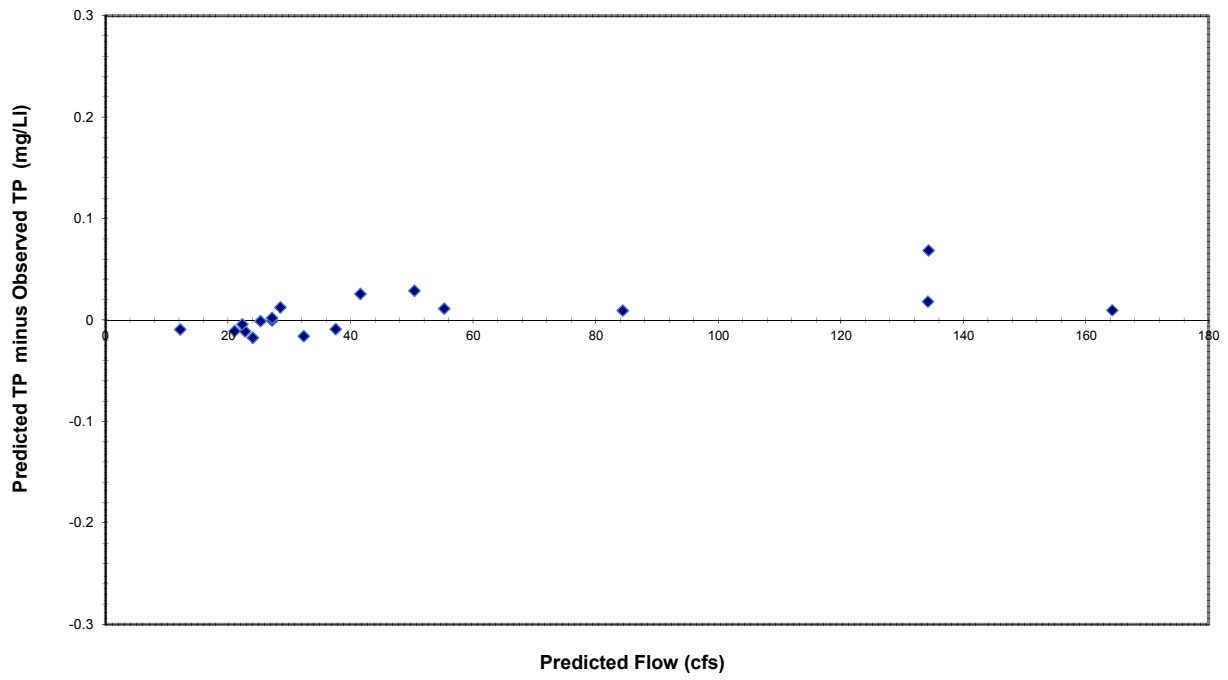


### South Branch Raritan River near Four Bridges (SBRR2)

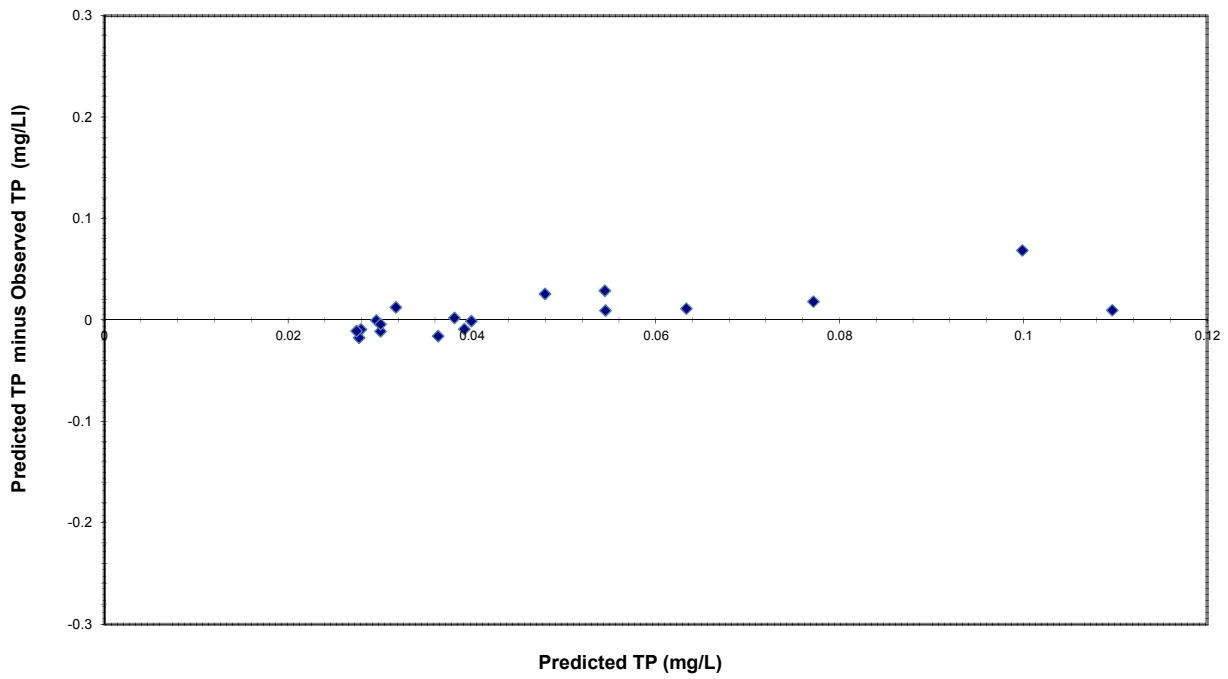


### South Branch Raritan River near Four Bridges (SBRR2)

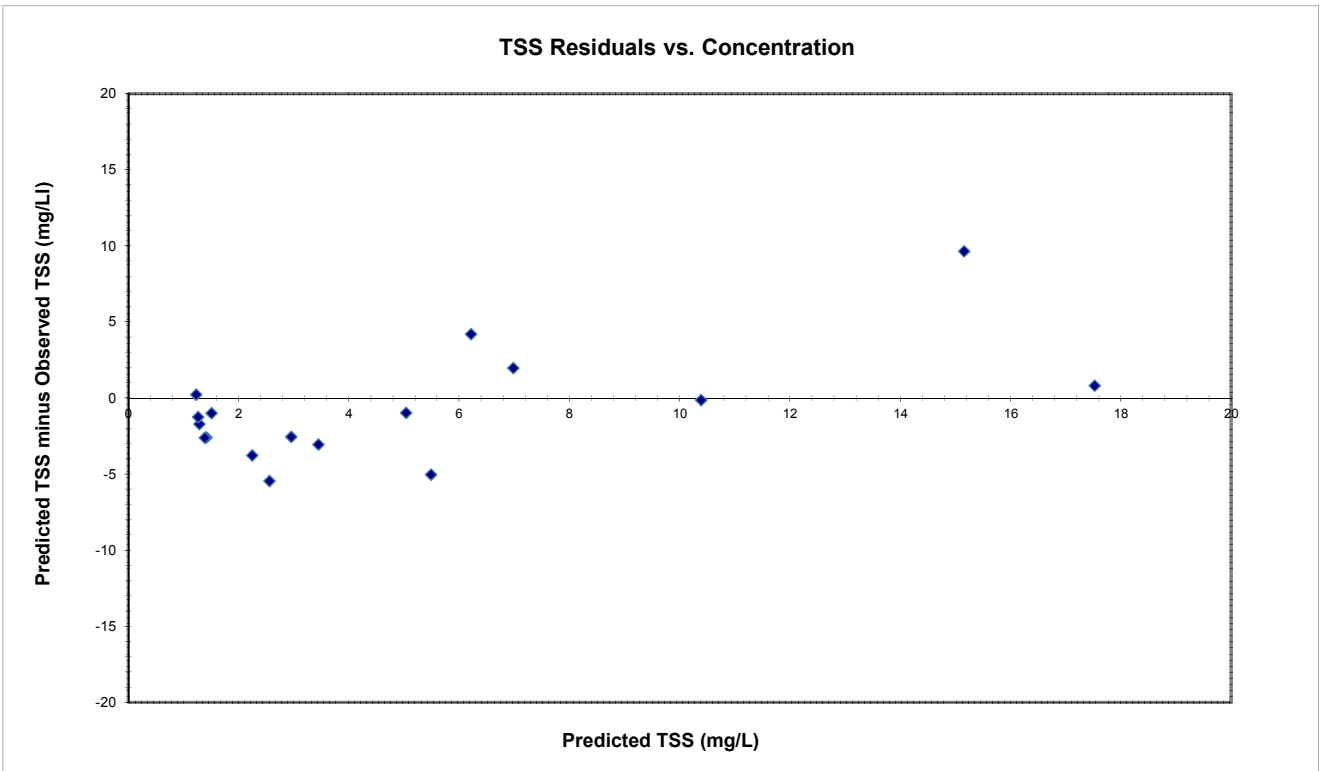
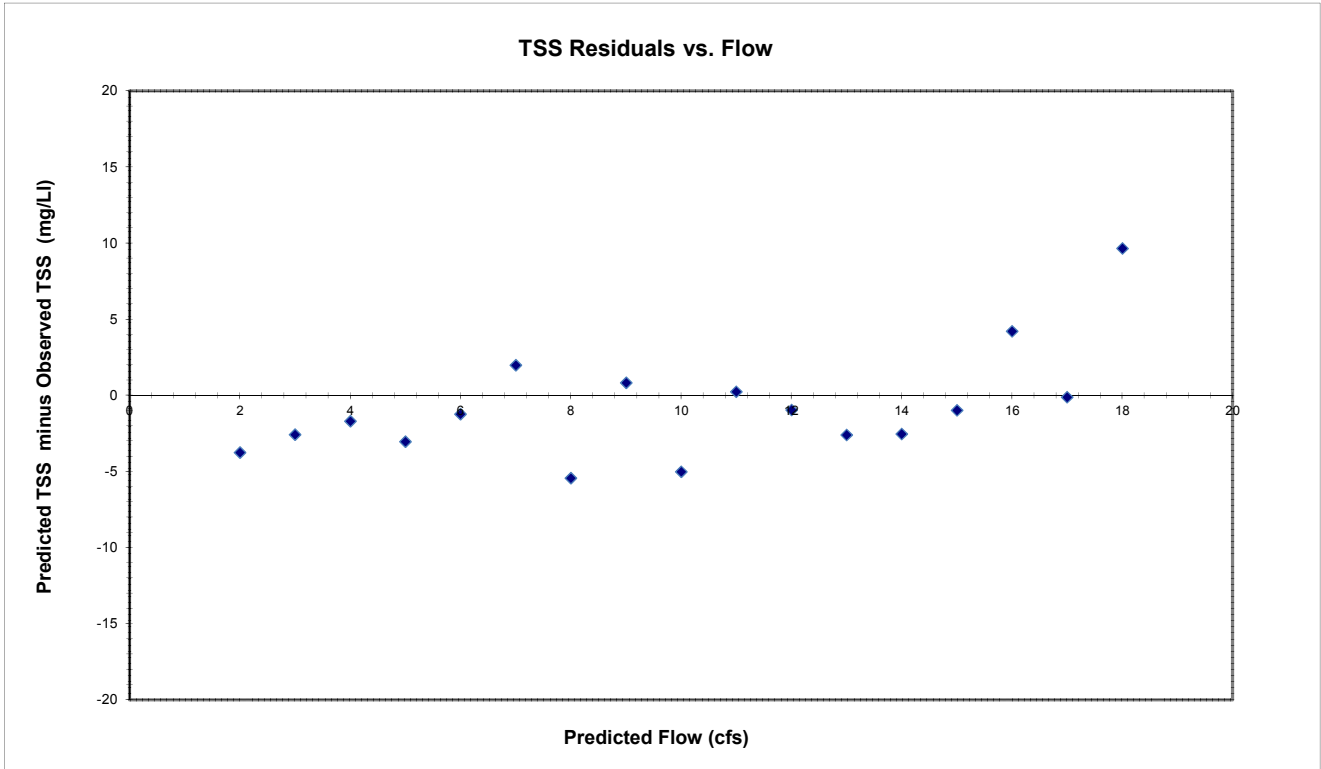
#### Total Phosphorus Residuals vs. Flow



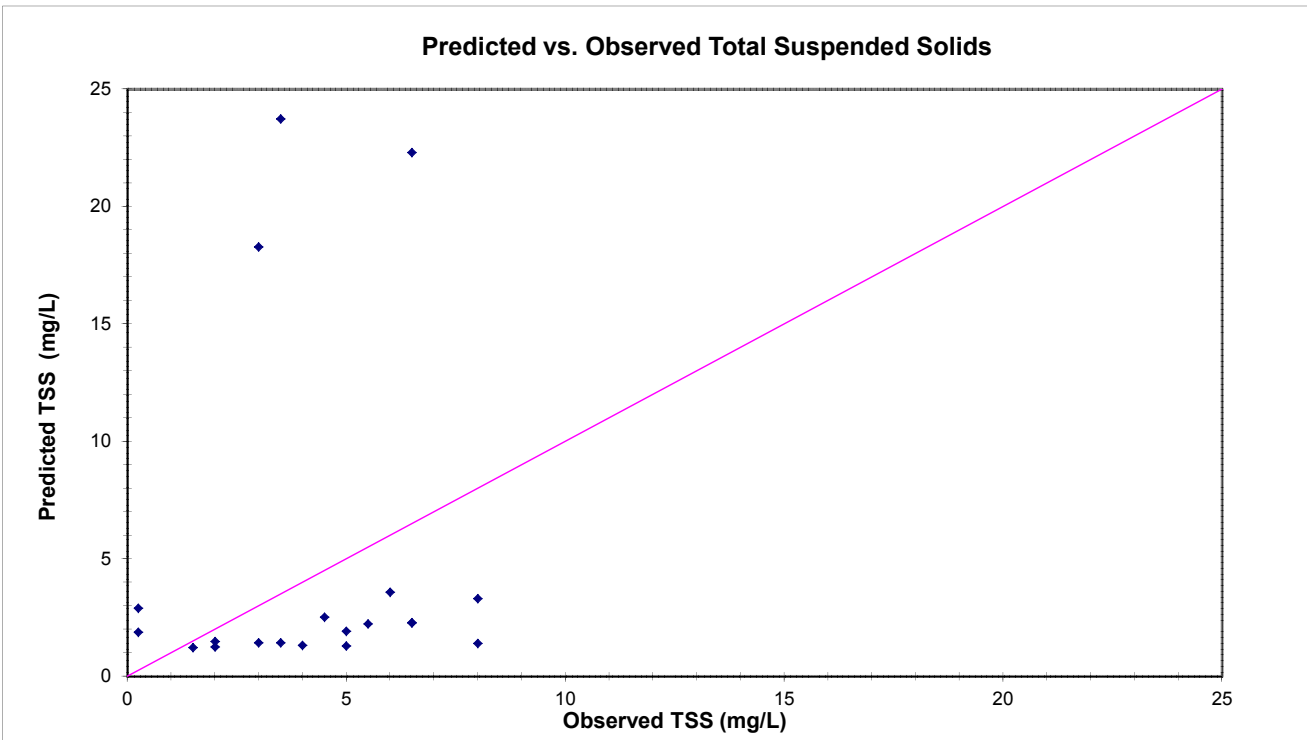
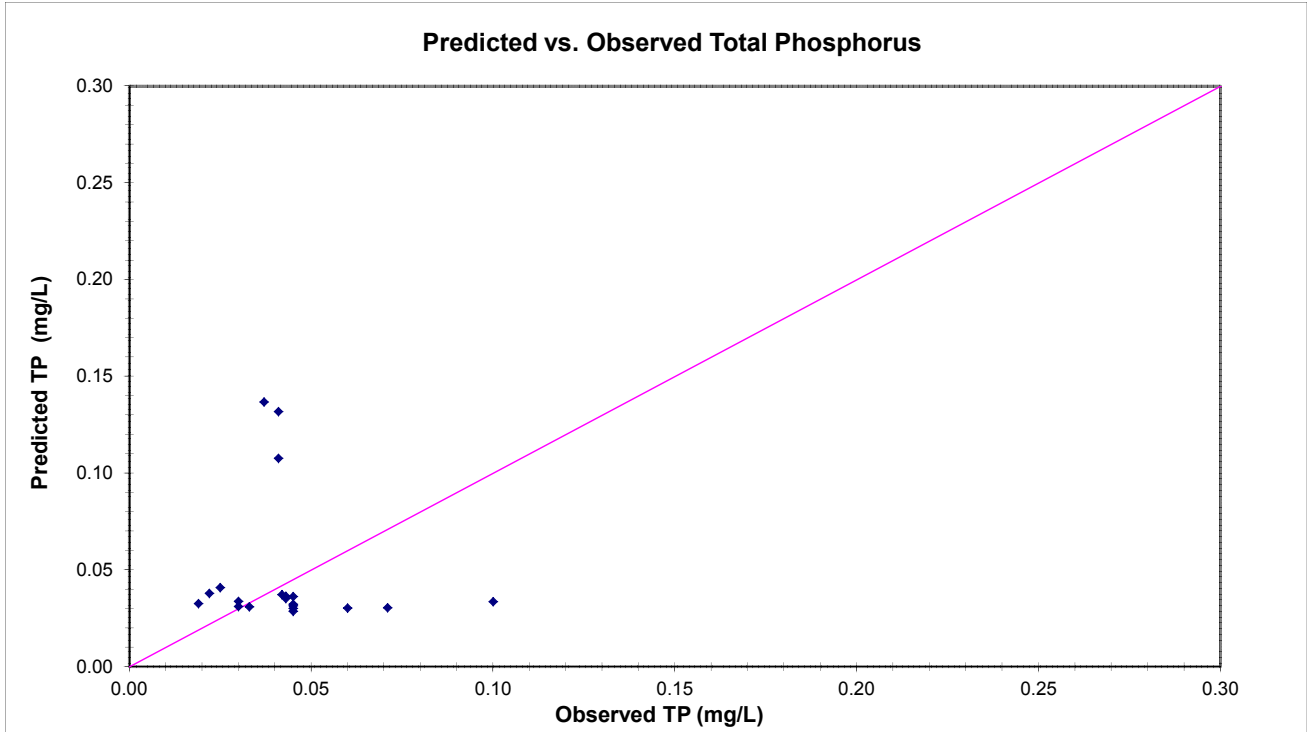
#### Total Phosphorus Residuals vs. Concentration



### South Branch Raritan River near Four Bridges (SBRR2)

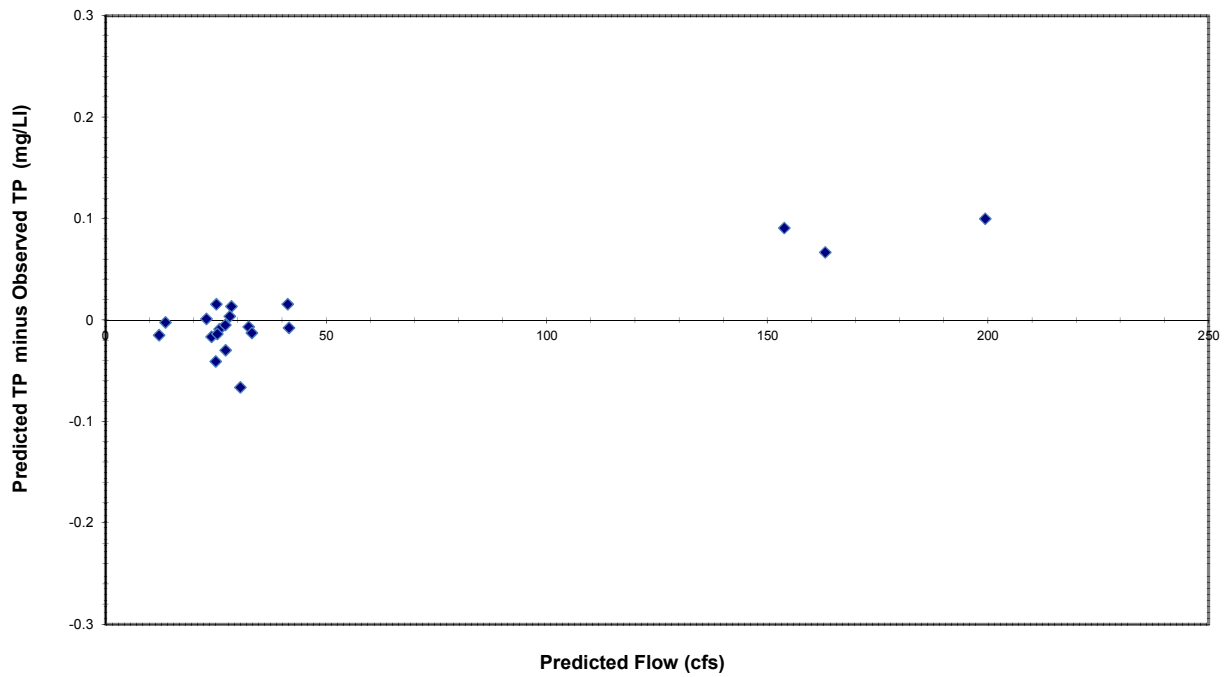


### South Branch Raritan River Upstream Washington Township (SBR1)

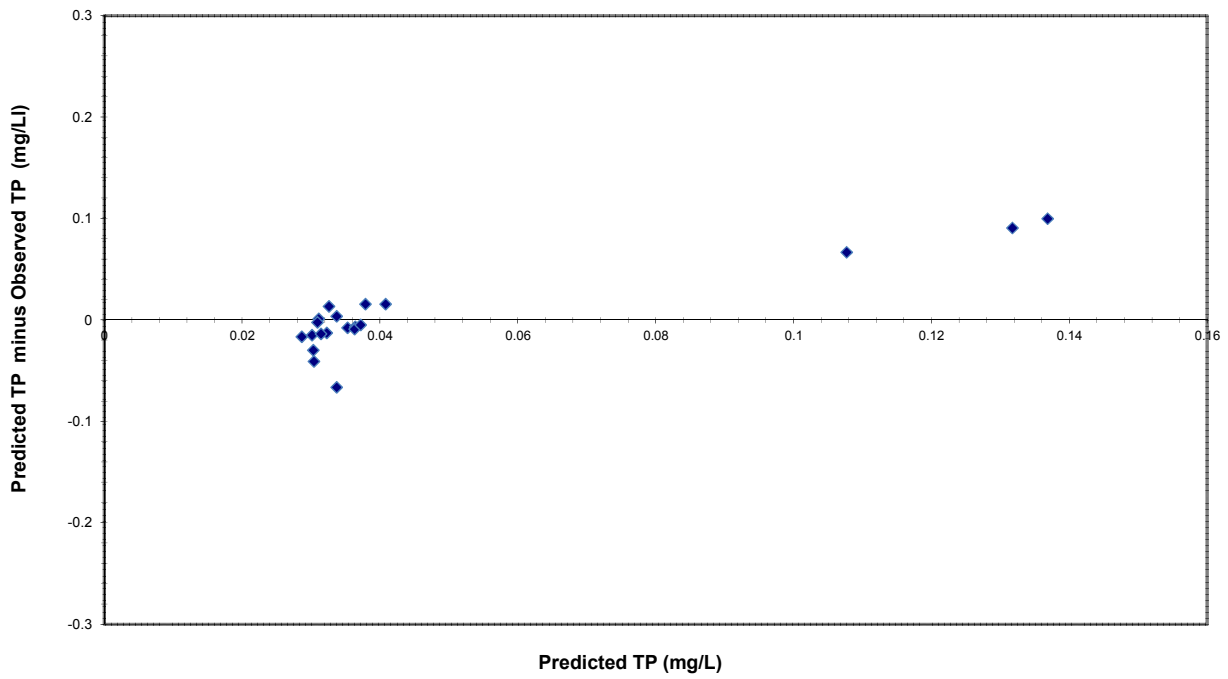


### South Branch Raritan River Upstream Washington Township (SBR1)

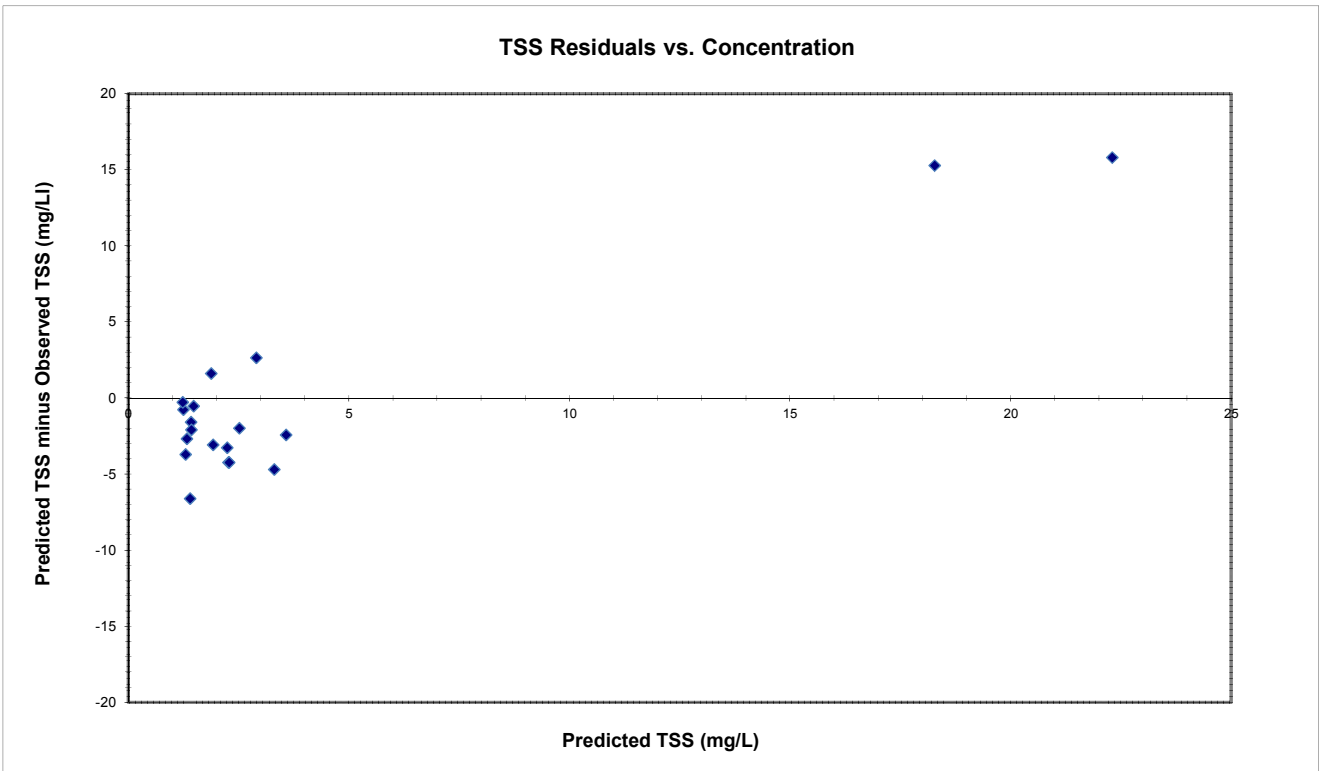
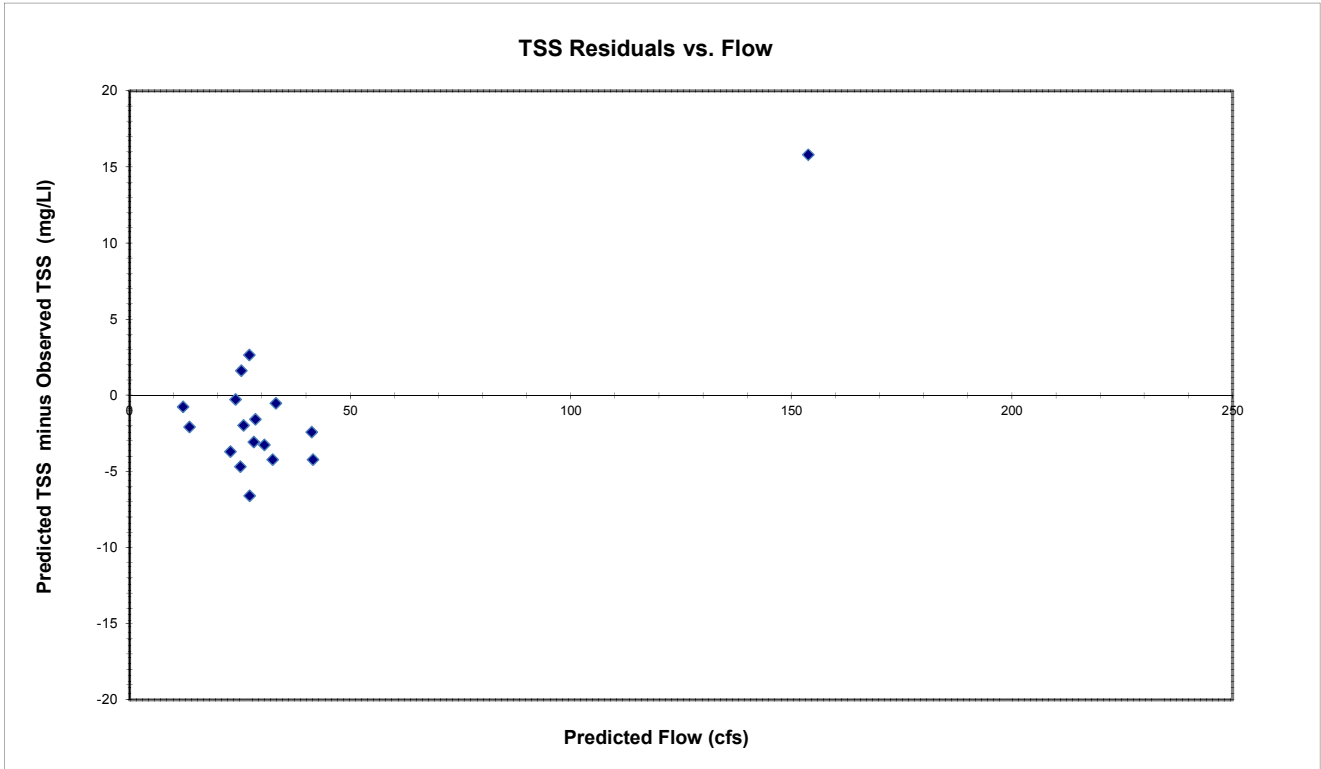
#### Total Phosphorus Residuals vs. Flow



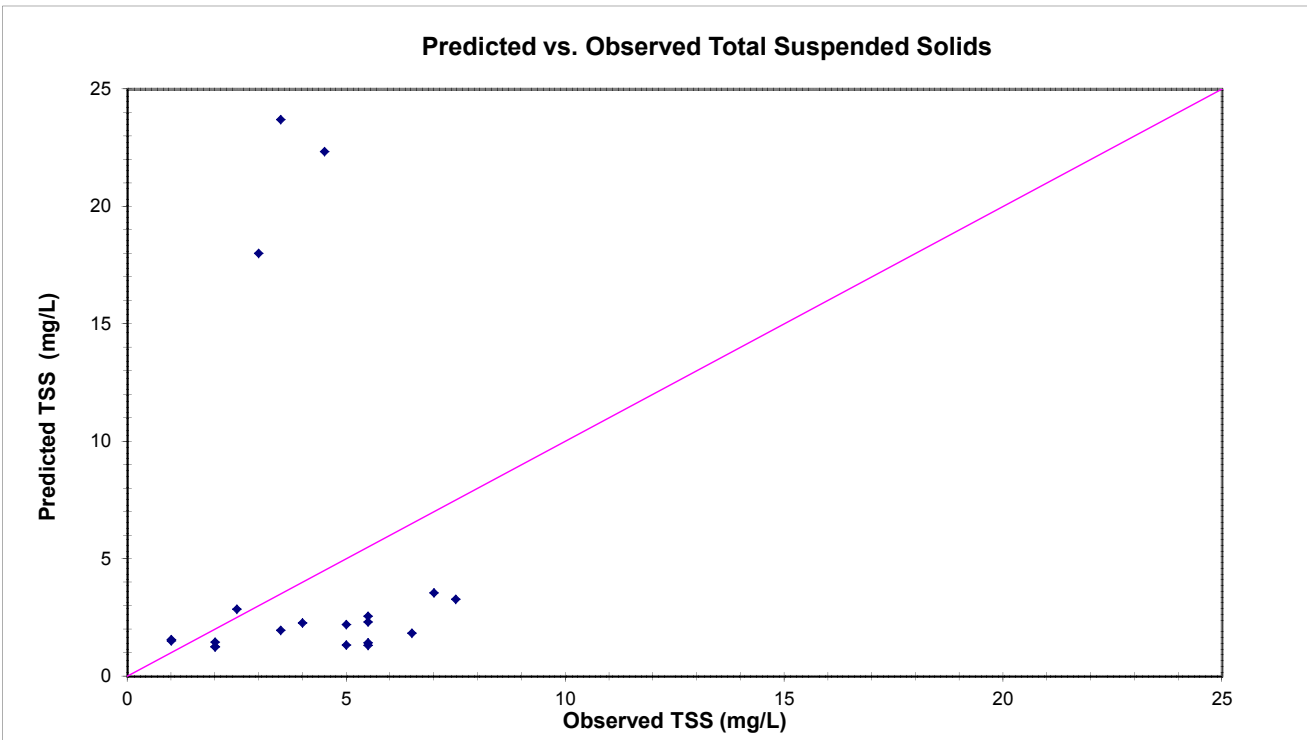
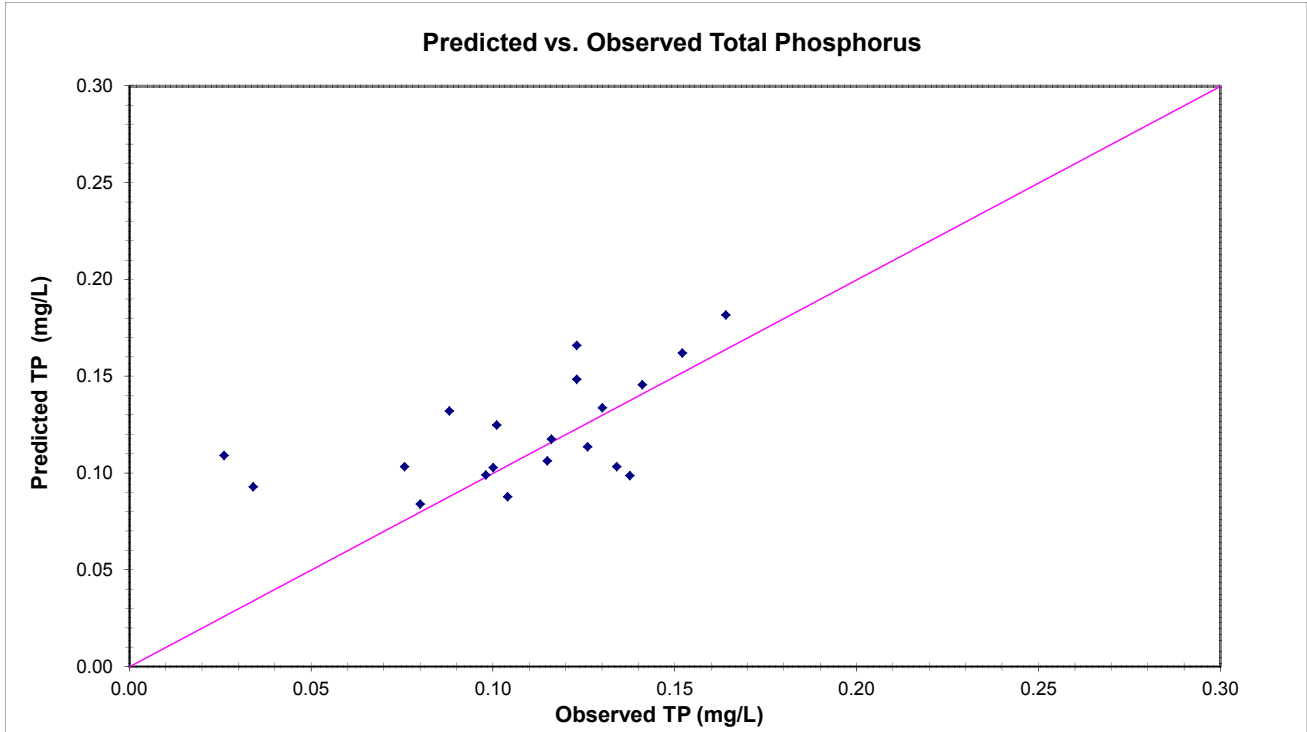
#### Total Phosphorus Residuals vs. Concentration



### South Branch Raritan River Upstream Washington Township (SBR1)



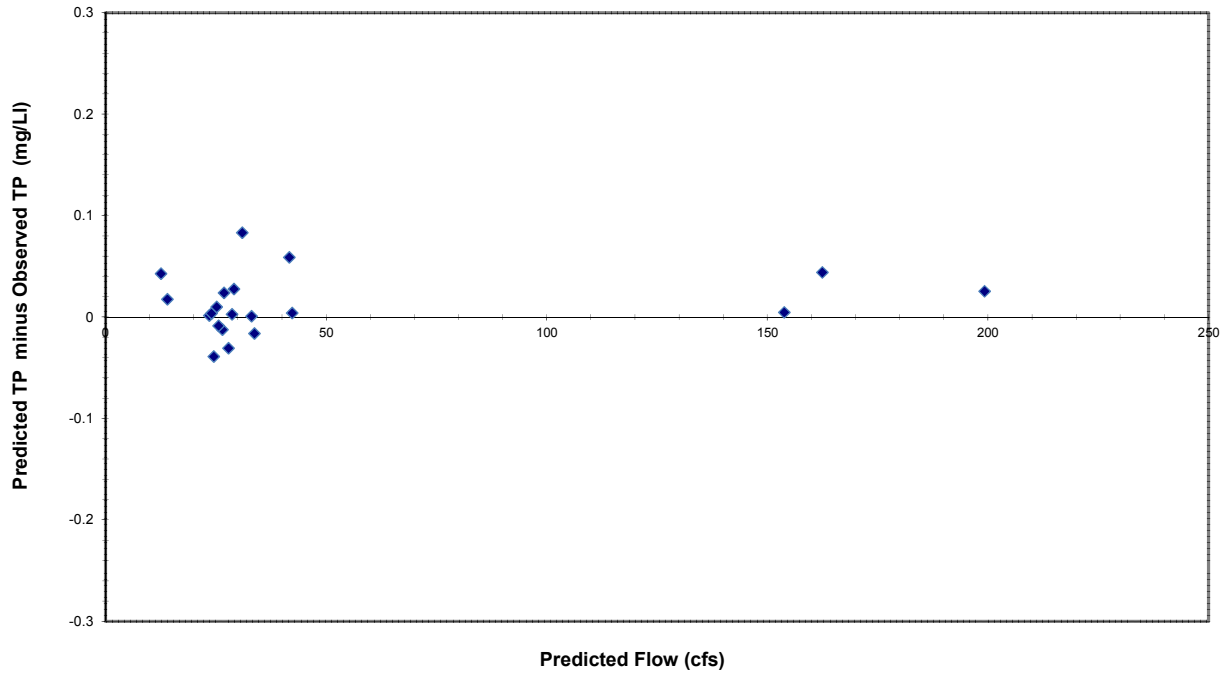
### South Branch Raritan River Downstream Schooley's Mt. STP (SBR2)



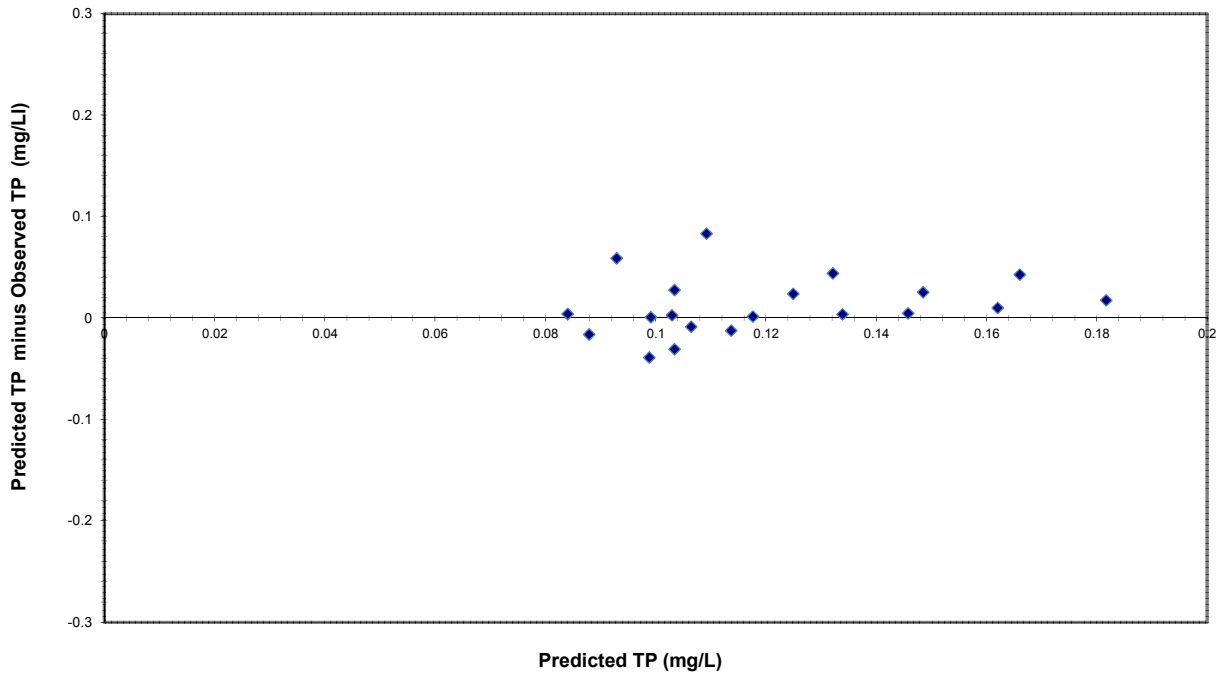


South Branch Raritan River Downstream Schooley's Mt. STP (SBR2)

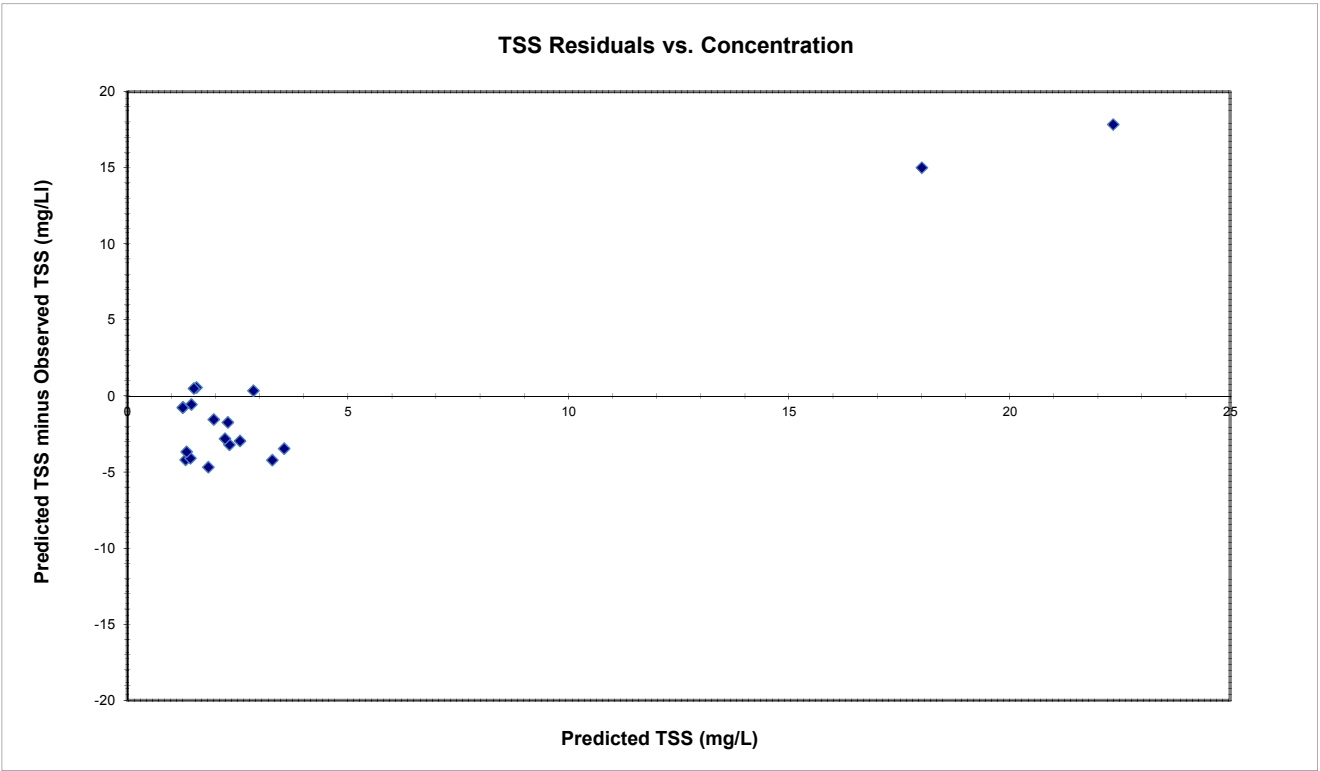
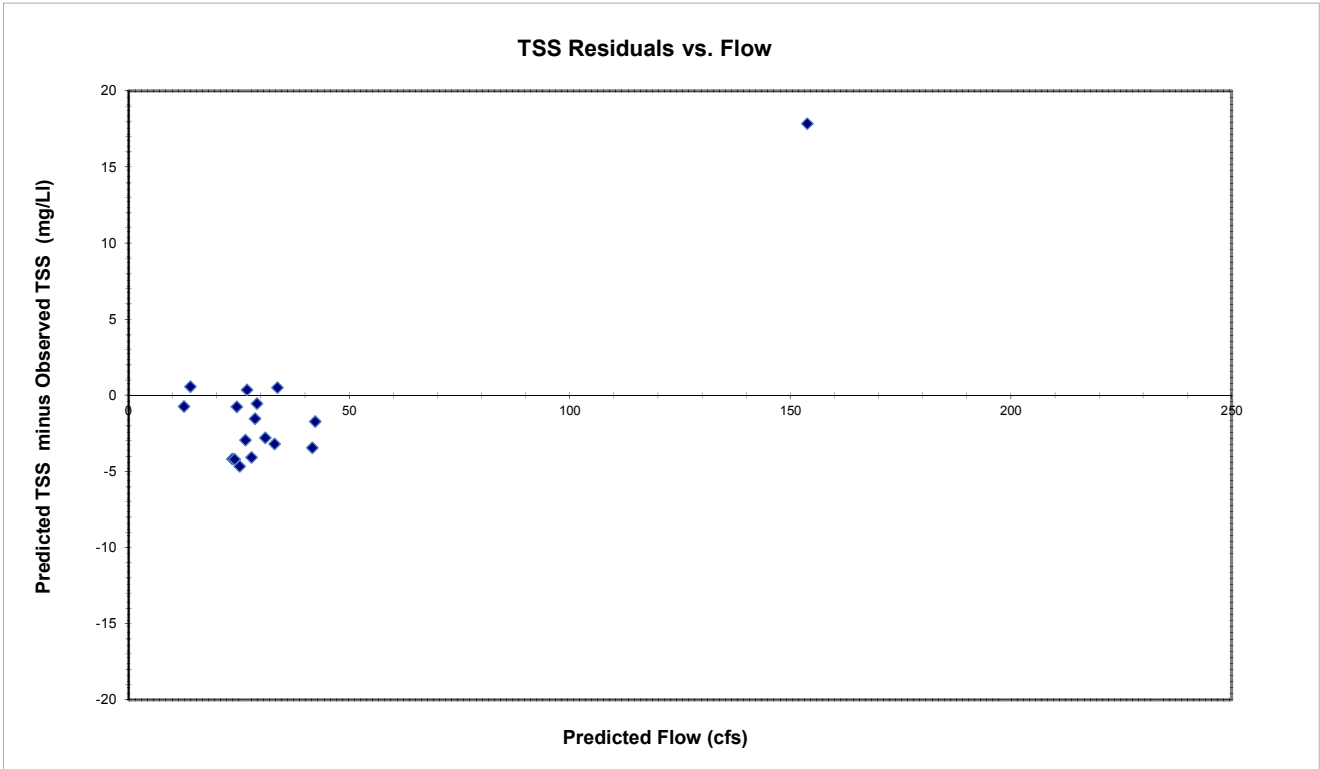
Total Phosphorus Residuals vs. Flow



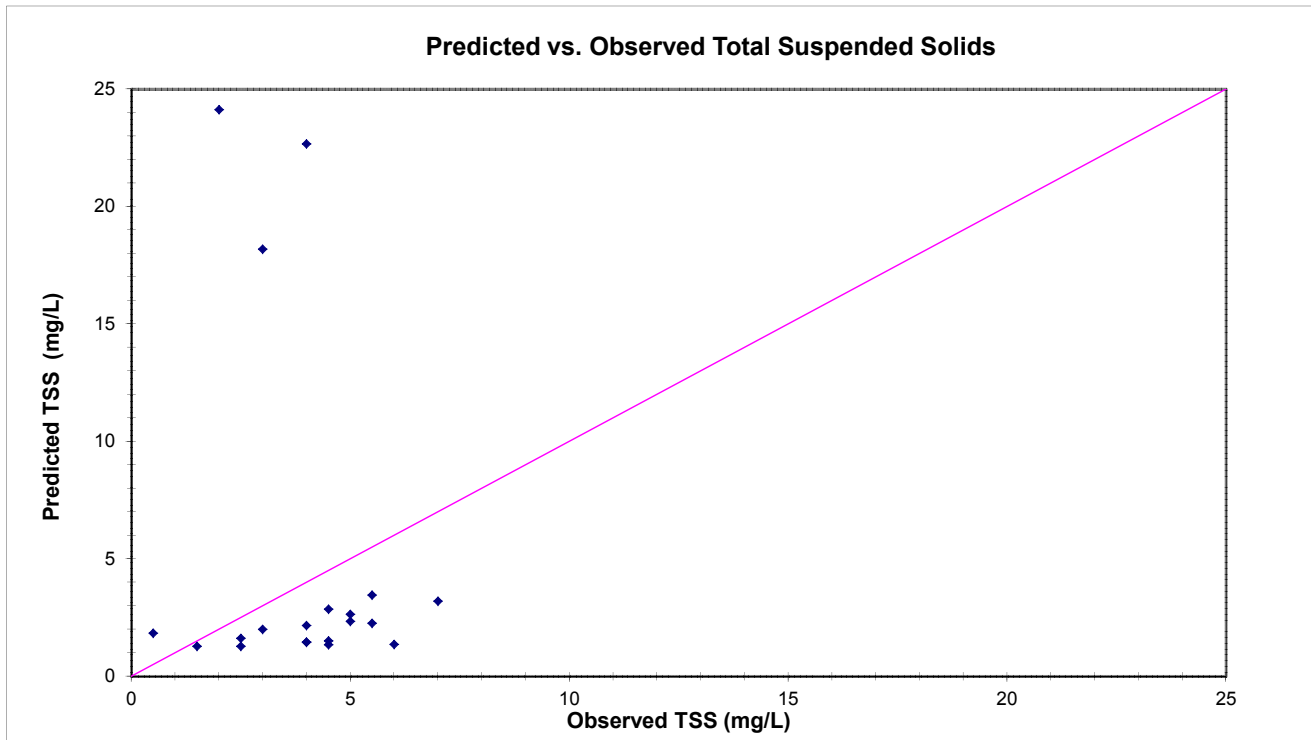
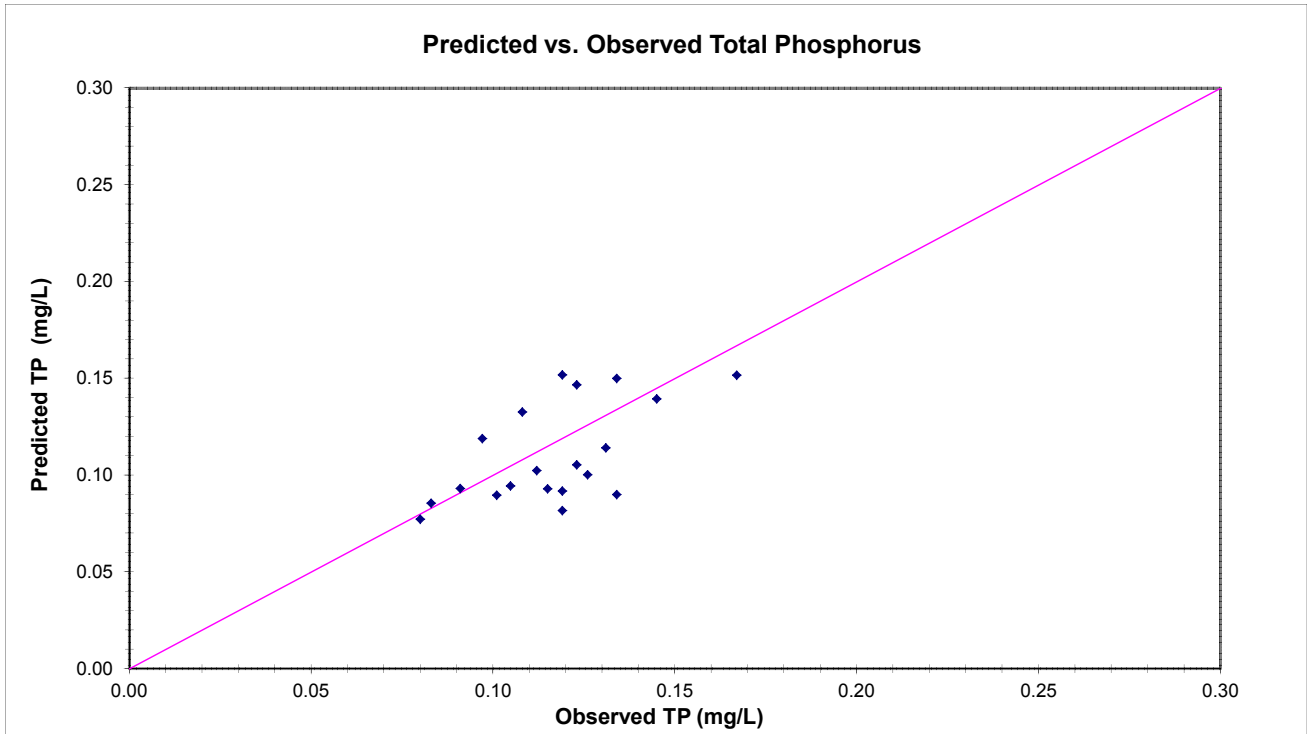
Total Phosphorus Residuals vs. Concentration



South Branch Raritan River Downstream Schooley's Mt. STP (SBR2)

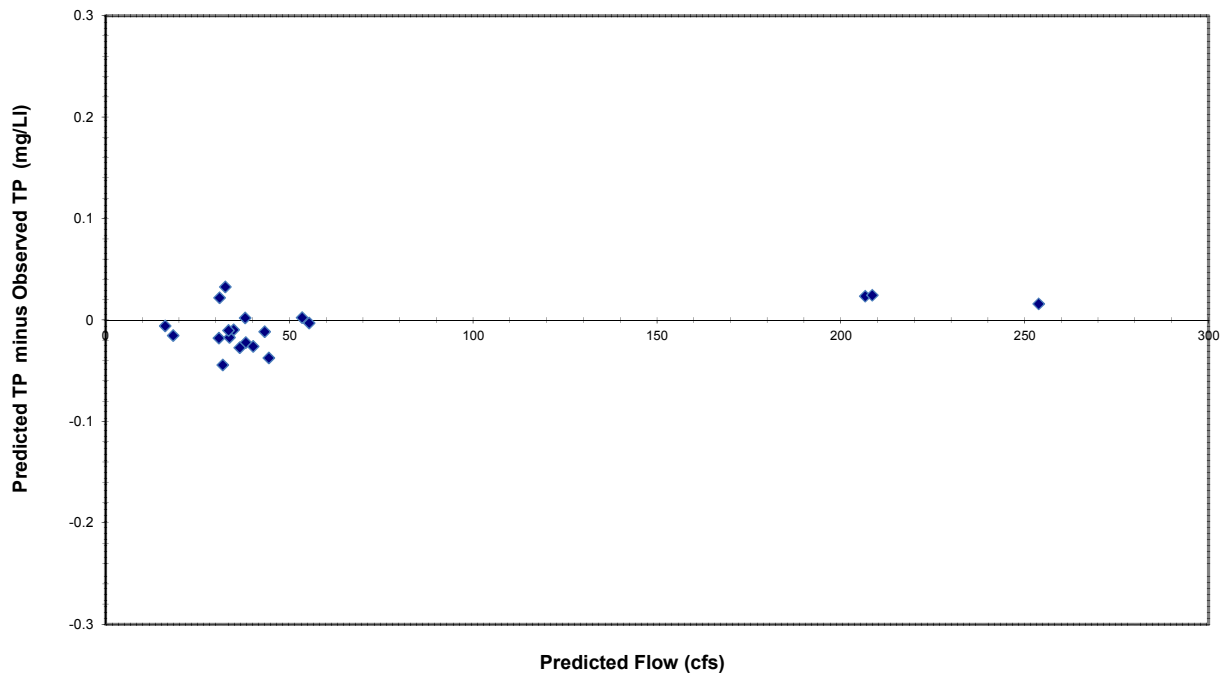


### South Branch Raritan River Downstream Long Valley STP (SBR3)

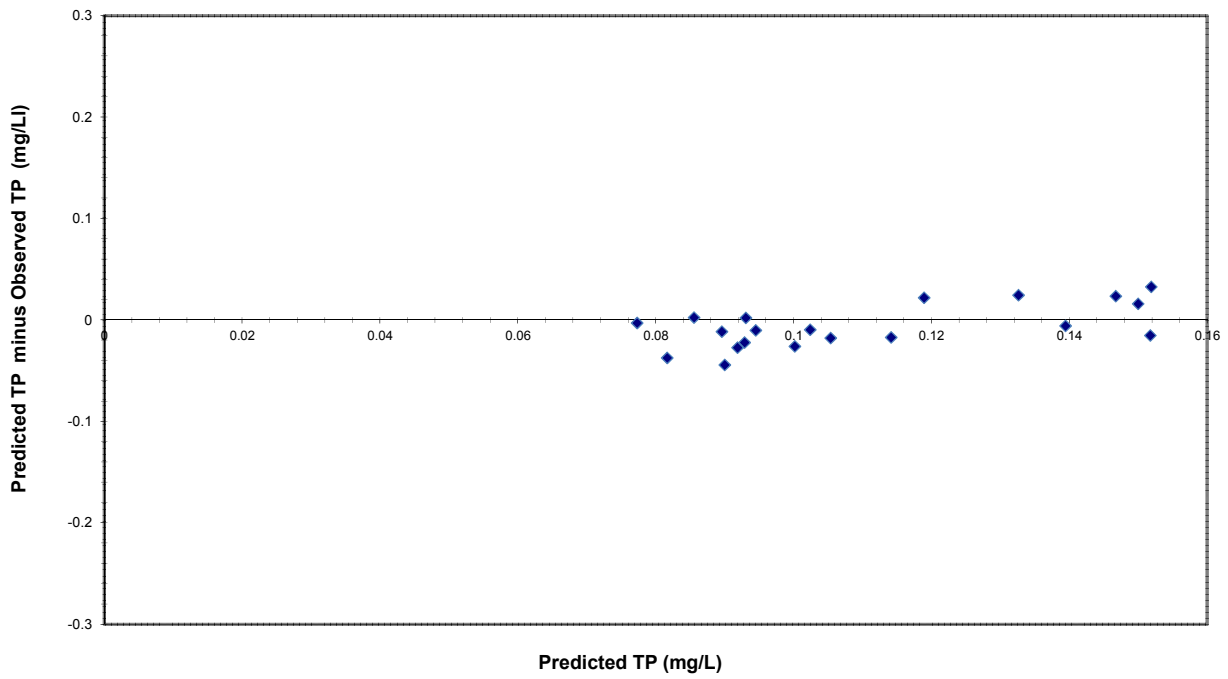


### South Branch Raritan River Downstream Long Valley STP (SBR3)

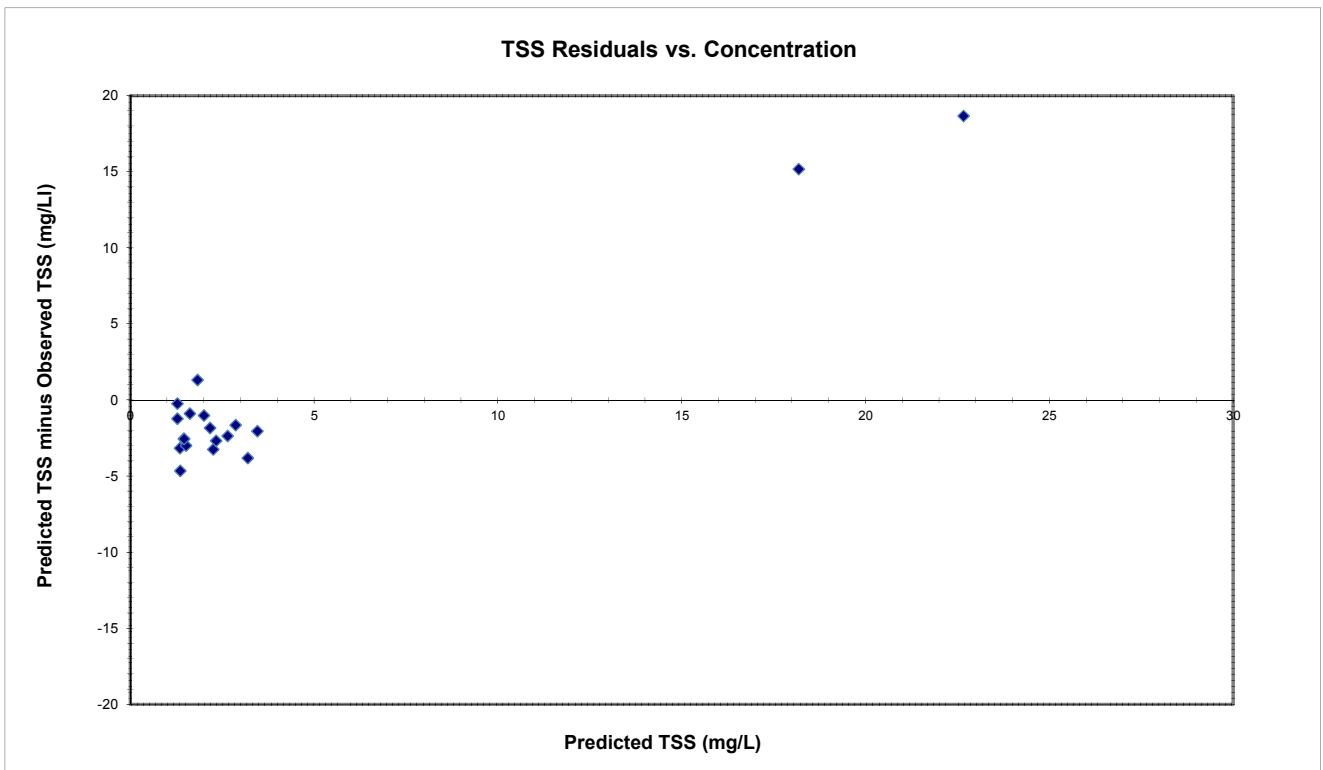
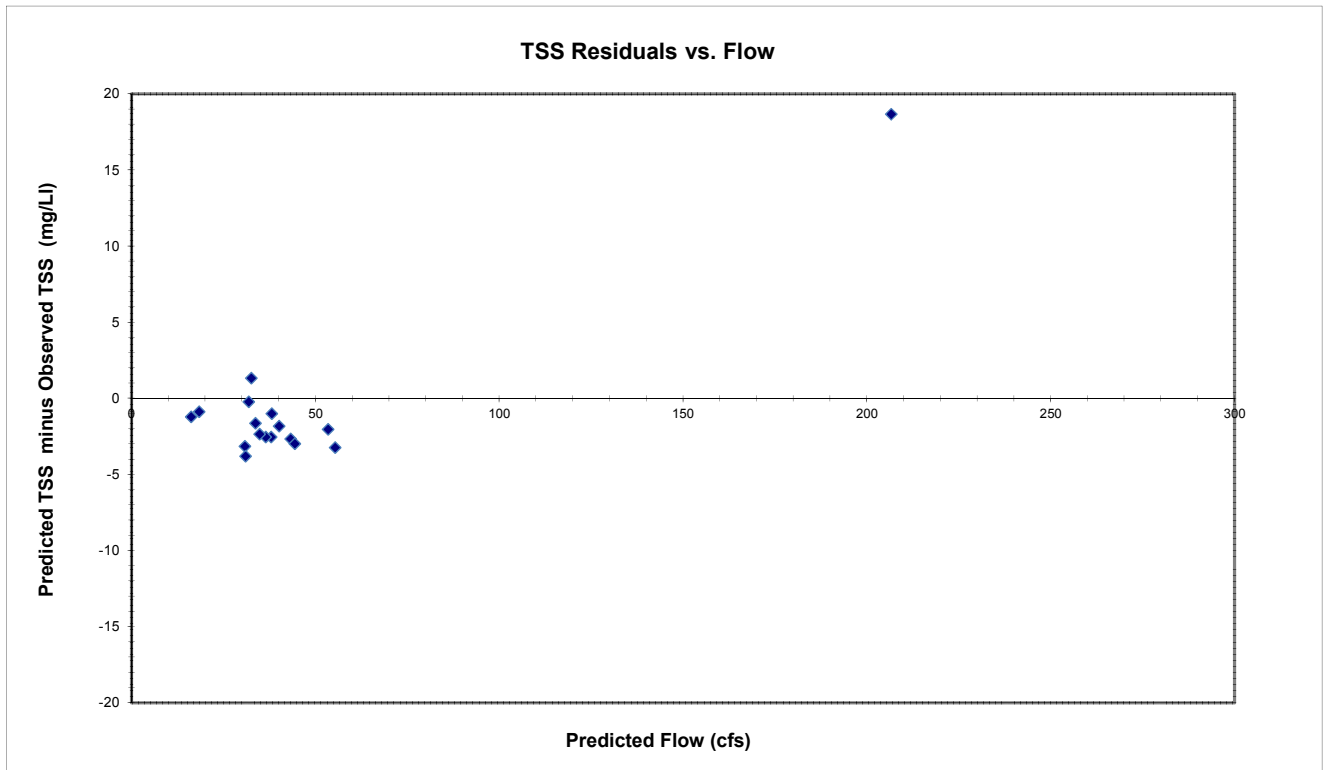
#### Total Phosphorus Residuals vs. Flow



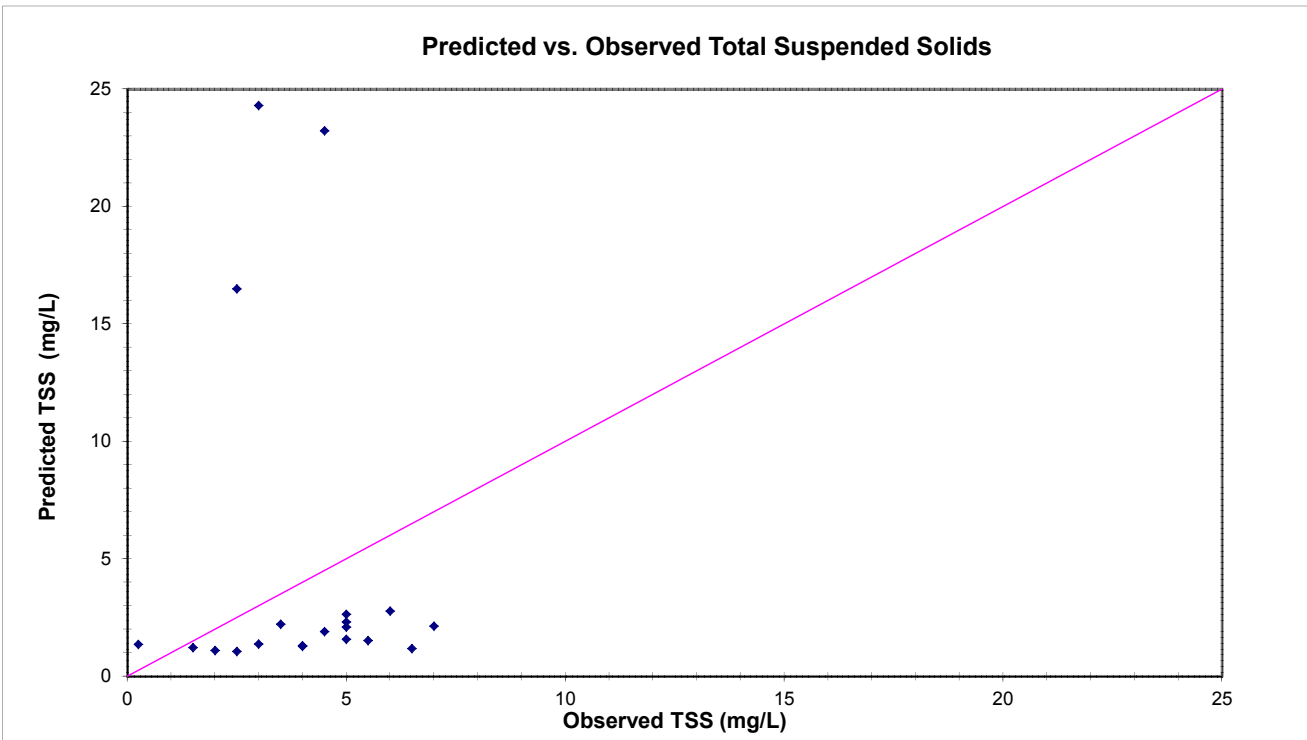
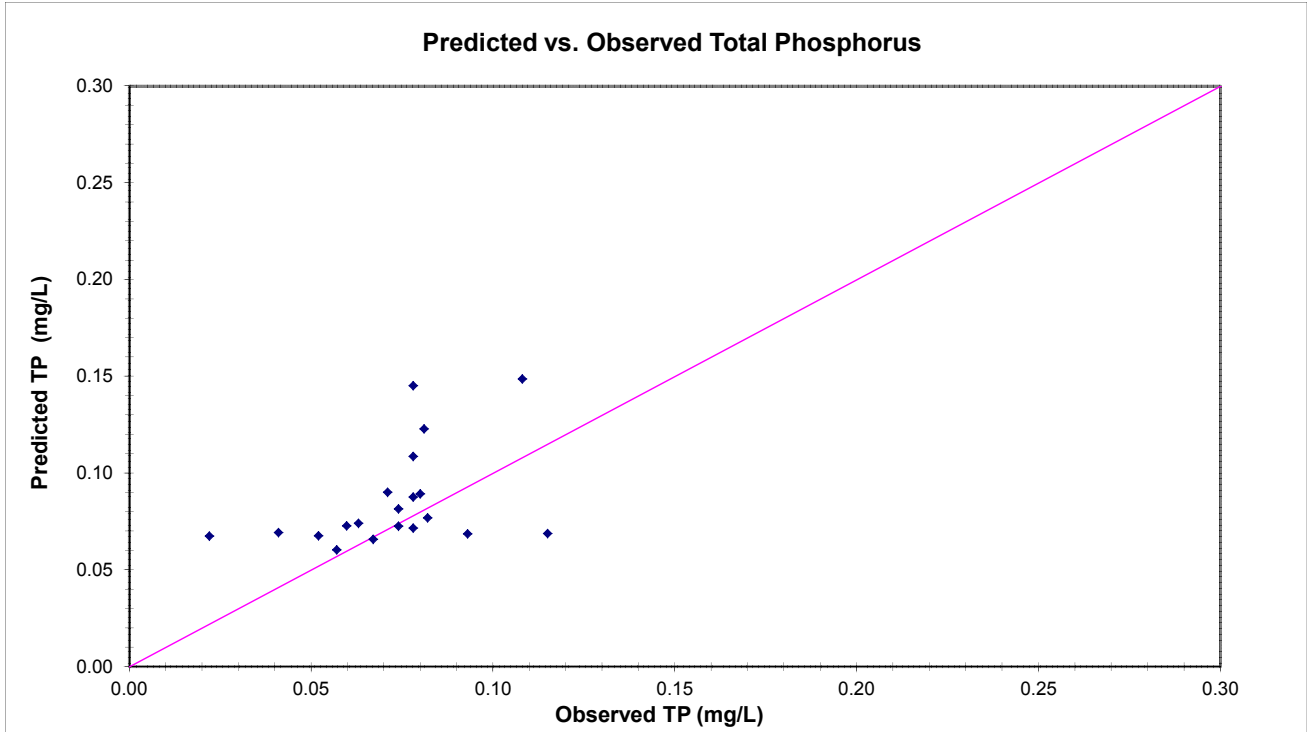
#### Total Phosphorus Residuals vs. Concentration



### South Branch Raritan River Downstream Long Valley STP (SBR3)

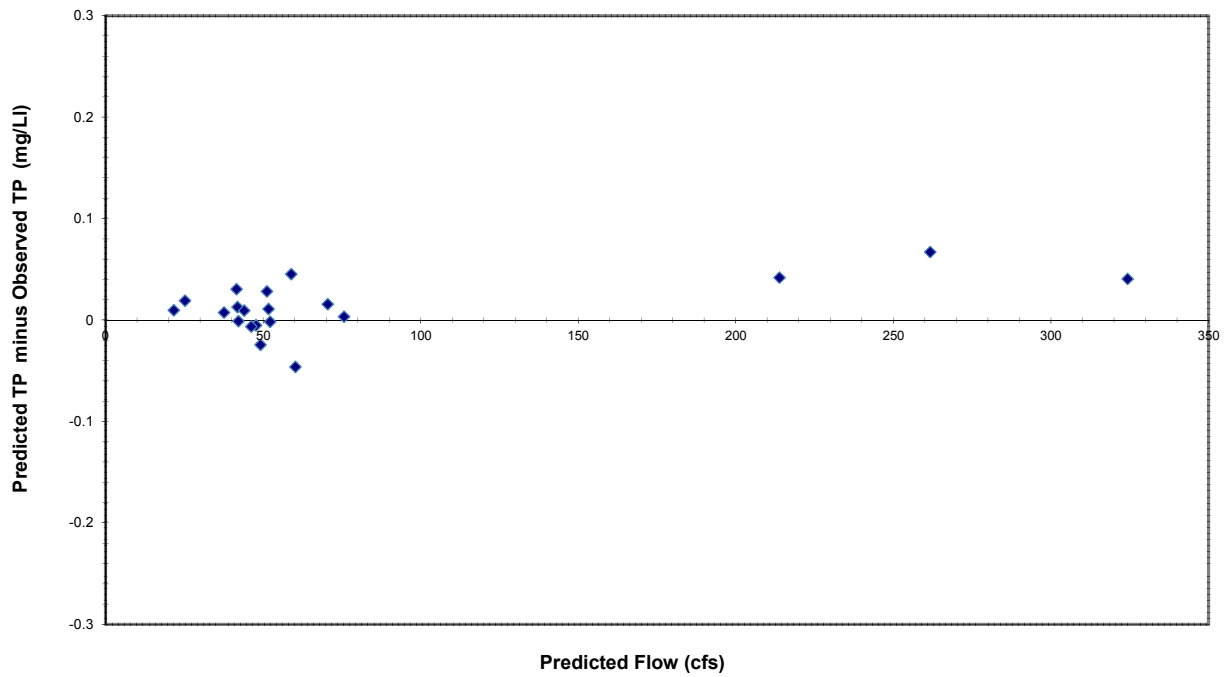


### South Branch Raritan River at Middle Valley (SBR4)

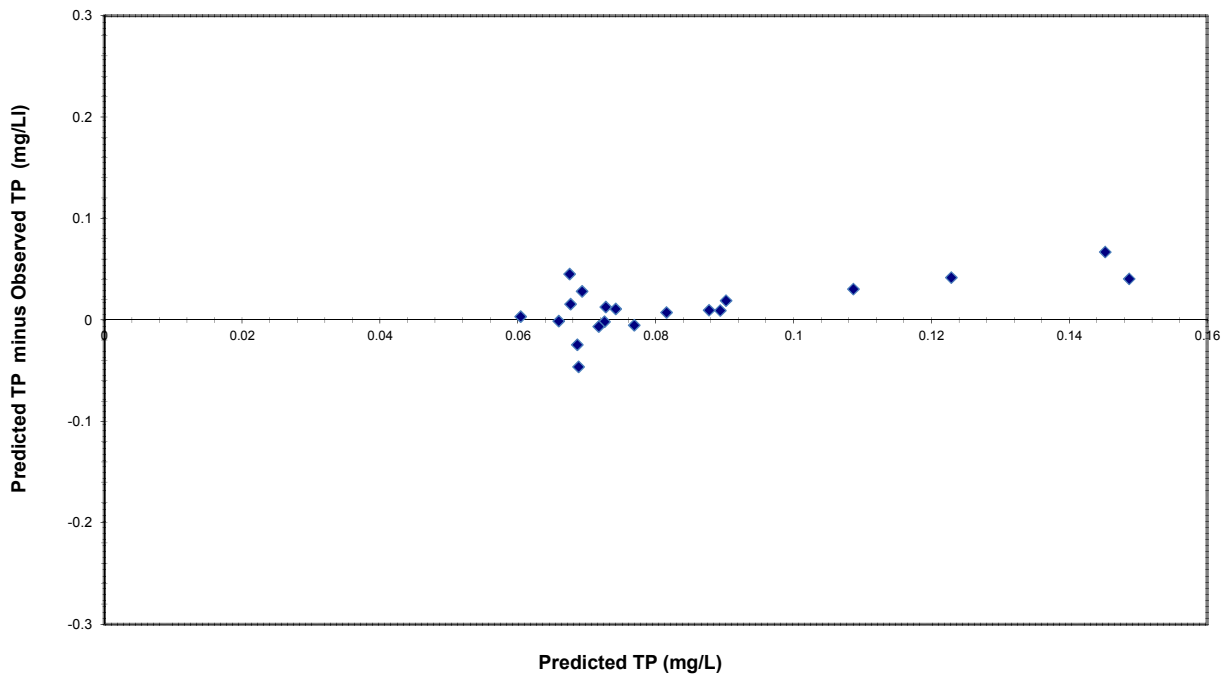


### South Branch Raritan River at Middle Valley (SBR4)

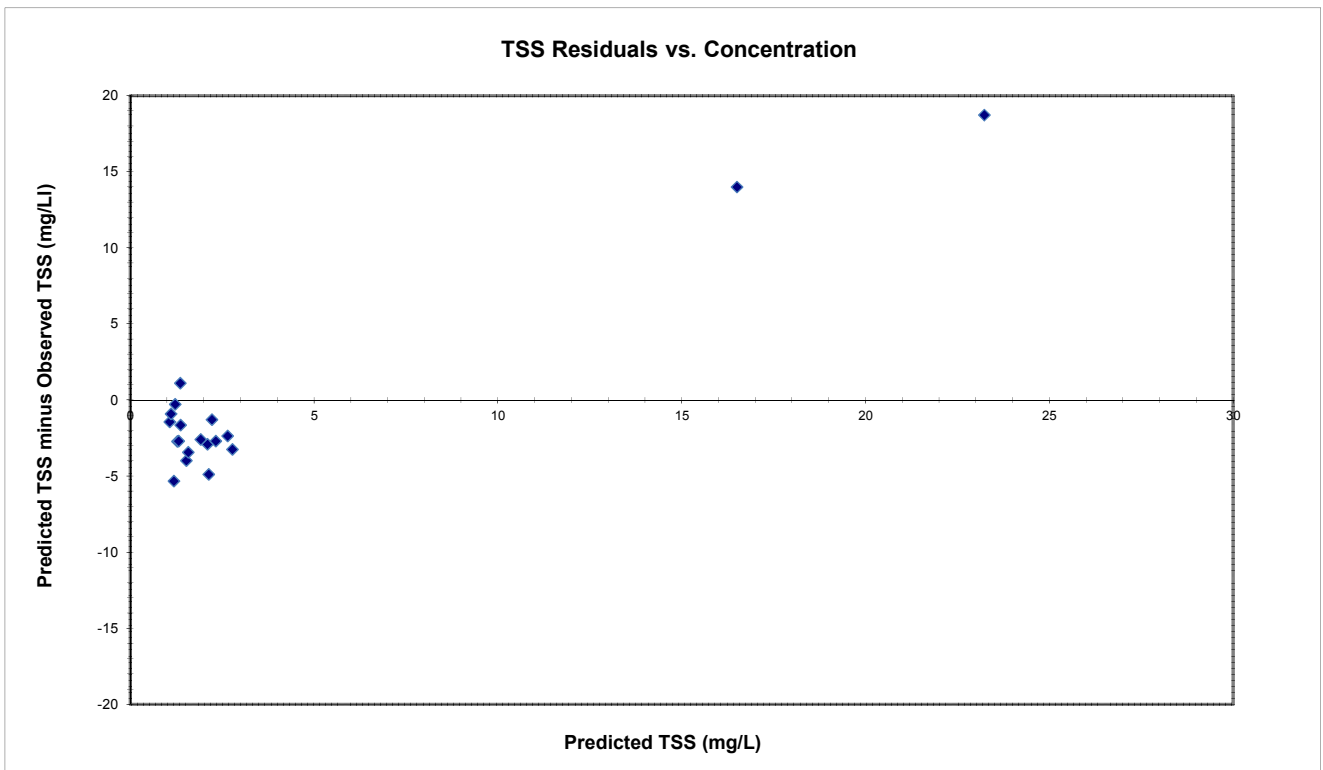
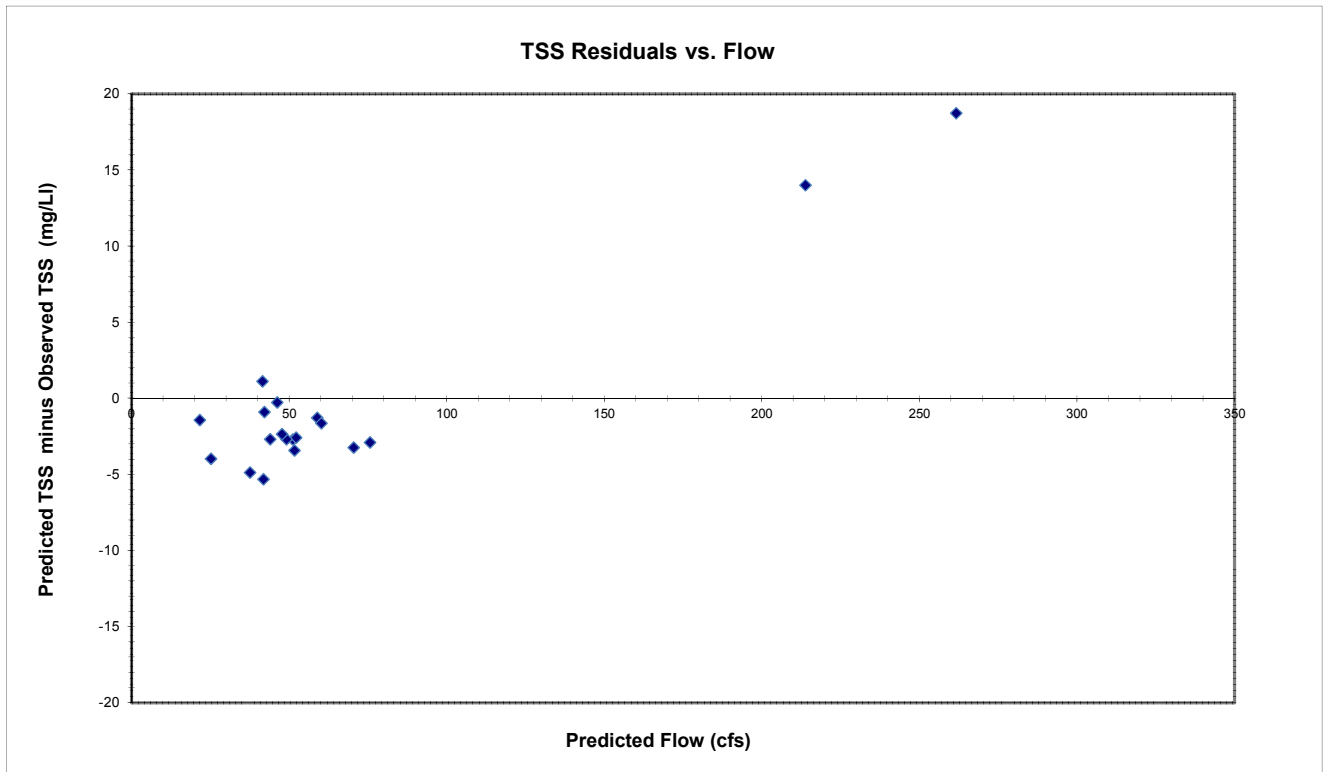
#### Total Phosphorus Residuals vs. Flow



#### Total Phosphorus Residuals vs. Concentration

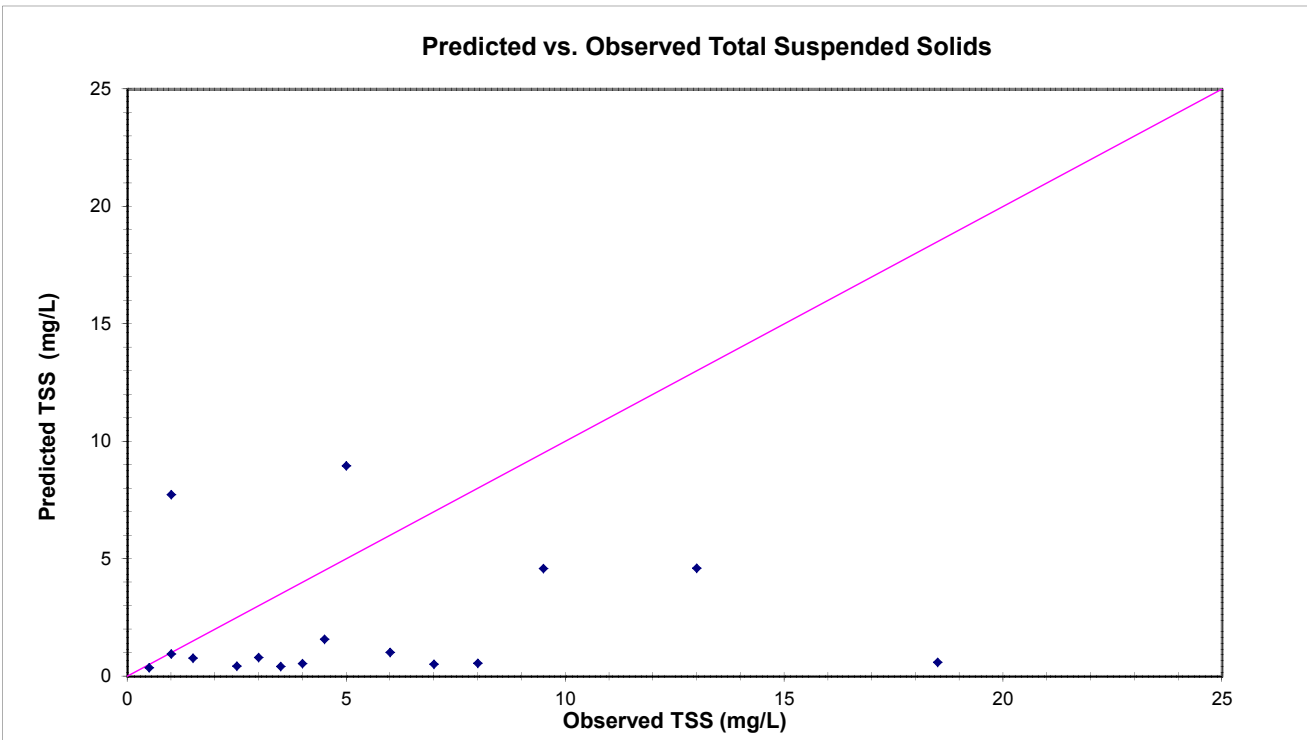
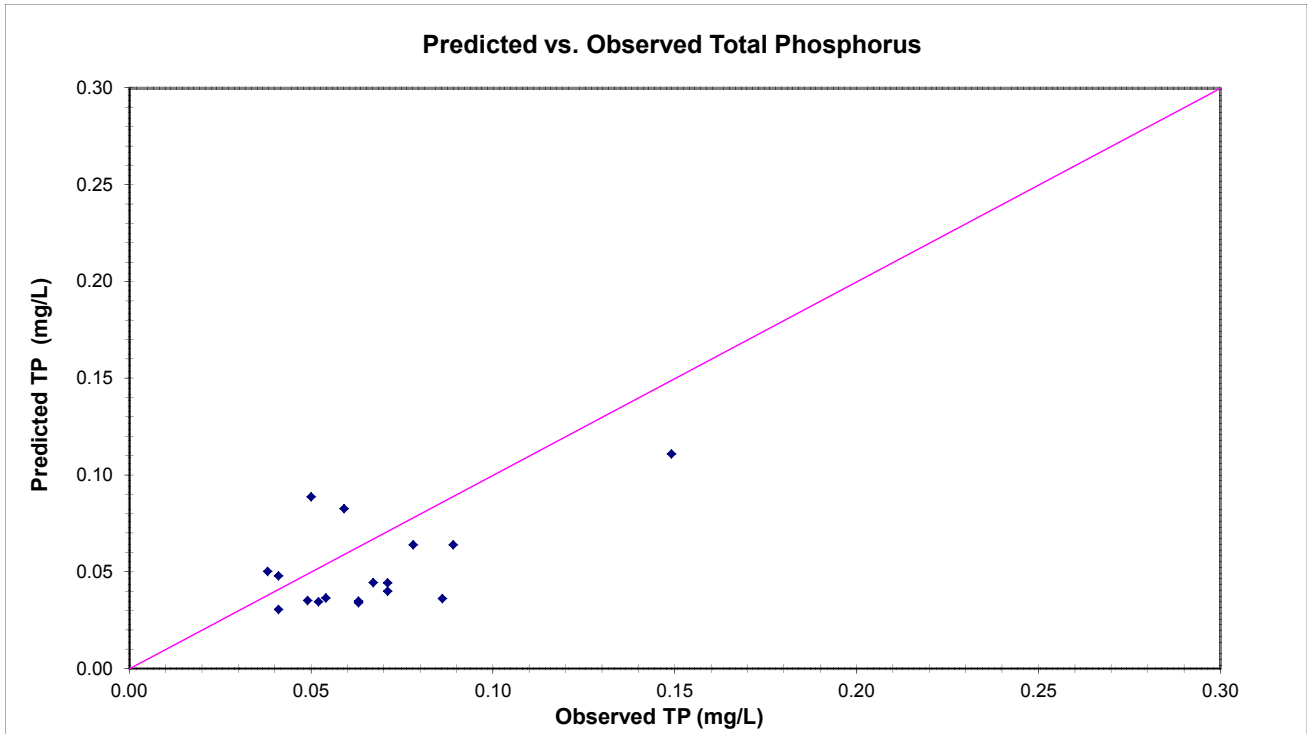


### South Branch Raritan River at Middle Valley (SBR4)



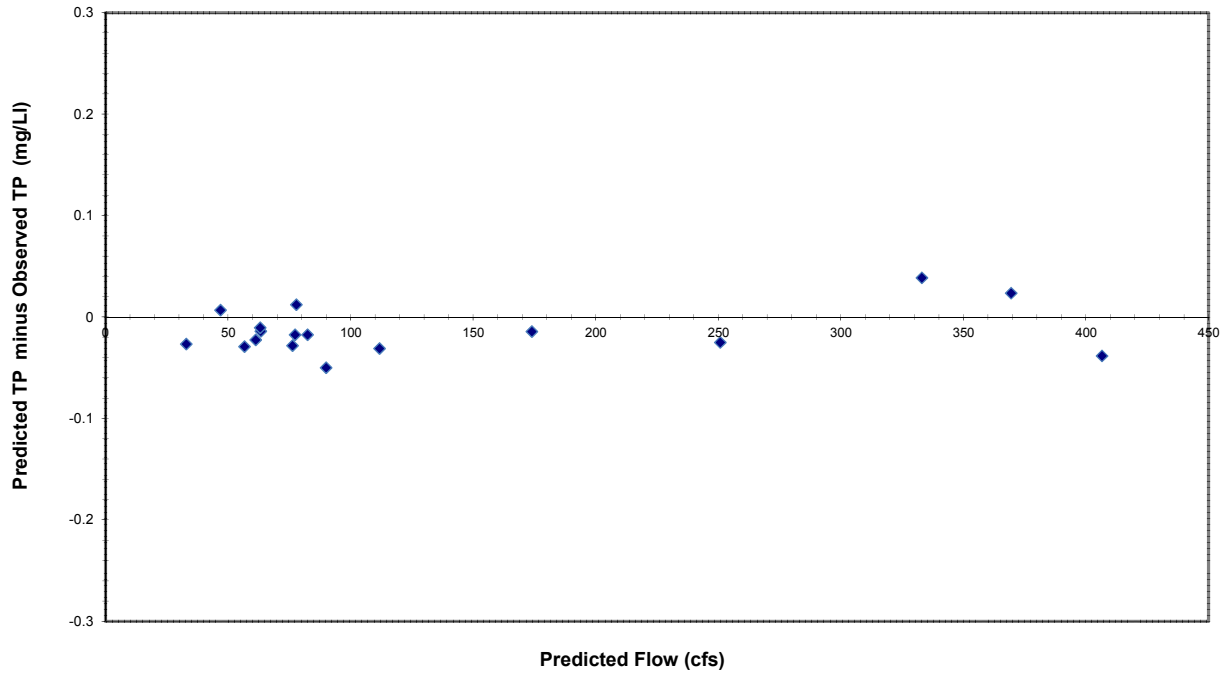


### South Branch Raritan River at Solitude Lake (Solitude Lake)

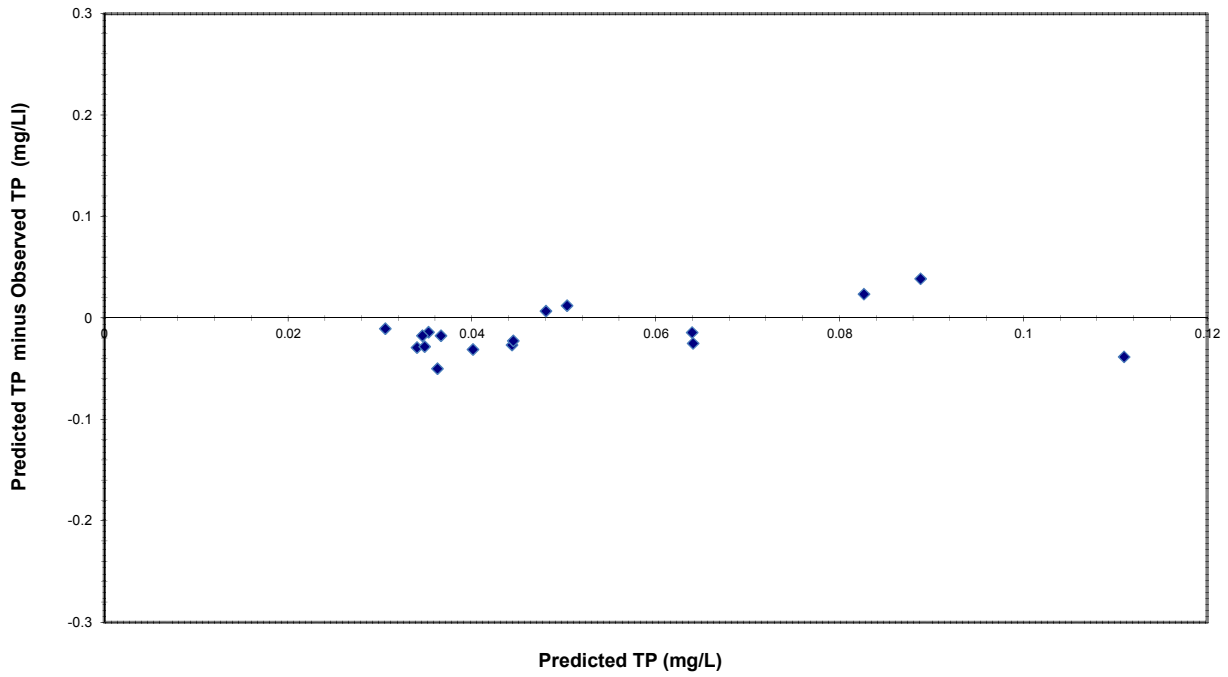


South Branch Raritan River at Solitude Lake (Solitude Lake)

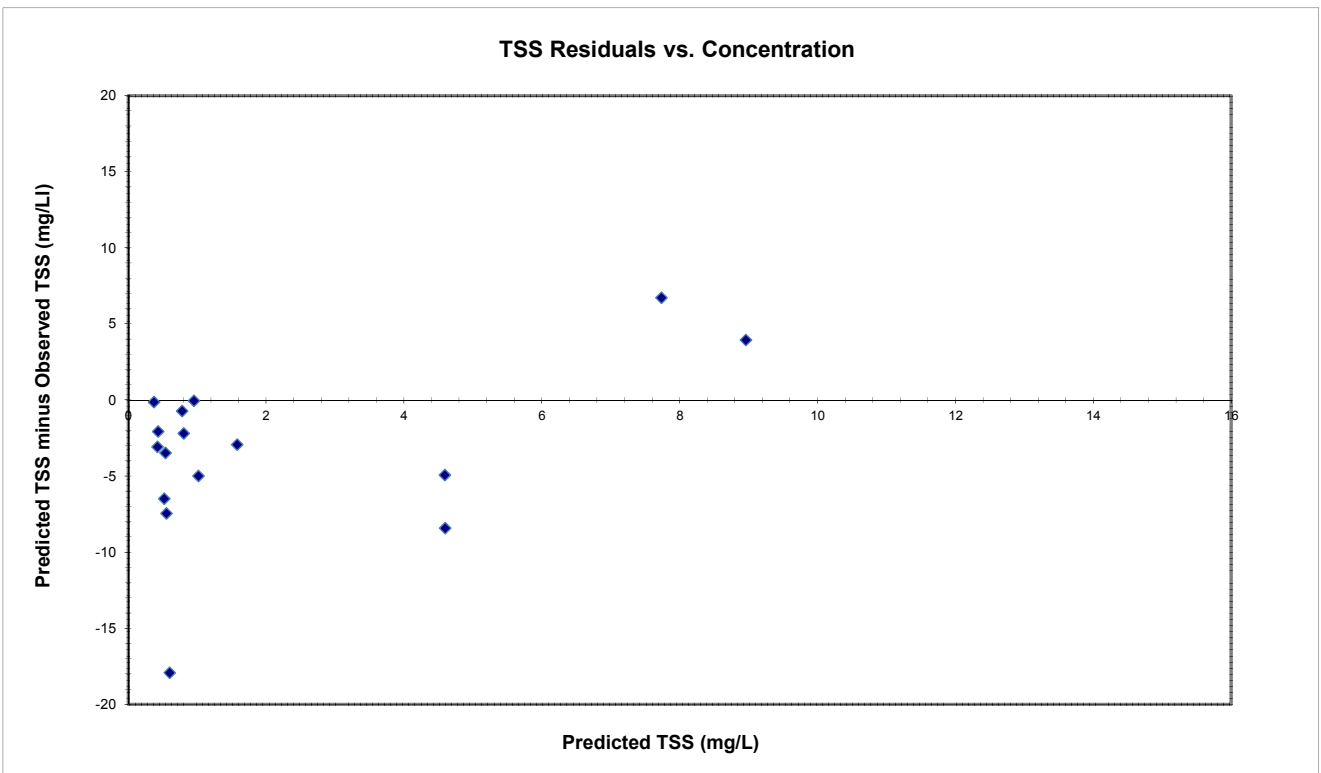
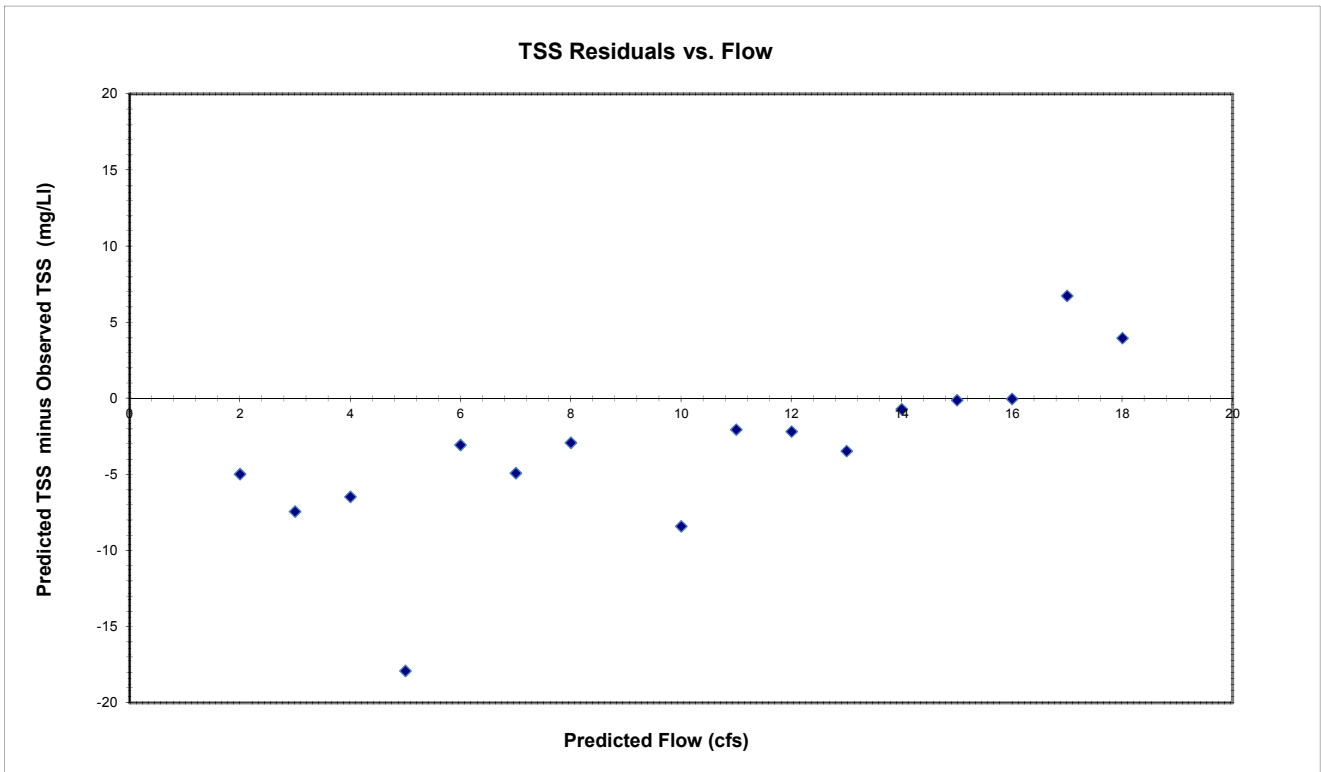
Total Phosphorus Residuals vs. Flow



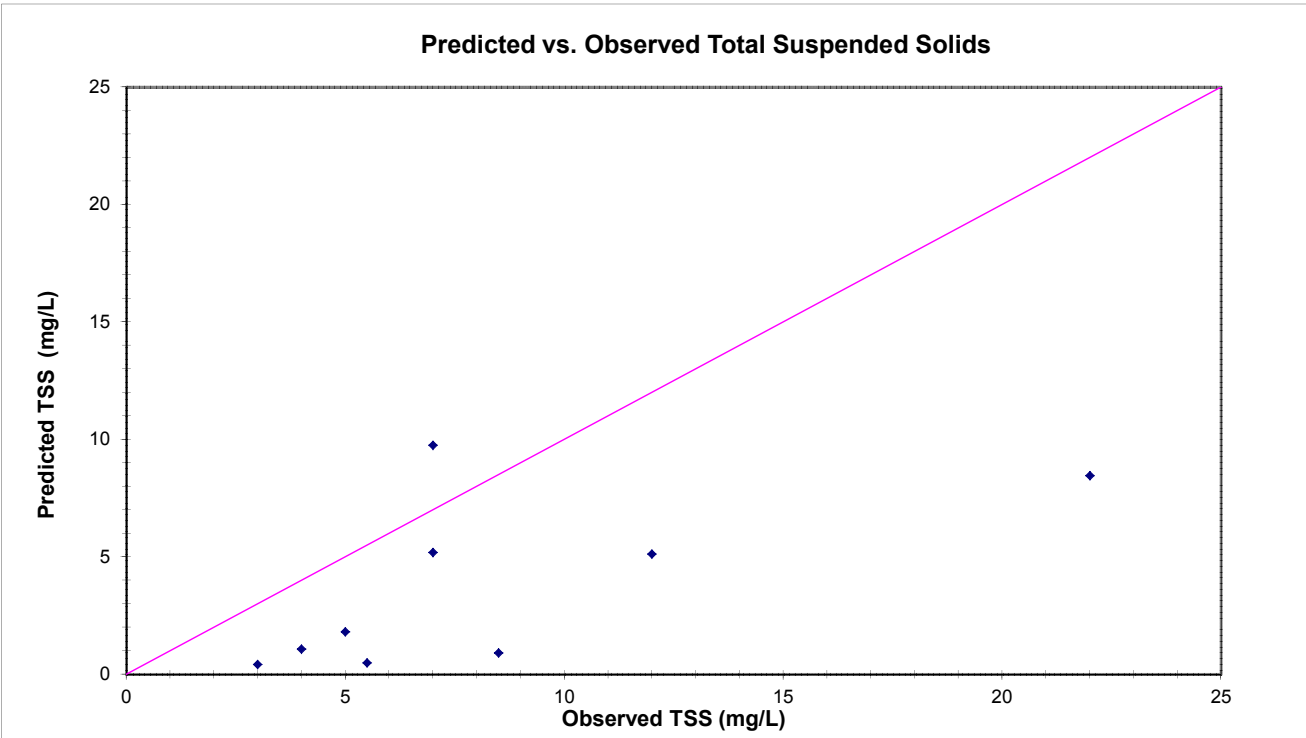
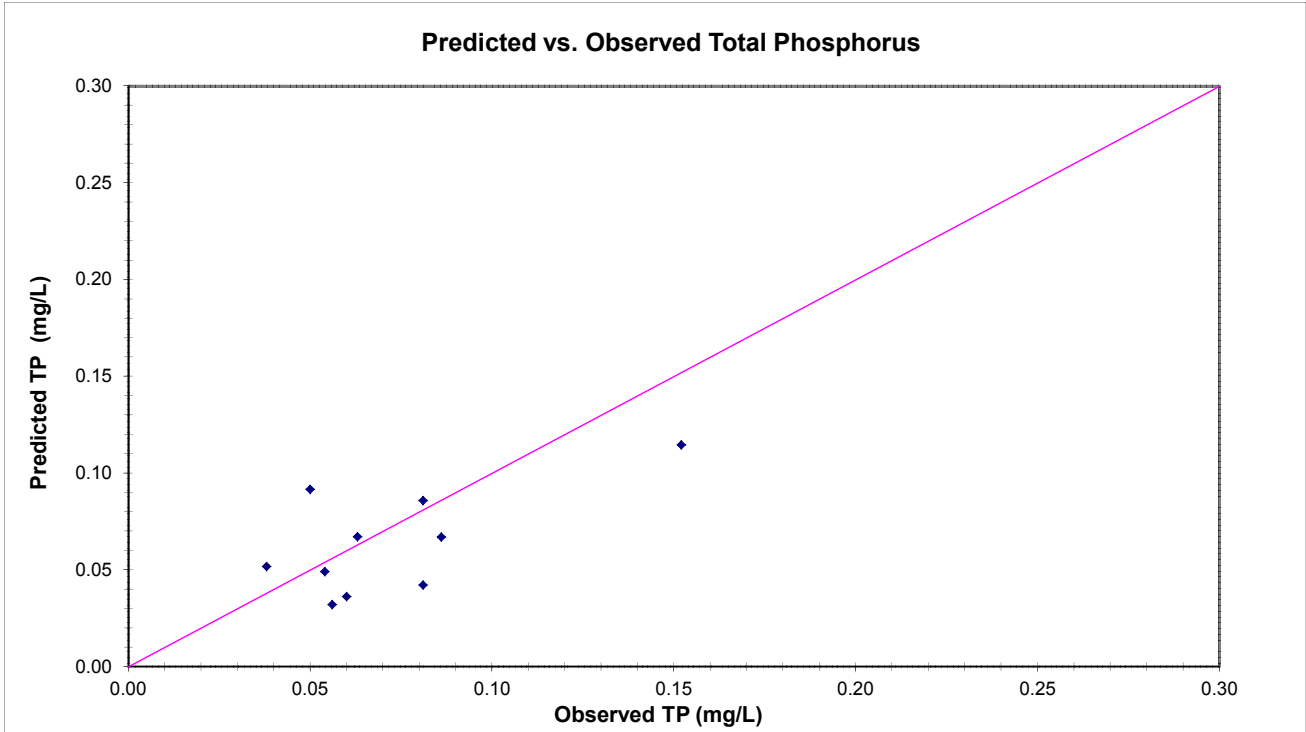
Total Phosphorus Residuals vs. Concentration



### South Branch Raritan River at Solitude Lake (Solitude Lake)

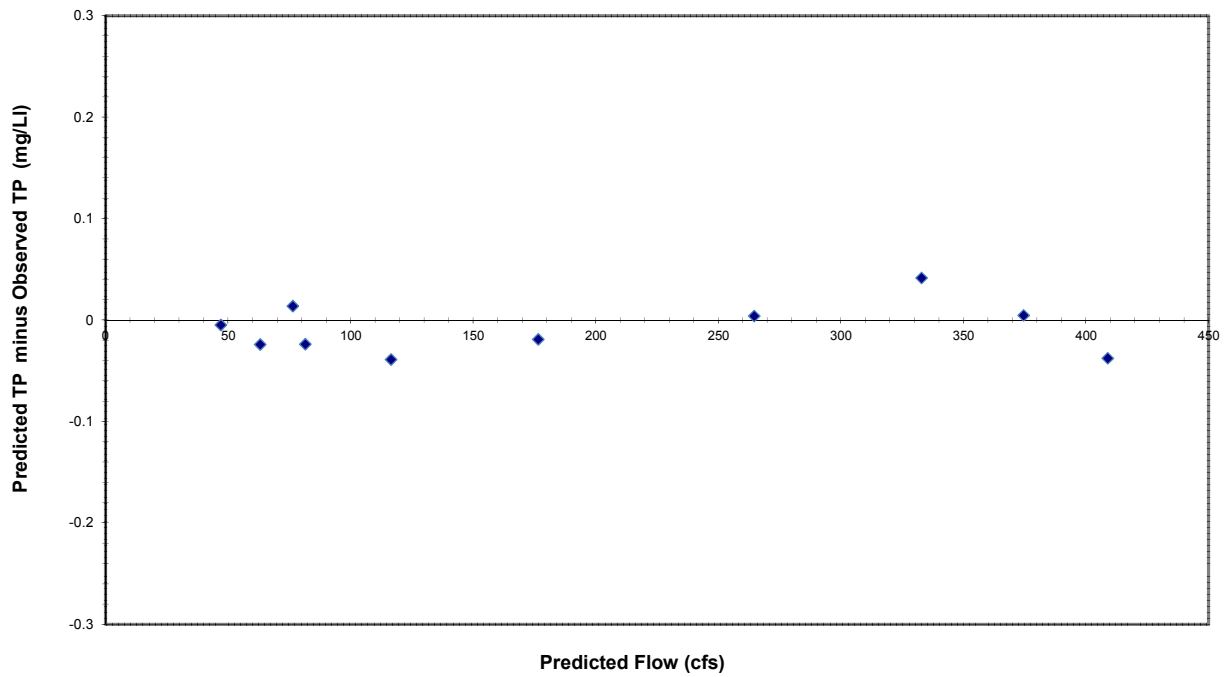


### South Branch Raritan River at High Bridge (SBRR5)

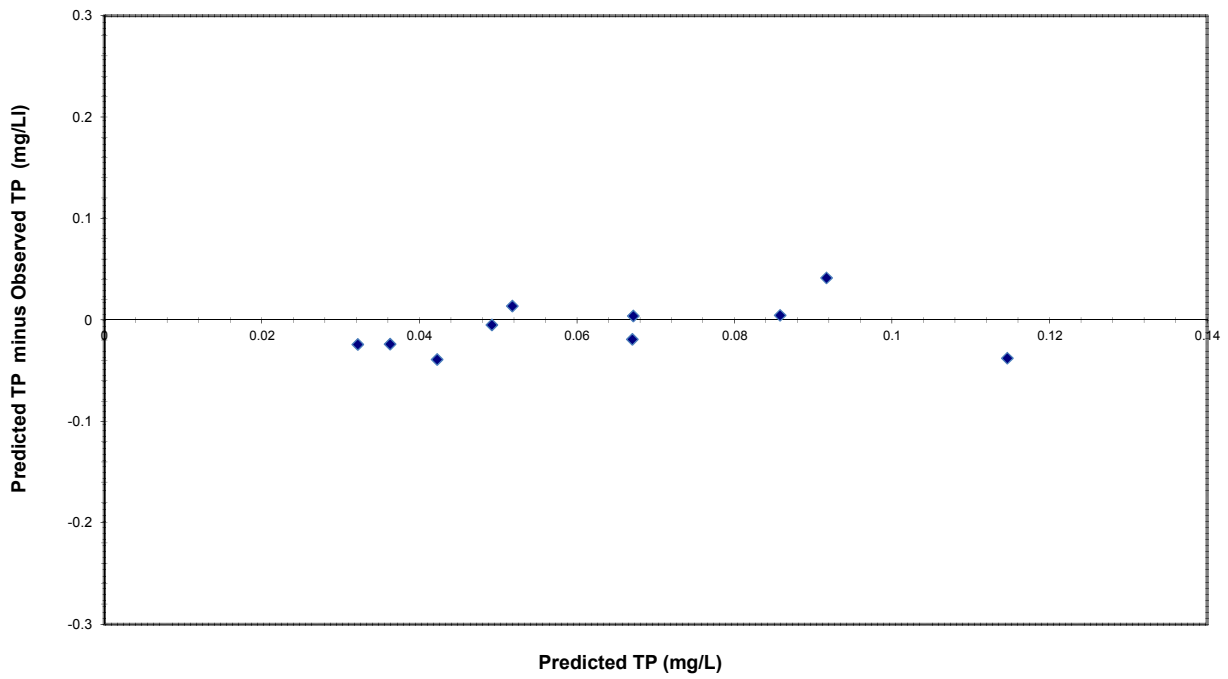


### South Branch Raritan River at High Bridge (SBRR5)

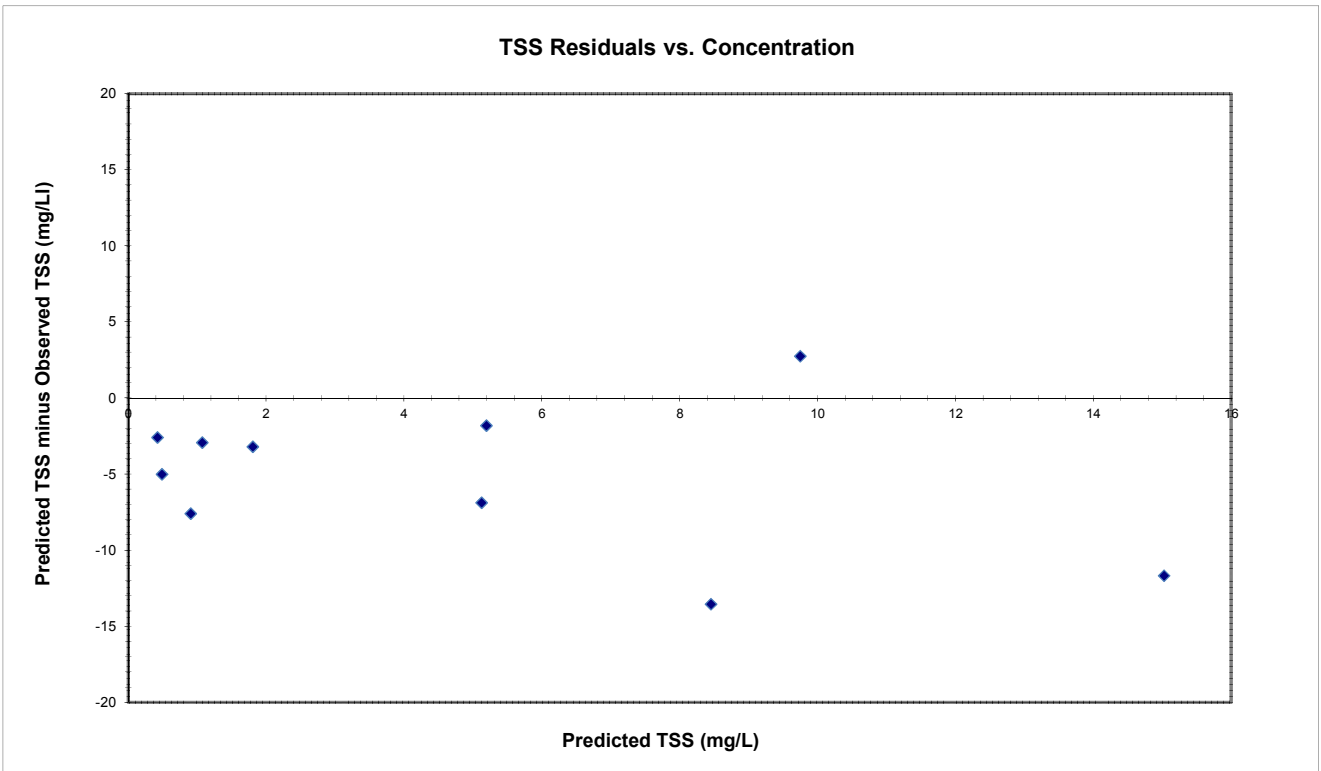
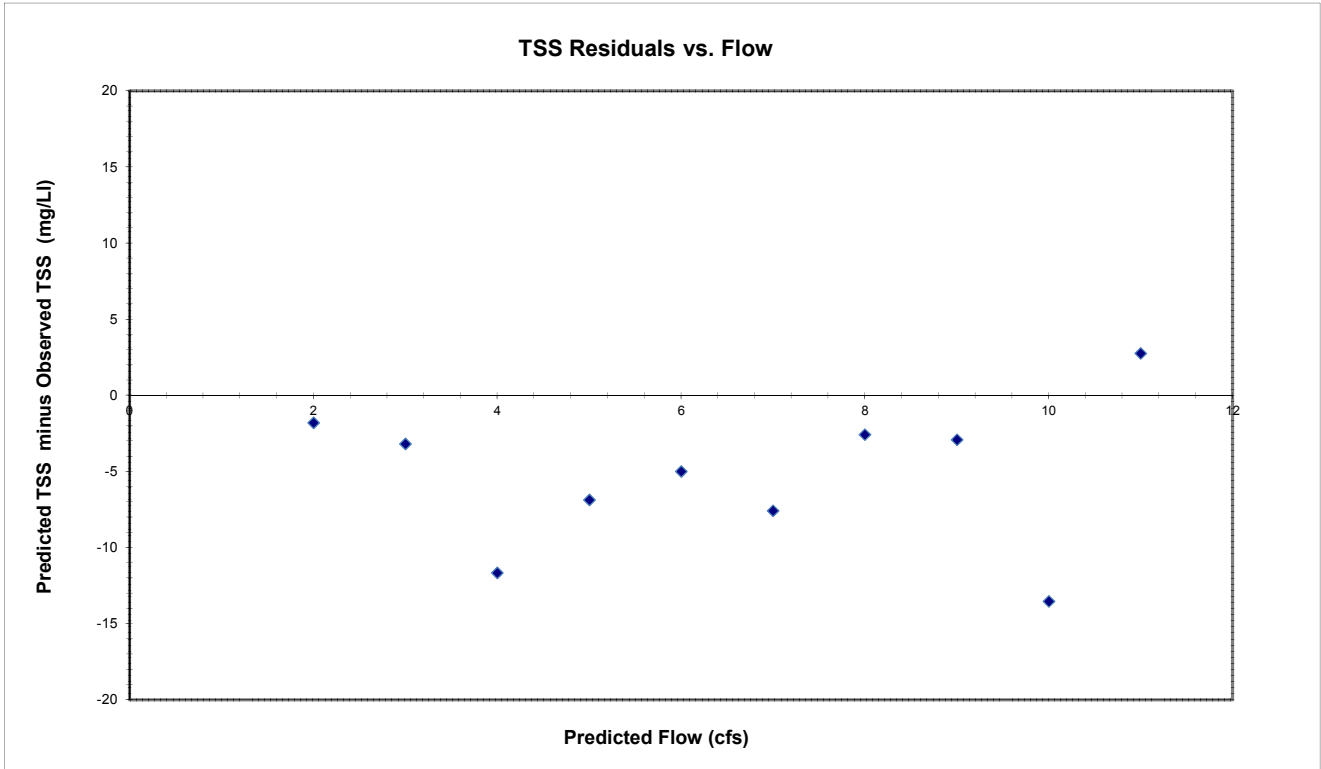
#### Total Phosphorus Residuals vs. Flow



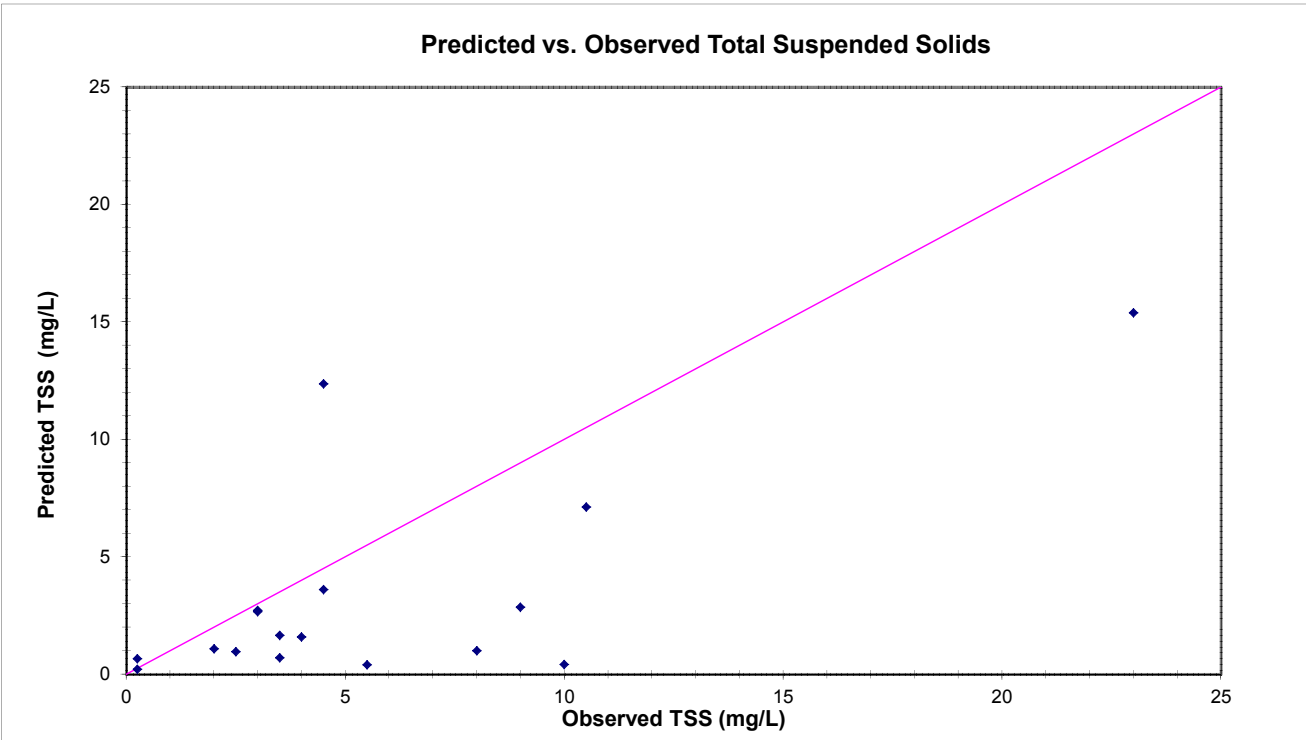
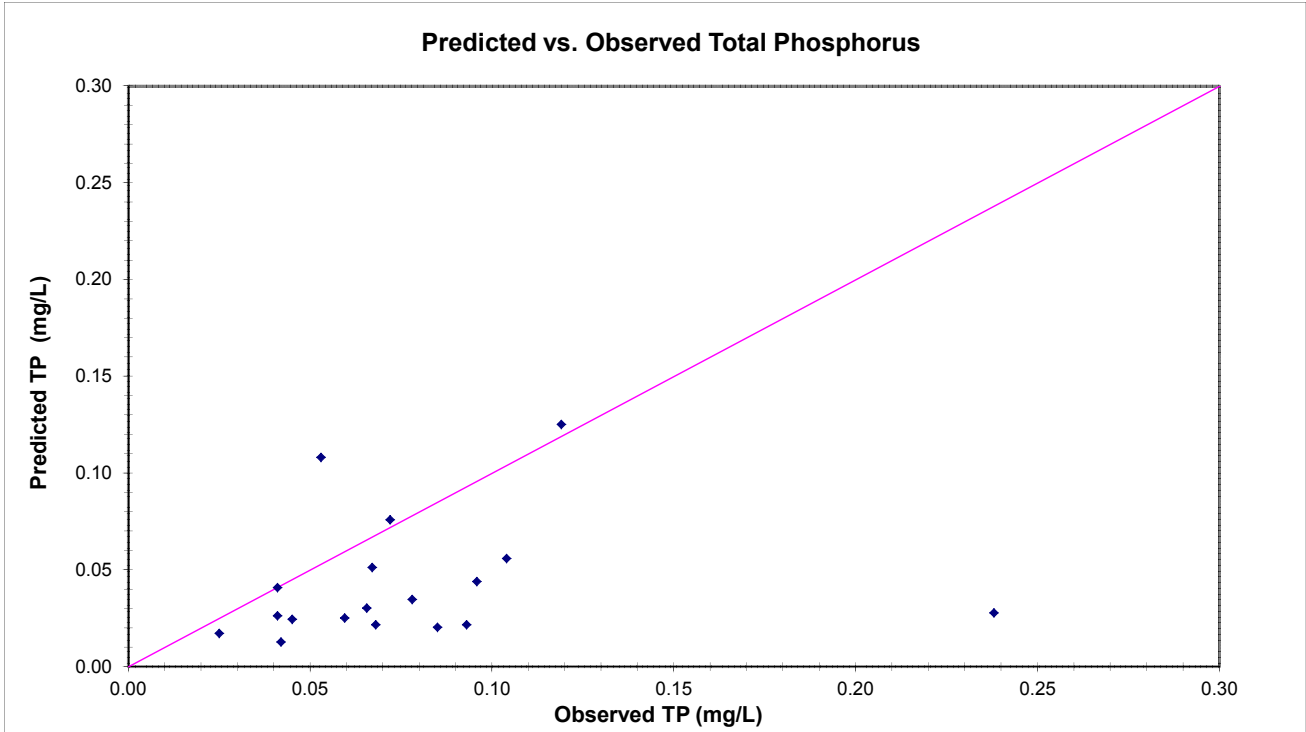
#### Total Phosphorus Residuals vs. Concentration



### South Branch Raritan River at High Bridge (SBRR5)

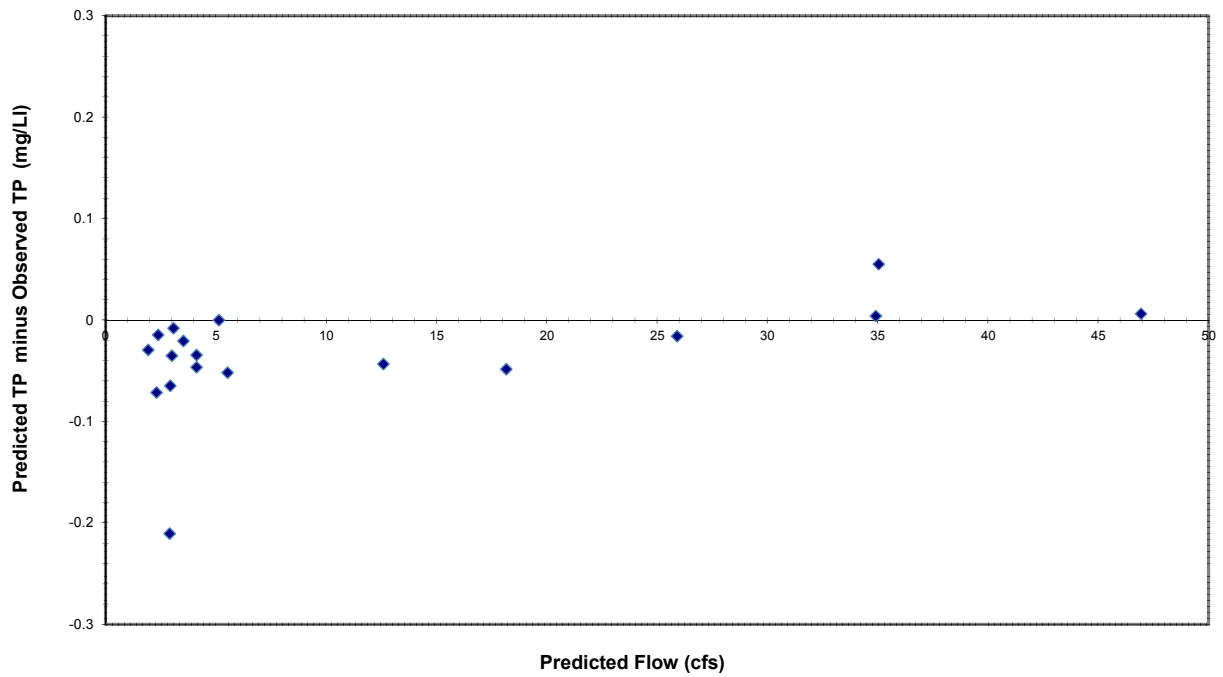


### Beaver Brook @ Hamden Road in Town of Clinton (BvB1)

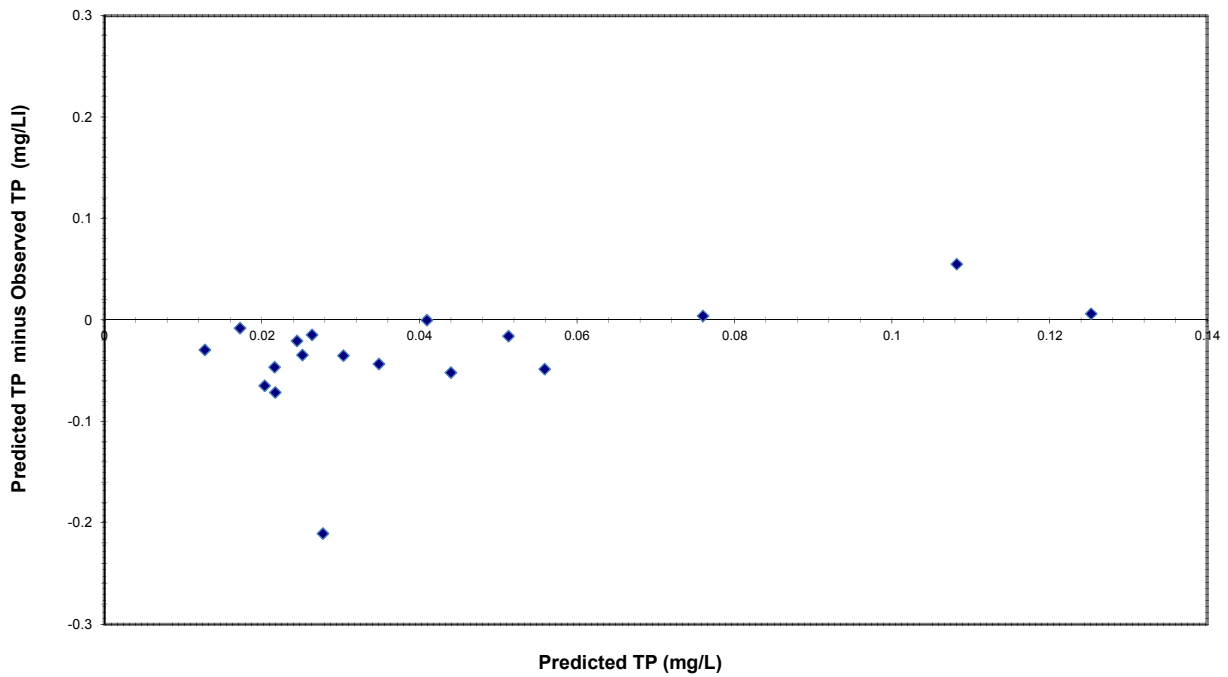


Beaver Brook @ Hamden Road in Town of Clinton (BvB1)

Total Phosphorus Residuals vs. Flow

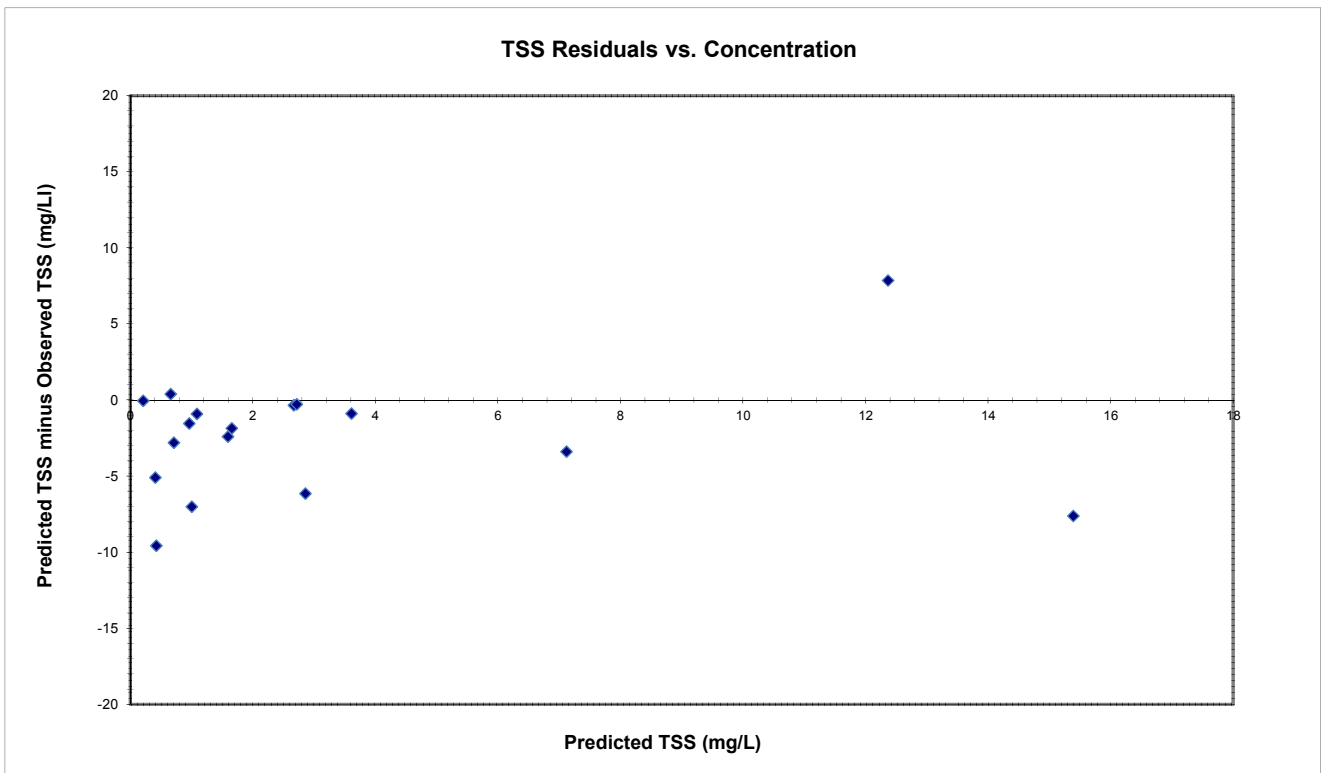
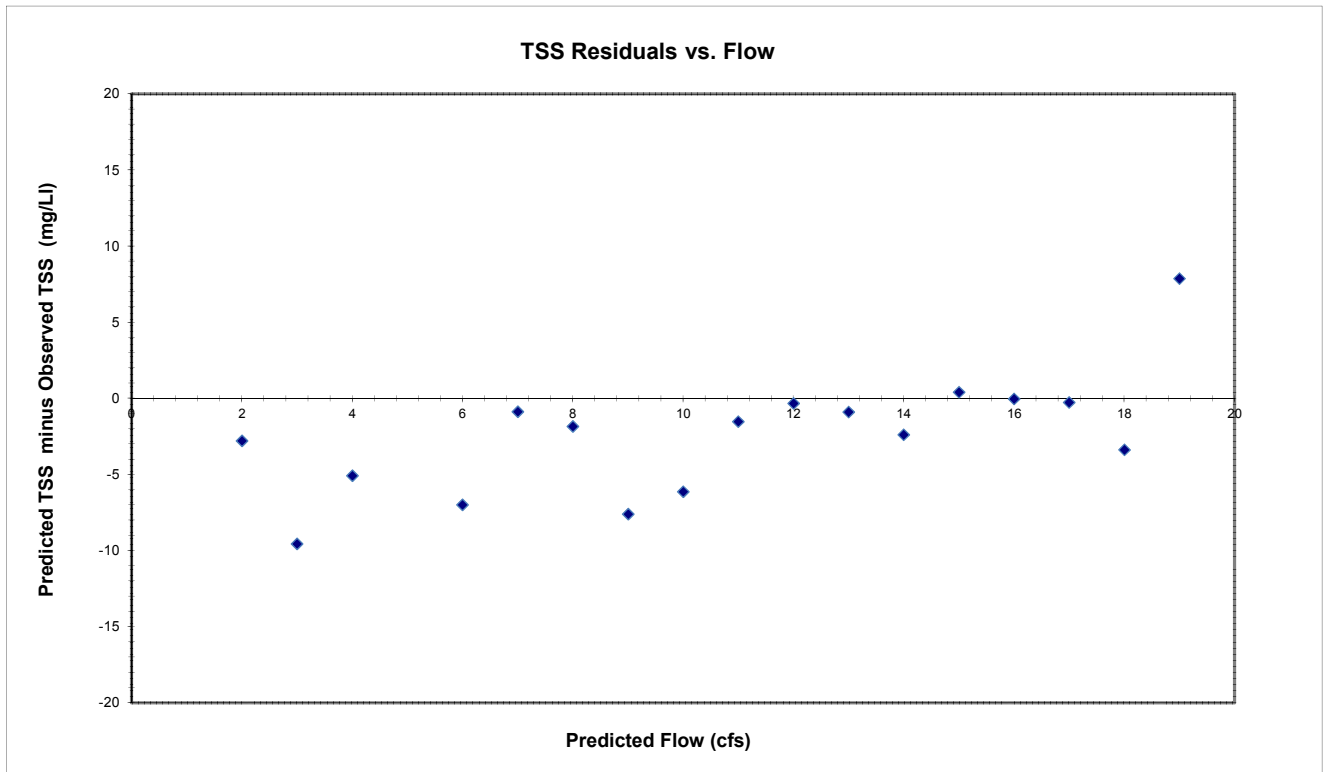


Total Phosphorus Residuals vs. Concentration

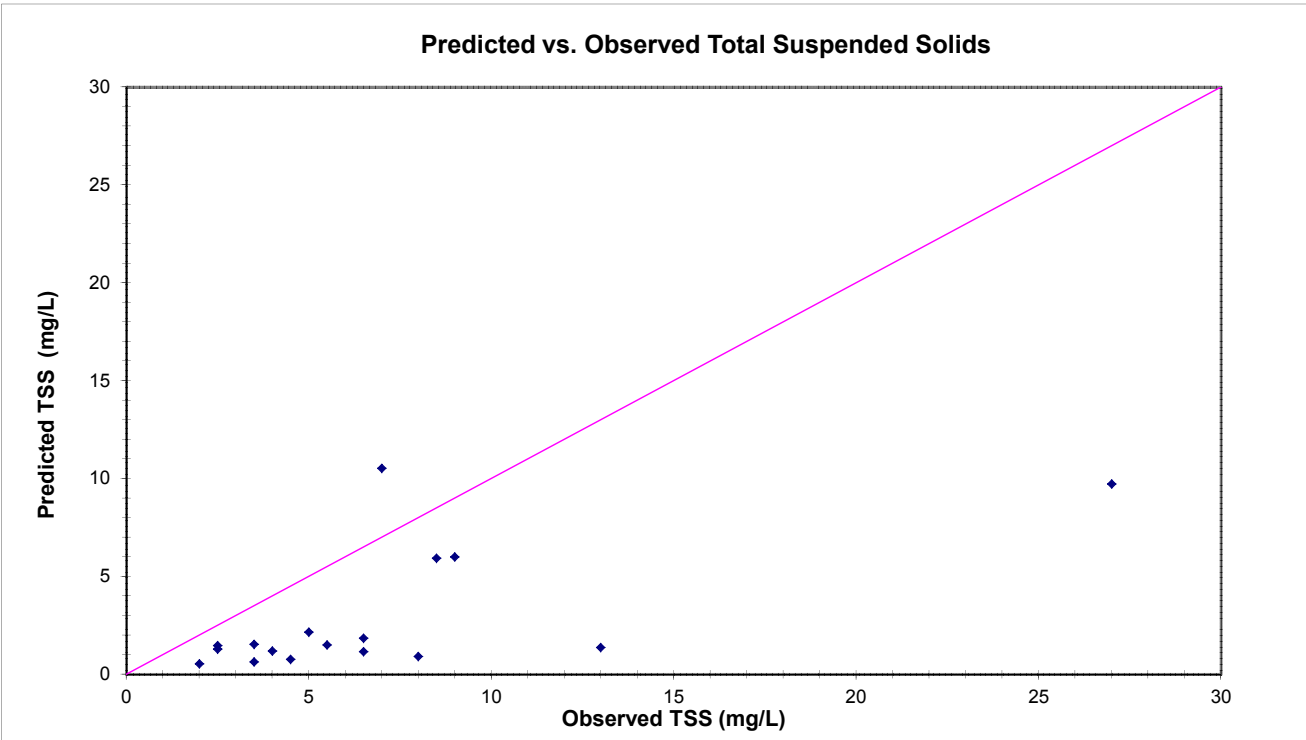
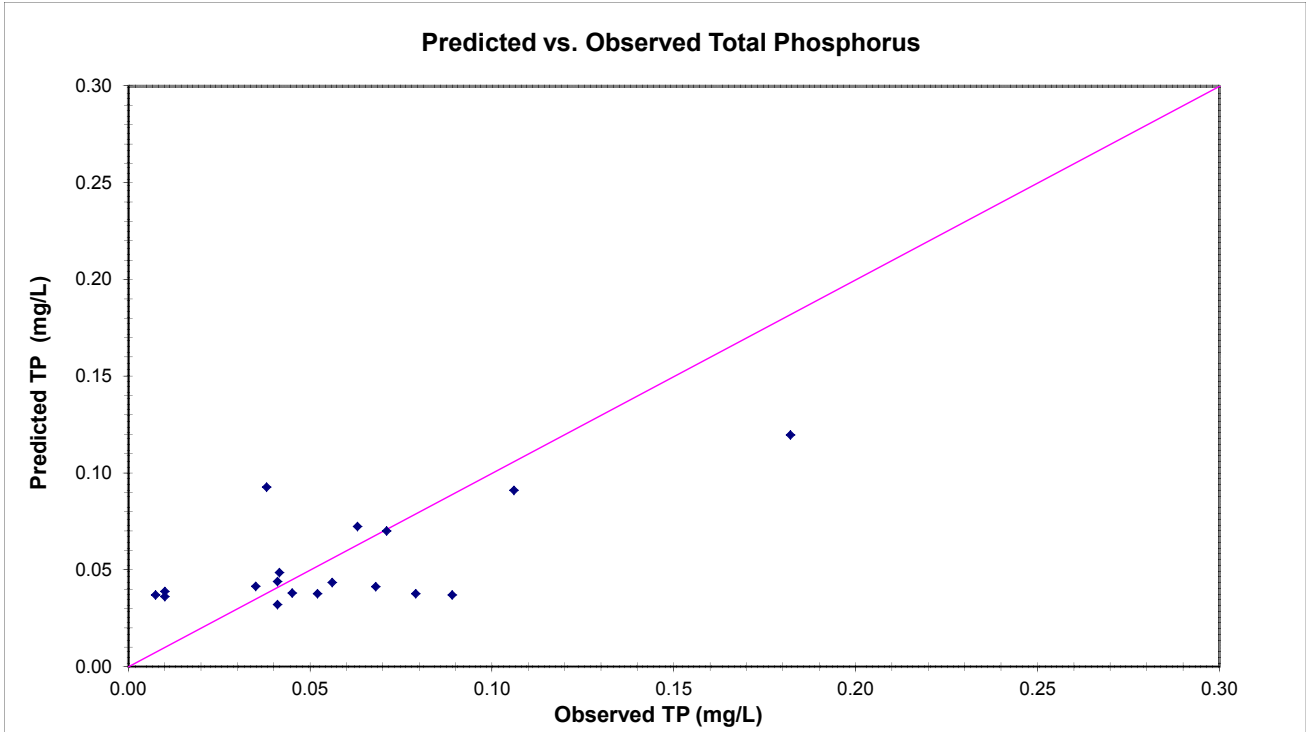




Beaver Brook @ Hamden Road in Town of Clinton (BvB1)

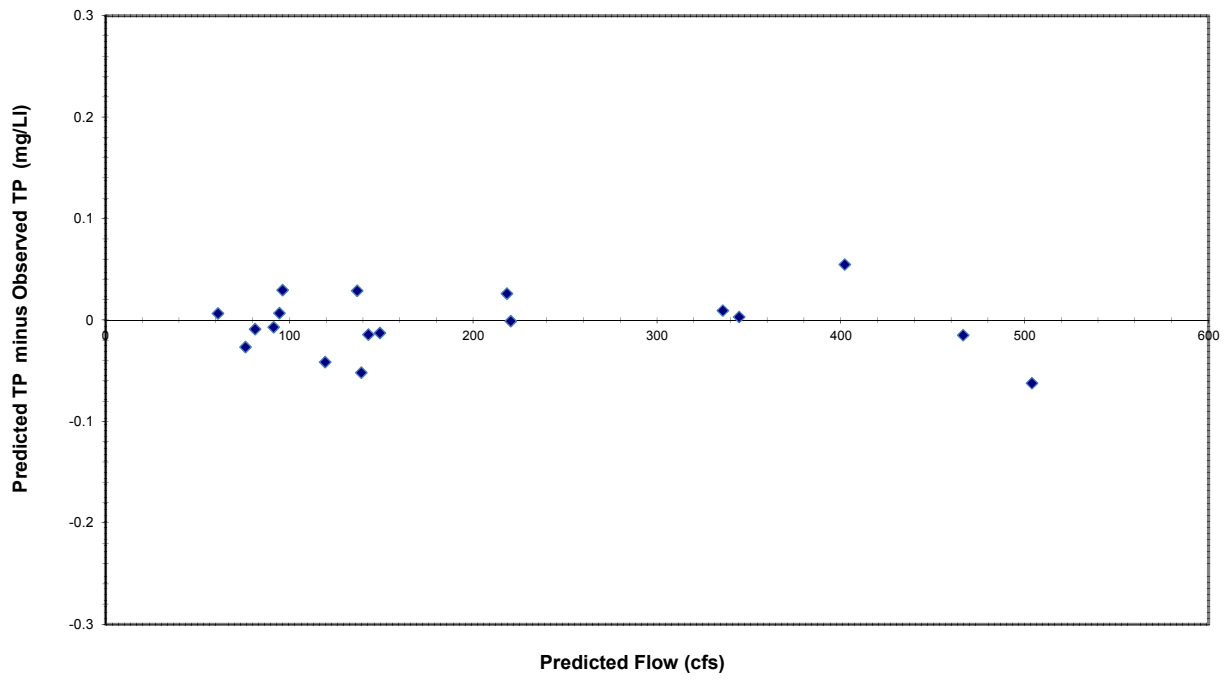


### South Branch Raritan River Upstream Clinton WTP (SBRR6)

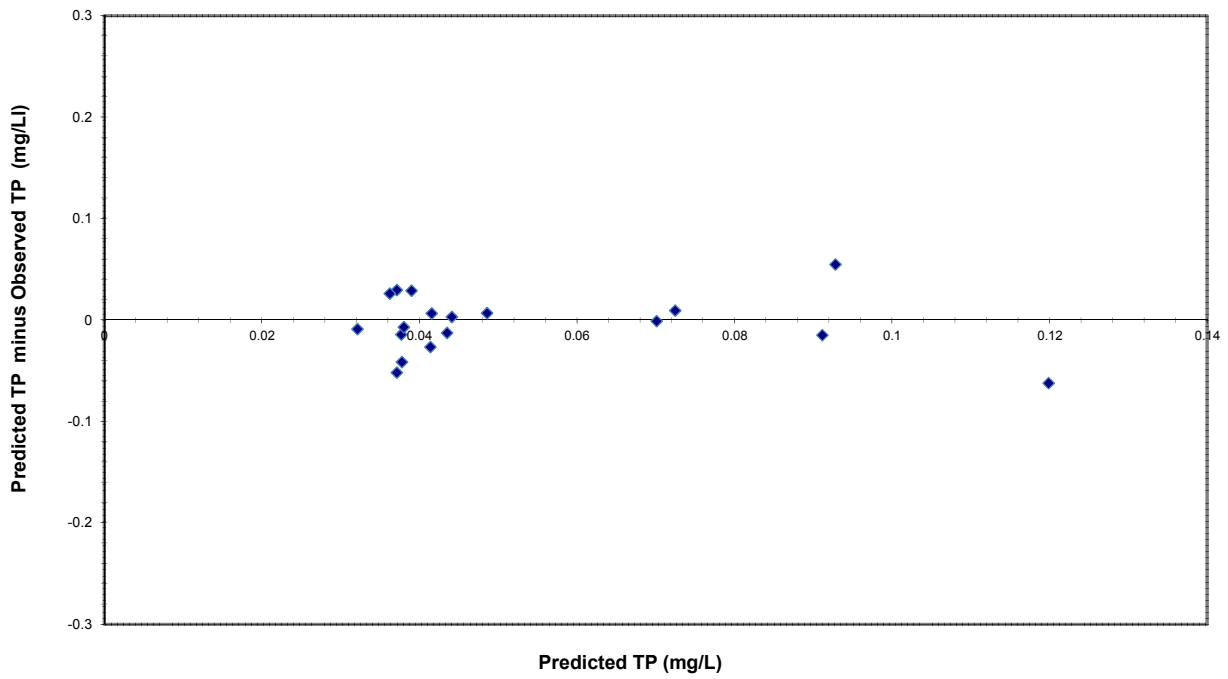


### South Branch Raritan River Upstream Clinton WTP (SBRR6)

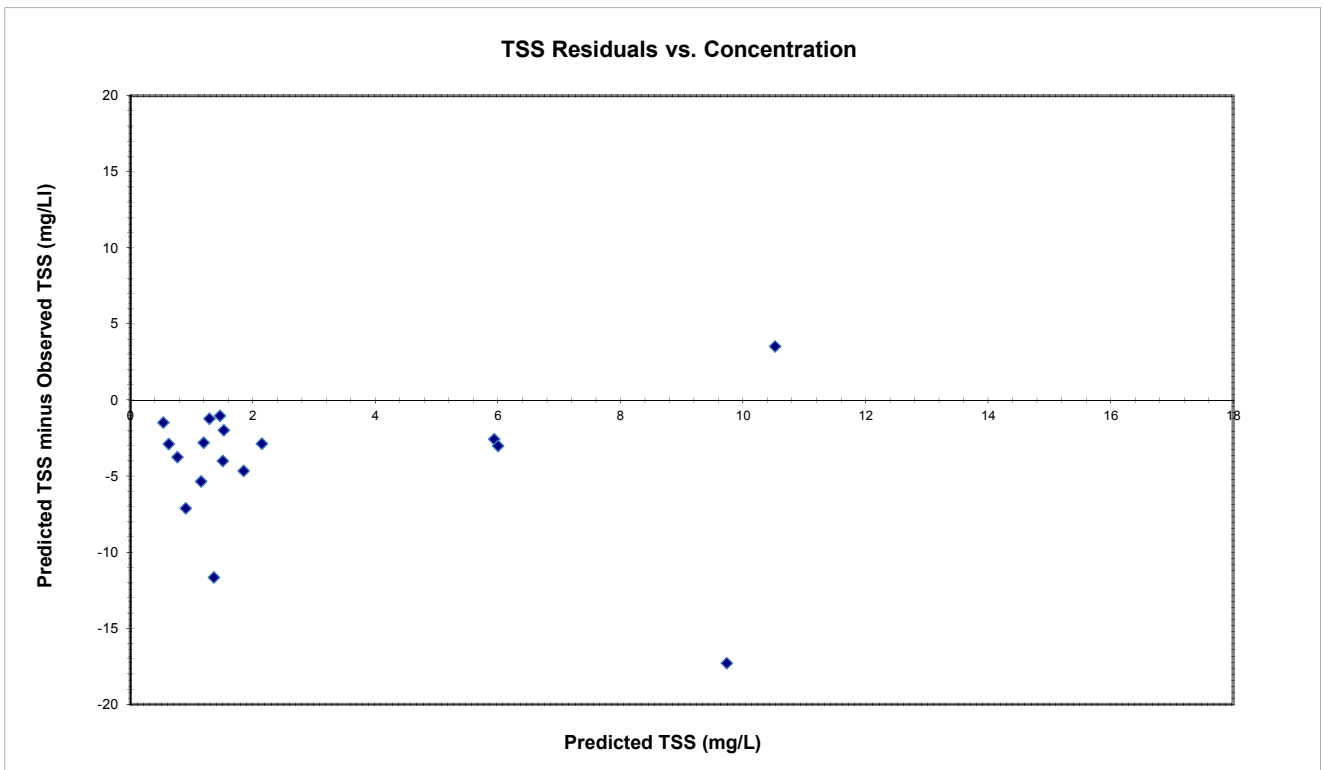
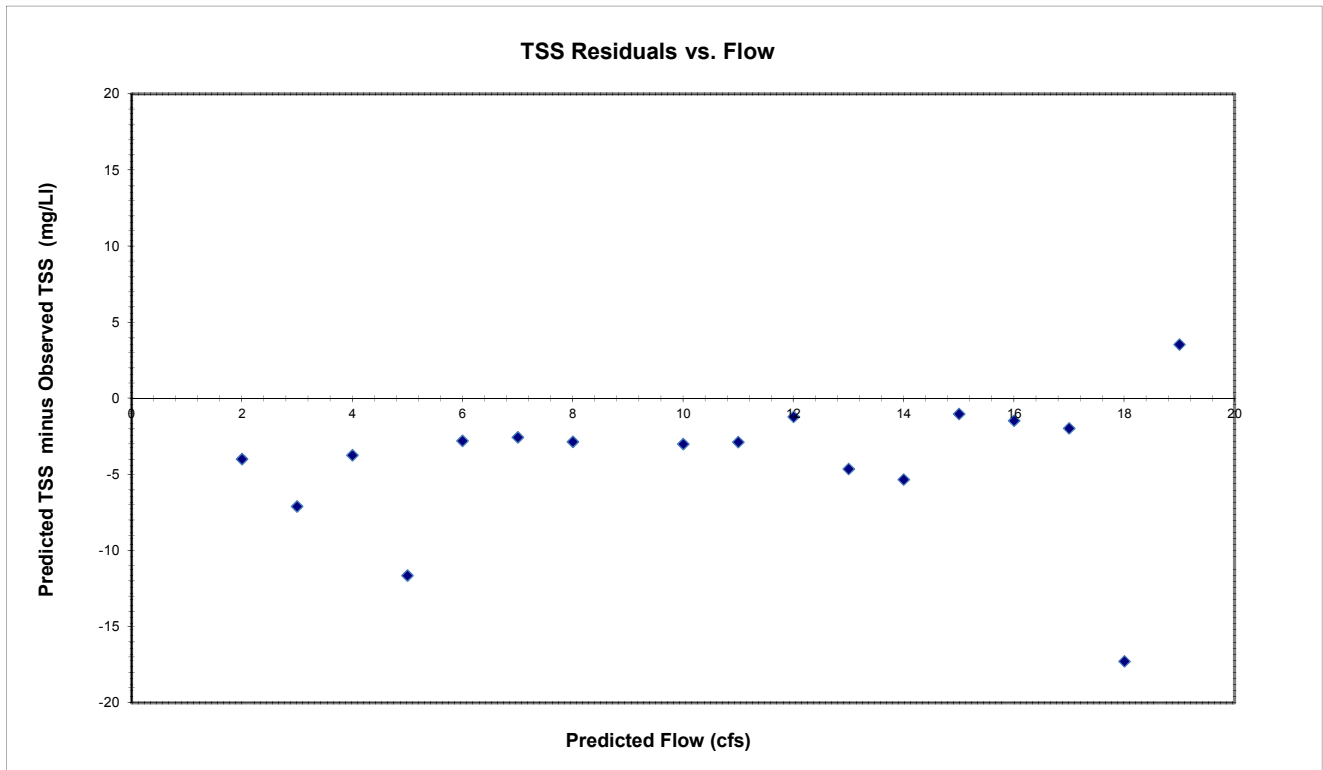
#### Total Phosphorus Residuals vs. Flow



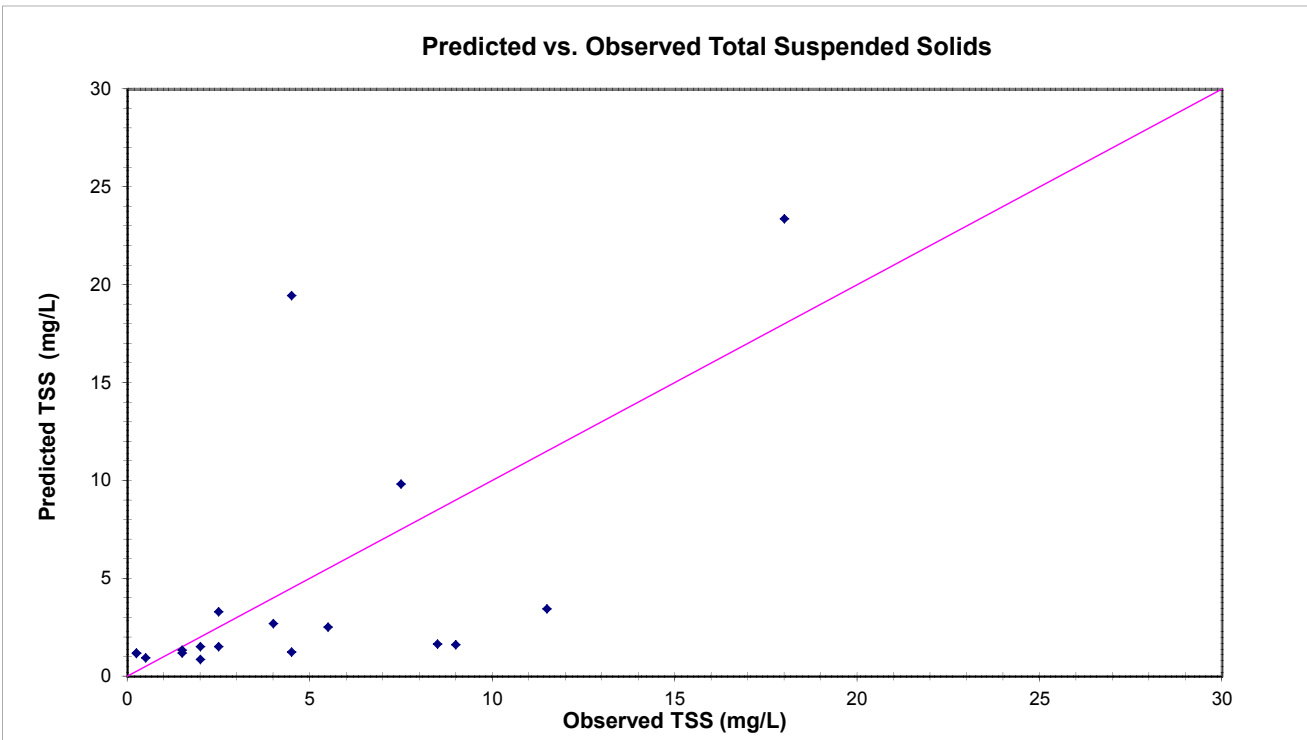
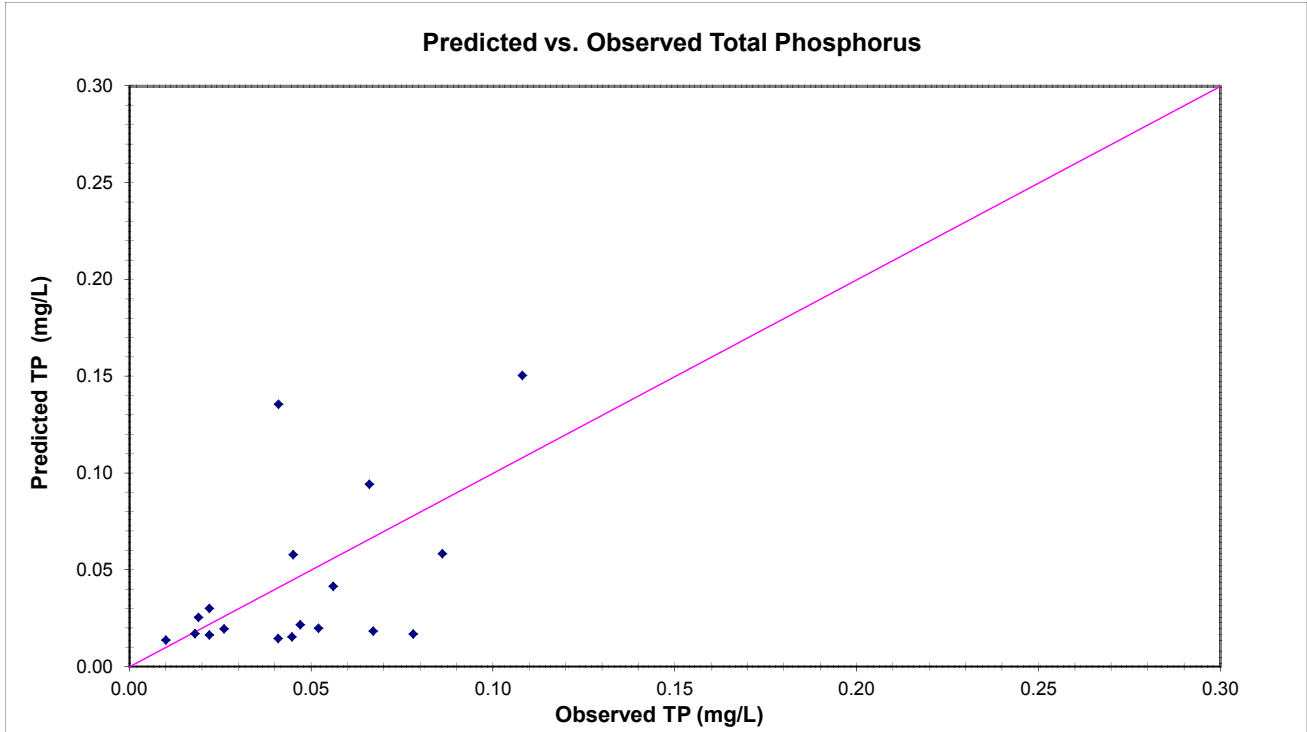
#### Total Phosphorus Residuals vs. Concentration



### South Branch Raritan River Upstream Clinton WTP (SBRR6)

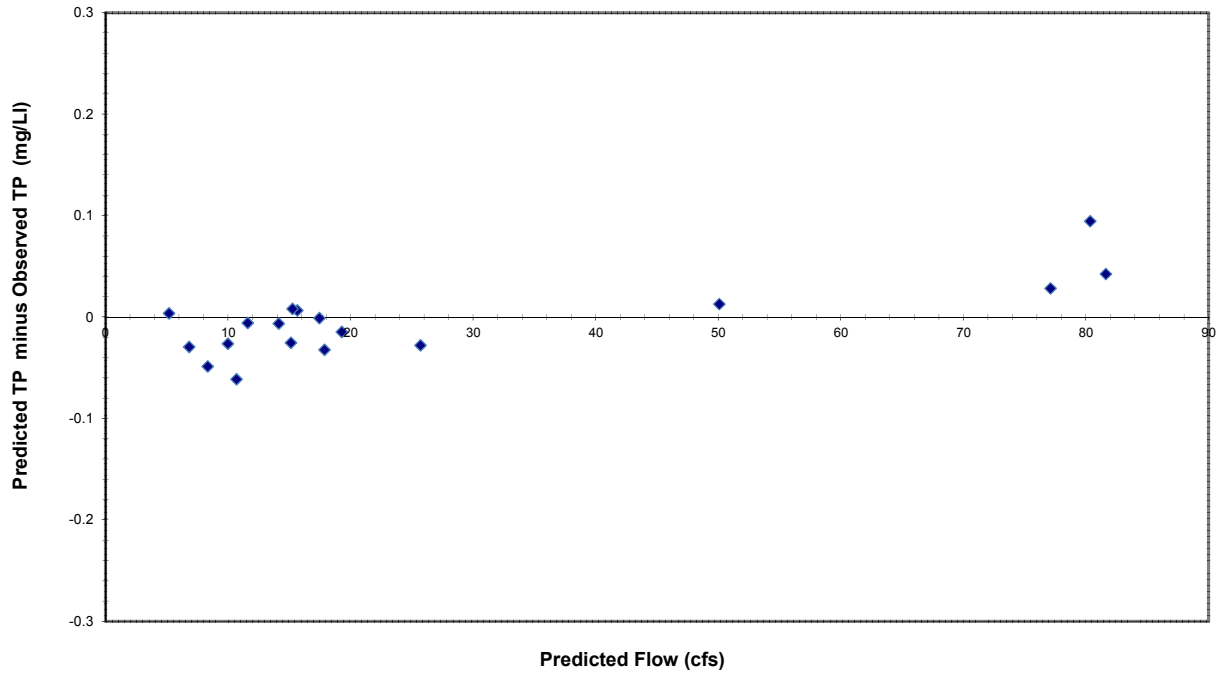


### Cakepoulin Creek at Lower Lansdown Rd. (CC1)

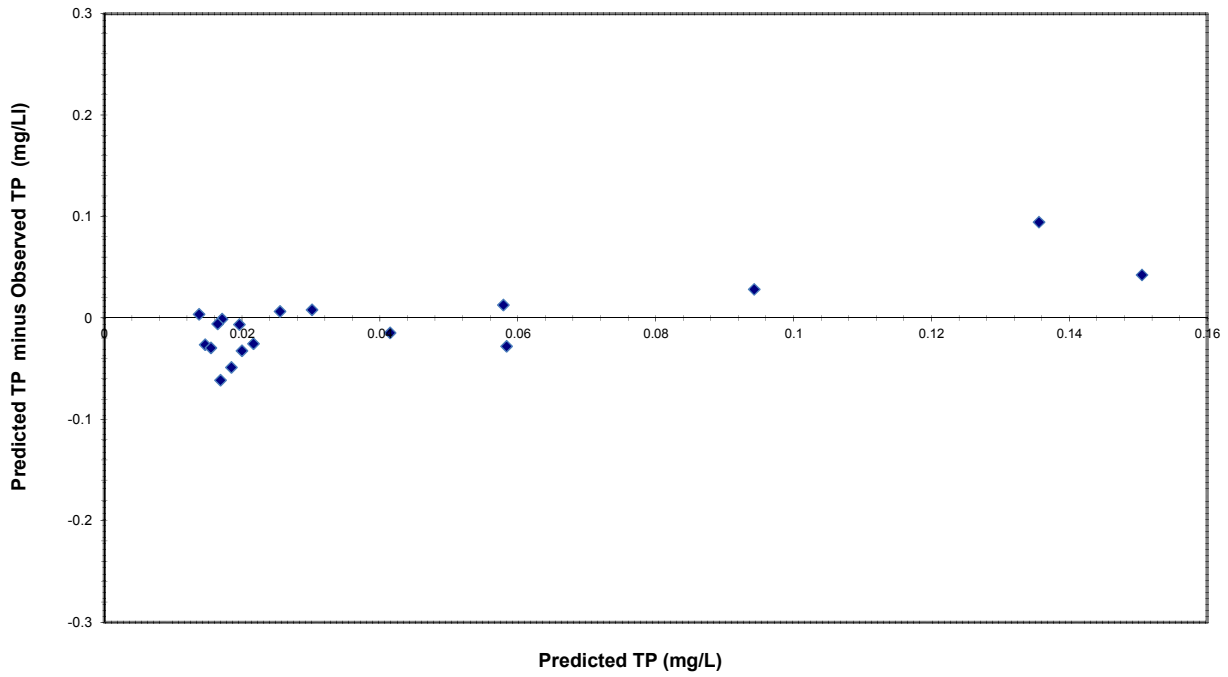


### Cakepoulin Creek at Lower Lansdown Rd. (CC1)

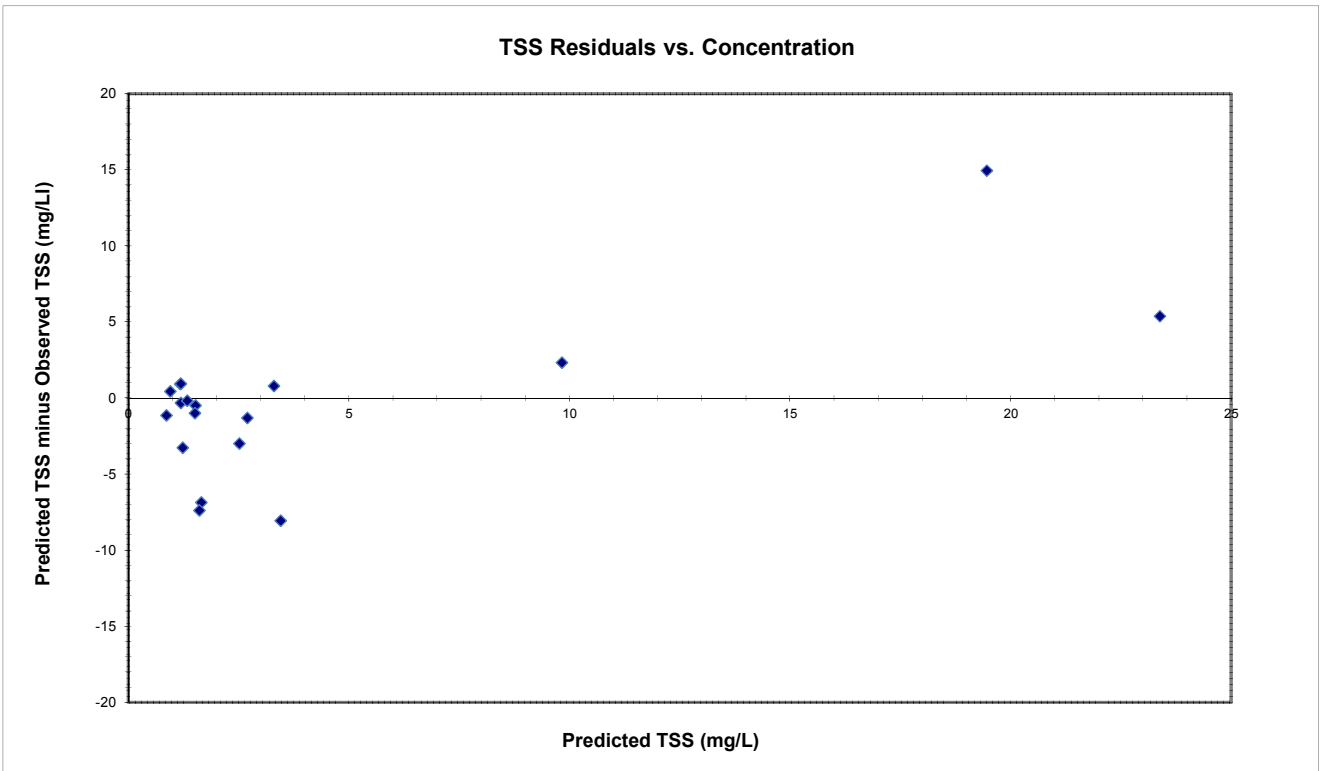
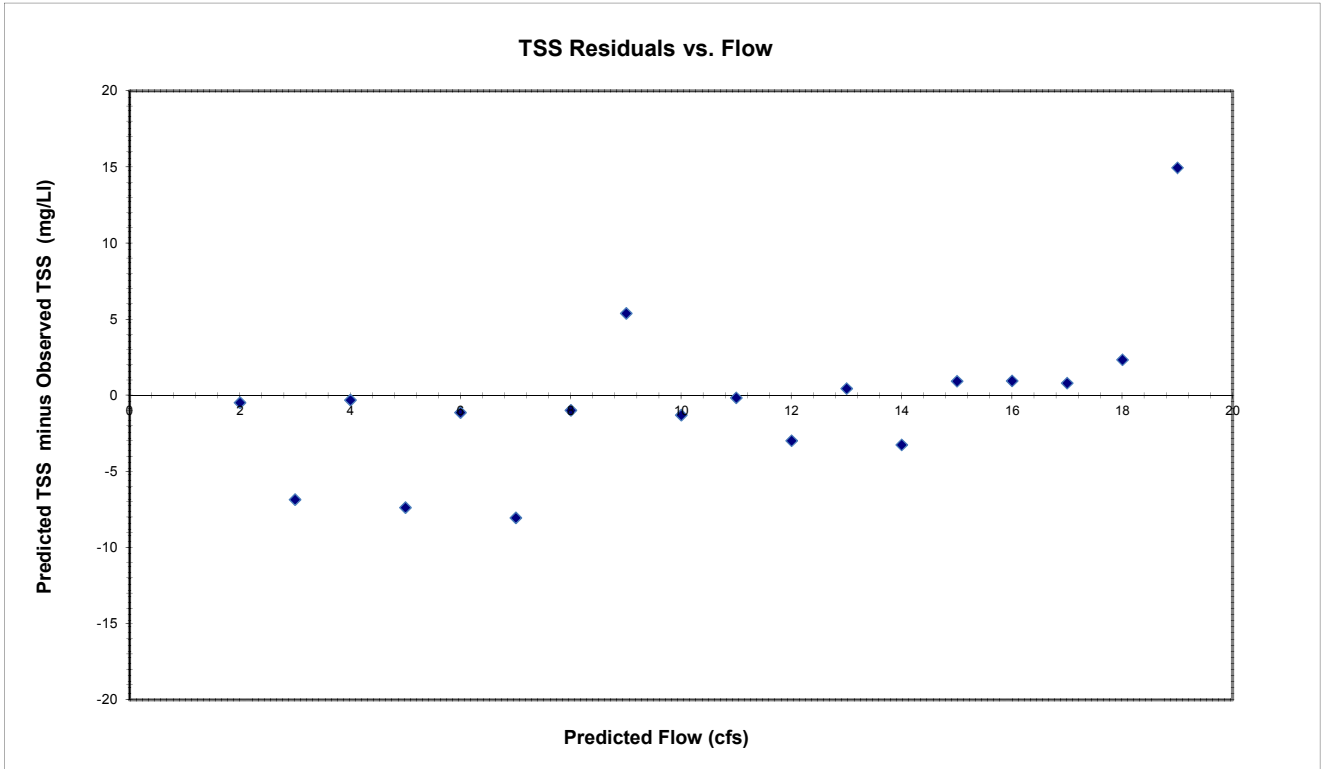
#### Total Phosphorus Residuals vs. Flow



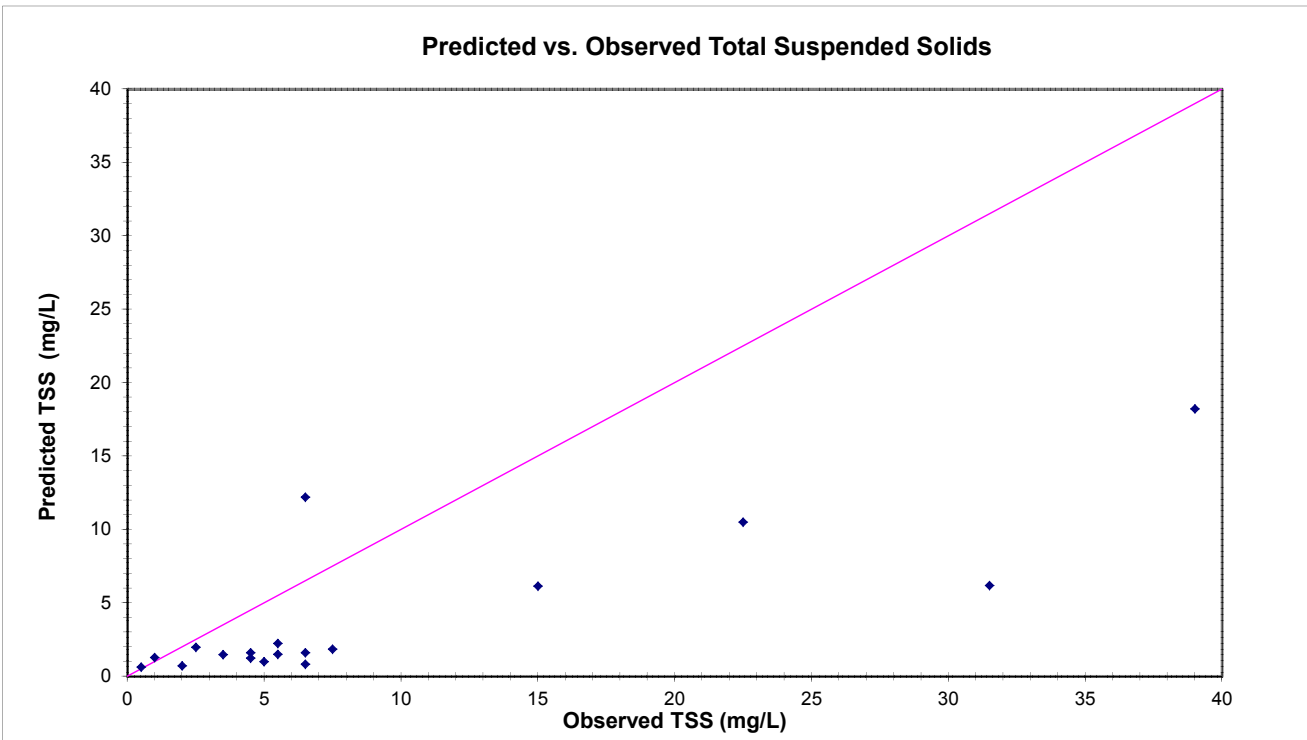
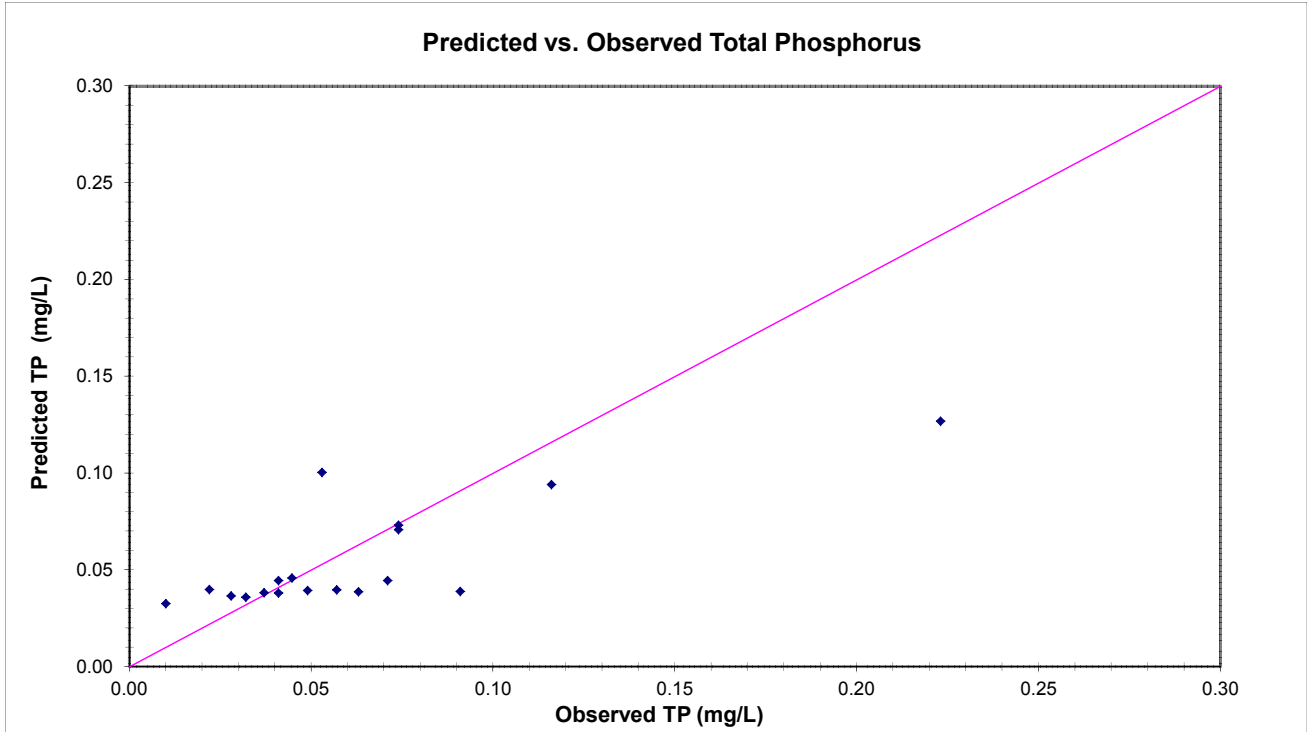
#### Total Phosphorus Residuals vs. Concentration



### Cakepoulin Creek at Lower Lansdown Rd. (CC1)



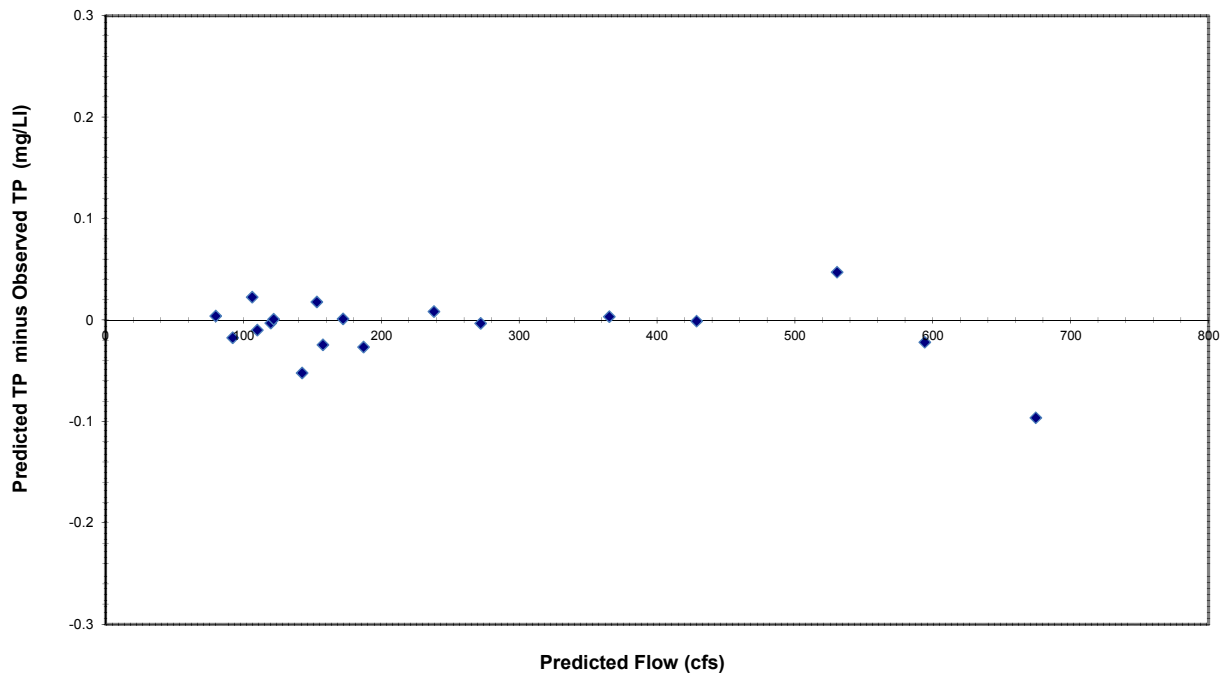
### South Branch Raritan River at Hamden Rd (SBRR7)



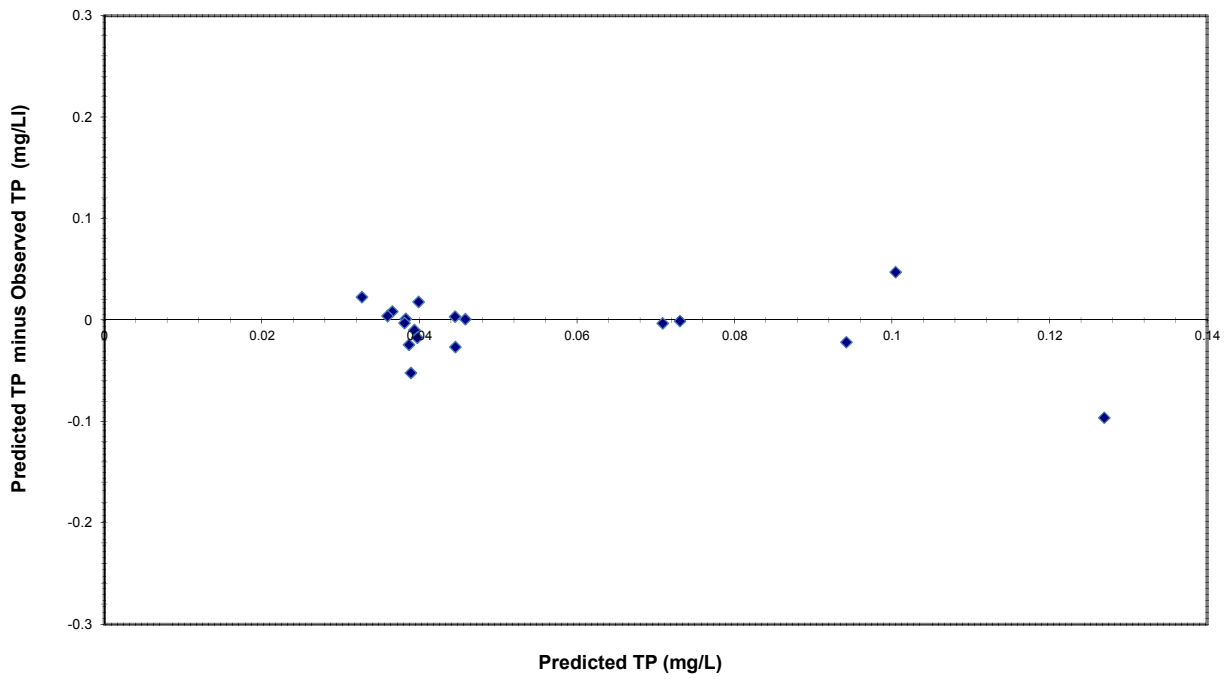


### South Branch Raritan River at Hamden Rd (SBRR7)

#### Total Phosphorus Residuals vs. Flow

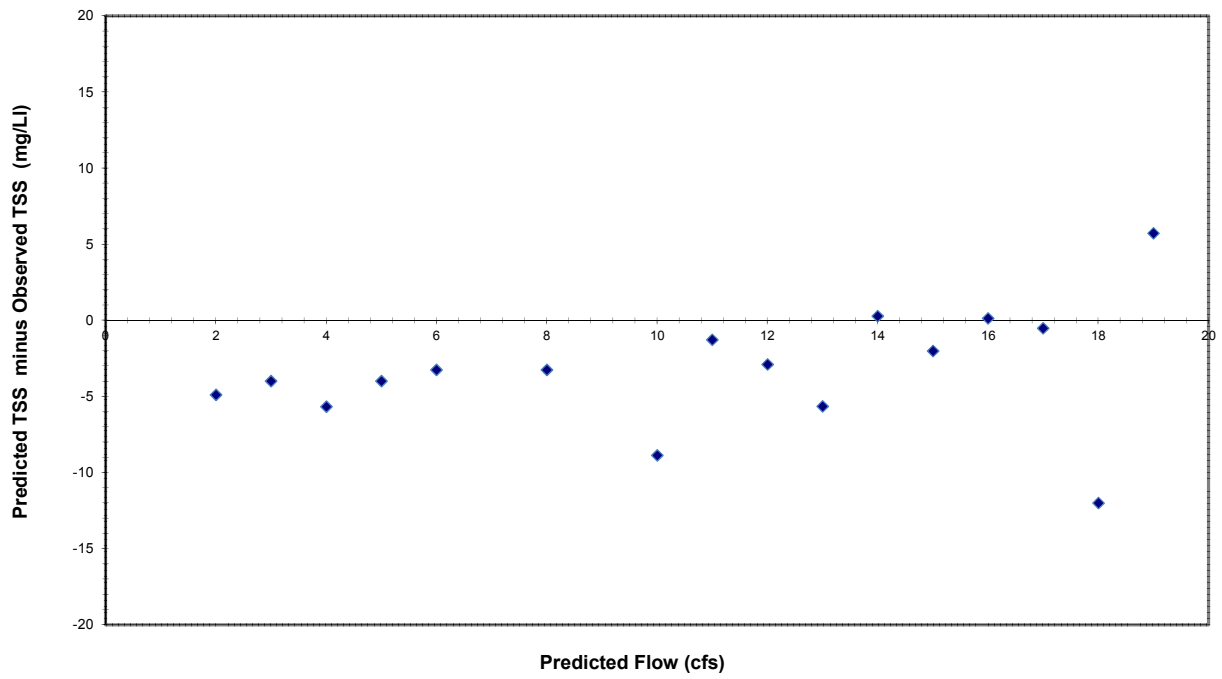


#### Total Phosphorus Residuals vs. Concentration

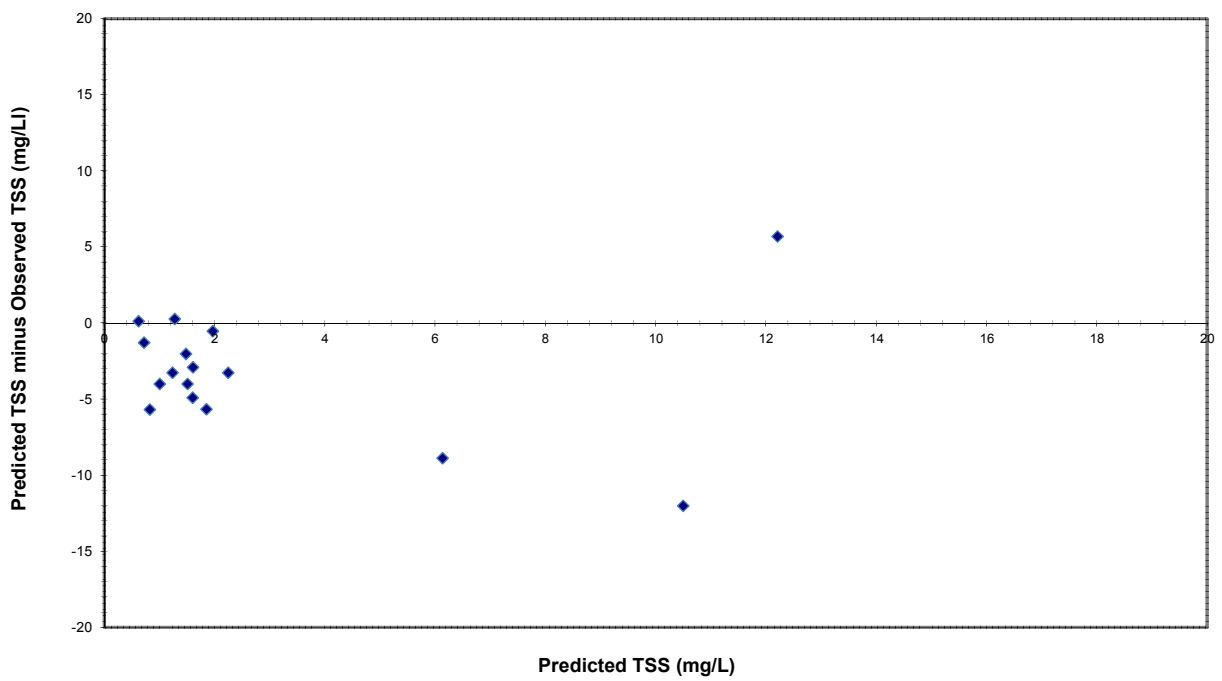


### South Branch Raritan River at Hamden Rd (SBRR7)

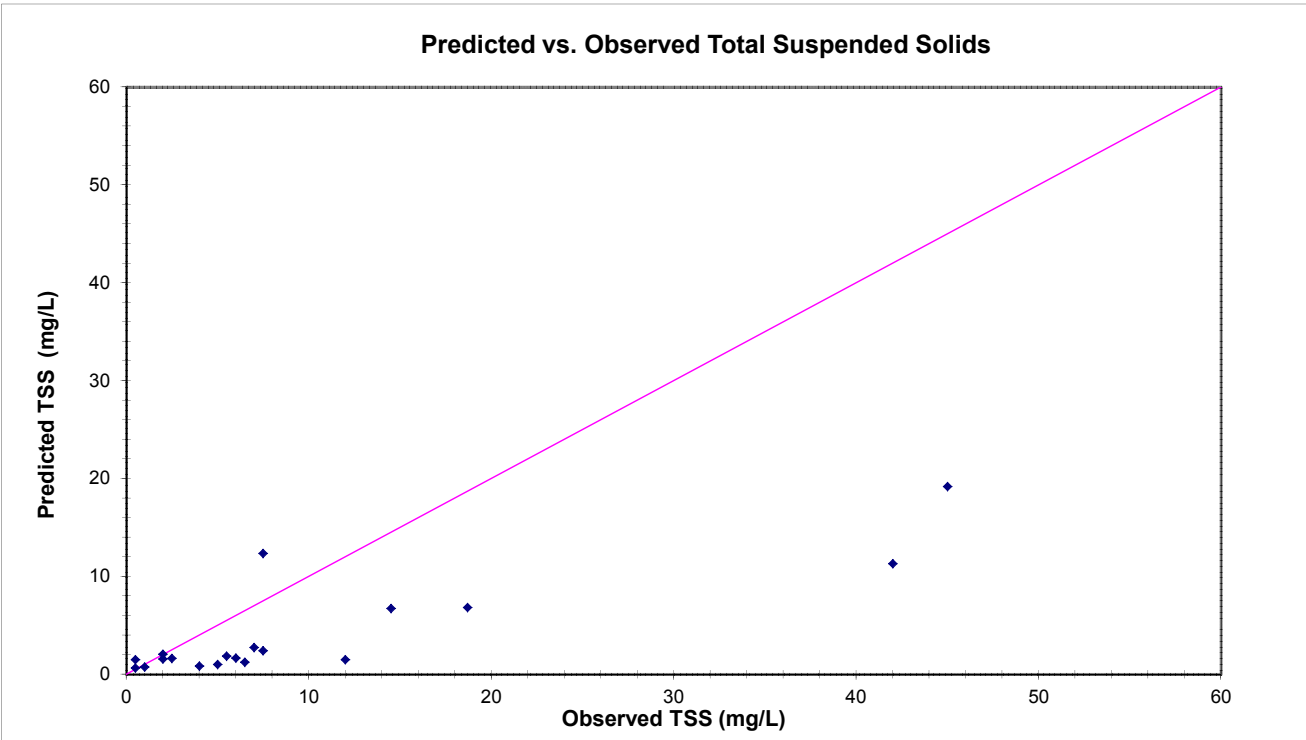
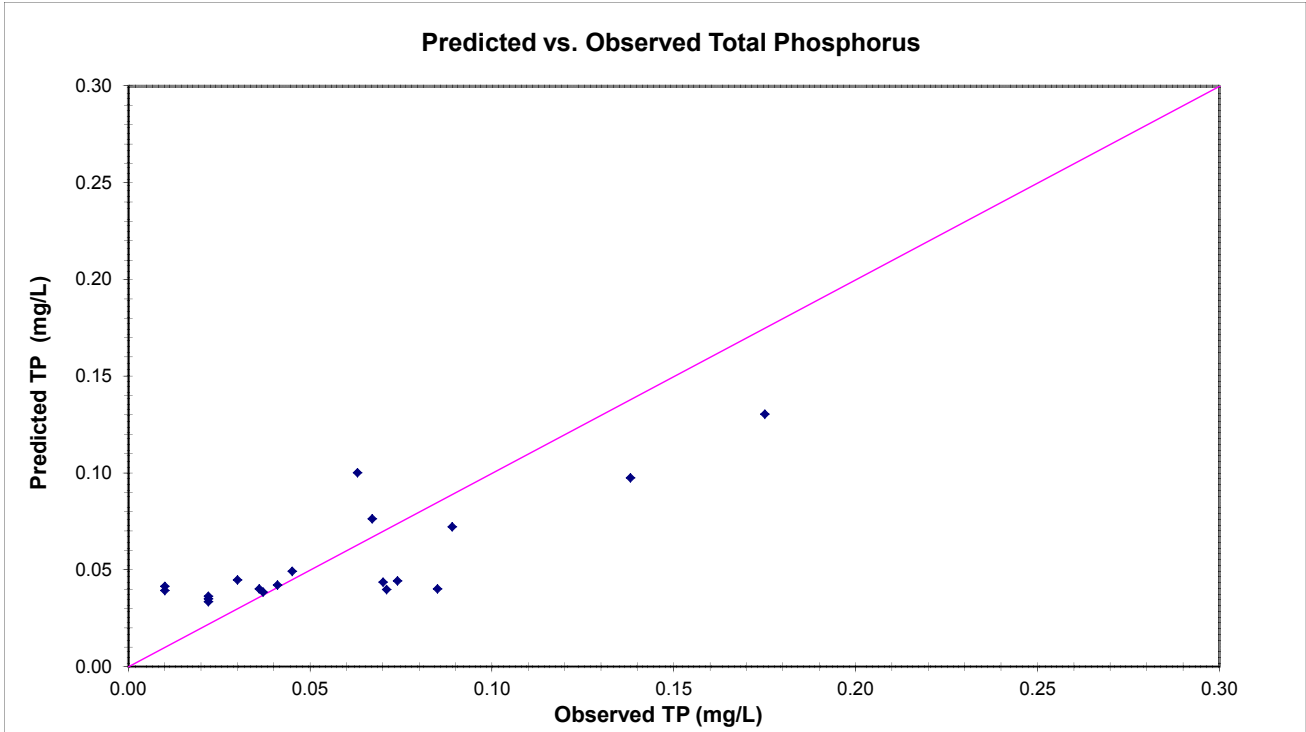
#### TSS Residuals vs. Flow



#### TSS Residuals vs. Concentration

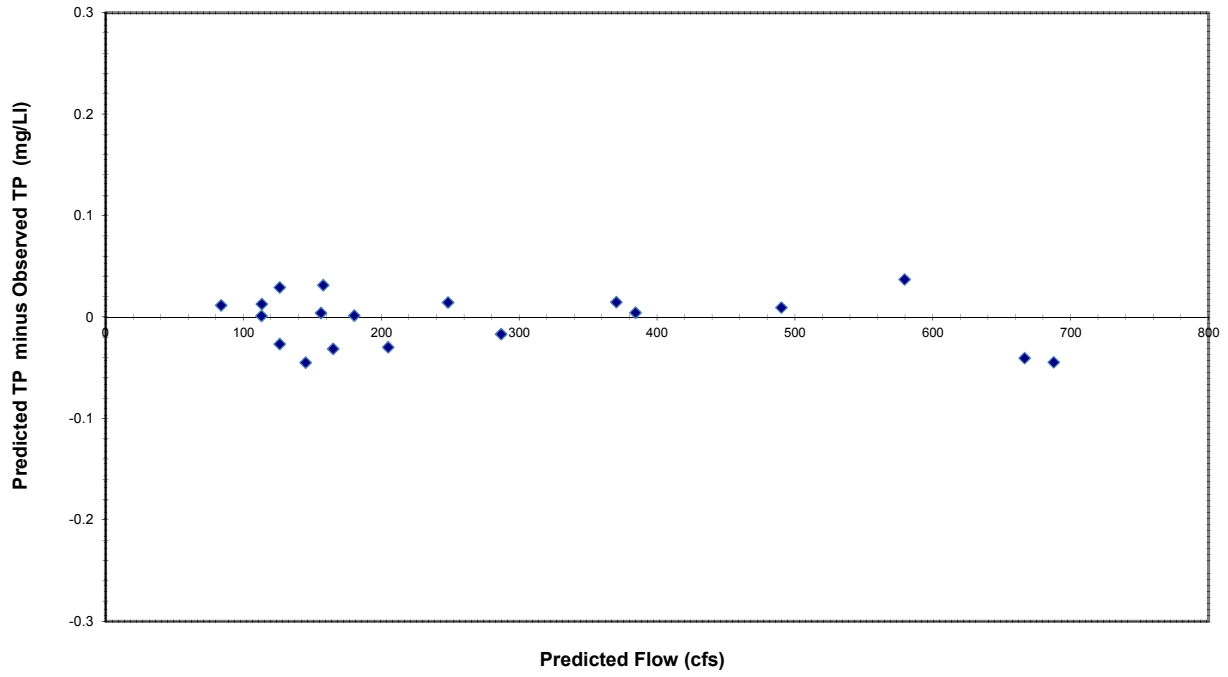


### South Branch Raritan River at Stanton Rd. (SBRR8)

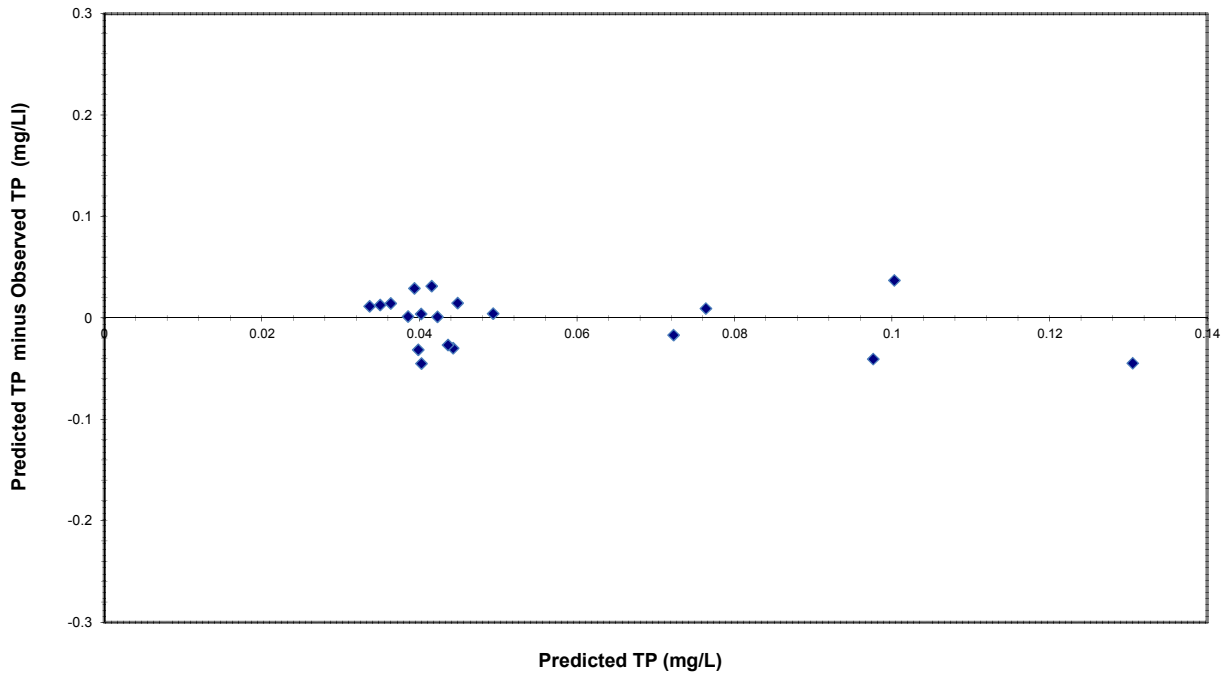


South Branch Raritan River at Stanton Rd. (SBRR8)

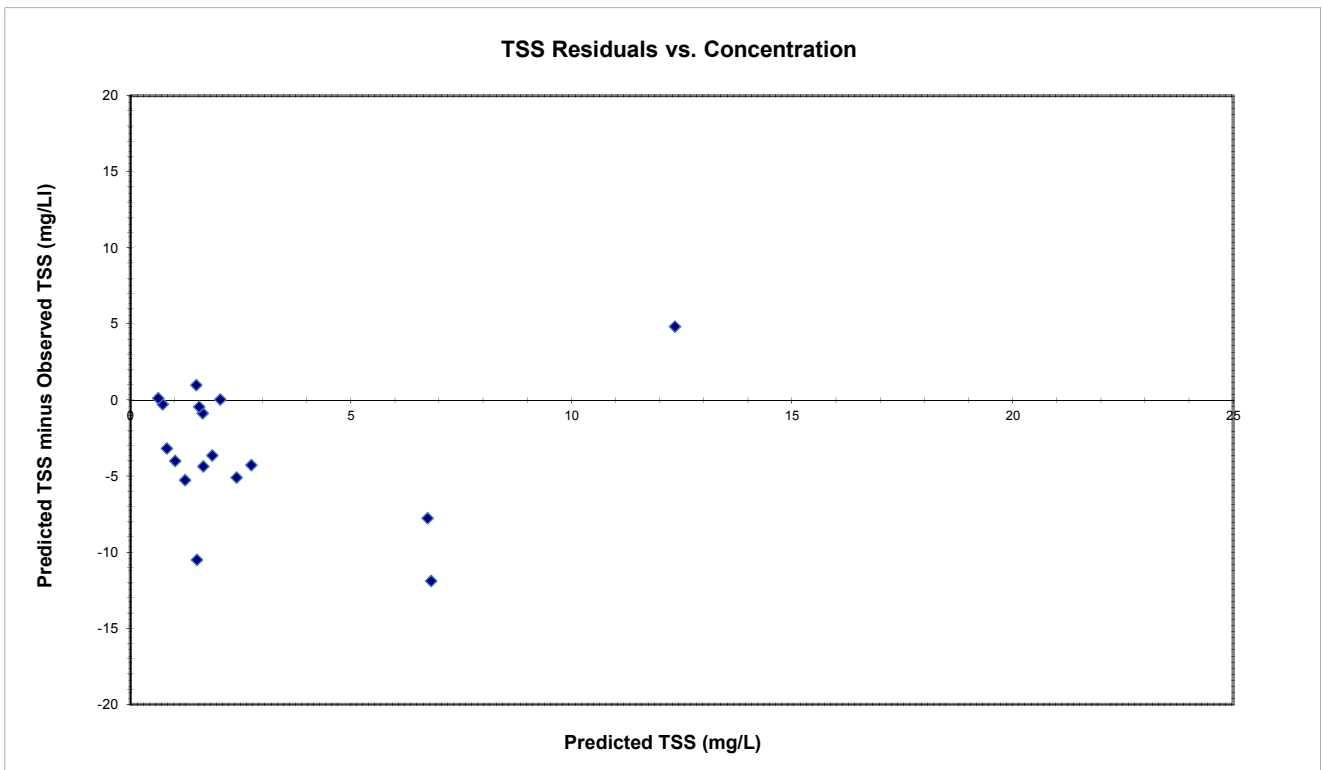
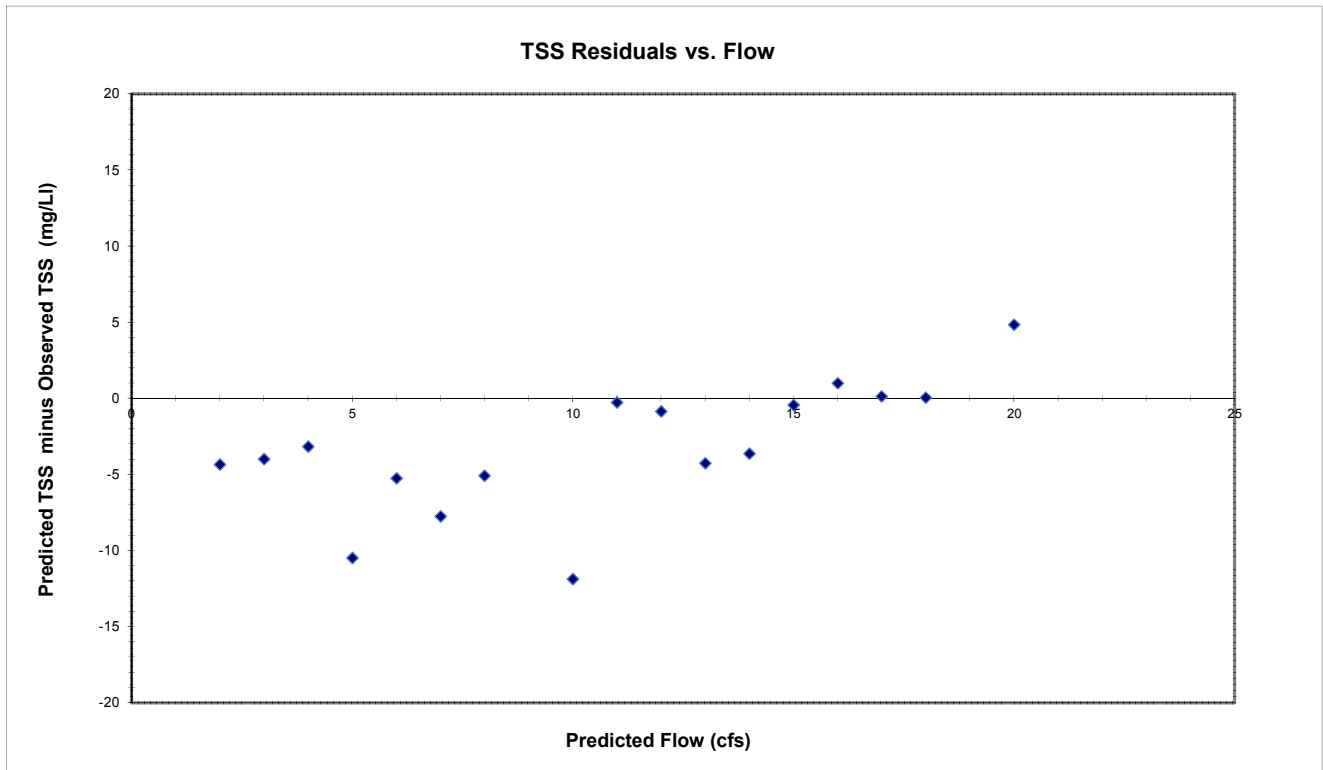
Total Phosphorus Residuals vs. Flow



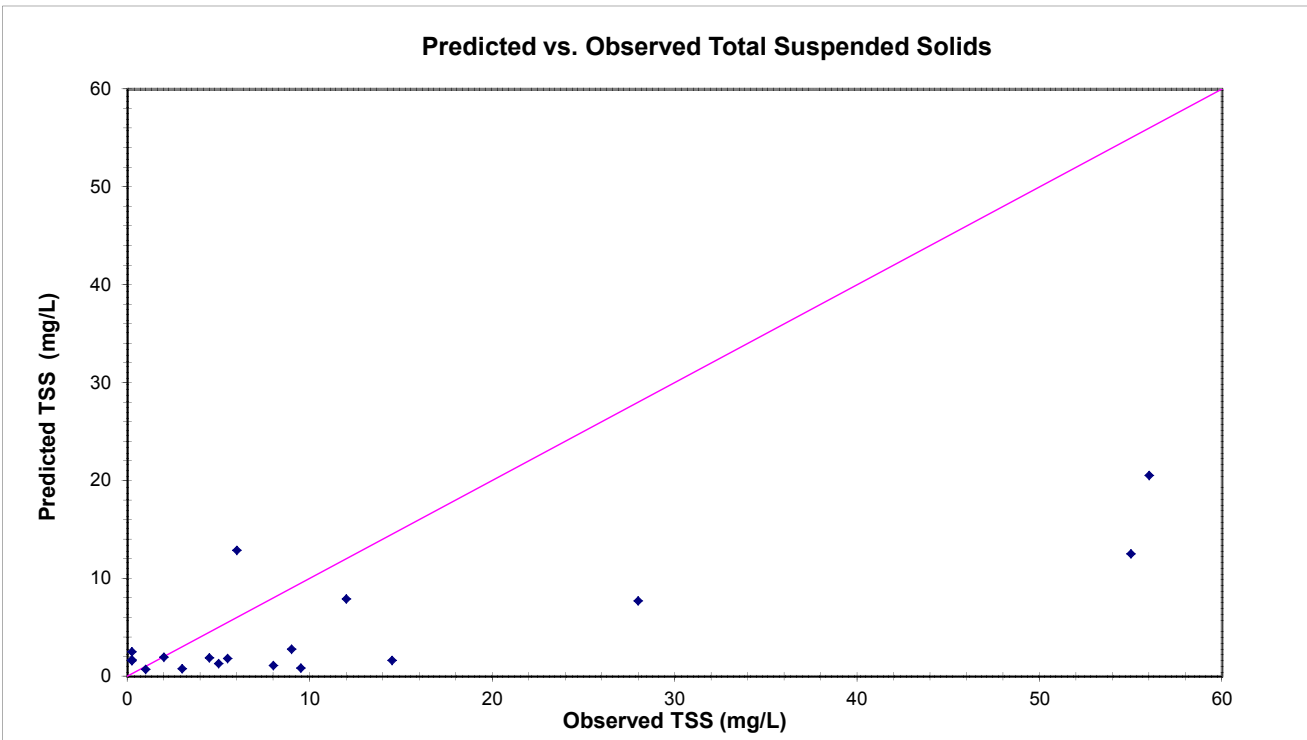
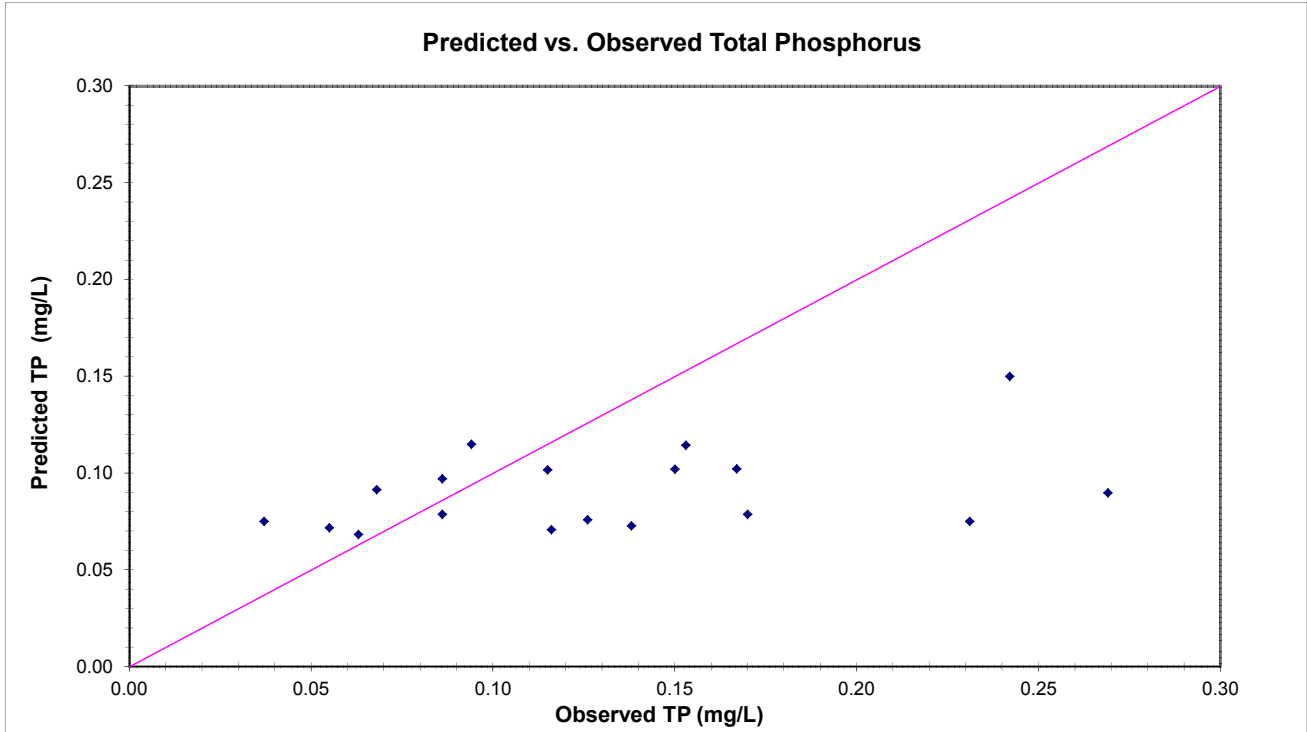
Total Phosphorus Residuals vs. Concentration



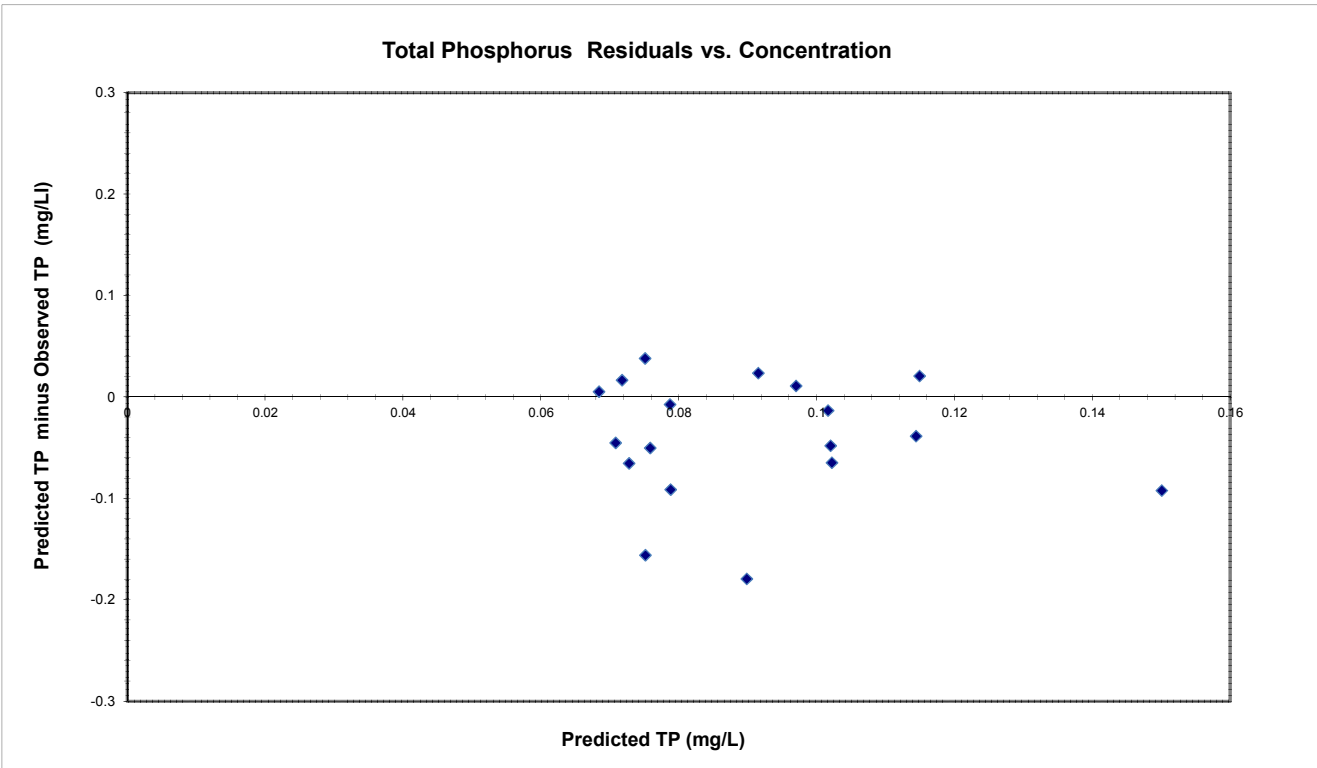
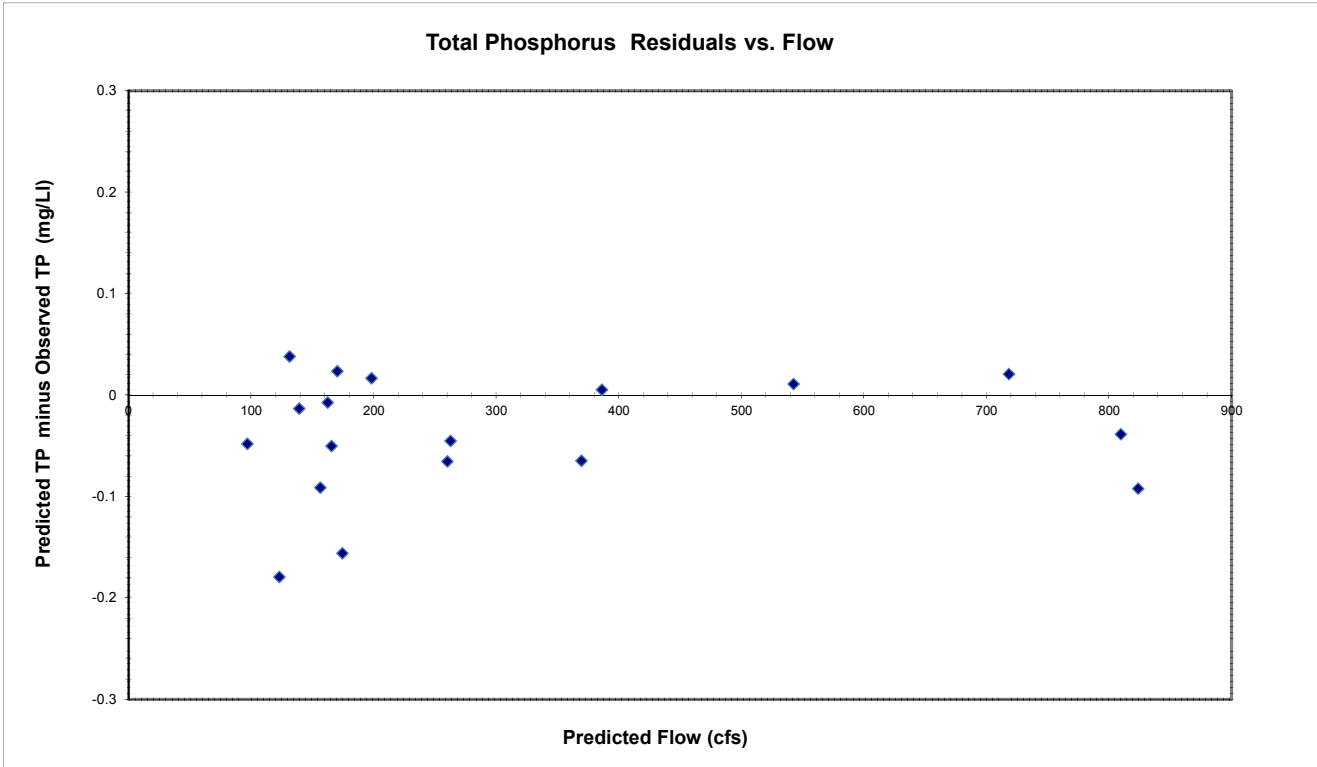
### South Branch Raritan River at Stanton Rd. (SBRR8)



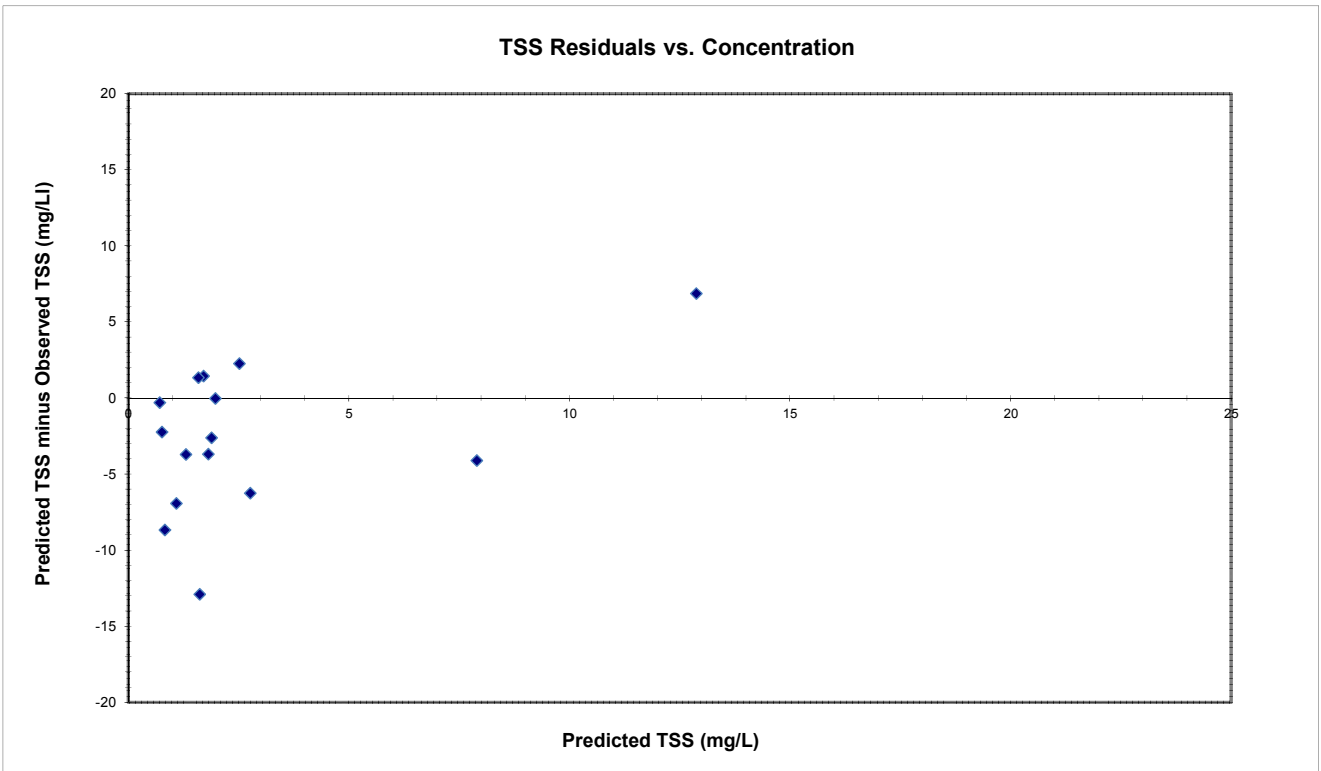
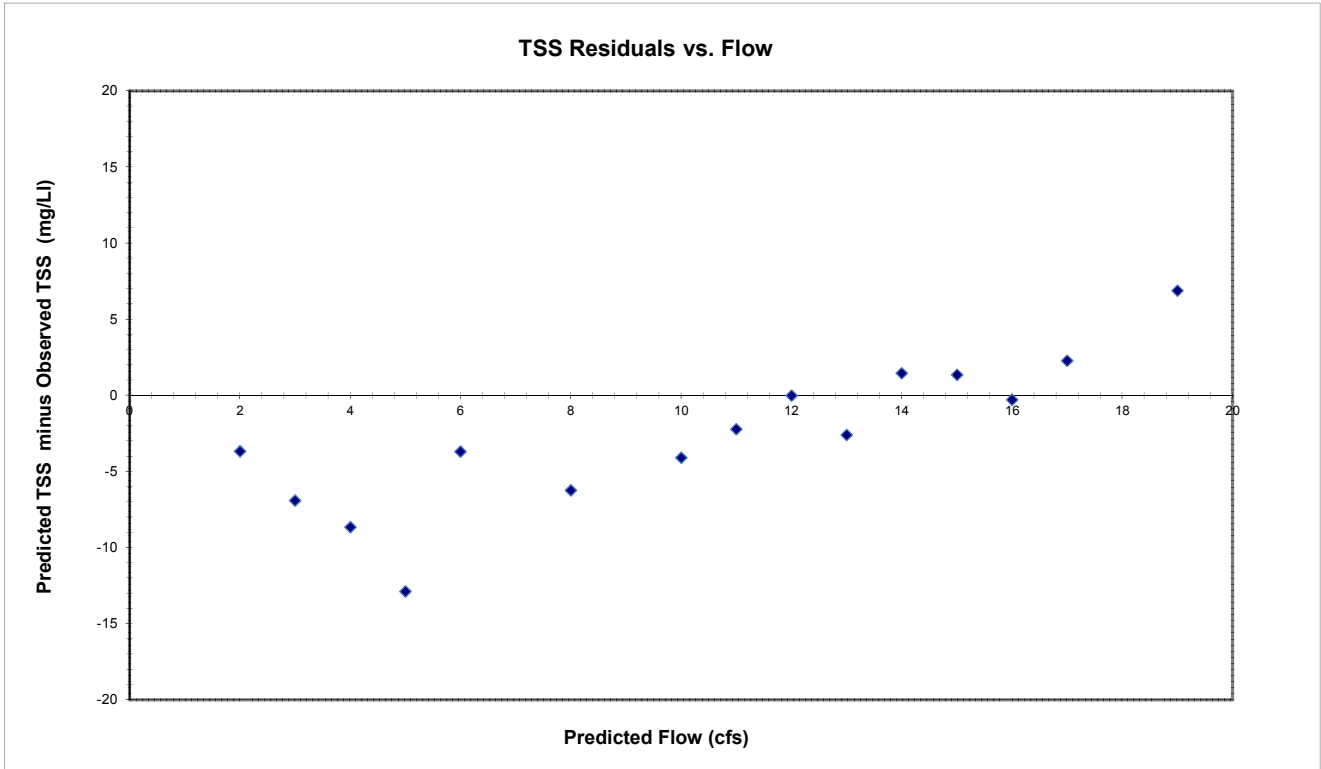
### South Branch Raritan River at Three Bridges (SBRR9)



### South Branch Raritan River at Three Bridges (SBRR9)

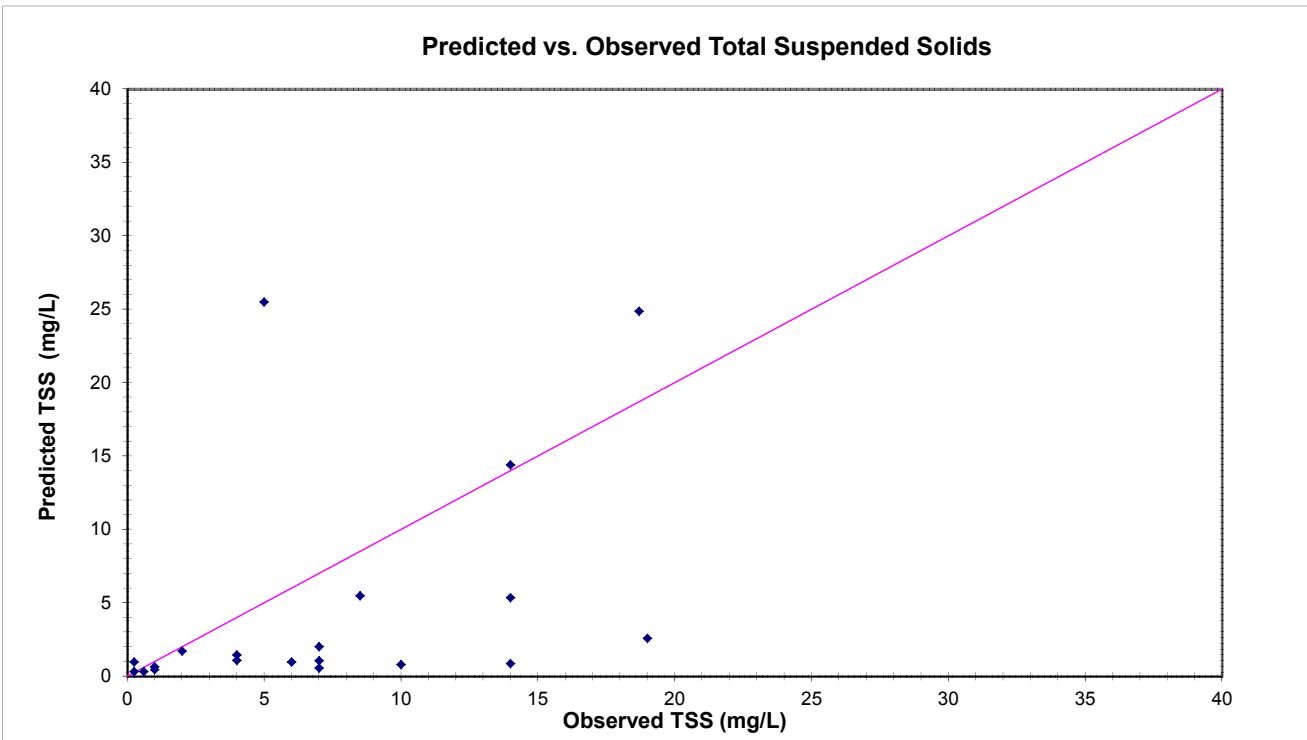
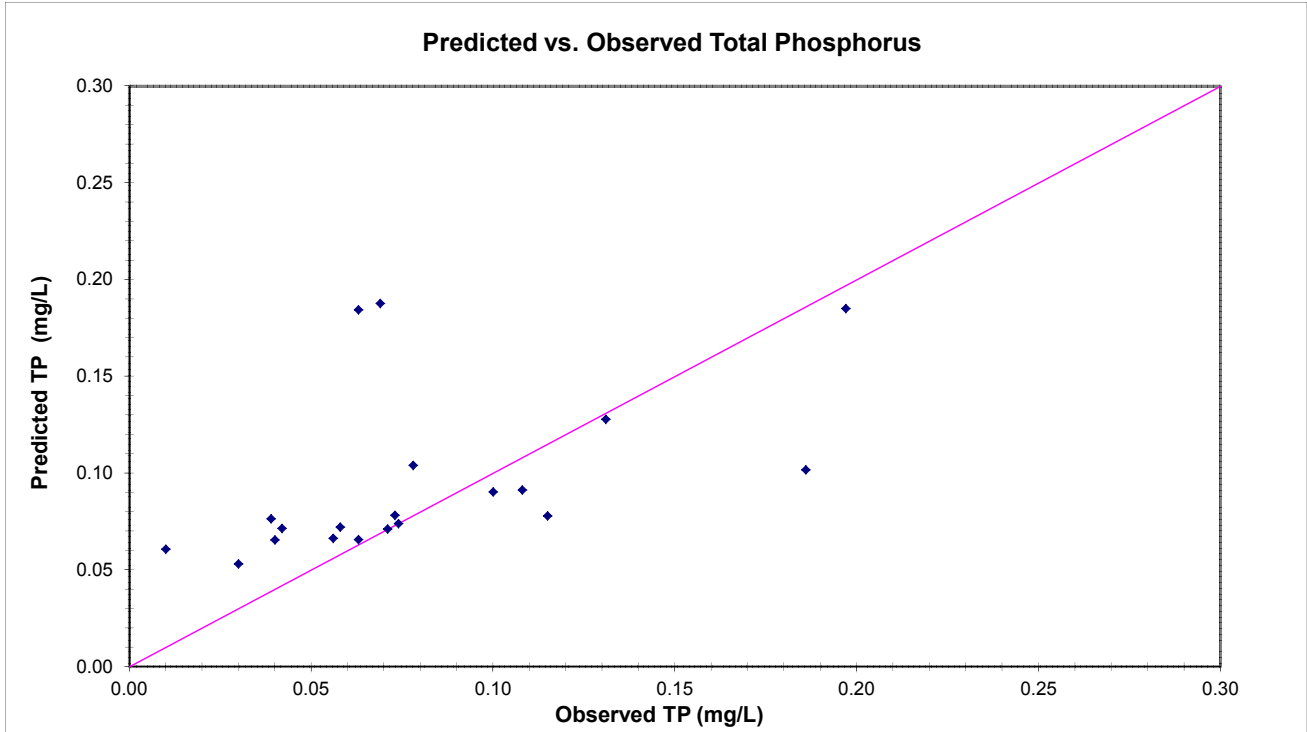


### South Branch Raritan River at Three Bridges (SBRR9)



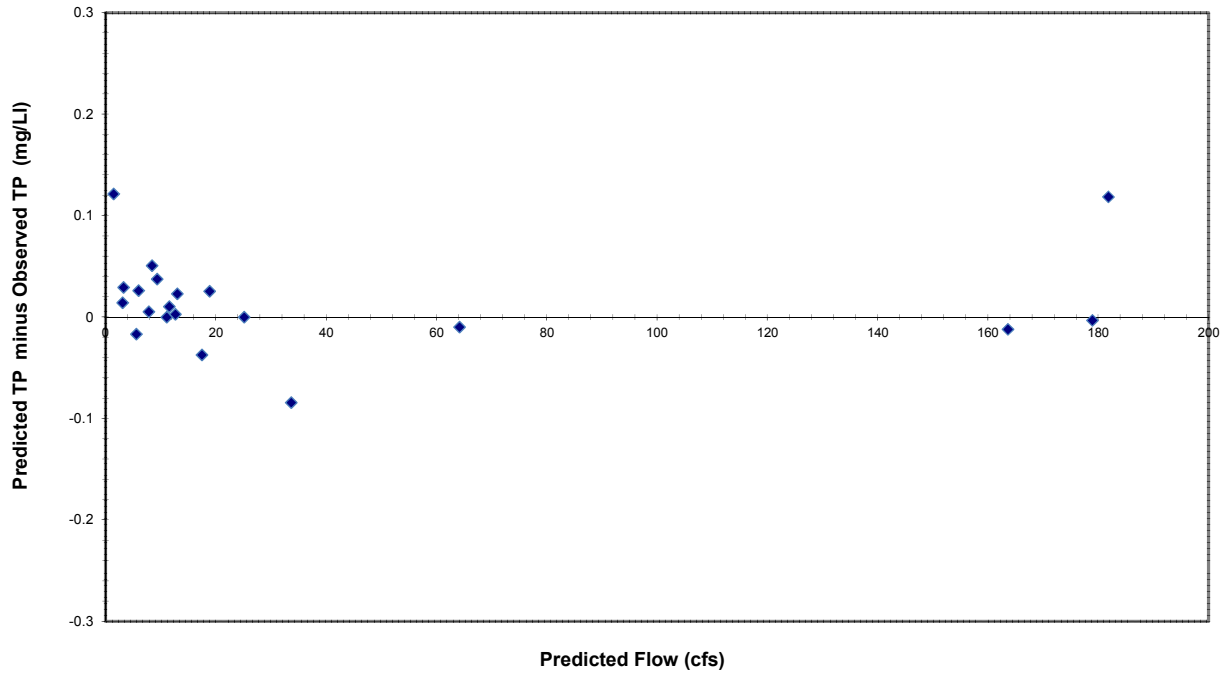


### Neshanic River near Reaville (NR1)

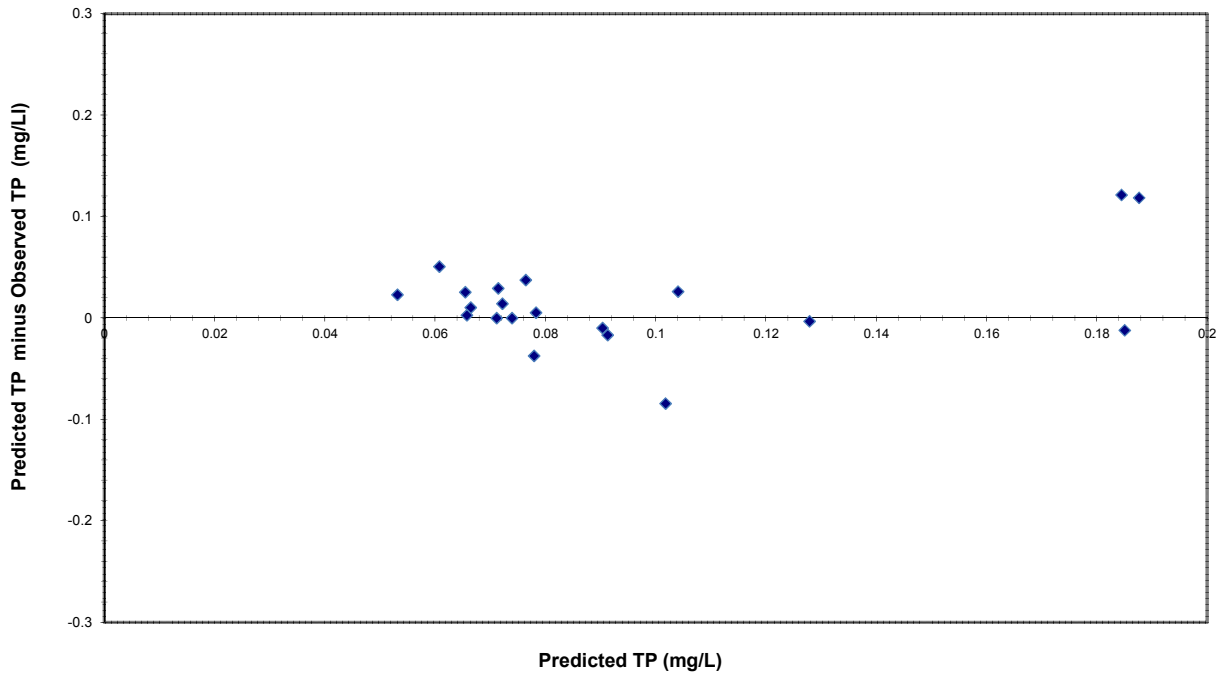


### Neshanic River near Reaville (NR1)

#### Total Phosphorus Residuals vs. Flow

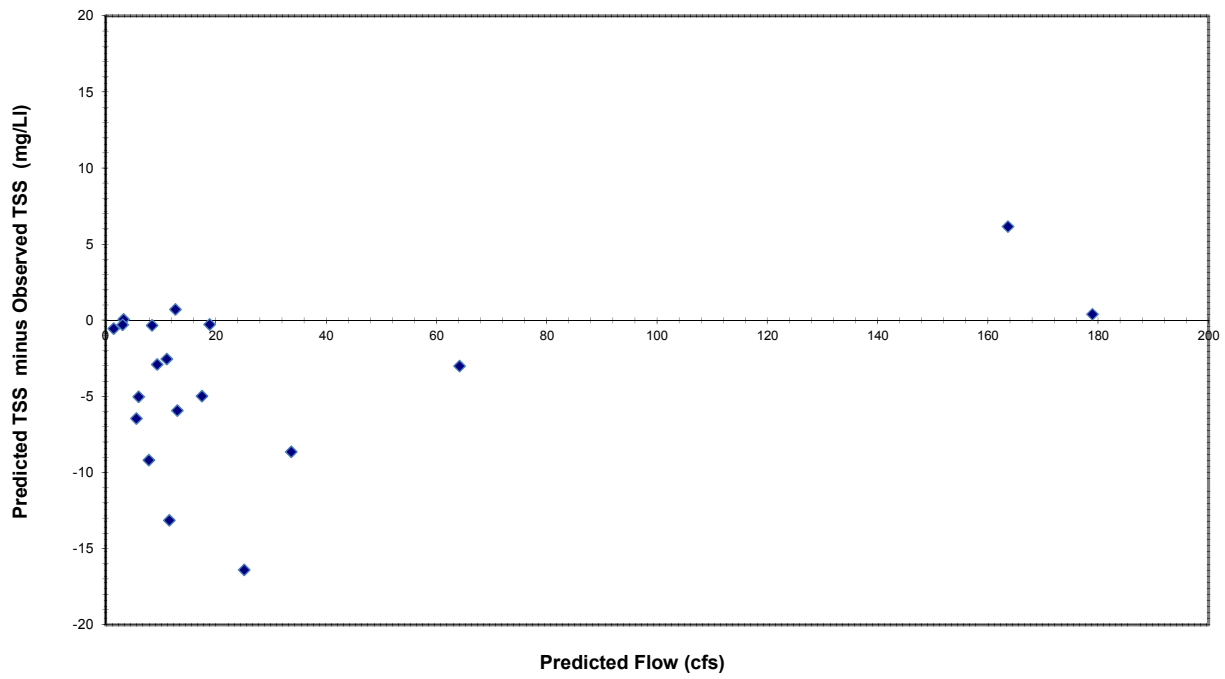


#### Total Phosphorus Residuals vs. Concentration

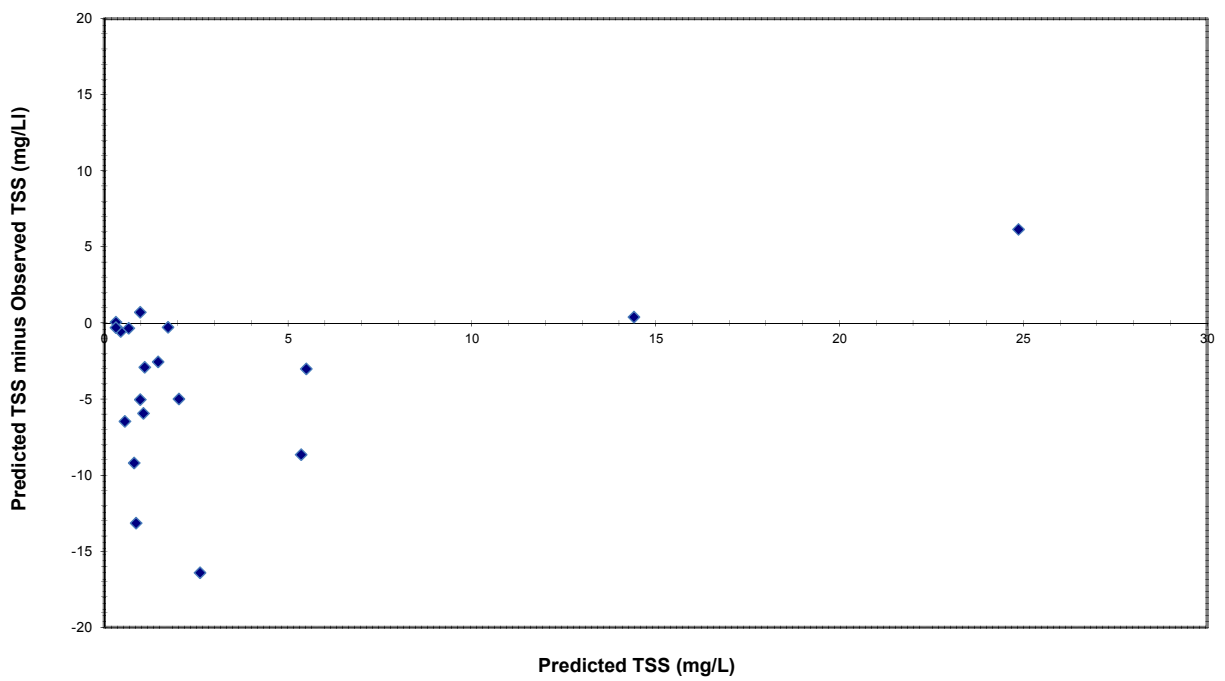


### Neshanic River near Reaville (NR1)

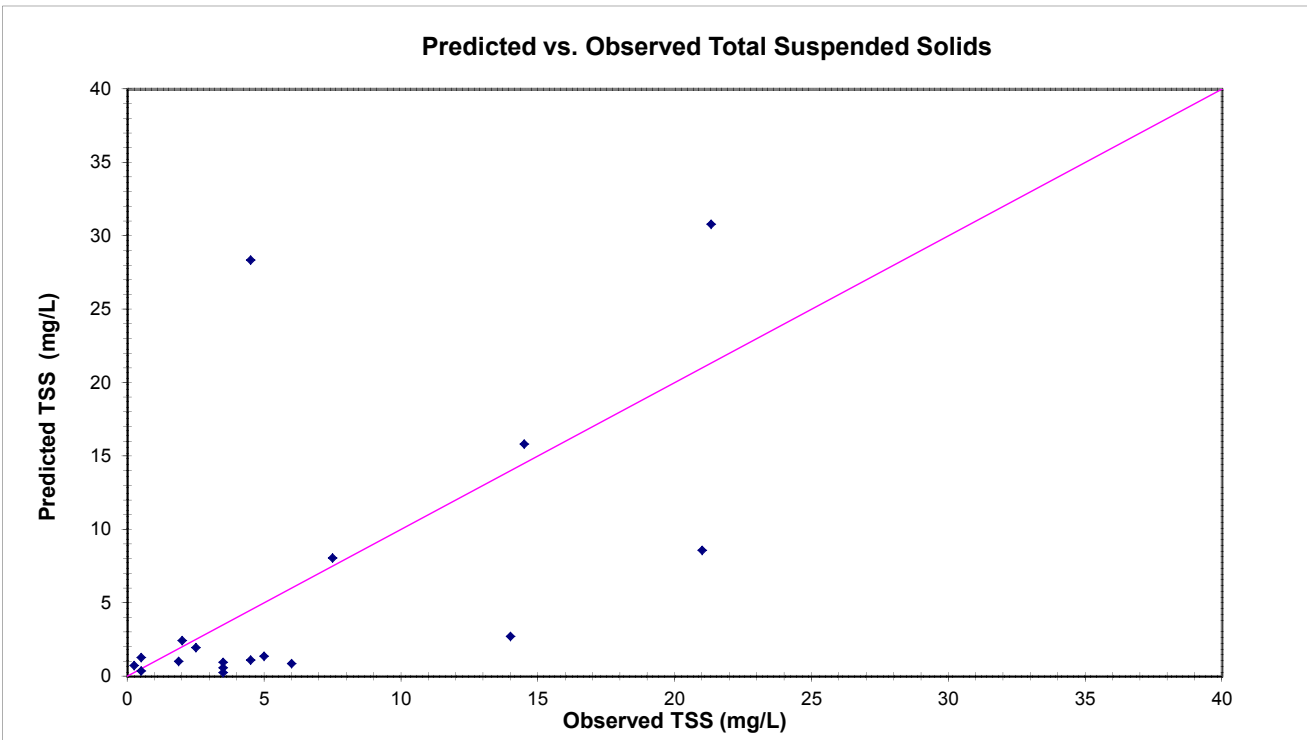
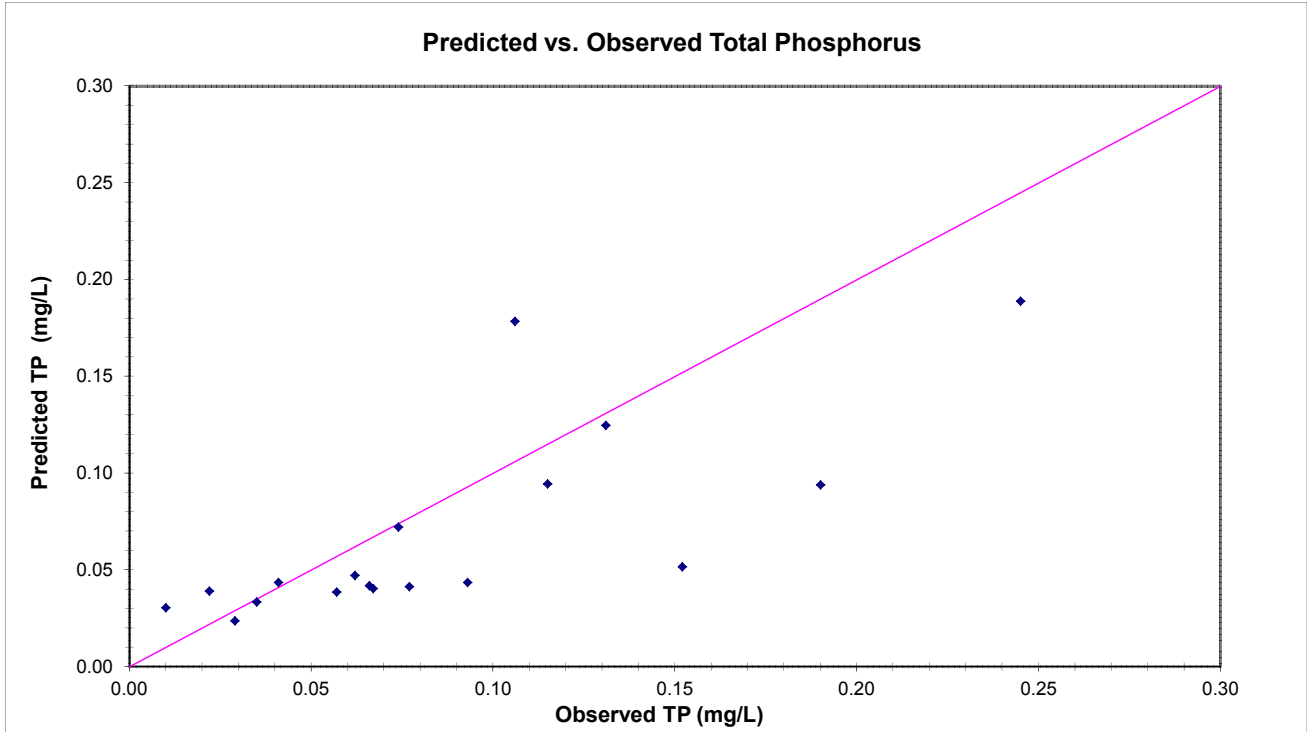
#### TSS Residuals vs. Flow



#### TSS Residuals vs. Concentration

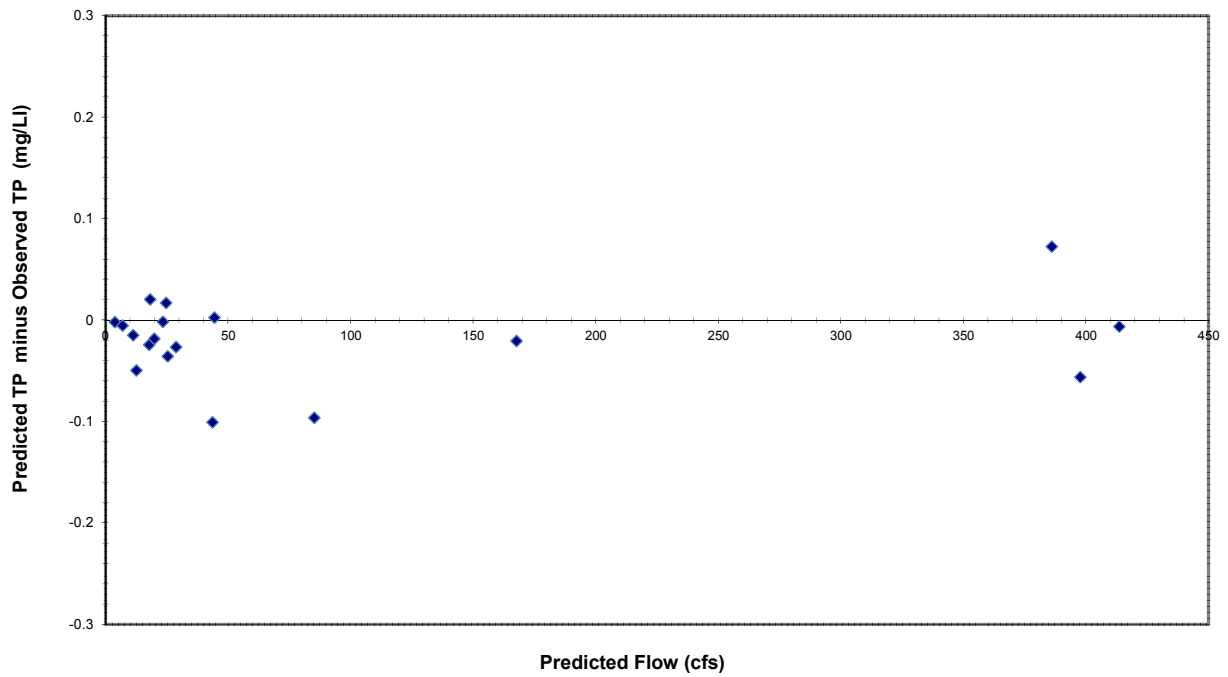


### Neshanic River at Hillsborough (NR2)

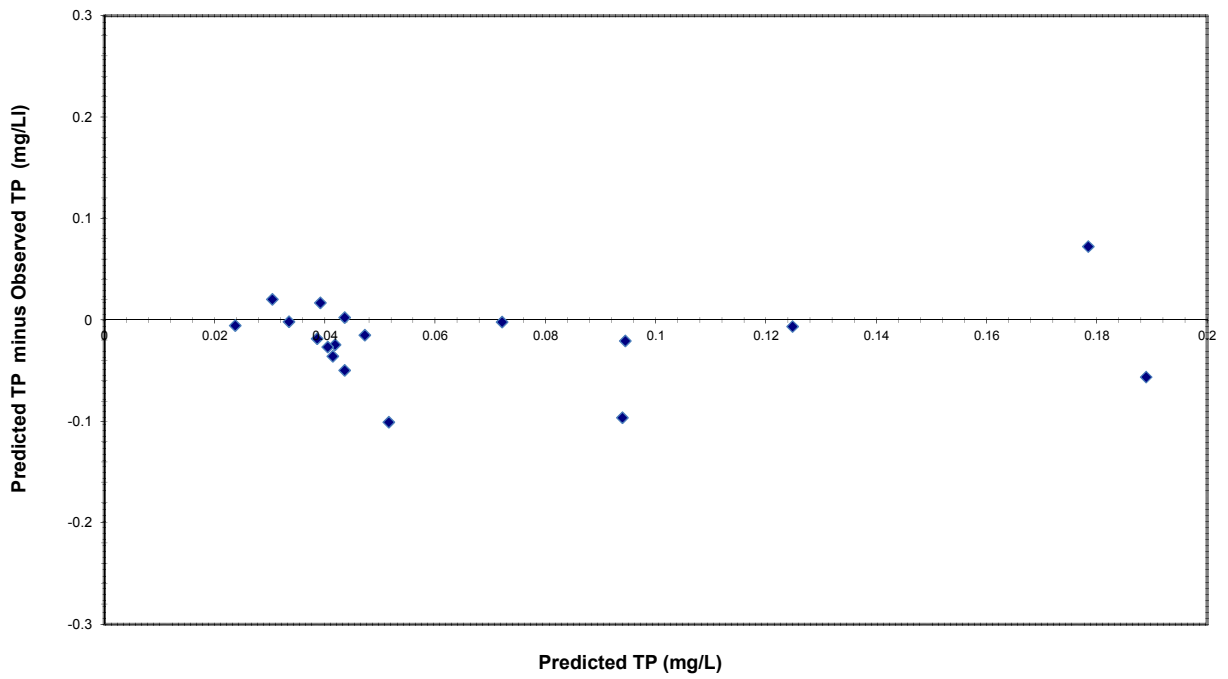


### Neshanic River at Hillsborough (NR2)

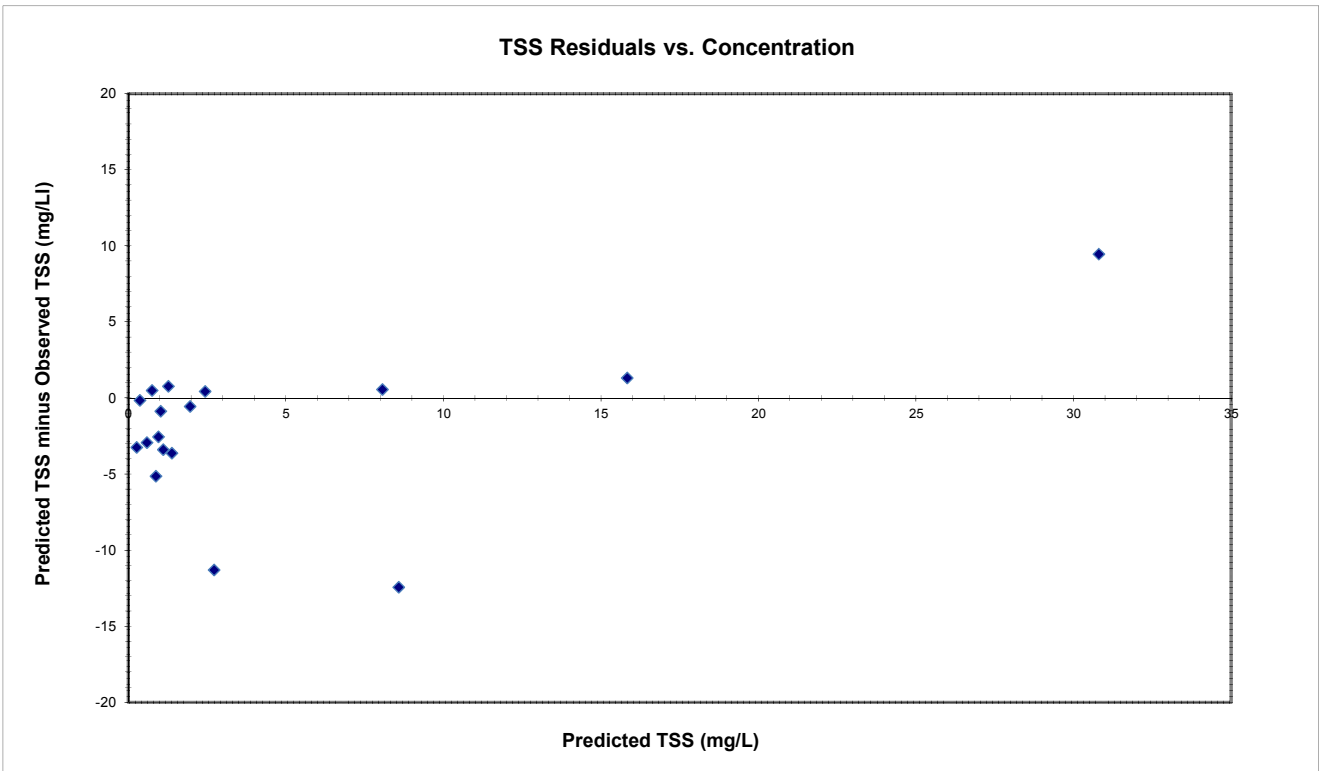
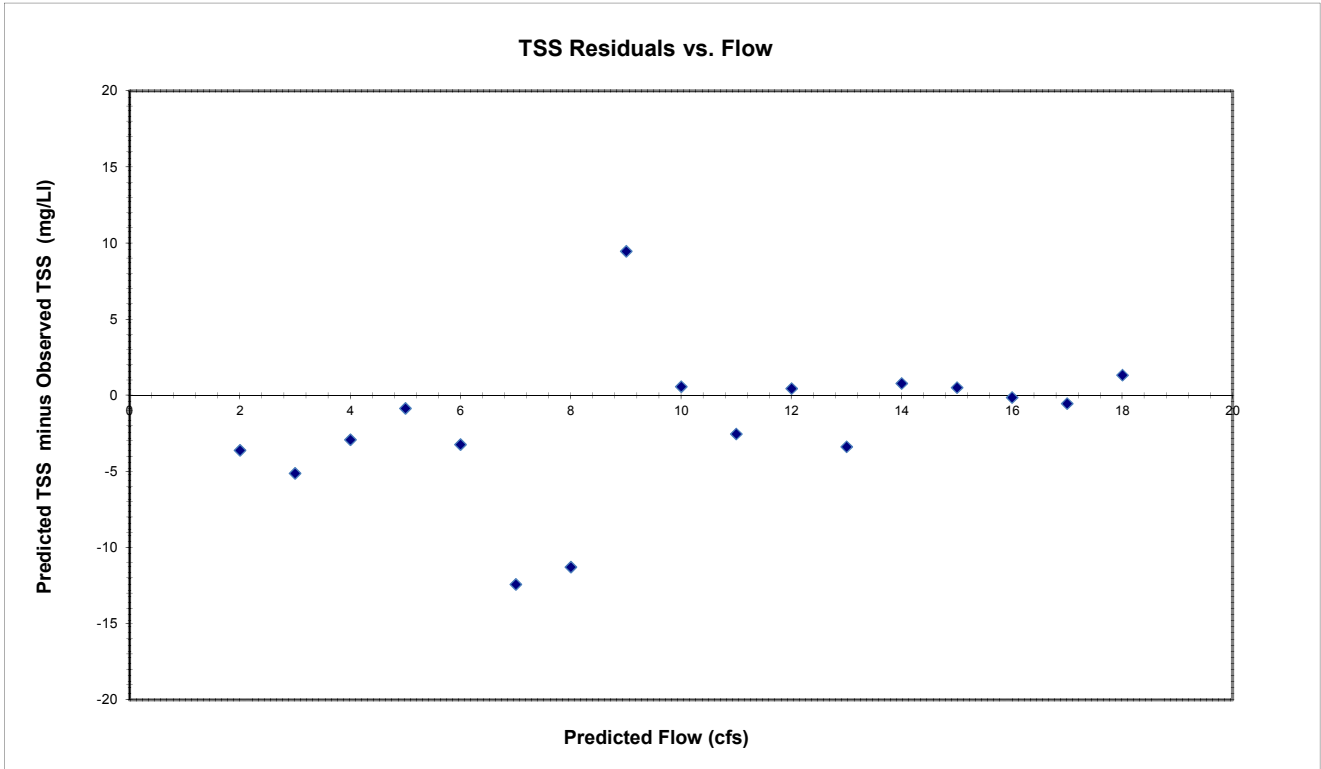
#### Total Phosphorus Residuals vs. Flow



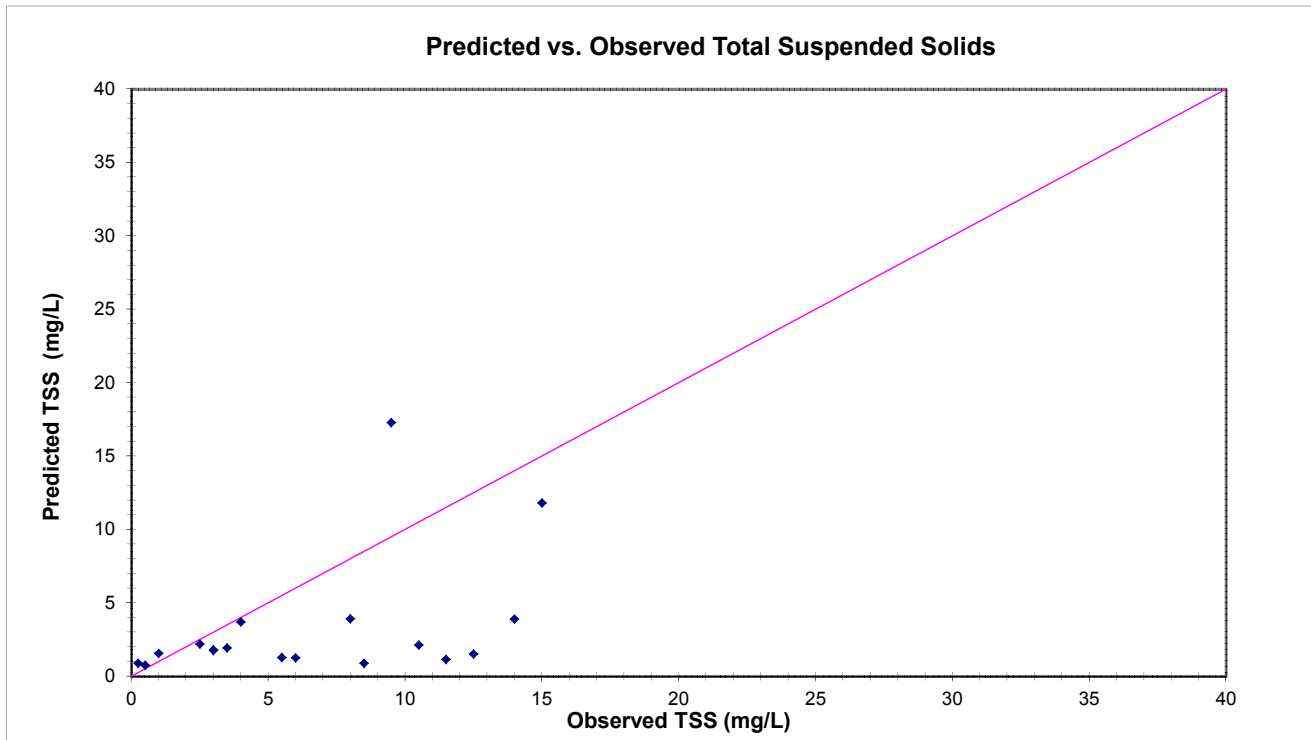
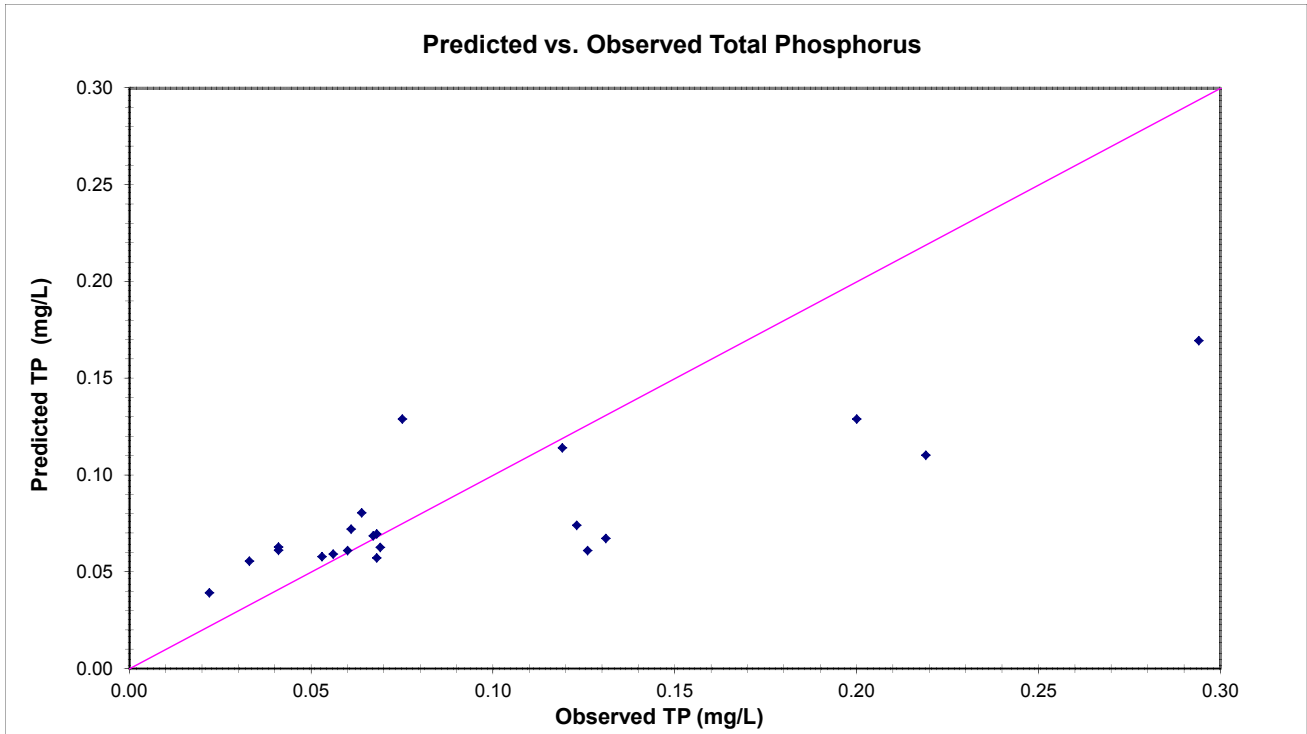
#### Total Phosphorus Residuals vs. Concentration



### Neshanic River at Hillsborough (NR2)

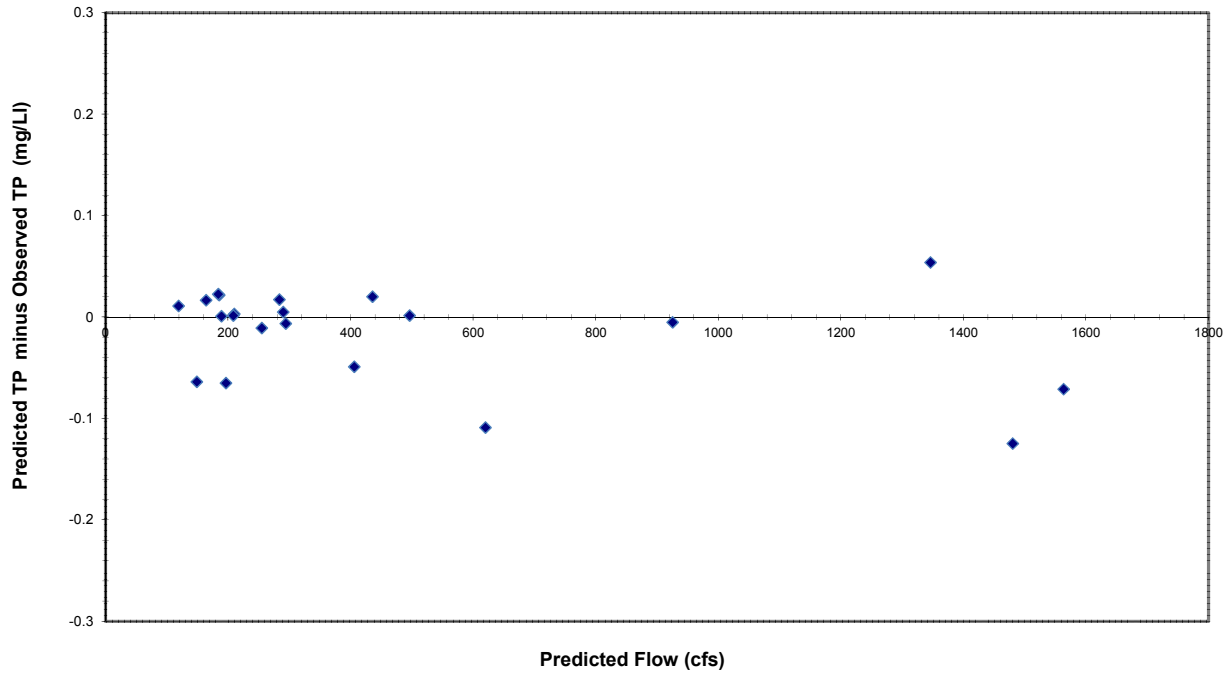


### South Branch Raritan River at Studdiford Rd. (SBRR10)

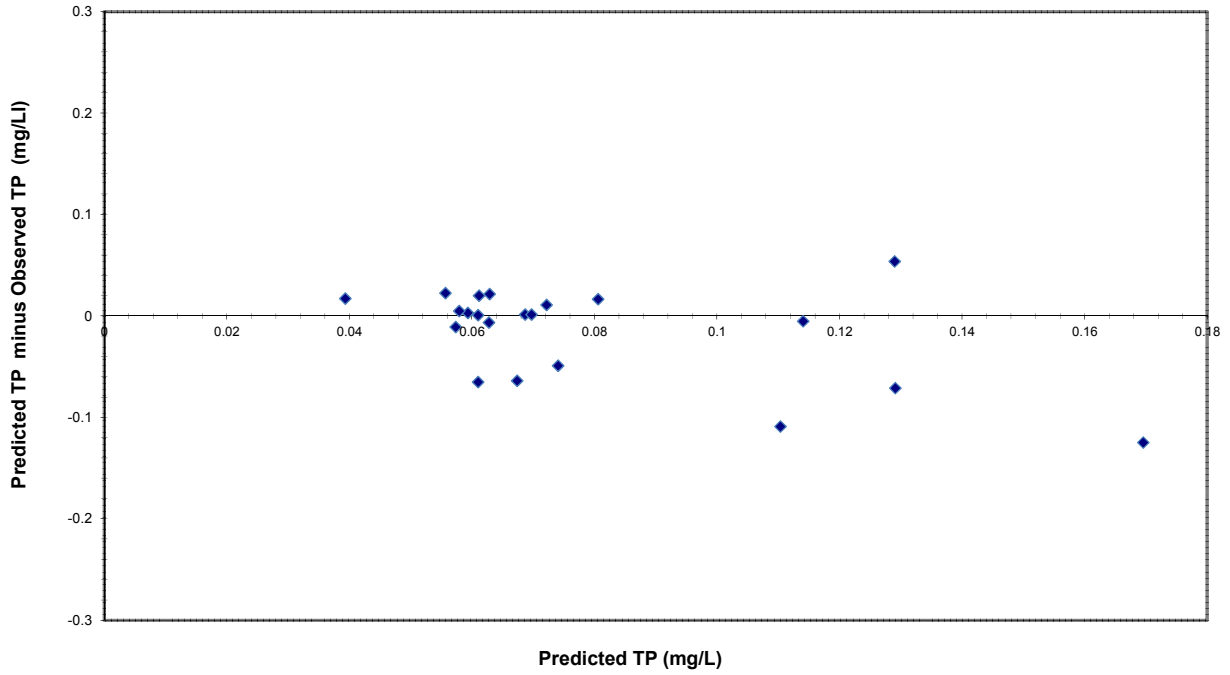


South Branch Raritan River at Studdiford Rd. (SBRR10)

Total Phosphorus Residuals vs. Flow

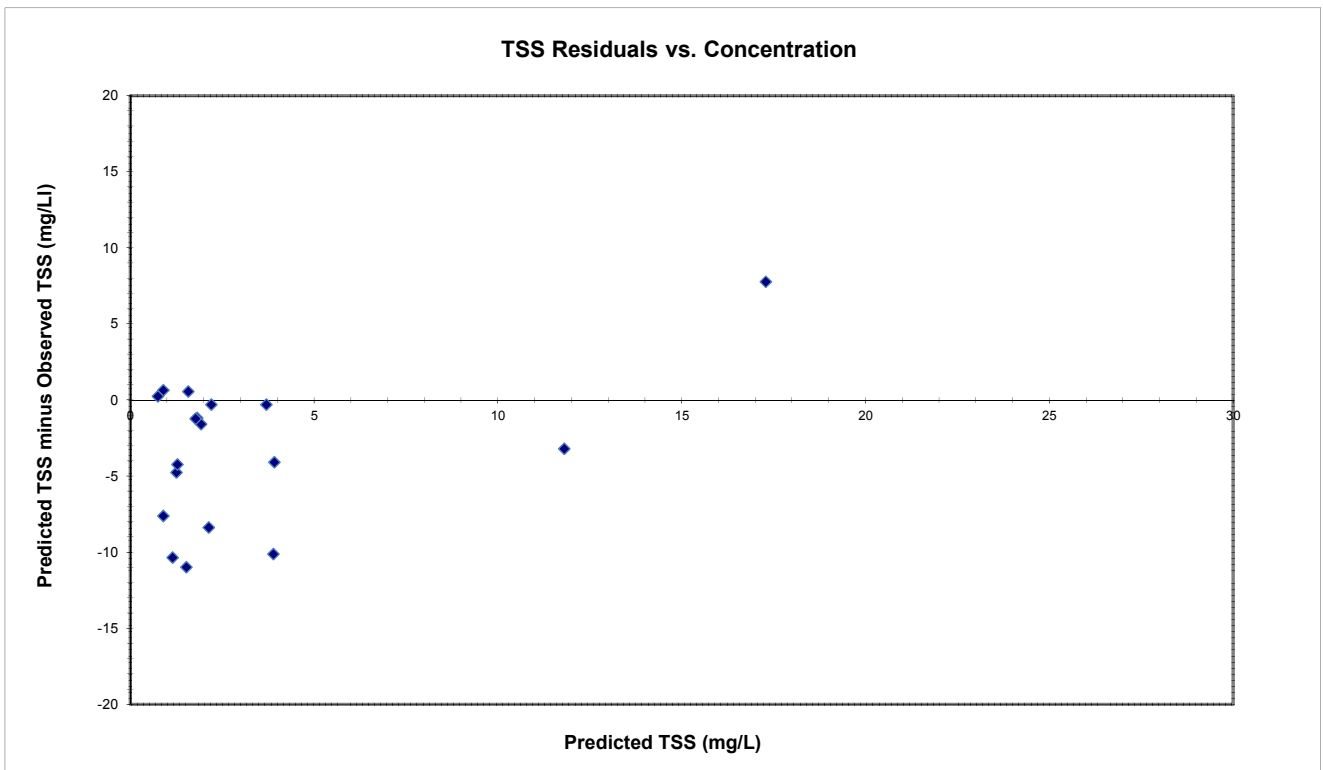
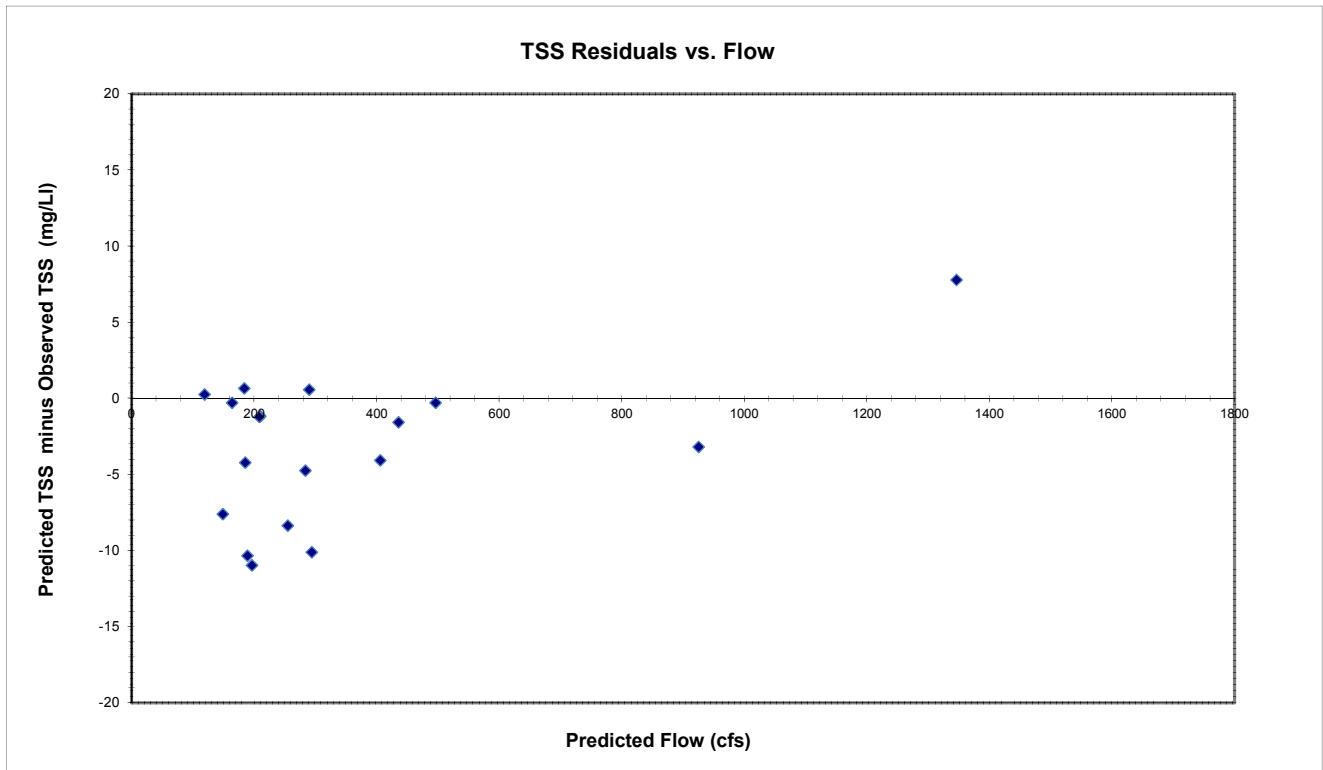


Total Phosphorus Residuals vs. Concentration

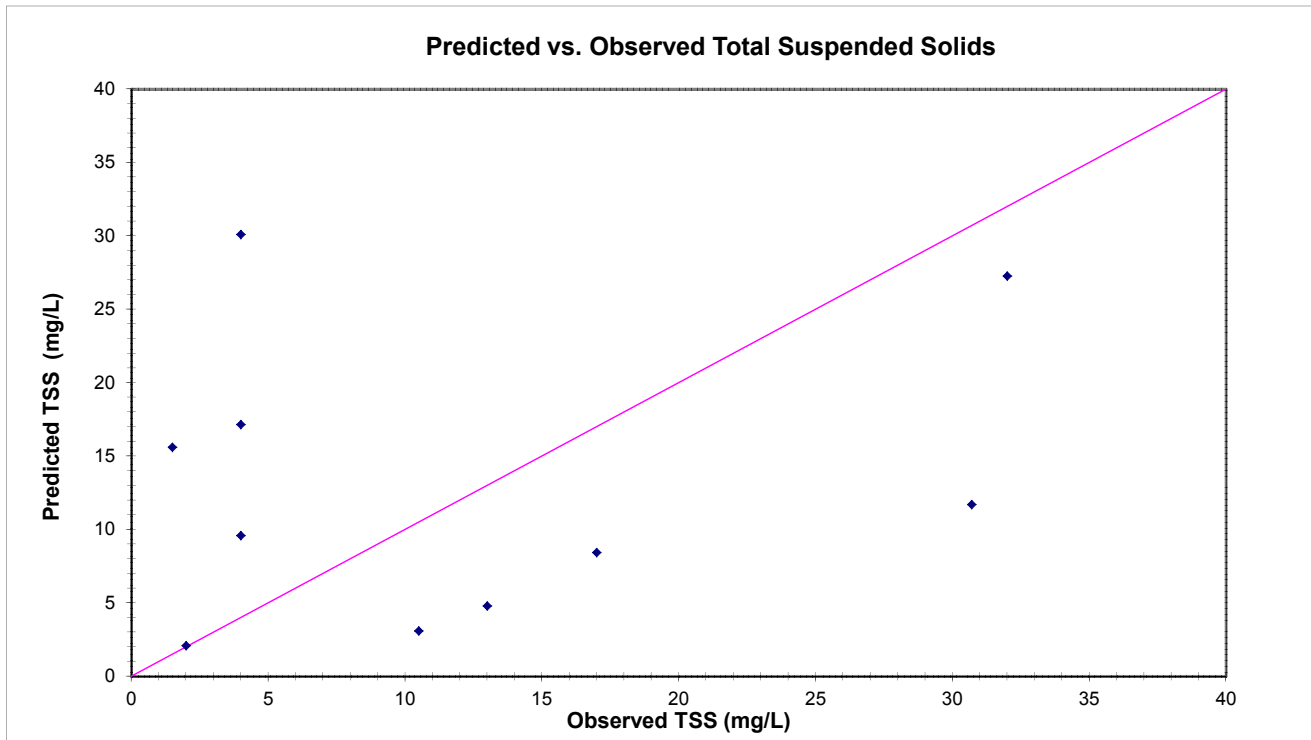
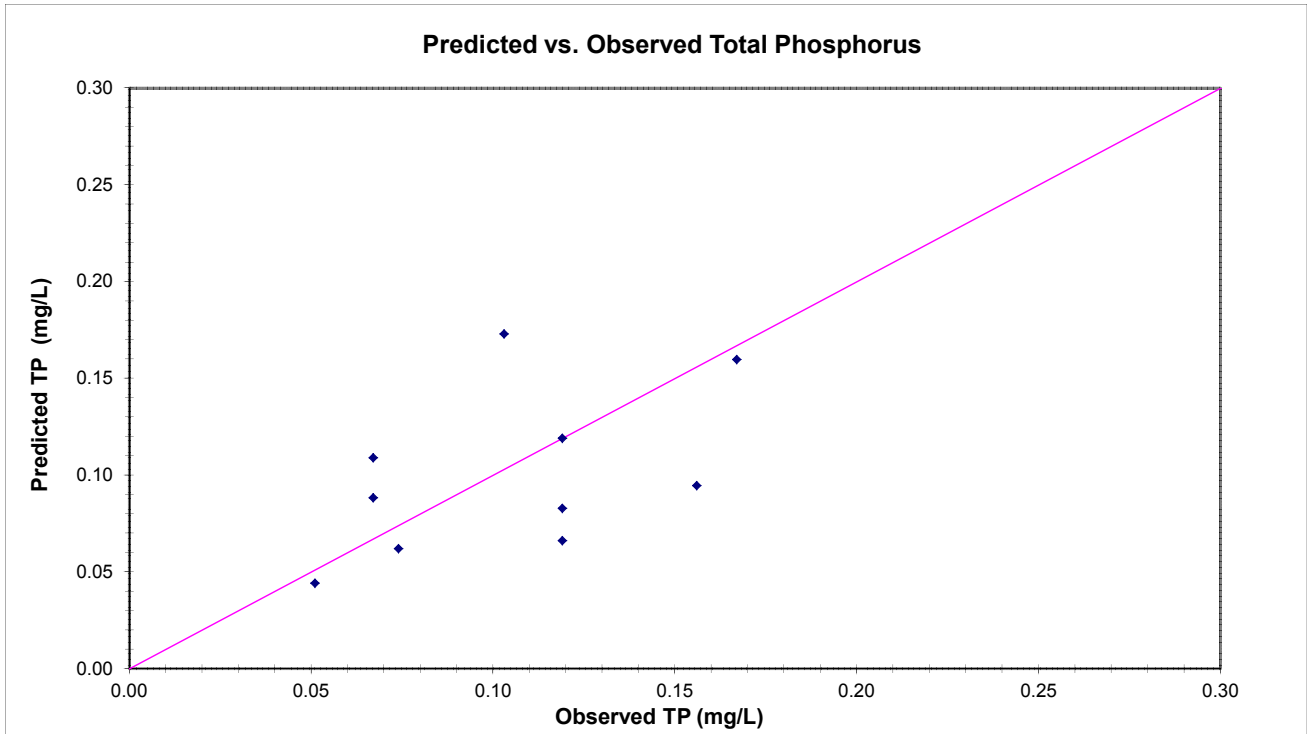




South Branch Raritan River at Studdiford Rd. (SBRR10)

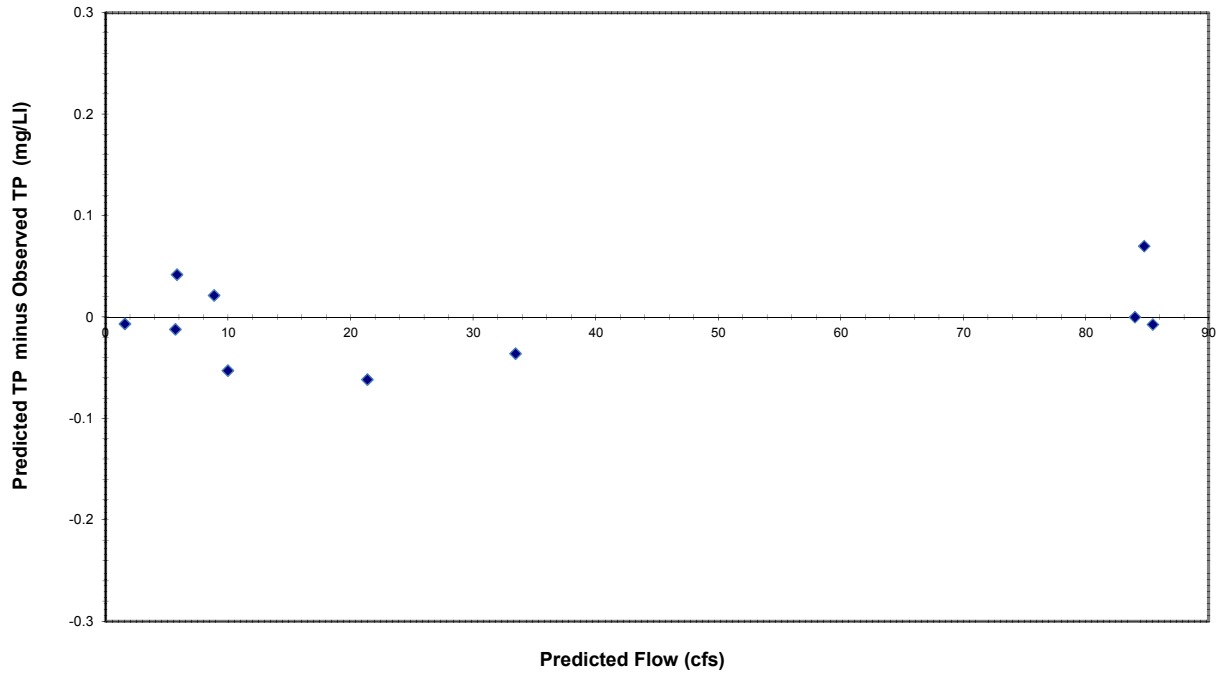


### Holland Brook at South Branch Road (HB1)

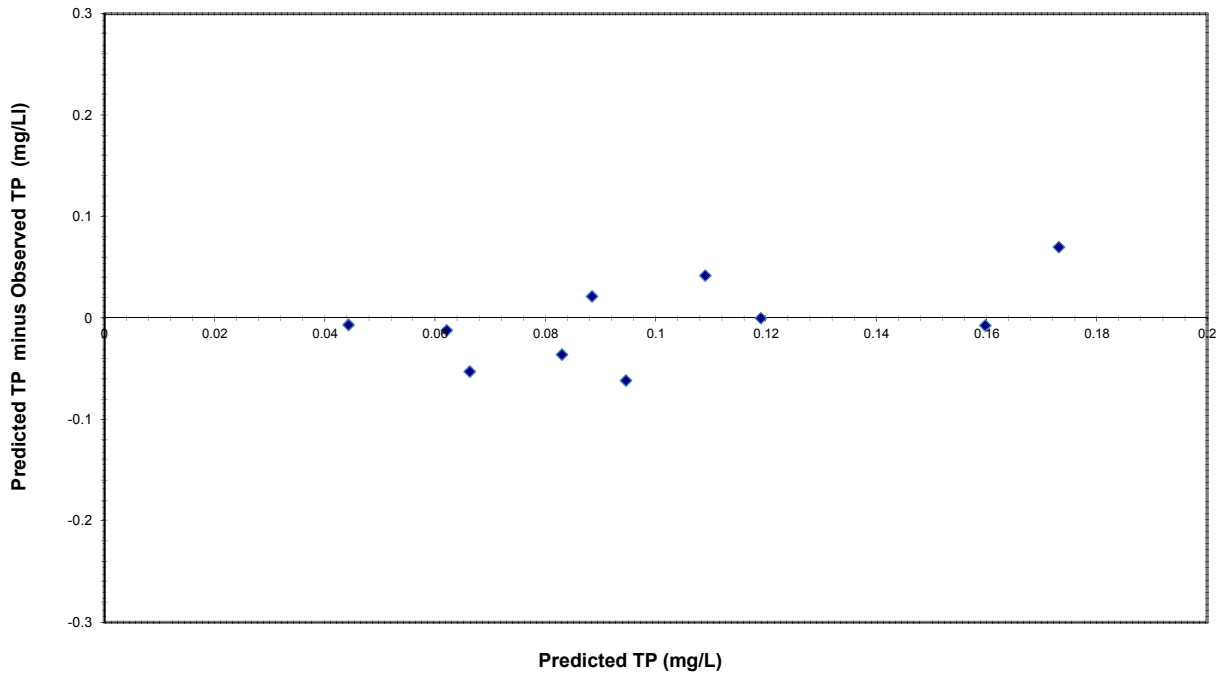


### Holland Brook at South Branch Road (HB1)

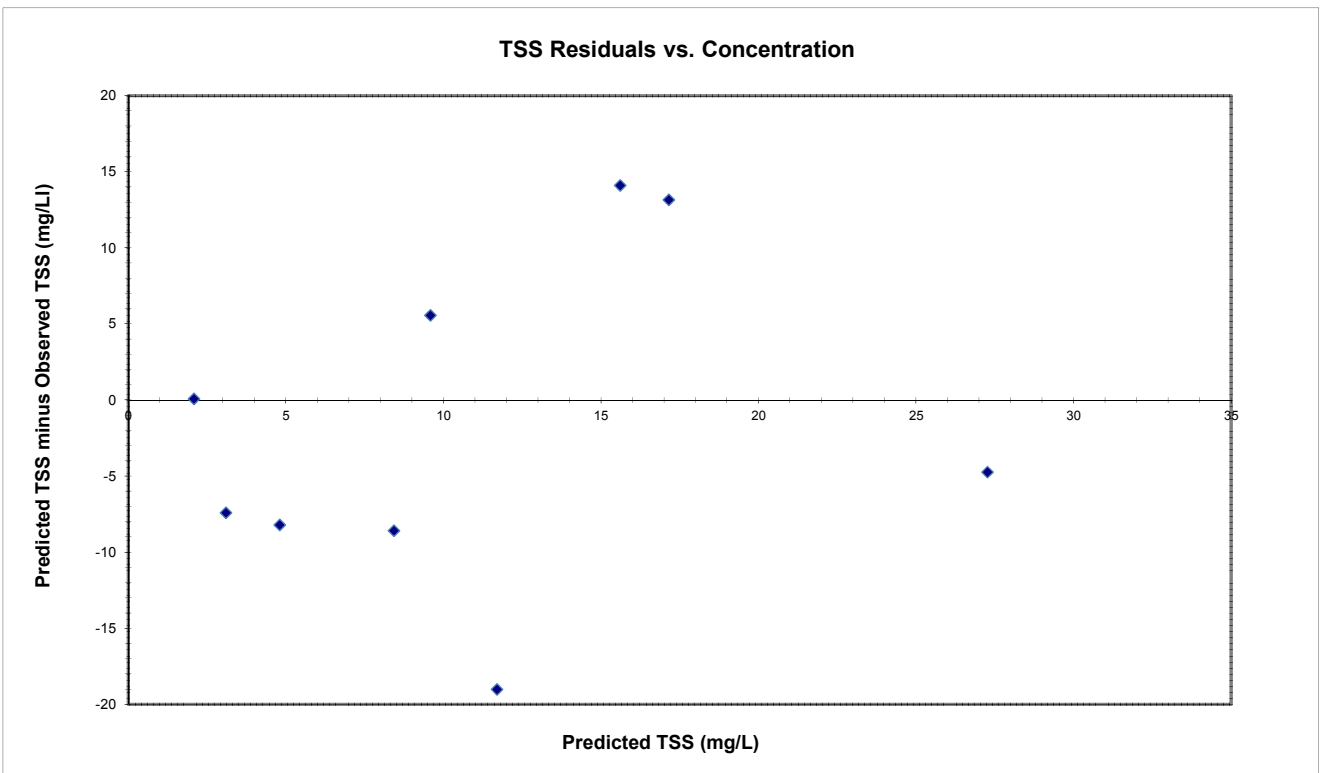
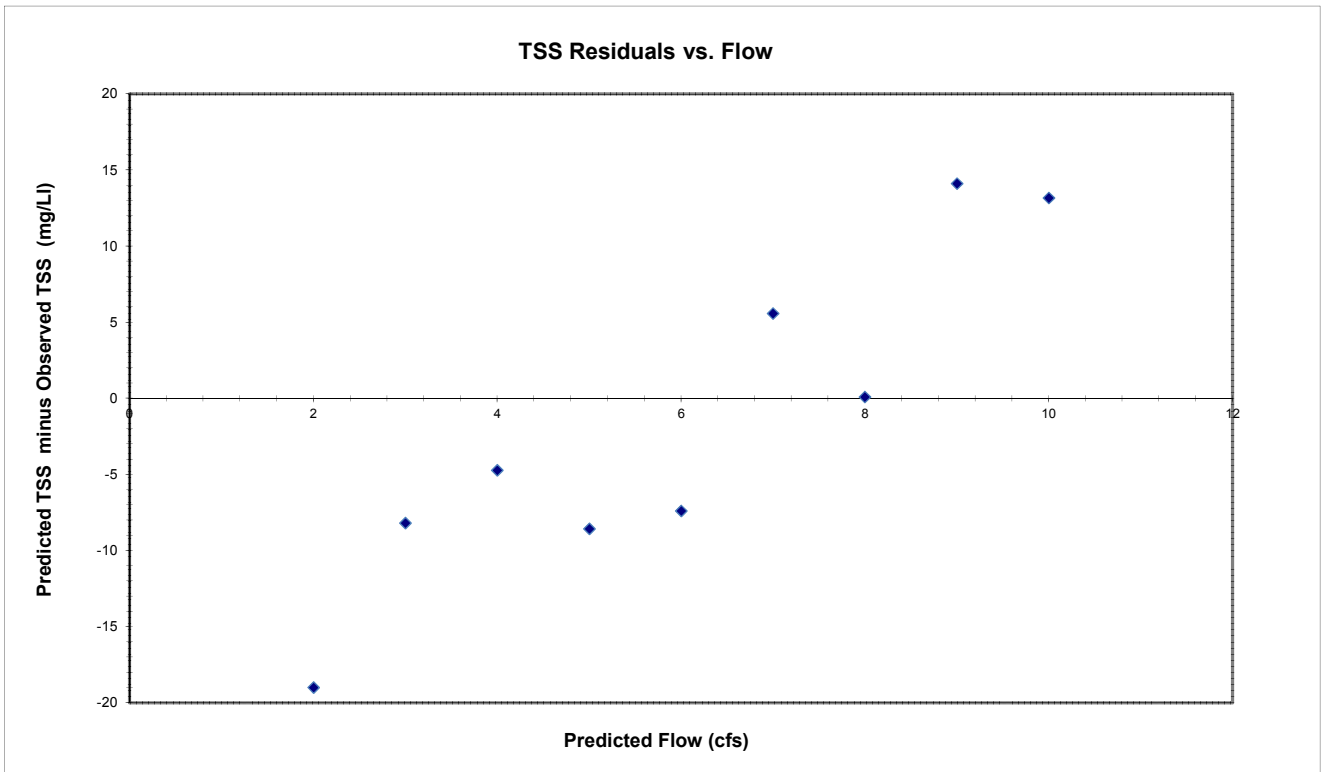
#### Total Phosphorus Residuals vs. Flow



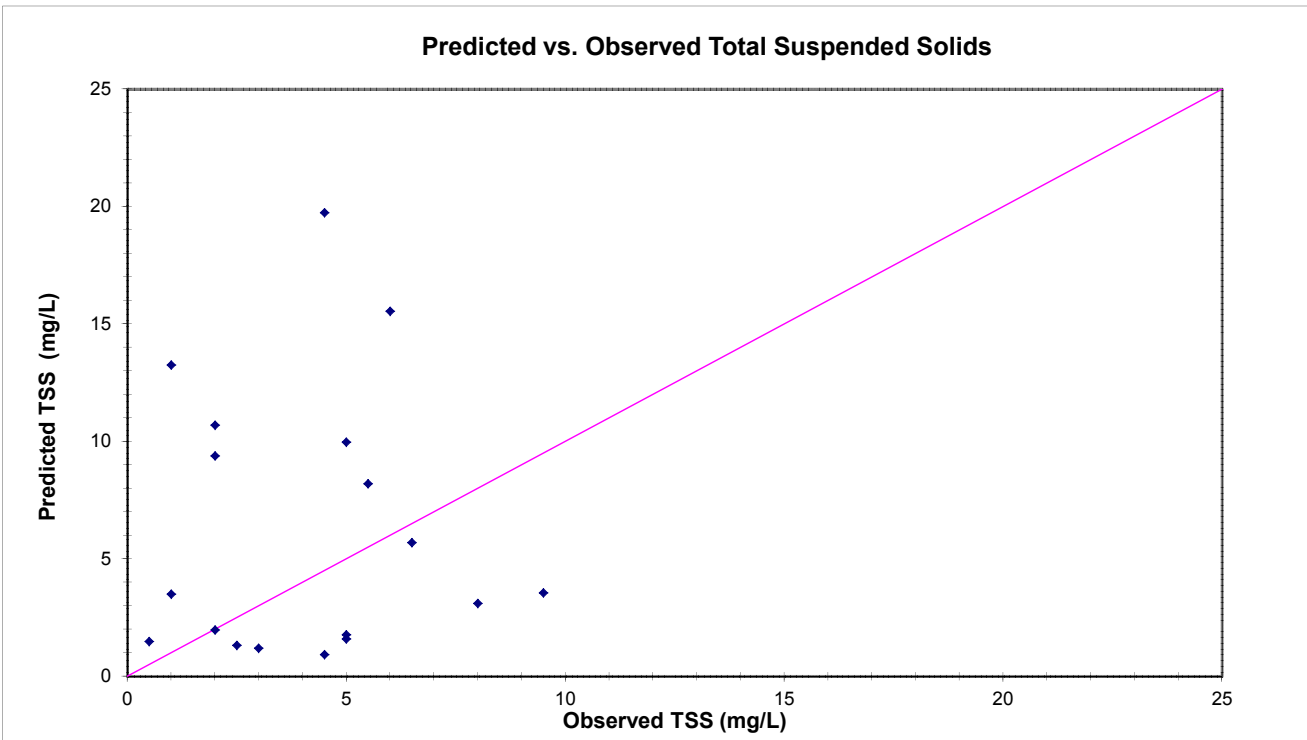
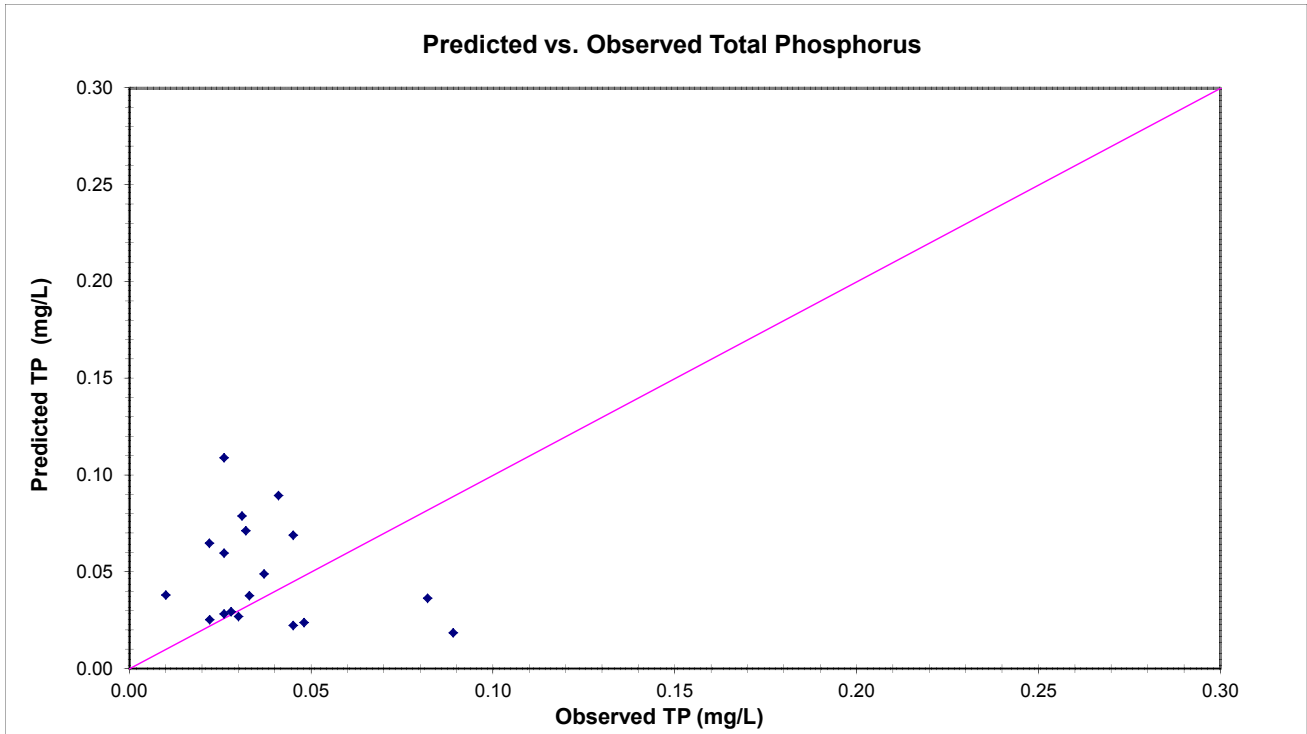
#### Total Phosphorus Residuals vs. Concentration



### Holland Brook at South Branch Road (HB1)

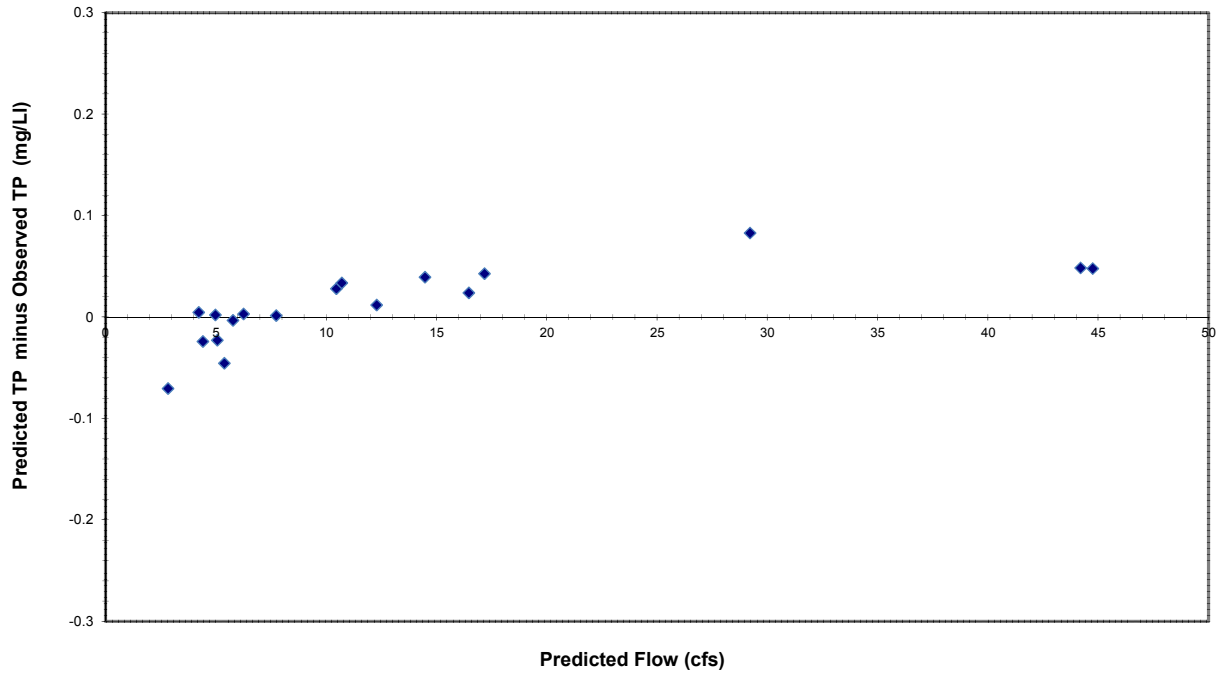


### Lamington River Upstream Roxbury STP (LR1)

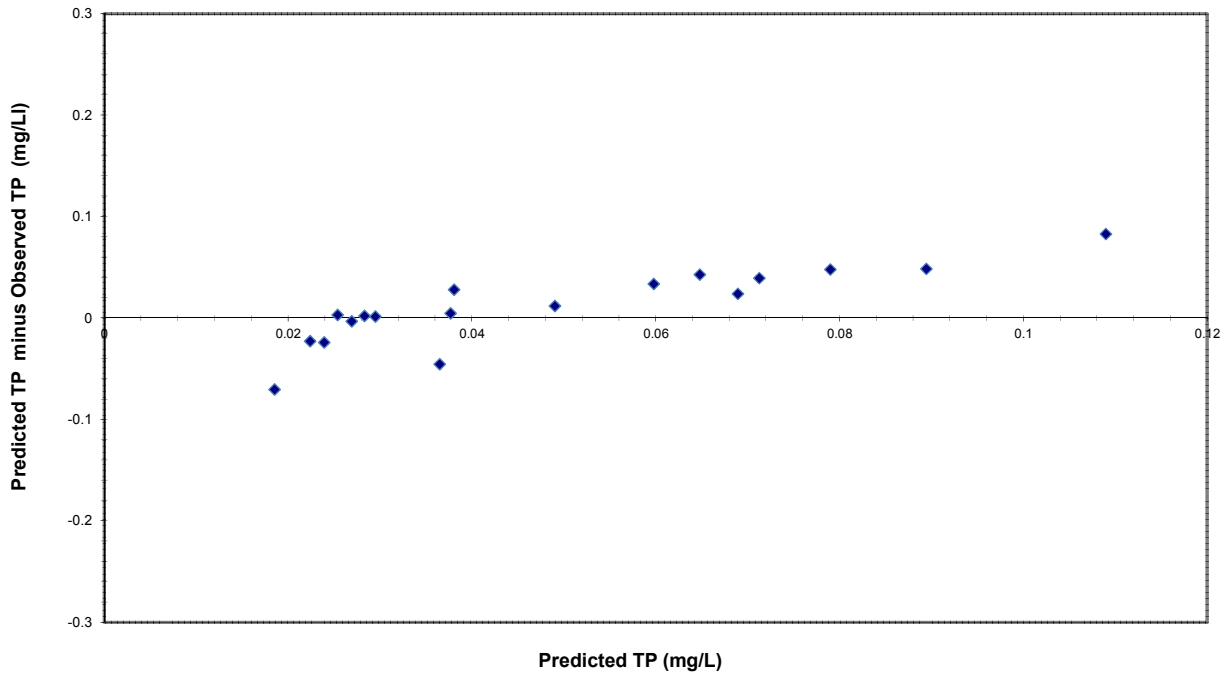


### Lamington River Upstream Roxbury STP (LR1)

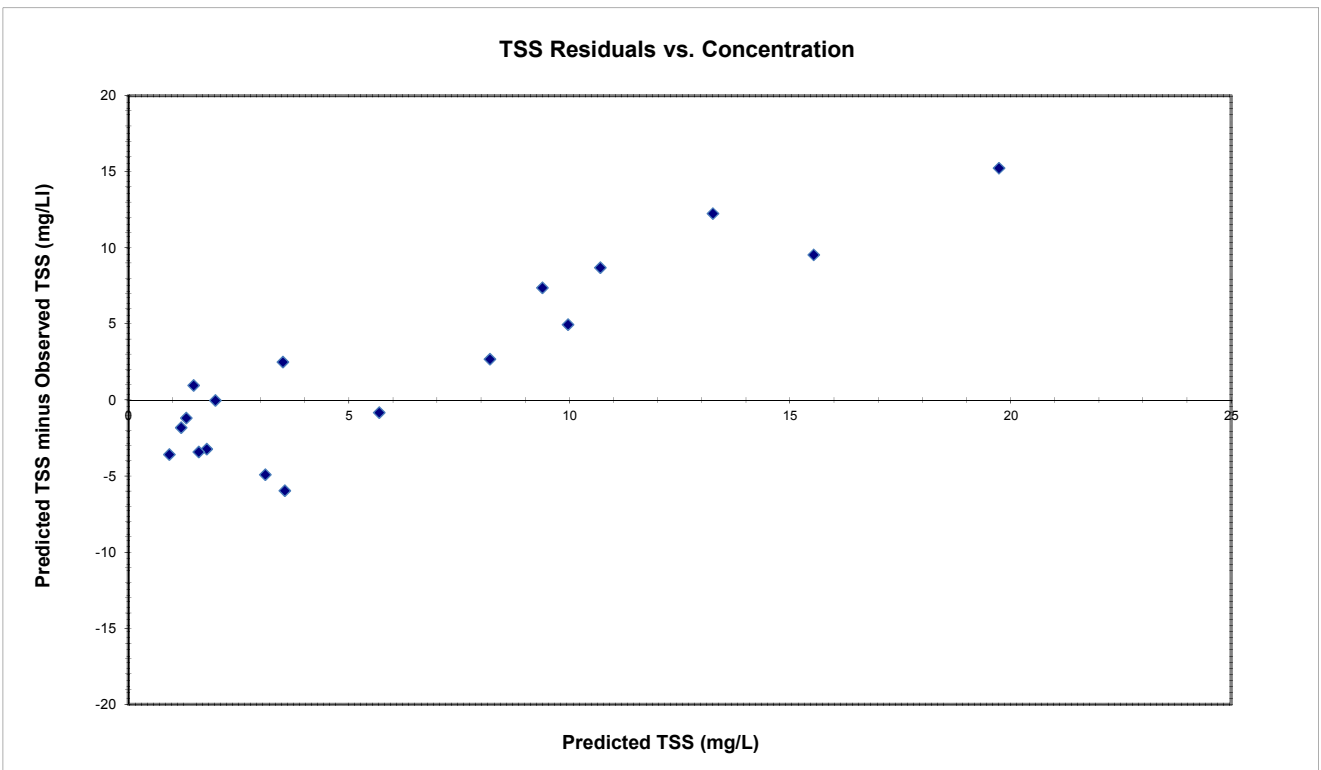
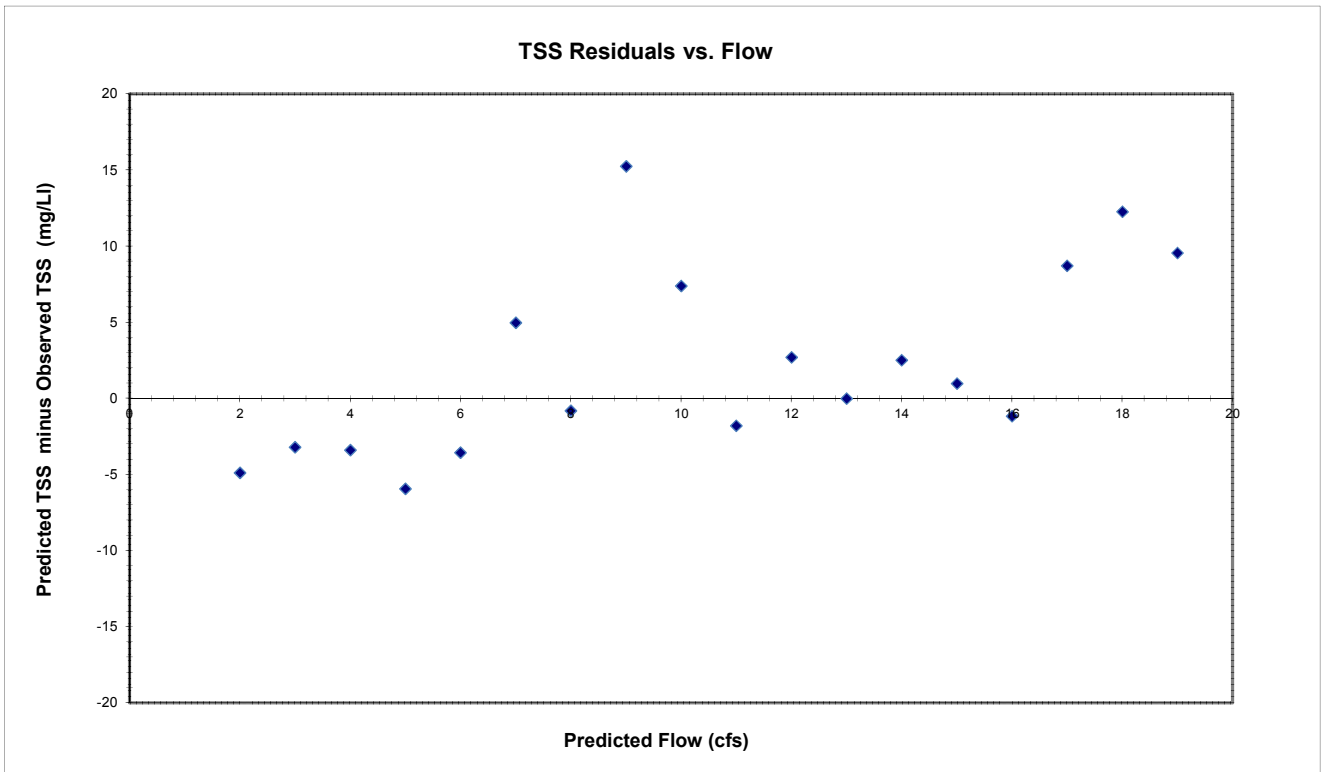
#### Total Phosphorus Residuals vs. Flow



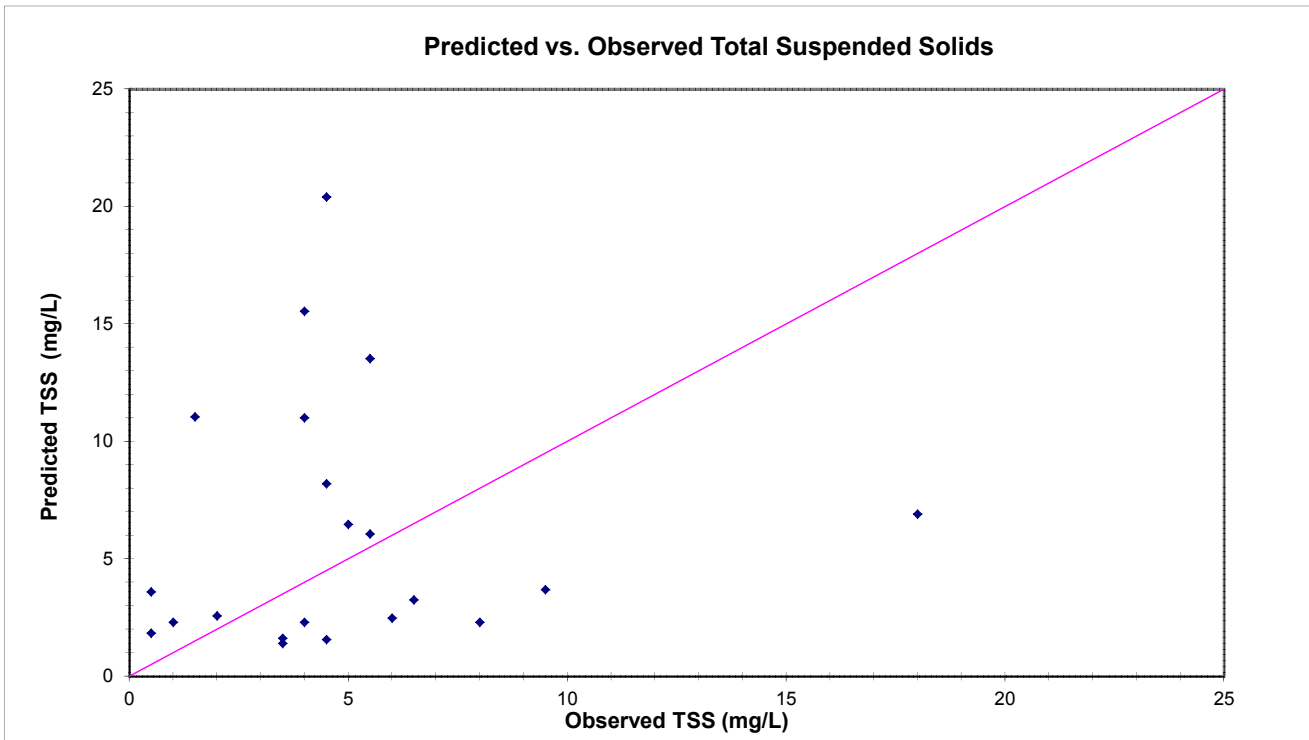
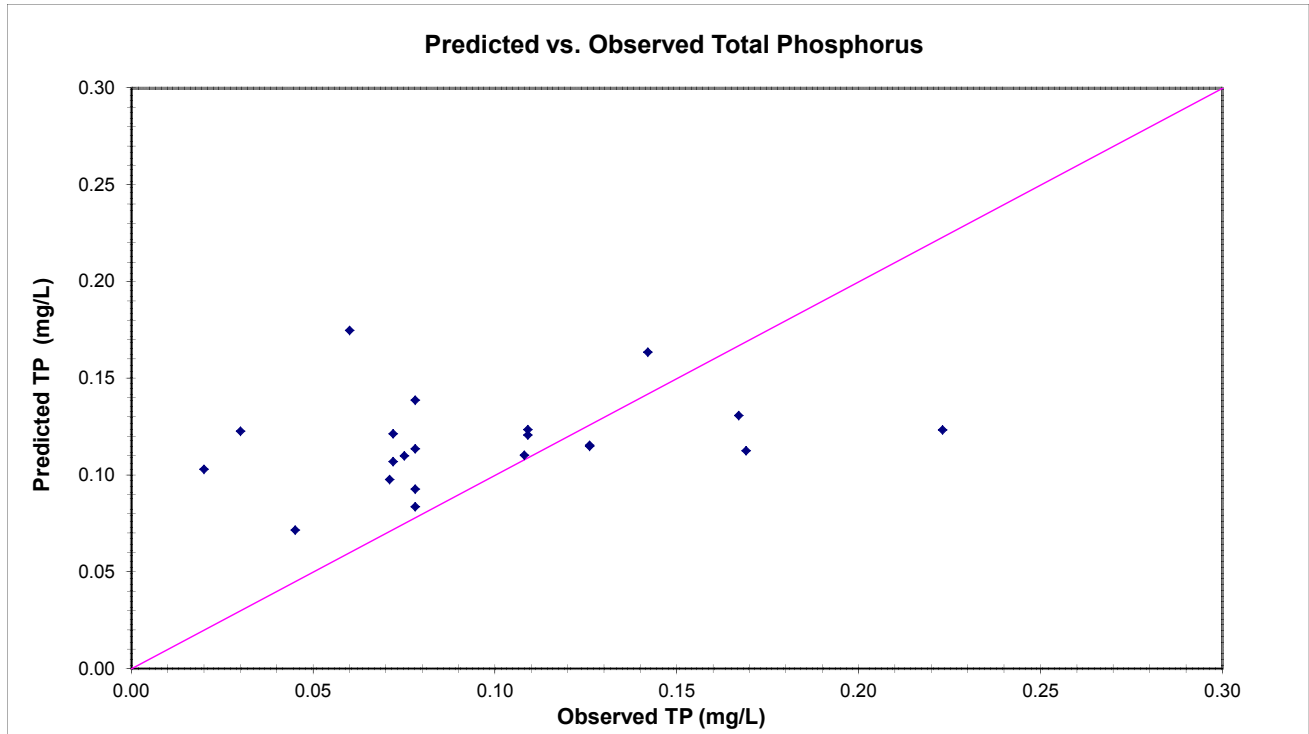
#### Total Phosphorus Residuals vs. Concentration



### Lamington River Upstream Roxbury STP (LR1)



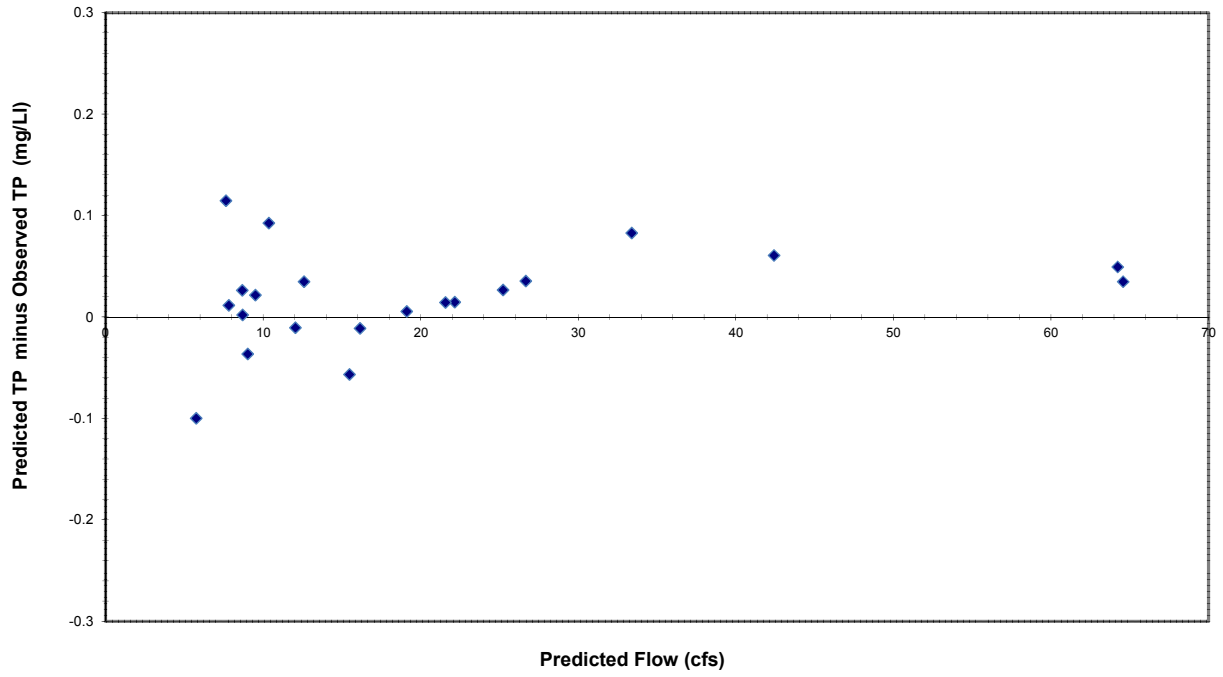
### Lamington River Downstream Roxbury STP (LR2)



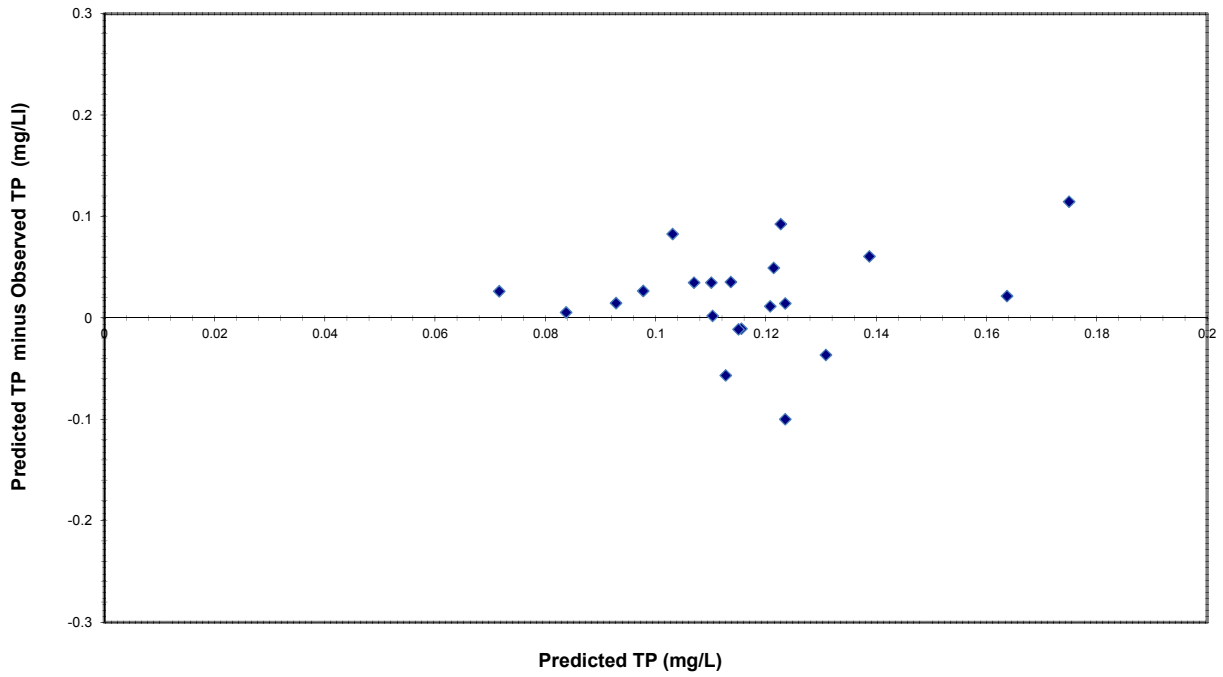


### Lamington River Downstream Roxbury STP (LR2)

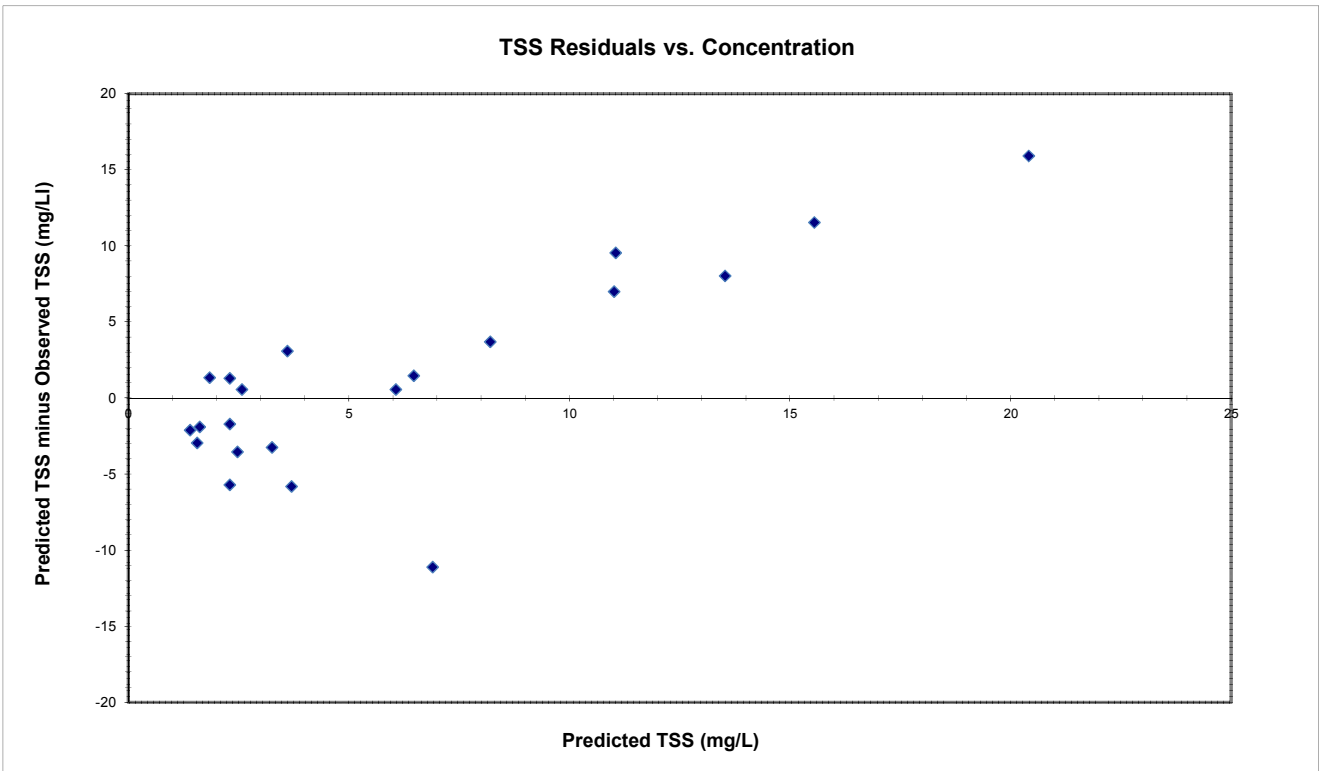
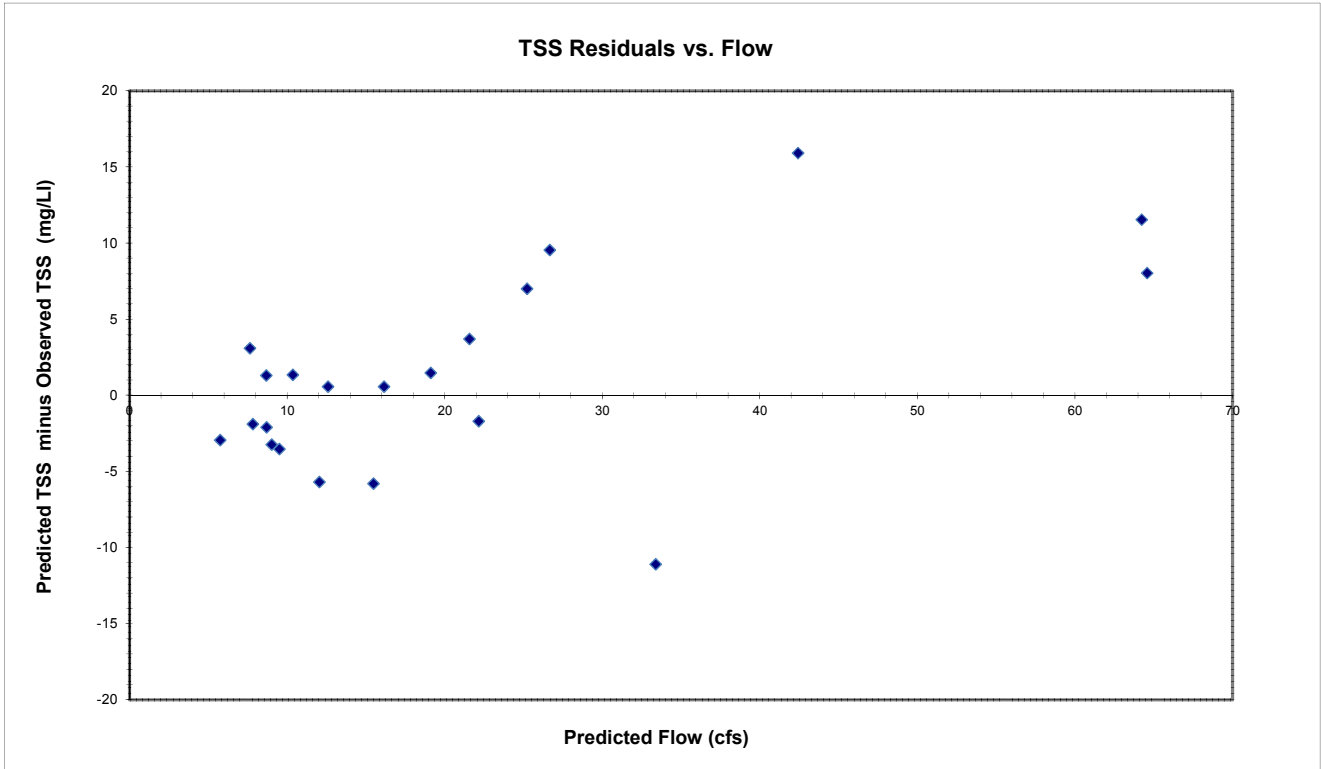
#### Total Phosphorus Residuals vs. Flow



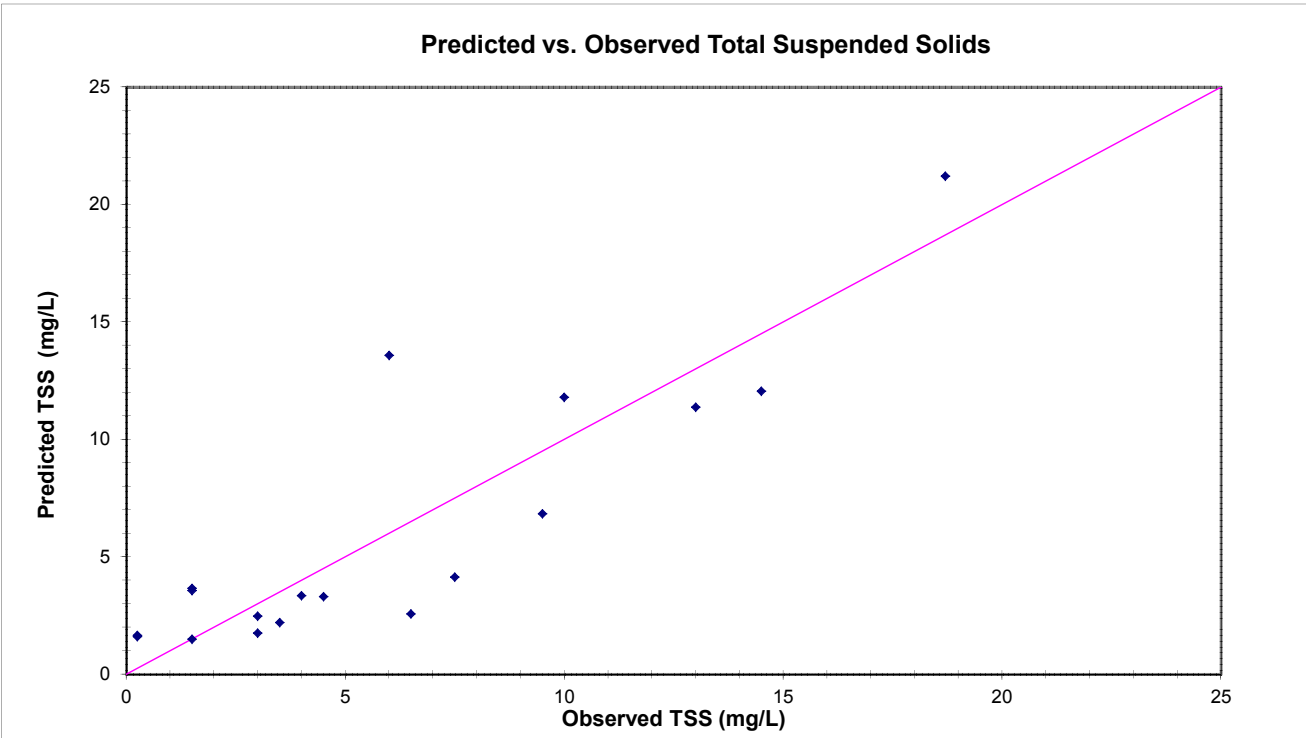
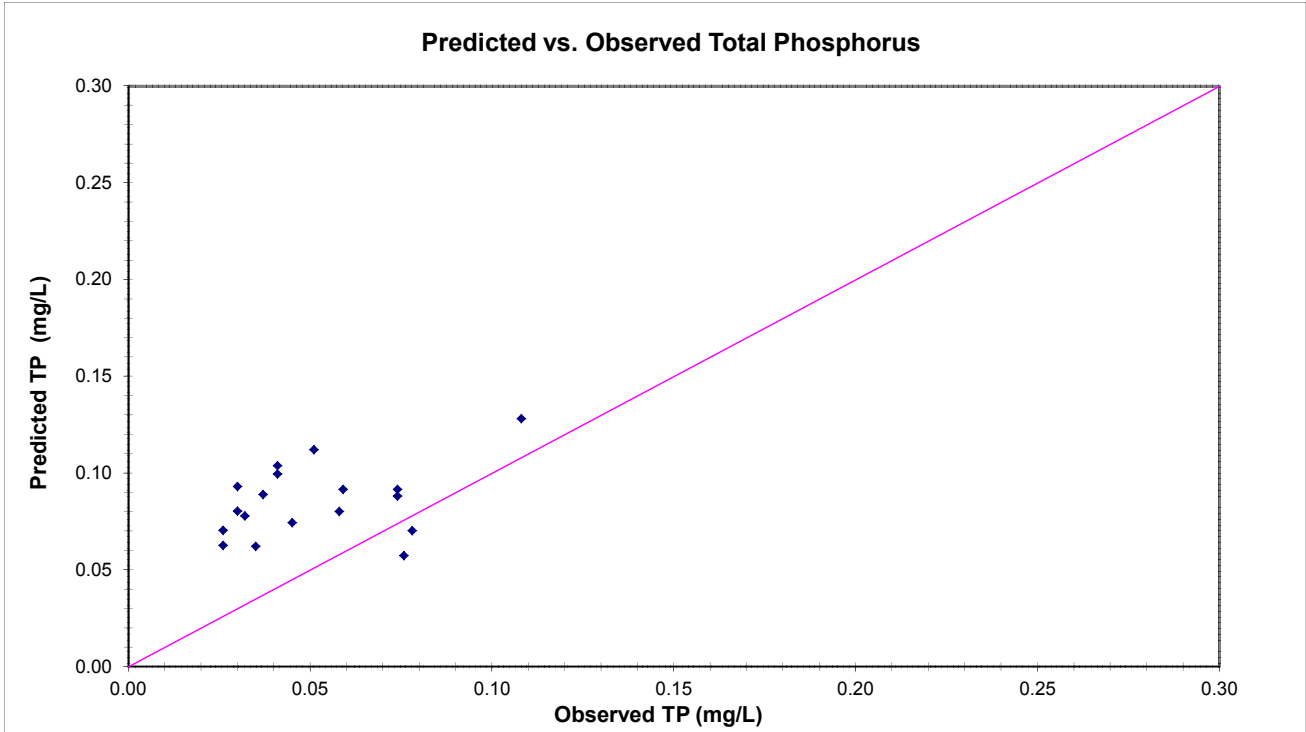
#### Total Phosphorus Residuals vs. Concentration



### Lamington River Downstream Roxbury STP (LR2)

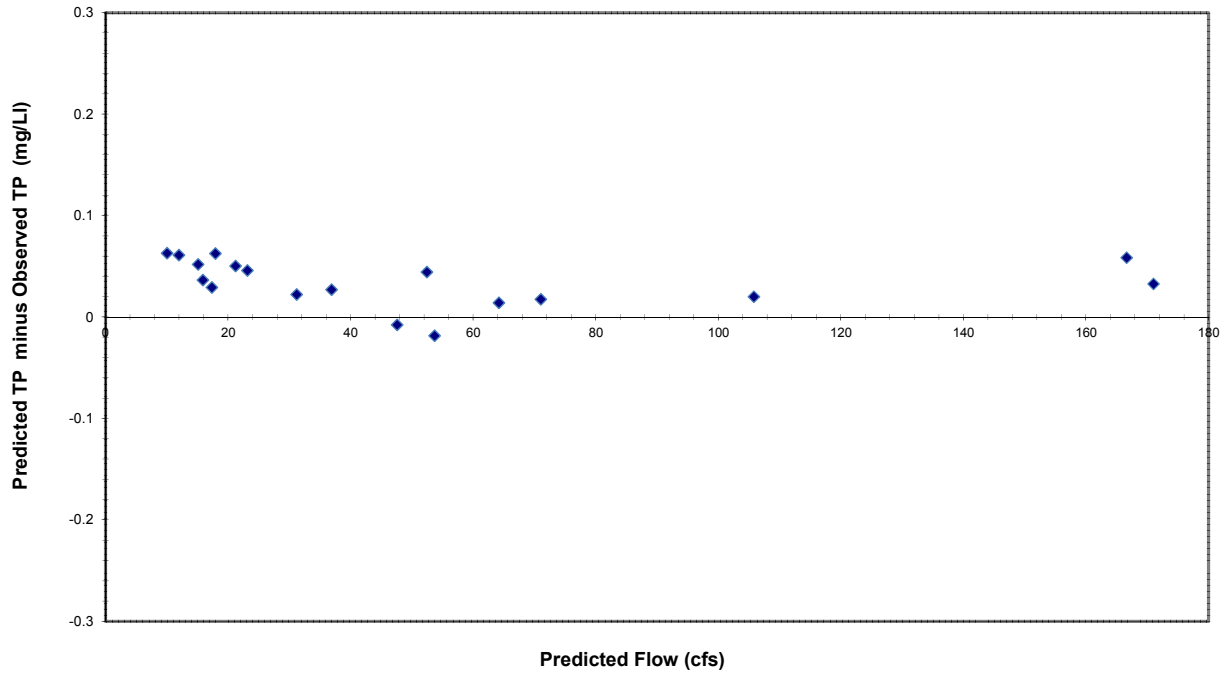


### Lamington River in Pottersville (LR3)

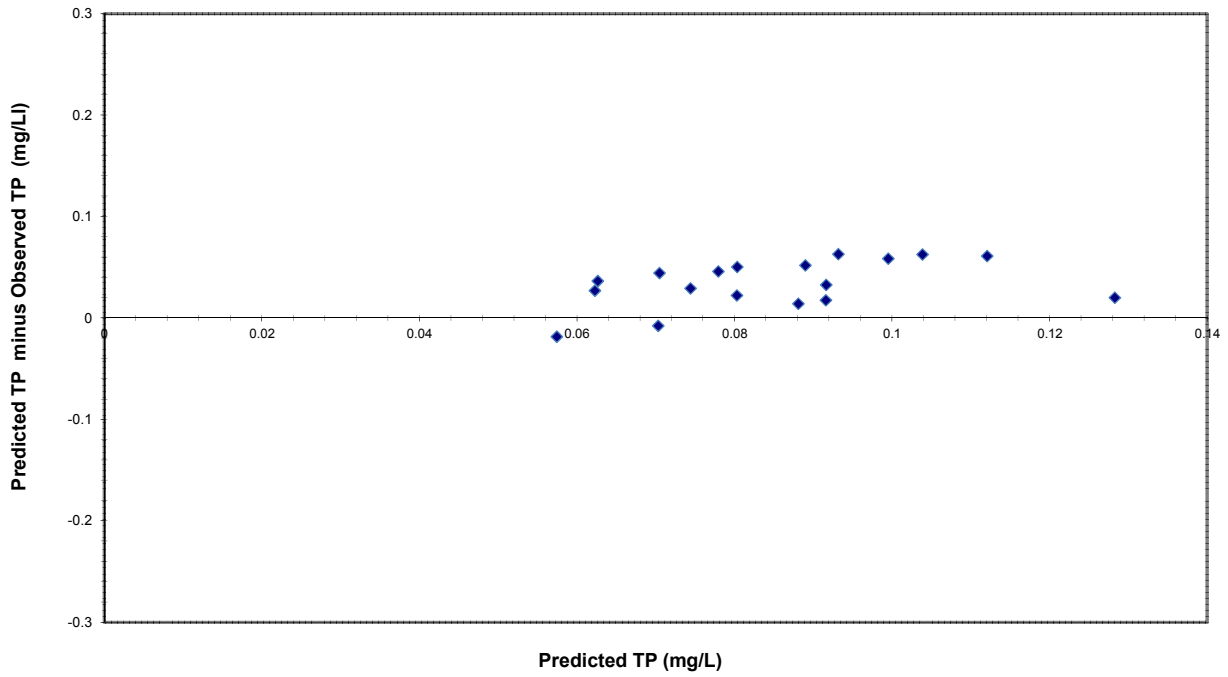


### Lamington River in Pottersville (LR3)

#### Total Phosphorus Residuals vs. Flow

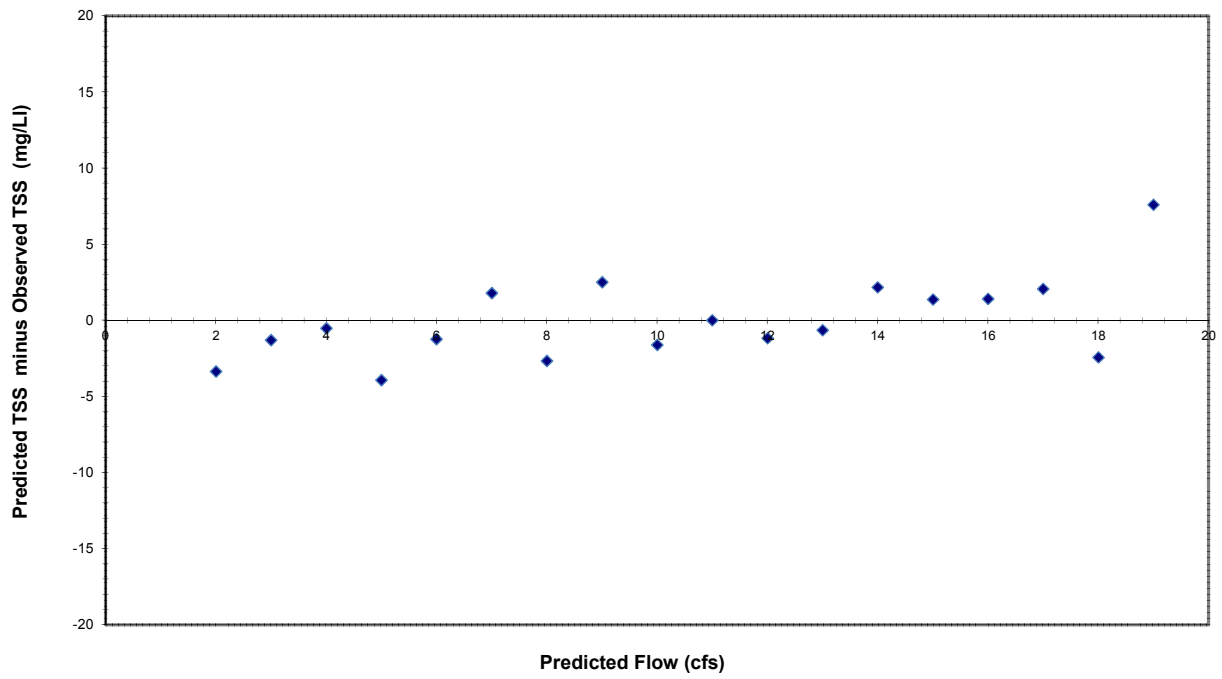


#### Total Phosphorus Residuals vs. Concentration

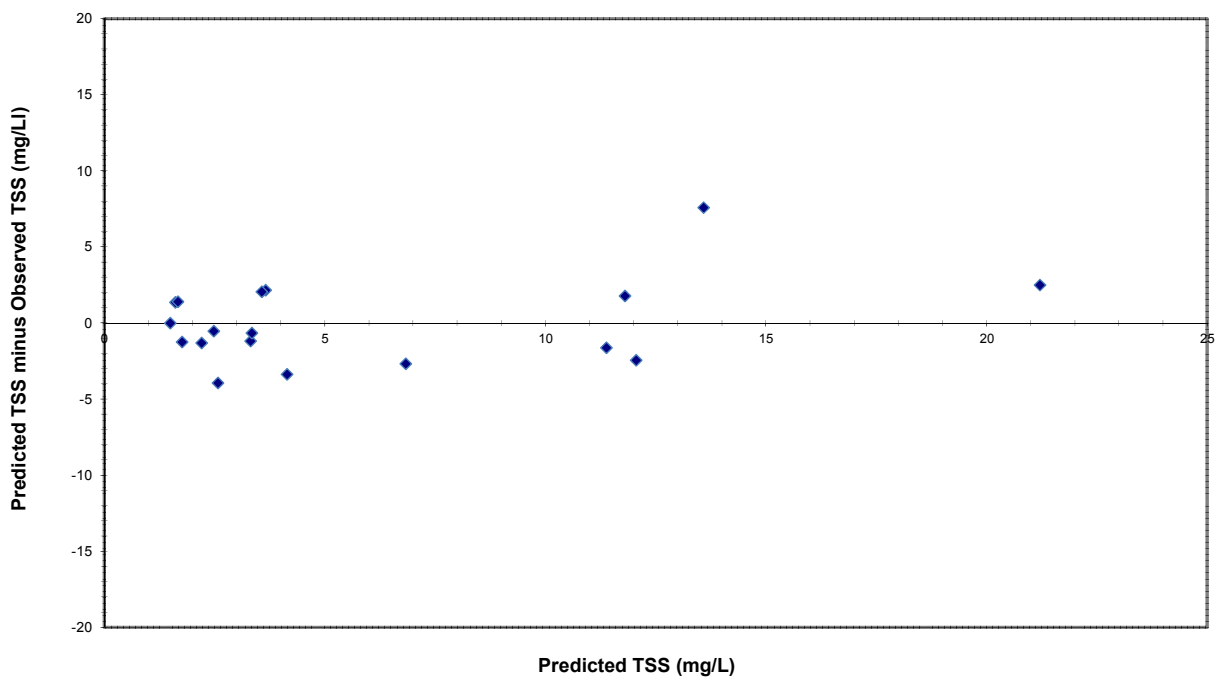


### Lamington River in Pottersville (LR3)

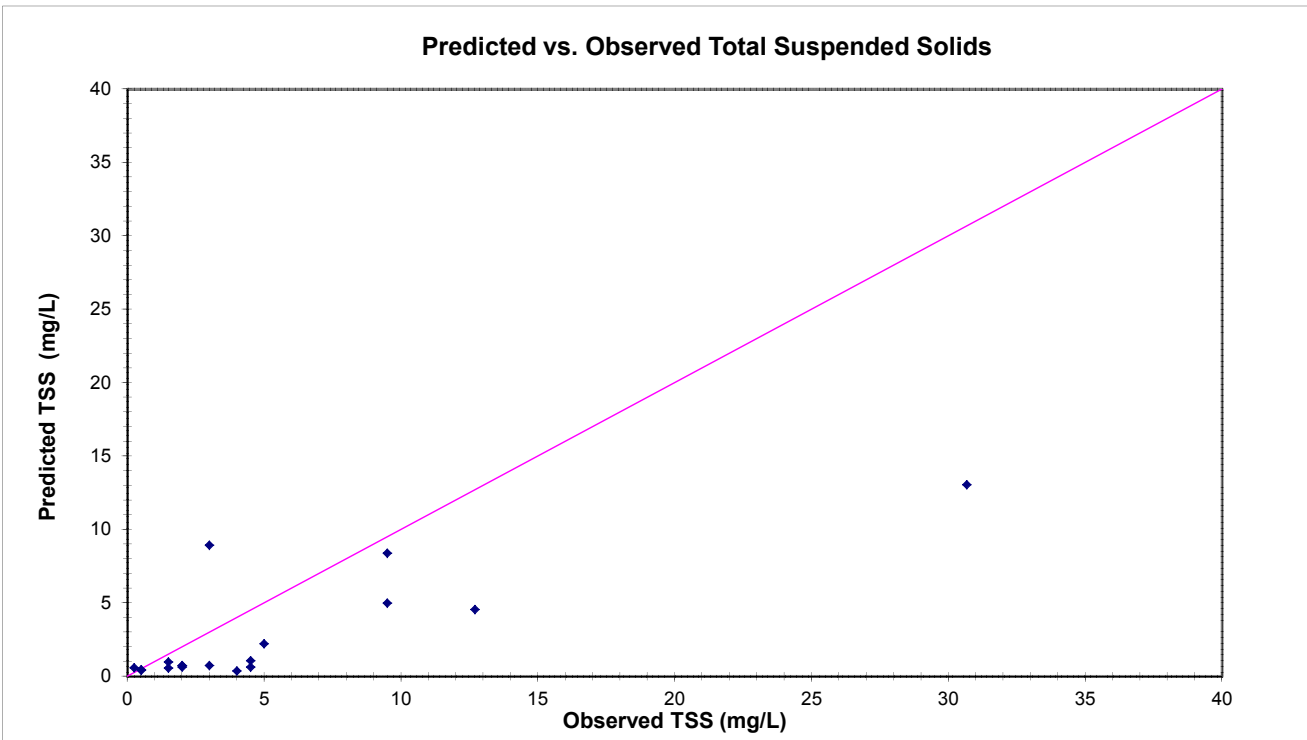
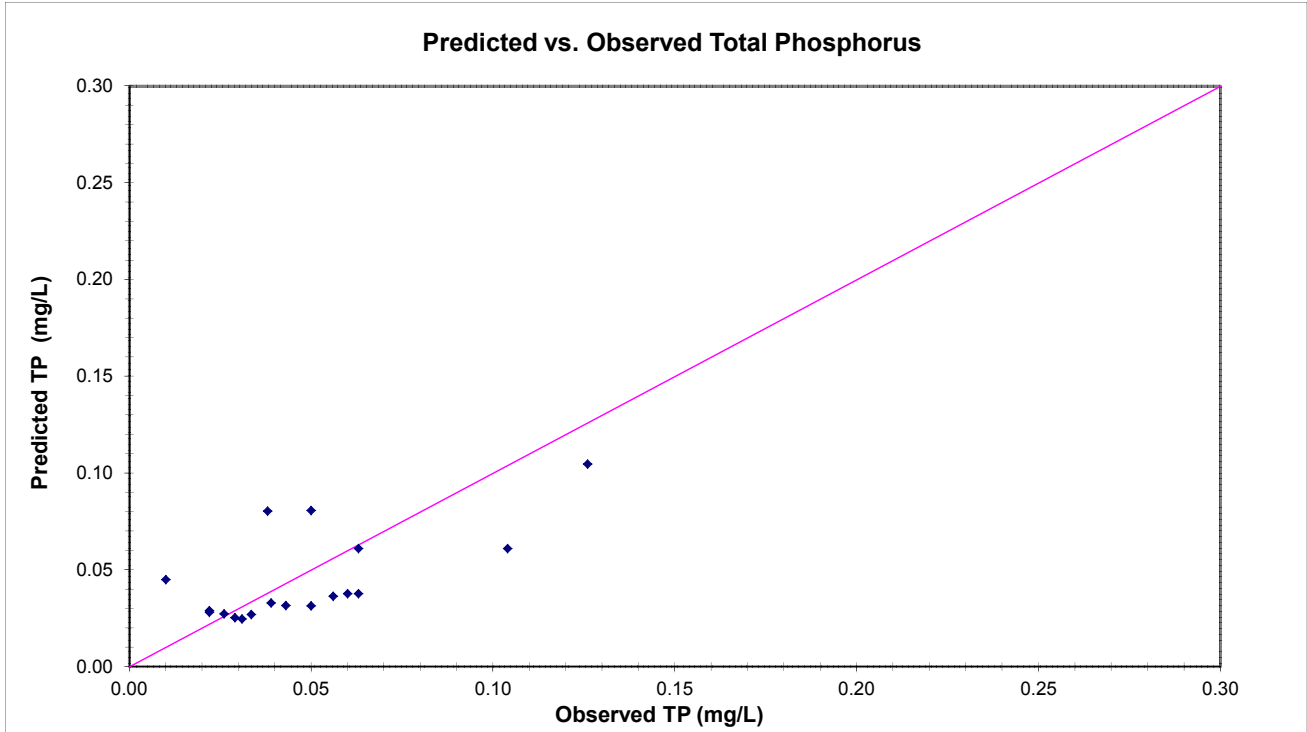
#### TSS Residuals vs. Flow



#### TSS Residuals vs. Concentration

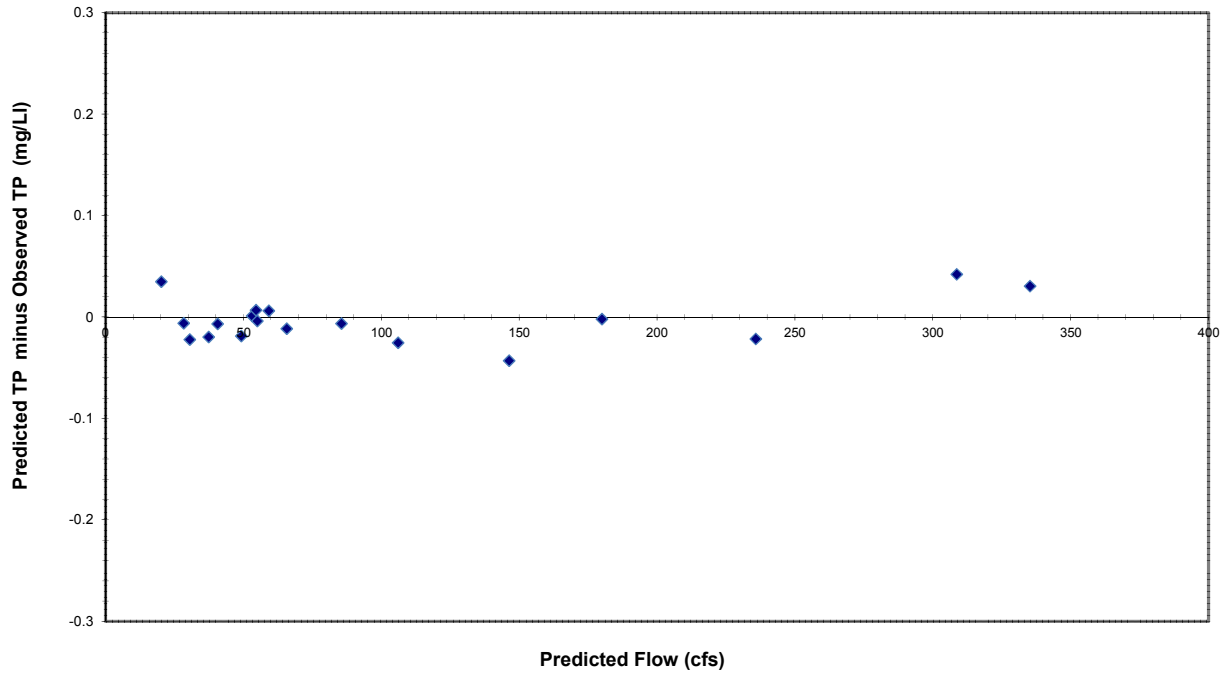


### Lamington River at River Road near Whitehouse (LR4)

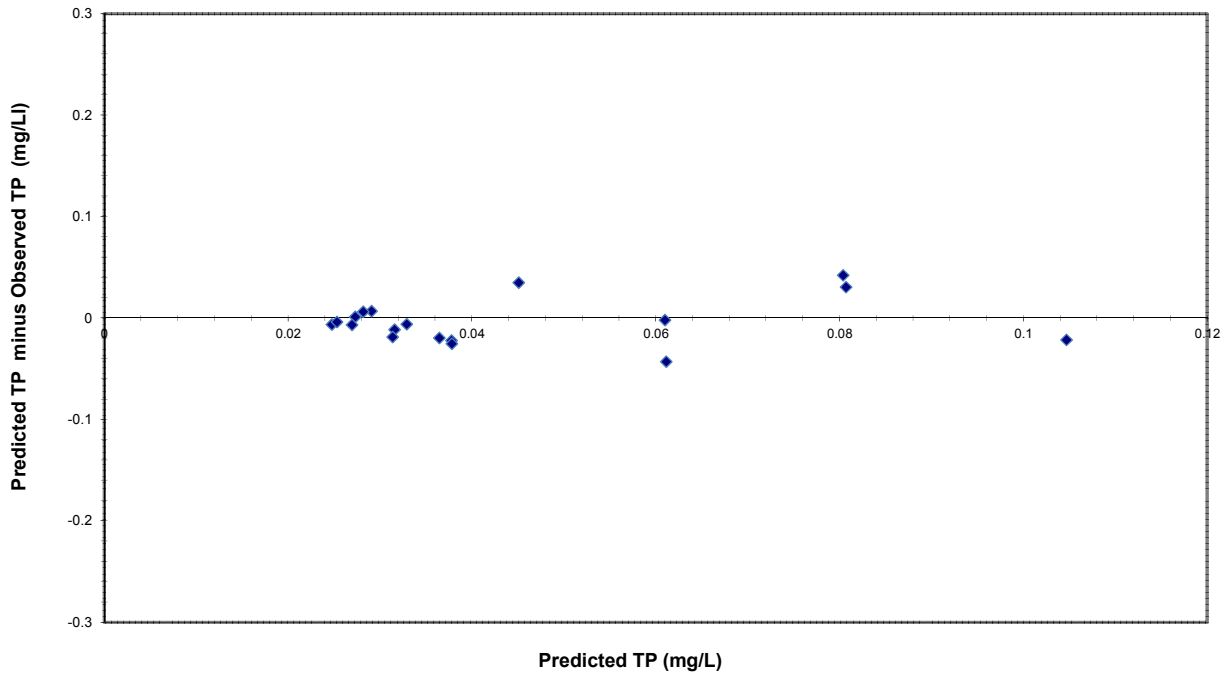


Lamington River at River Road near Whitehouse (LR4)

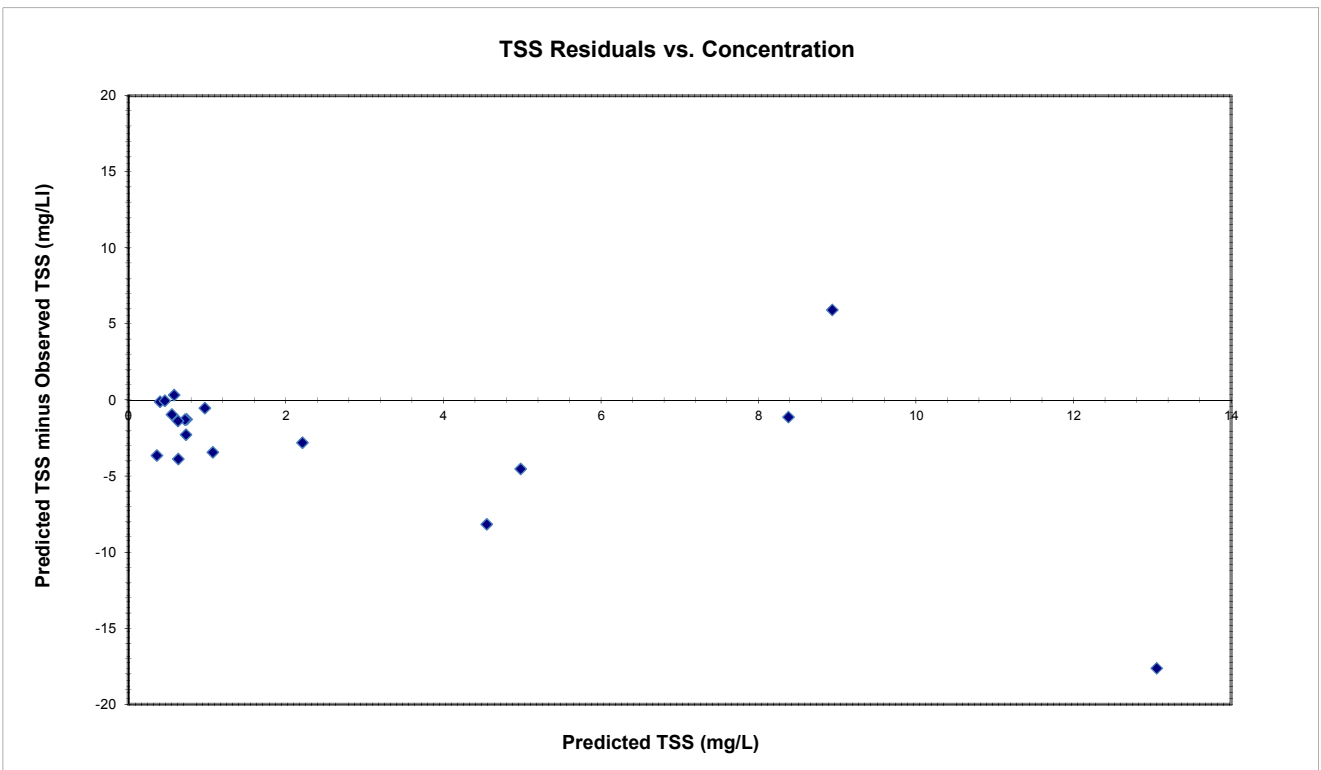
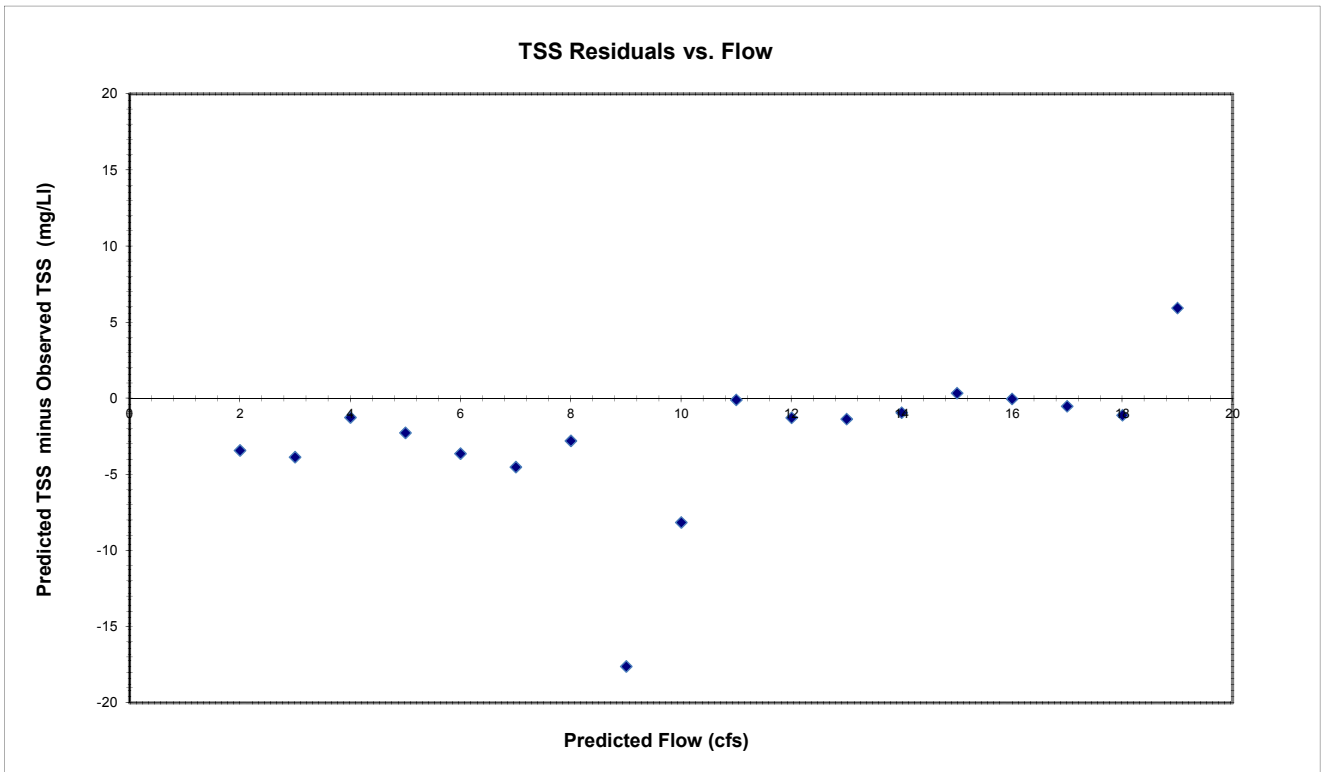
Total Phosphorus Residuals vs. Flow



Total Phosphorus Residuals vs. Concentration

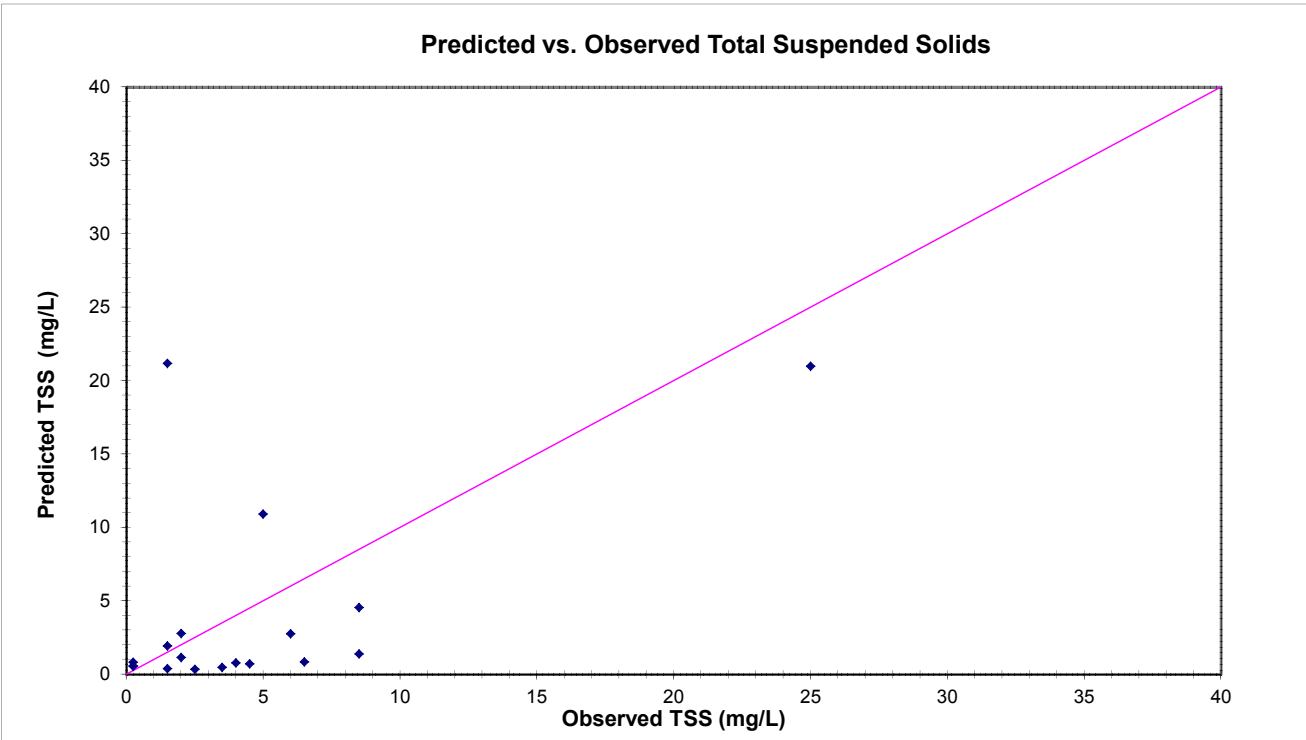
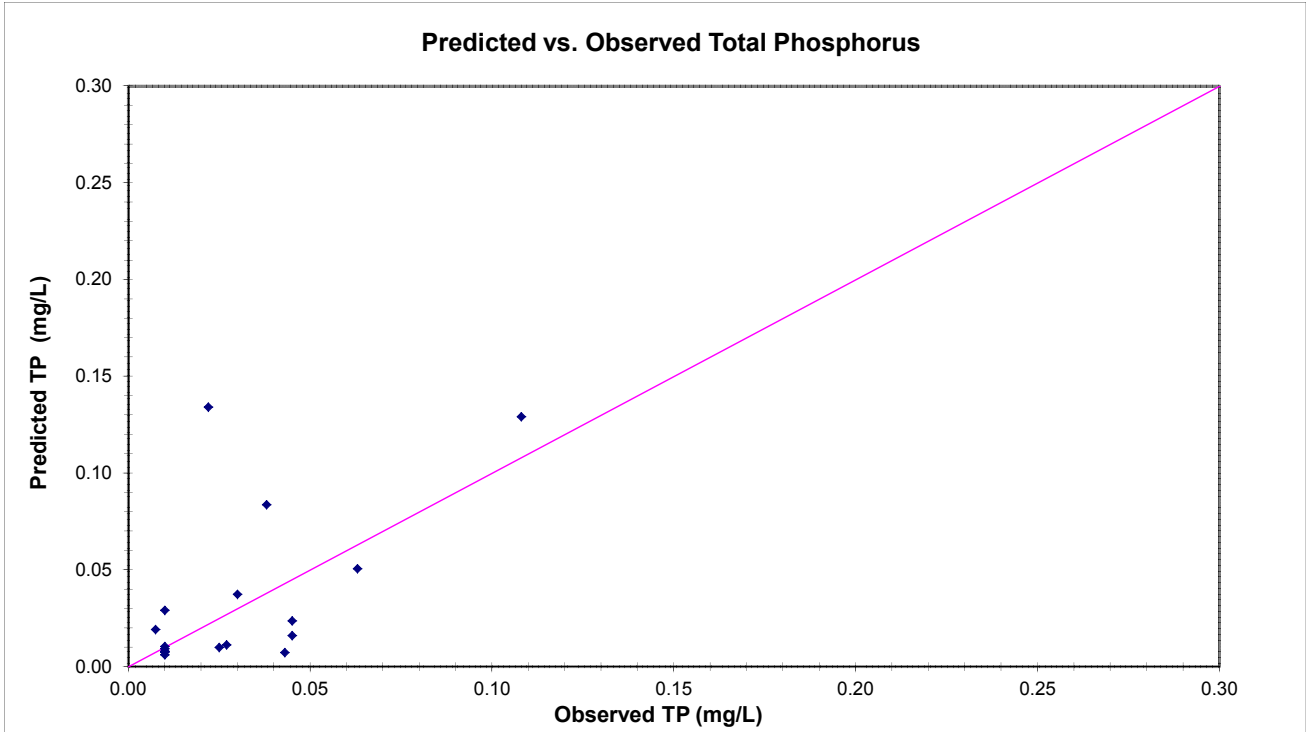


Lamington River at River Road near Whitehouse (LR4)



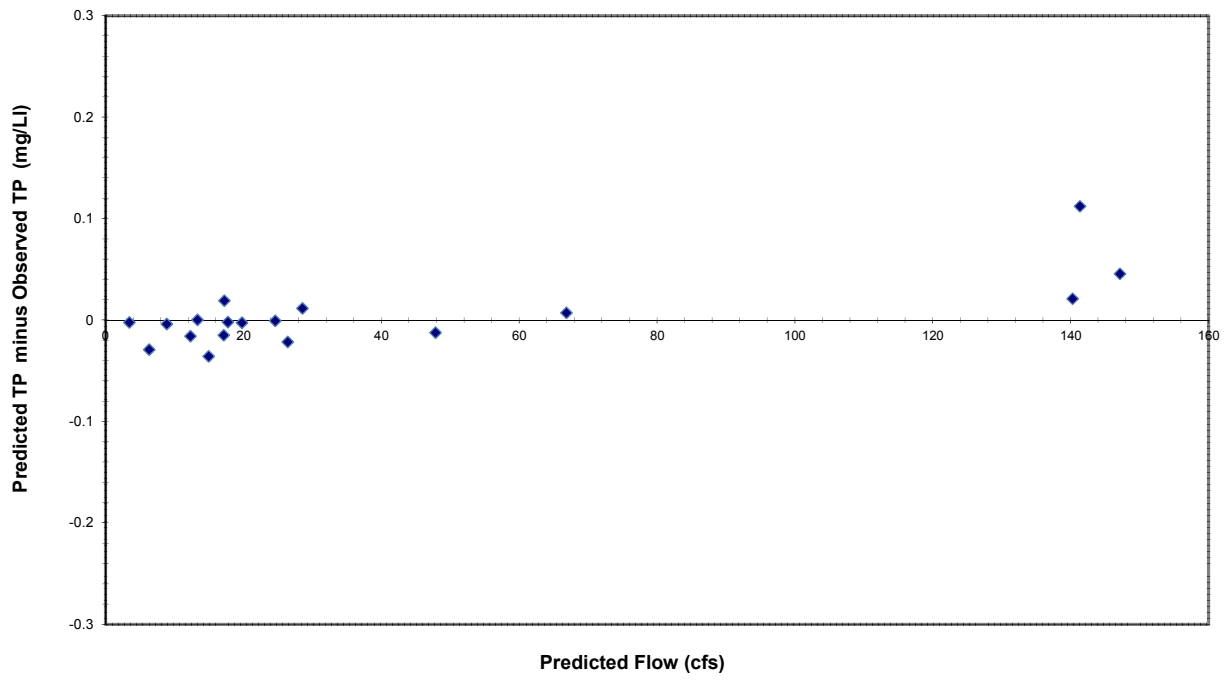


### North Branch Rockaway Creek at Route 523 (NBRC1)

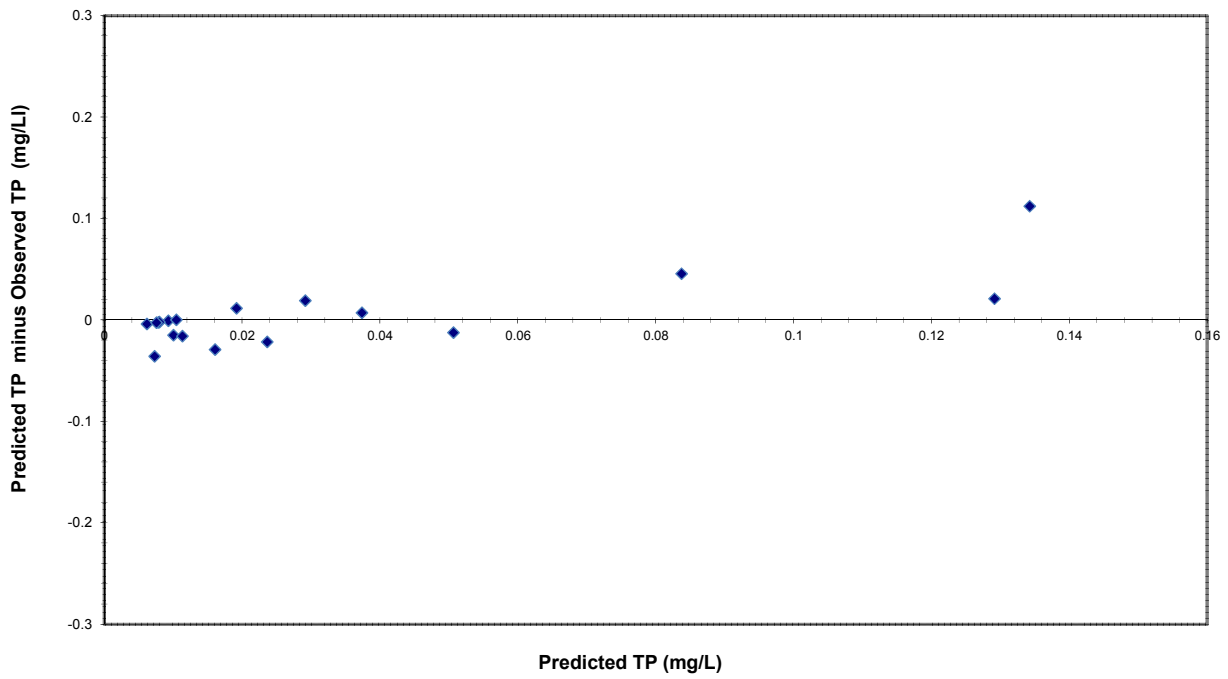


### North Branch Rockaway Creek at Route 523 (NBRC1)

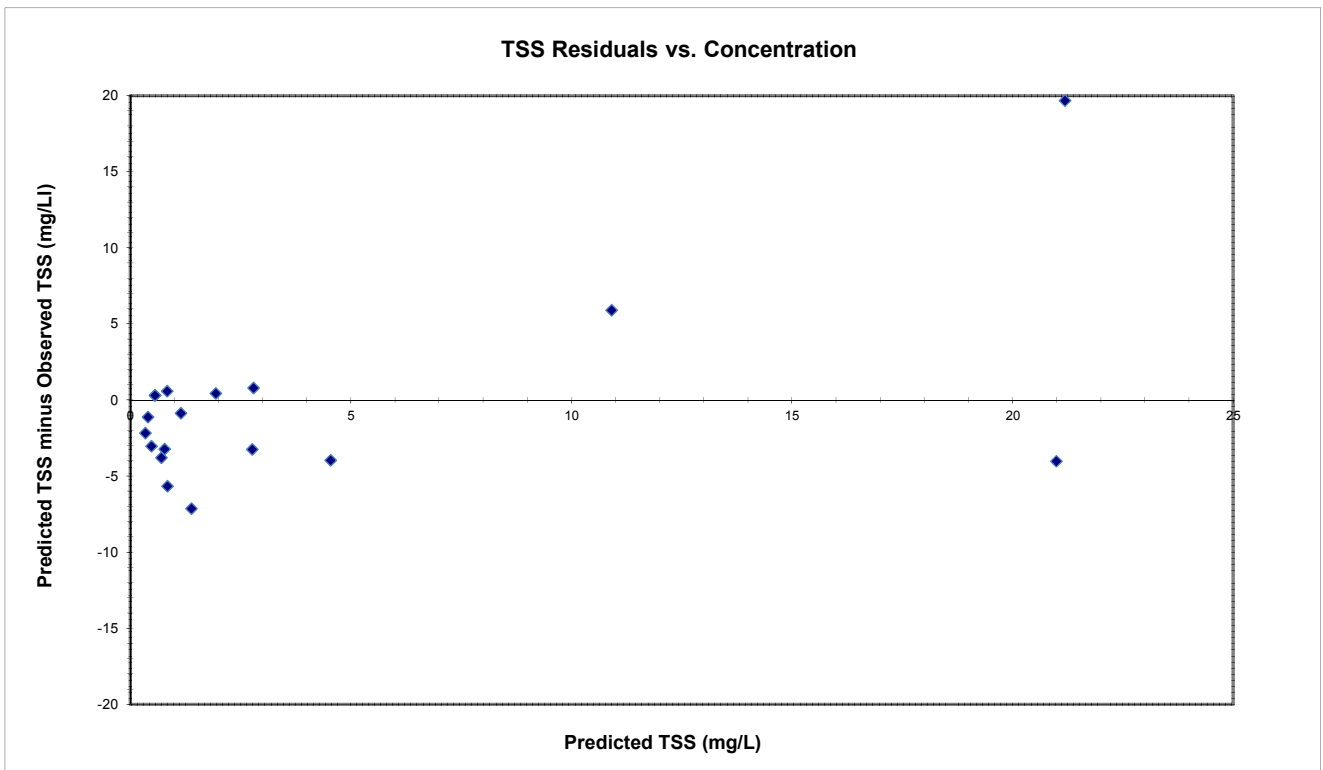
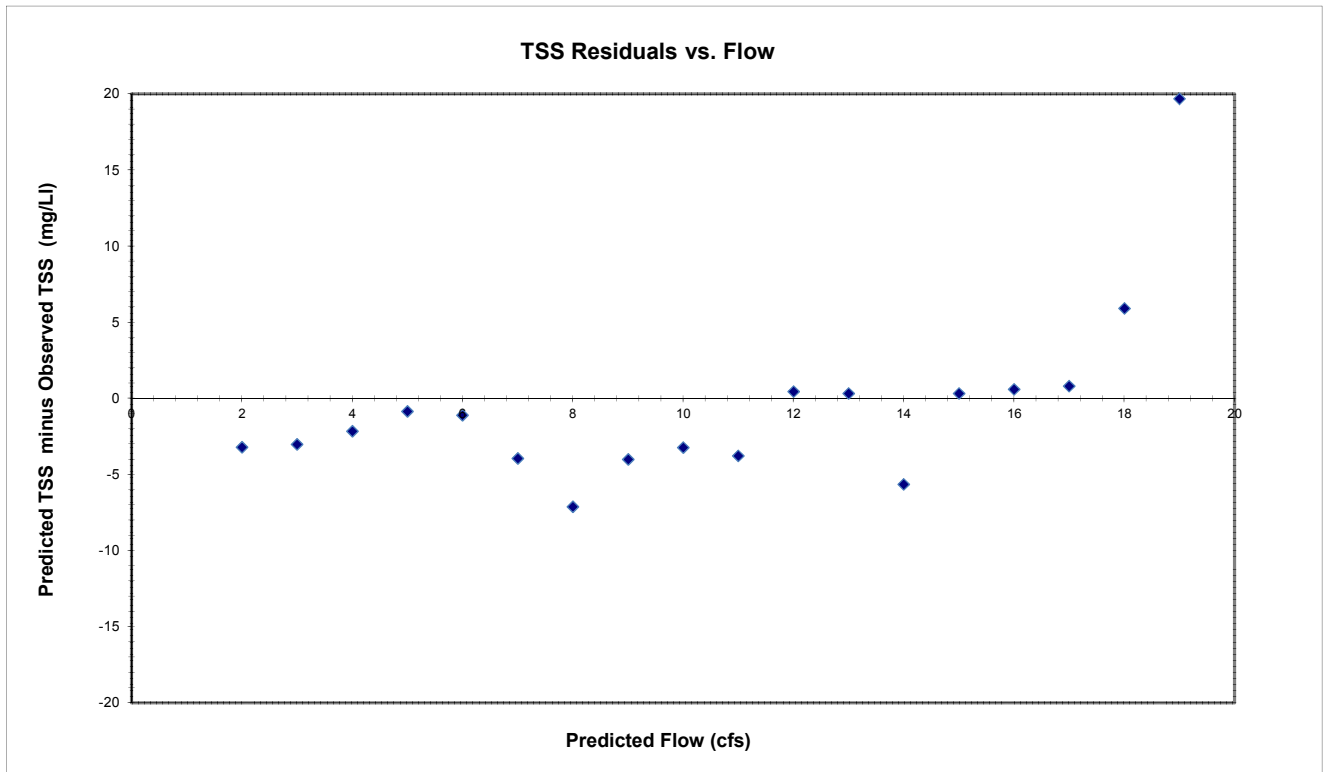
#### Total Phosphorus Residuals vs. Flow



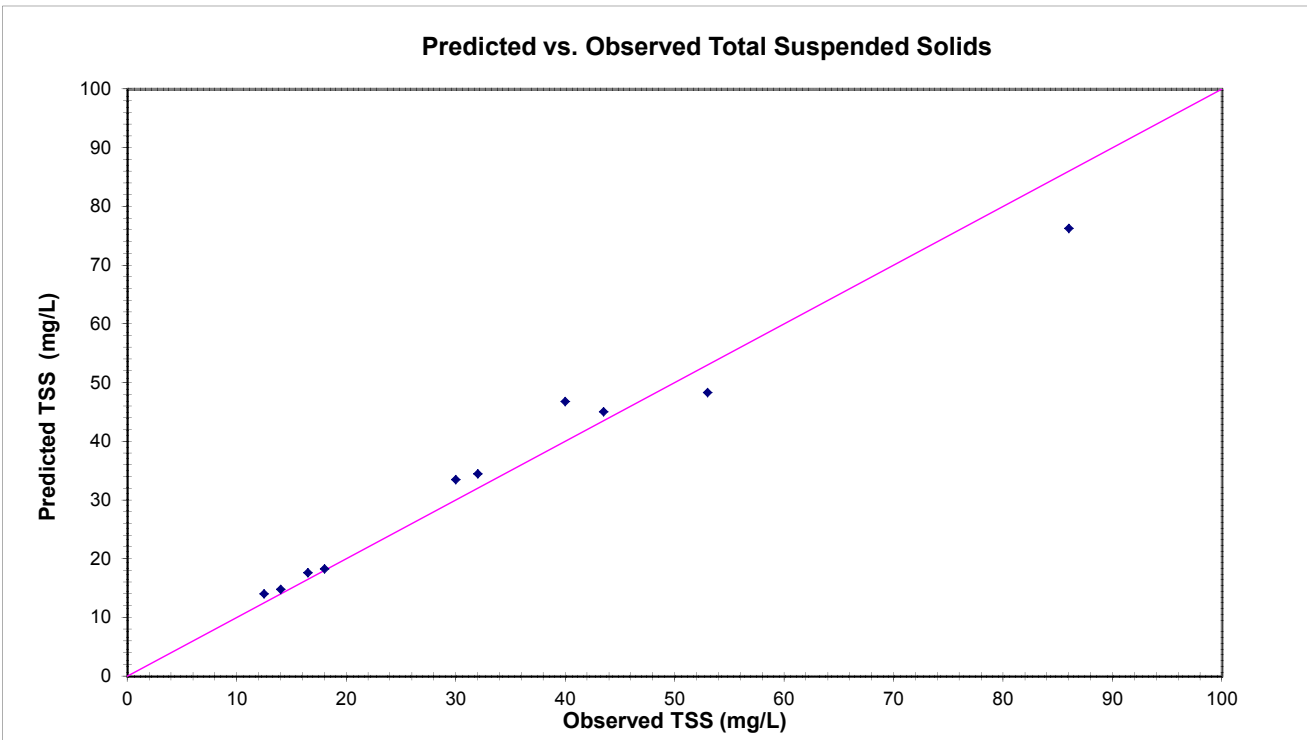
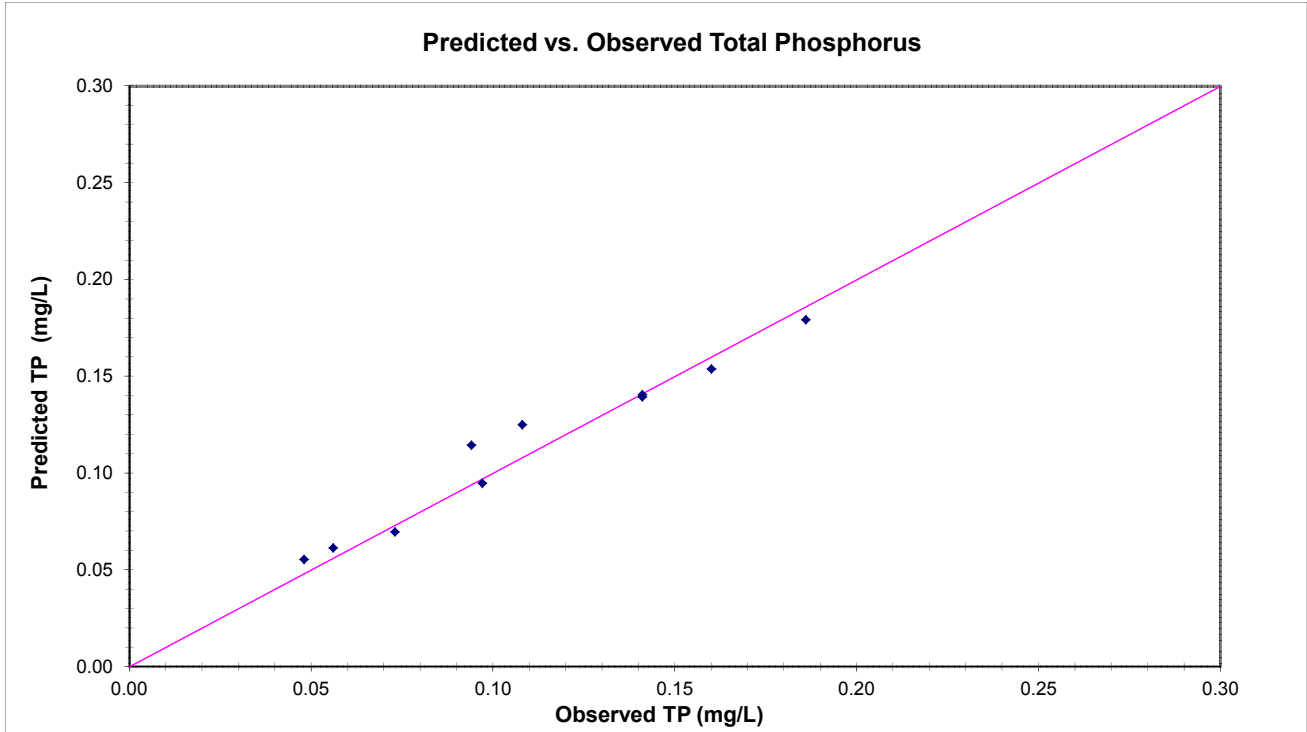
#### Total Phosphorus Residuals vs. Concentration



### North Branch Rockaway Creek at Route 523 (NBRC1)

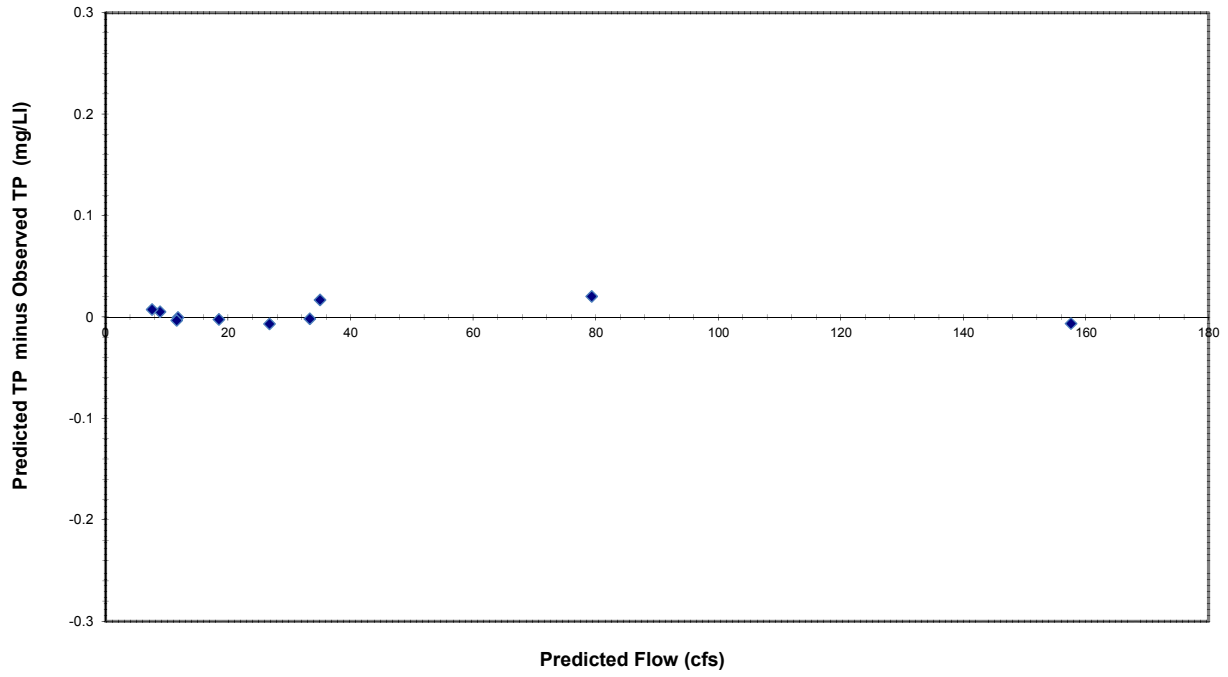


### South Branch Rockaway Creek Downstream Cushetunk Lake (SBRC3)

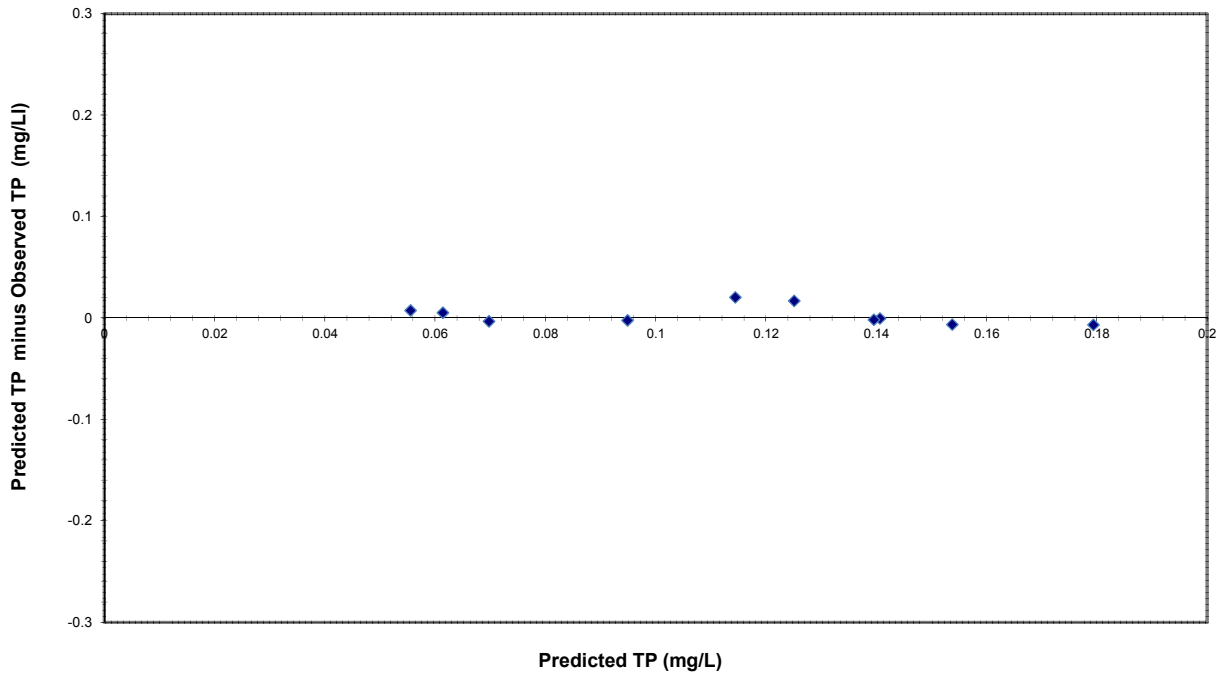


### South Branch Rockaway Creek Downstream Cushetunk Lake (SBRC3)

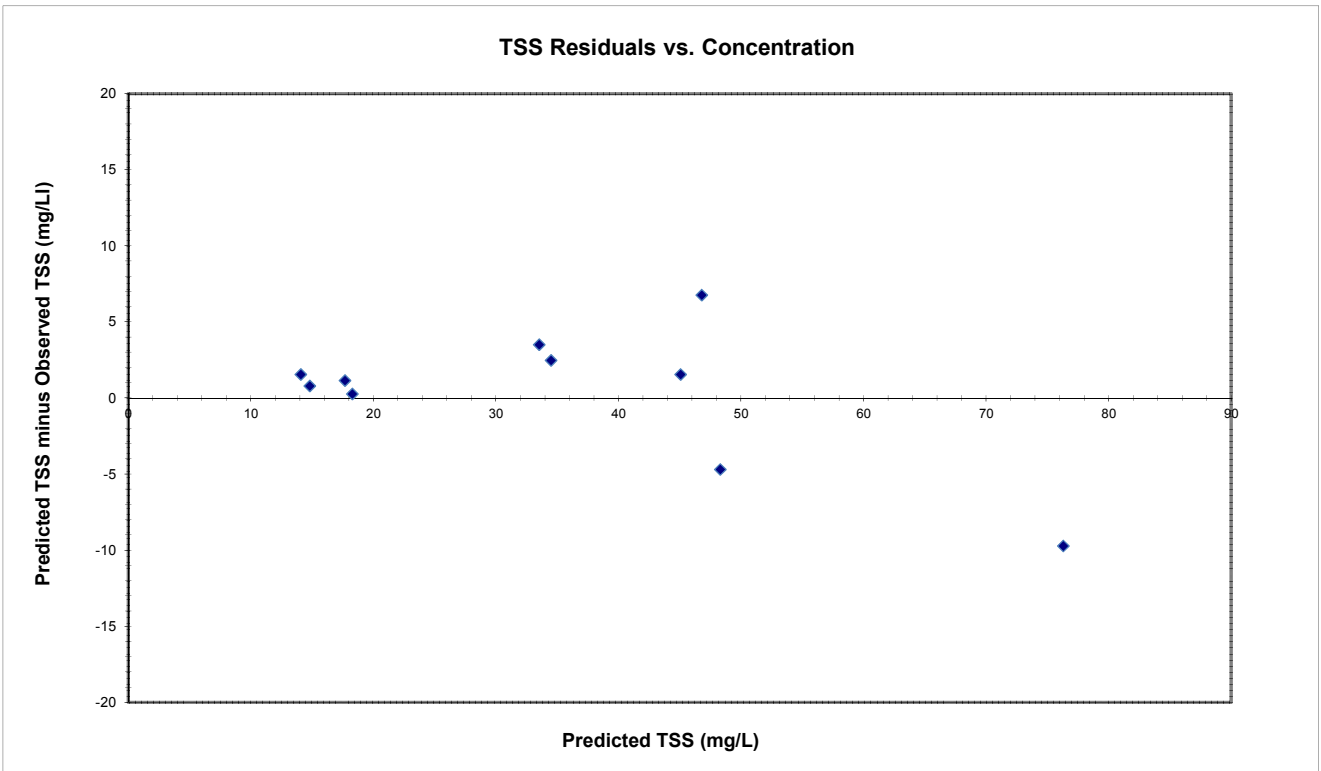
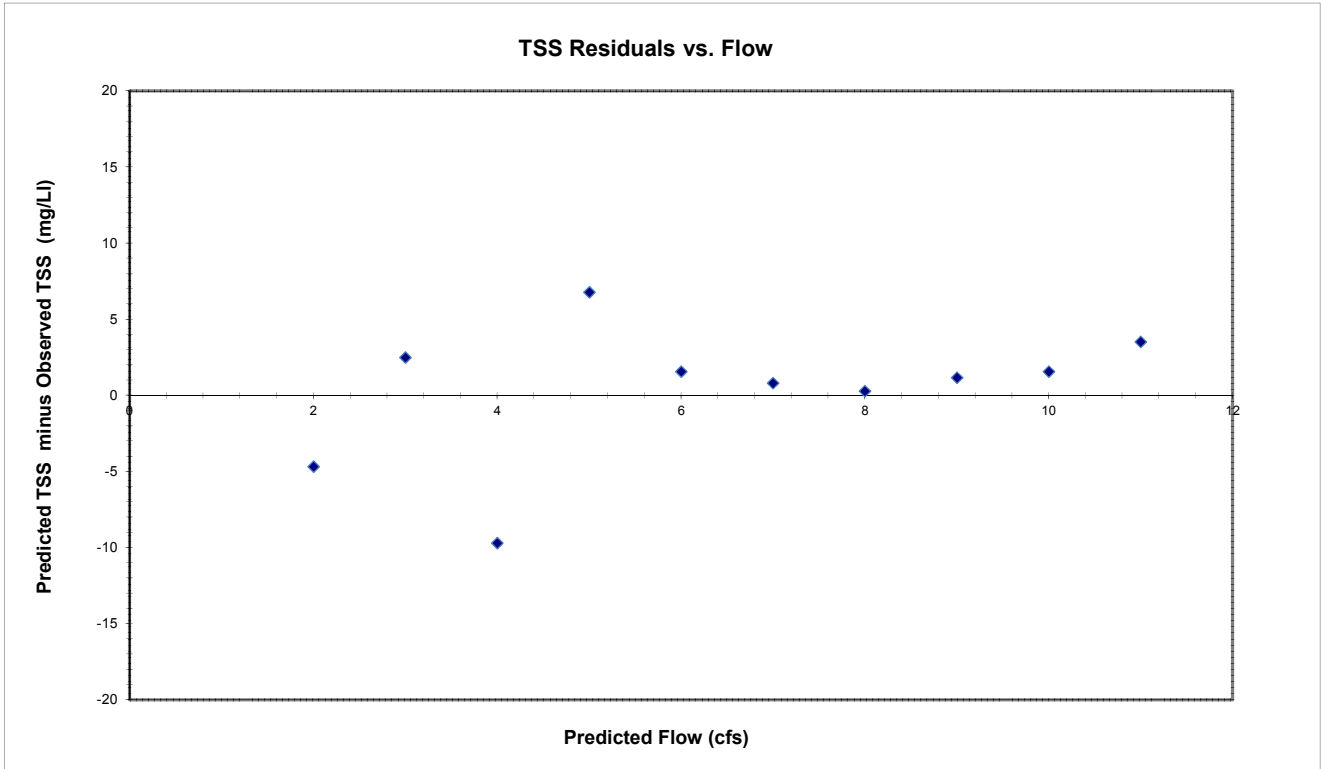
#### Total Phosphorus Residuals vs. Flow



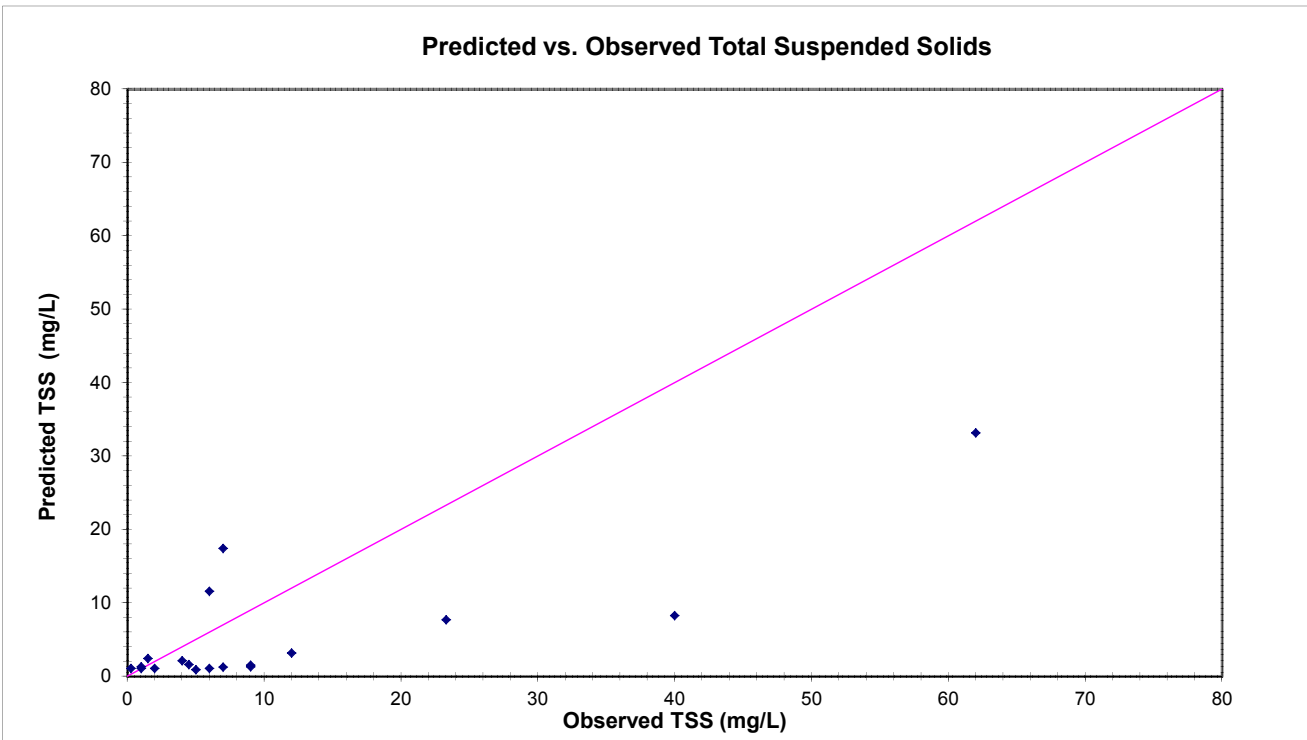
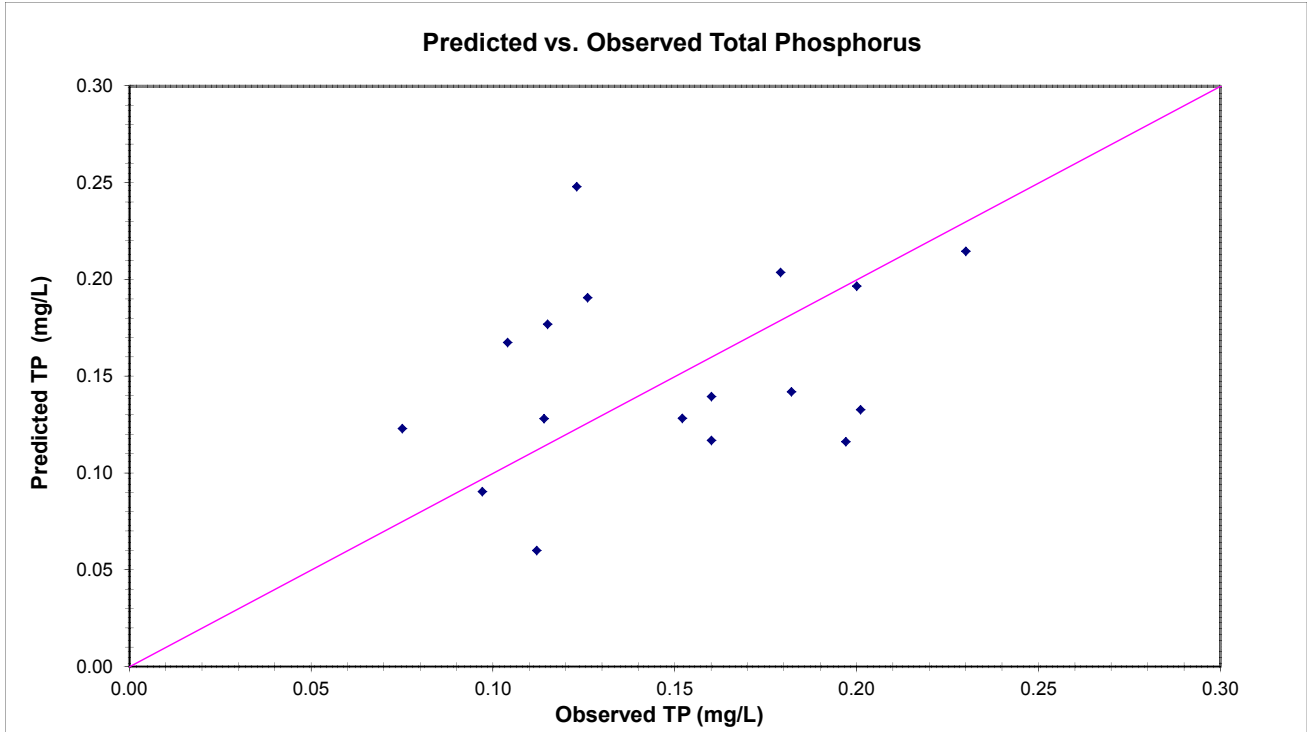
#### Total Phosphorus Residuals vs. Concentration



### South Branch Rockaway Creek Downstream Cushetunk Lake (SBRC3)

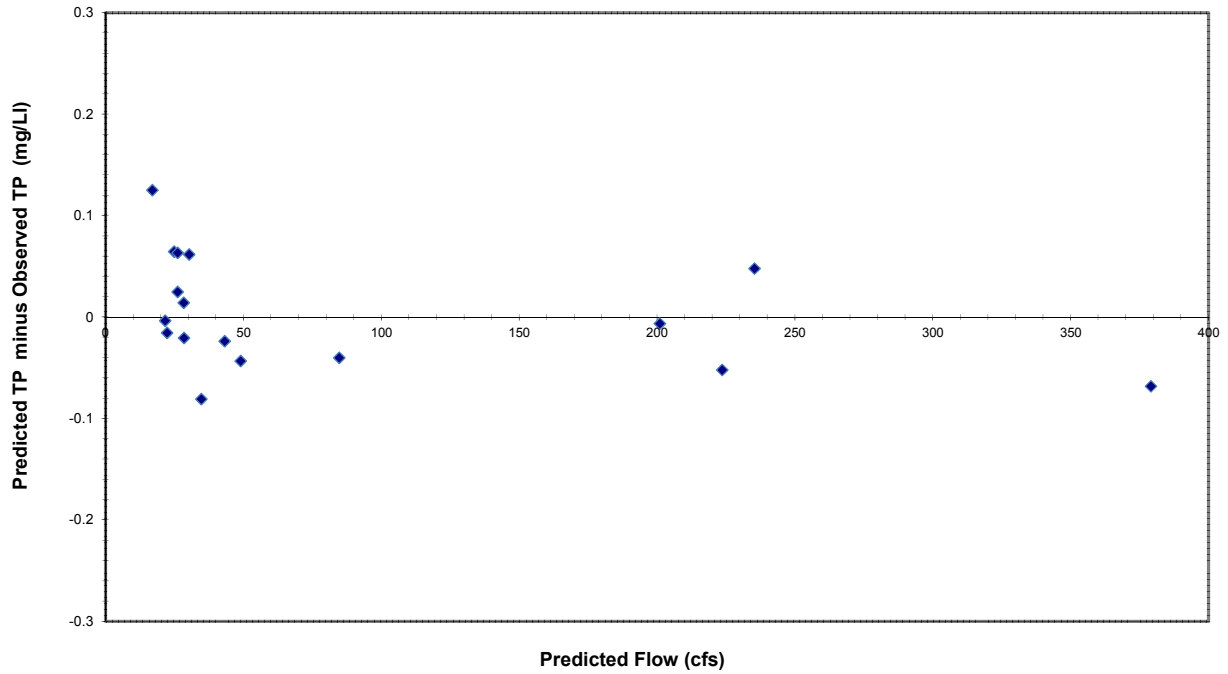


### Rockaway Creek at Lamington Road near Whitehouse (RC1)

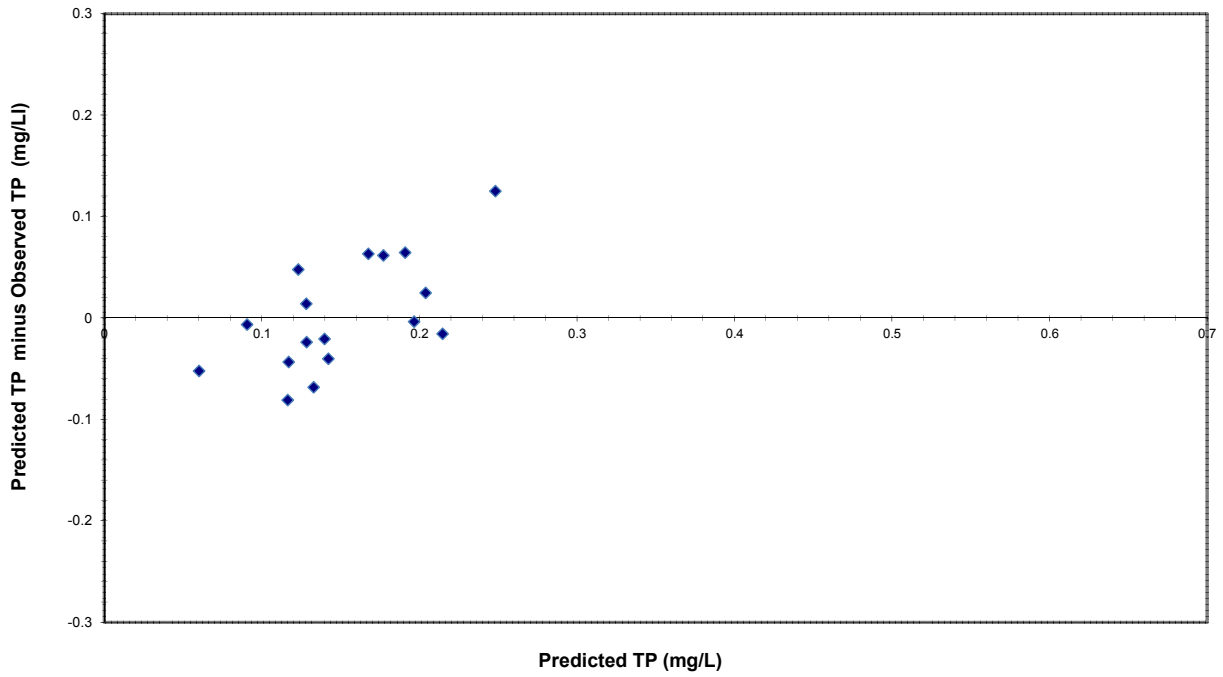


### Rockaway Creek at Lamington Road near Whitehouse (RC1)

#### Total Phosphorus Residuals vs. Flow

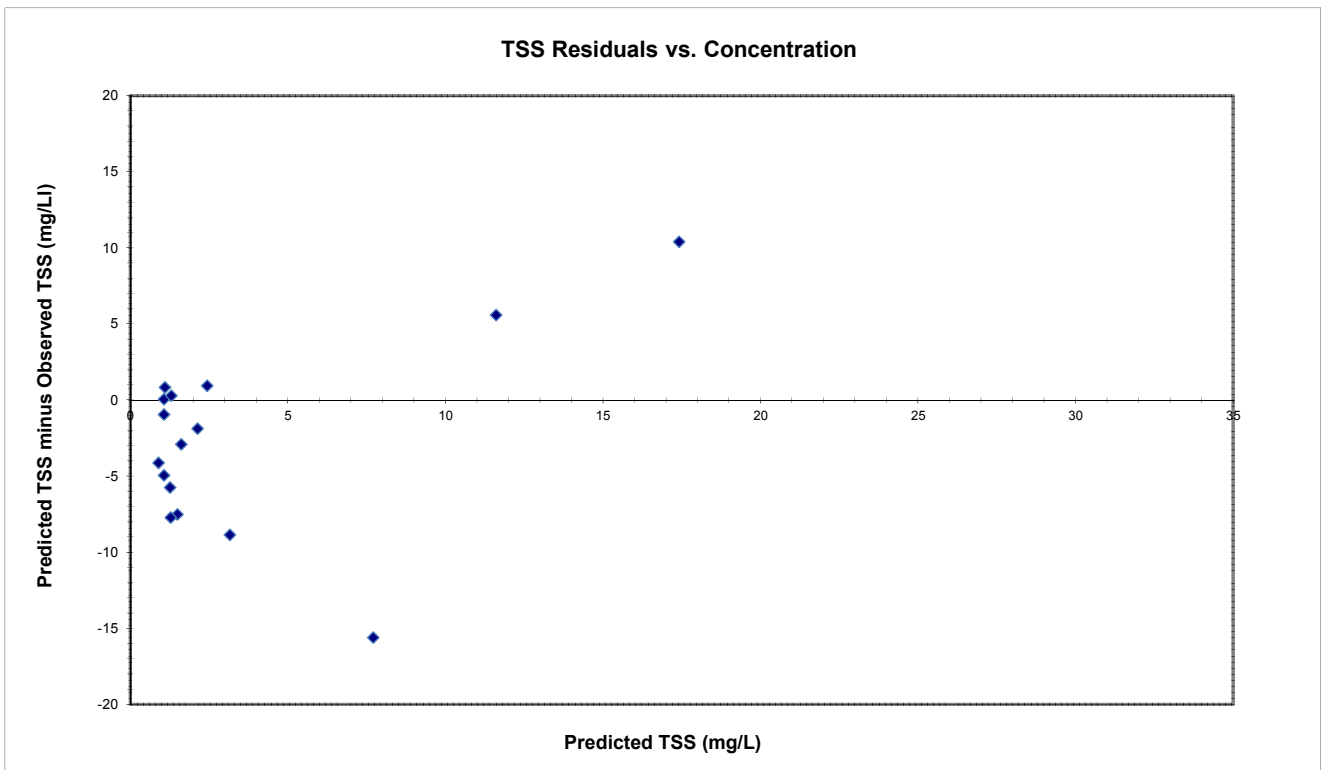
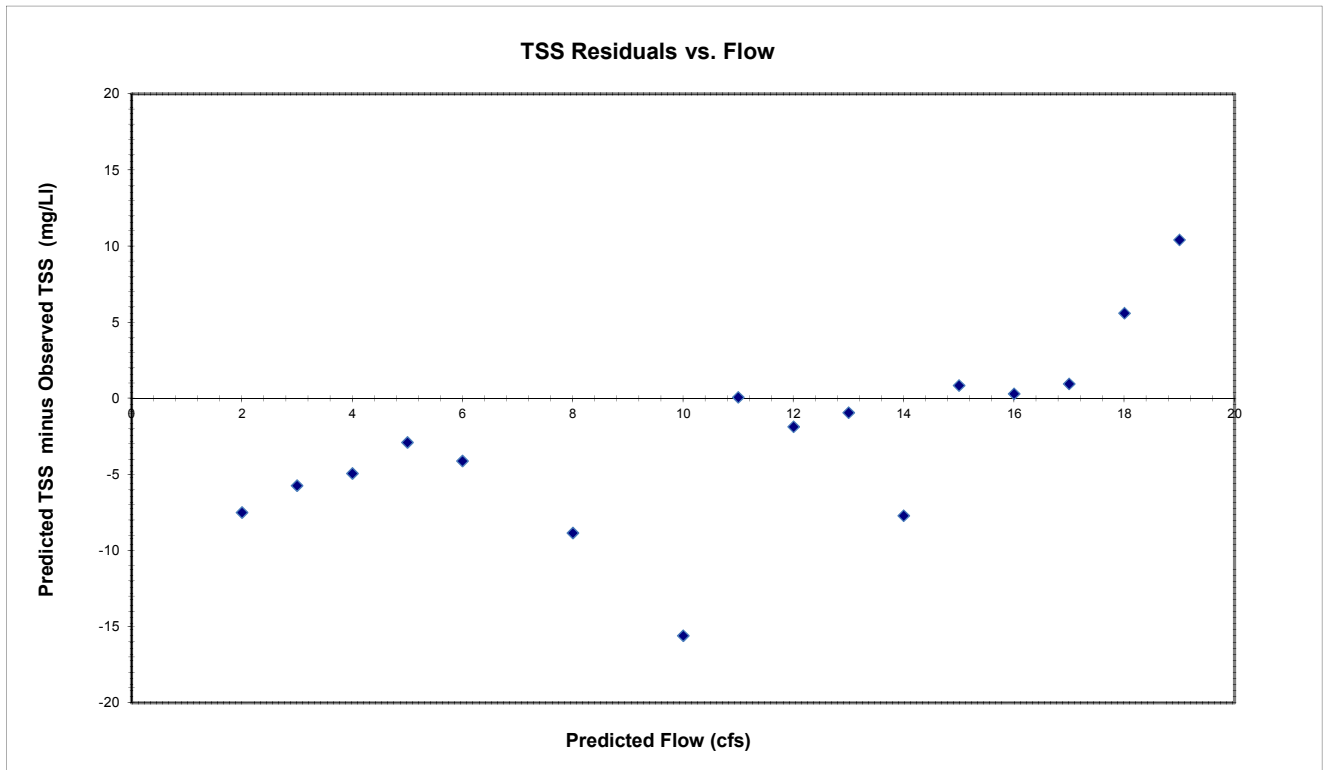


#### Total Phosphorus Residuals vs. Concentration

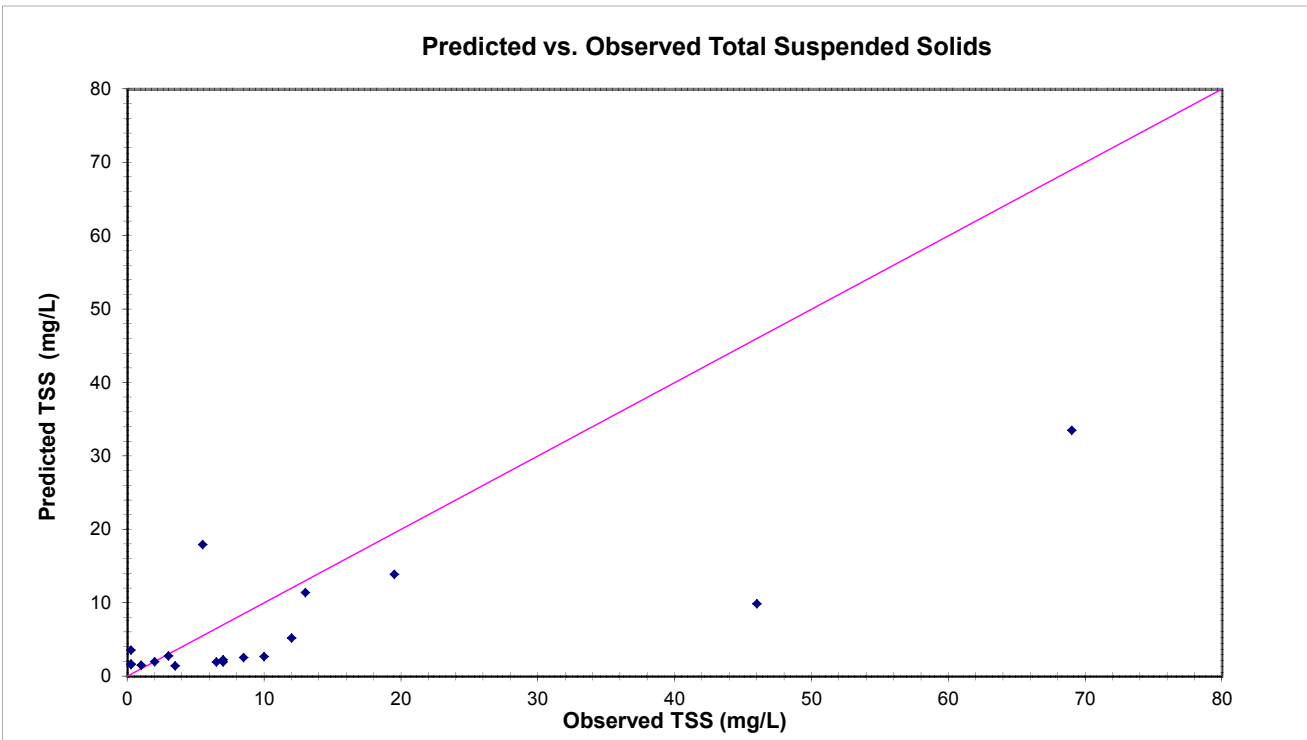
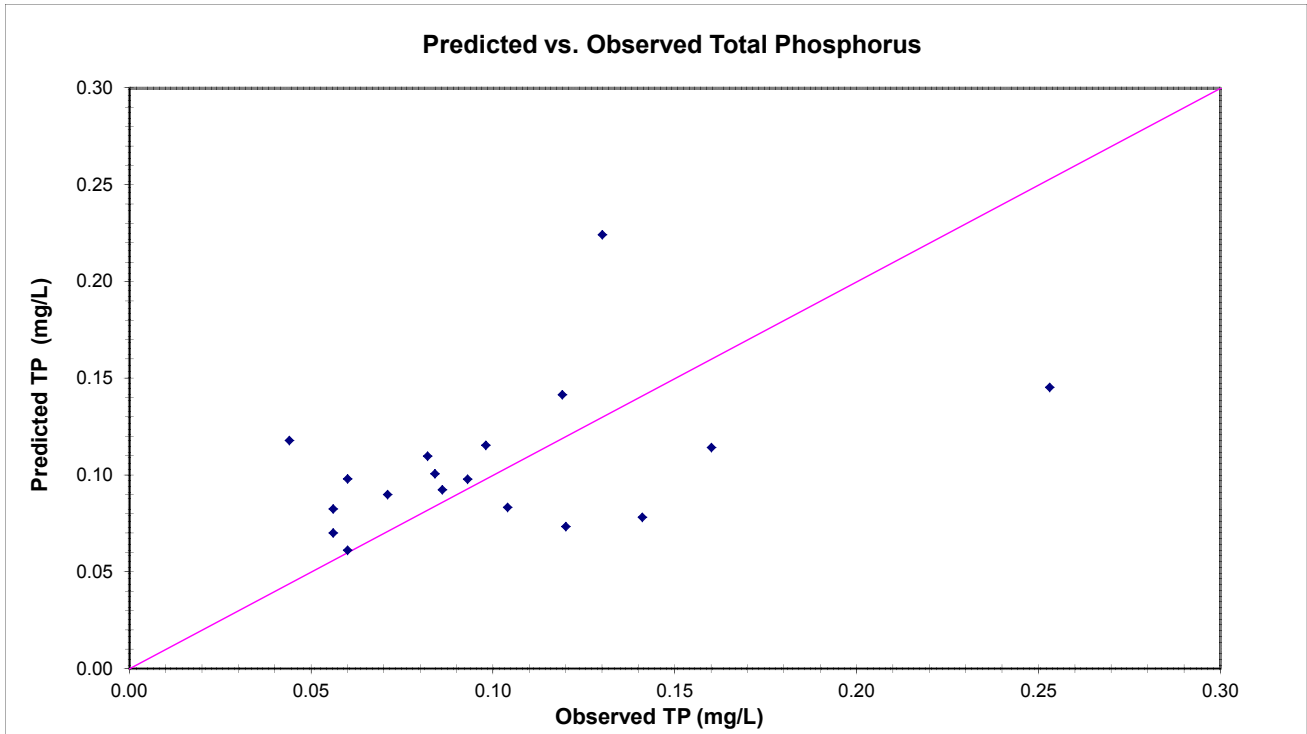




### Rockaway Creek at Lamington Road near Whitehouse (RC1)

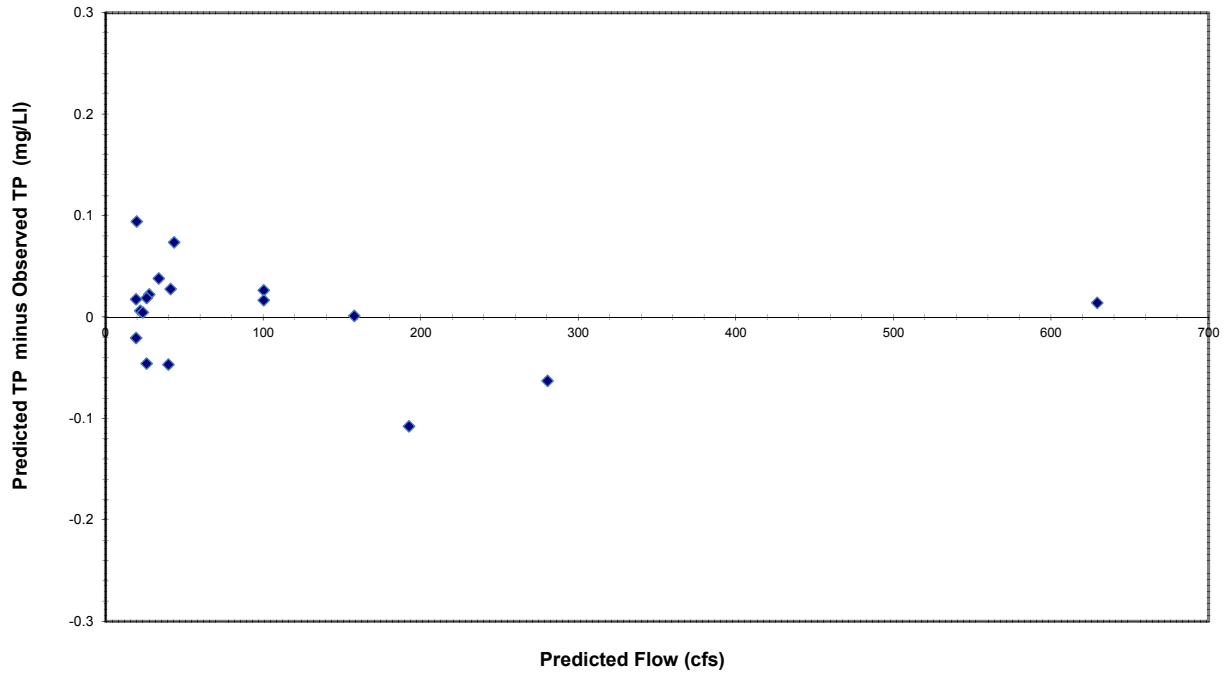


### Lamington River at Confluence with North Branch Raritan River (LR5)

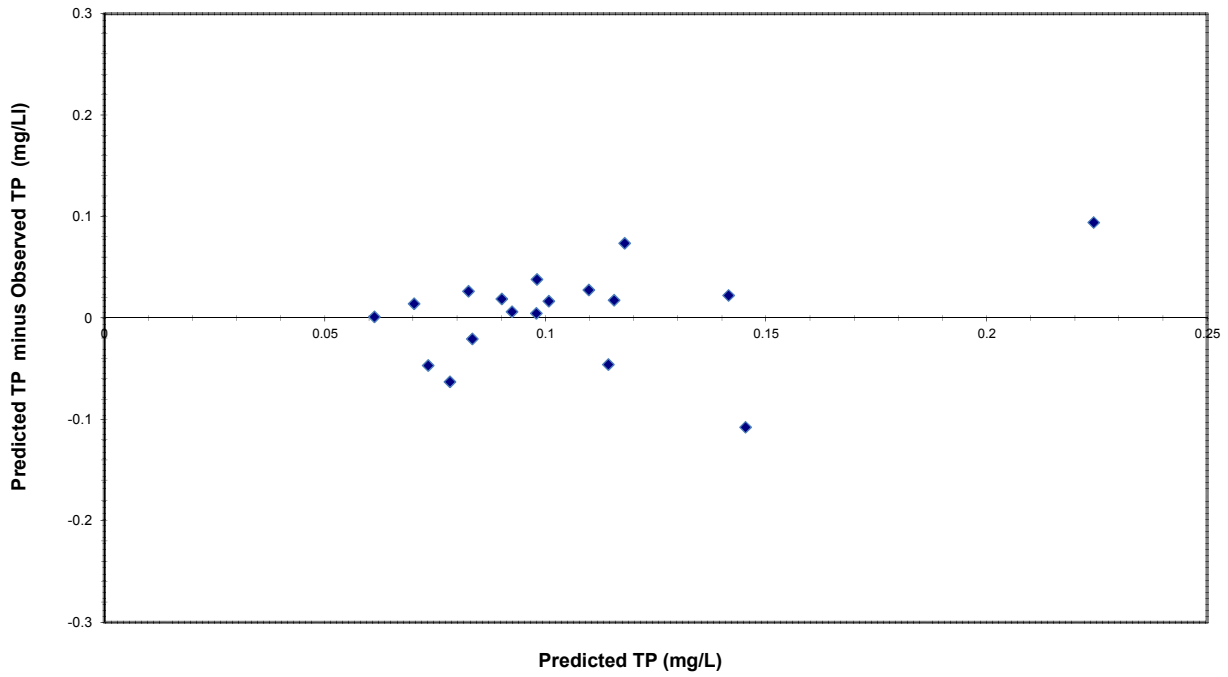


Lamington River at Confluence with North Branch Raritan River (LR5)

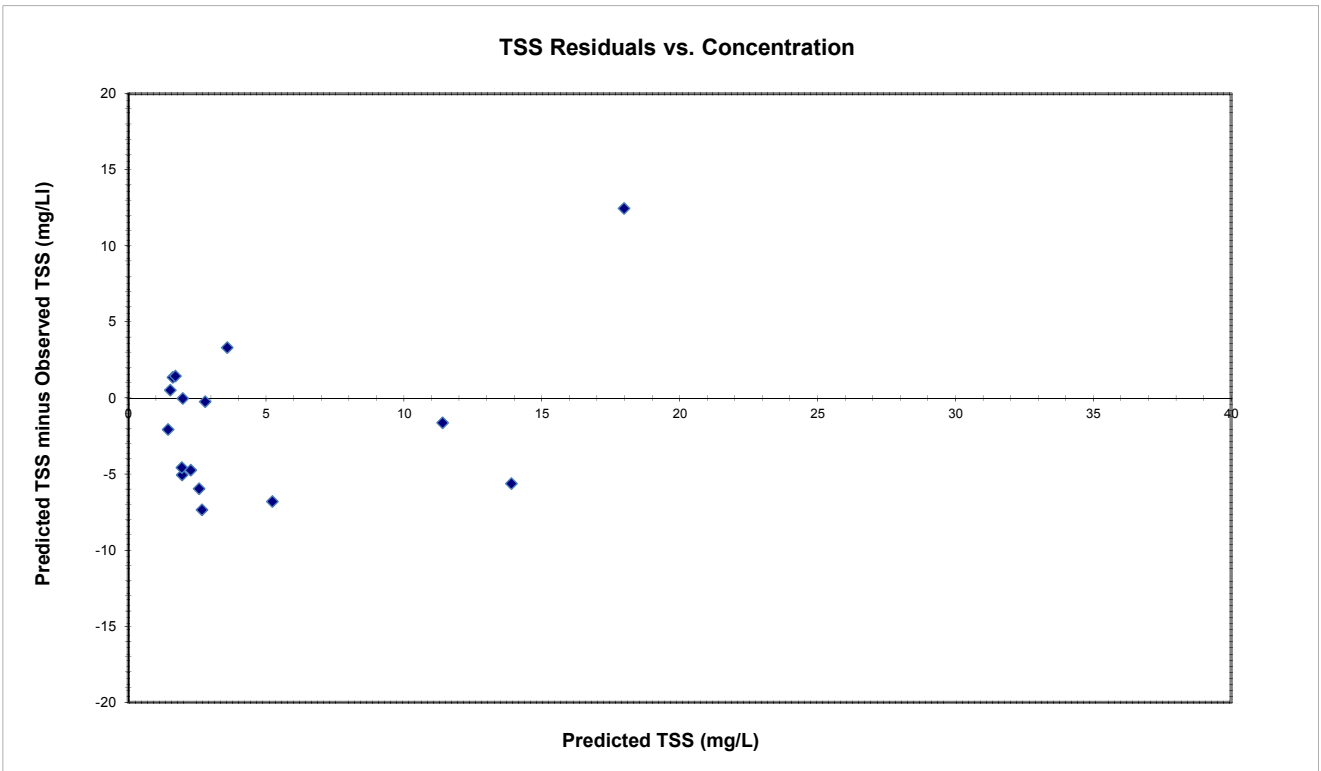
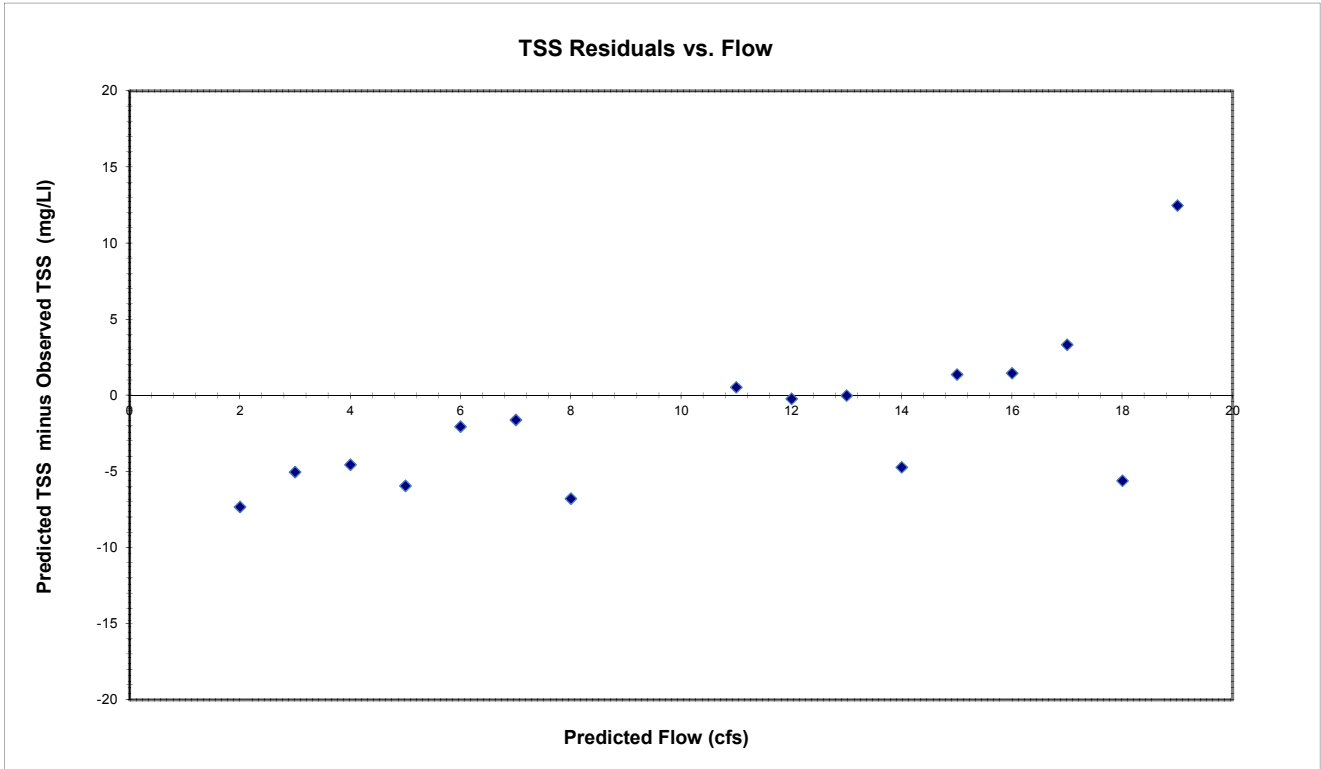
Total Phosphorus Residuals vs. Flow



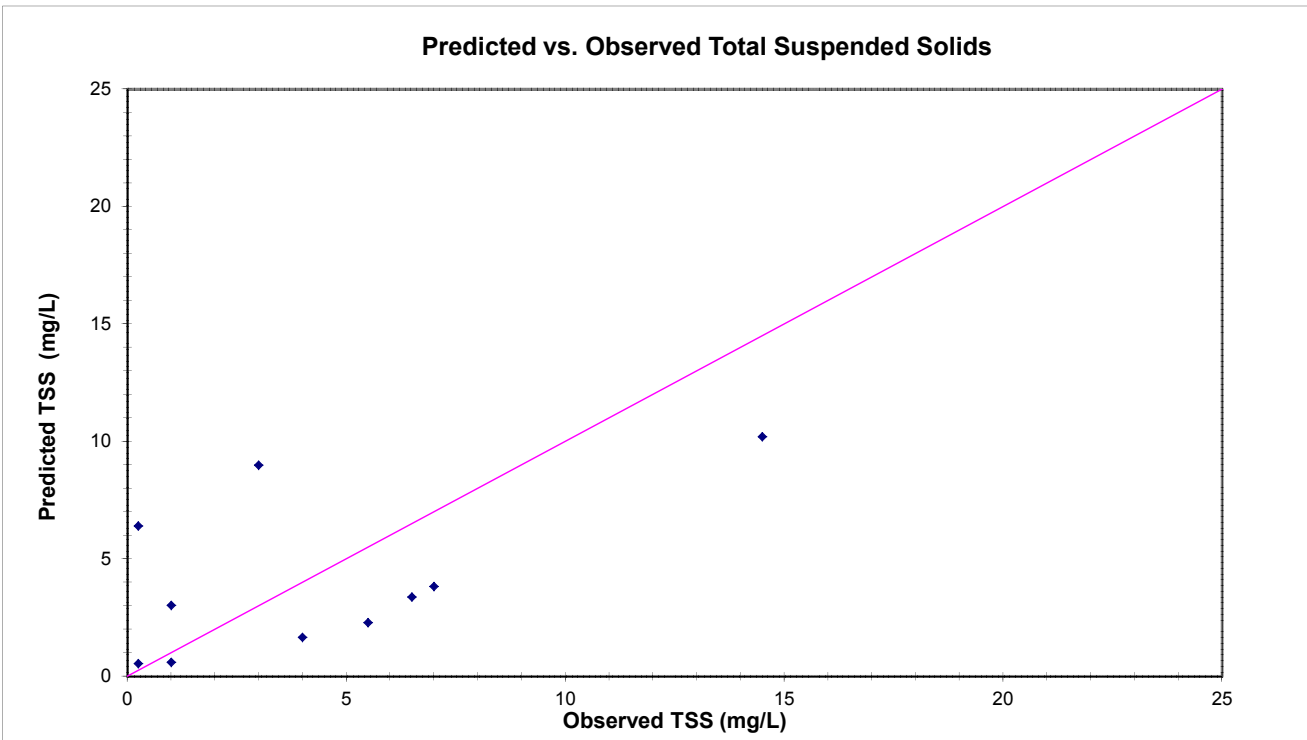
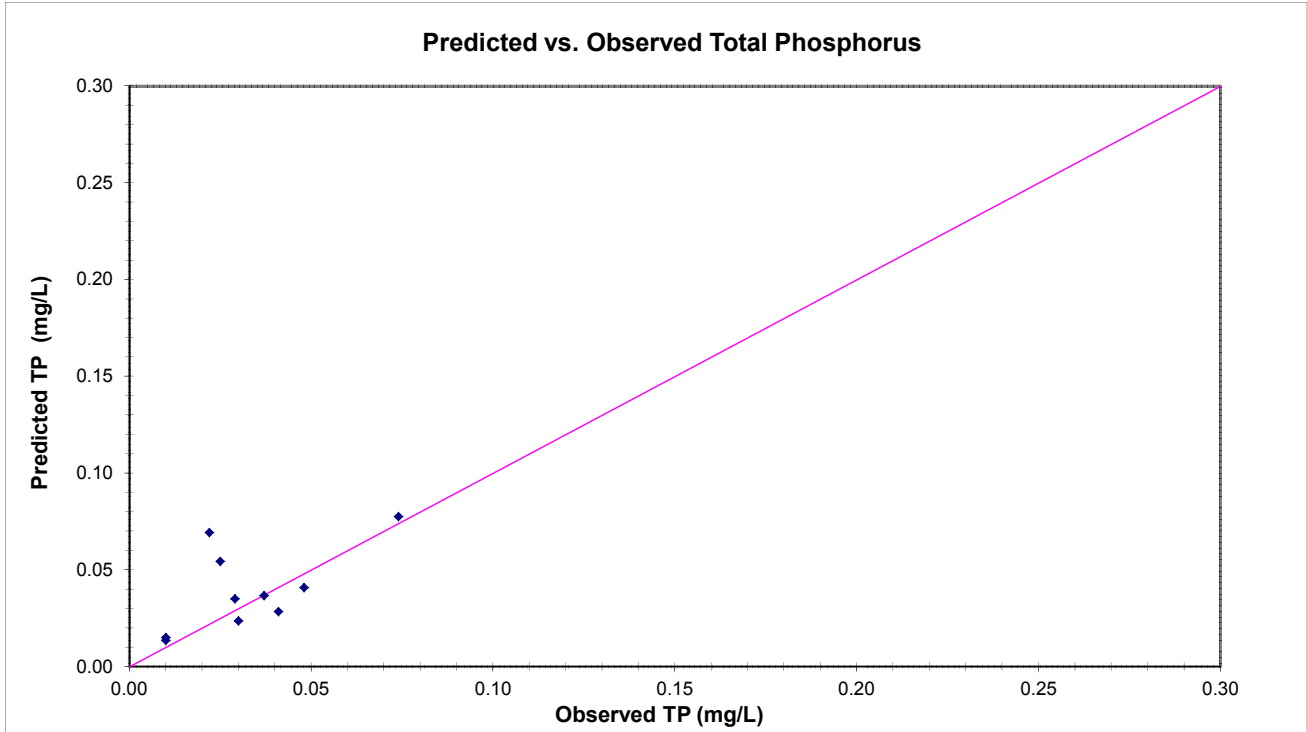
Total Phosphorus Residuals vs. Concentration



Lamington River at Confluence with North Branch Raritan River (LR5)

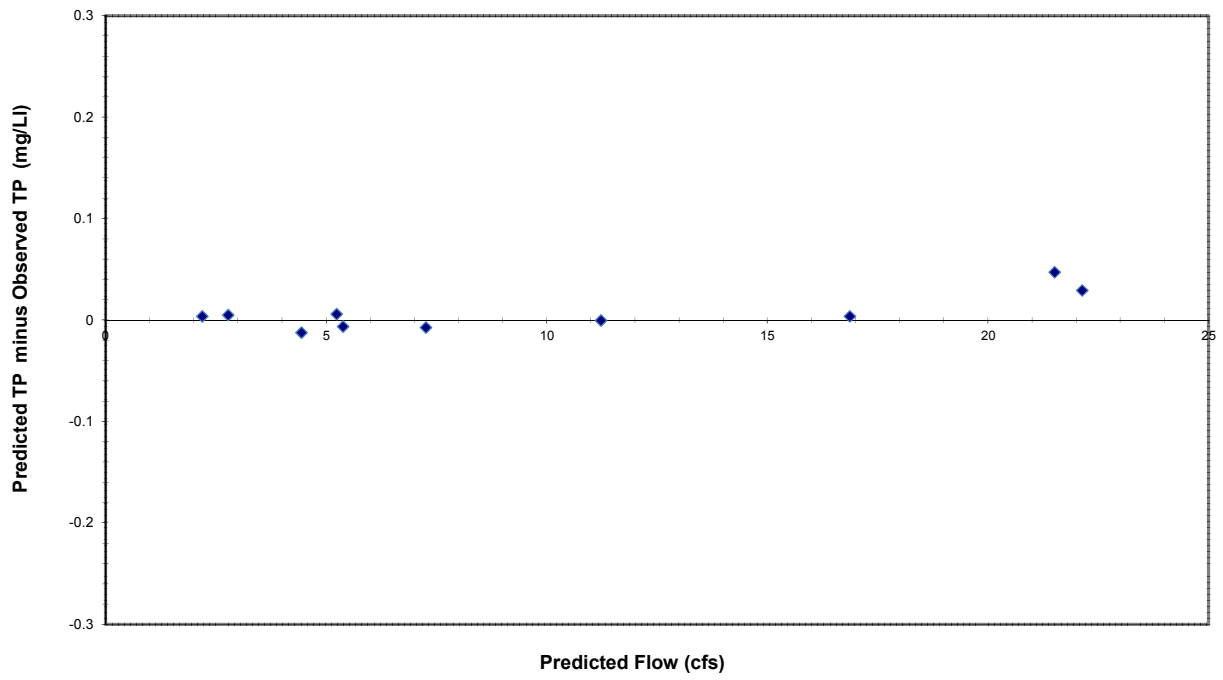


### India Brook at Mountainside Road in Mendham (IB1)

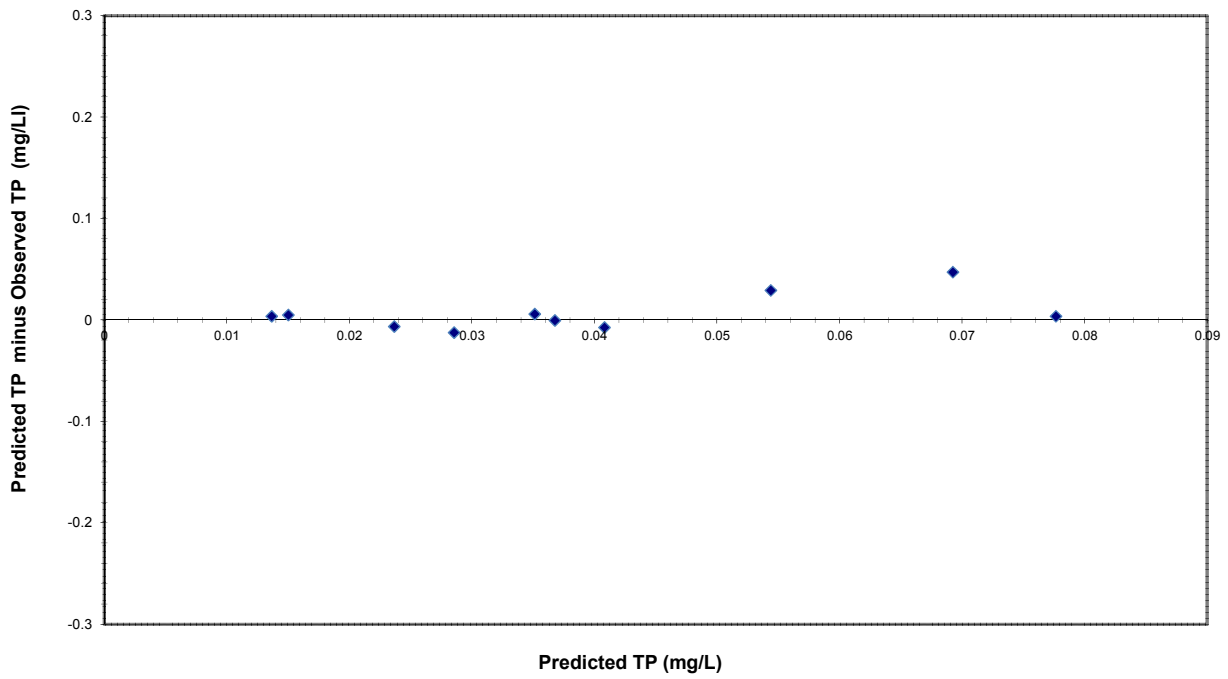


### India Brook at Mountainside Road in Mendham (IB1)

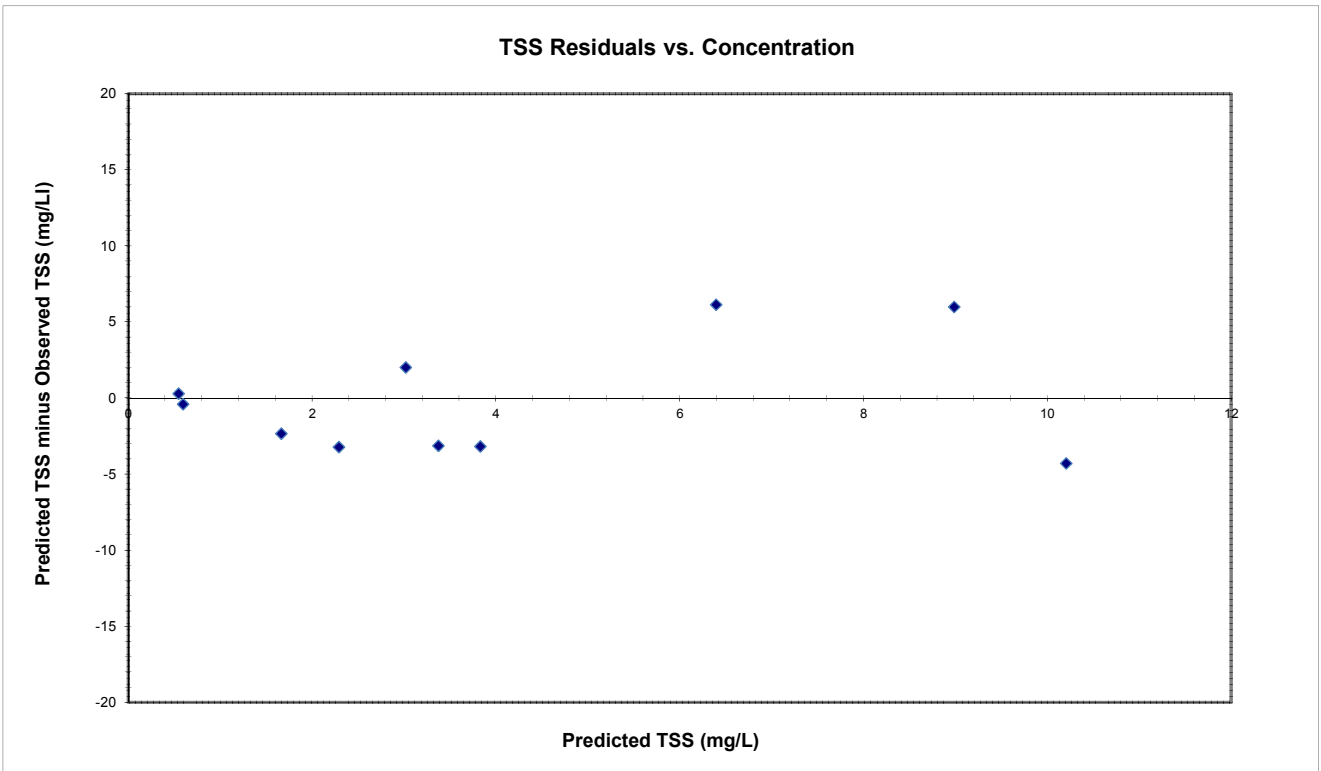
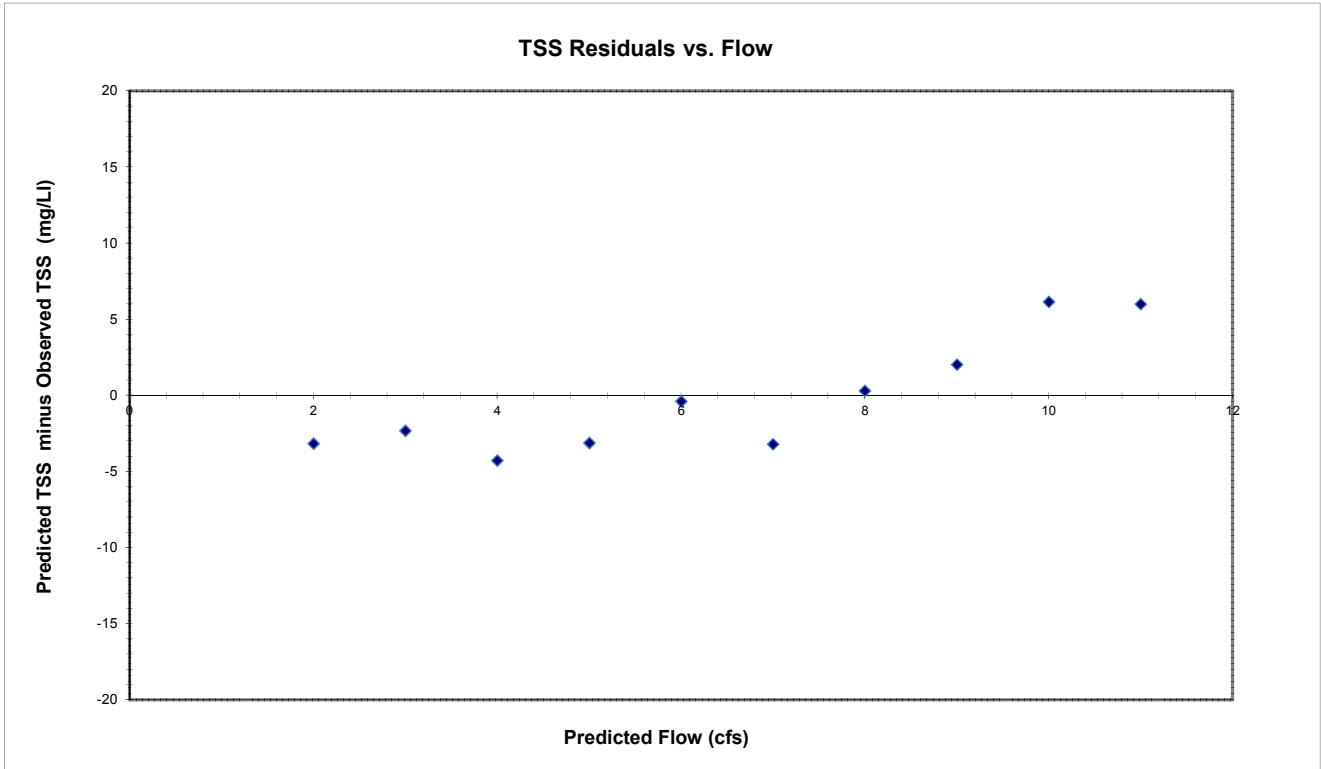
#### Total Phosphorus Residuals vs. Flow



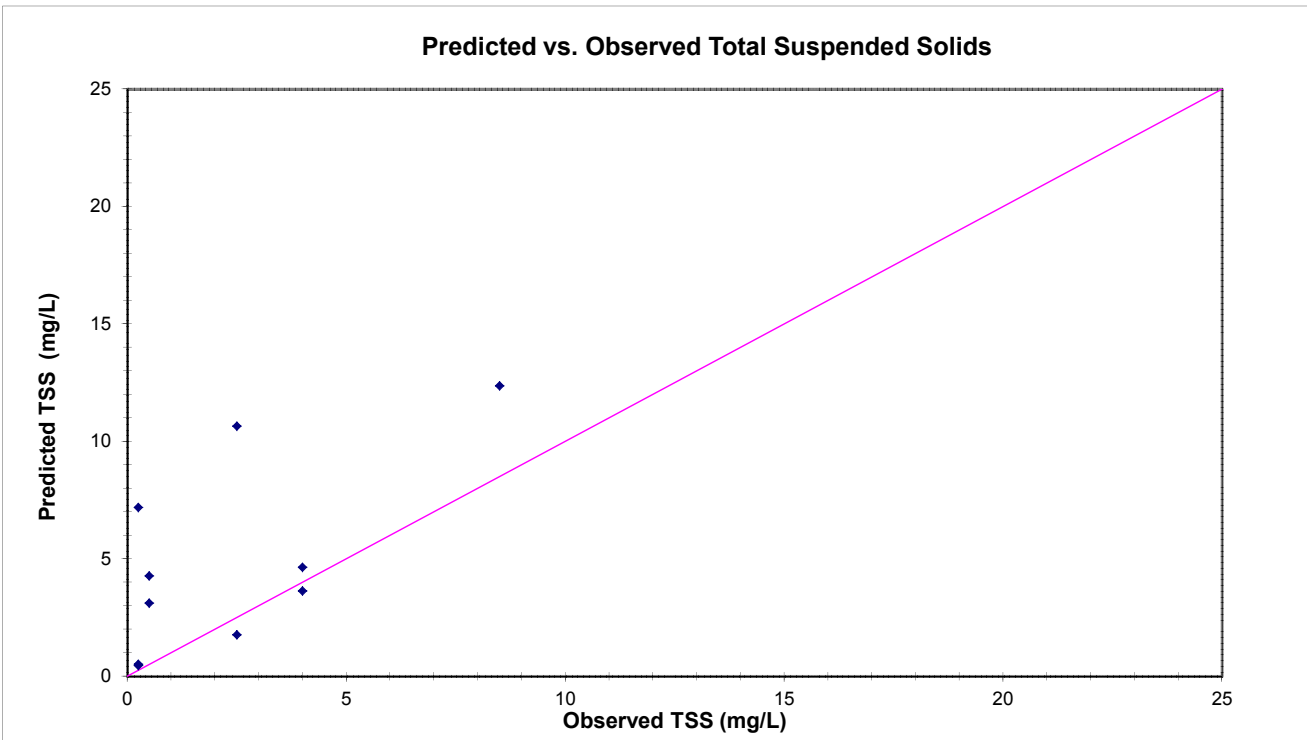
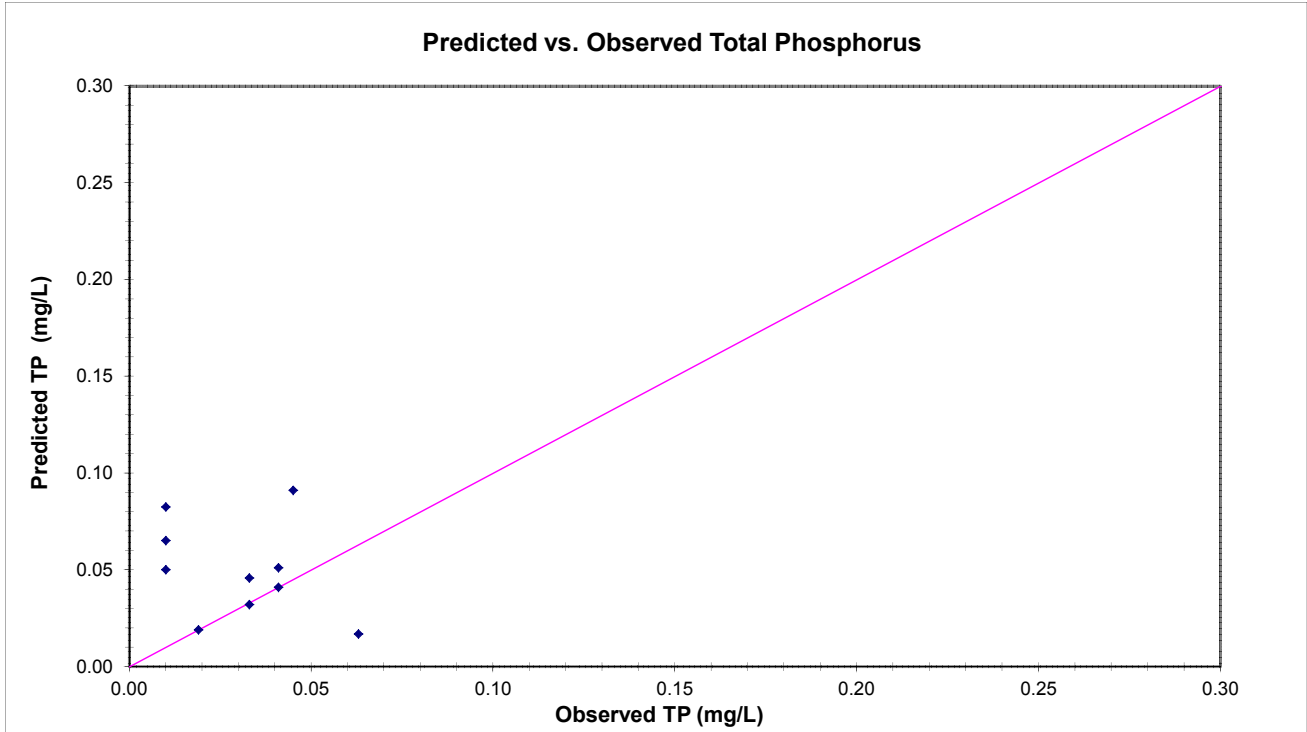
#### Total Phosphorus Residuals vs. Concentration



### India Brook at Mountainside Road in Mendham (IB1)



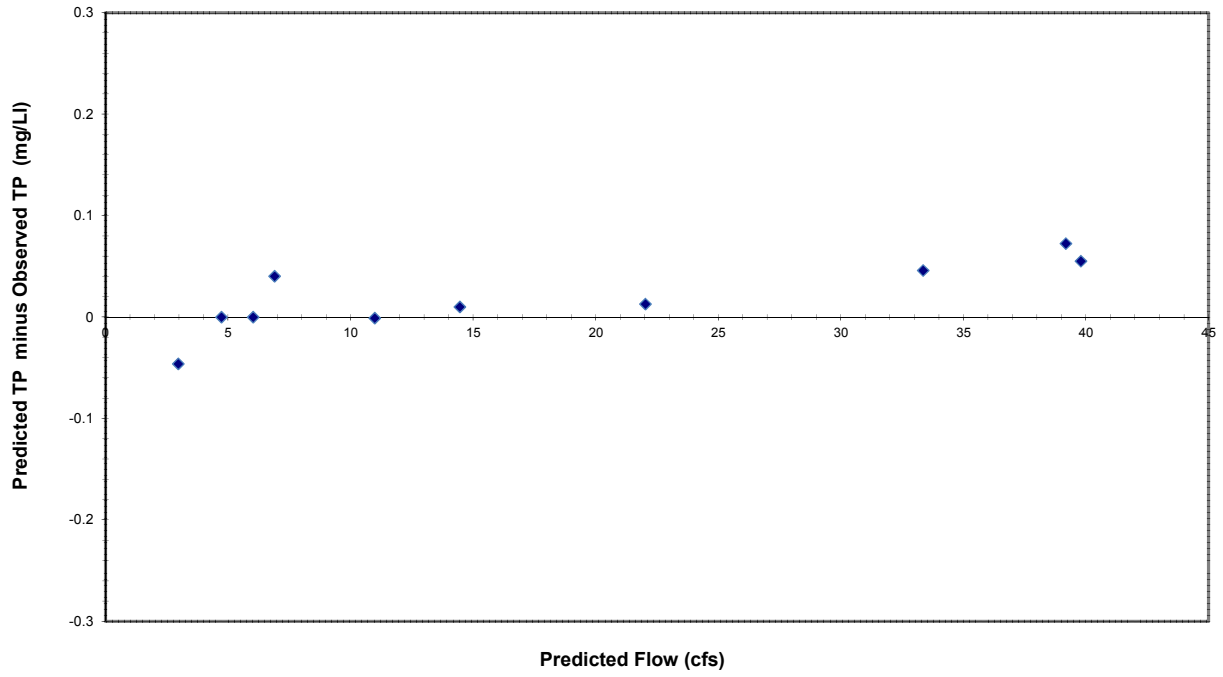
### Burnett Brook at Chester (BuB1)



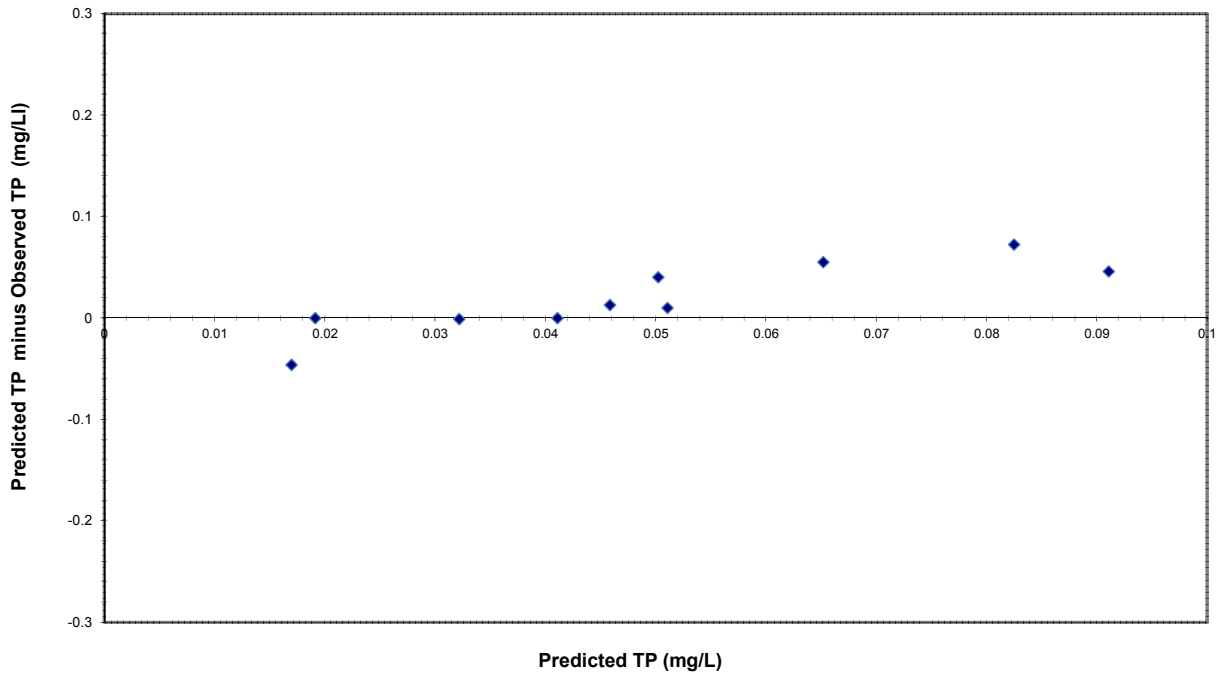


### Burnett Brook at Chester (BuB1)

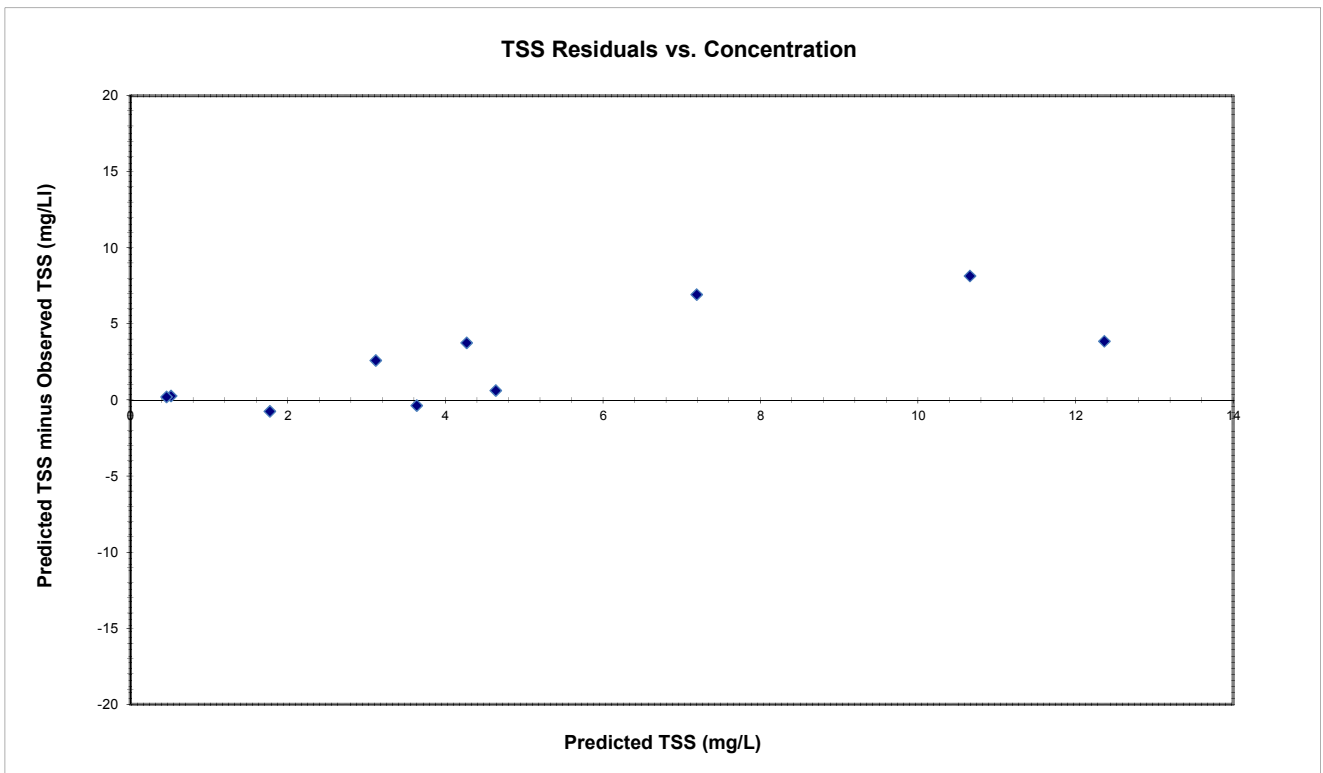
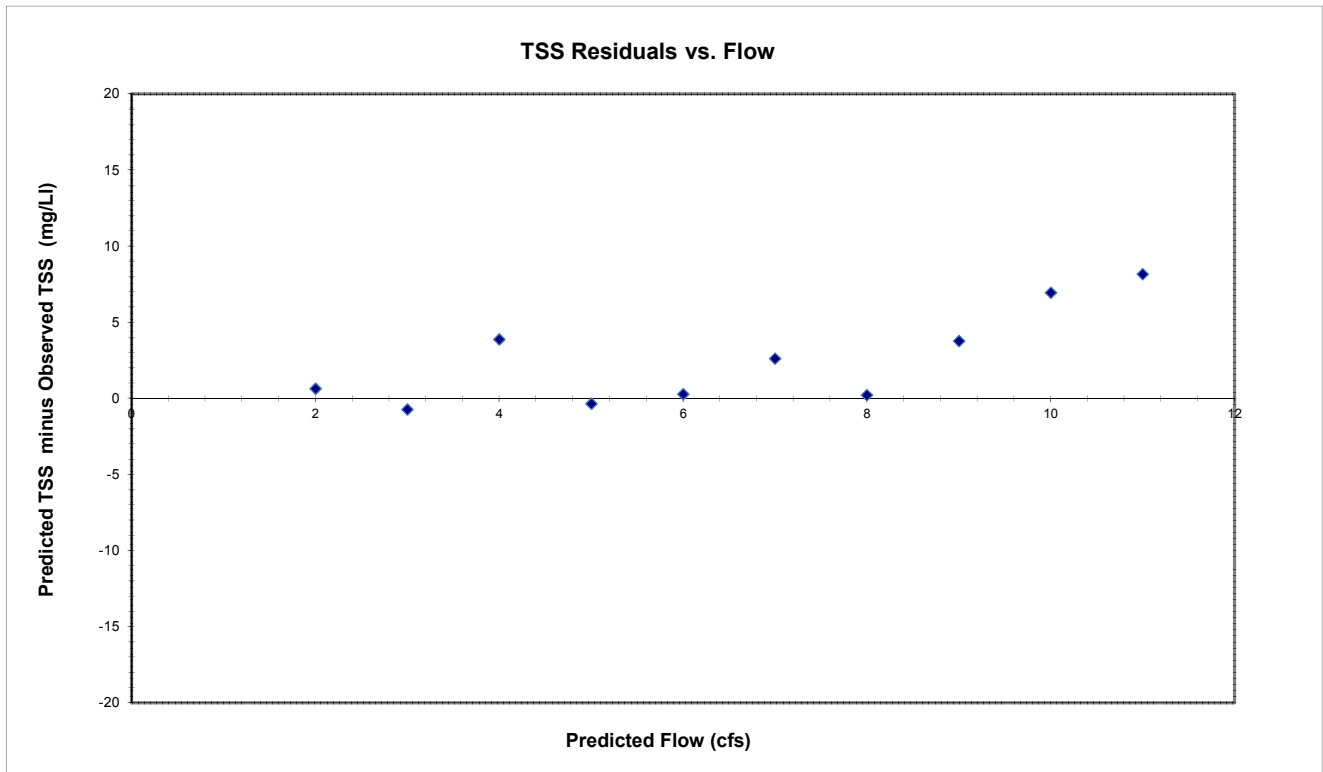
#### Total Phosphorus Residuals vs. Flow



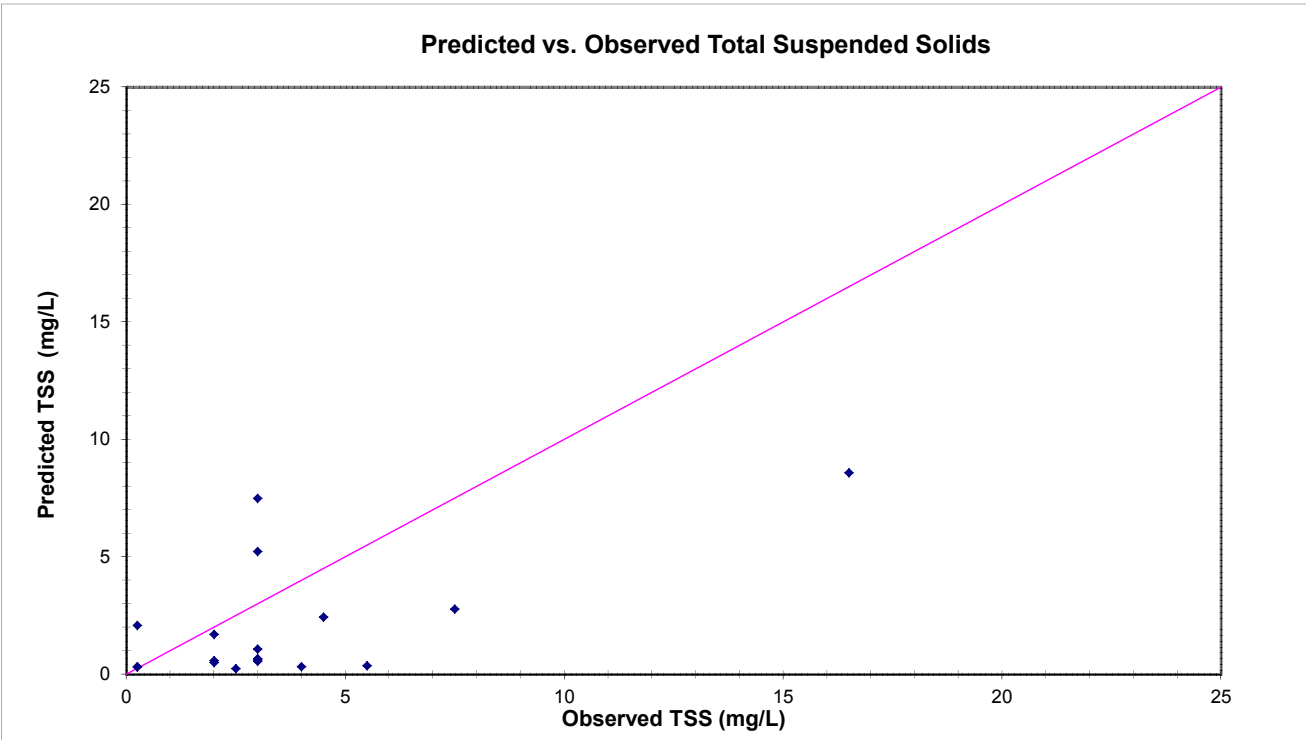
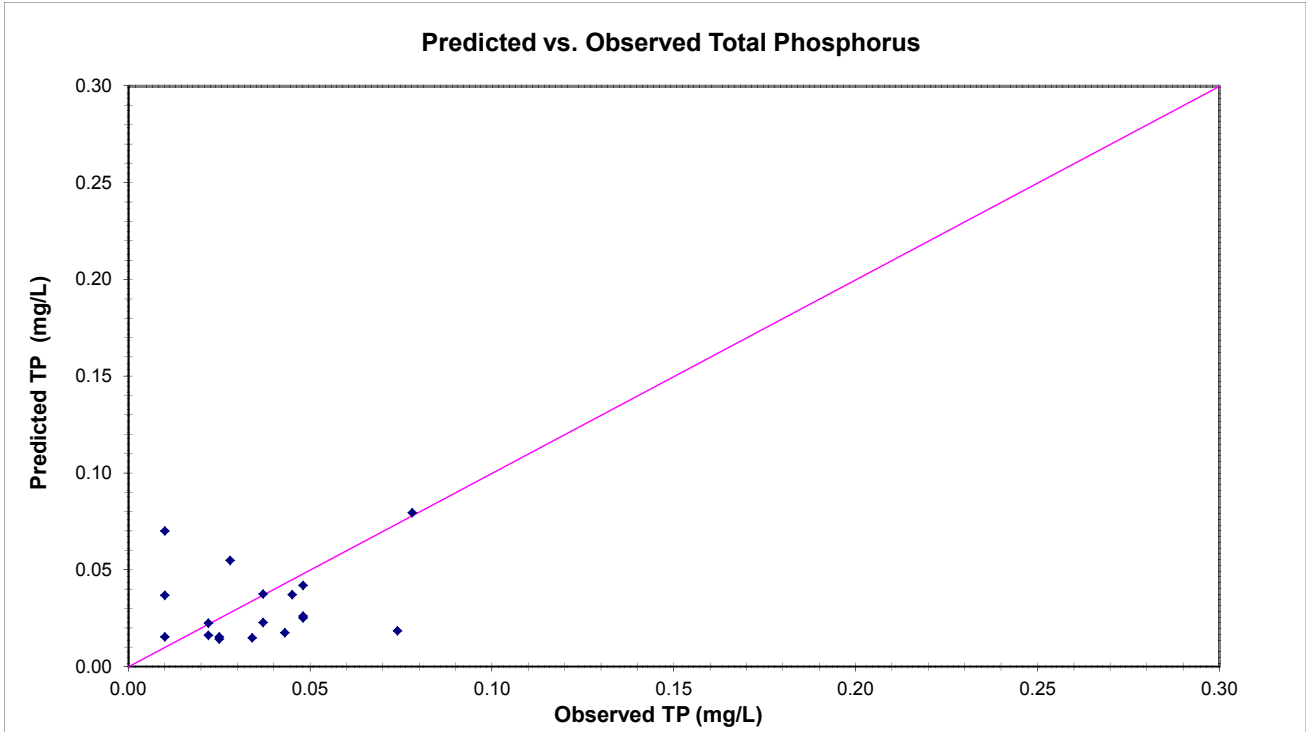
#### Total Phosphorus Residuals vs. Concentration



### Burnett Brook at Chester (BuB1)

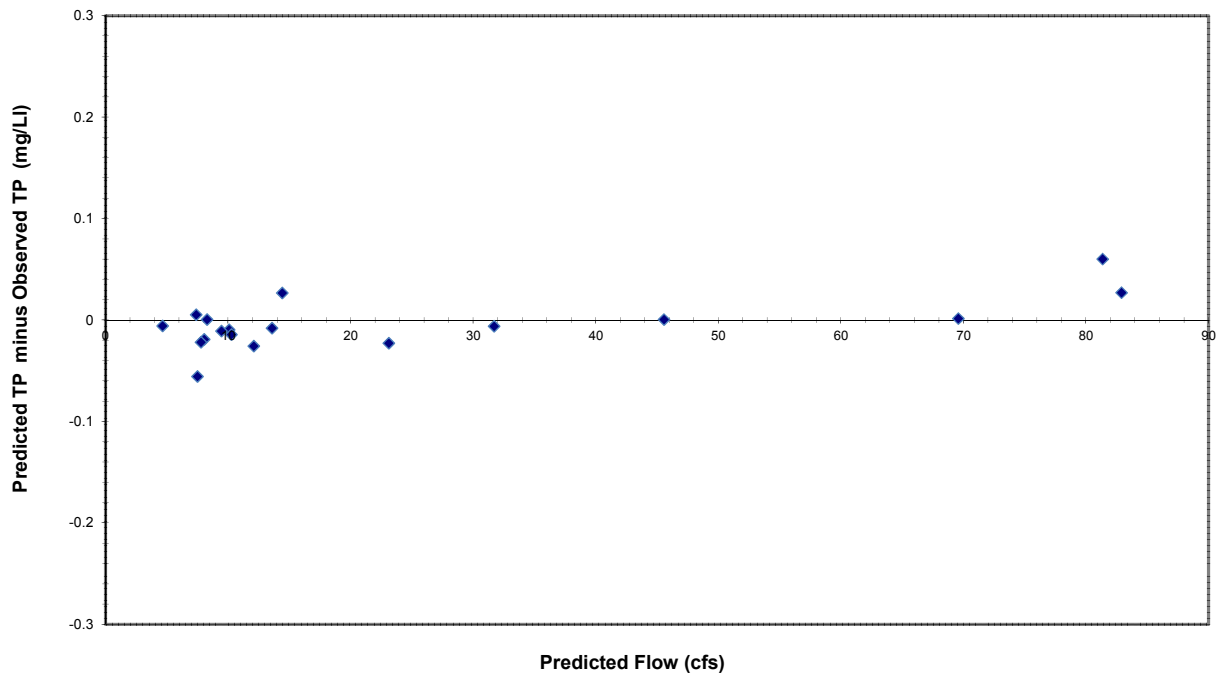


# North Branch Raritan River in Mendham Township (NBRR1)

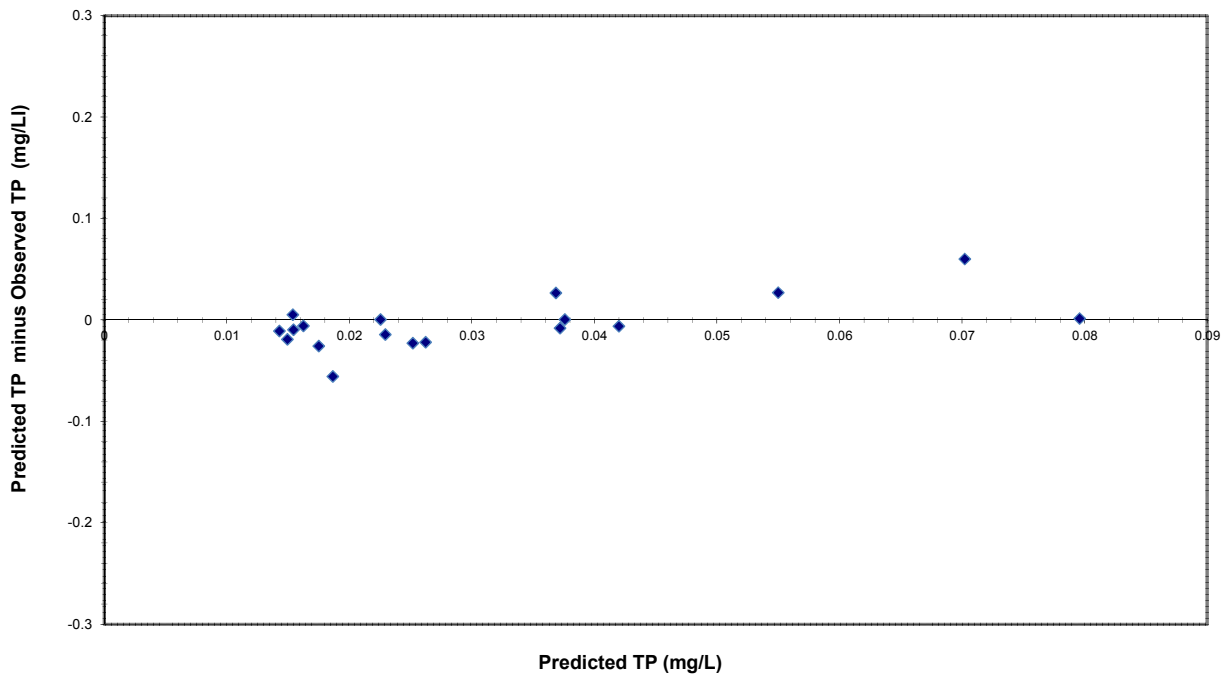


### North Branch Raritan River in Mendham Township (NBRR1)

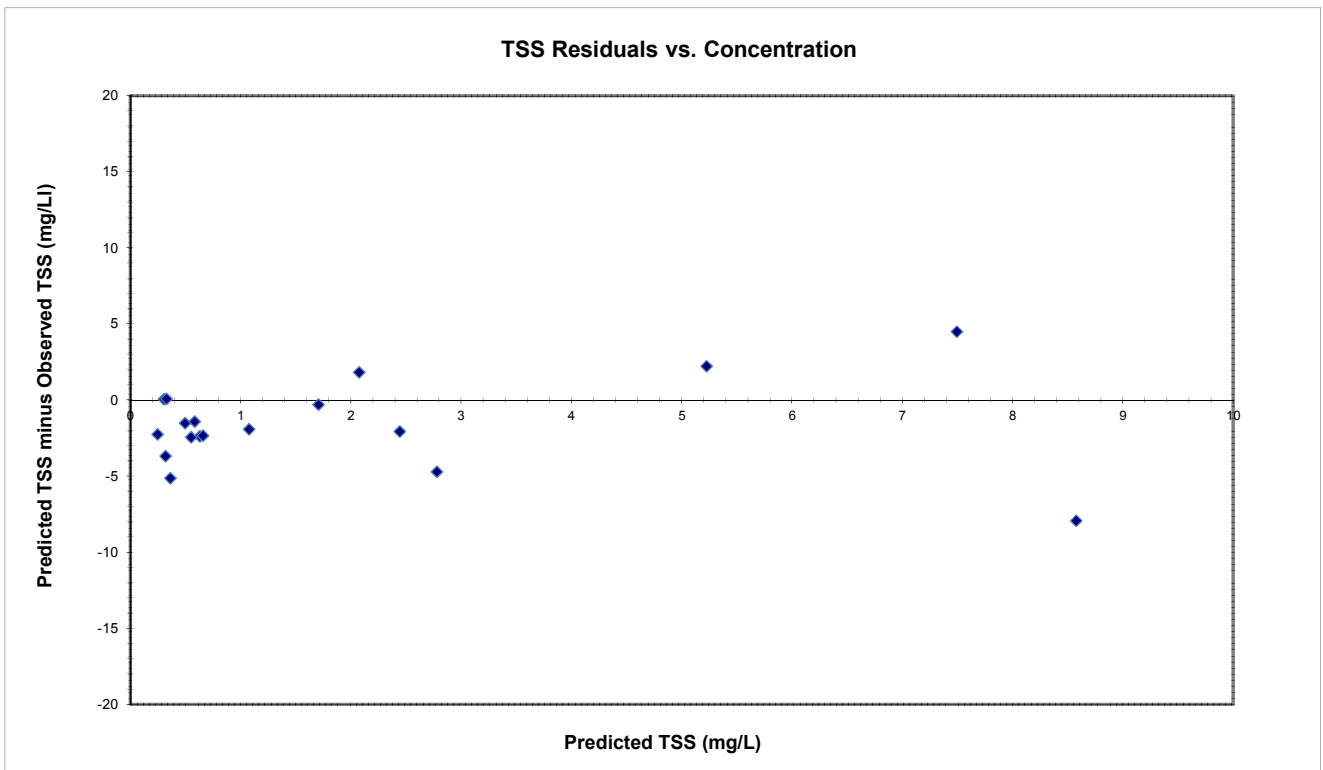
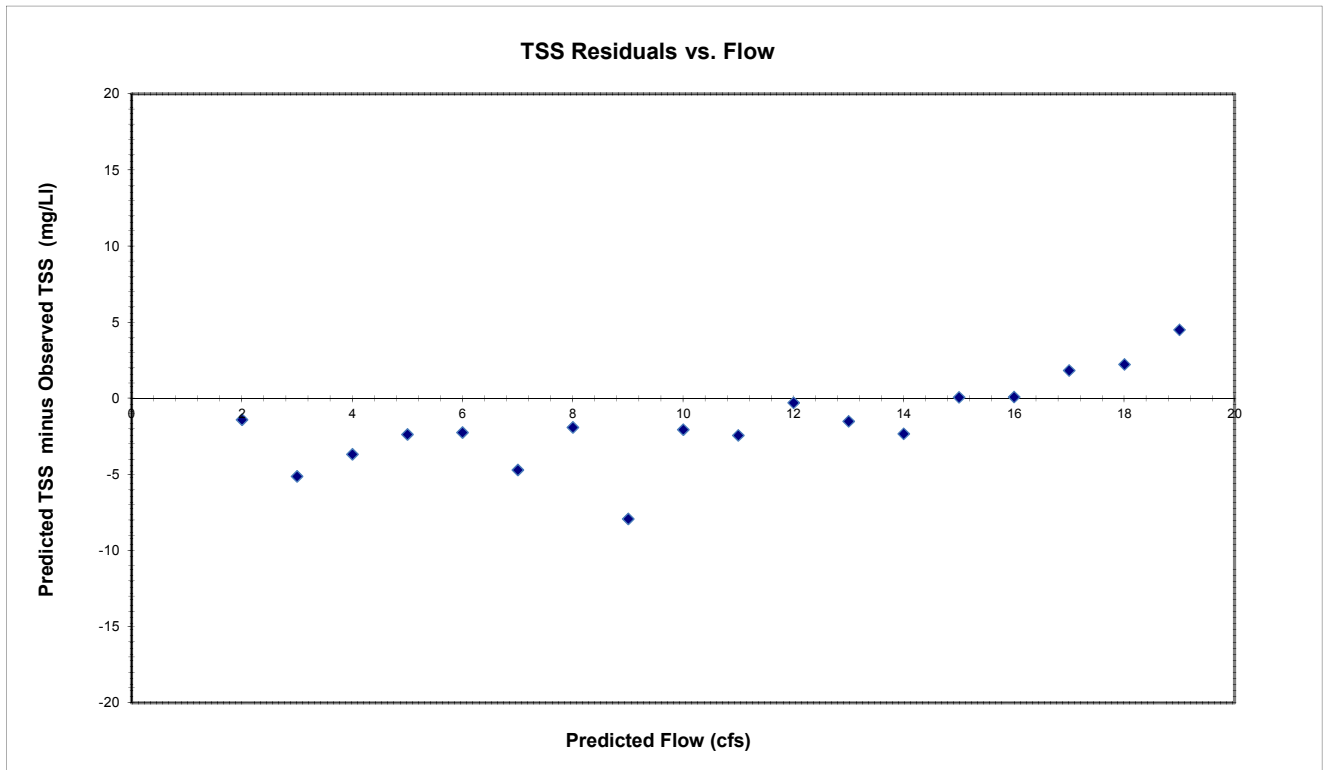
#### Total Phosphorus Residuals vs. Flow



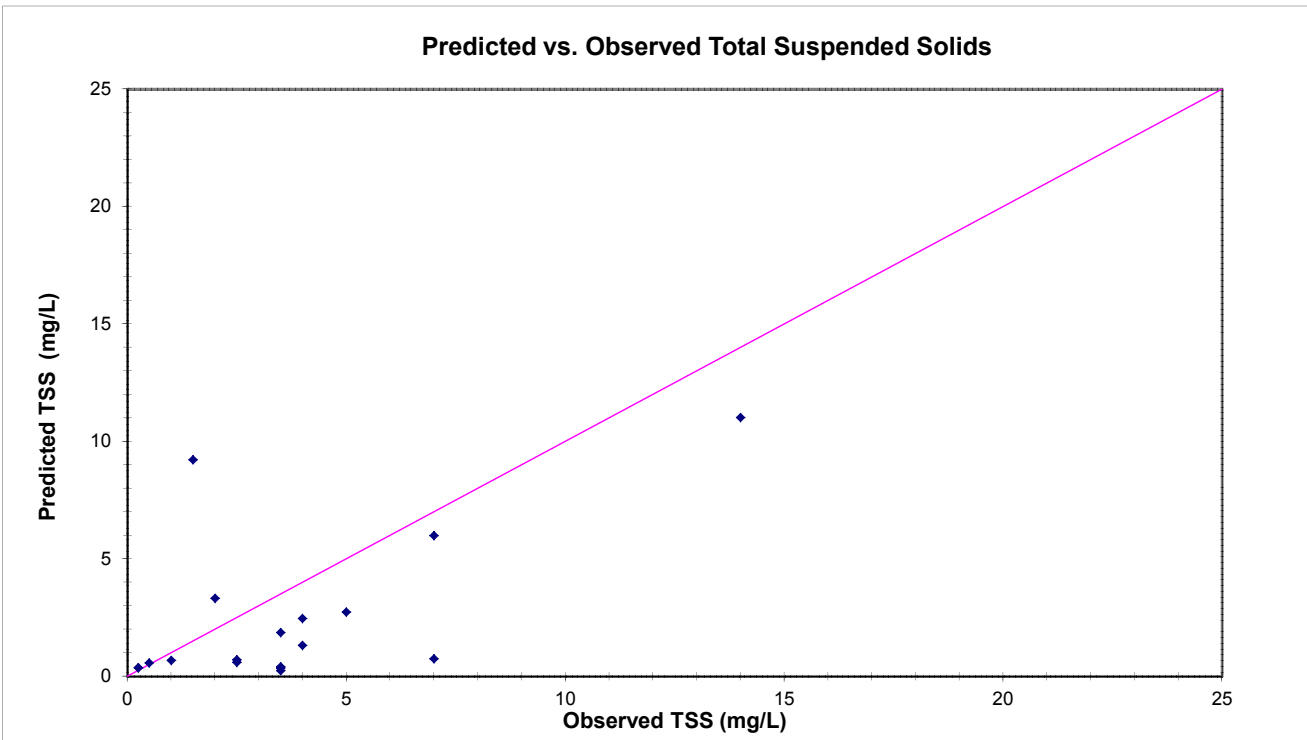
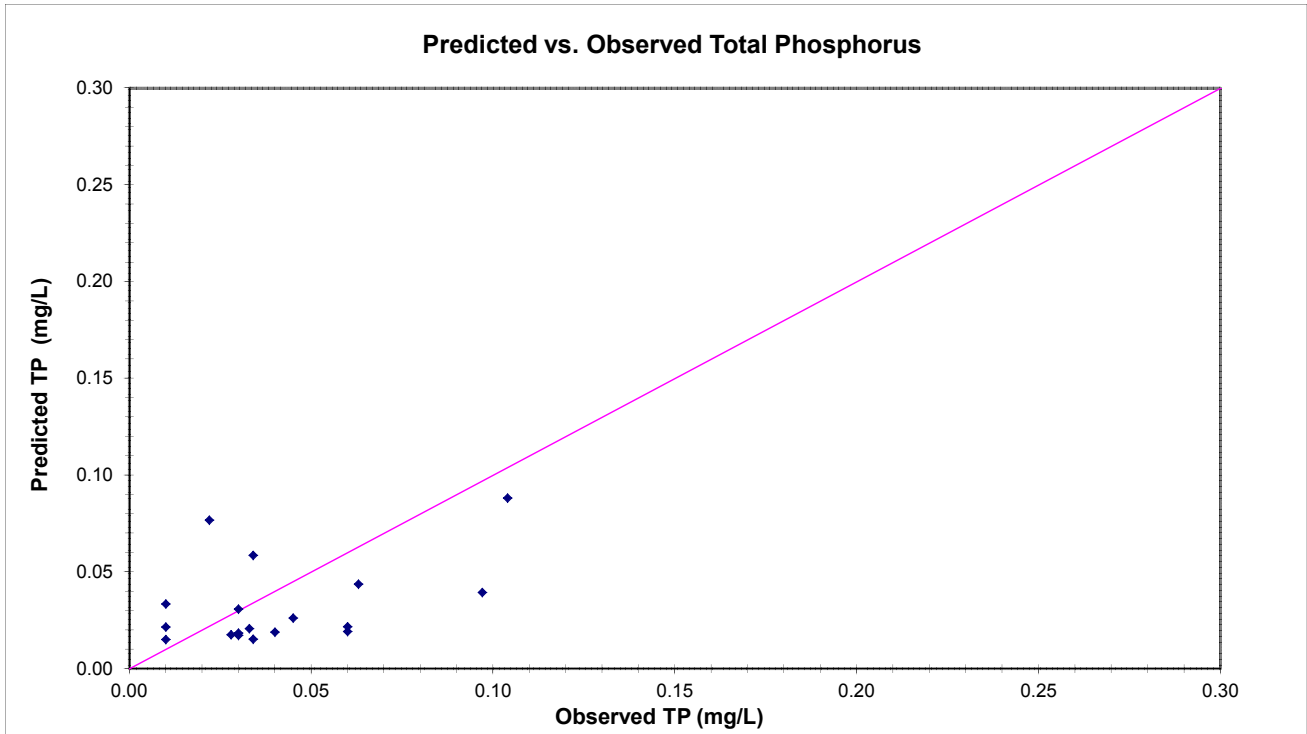
#### Total Phosphorus Residuals vs. Concentration



### North Branch Raritan River in Mendham Township (NBRR1)

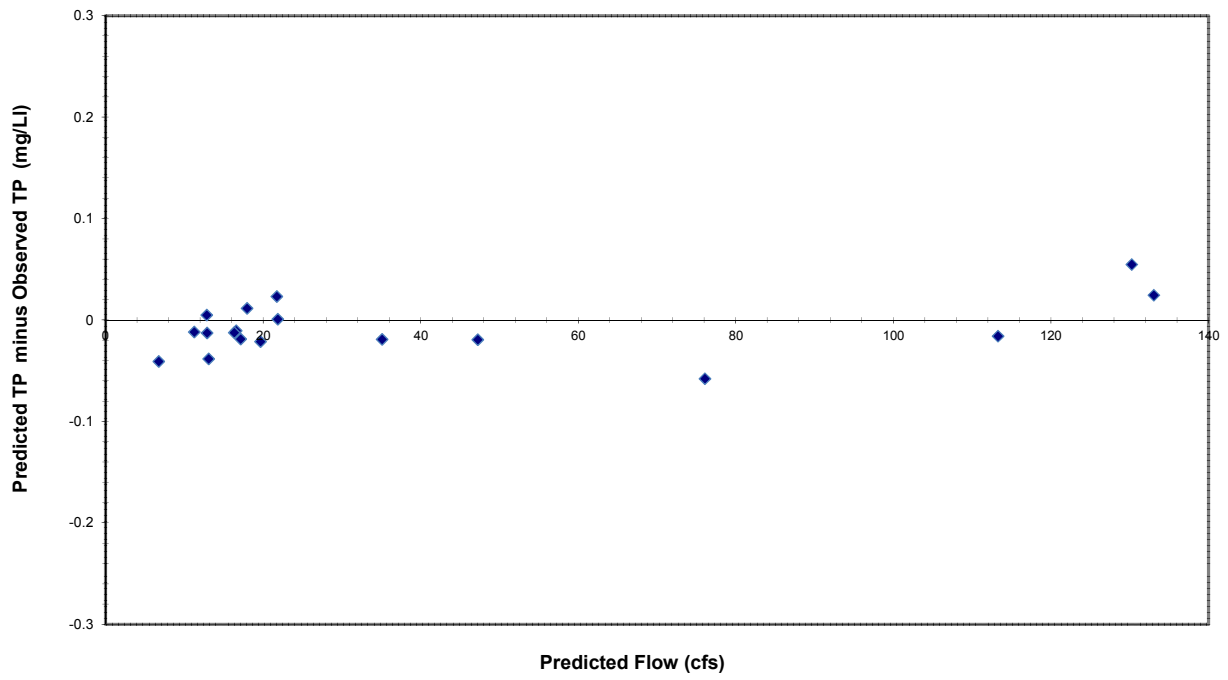


### North Branch Raritan River Upstream of Ravine Lake (NBRR2)

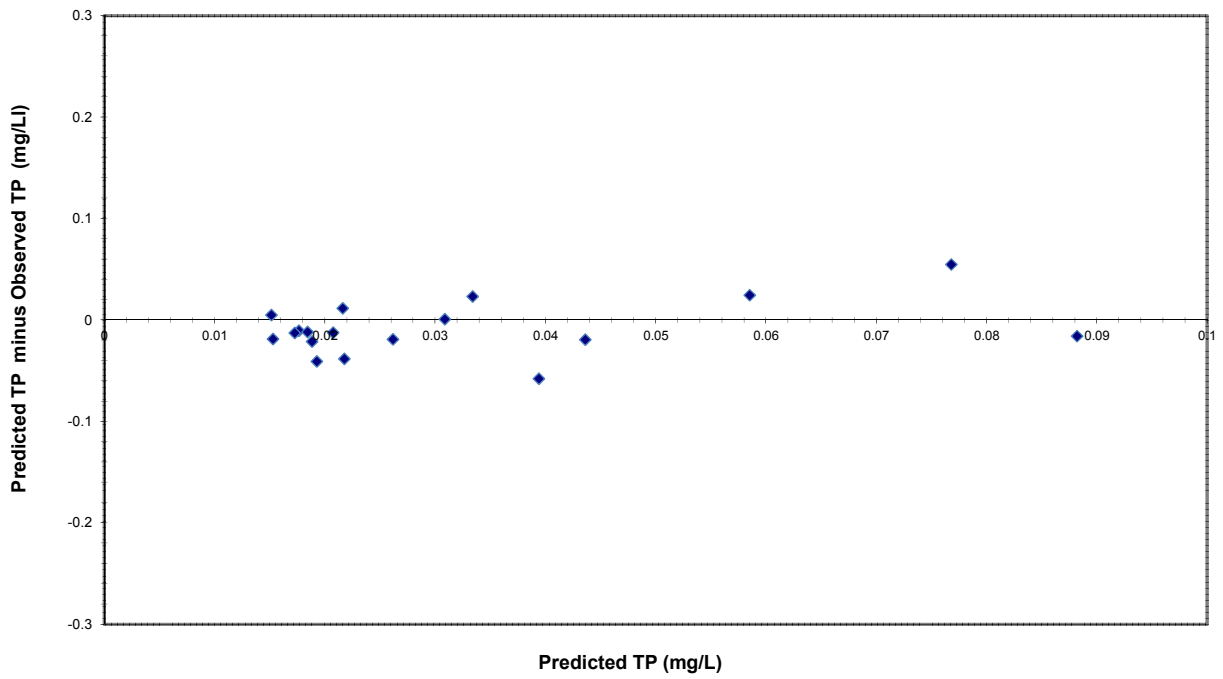


### North Branch Raritan River Upstream of Ravine Lake (NBRR2)

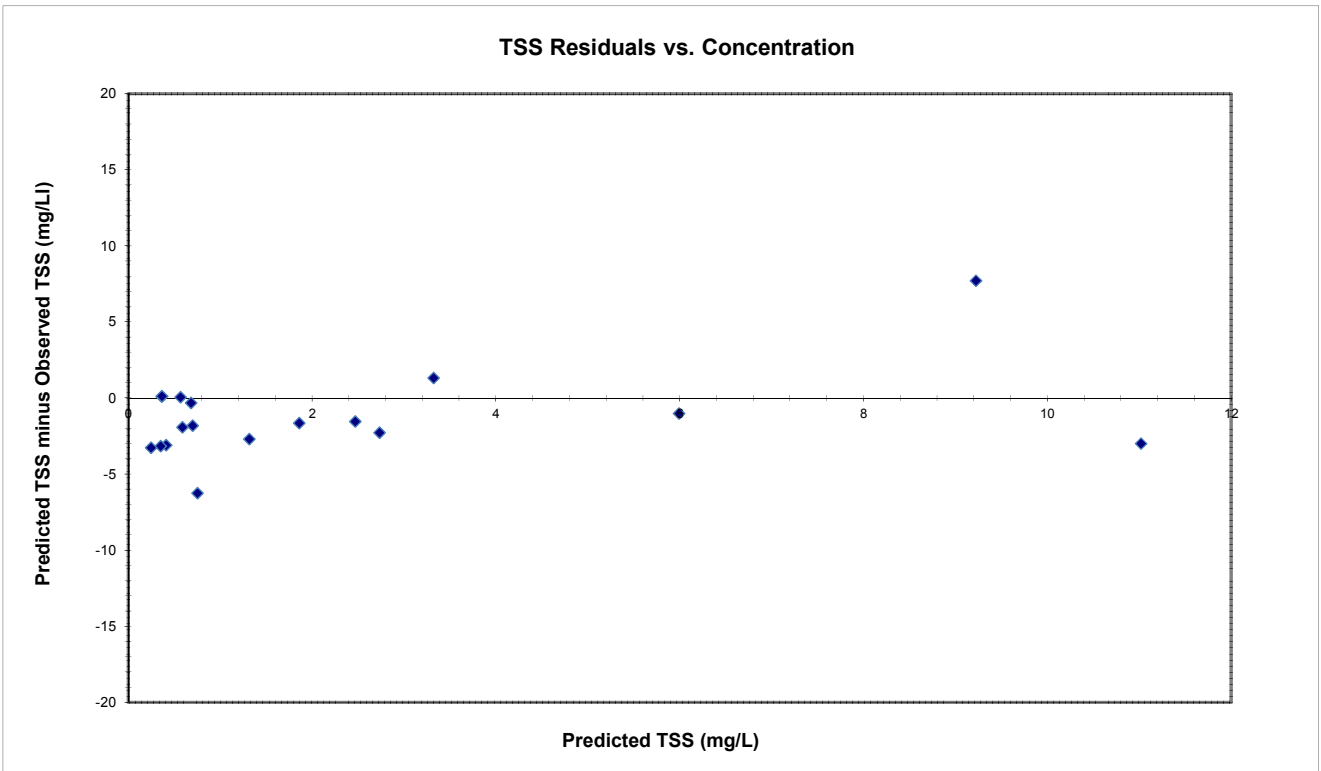
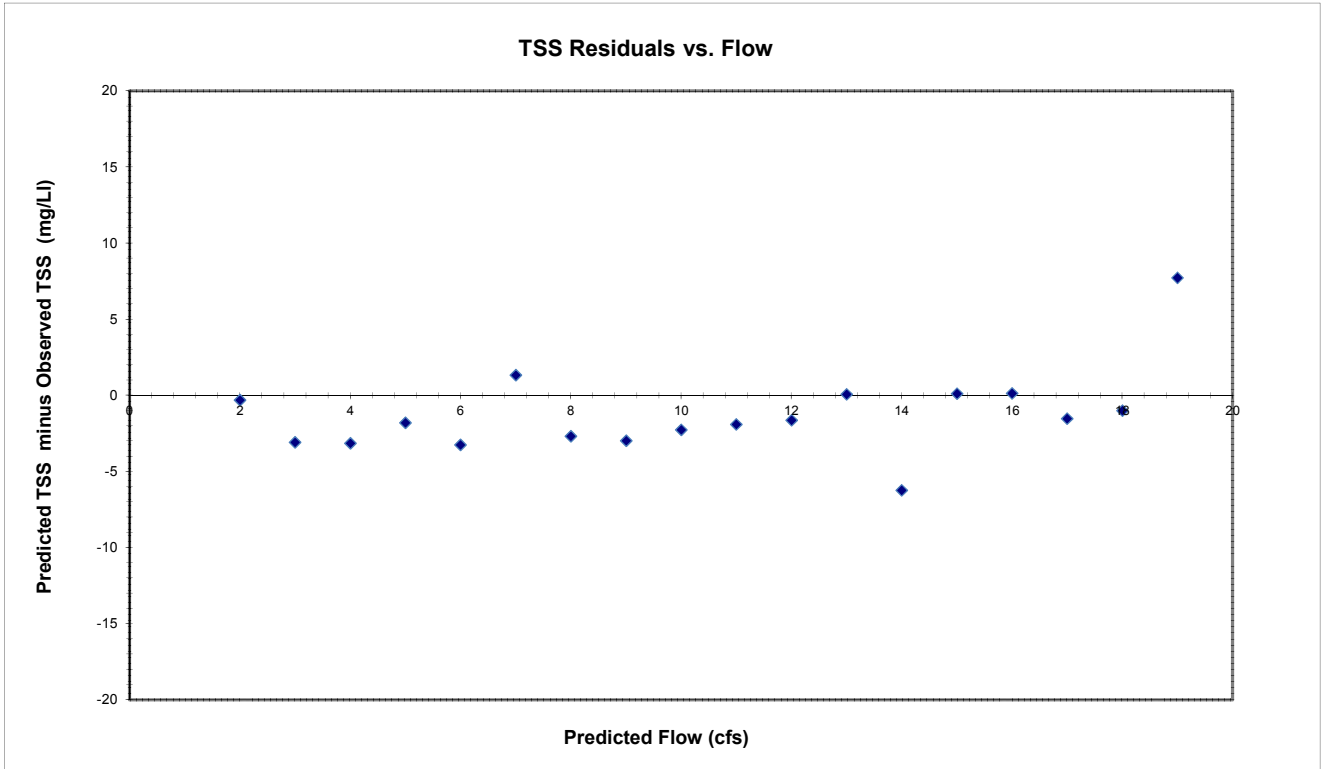
#### Total Phosphorus Residuals vs. Flow



#### Total Phosphorus Residuals vs. Concentration

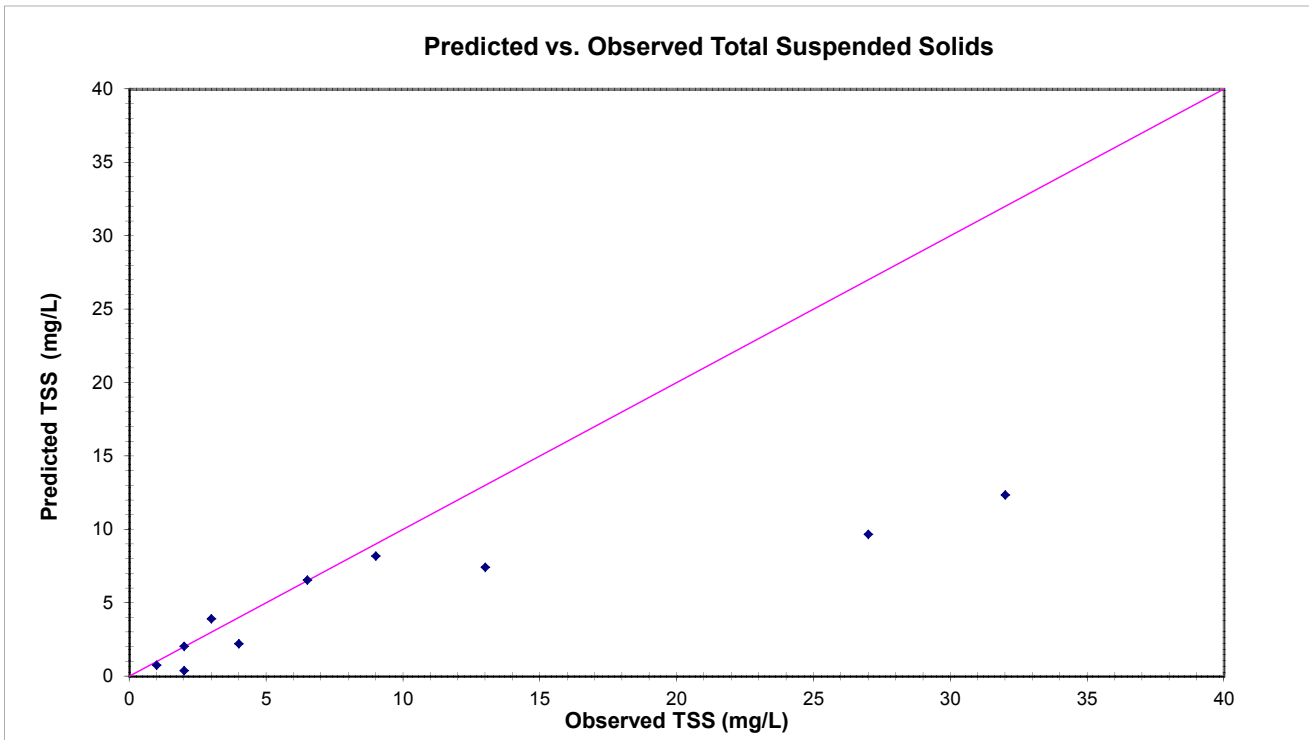
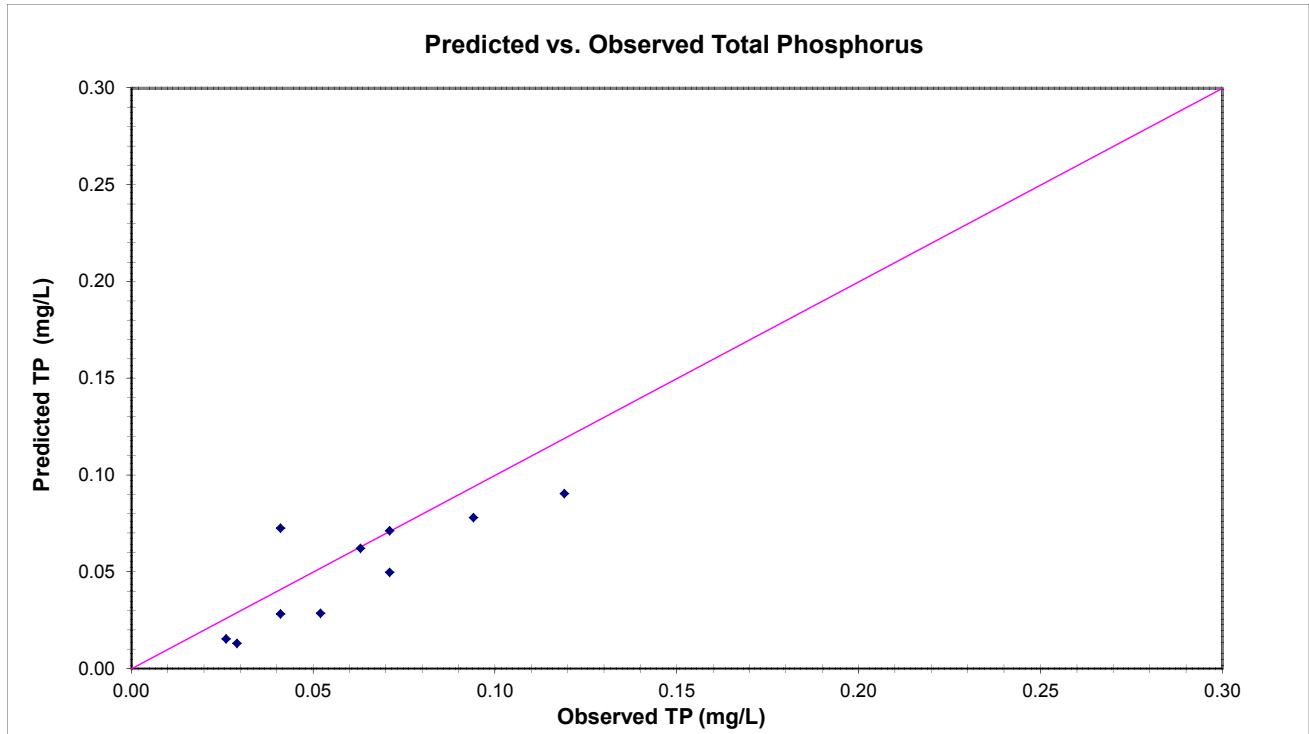


### North Branch Raritan River Upstream of Ravine Lake (NBRR2)



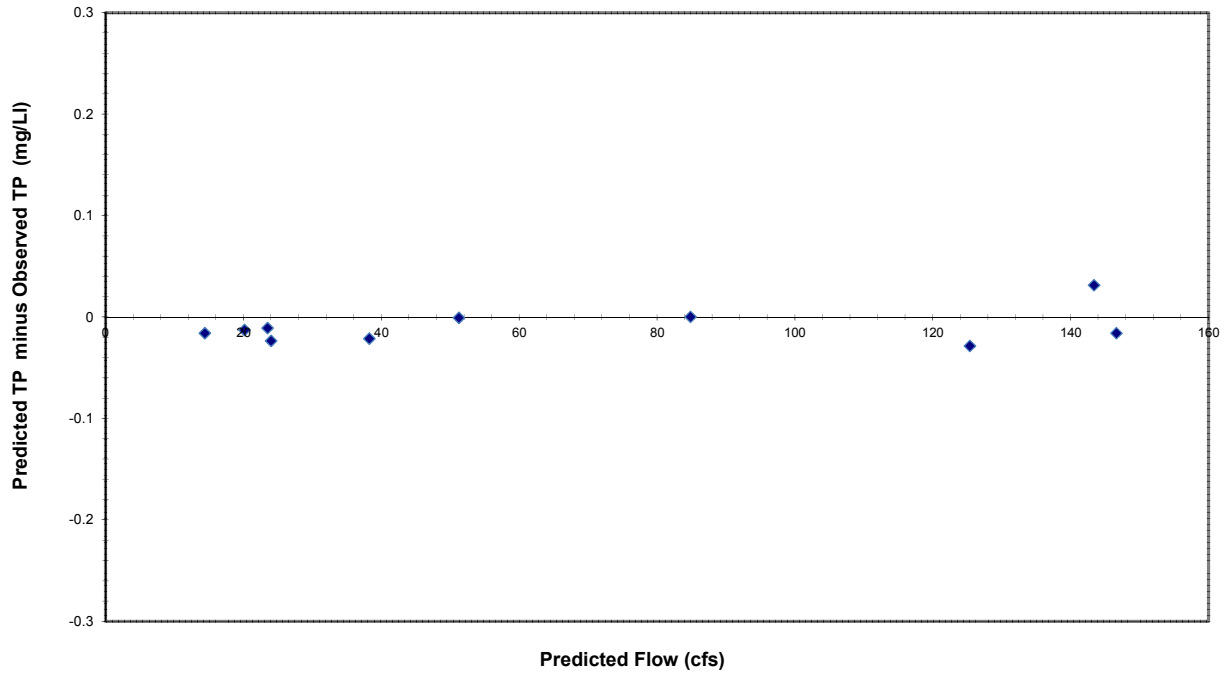


# North Branch Raritan River Downstream Ravine Lake (NBRR4)

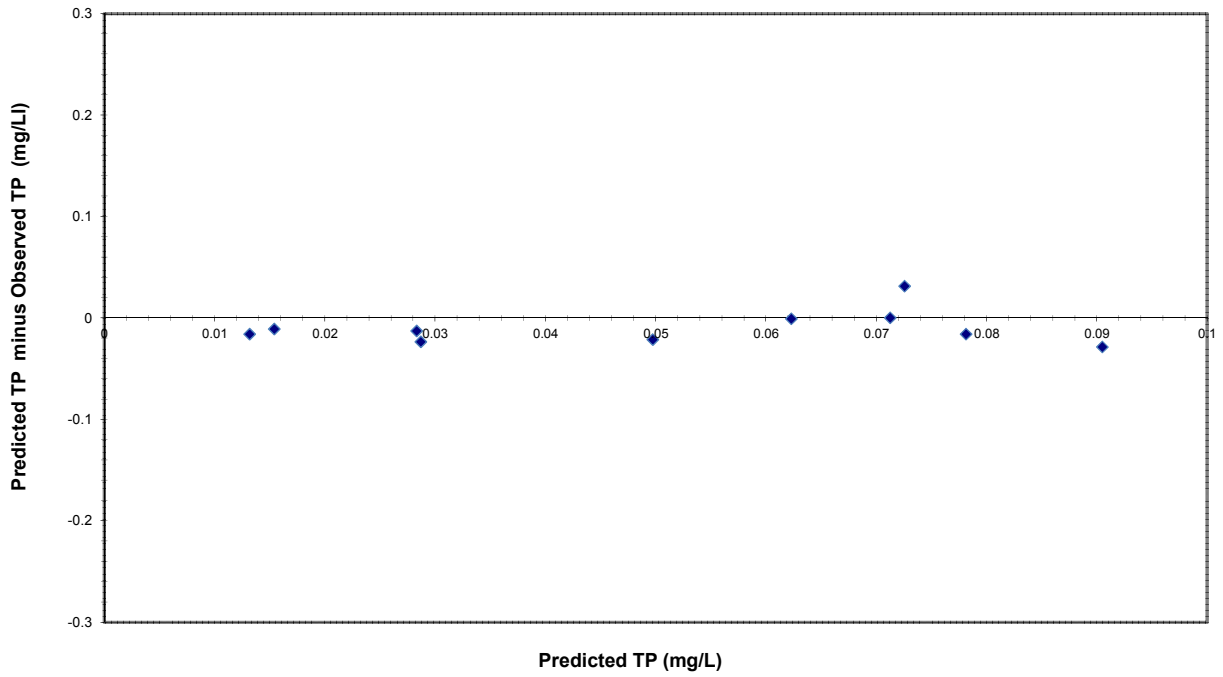


### North Branch Raritan River Downstream Ravine Lake (NBRR4)

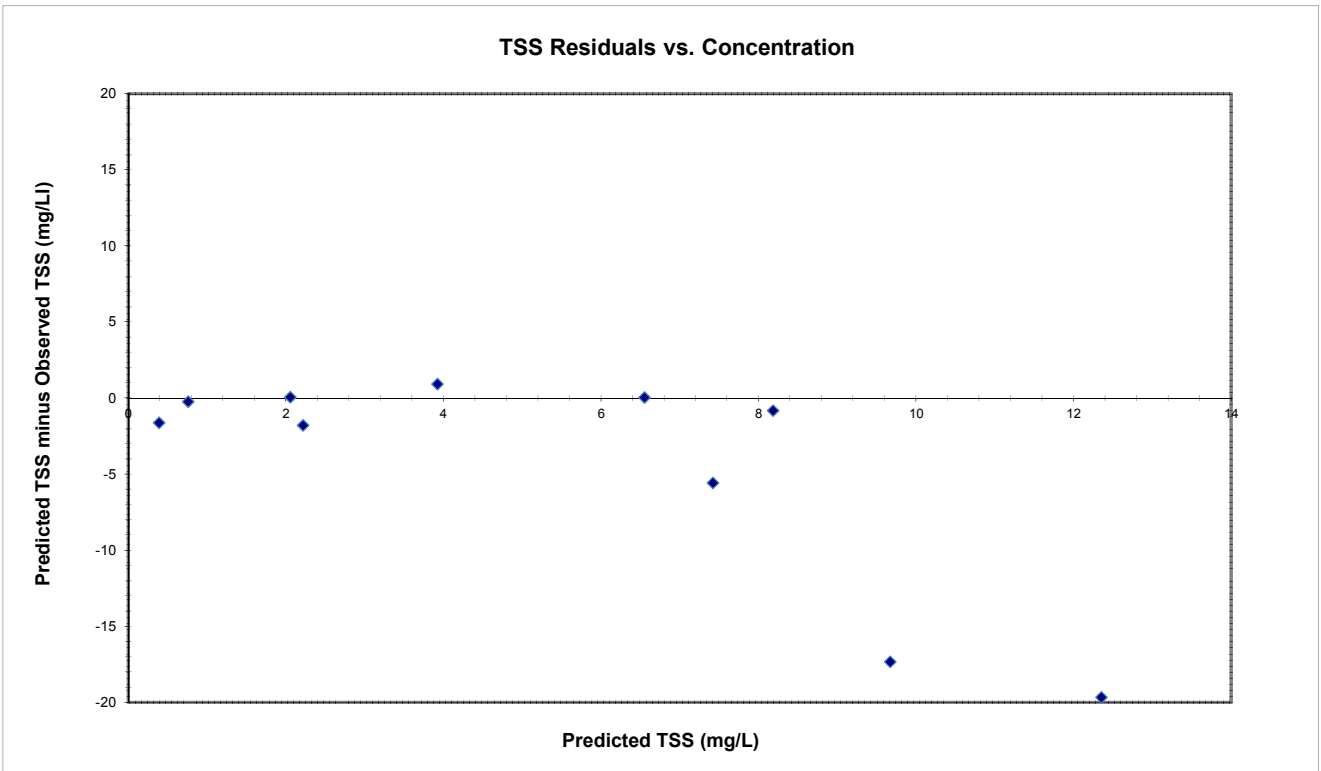
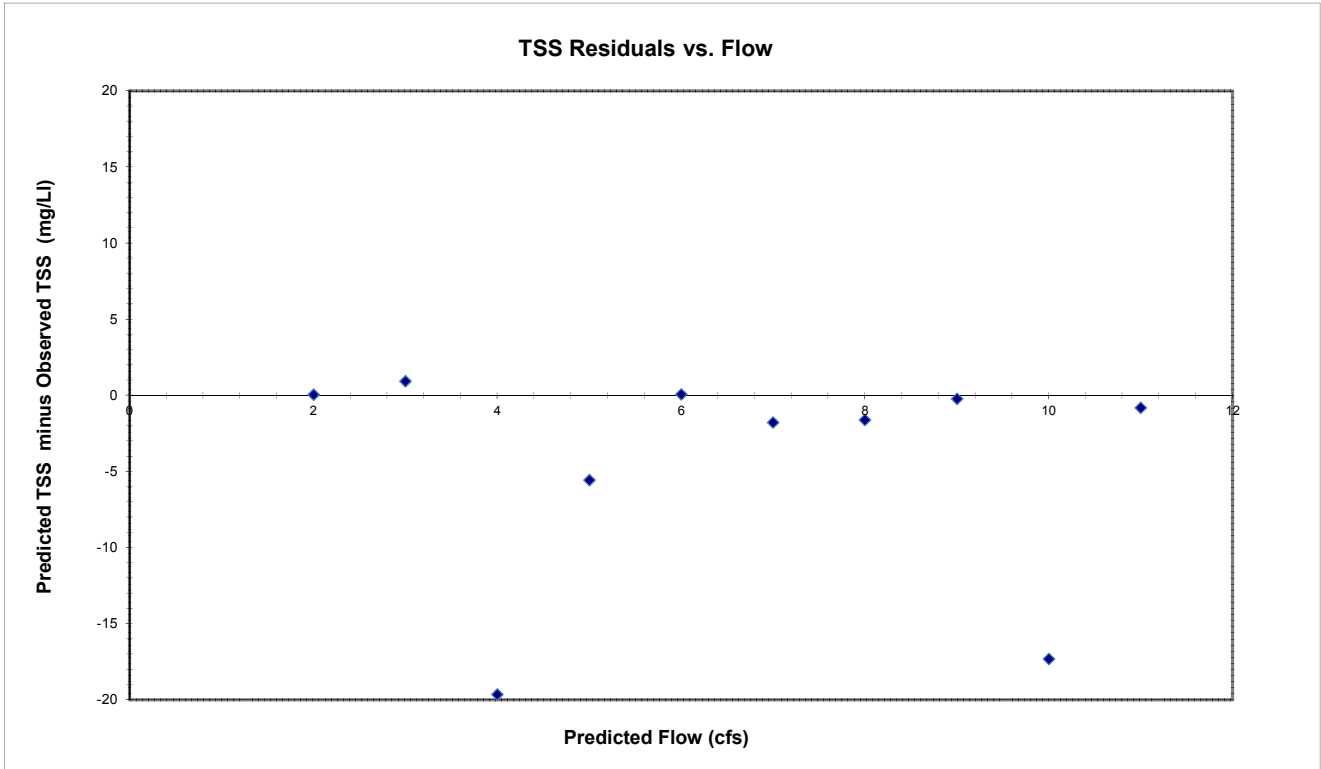
#### Total Phosphorus Residuals vs. Flow



#### Total Phosphorus Residuals vs. Concentration

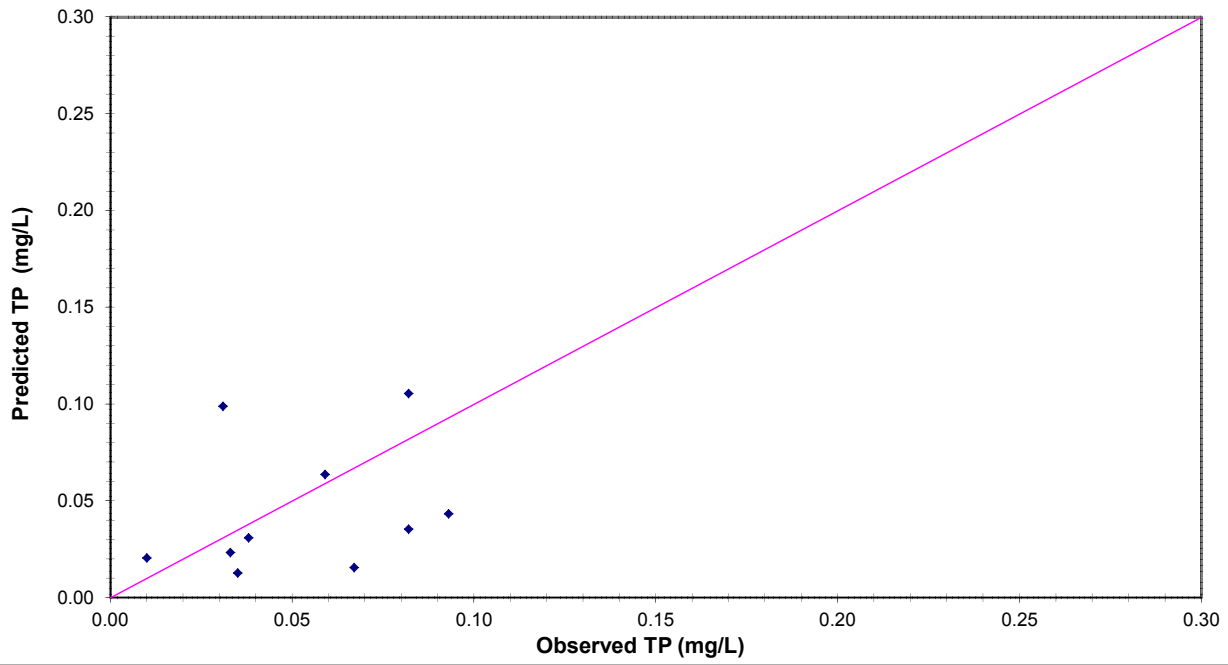


### North Branch Raritan River Downstream Ravine Lake (NBRR4)

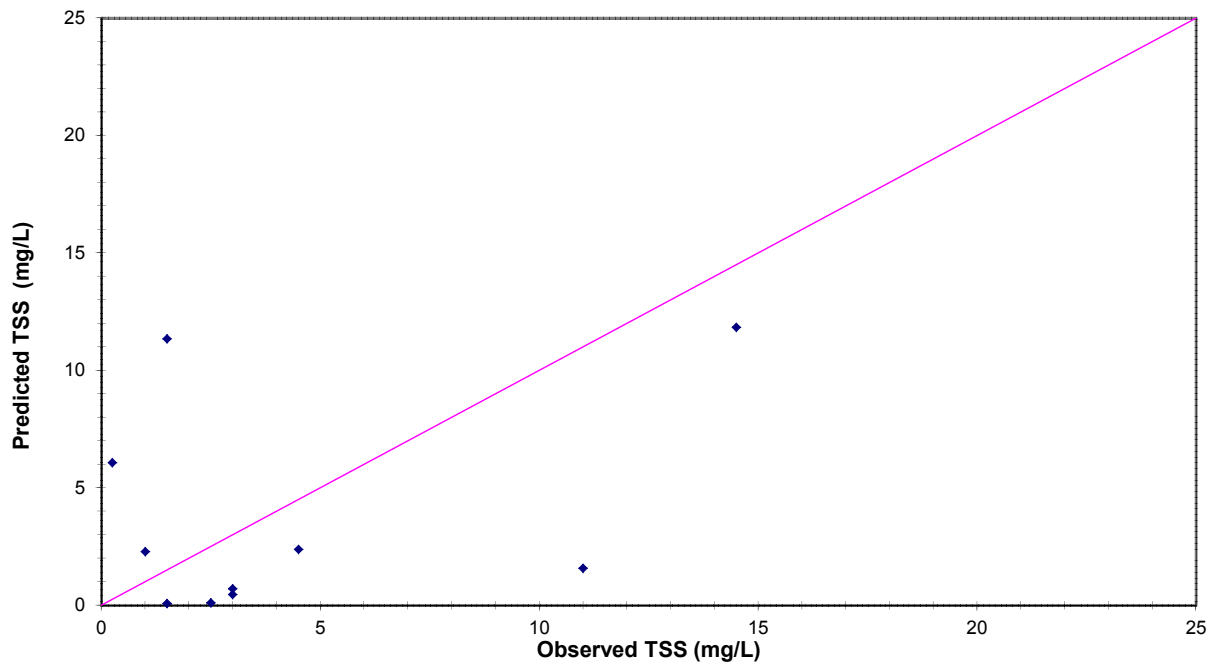


### Mine Brook at Route 512 (MiB1)

Predicted vs. Observed Total Phosphorus

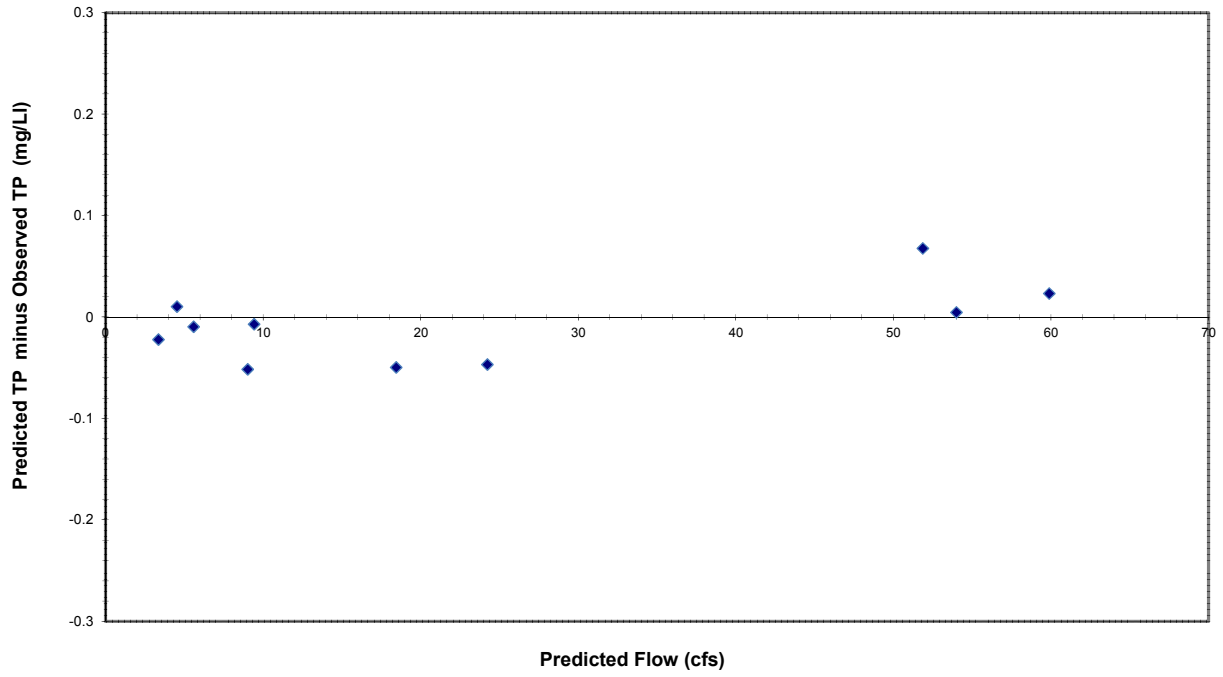


Predicted vs. Observed Total Suspended Solids

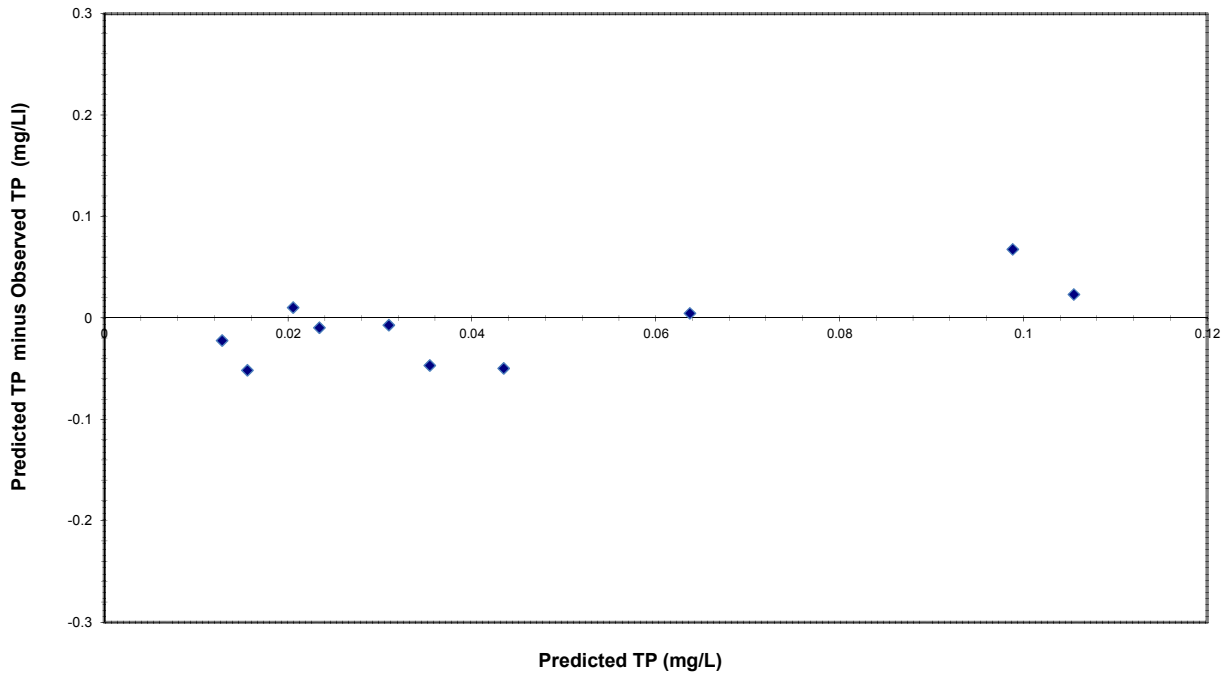


### Mine Brook at Route 512 (MiB1)

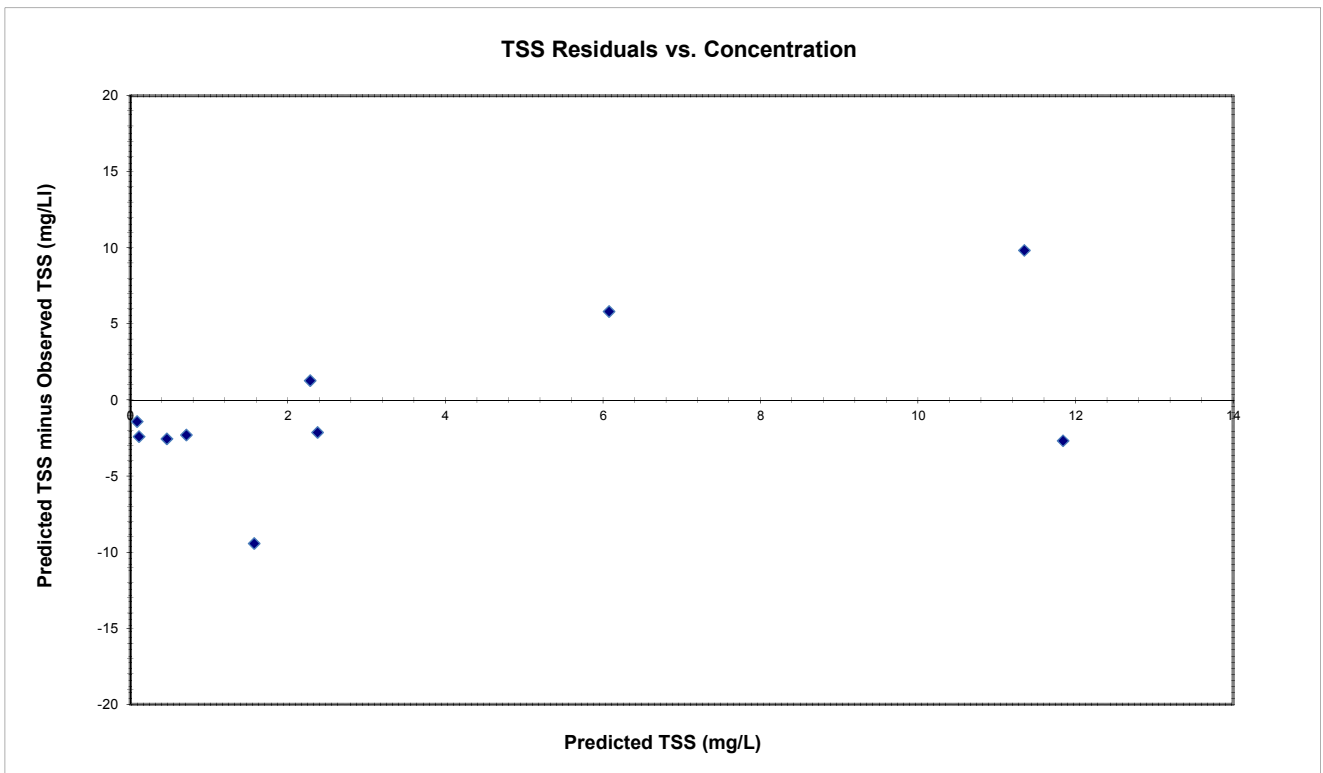
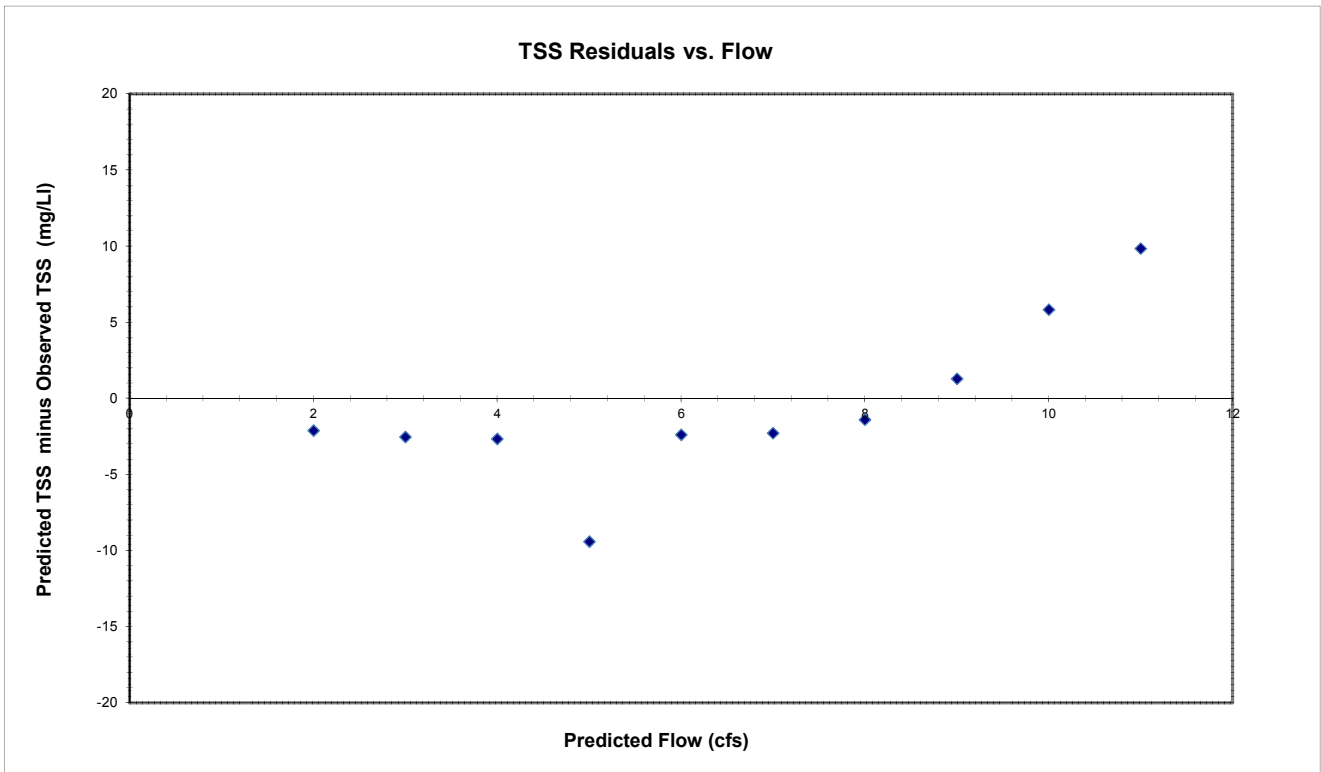
#### Total Phosphorus Residuals vs. Flow



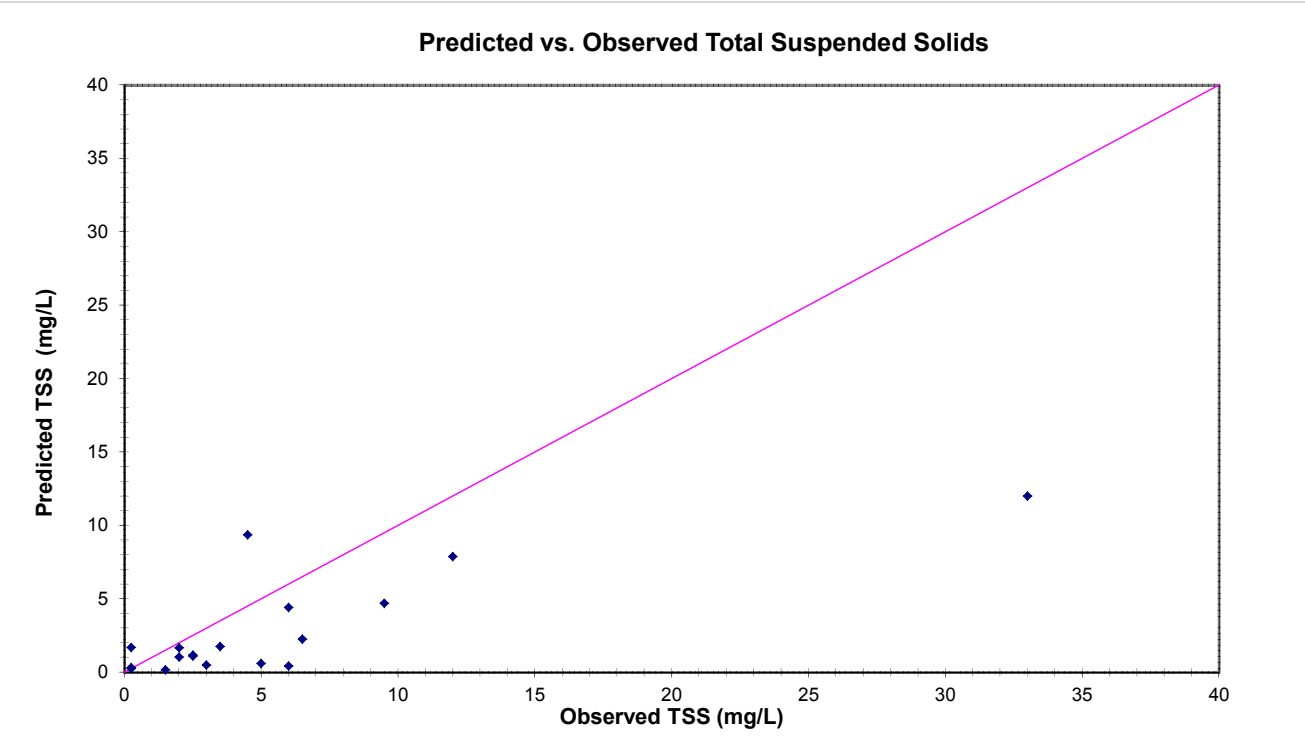
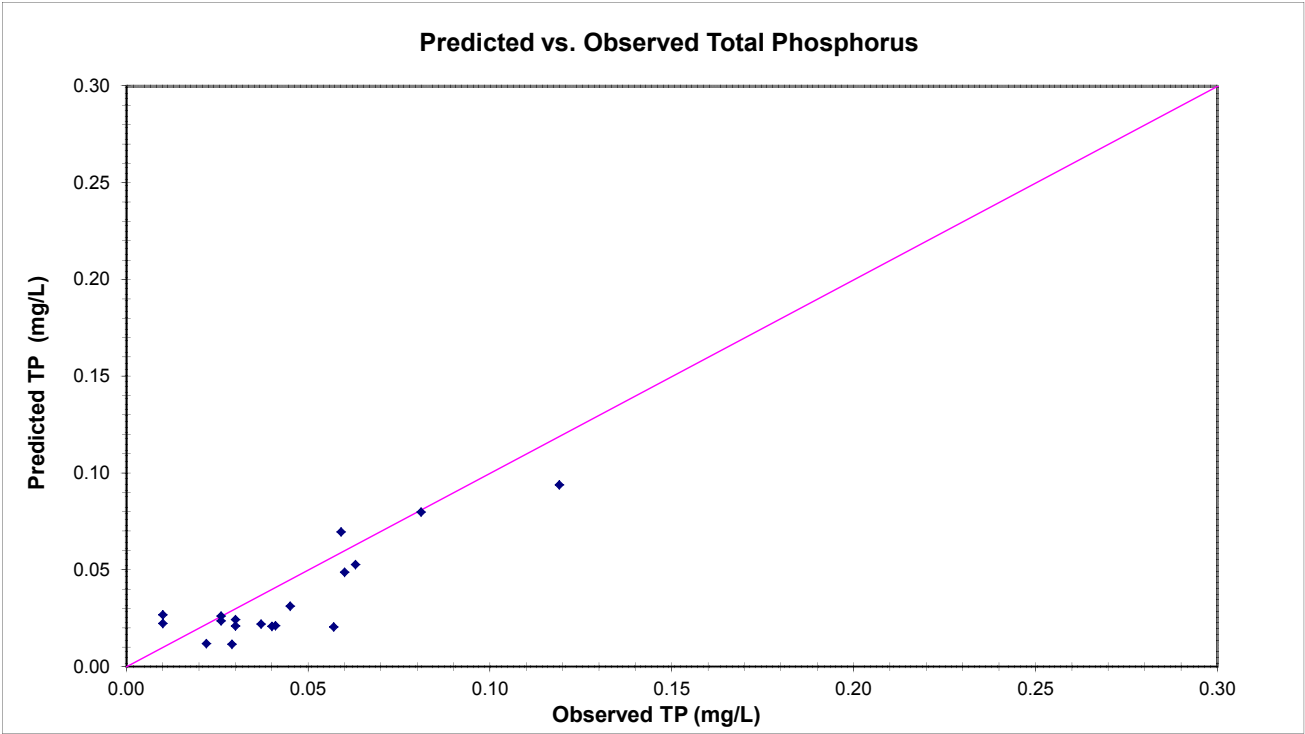
#### Total Phosphorus Residuals vs. Concentration



### Mine Brook at Route 512 (MiB1)

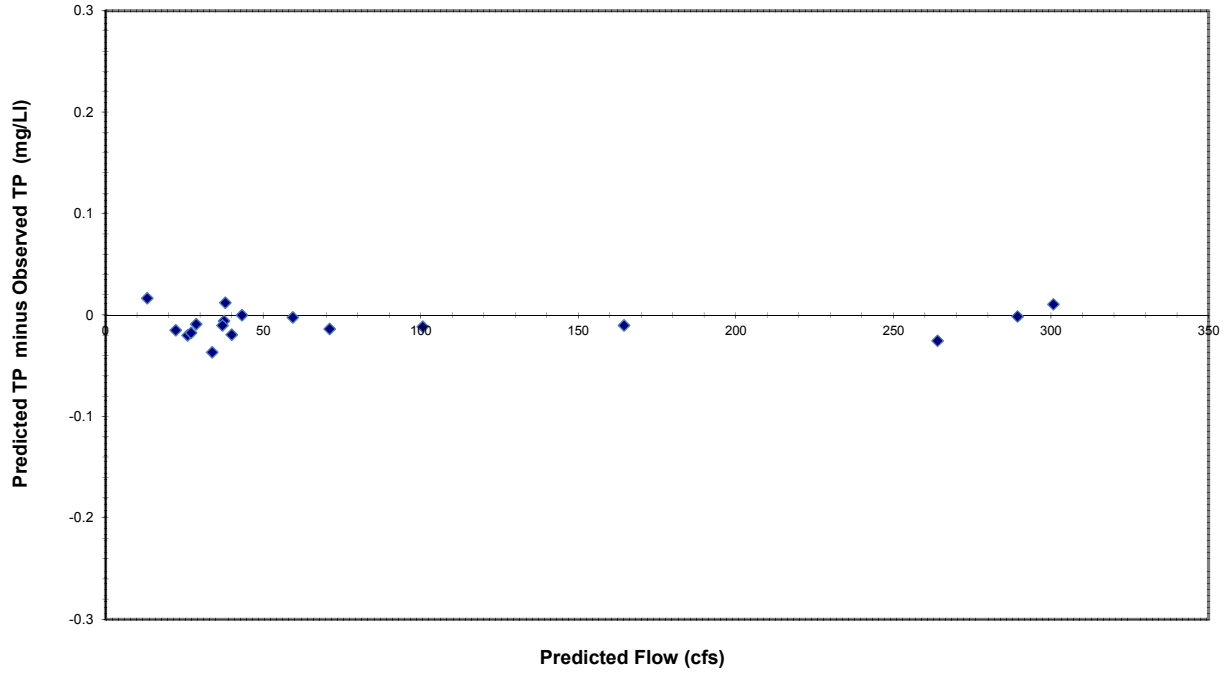


### North Branch Raritan River at Route 202/206 (NBRR5)

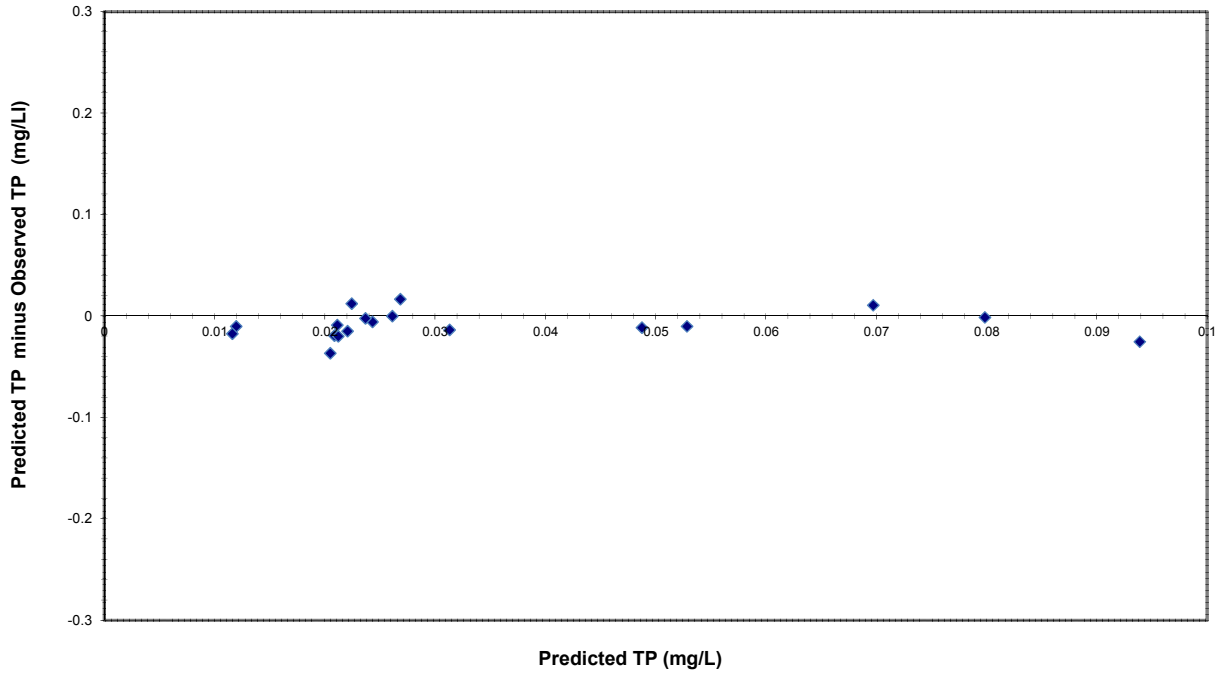


North Branch Raritan River at Route 202/206 (NBRR5)

Total Phosphorus Residuals vs. Flow

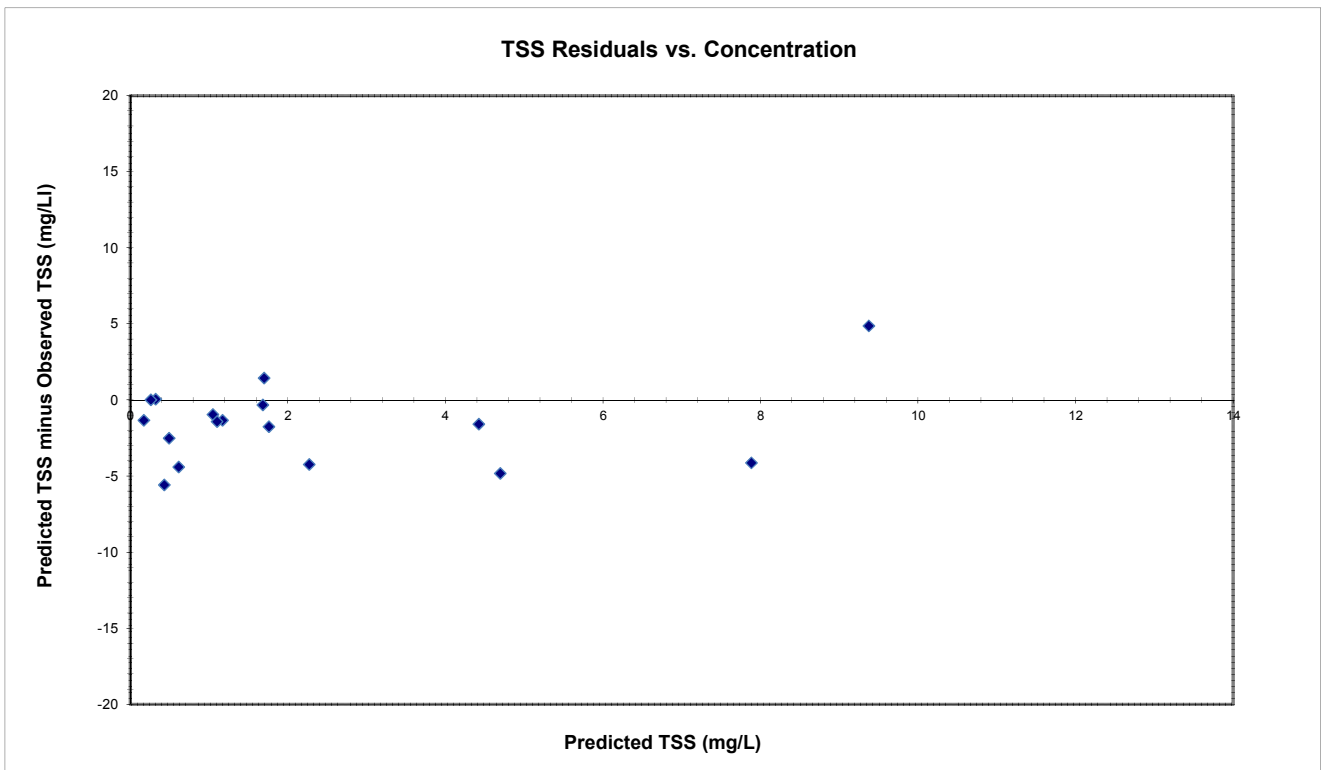
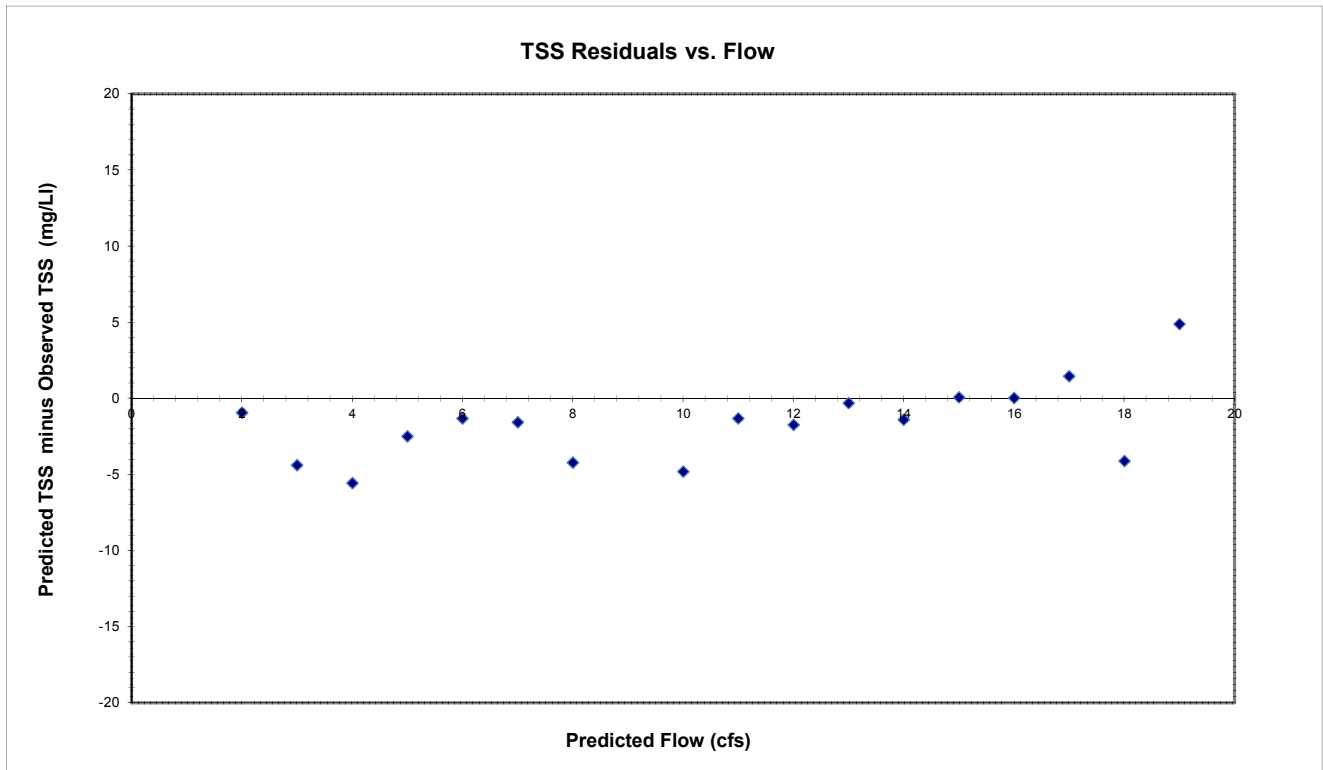


Total Phosphorus Residuals vs. Concentration

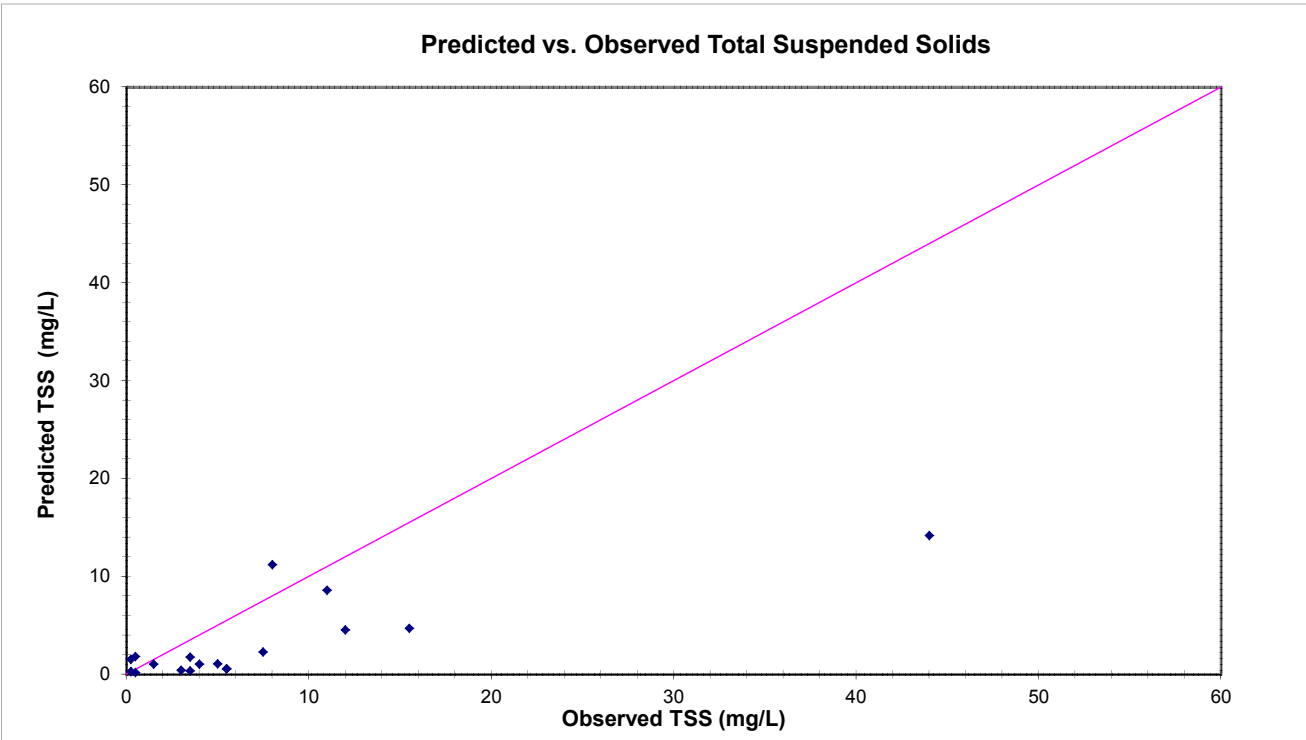
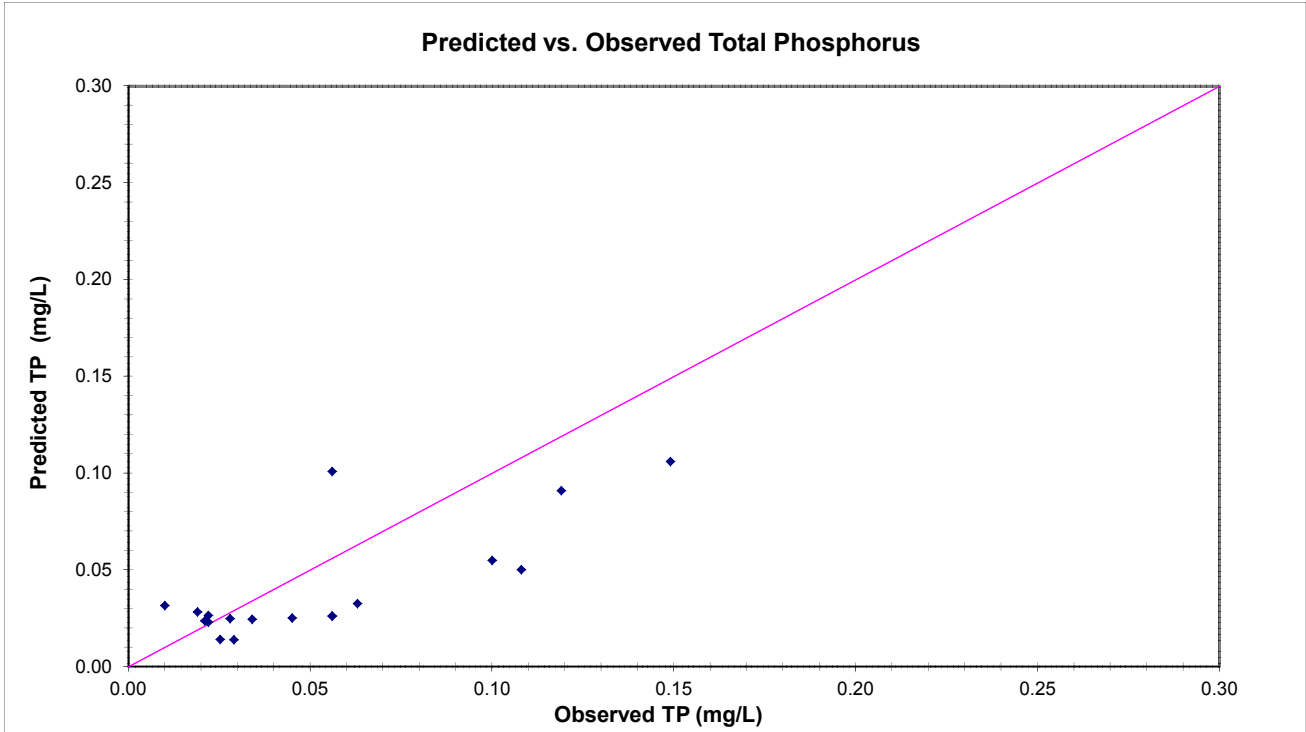




### North Branch Raritan River at Route 202/206 (NBRR5)

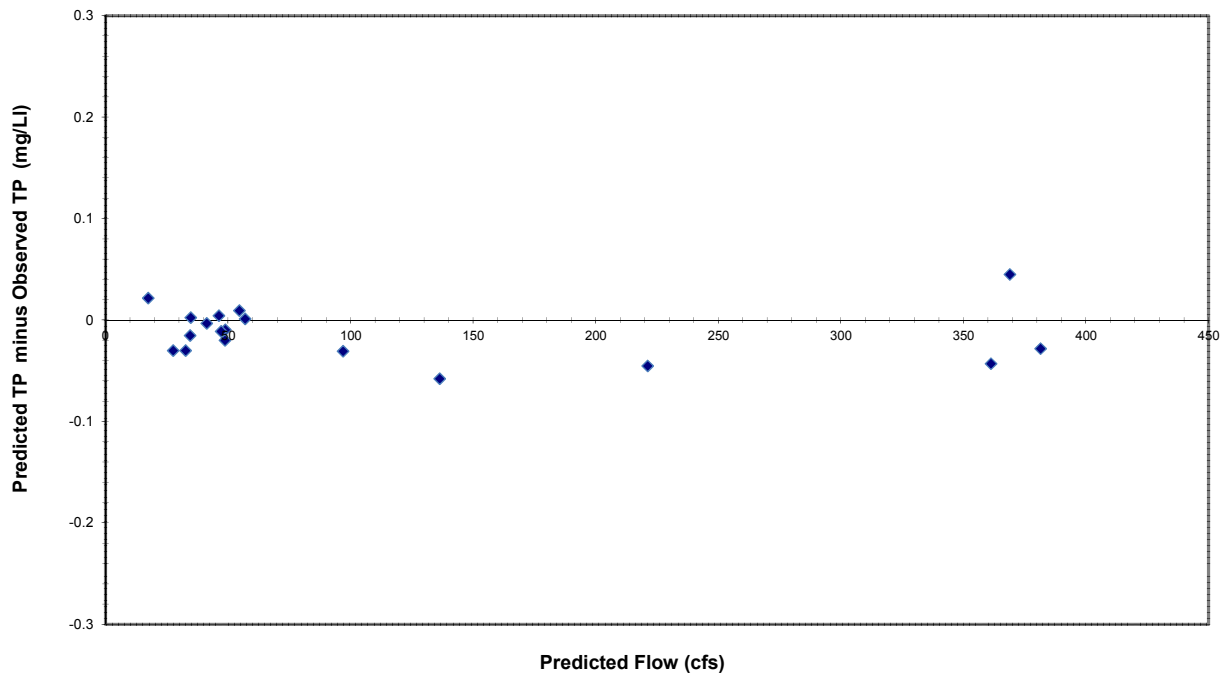


### North Branch Raritan River at Burnt Mills (NBRR6)

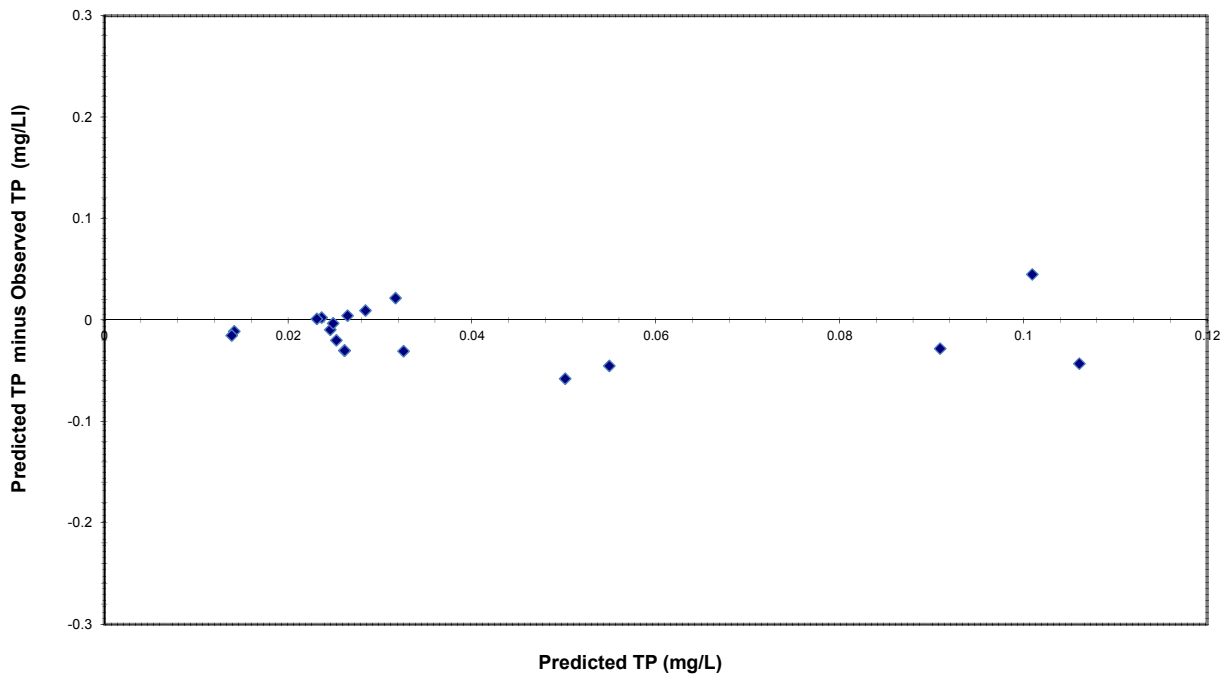


### North Branch Raritan River at Burnt Mills (NBRR6)

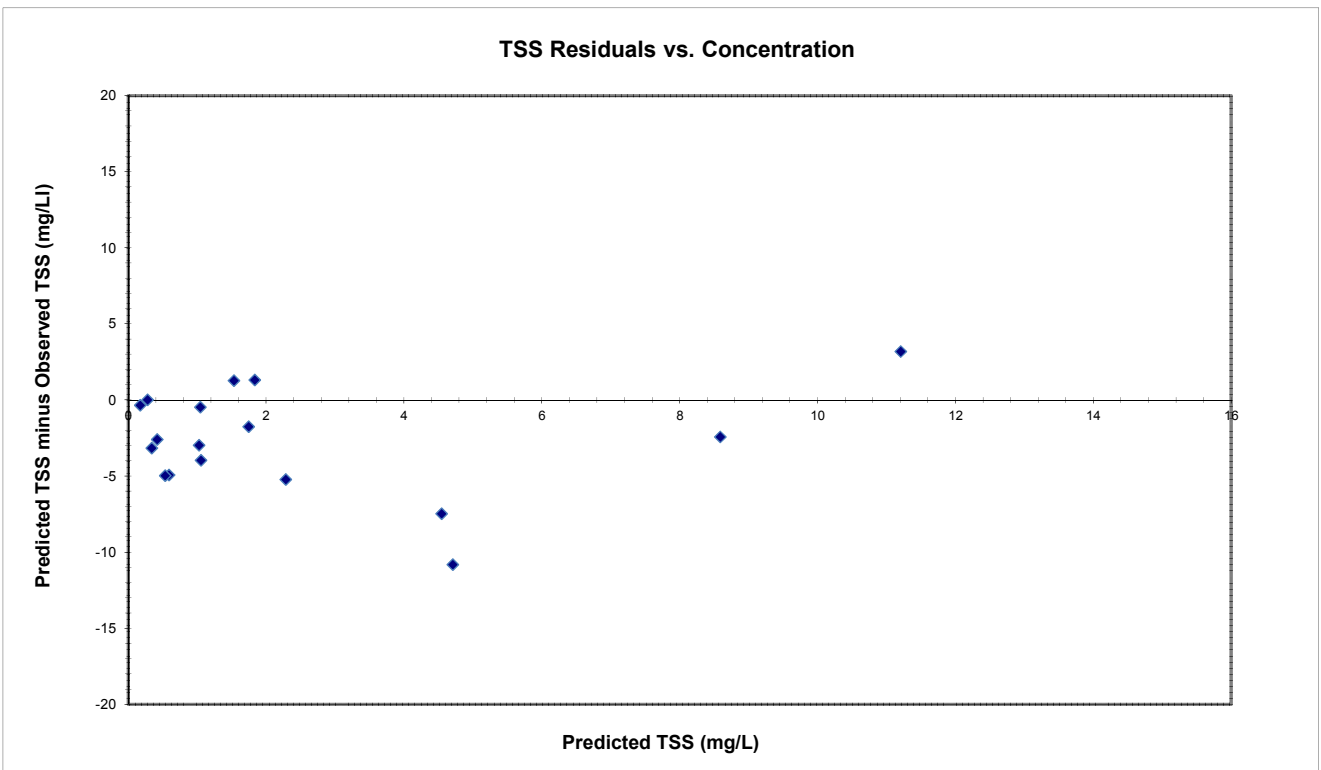
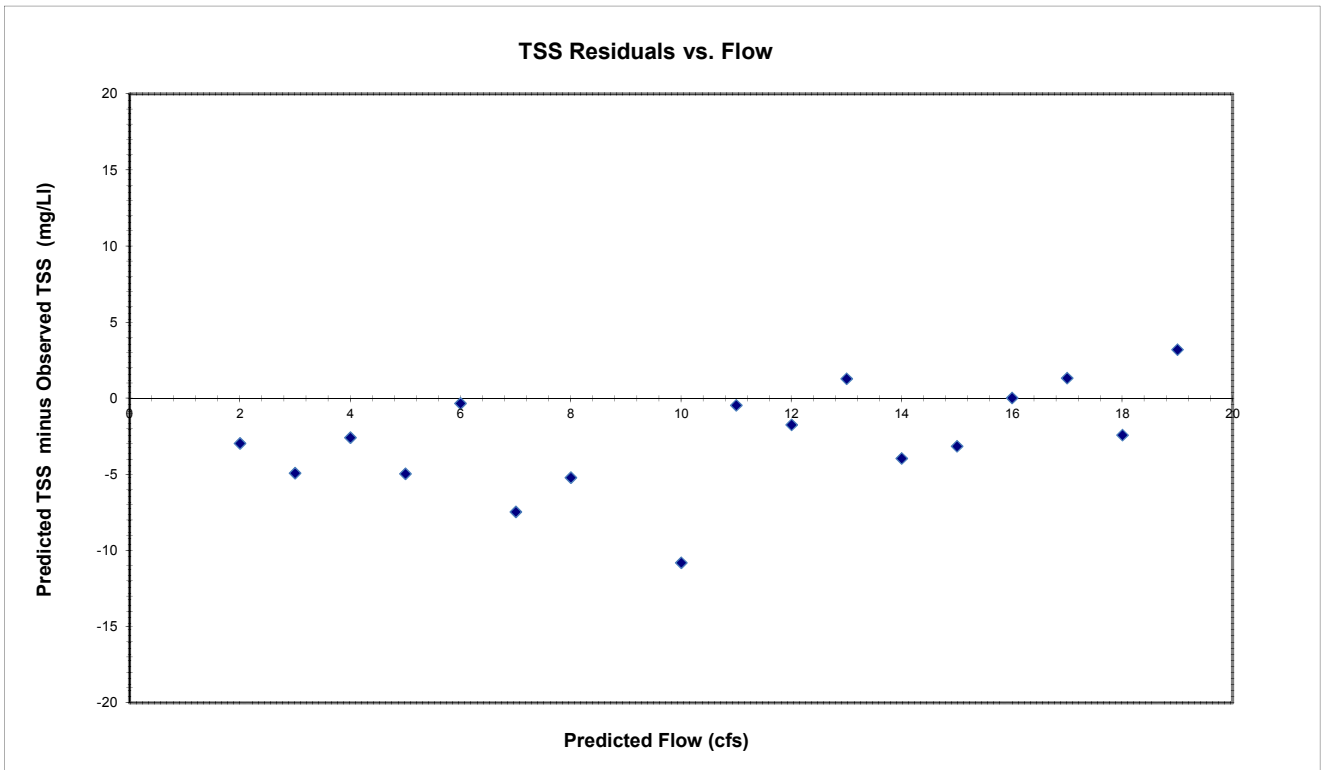
#### Total Phosphorus Residuals vs. Flow



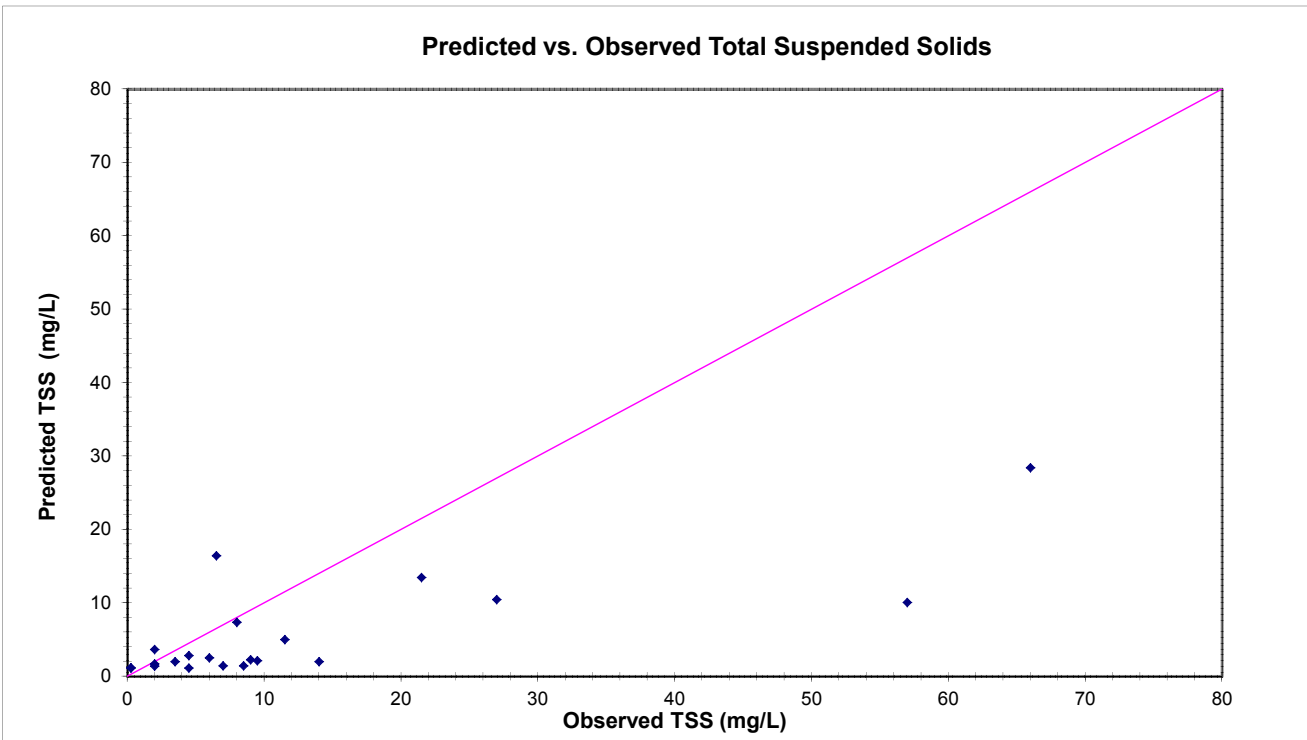
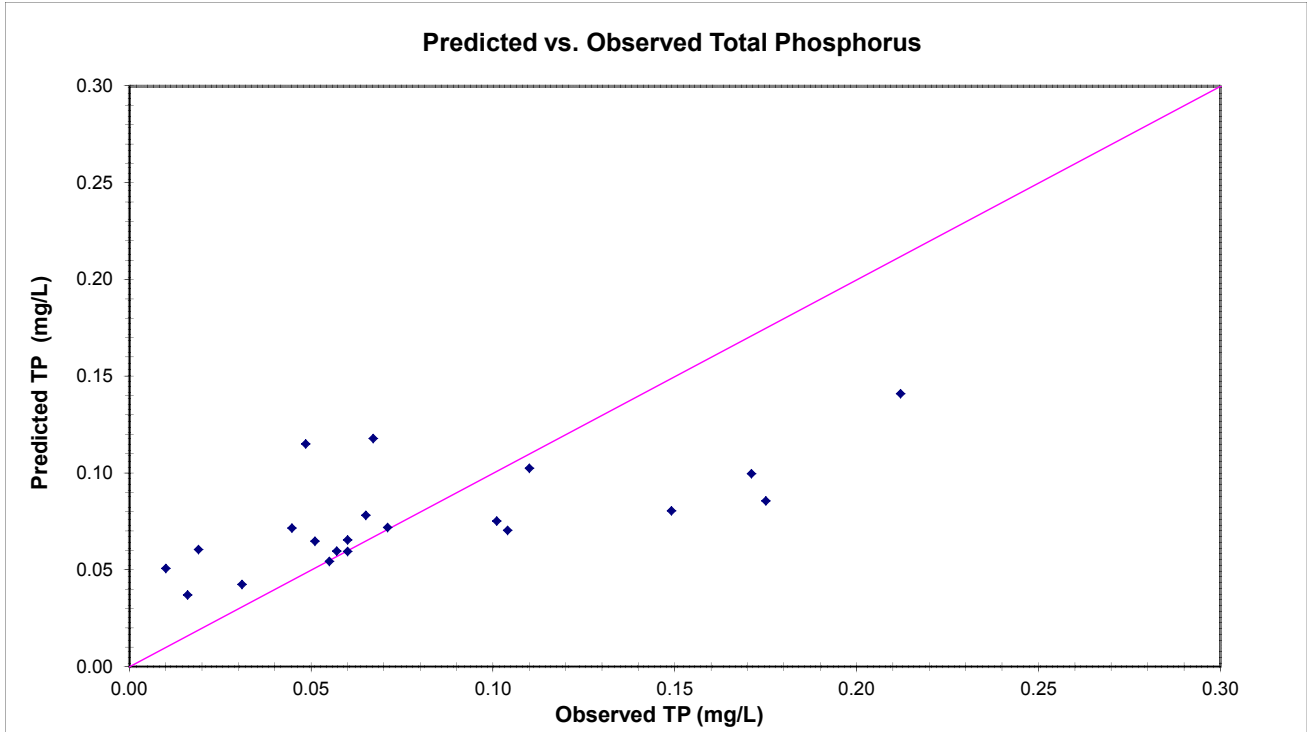
#### Total Phosphorus Residuals vs. Concentration



### North Branch Raritan River at Burnt Mills (NBRR6)

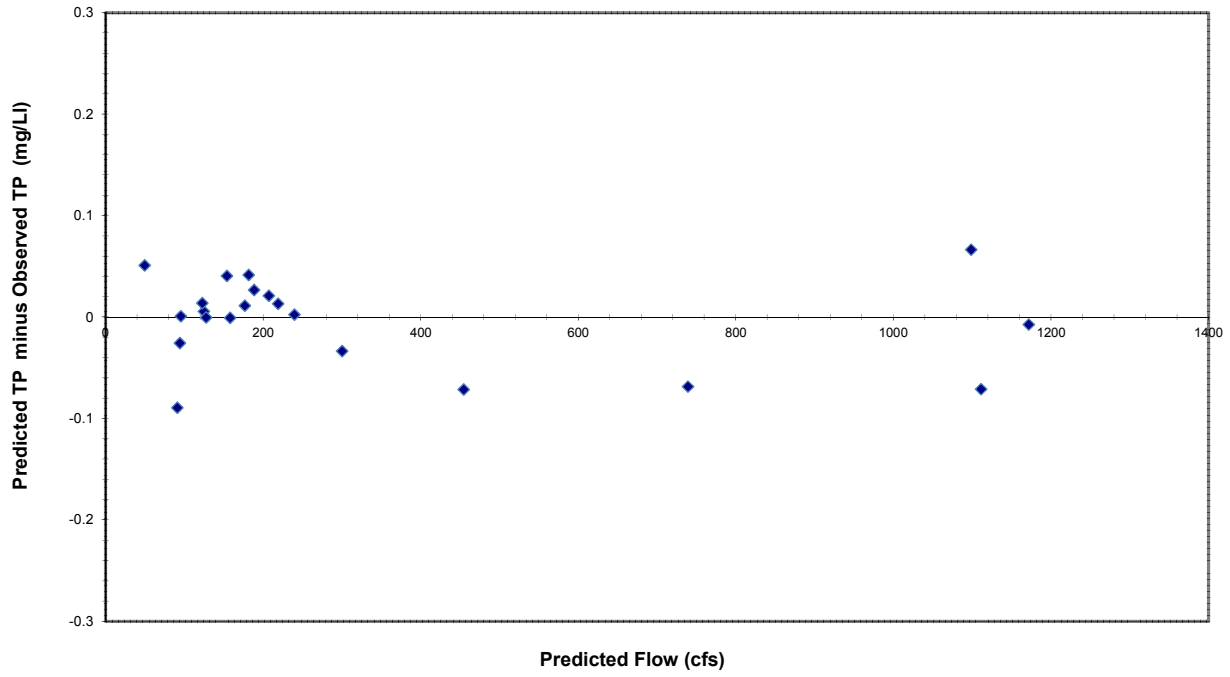


# North Branch Raritan River Downstream Route 202 (NBRR7)

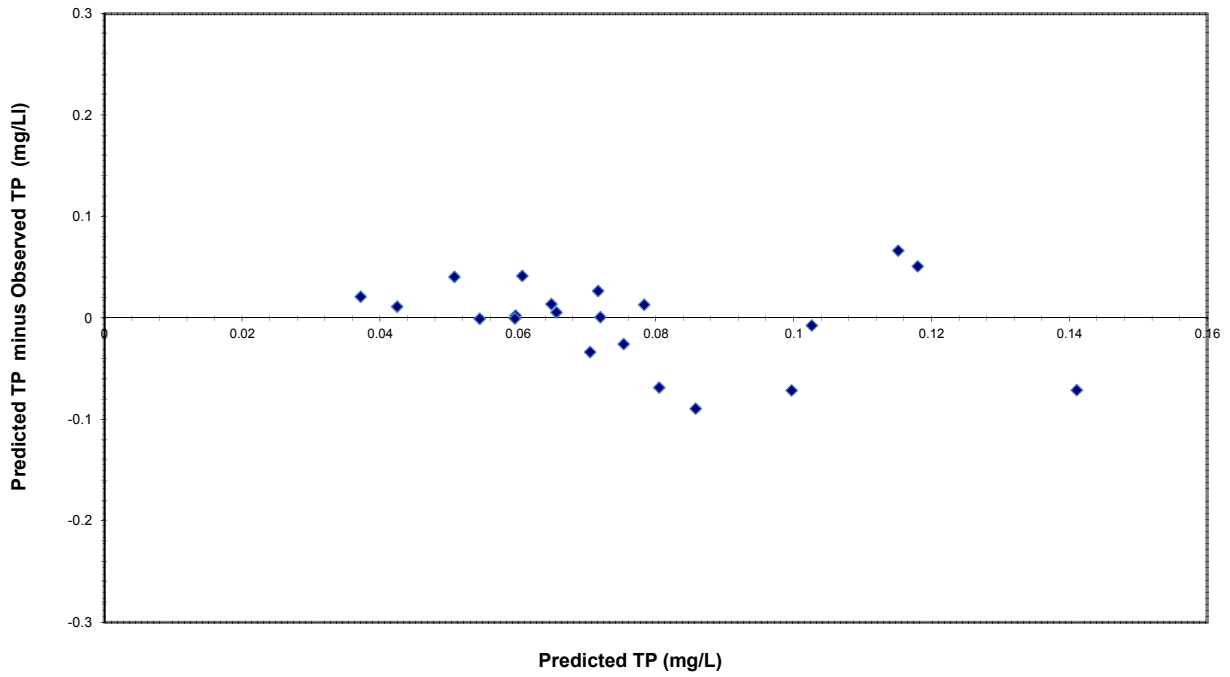


### North Branch Raritan River Downstream Route 202 (NBRR7)

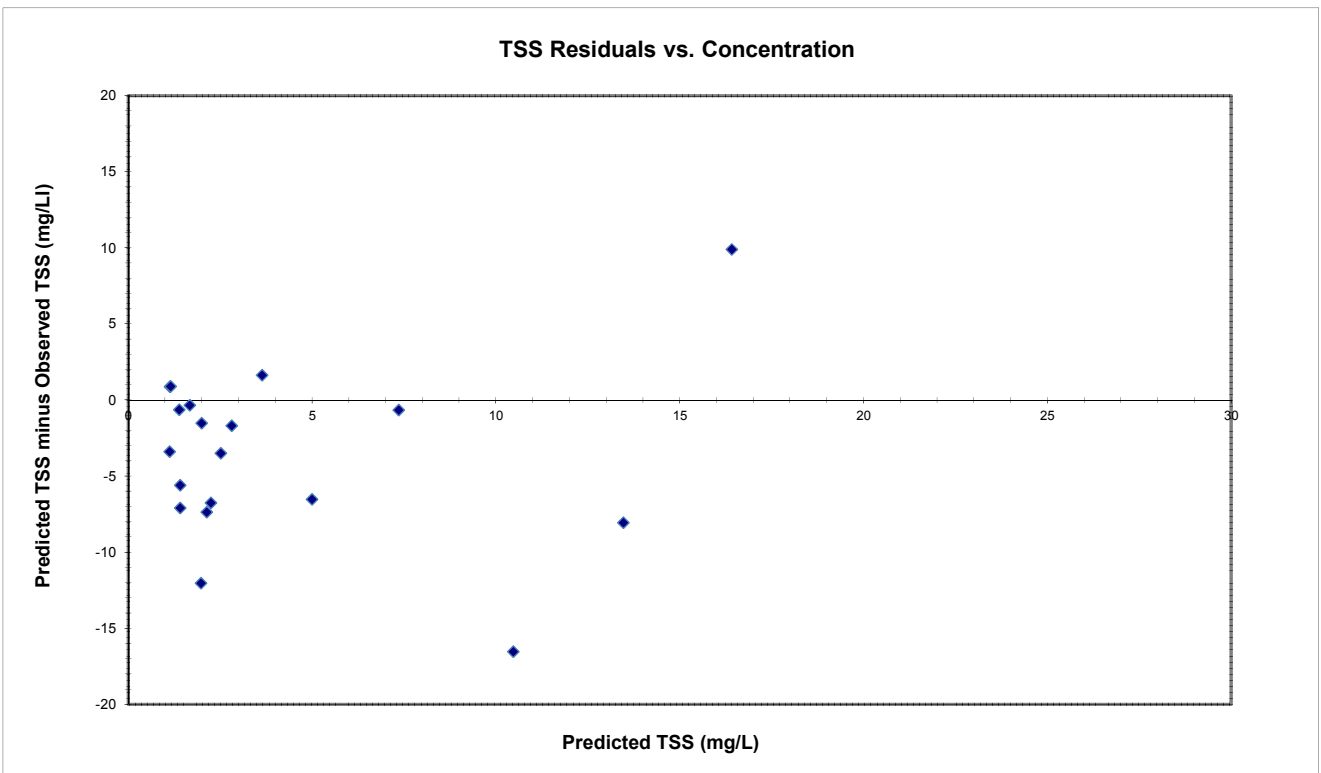
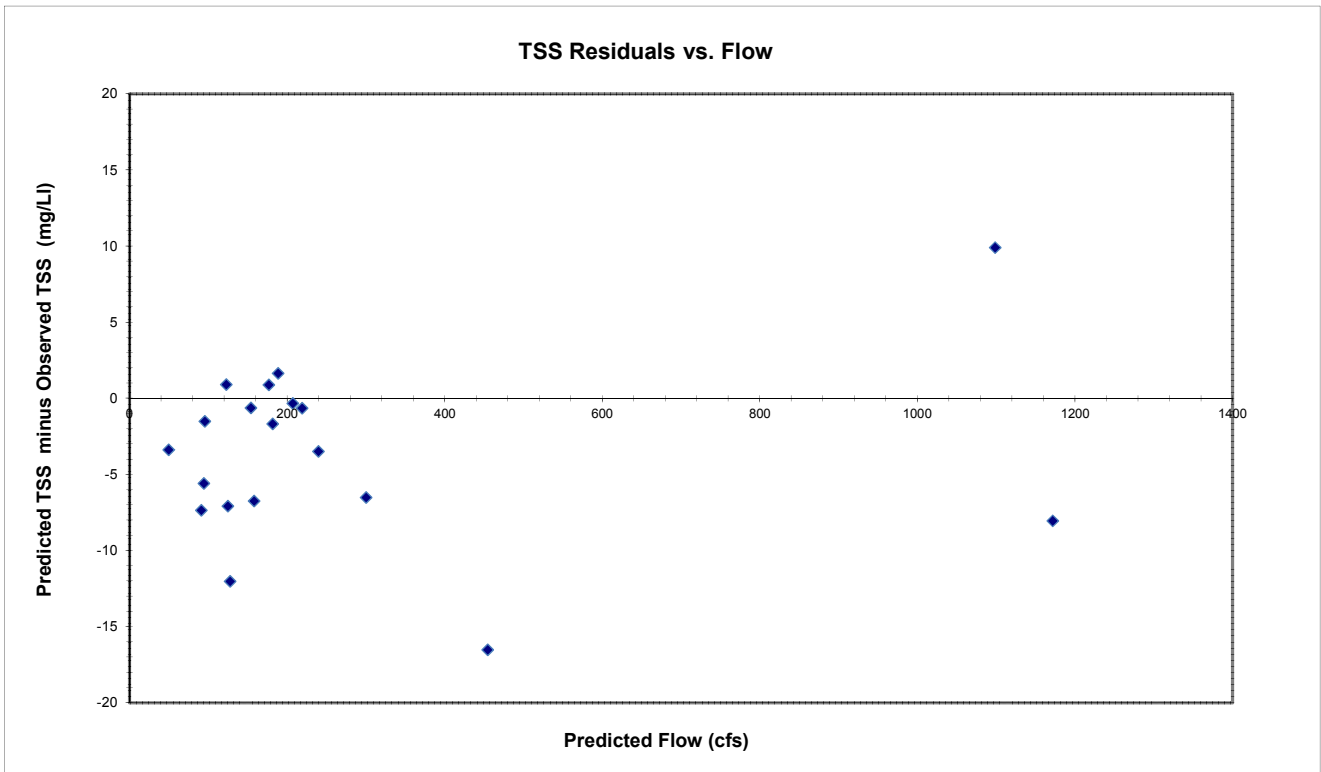
#### Total Phosphorus Residuals vs. Flow



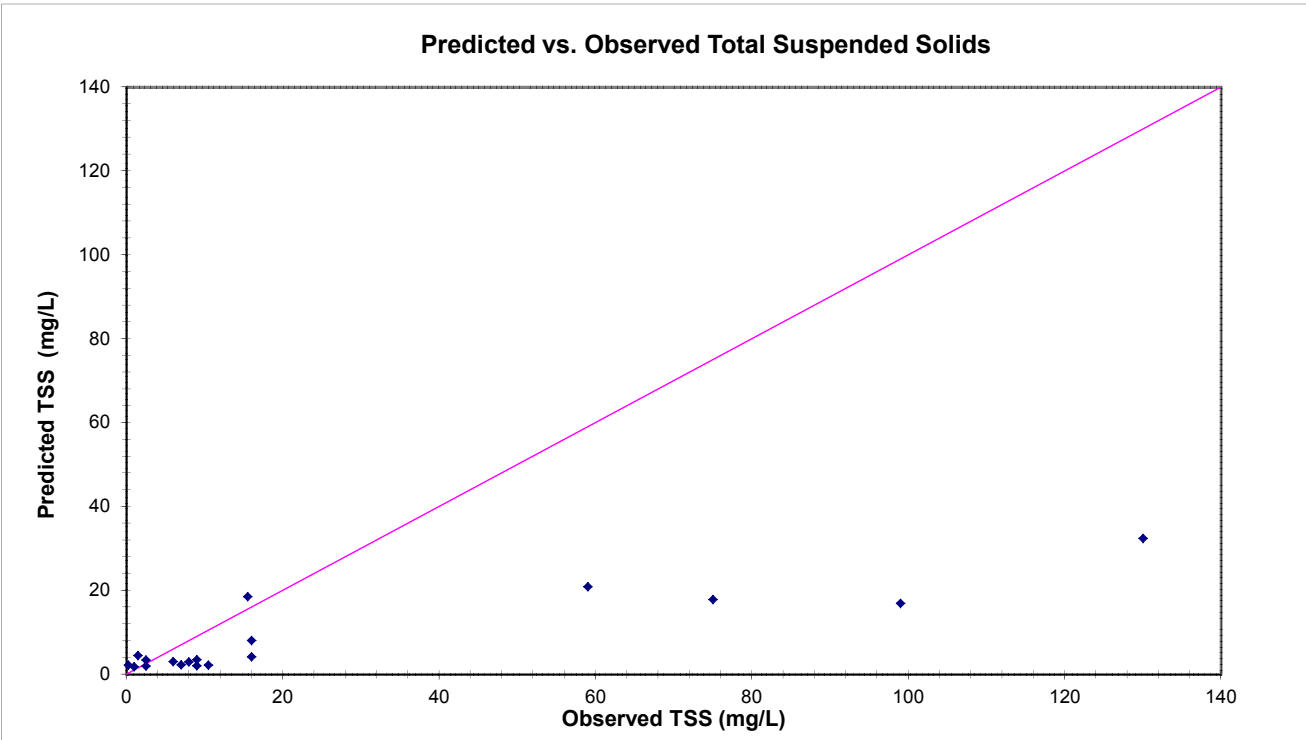
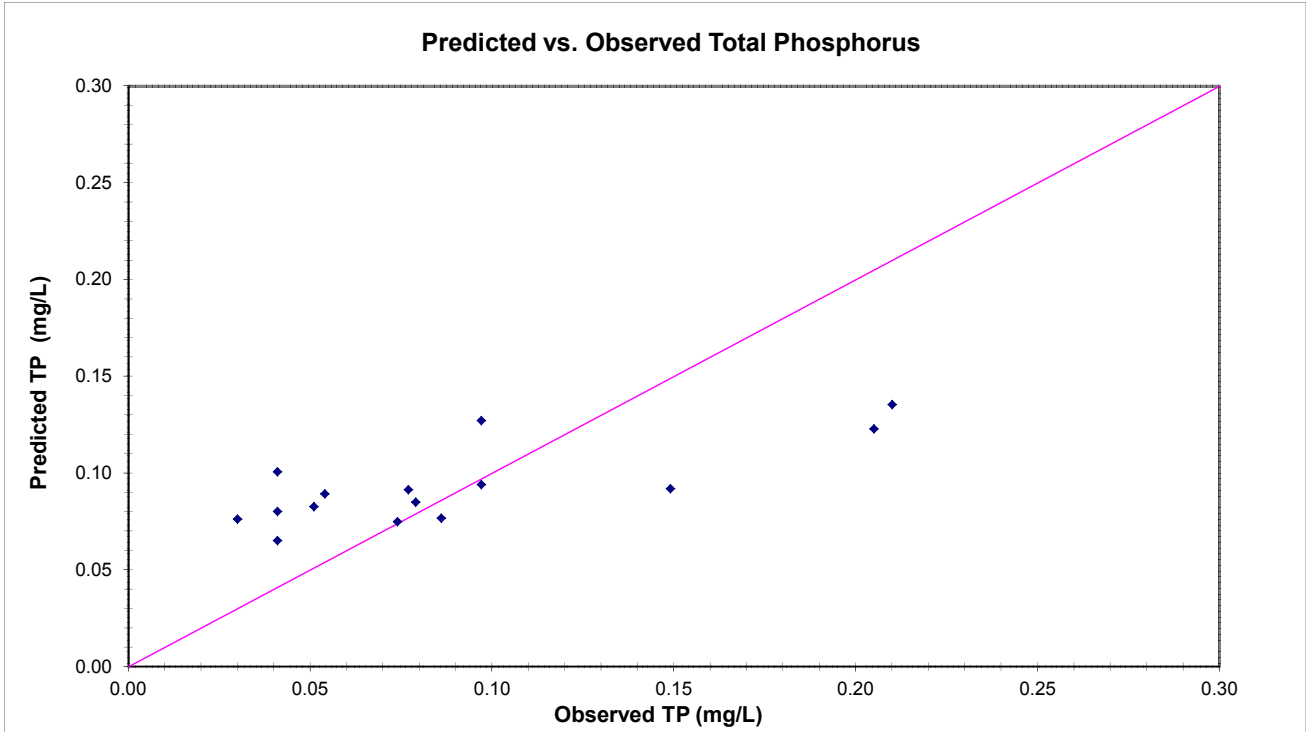
#### Total Phosphorus Residuals vs. Concentration



### North Branch Raritan River Downstream Route 202 (NBRR7)

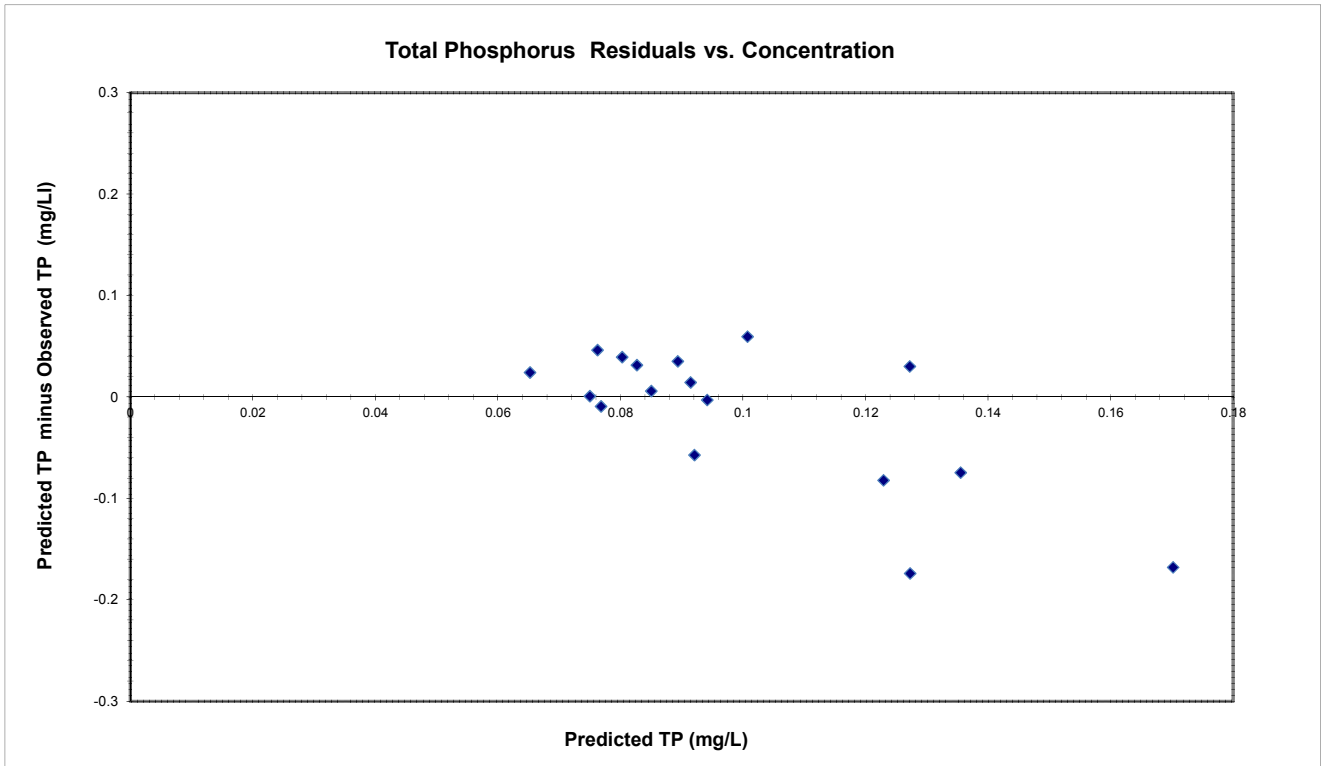
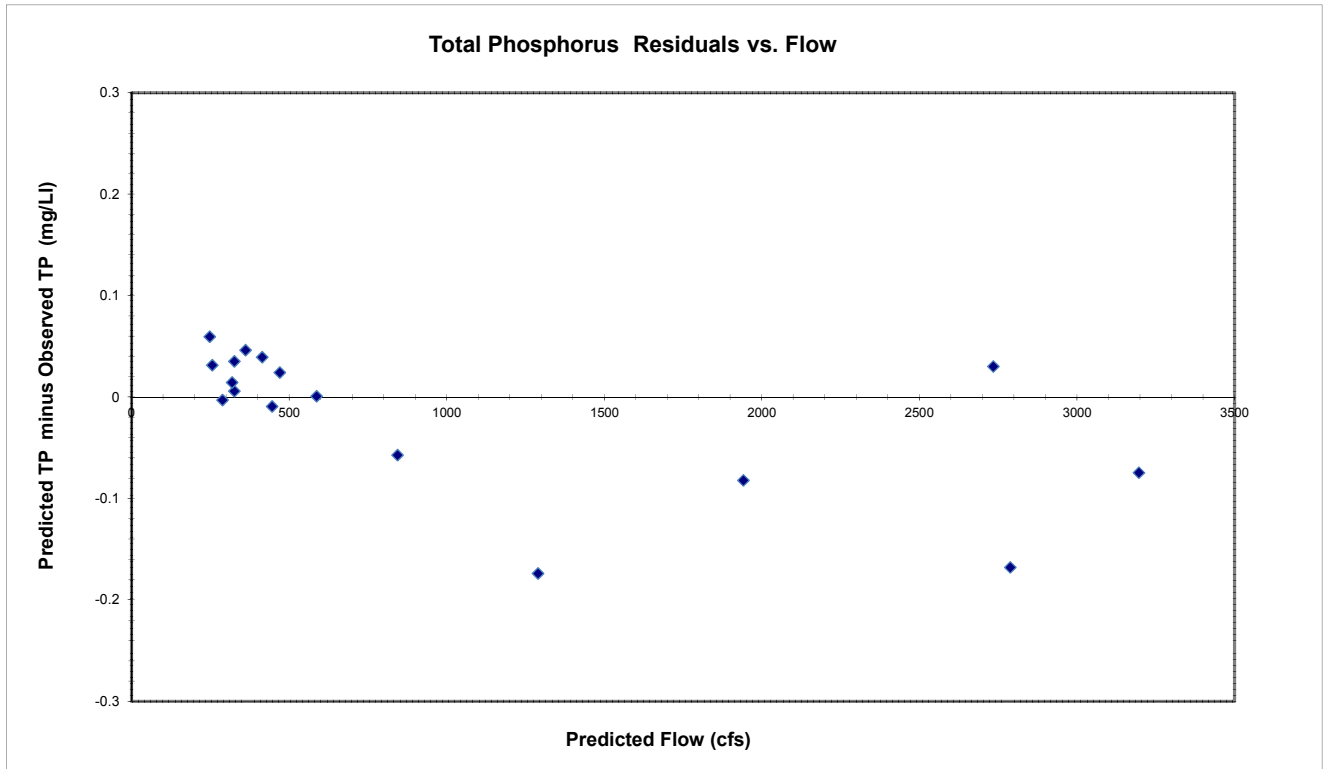


### Raritan River at Main Street in Manville (RR1)



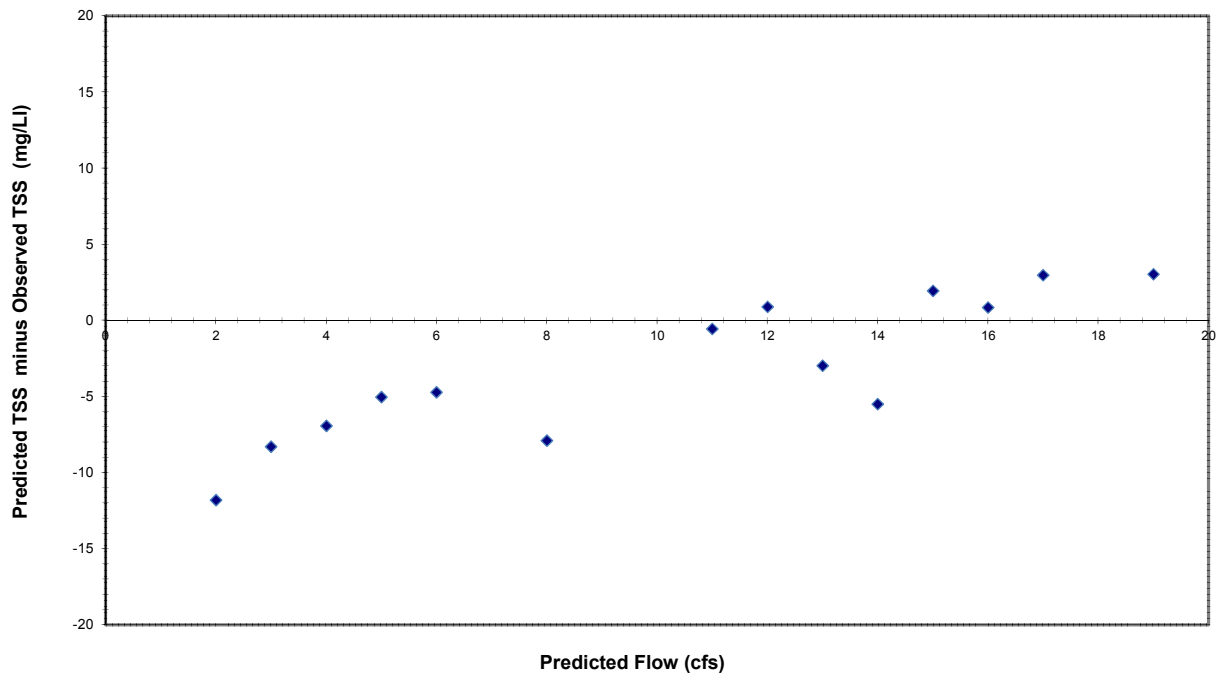


### Raritan River at Main Street in Manville (RR1)

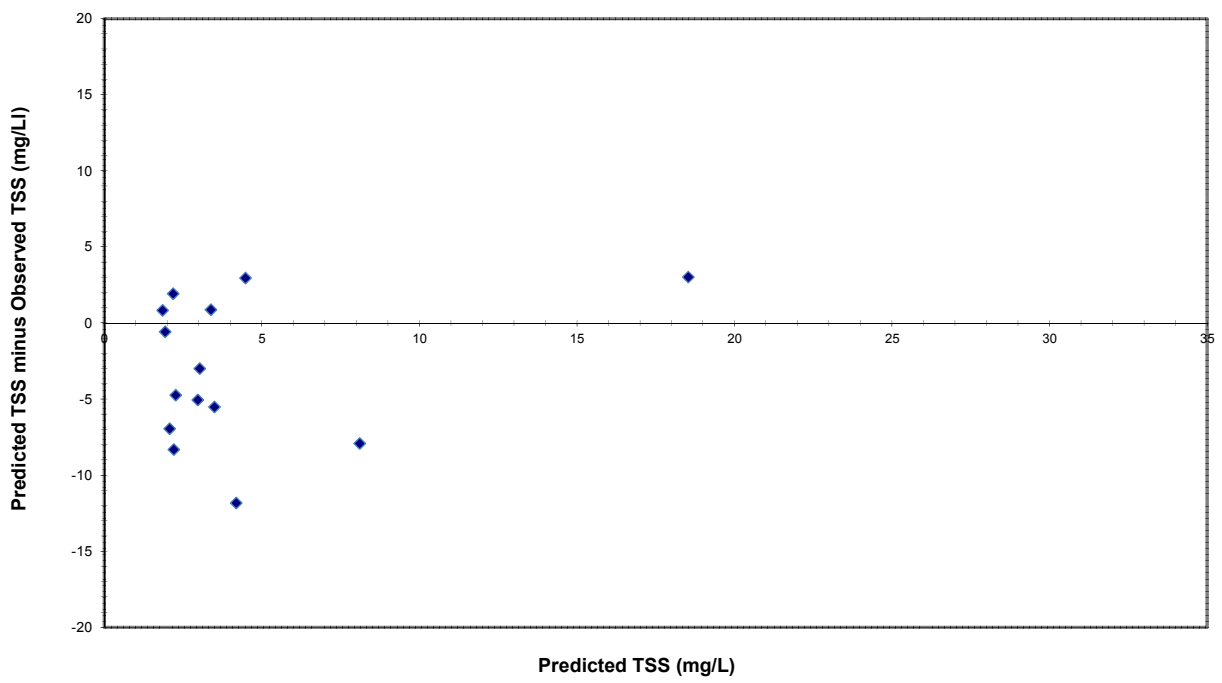


### Raritan River at Main Street in Manville (RR1)

#### TSS Residuals vs. Flow



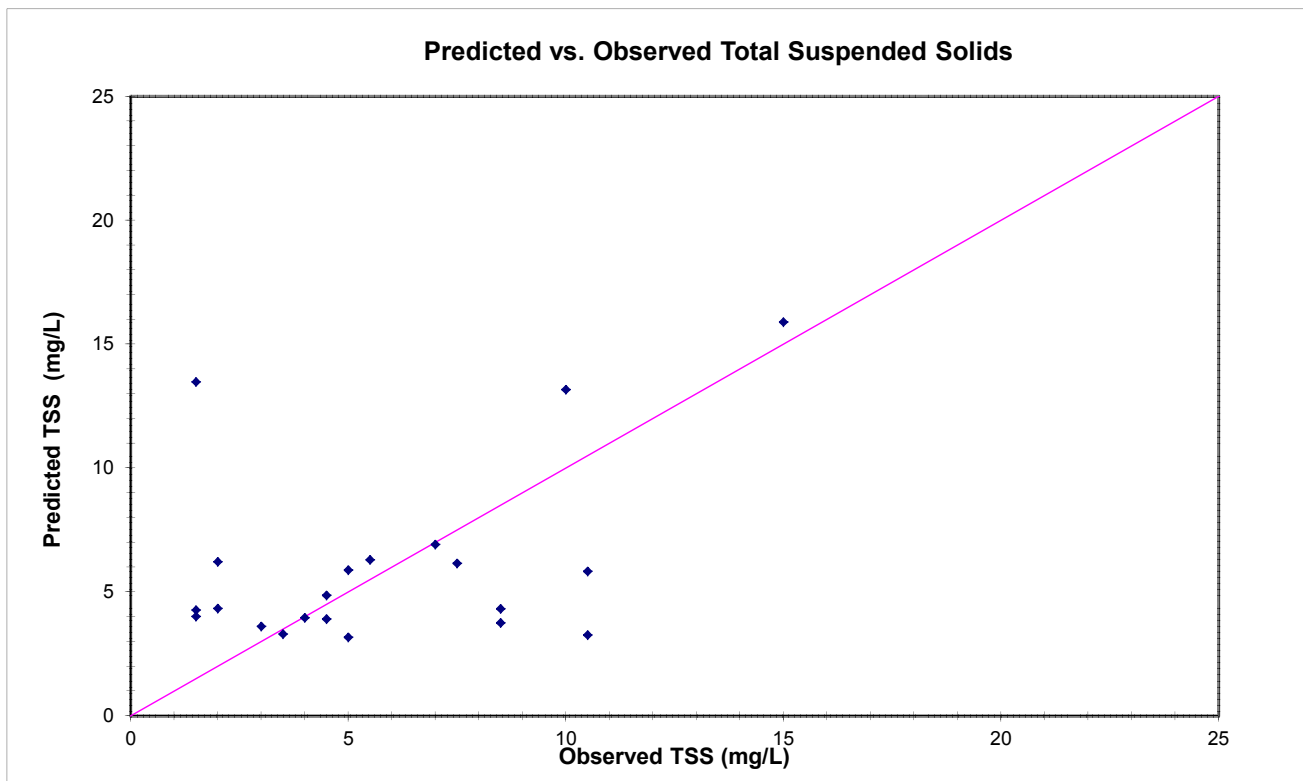
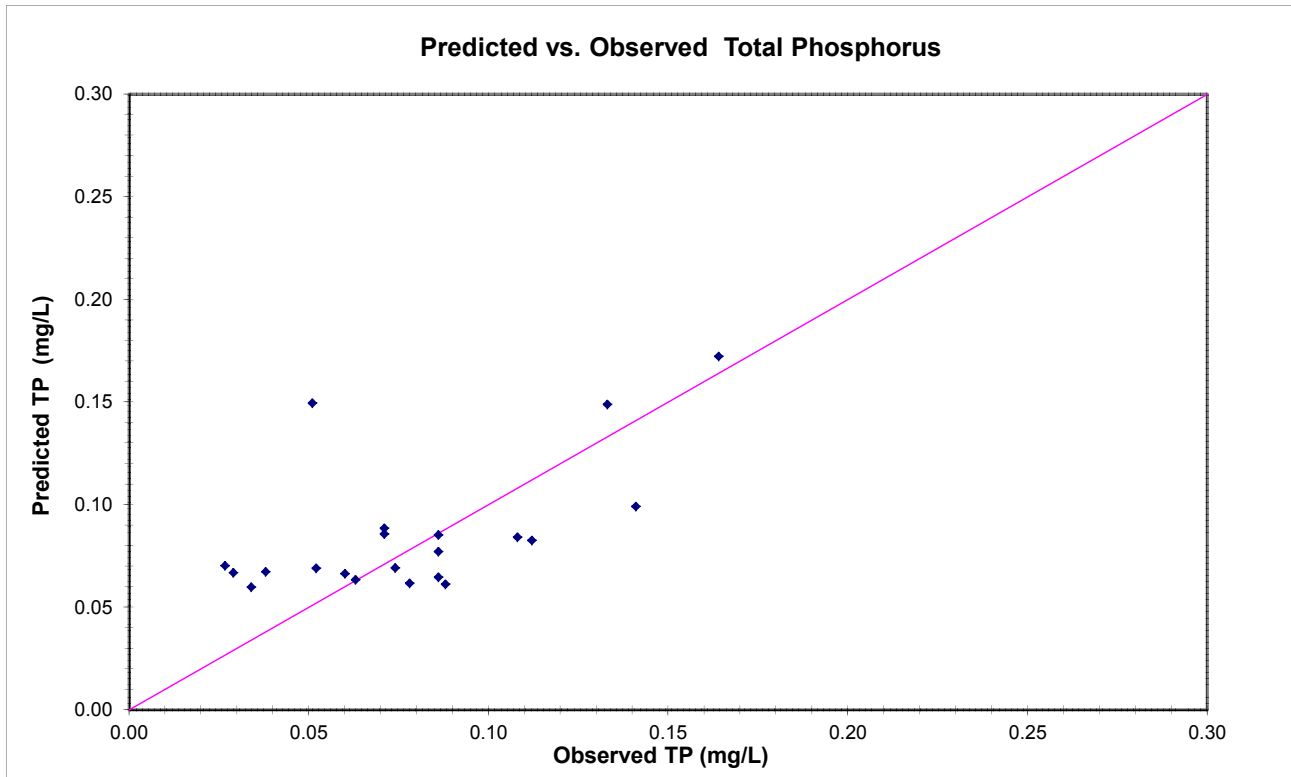
#### TSS Residuals vs. Concentration



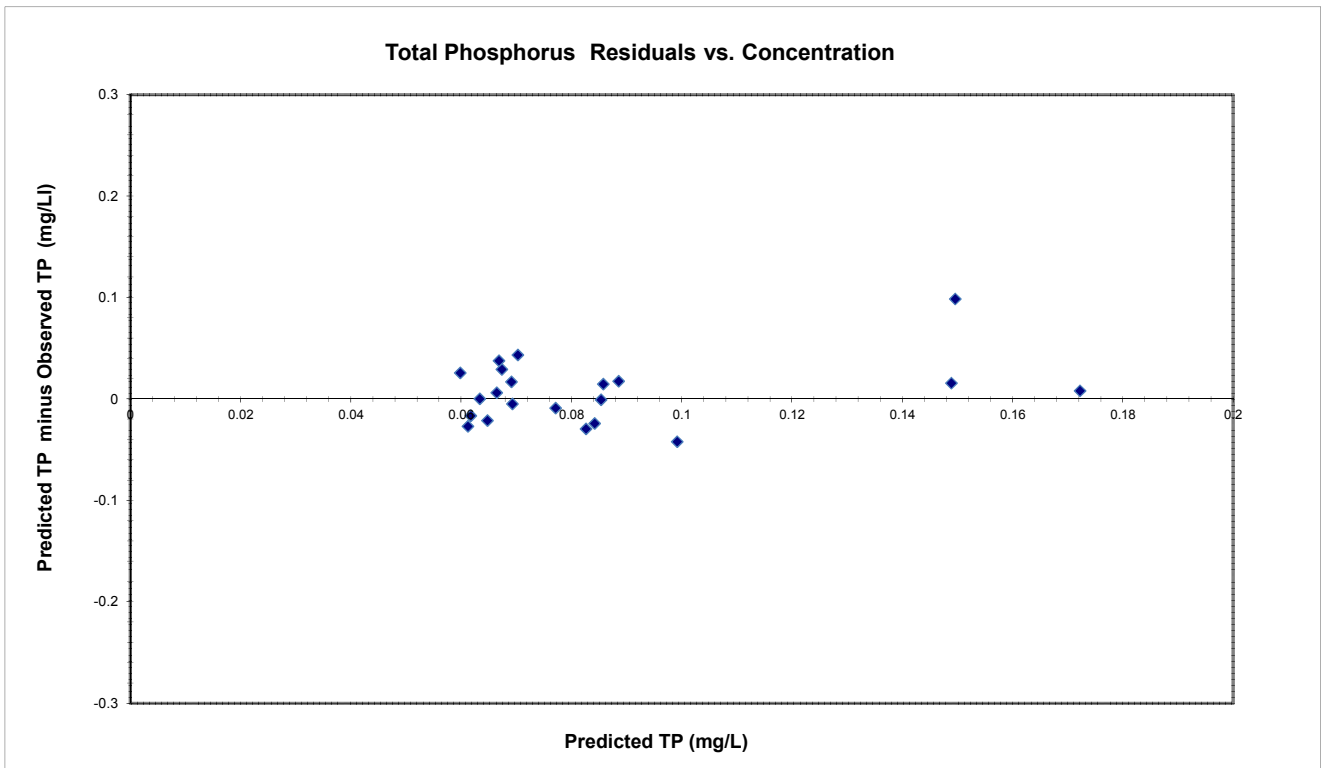
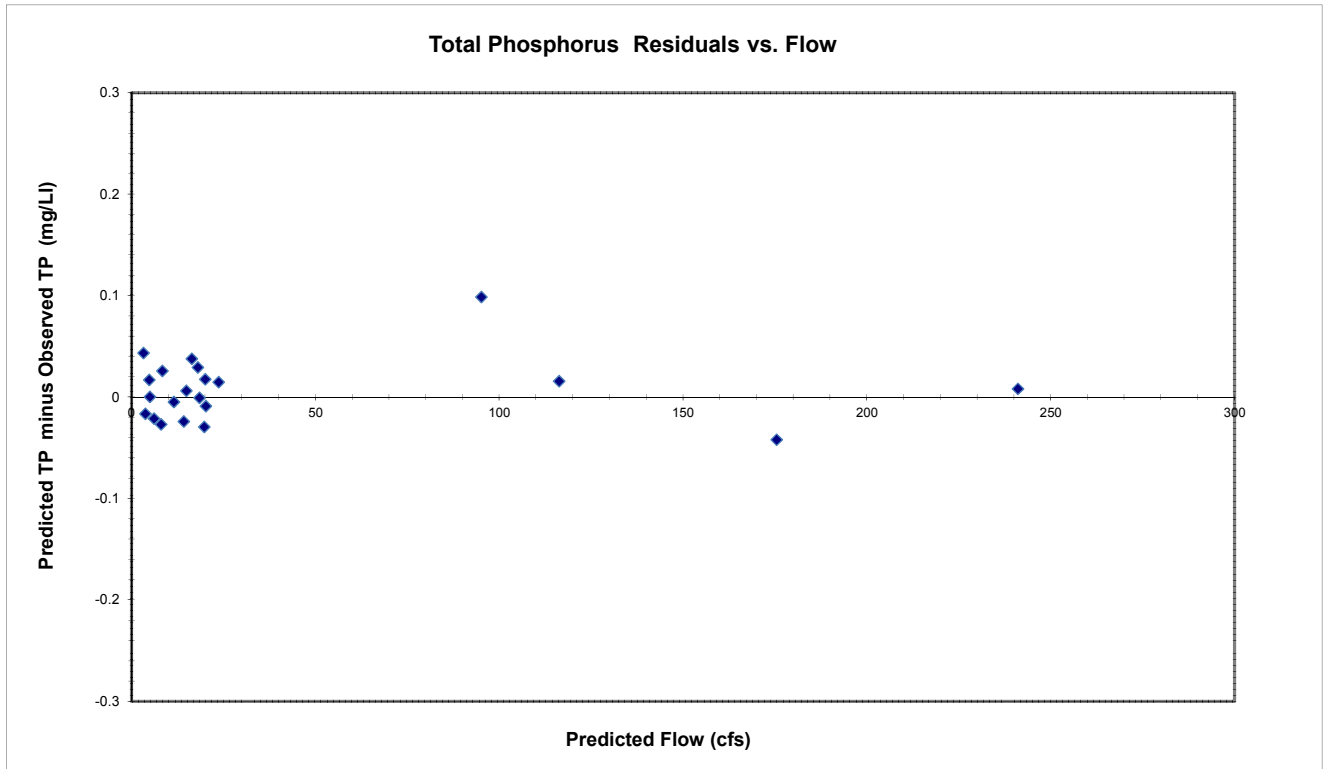
Upper Millstone River Watershed Area Model

Goodness of Fit Graphs for TP and TSS  
Predicted vs Observed  
Residuals vs Flow  
Residuals vs Concentration

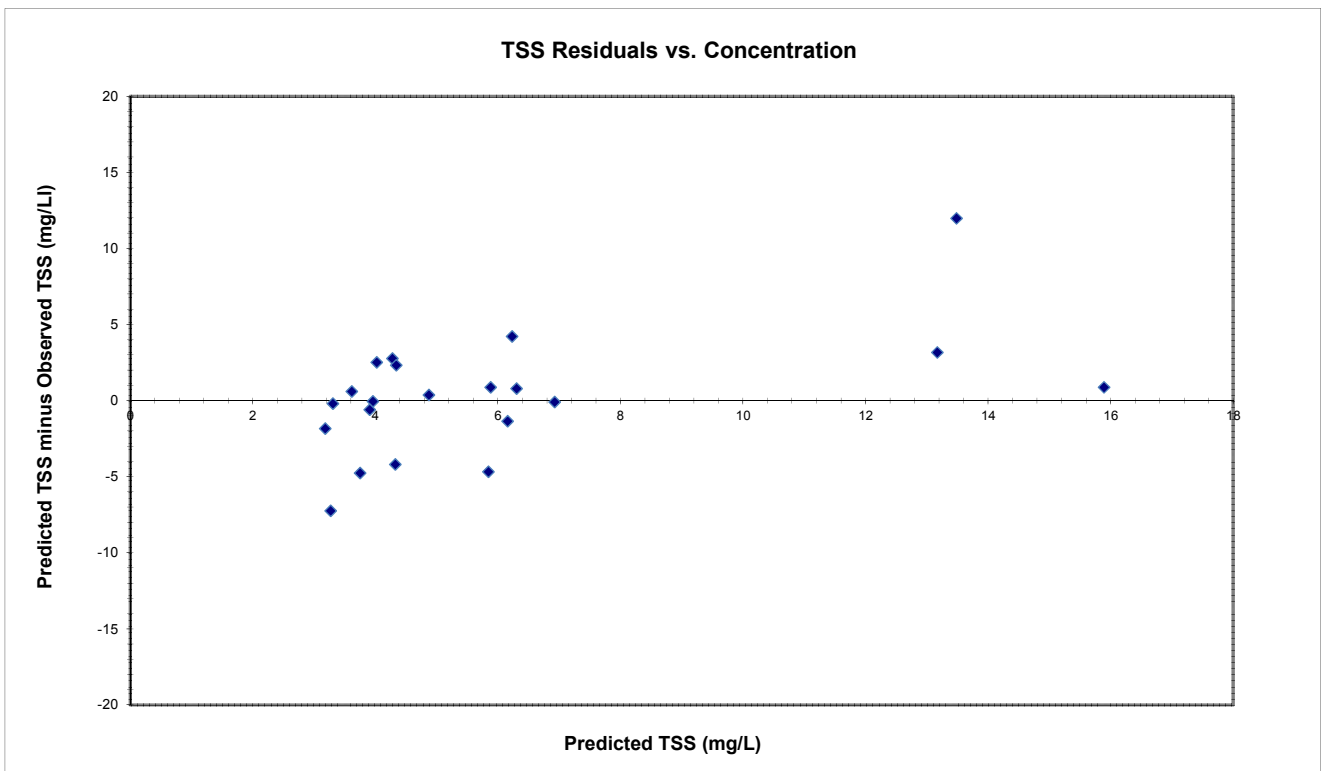
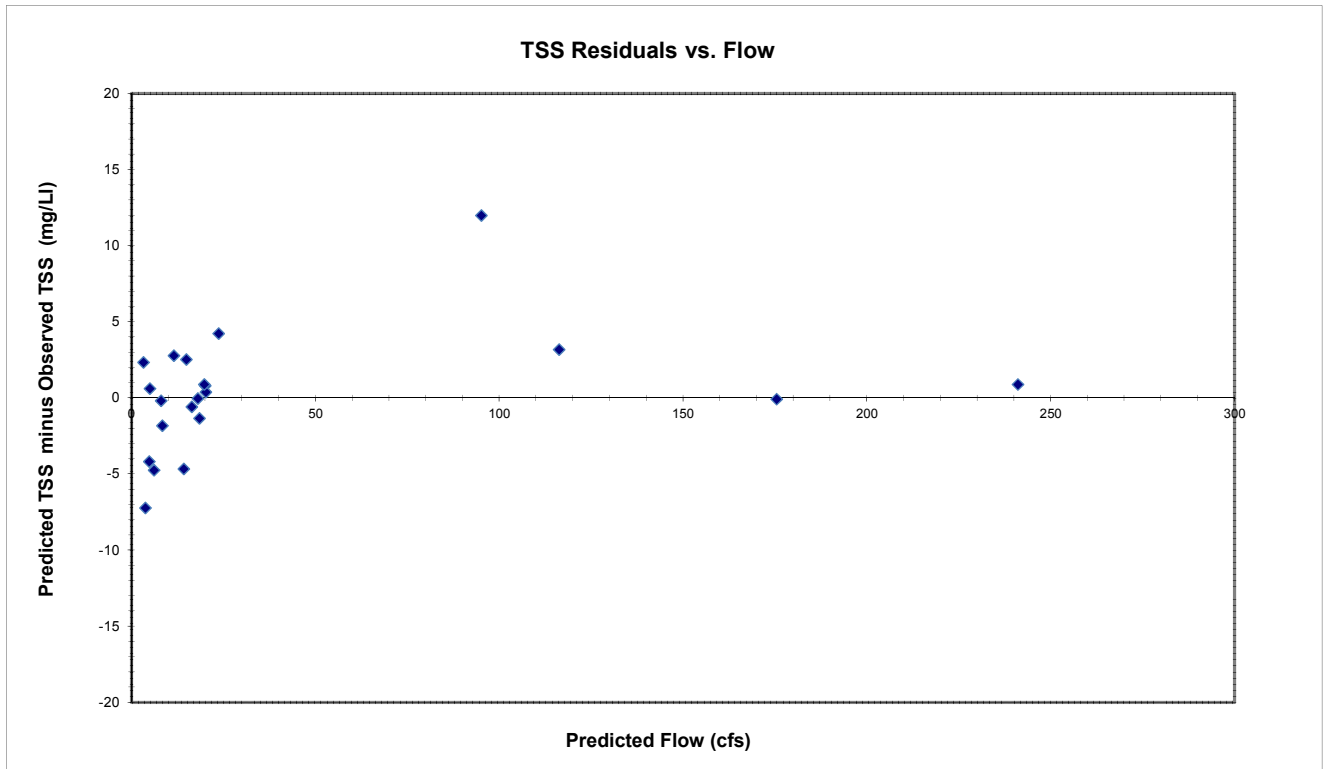
# Upper Millstone River at Old Cranbury Rd. (UMR1)



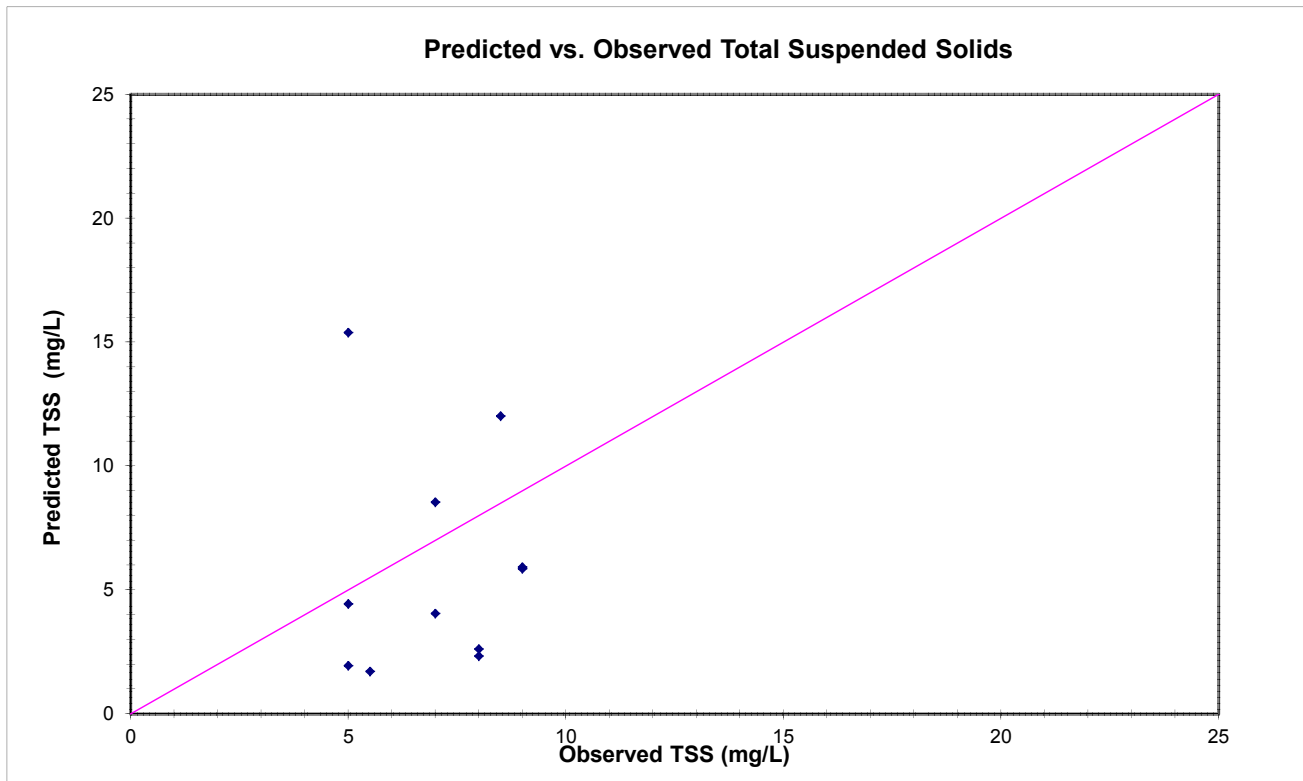
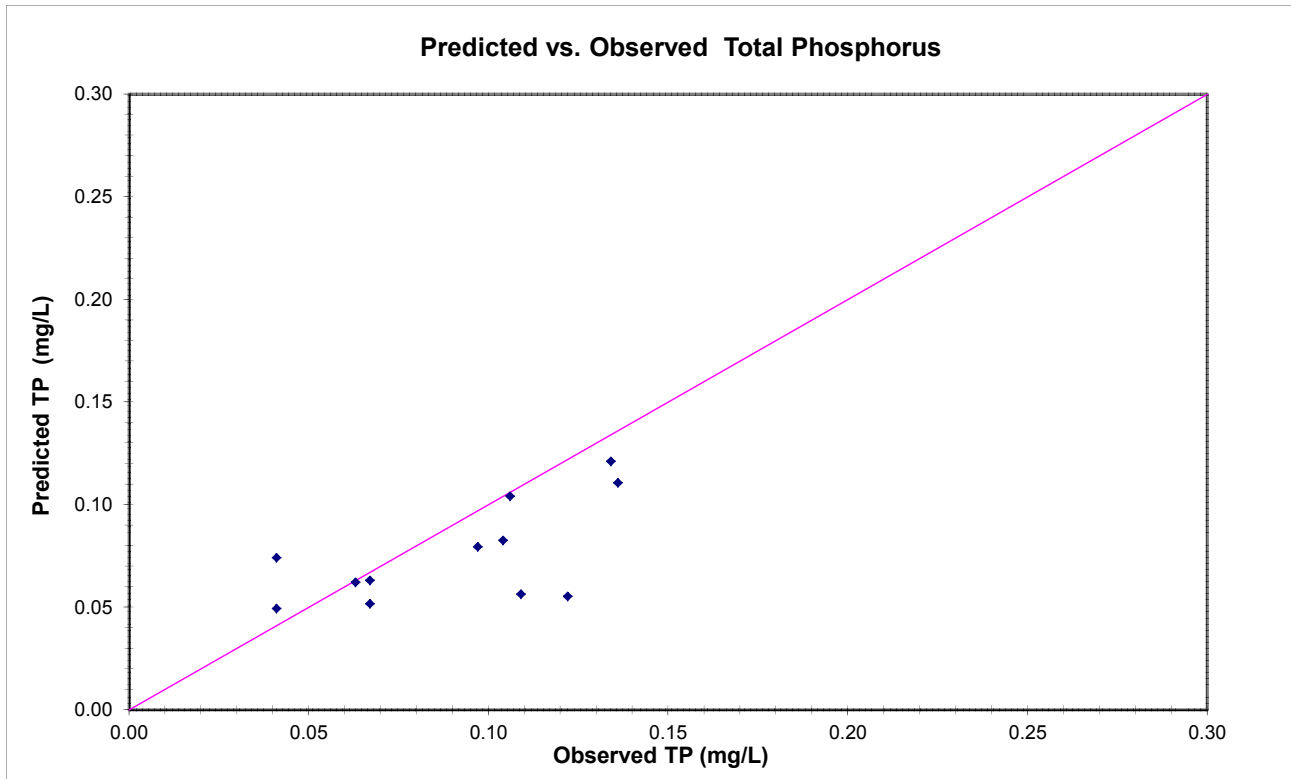
### Upper Millstone River at Old Cranbury Rd. (UMR1)



### Upper Millstone River at Old Cranbury Rd. (UMR1)

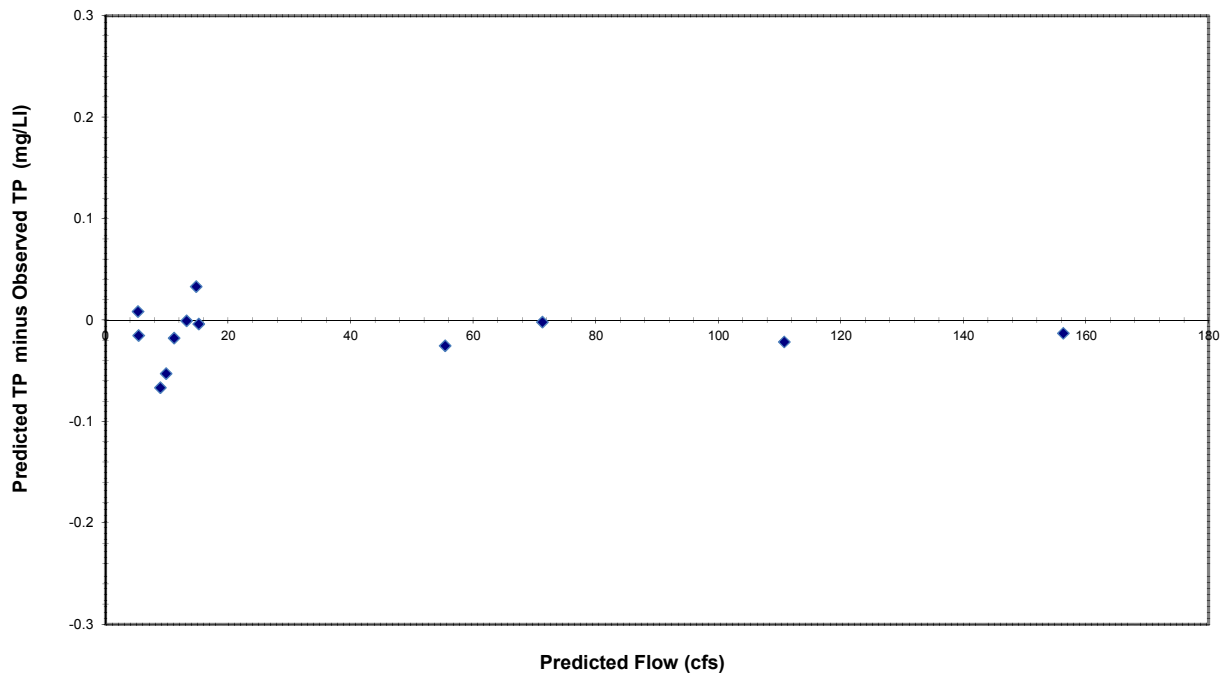


### Rocky Brook Downstream Peddie Lake (RB3)

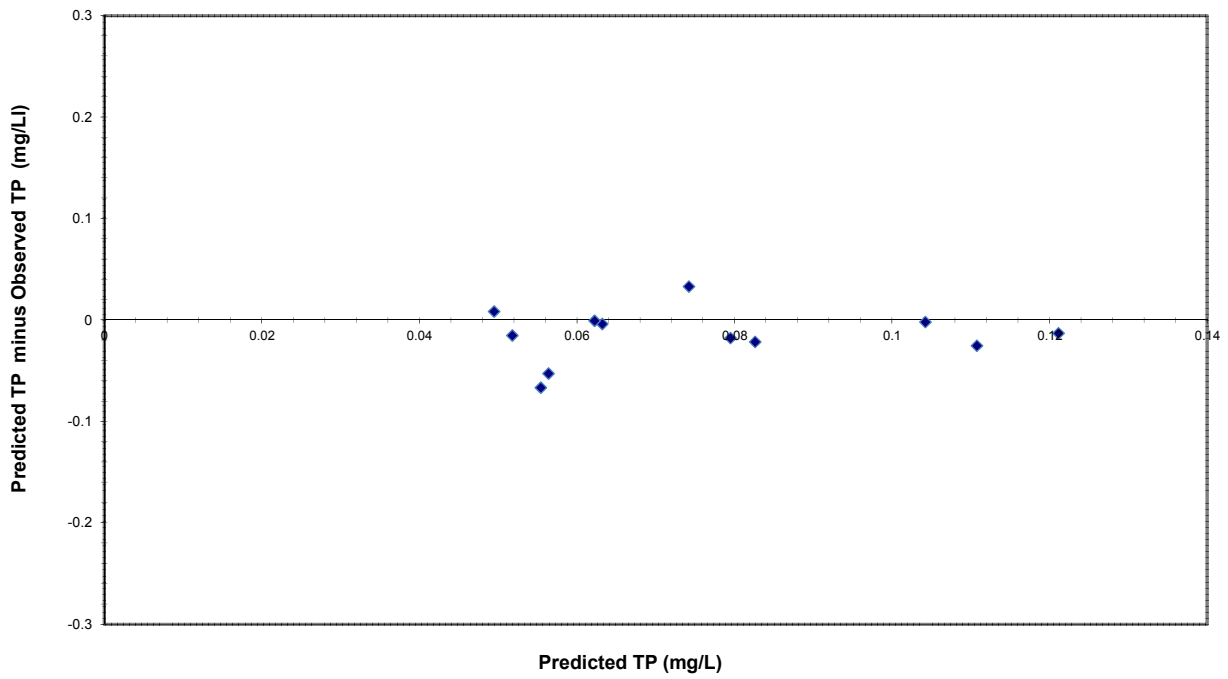


### Rocky Brook Downstream Peddie Lake (RB3)

#### Total Phosphorus Residuals vs. Flow

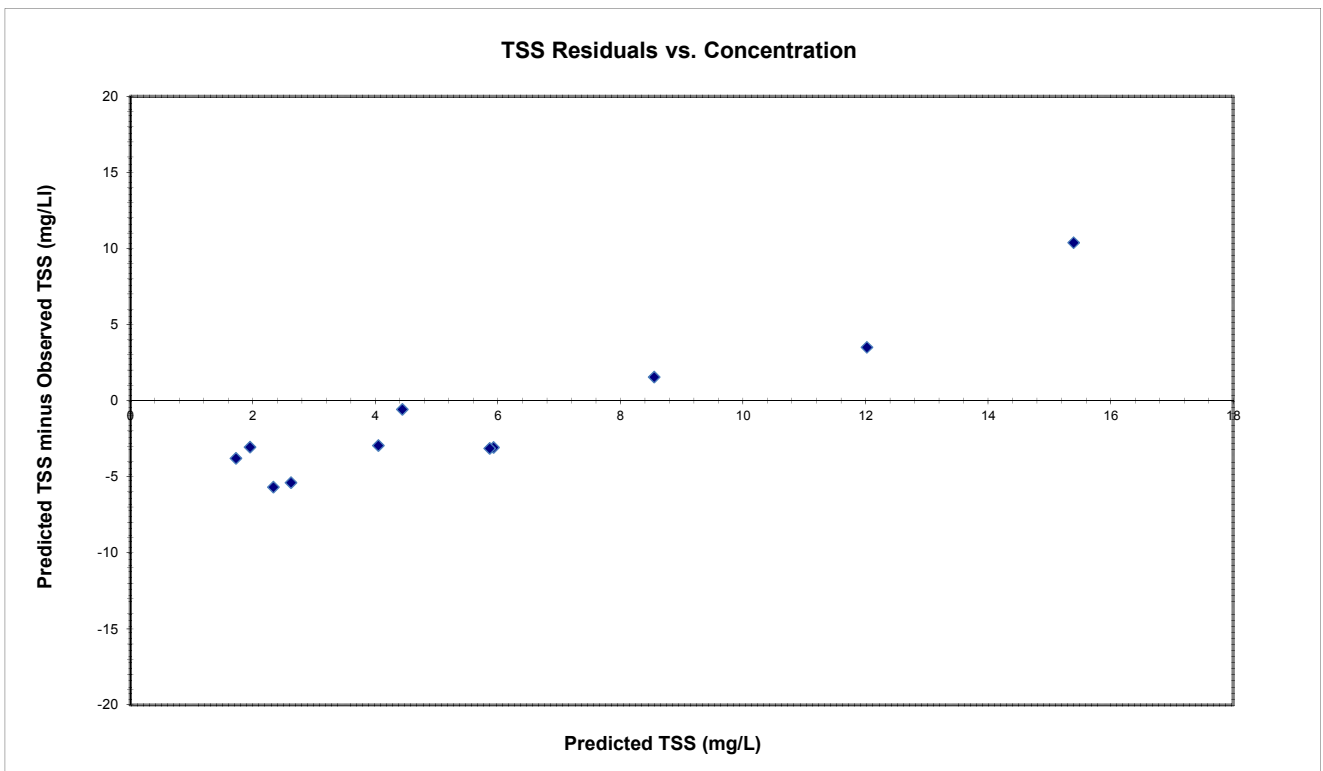
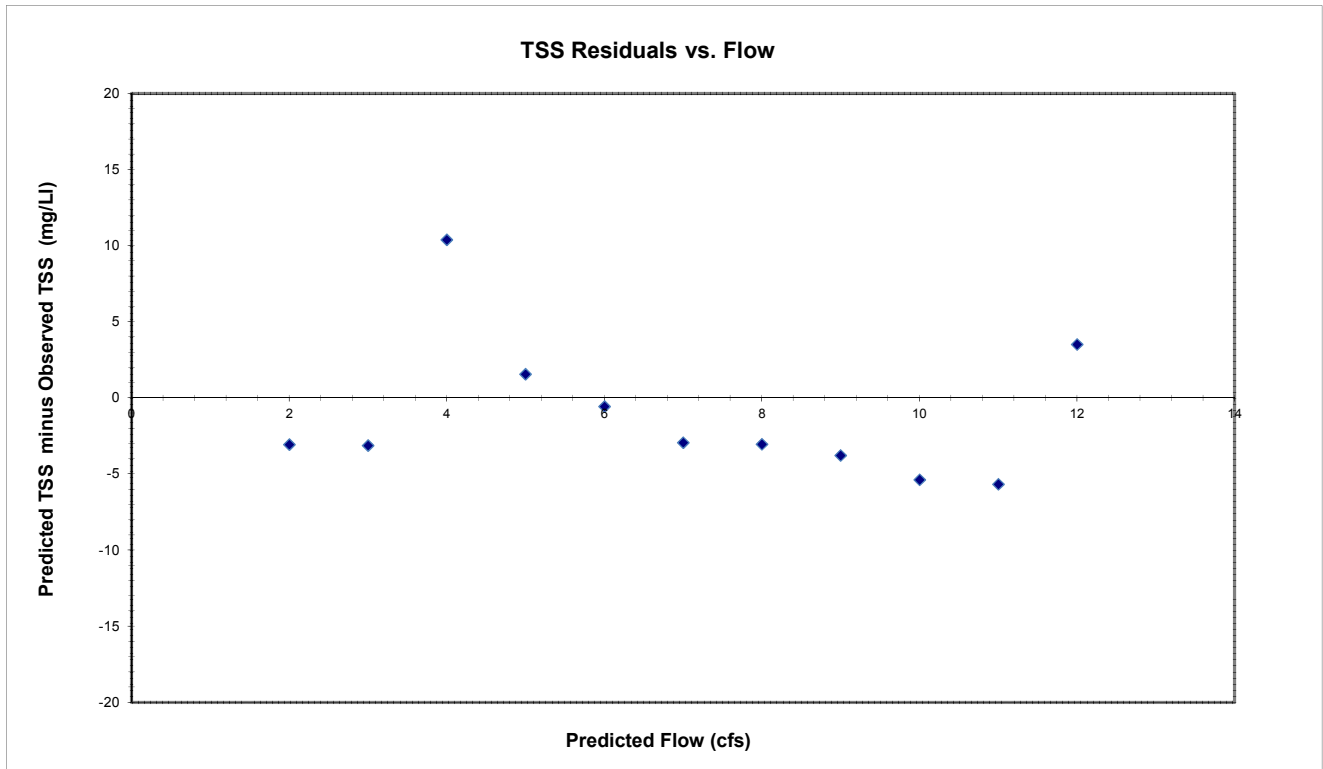


#### Total Phosphorus Residuals vs. Concentration

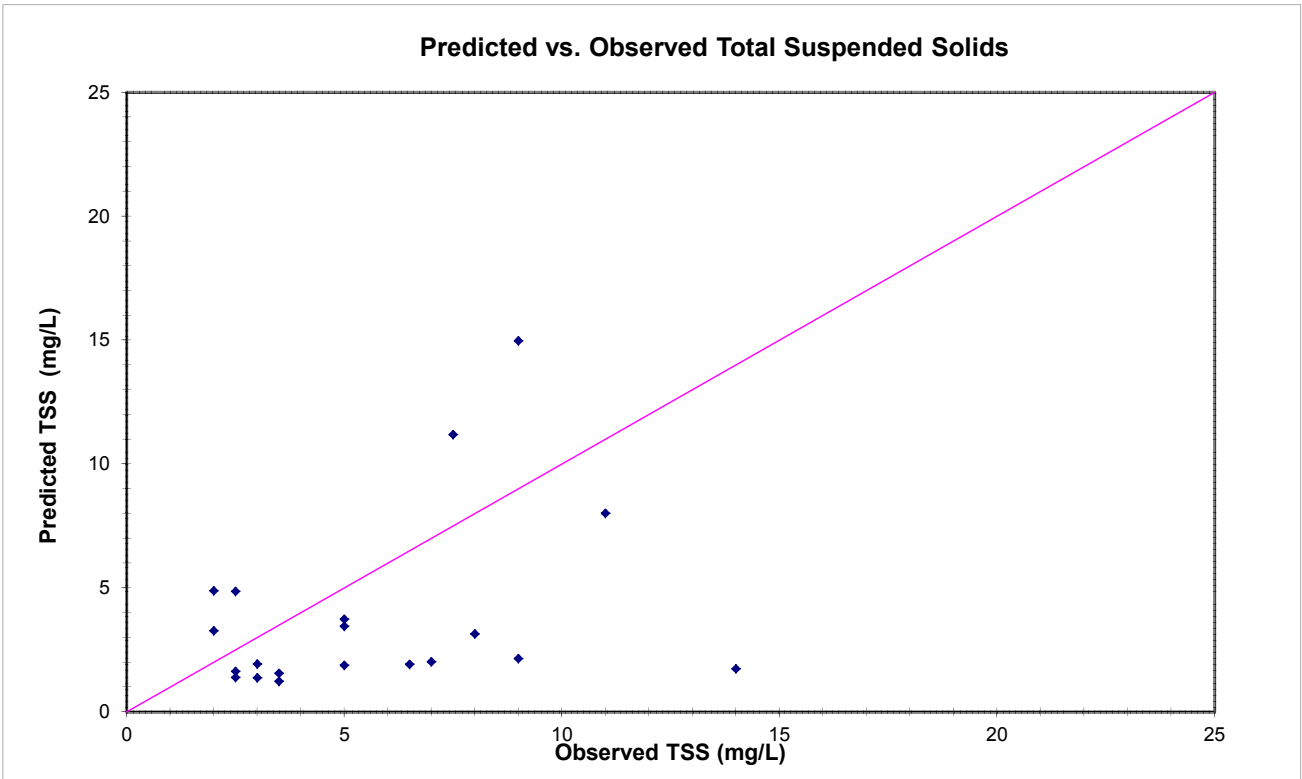
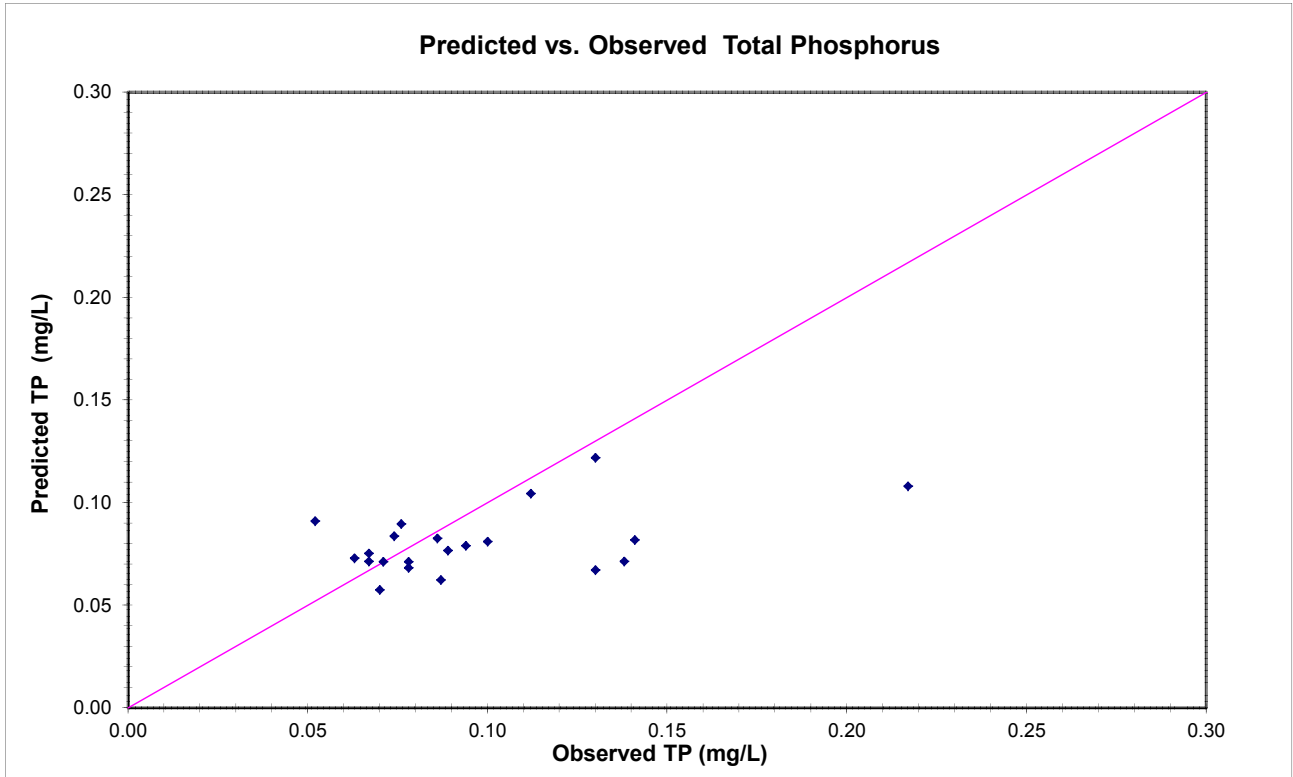




### Rocky Brook Downstream Peddie Lake (RB3)

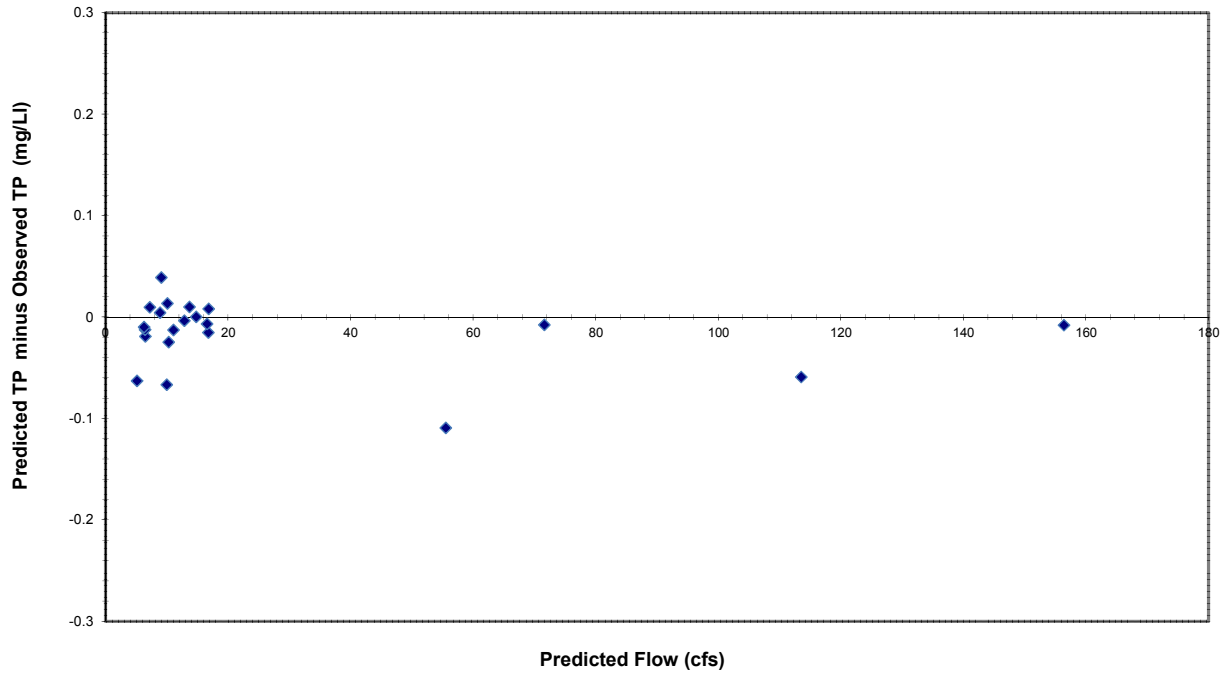


### Rocky Brook at Route 130 (RB4)

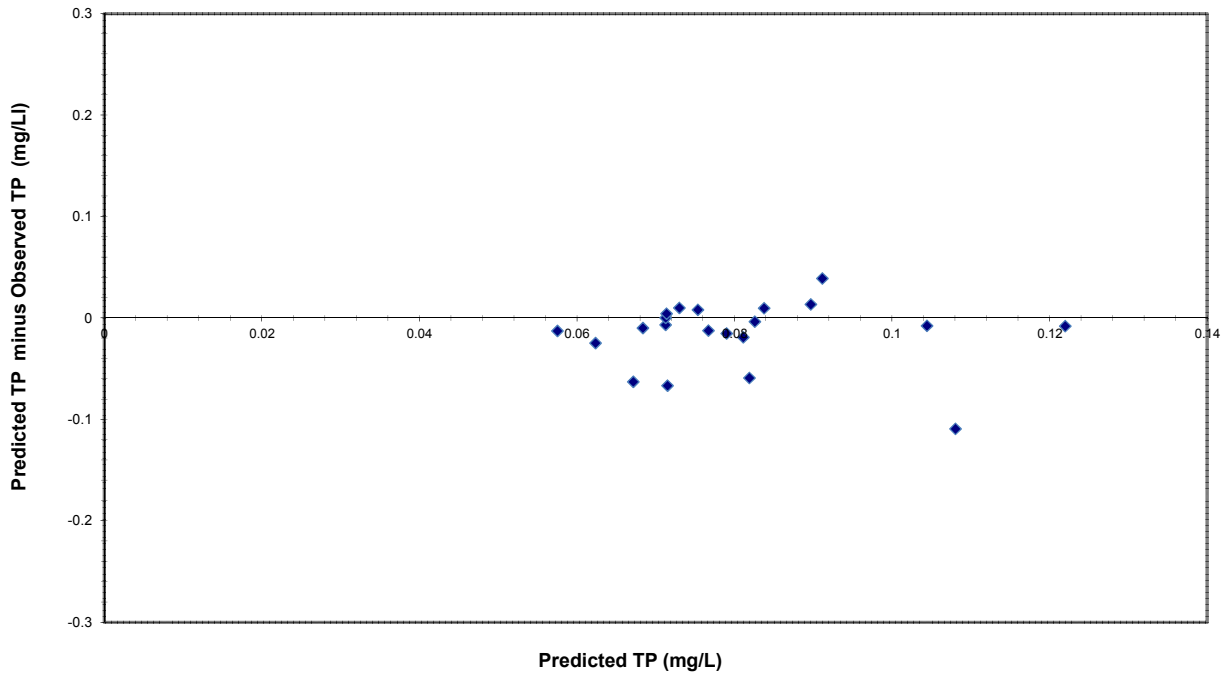


### Rocky Brook at Route 130 (RB4)

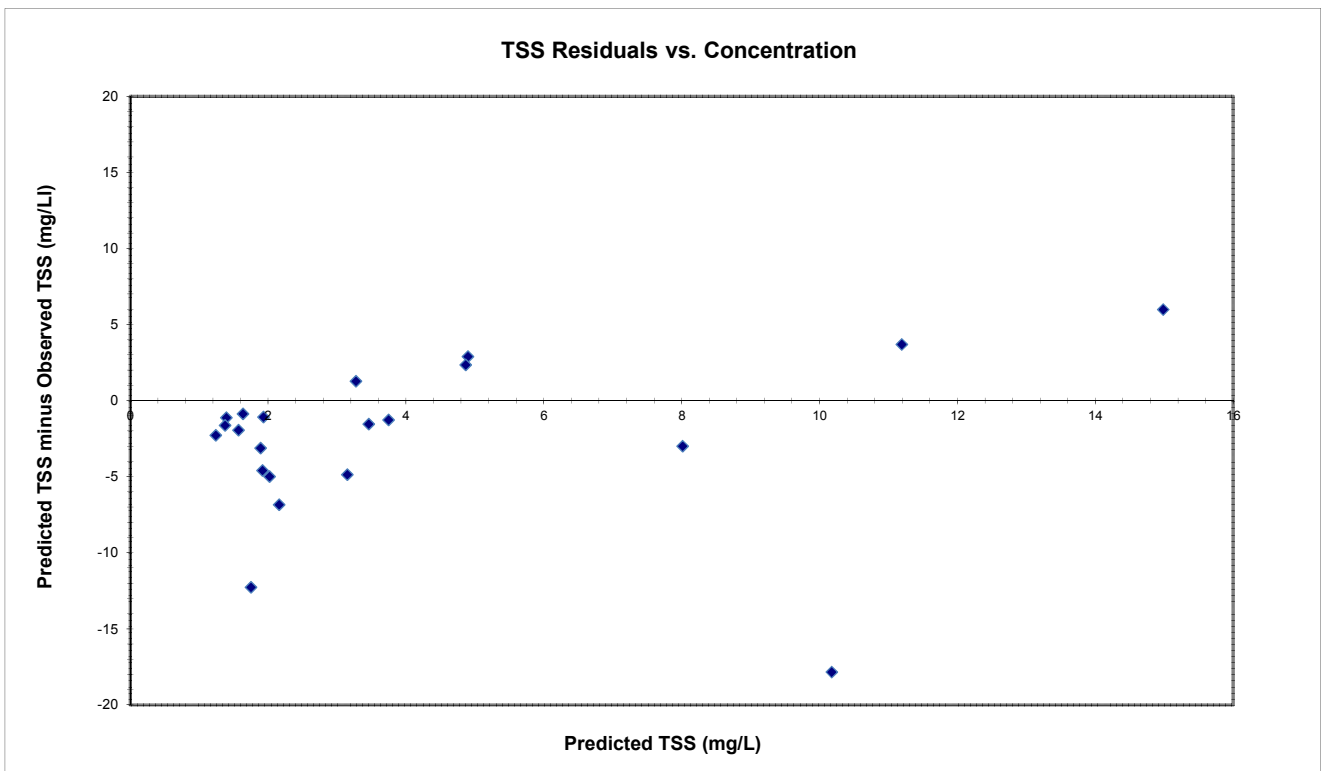
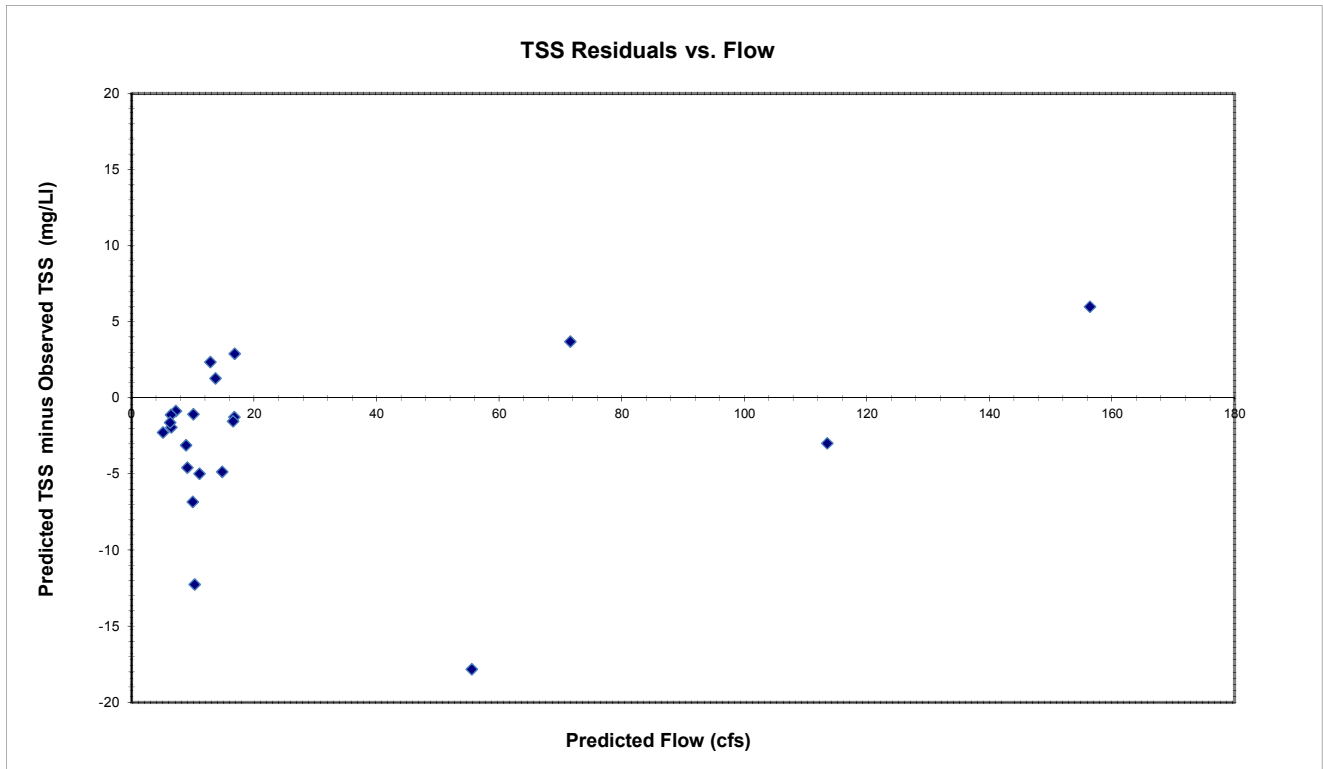
#### Total Phosphorus Residuals vs. Flow



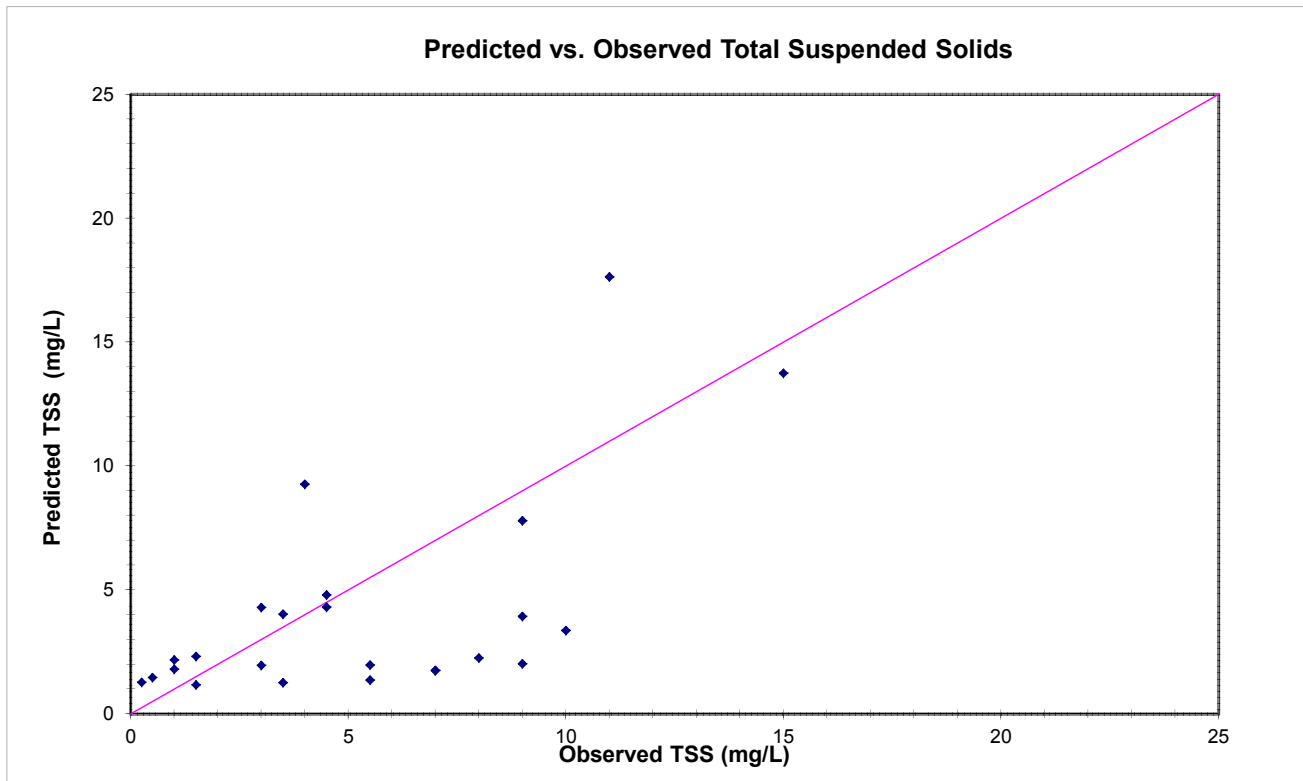
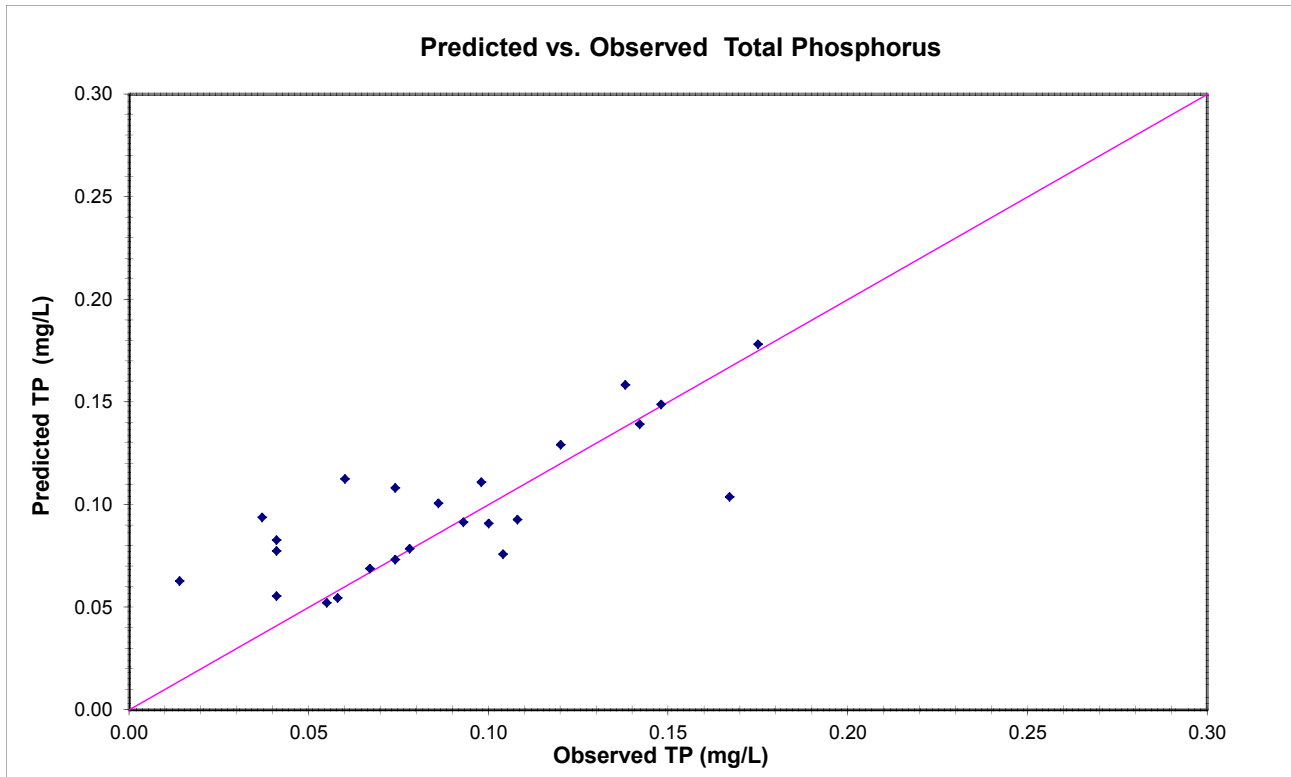
#### Total Phosphorus Residuals vs. Concentration



### Rocky Brook at Route 130 (RB4)

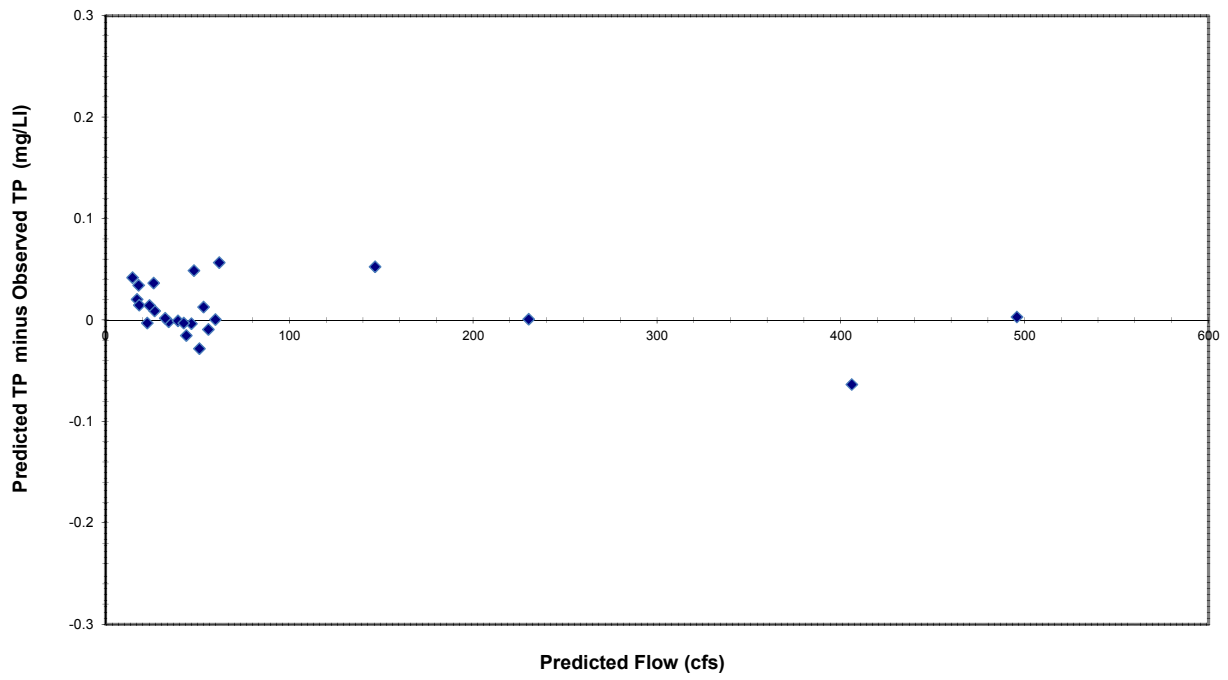


### Upper Millstone River at Cranbury Neck Rd. (UMR2)

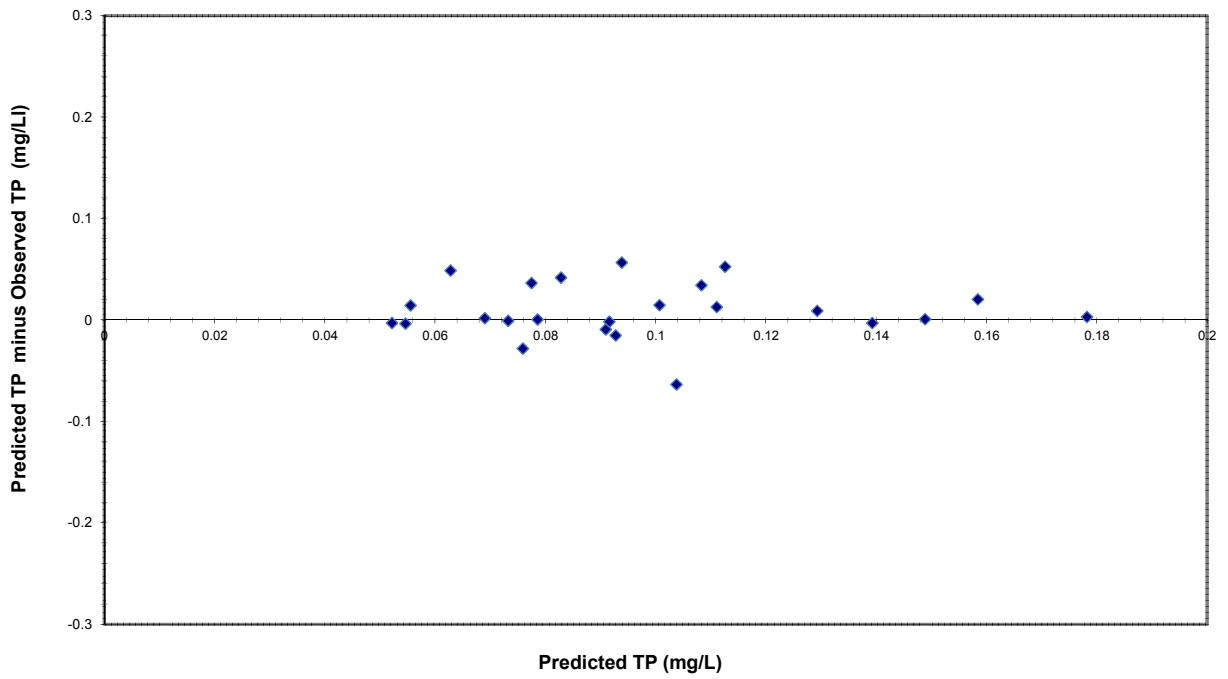


Upper Millstone River at Cranbury Neck Rd. (UMR2)

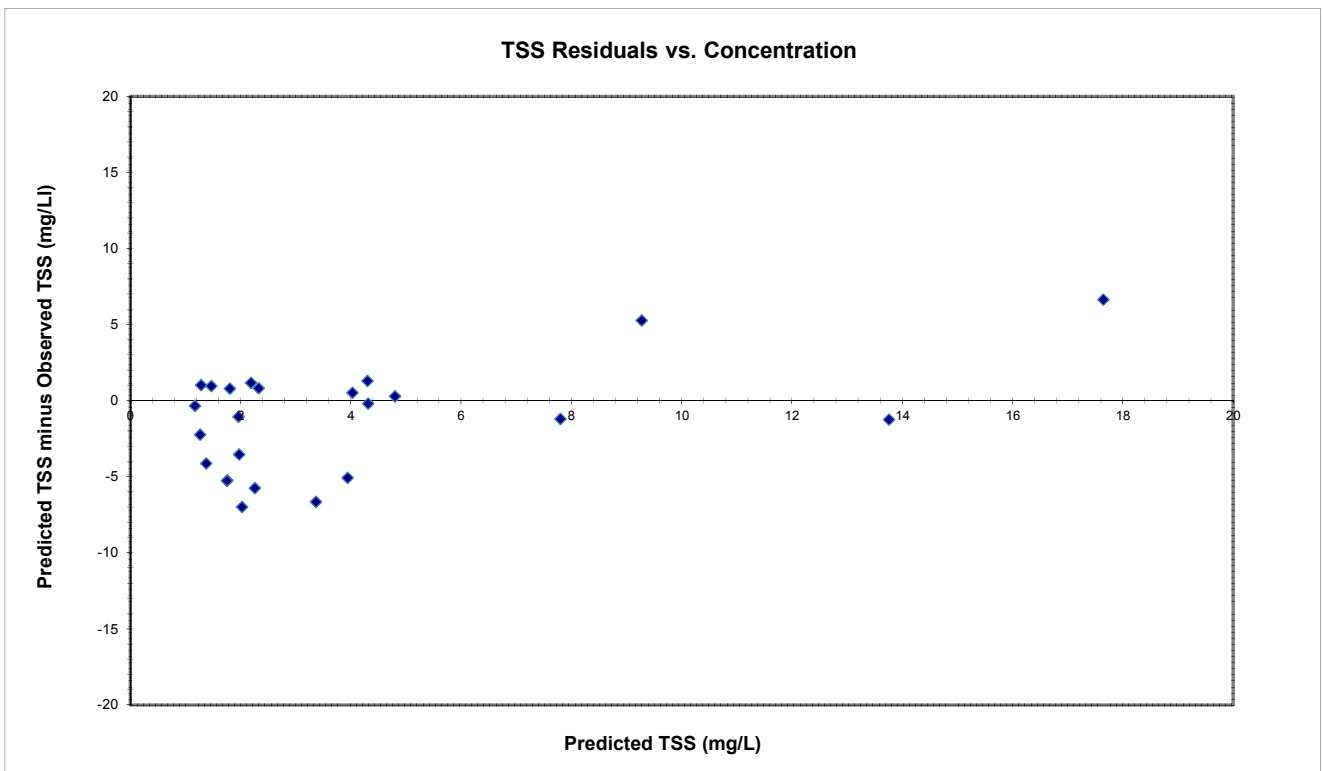
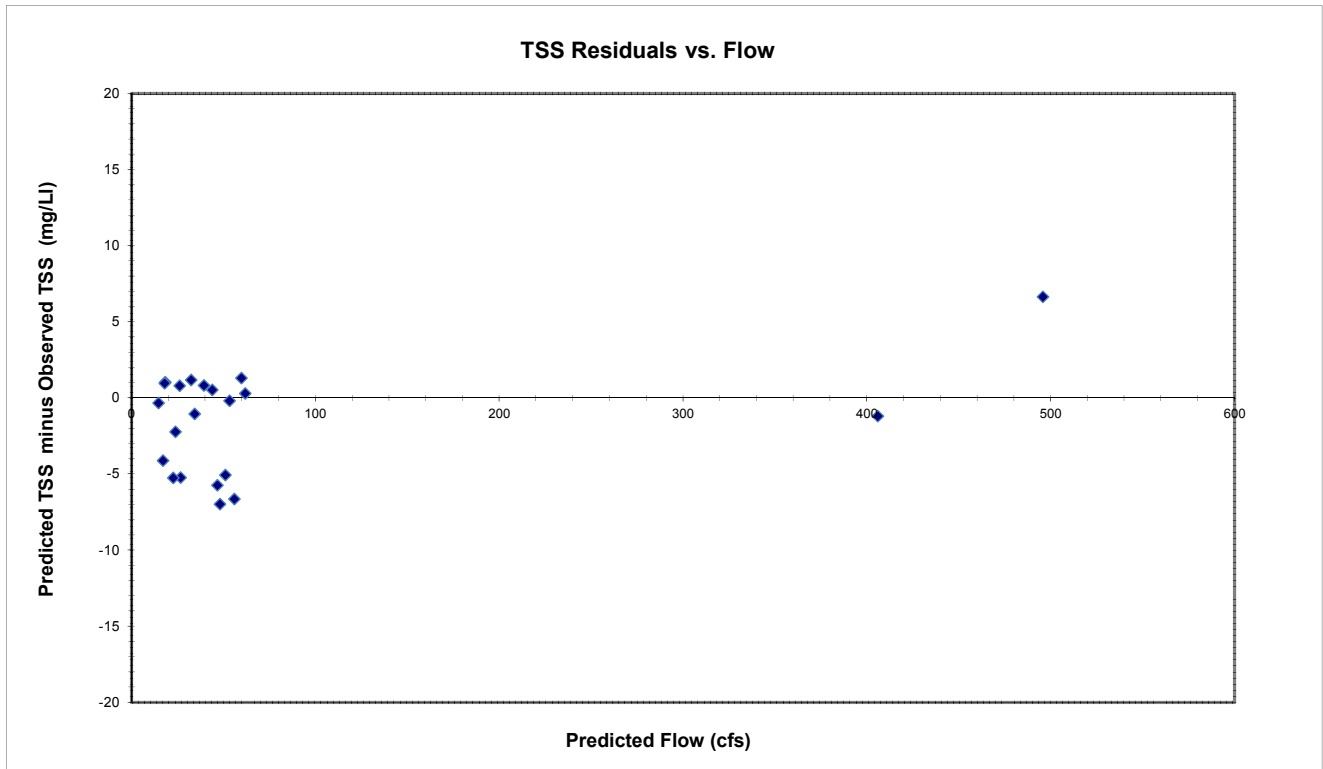
Total Phosphorus Residuals vs. Flow



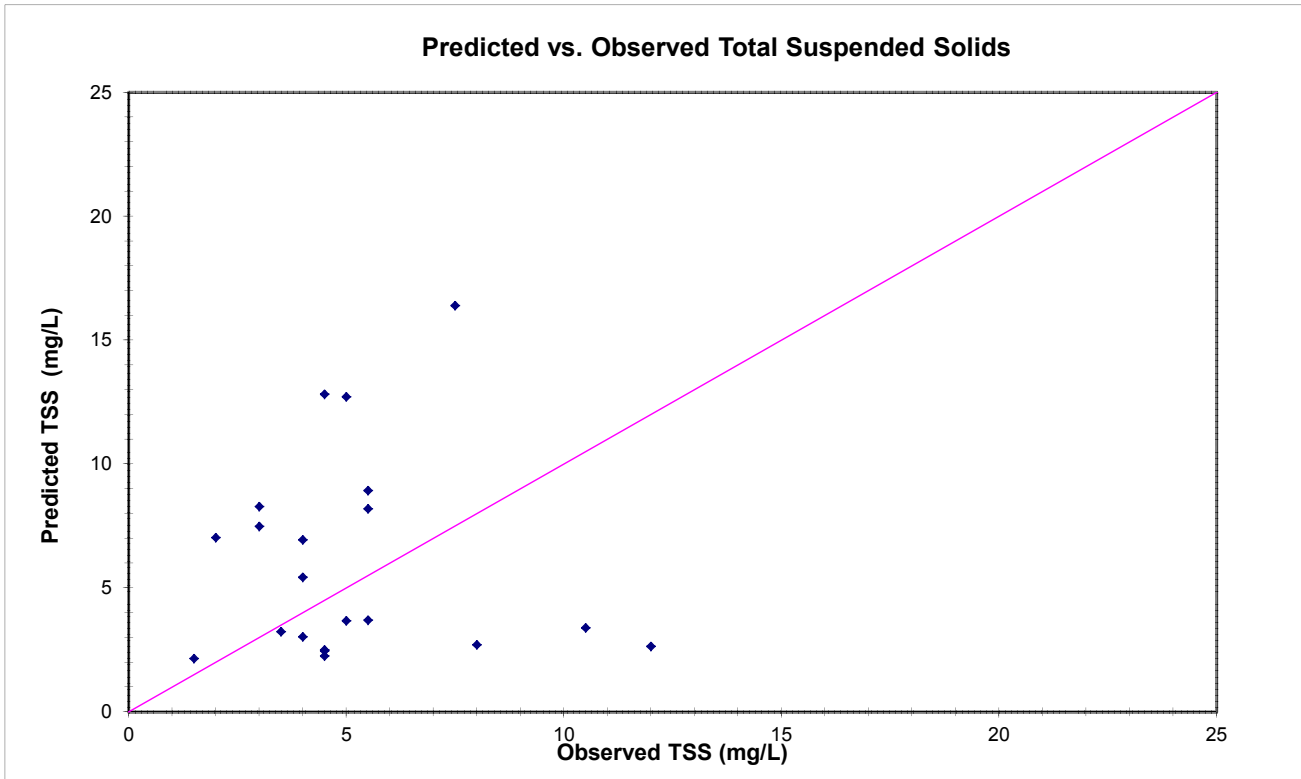
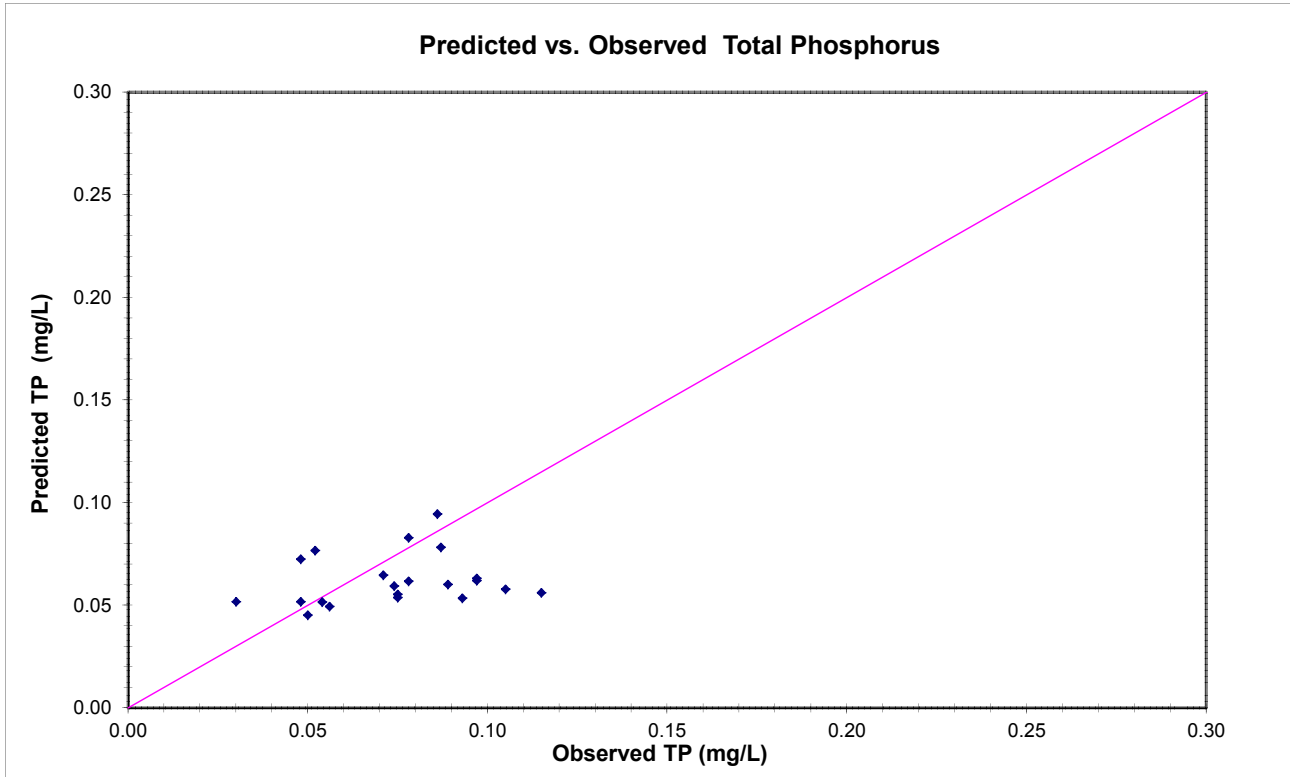
Total Phosphorus Residuals vs. Concentration



### Upper Millstone River at Cranbury Neck Rd. (UMR2)

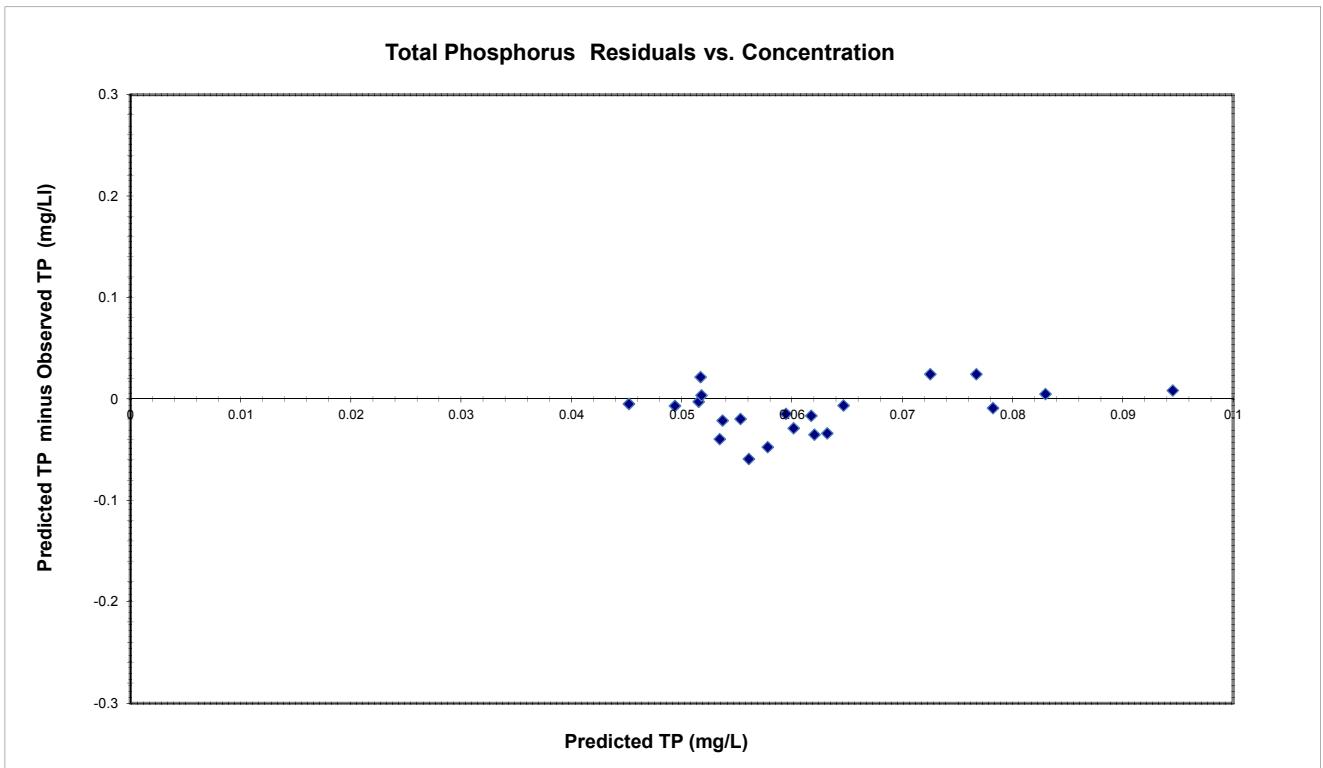
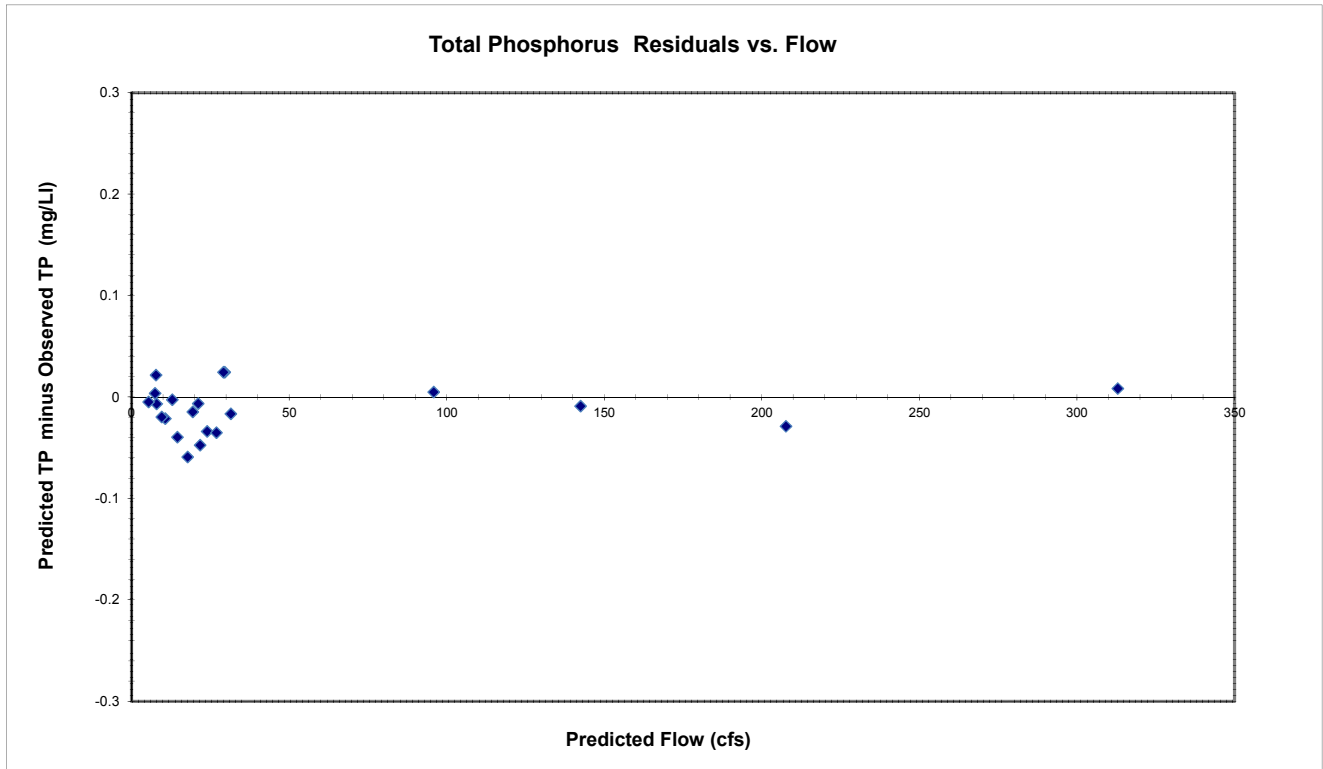


### Cranbury Brook at Plainsboro Pond Outlet (CB3)

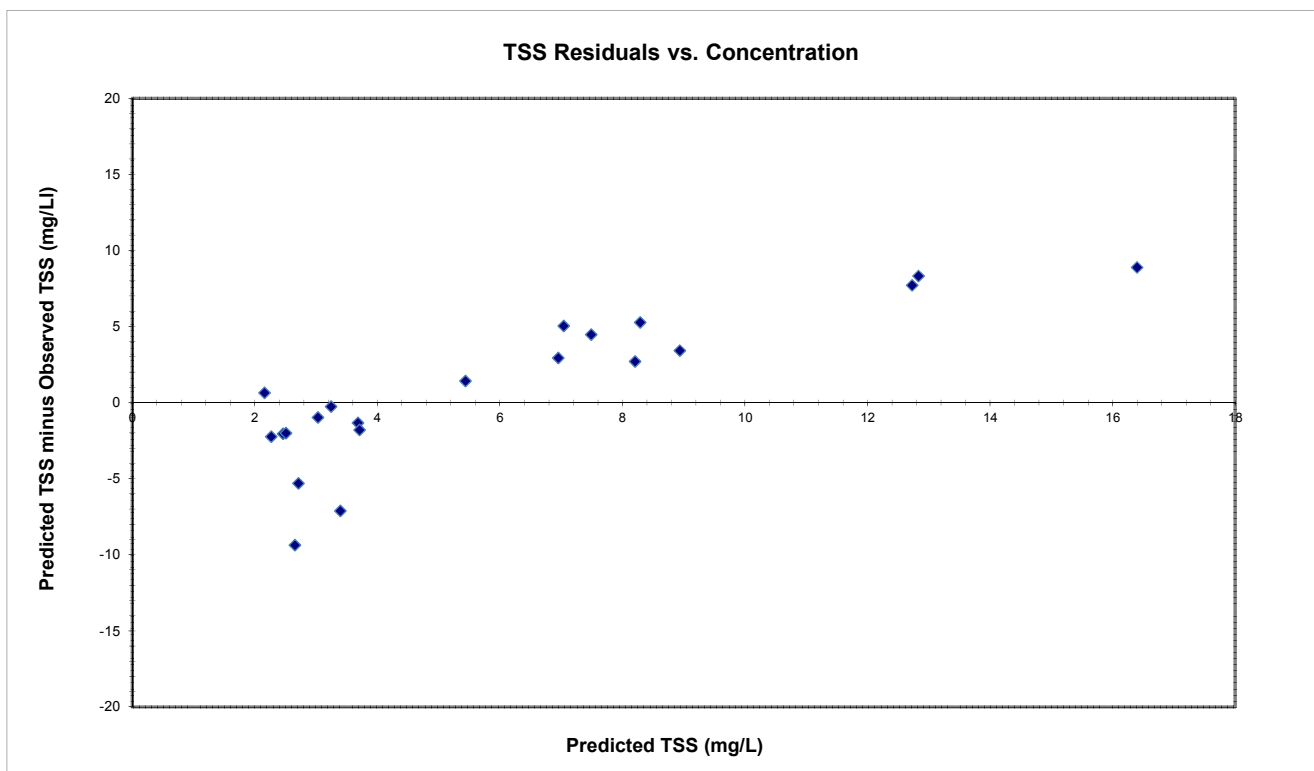
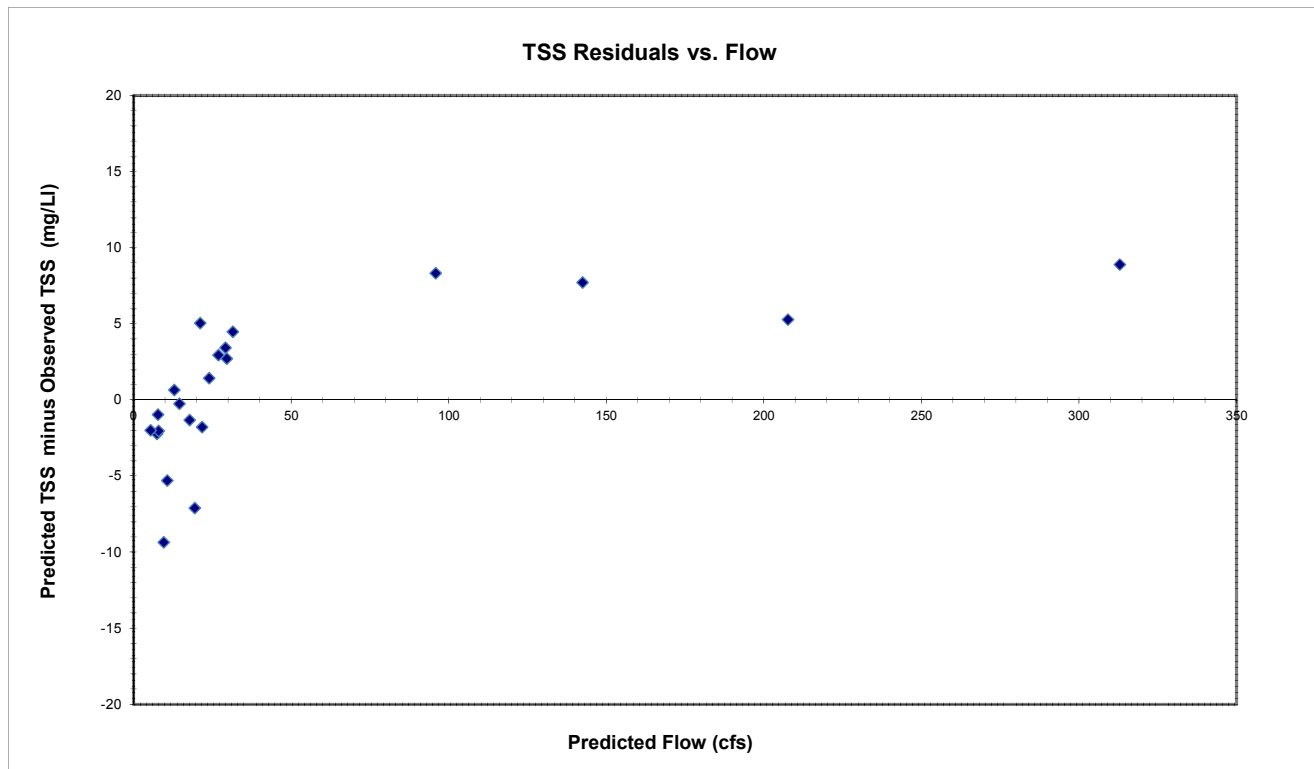




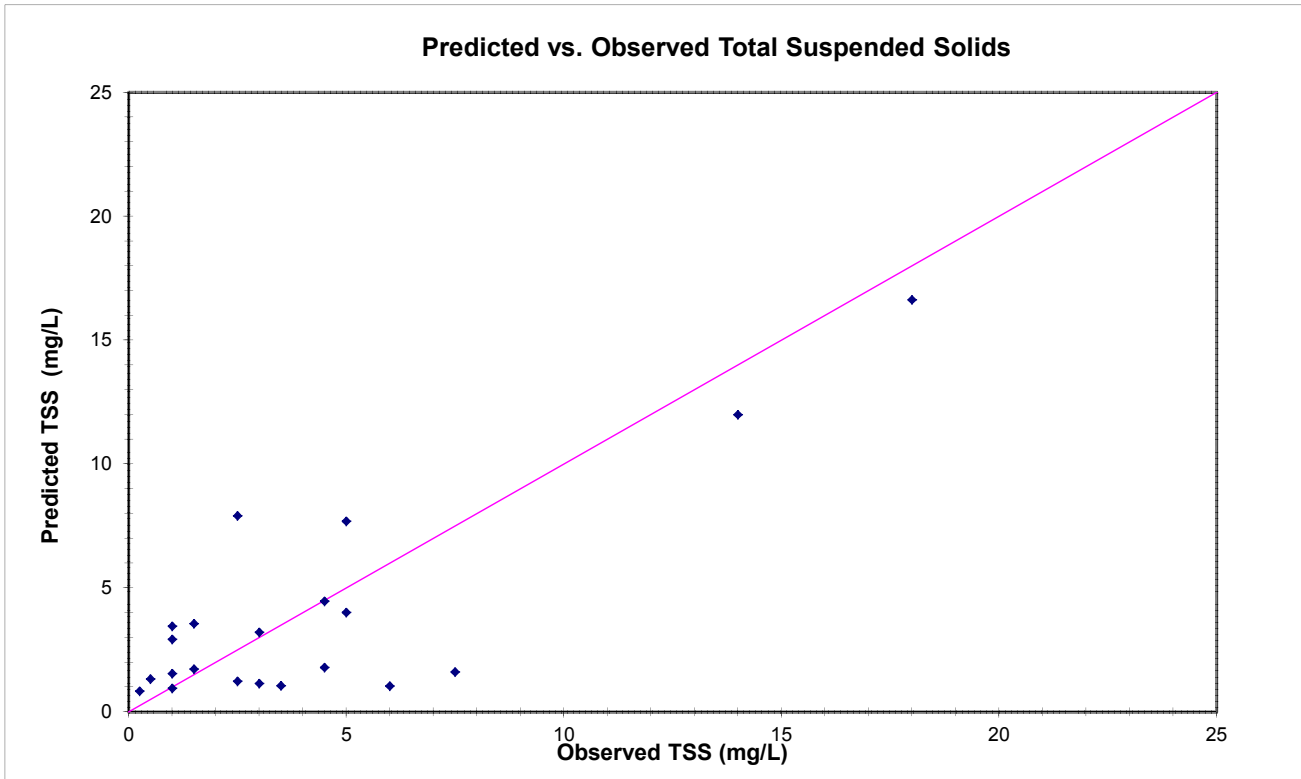
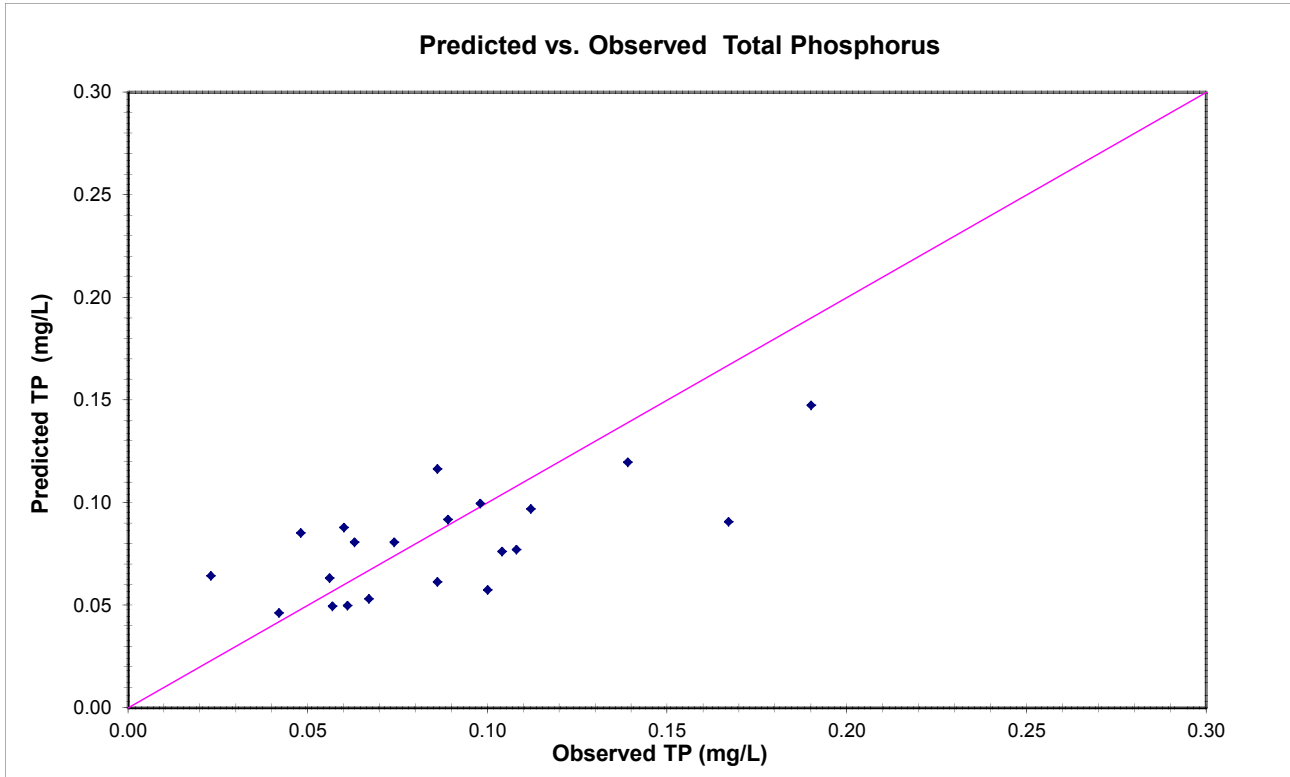
### Cranbury Brook at Plainsboro Pond Outlet (CB3)



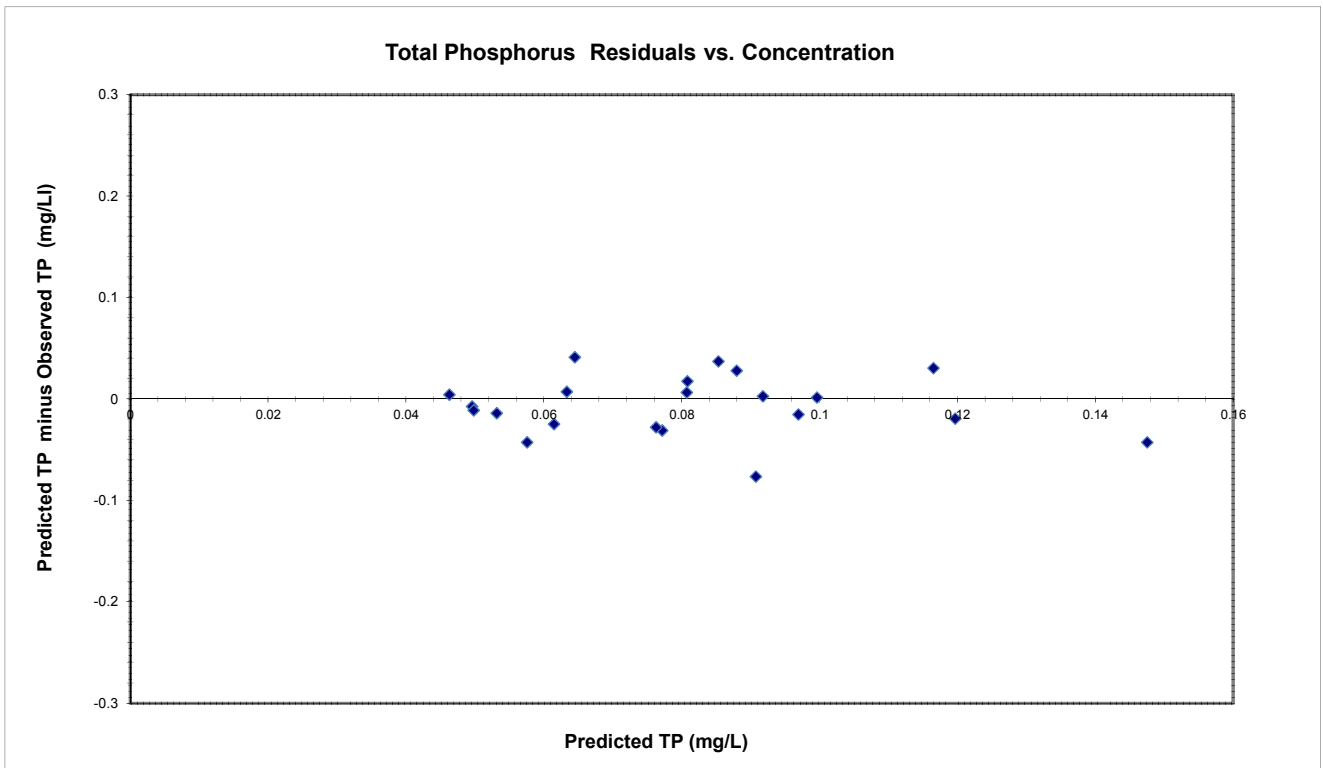
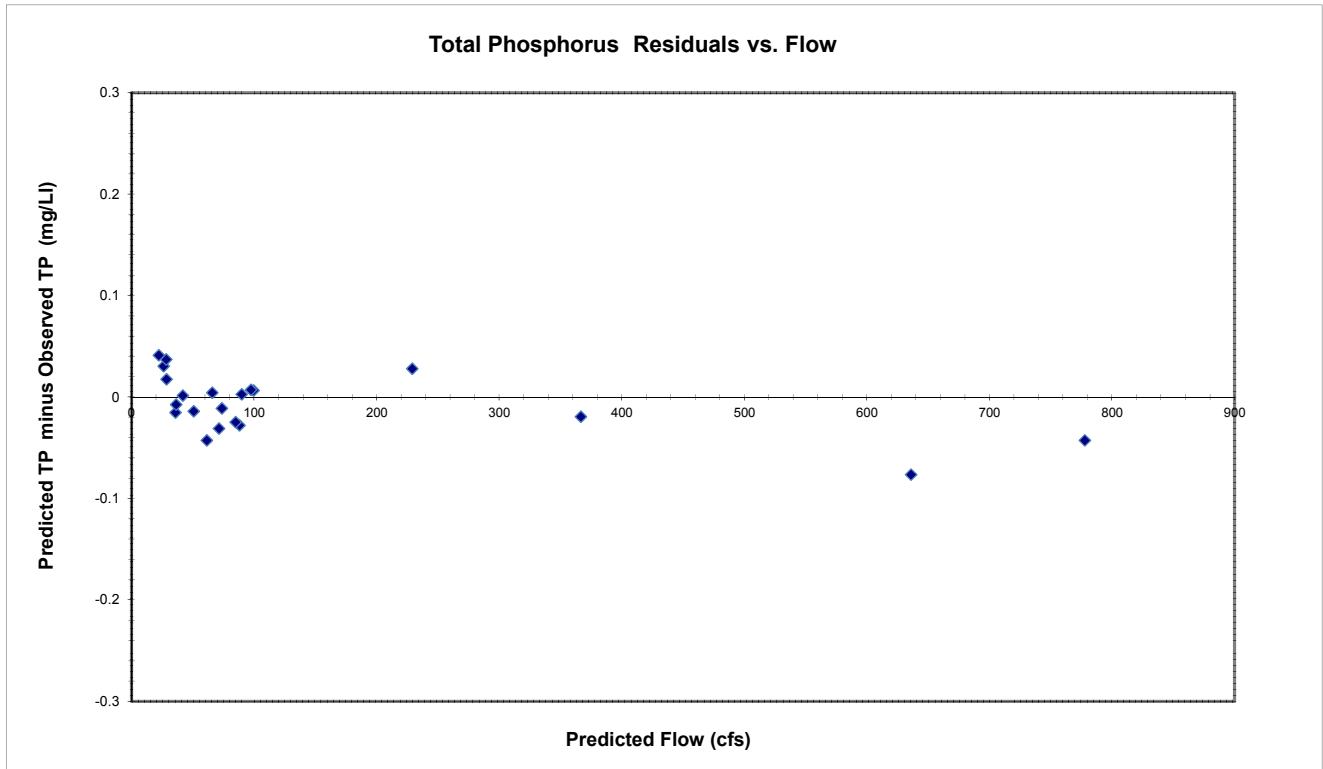
### Cranbury Brook at Plainsboro Pond Outlet (CB3)



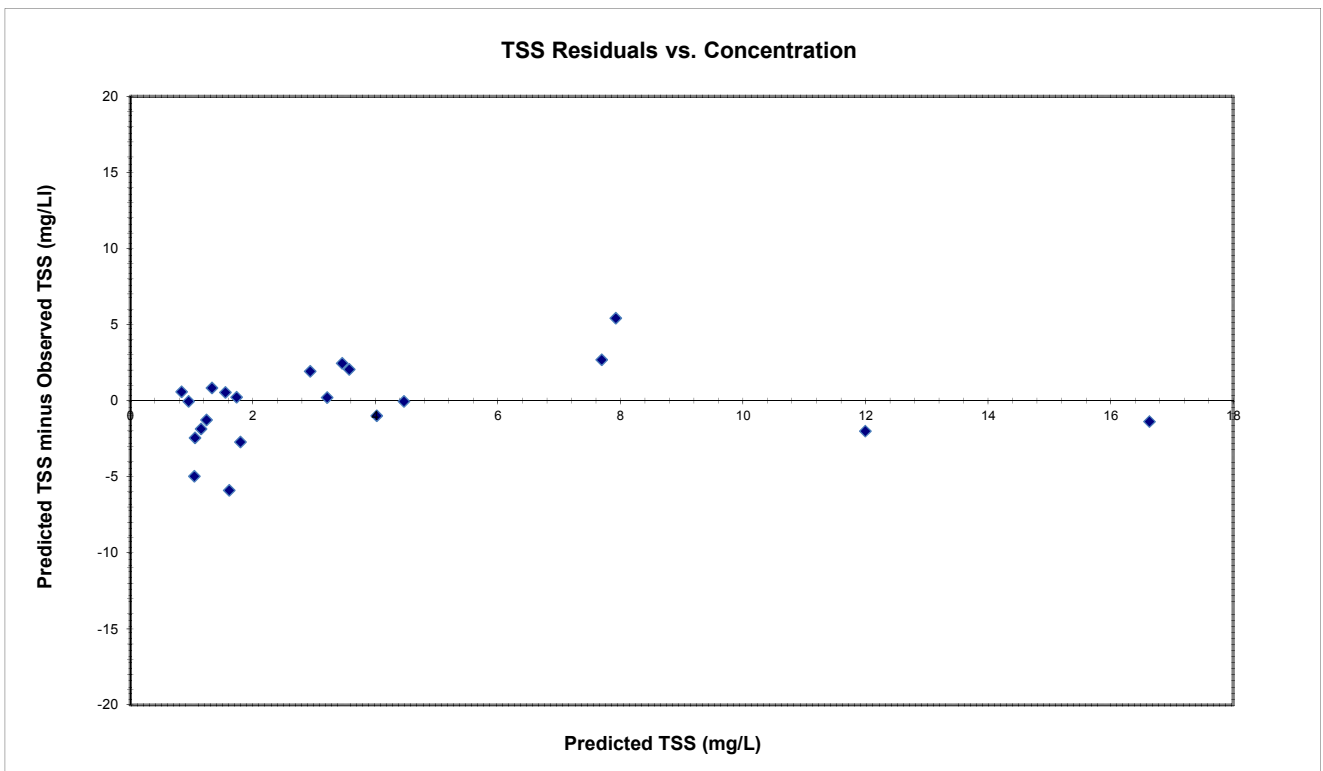
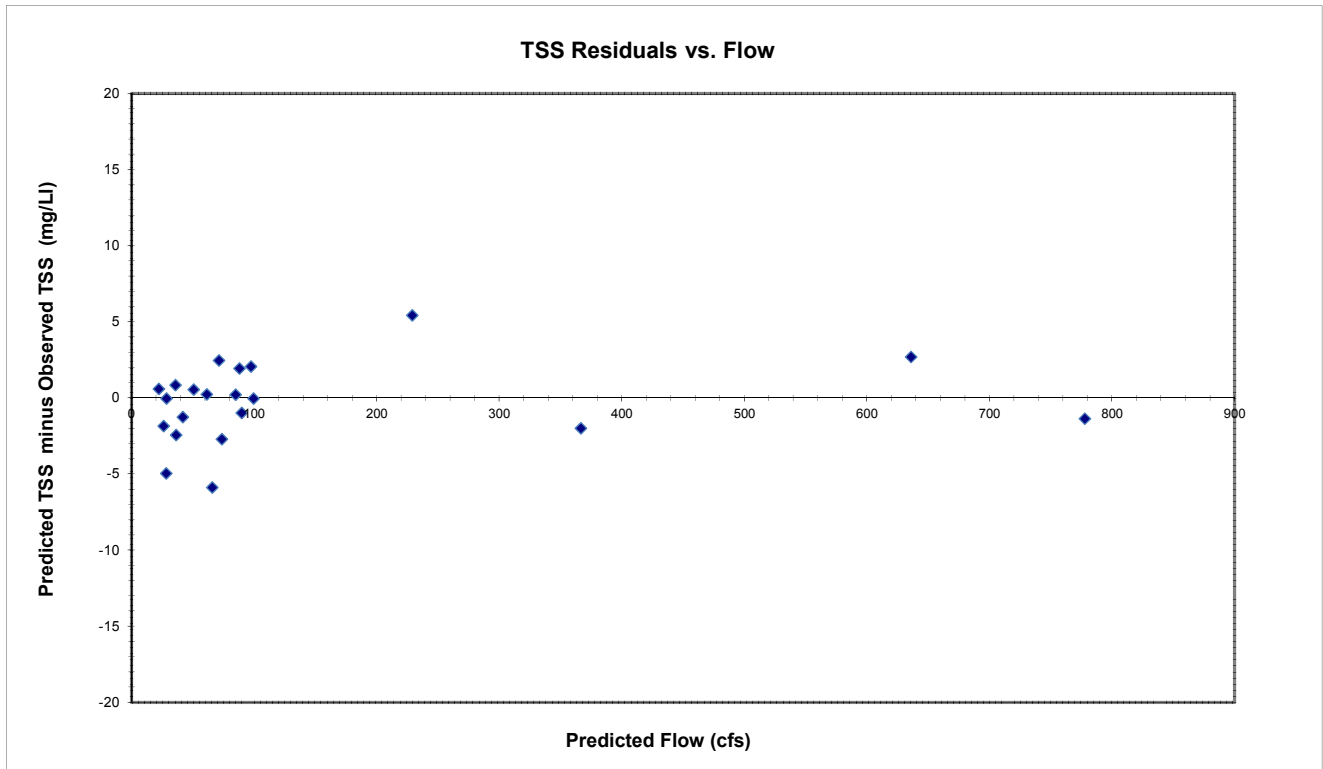
### Upper Millstone River Downstream Railroad Crossing in Plainsboro (UMR3)



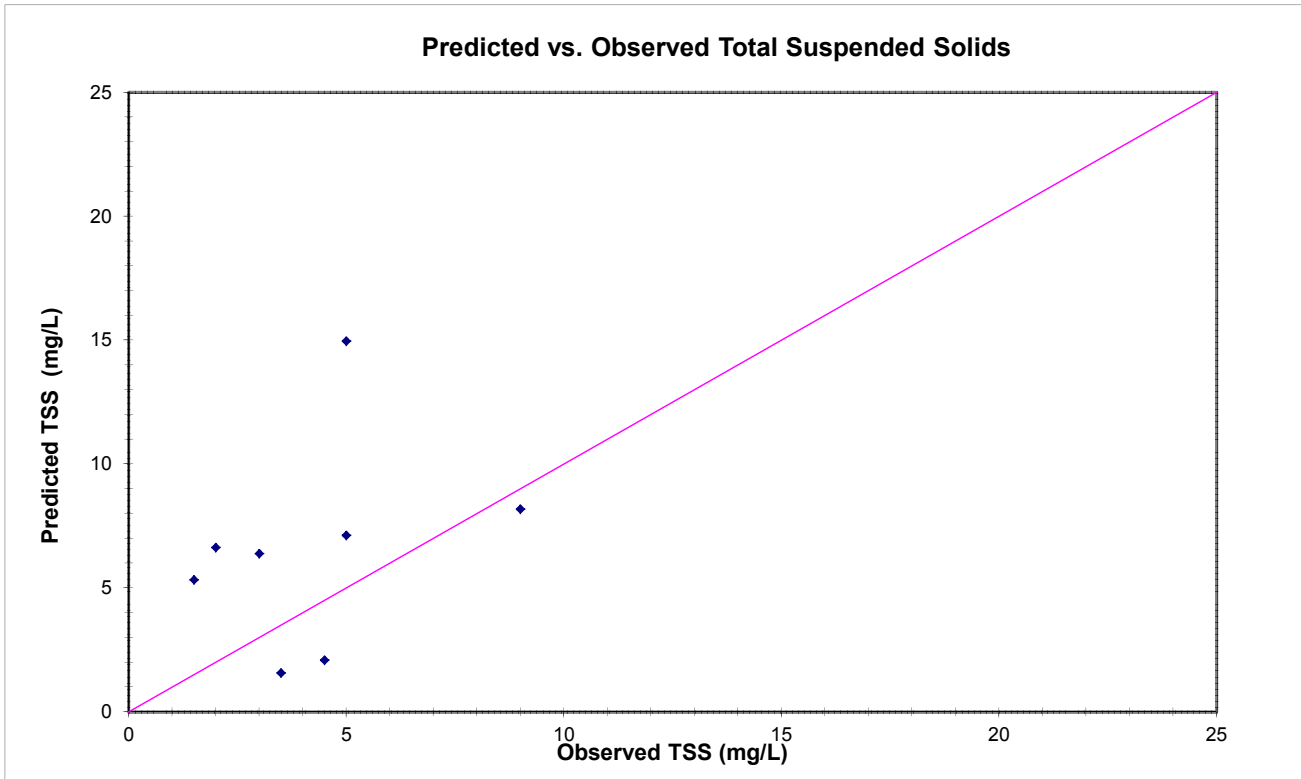
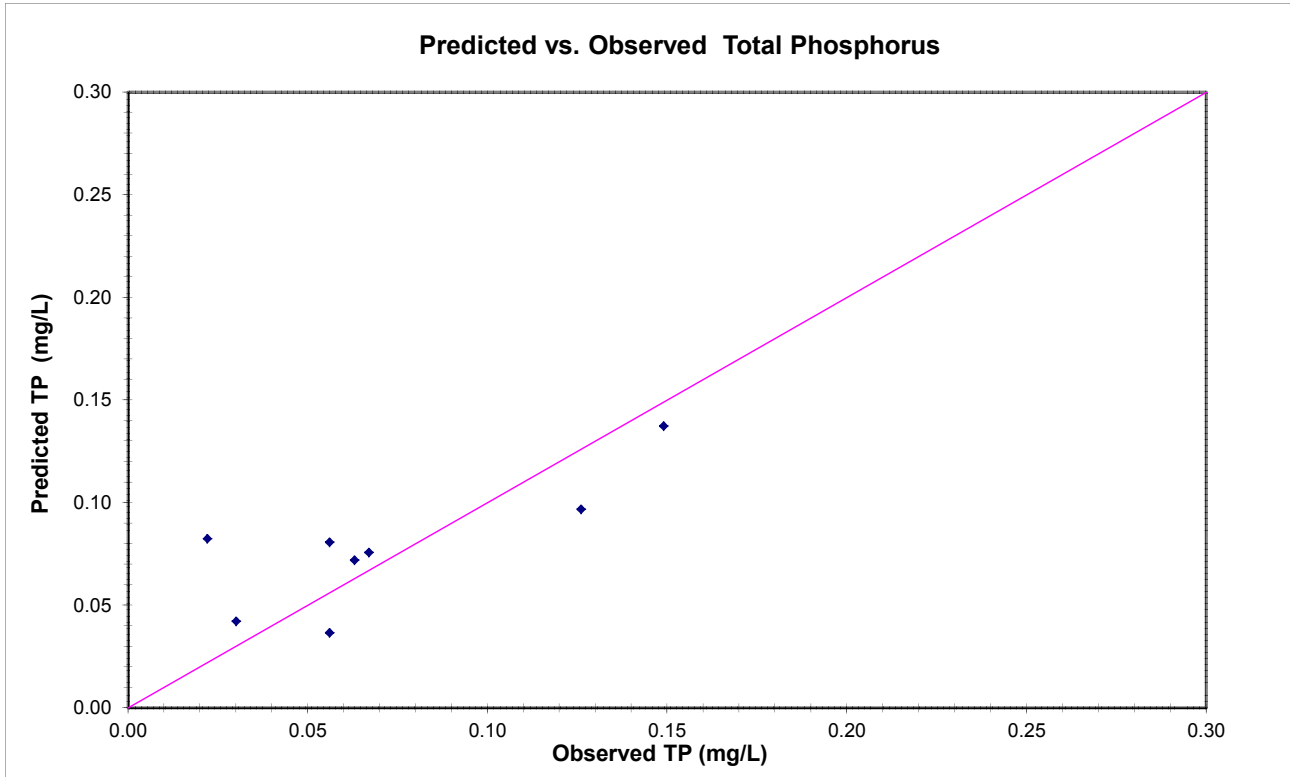
### Upper Millstone River Downstream Railroad Crossing in Plainsboro (UMR3)



### Upper Millstone River Downstream Railroad Crossing in Plainsboro (UMR3)

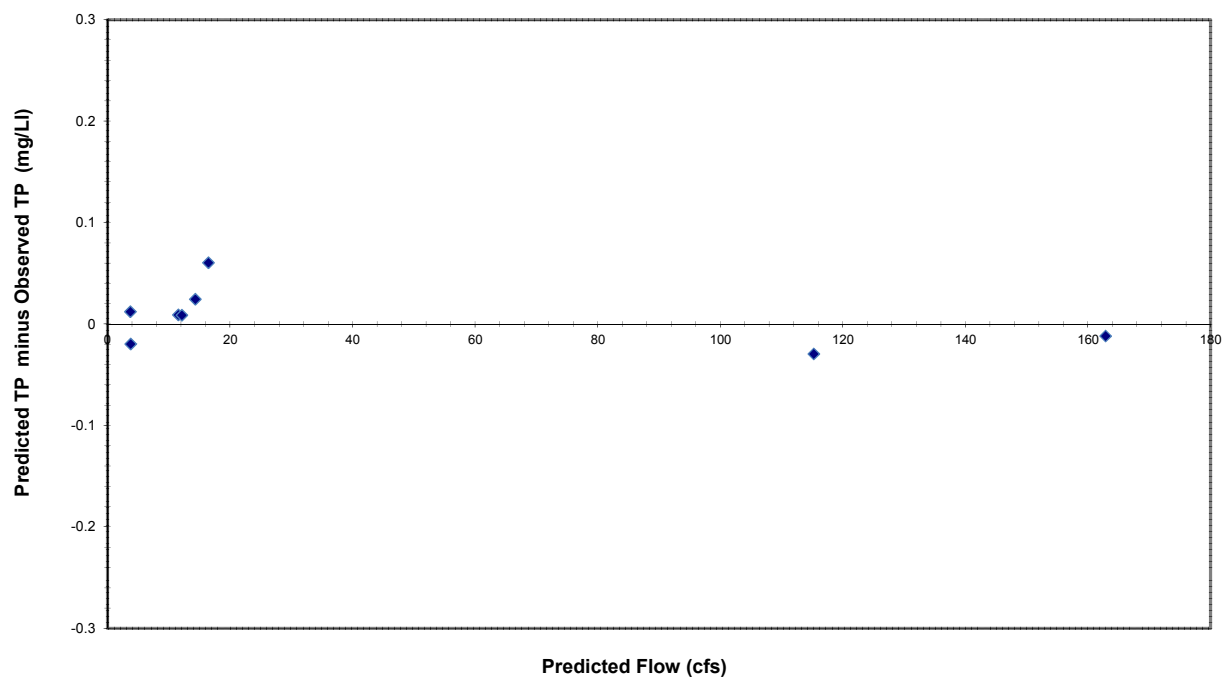


### Big Bear Brook Downstream Grovers Mill Pond (BBB3)

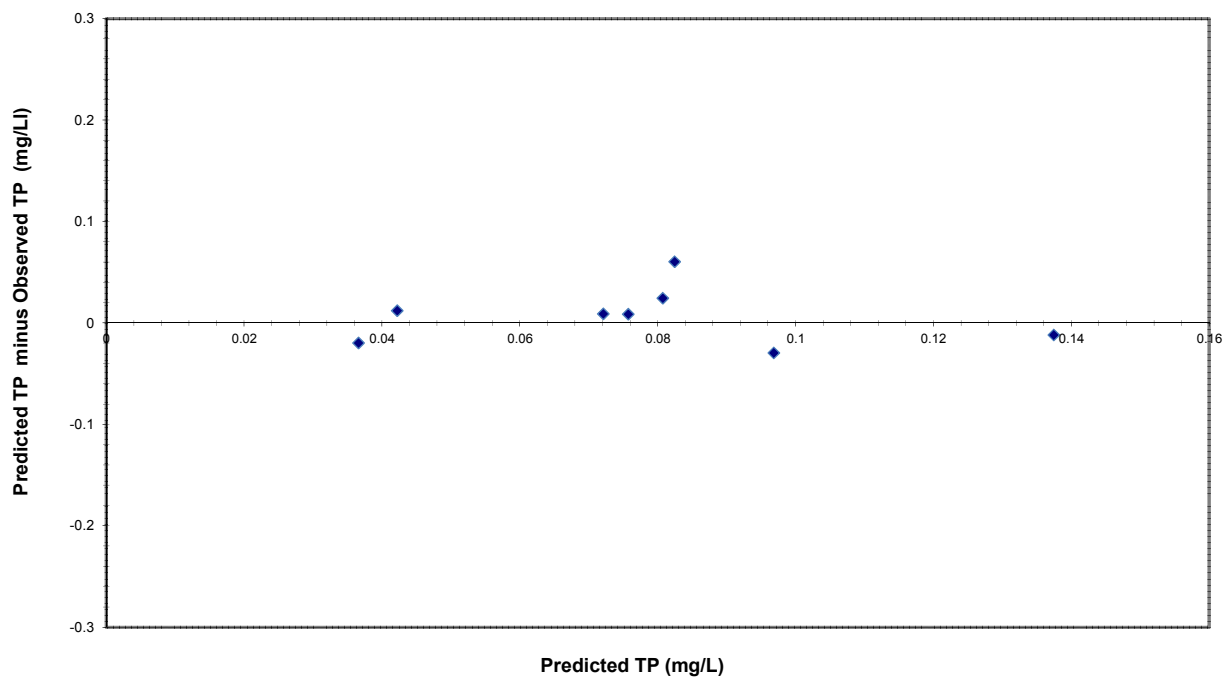


### Big Bear Brook Downstream Grovers Mill Pond (BBB3)

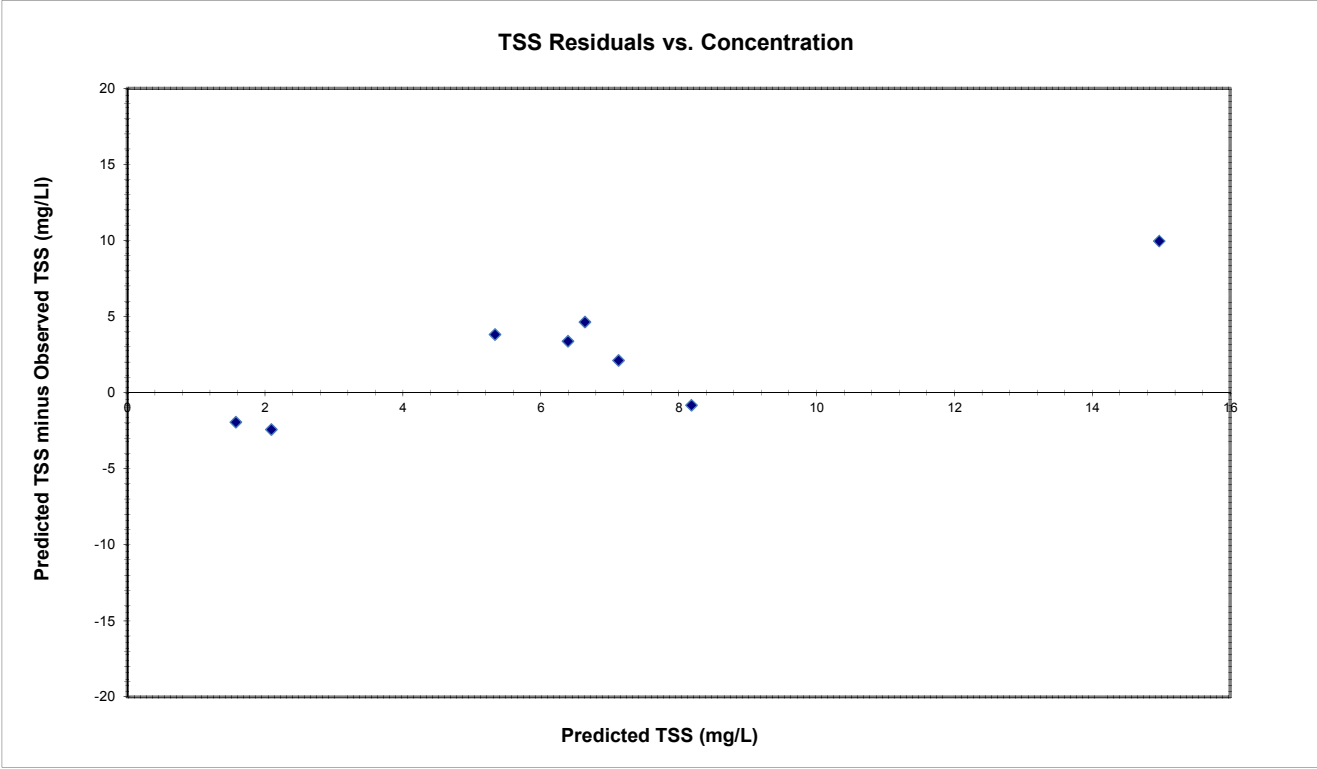
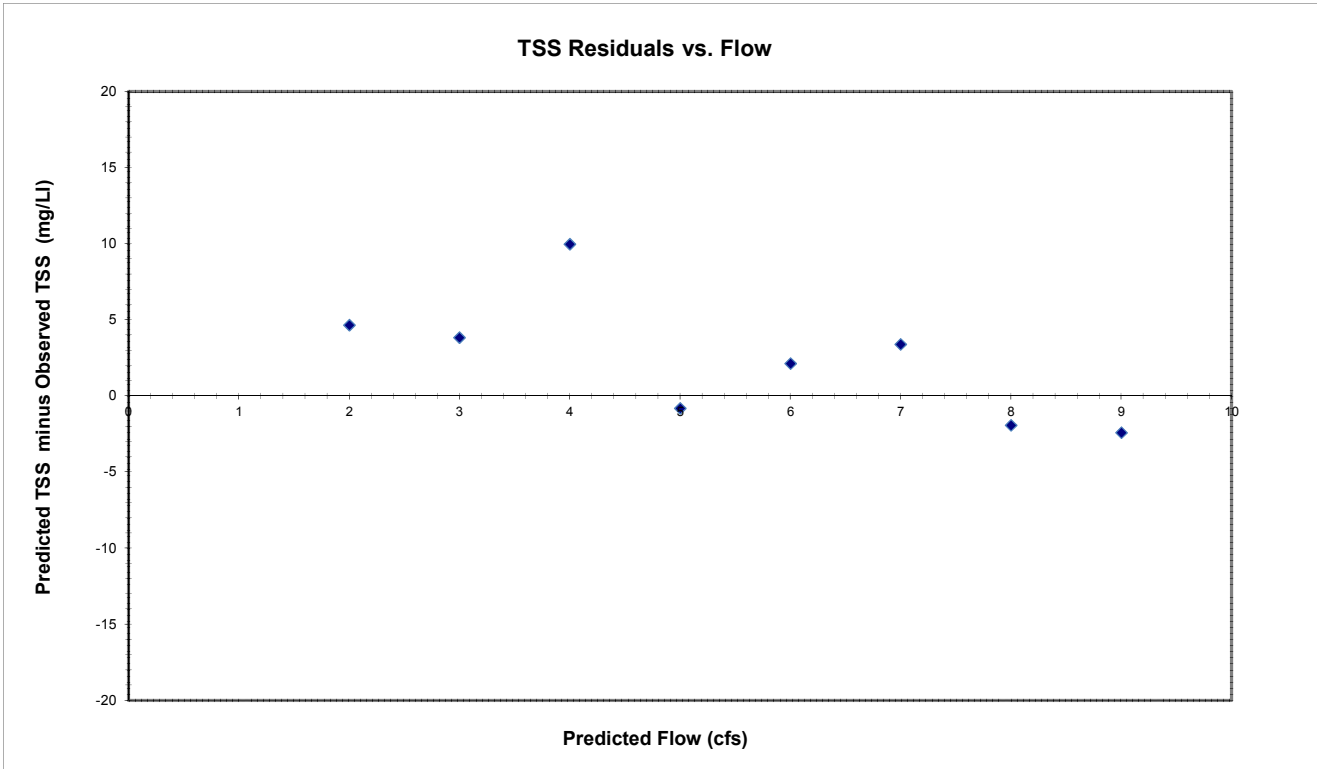
#### Total Phosphorus Residuals vs. Flow



#### Total Phosphorus Residuals vs. Concentration

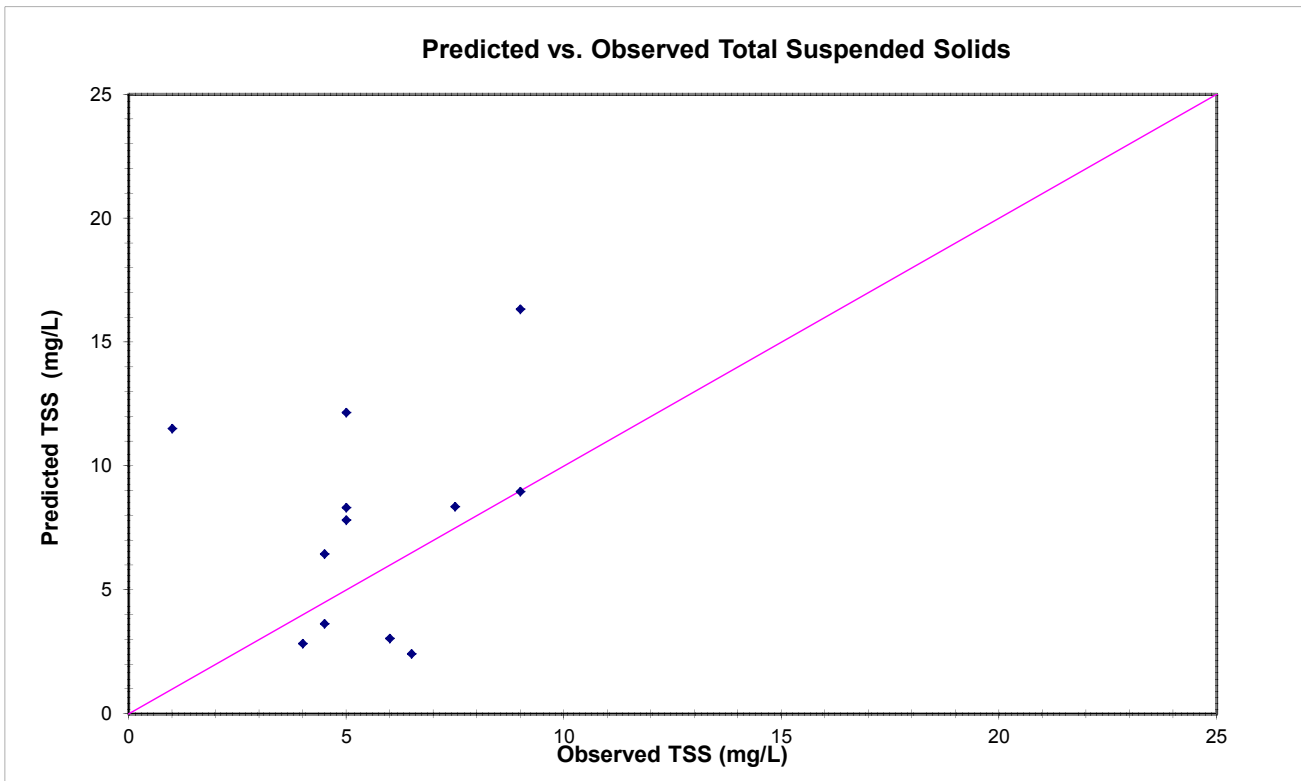
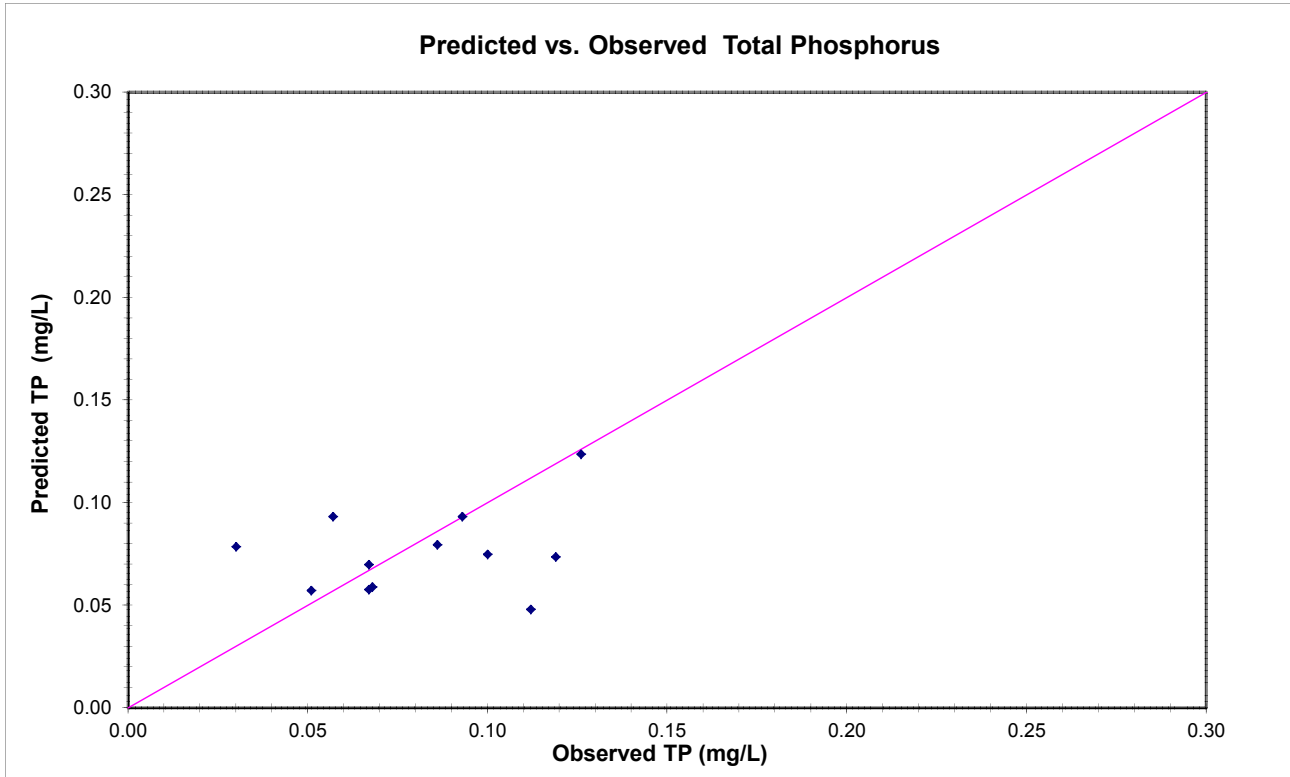


Big Bear Brook Downstream Grovers Mill Pond (BBB3)



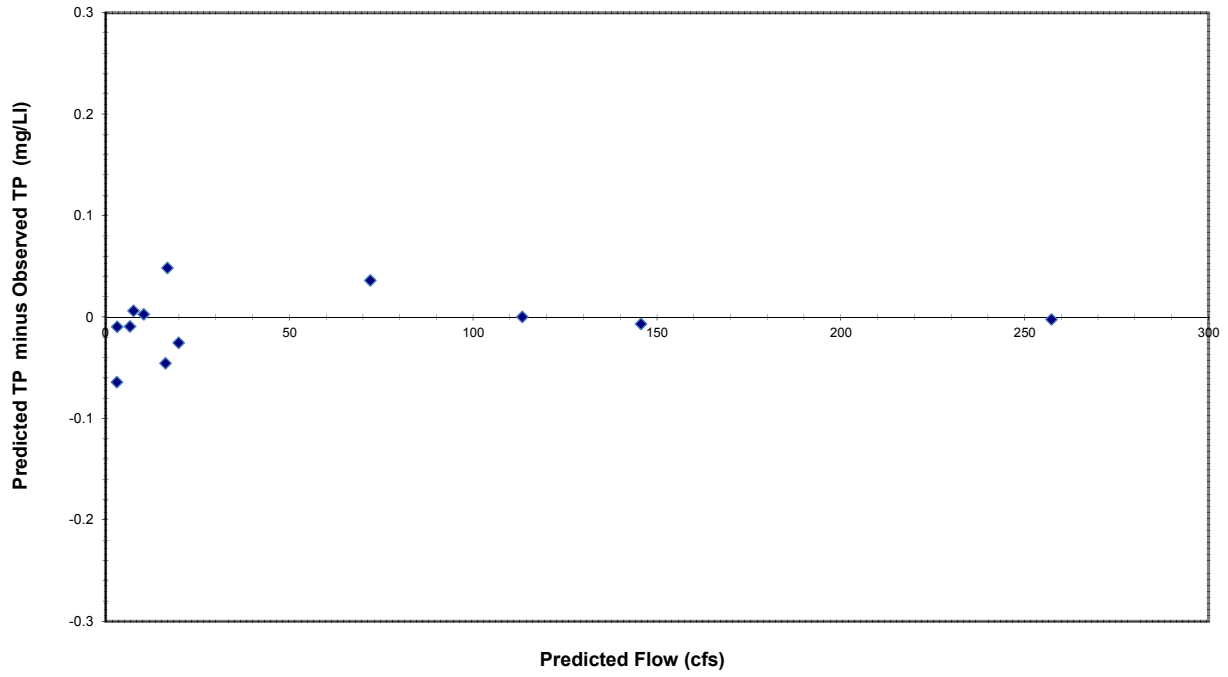


### Devils Brook Downstream Gordon Pond (DB3)

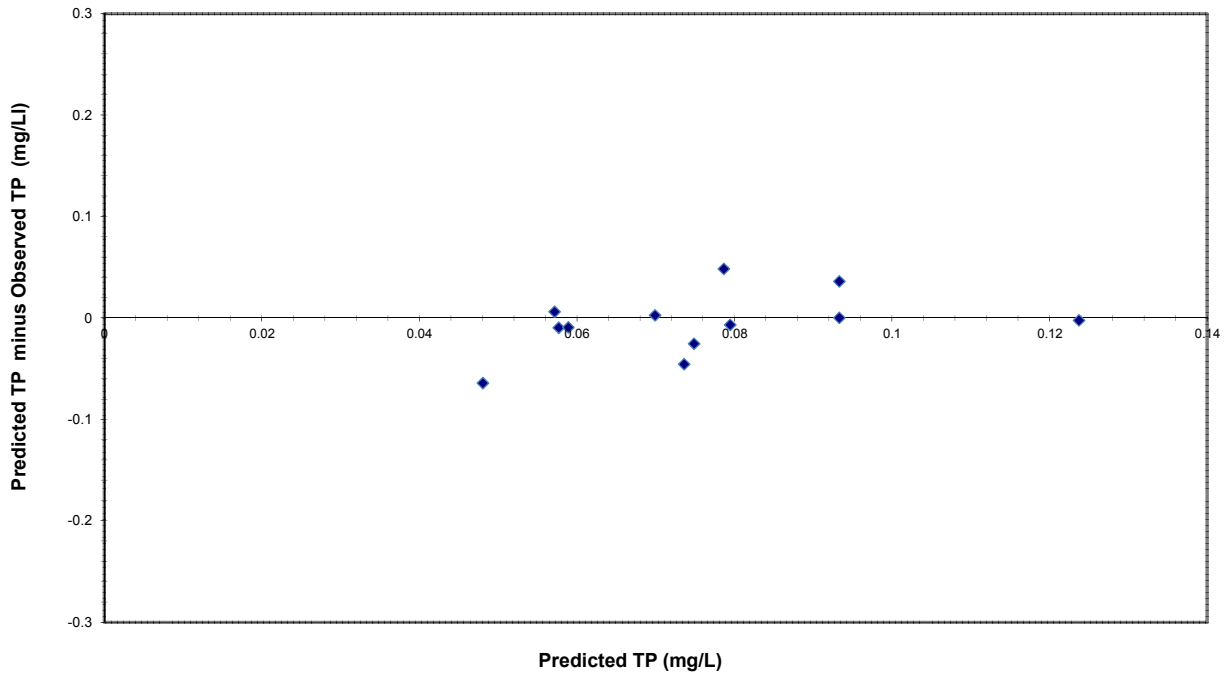


### Devils Brook Downstream Gordon Pond (DB3)

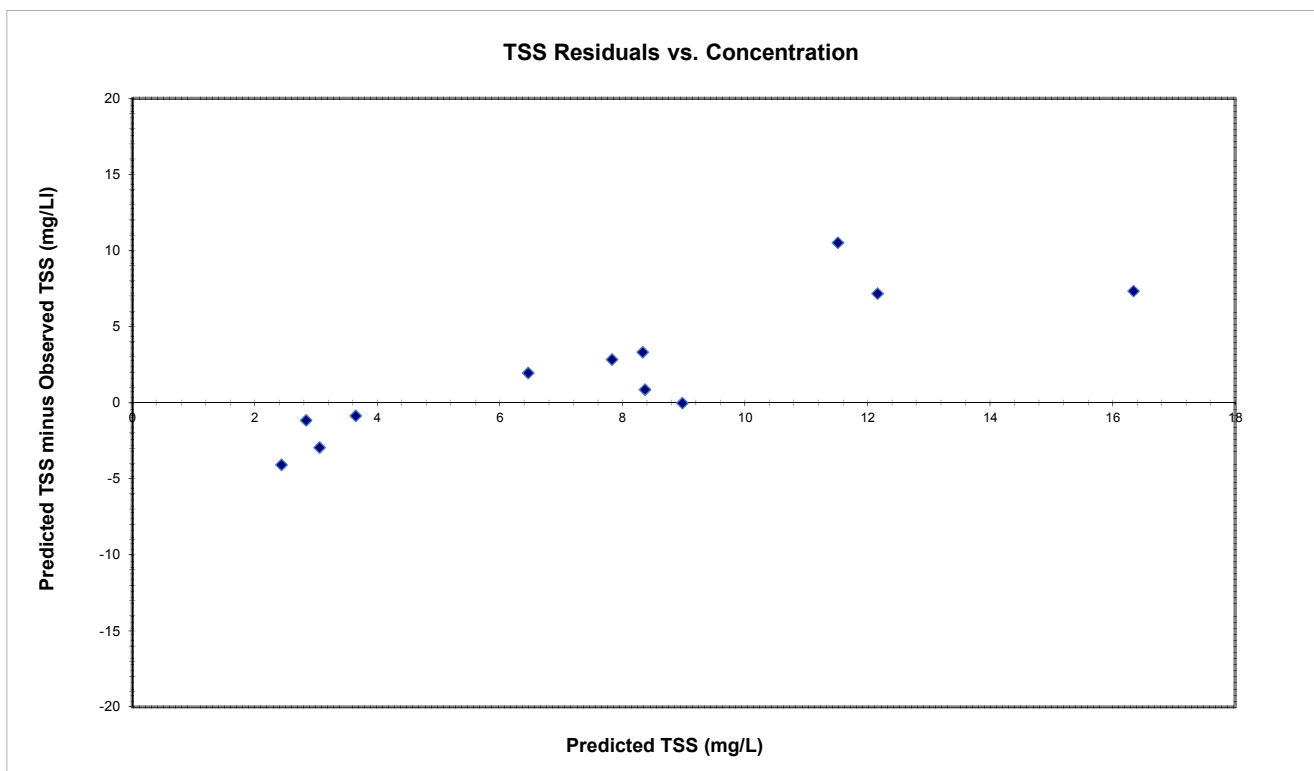
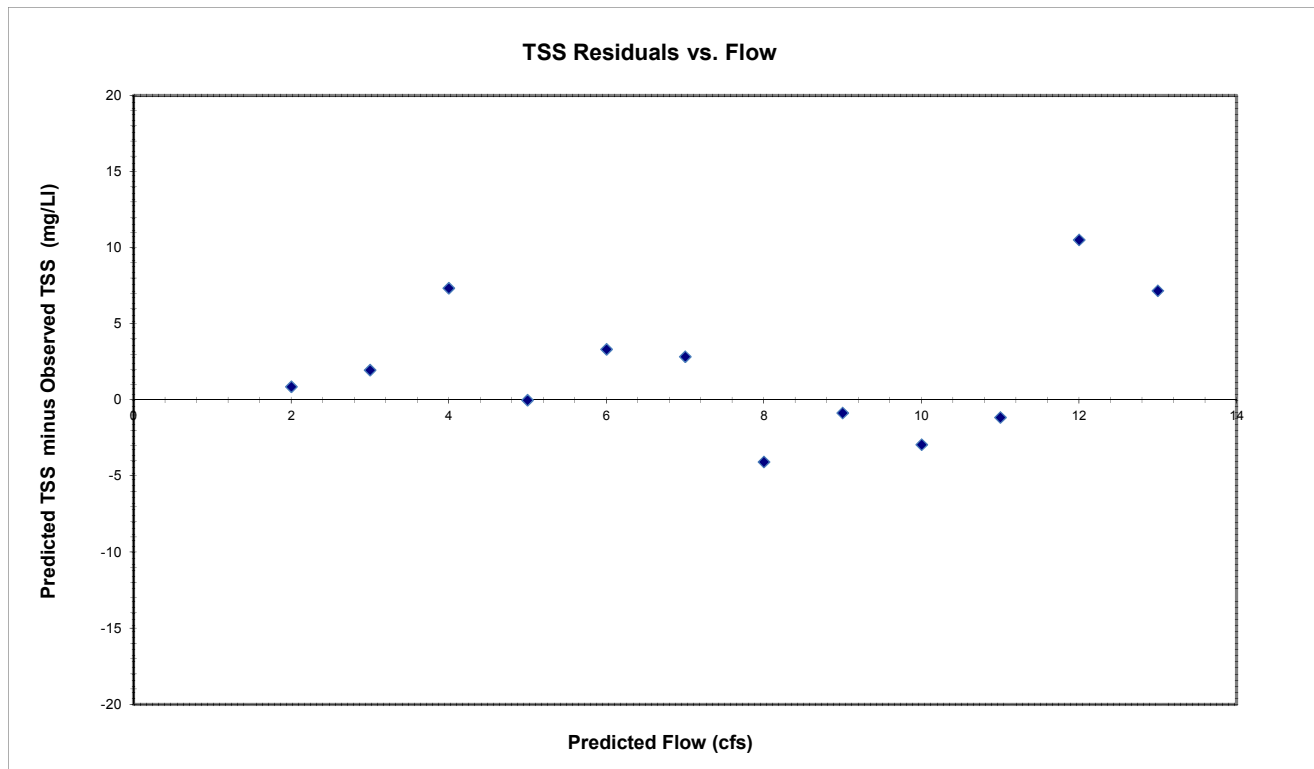
#### Total Phosphorus Residuals vs. Flow



#### Total Phosphorus Residuals vs. Concentration

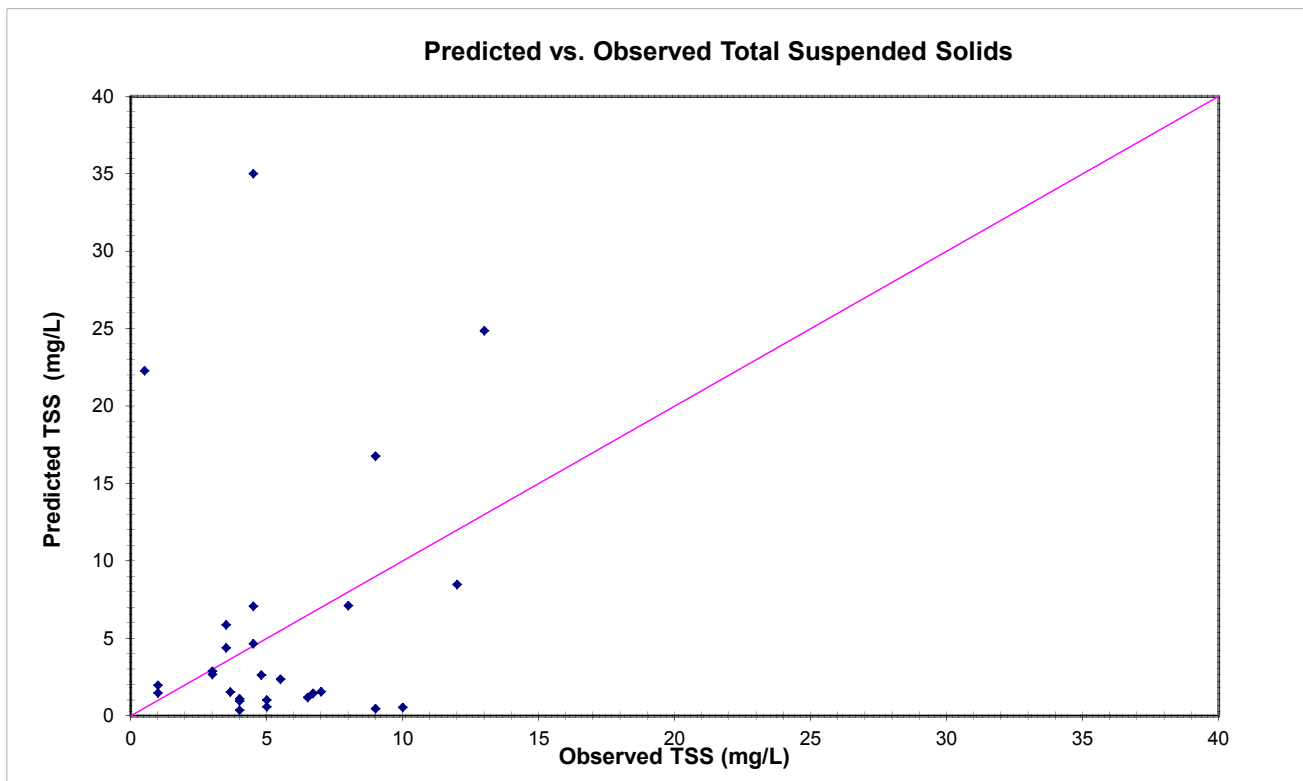
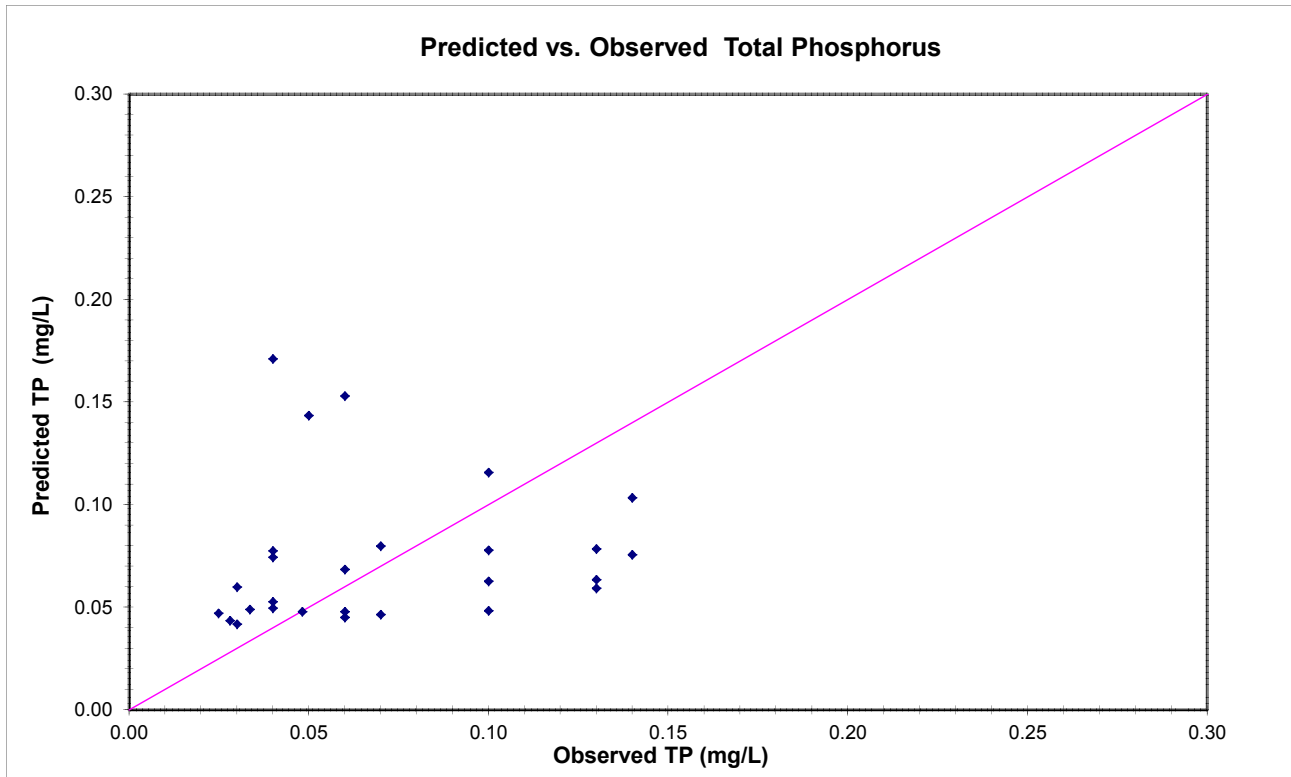


### Devils Brook Downstream Gordon Pond (DB3)



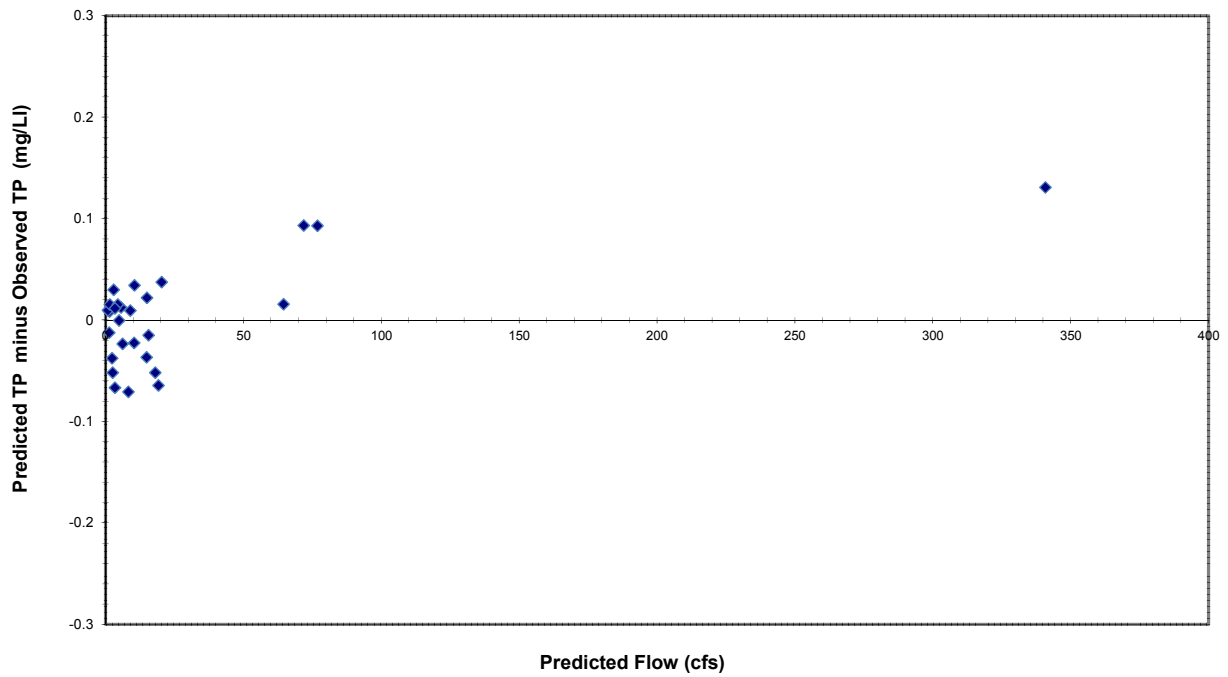
Stony Brook Watershed Area Model  
Goodness of Fit Graphs for TP and TSS  
    Predicted vs Observed  
    Residuals vs Flow  
    Residuals vs Concentration

### Stony Brook Upstream SBRSA - Pennington STP (SB1)

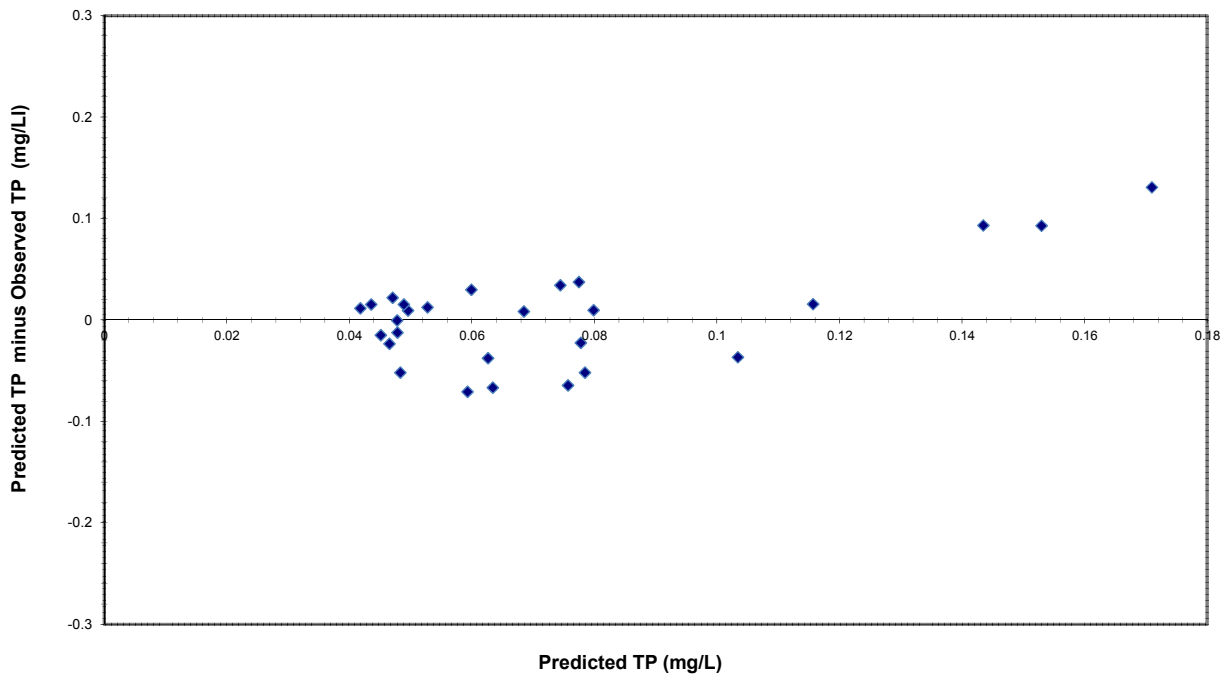


### Stony Brook Upstream SBRSA - Pennington STP (SB1)

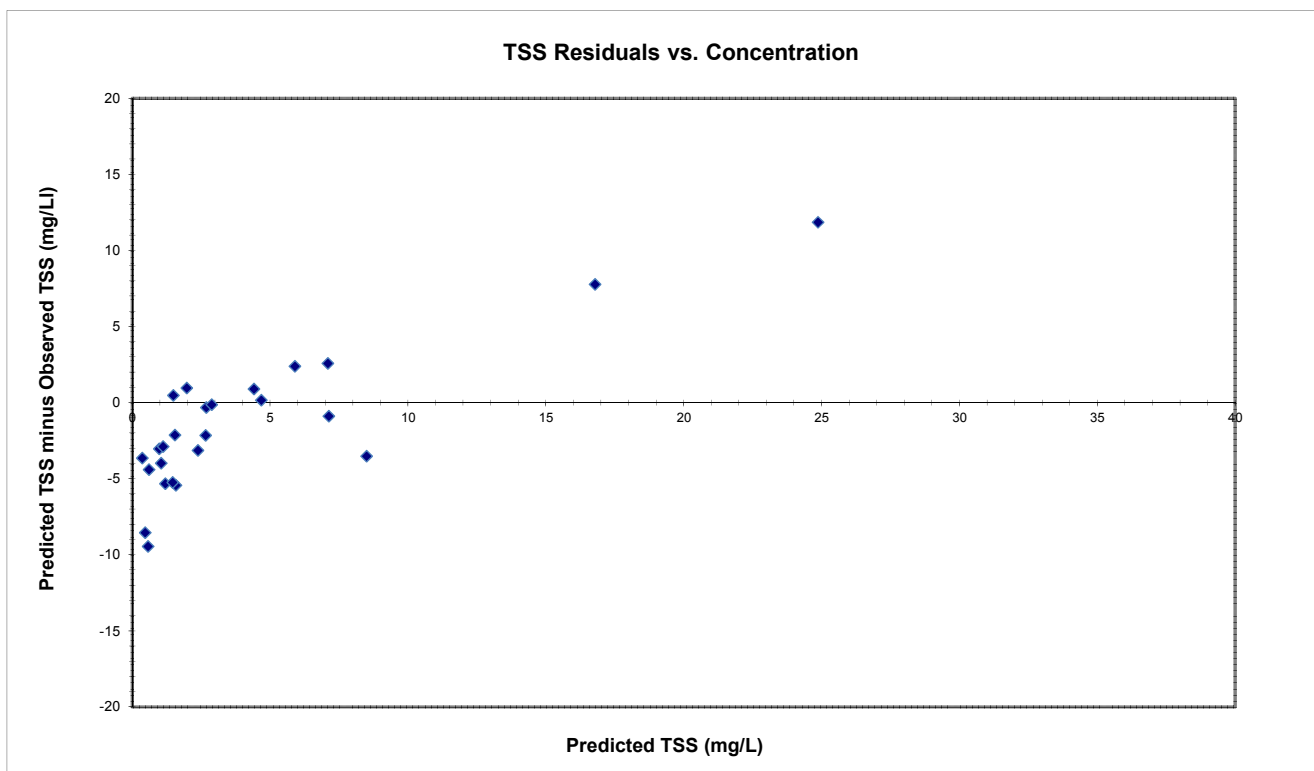
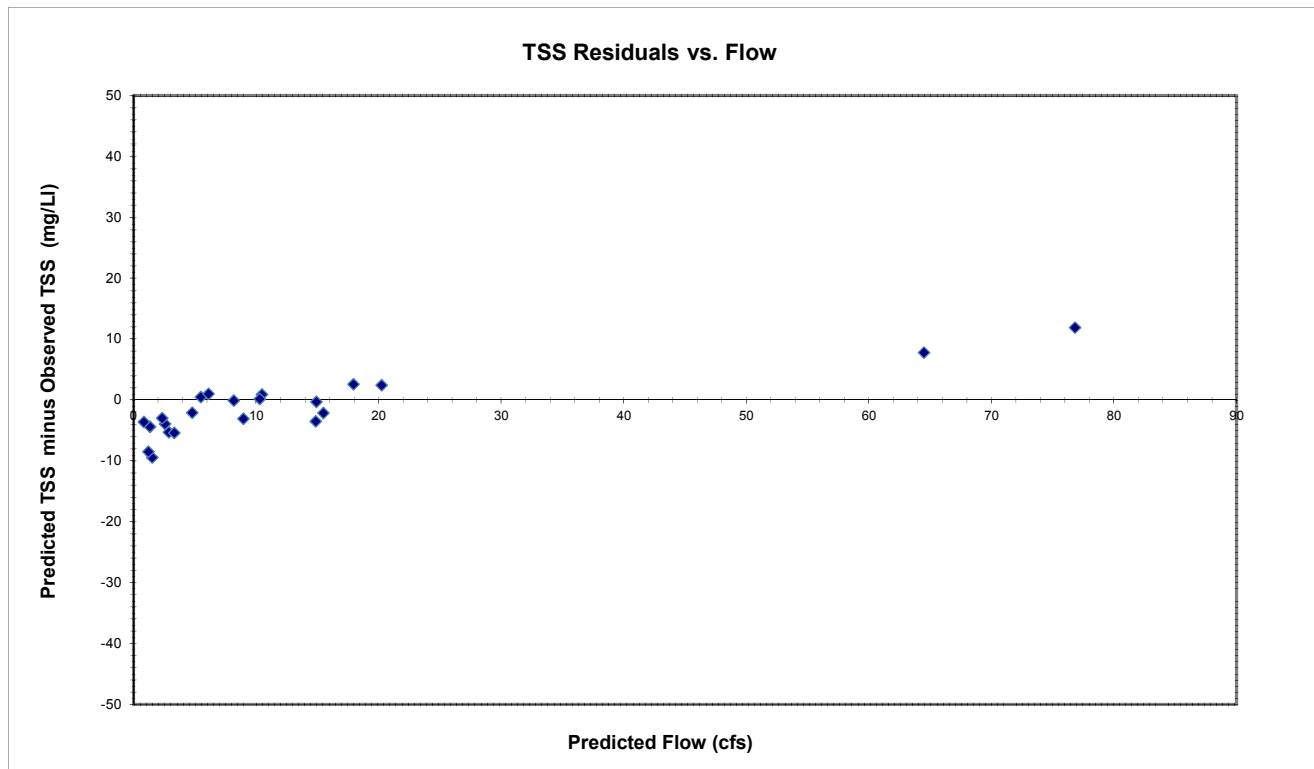
#### Total Phosphorus Residuals vs. Flow



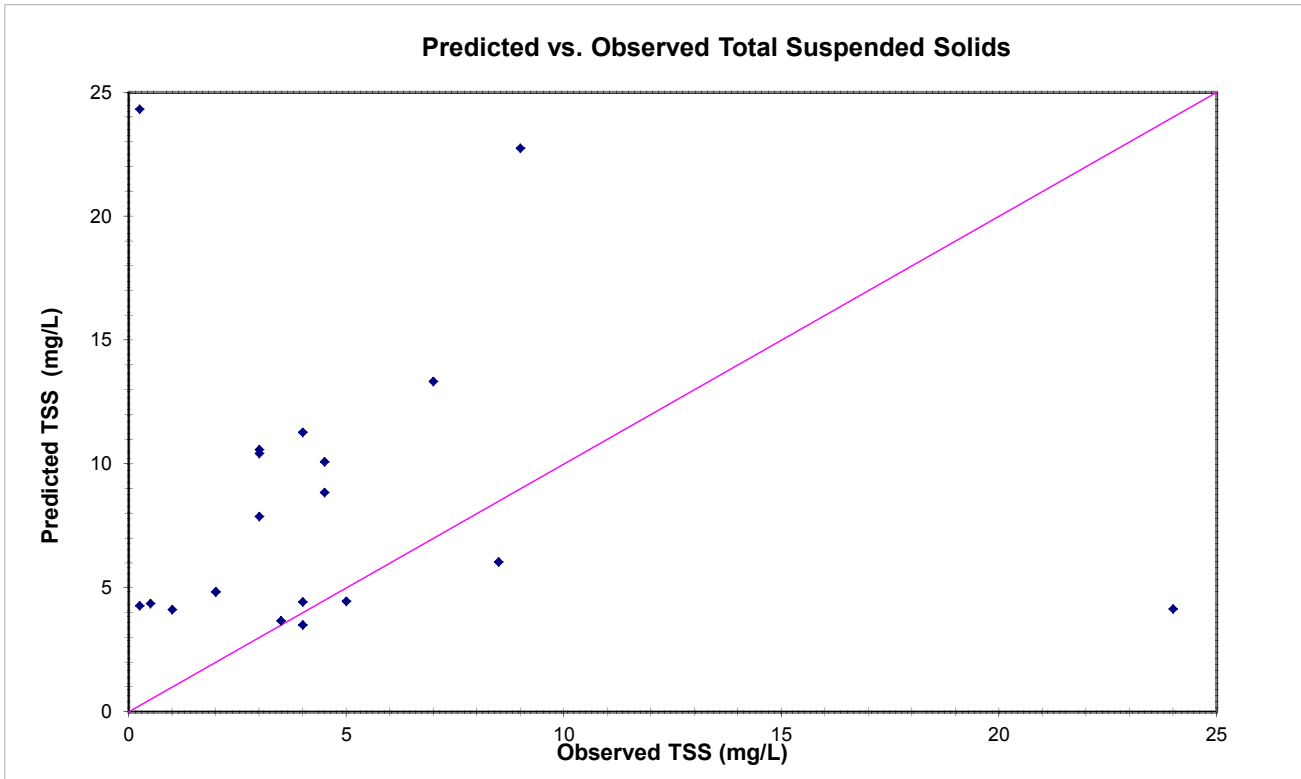
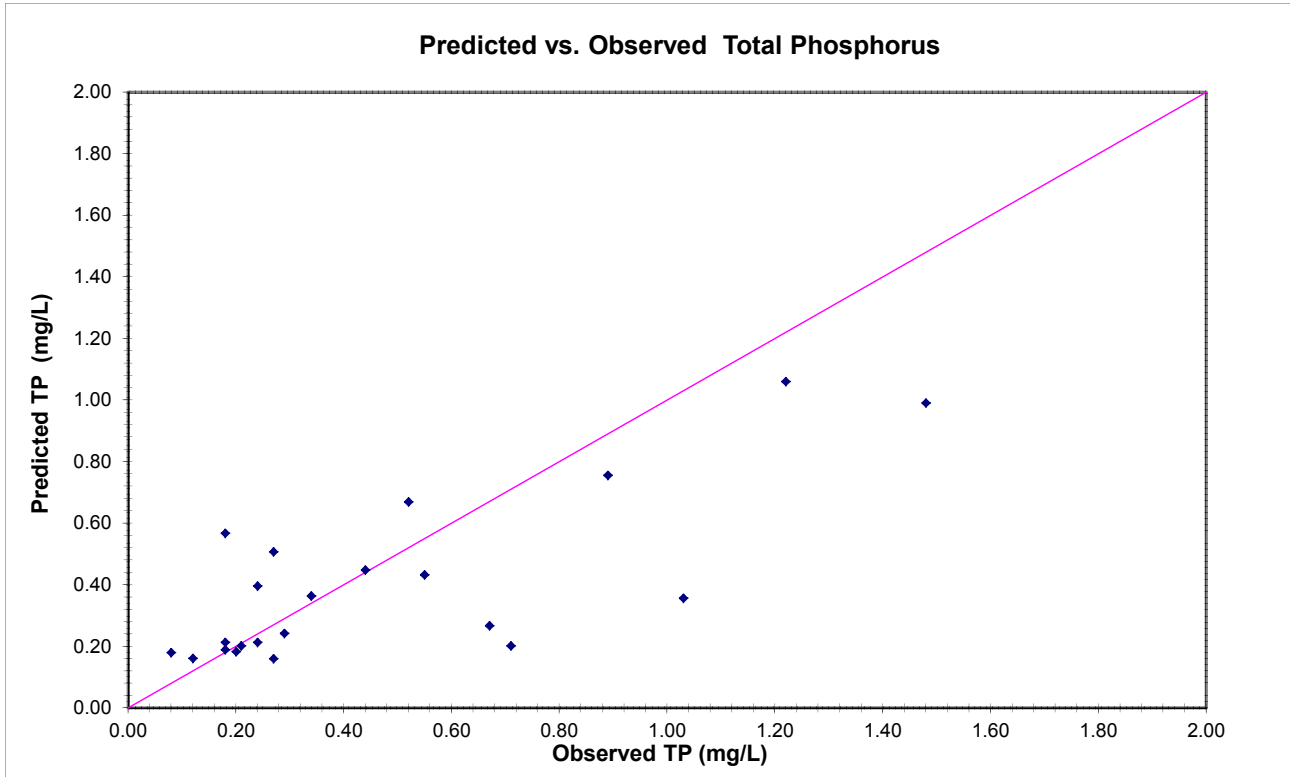
#### Total Phosphorus Residuals vs. Concentration



### Stony Brook Upstream SBRSA - Pennington STP (SB1)



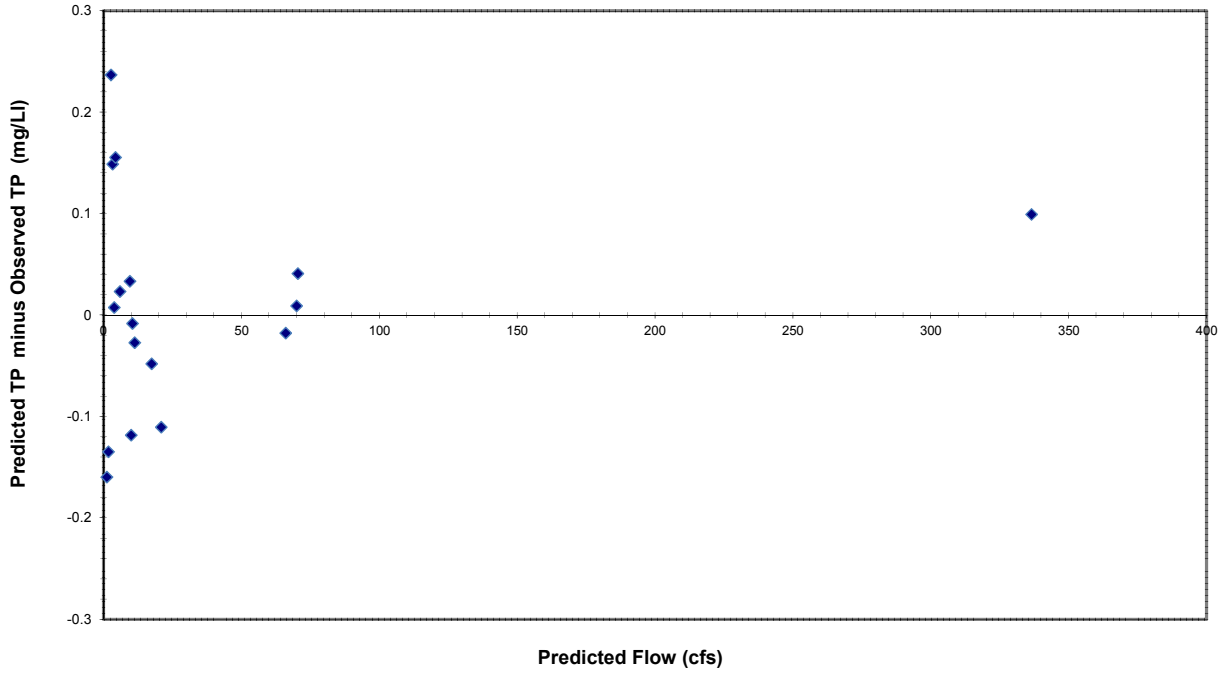
# Stony Brook Downstream SBRSA - Pennington STP (SB2)



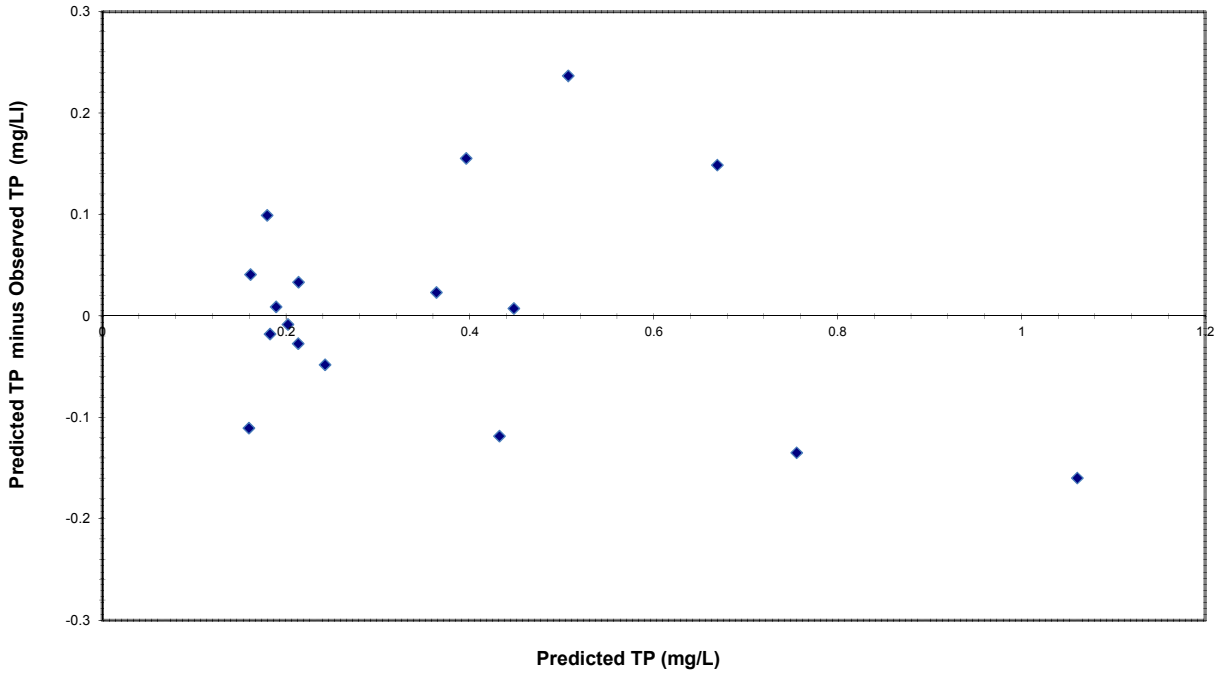


**Stony Brook Downstream SBRSA - Pennington STP (SB2)**

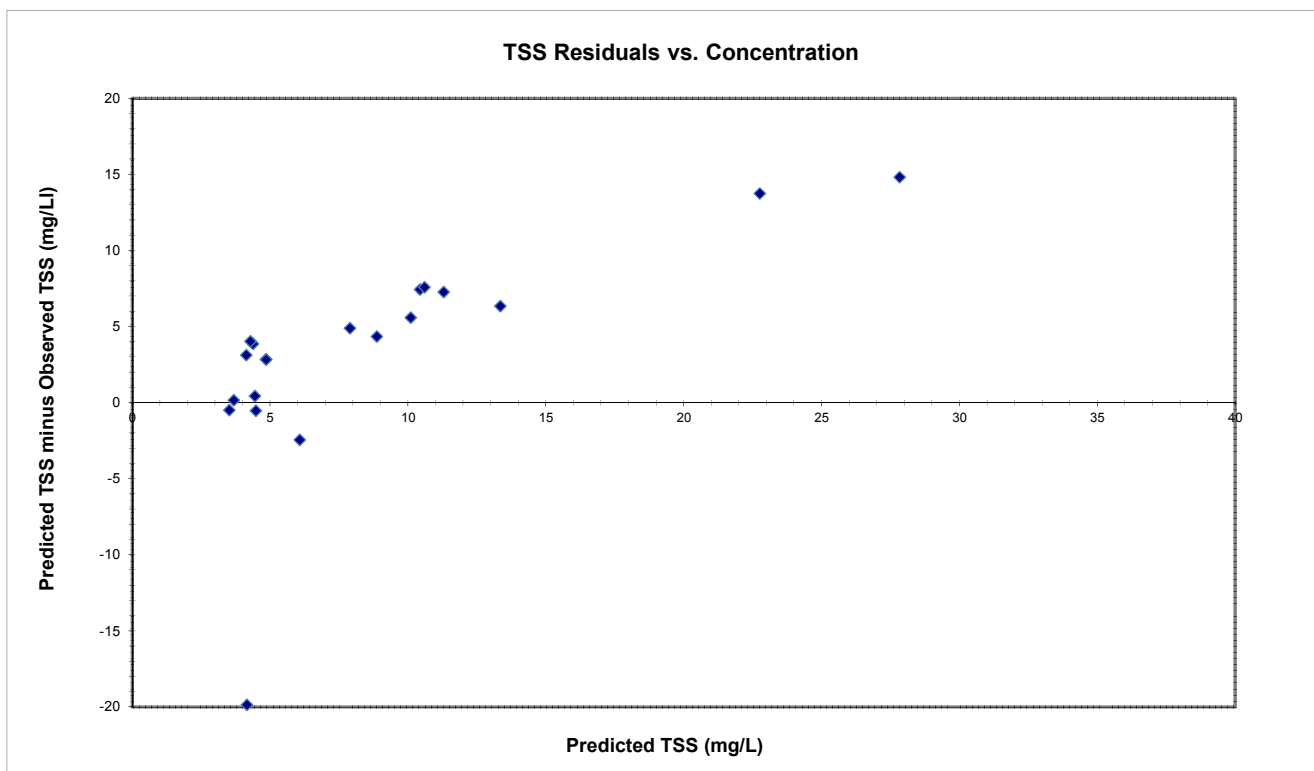
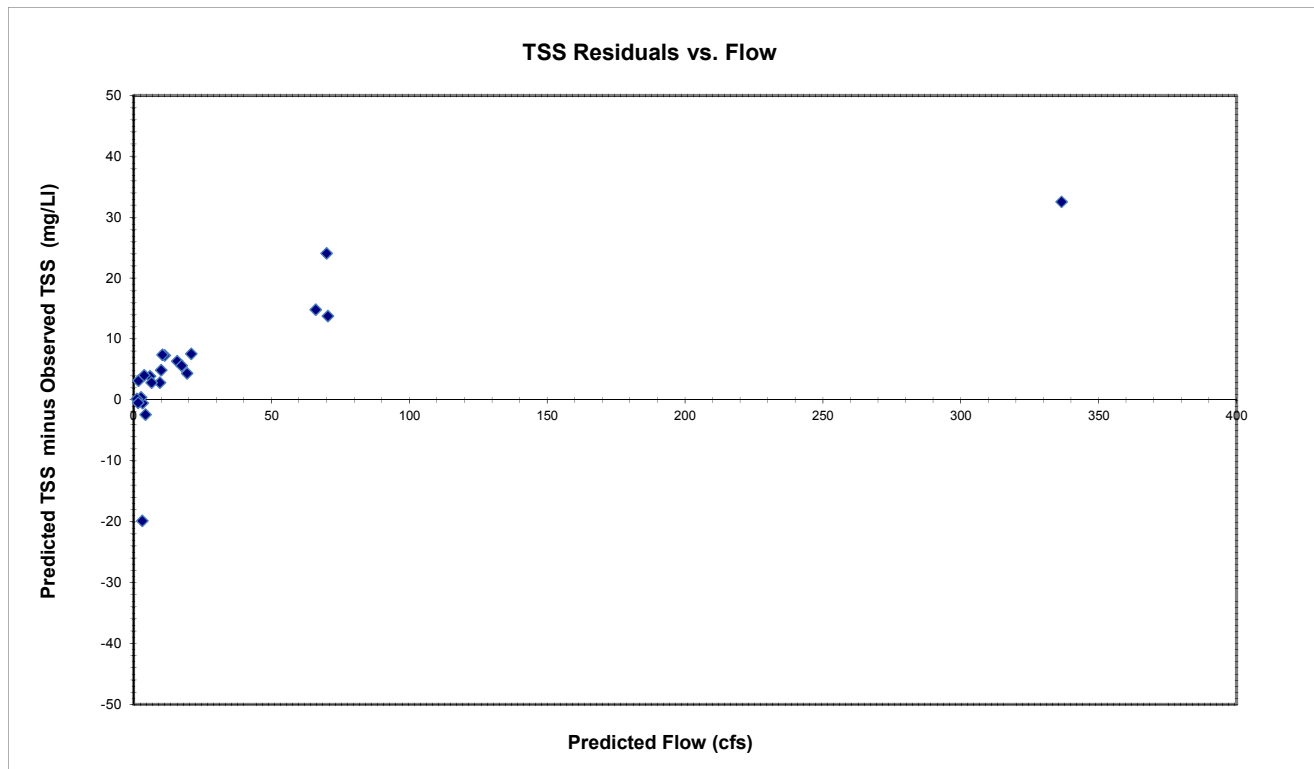
**Total Phosphorus Residuals vs. Flow**



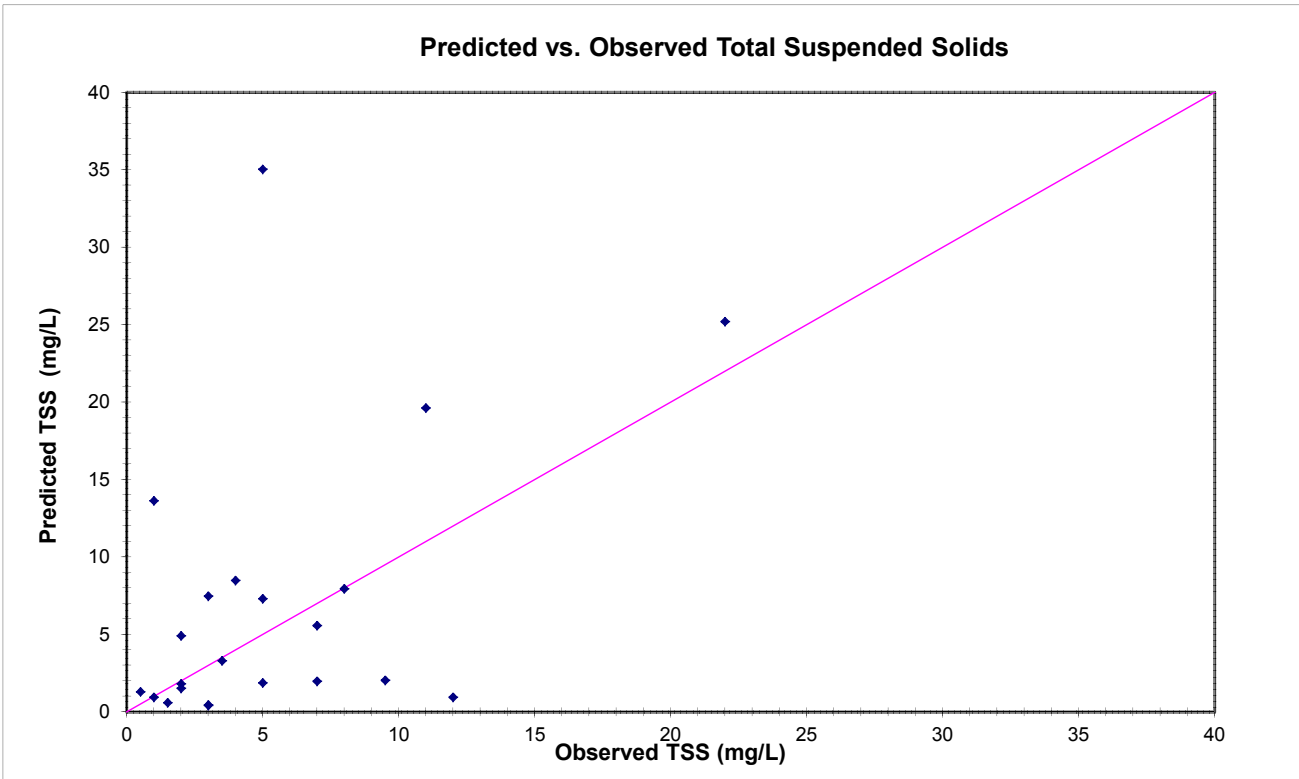
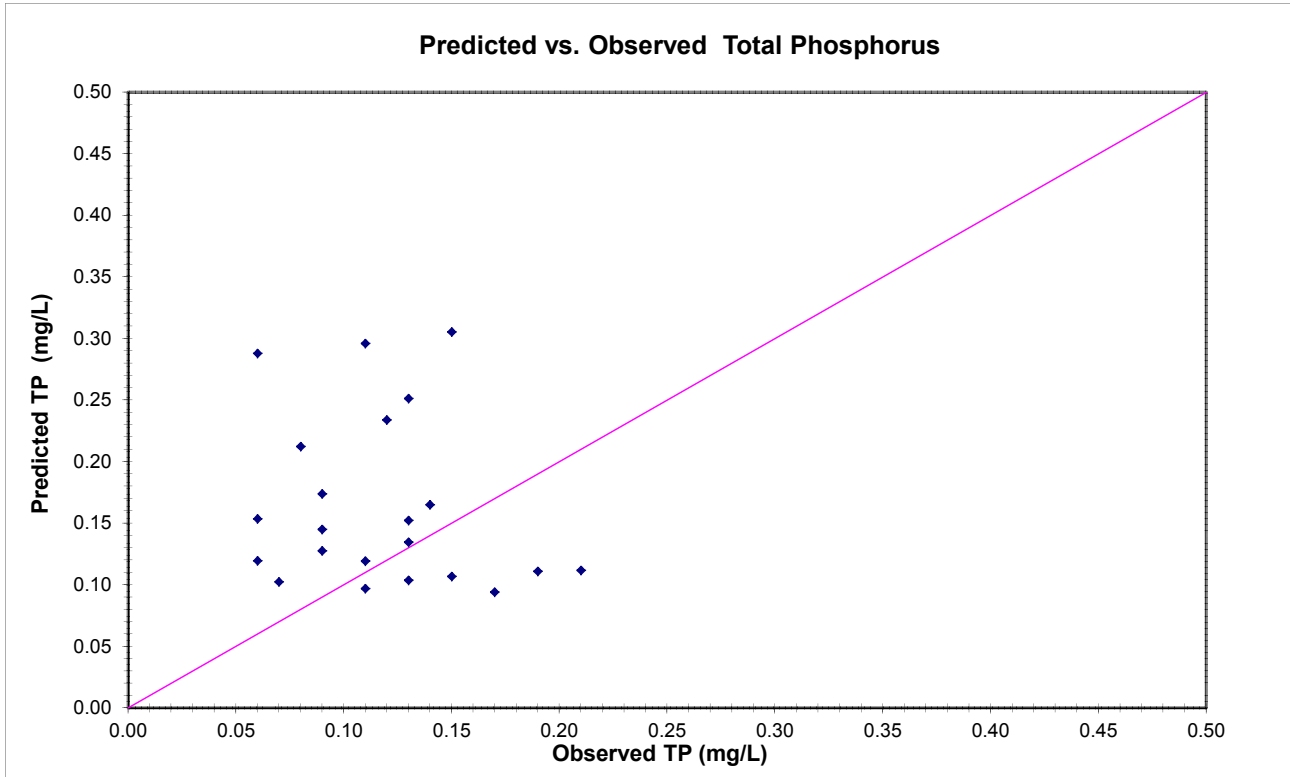
**Total Phosphorus Residuals vs. Concentration**



### Stony Brook Downstream SBRSA - Pennington STP (SB2)

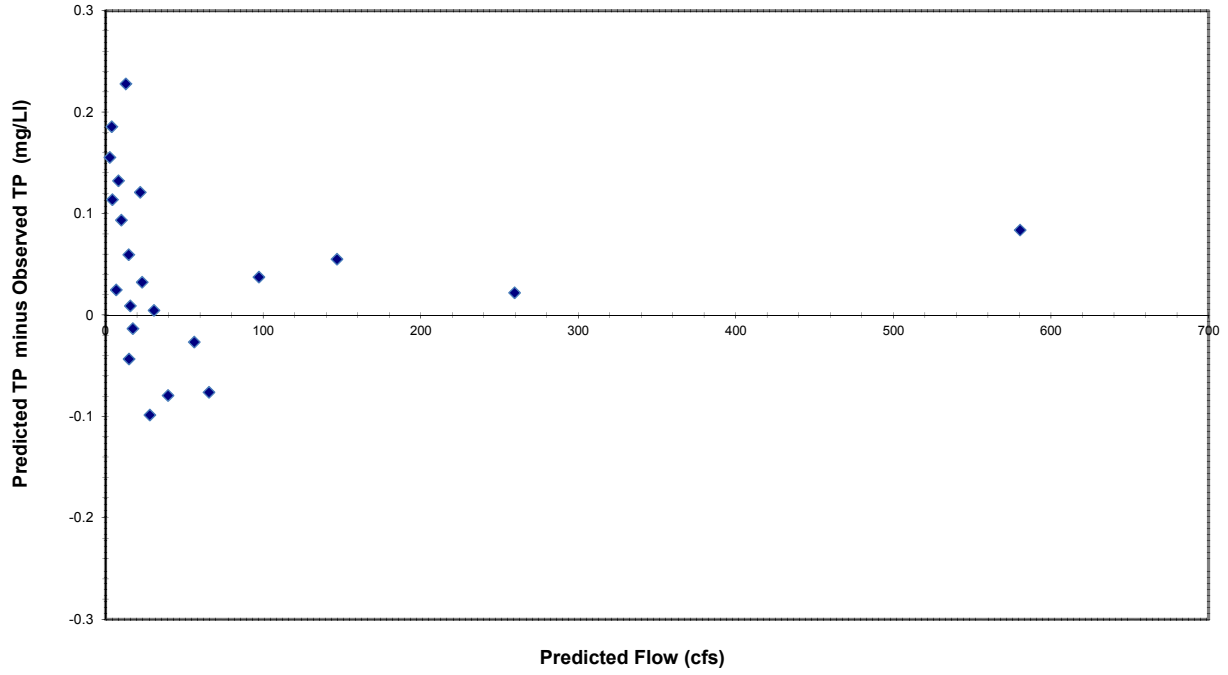


### Stony Brook at Princeton Rd. (SB3)

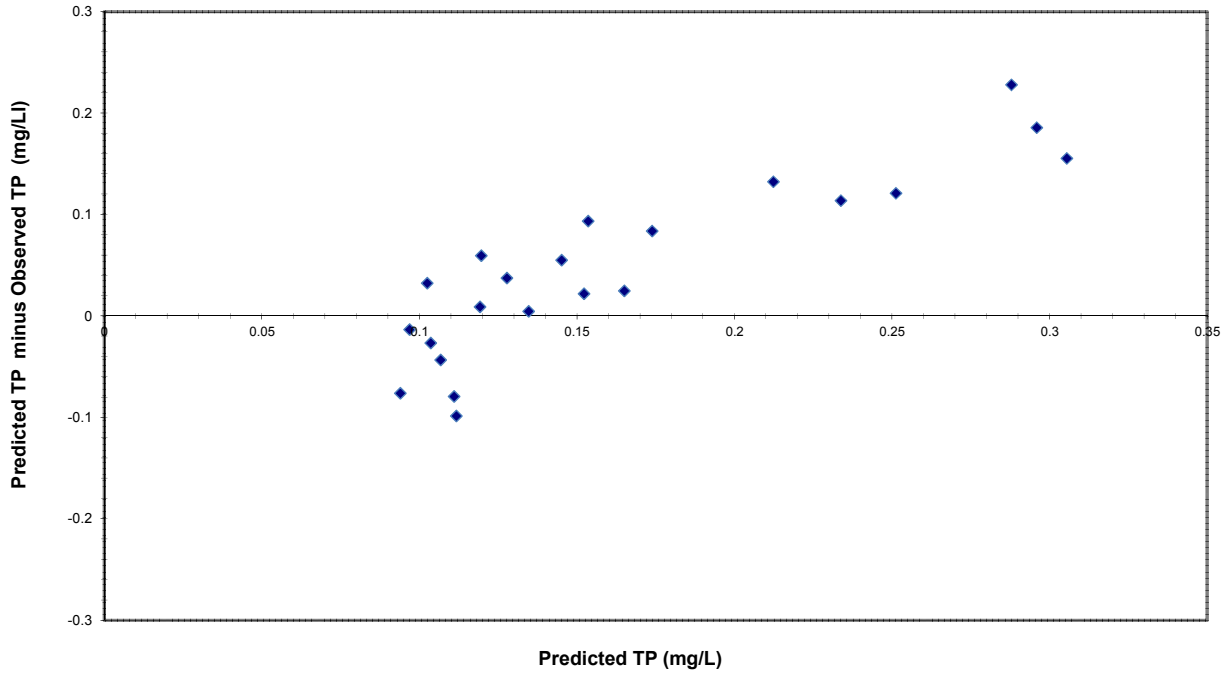


**Stony Brook at Princeton Rd. (SB3)**

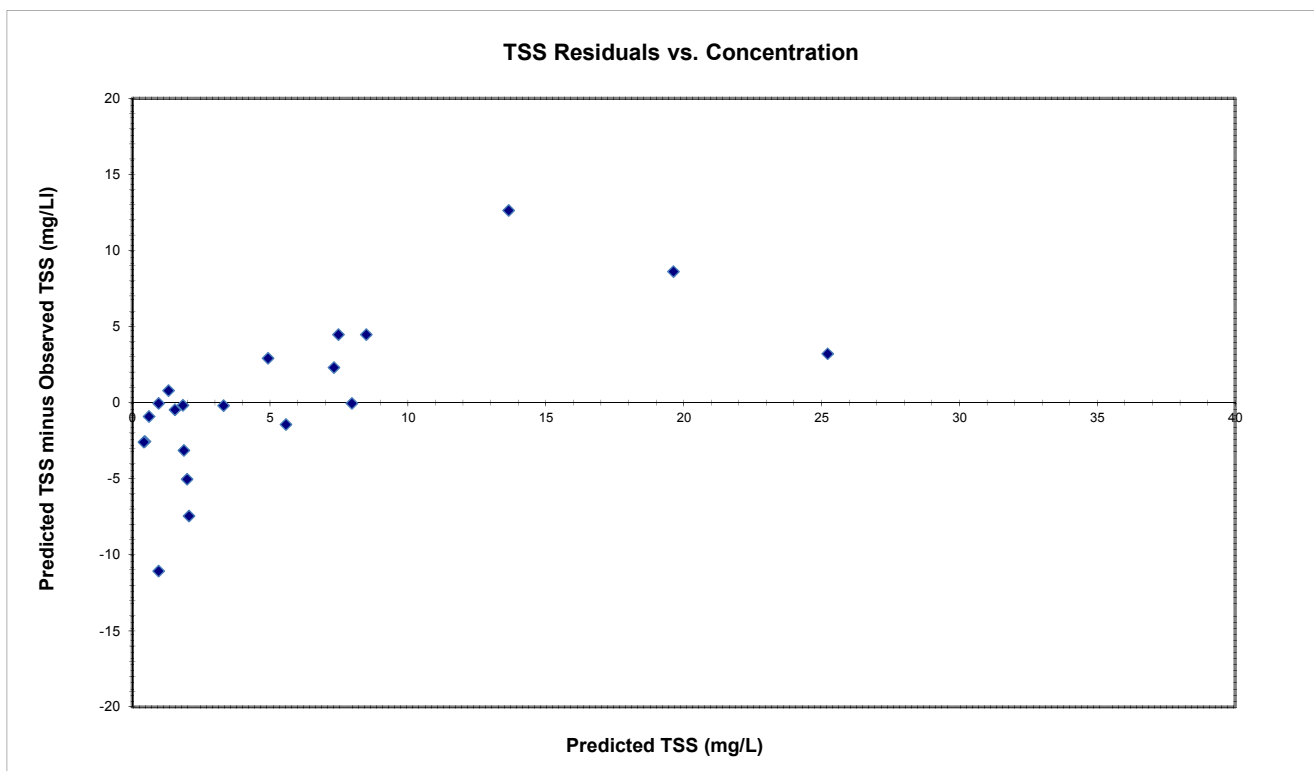
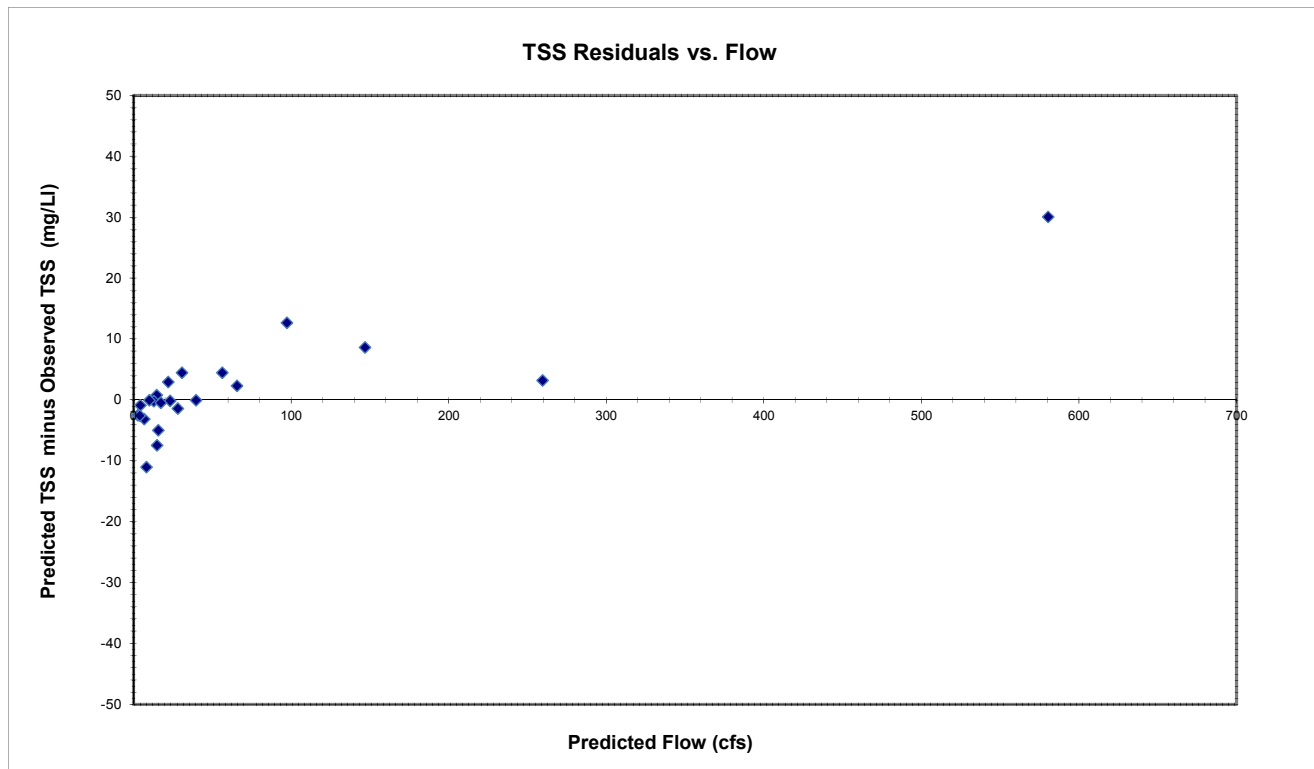
**Total Phosphorus Residuals vs. Flow**



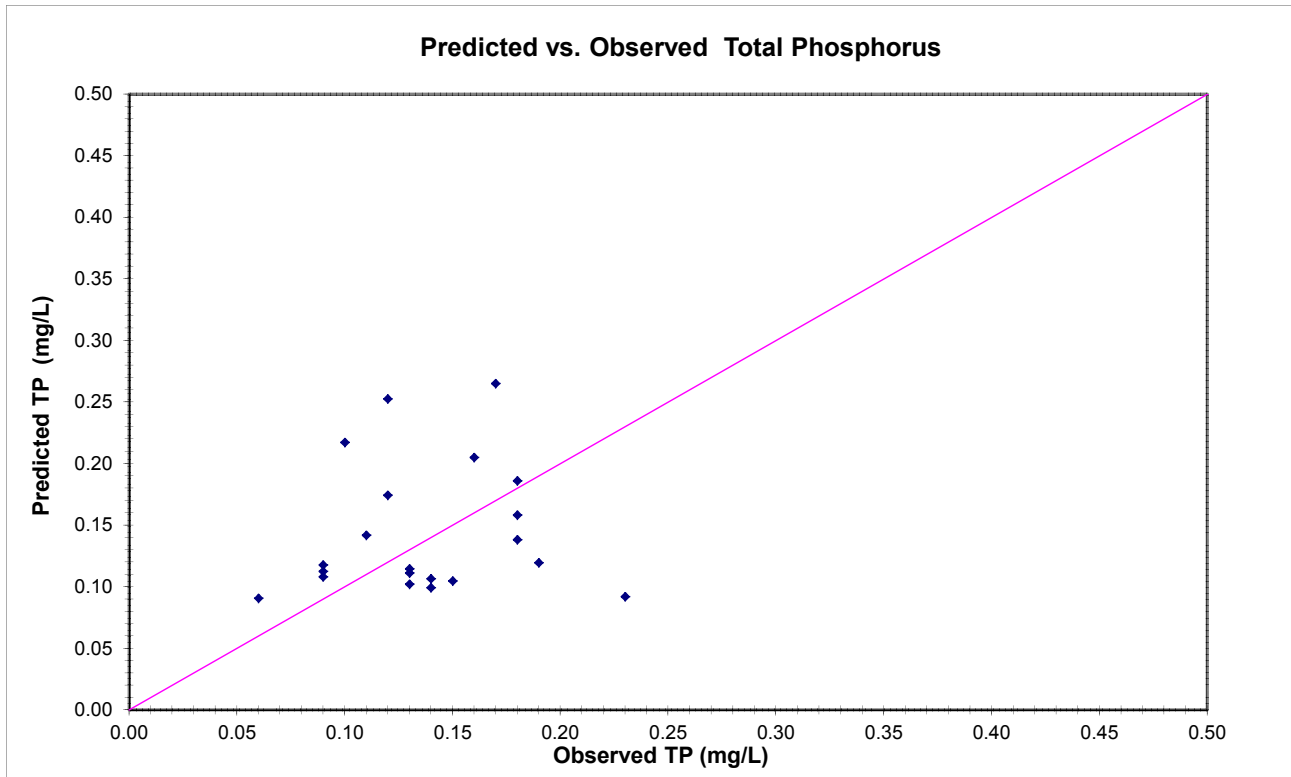
**Total Phosphorus Residuals vs. Concentration**



### Stony Brook at Princeton Rd. (SB3)

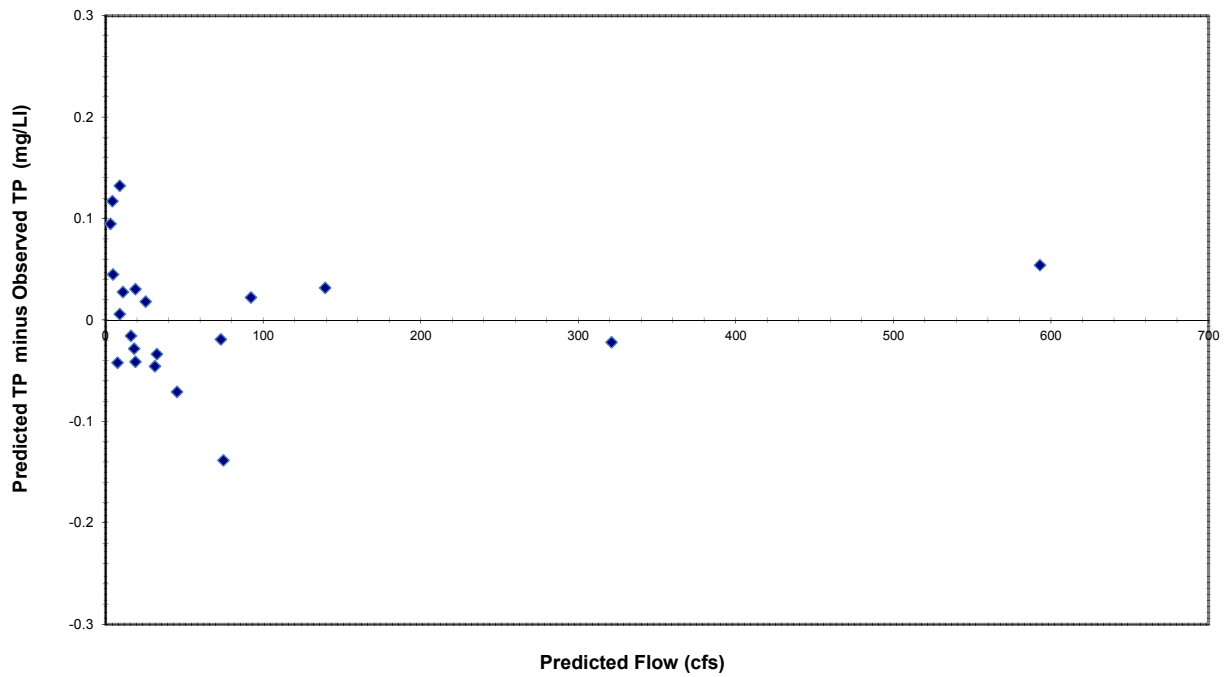


### Stony Brook at Alexander Road (SB4)

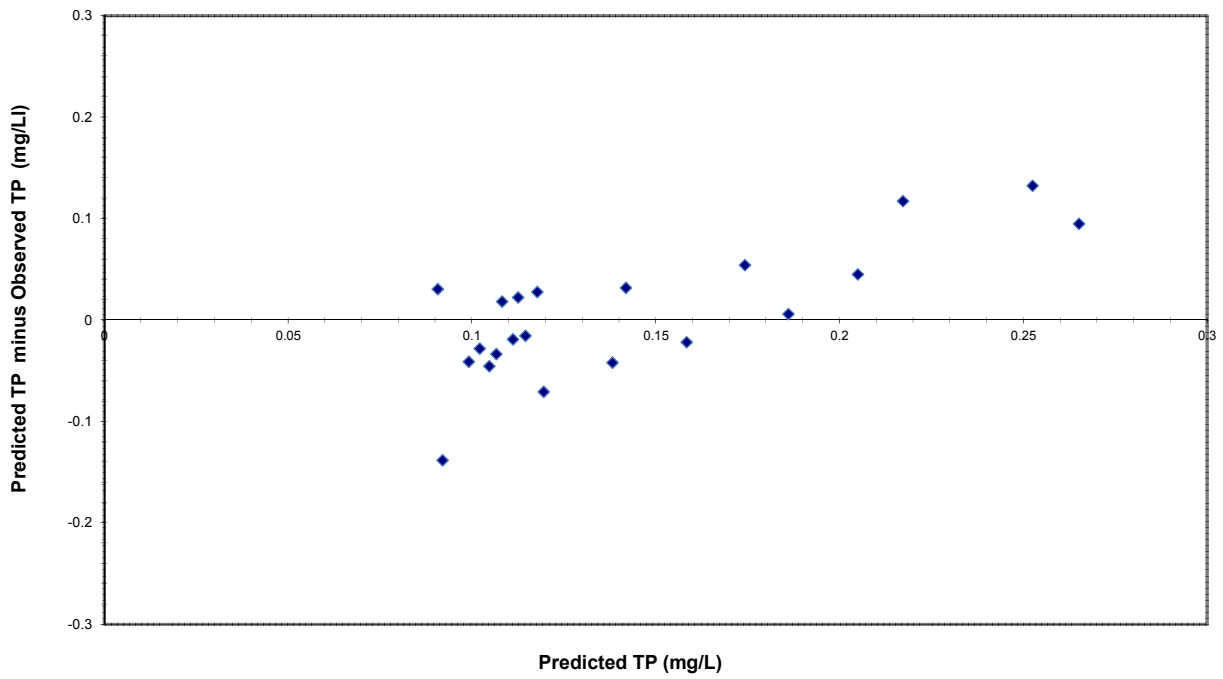


### Stony Brook at Alexander Road (SB4)

#### Total Phosphorus Residuals vs. Flow



#### Total Phosphorus Residuals vs. Concentration

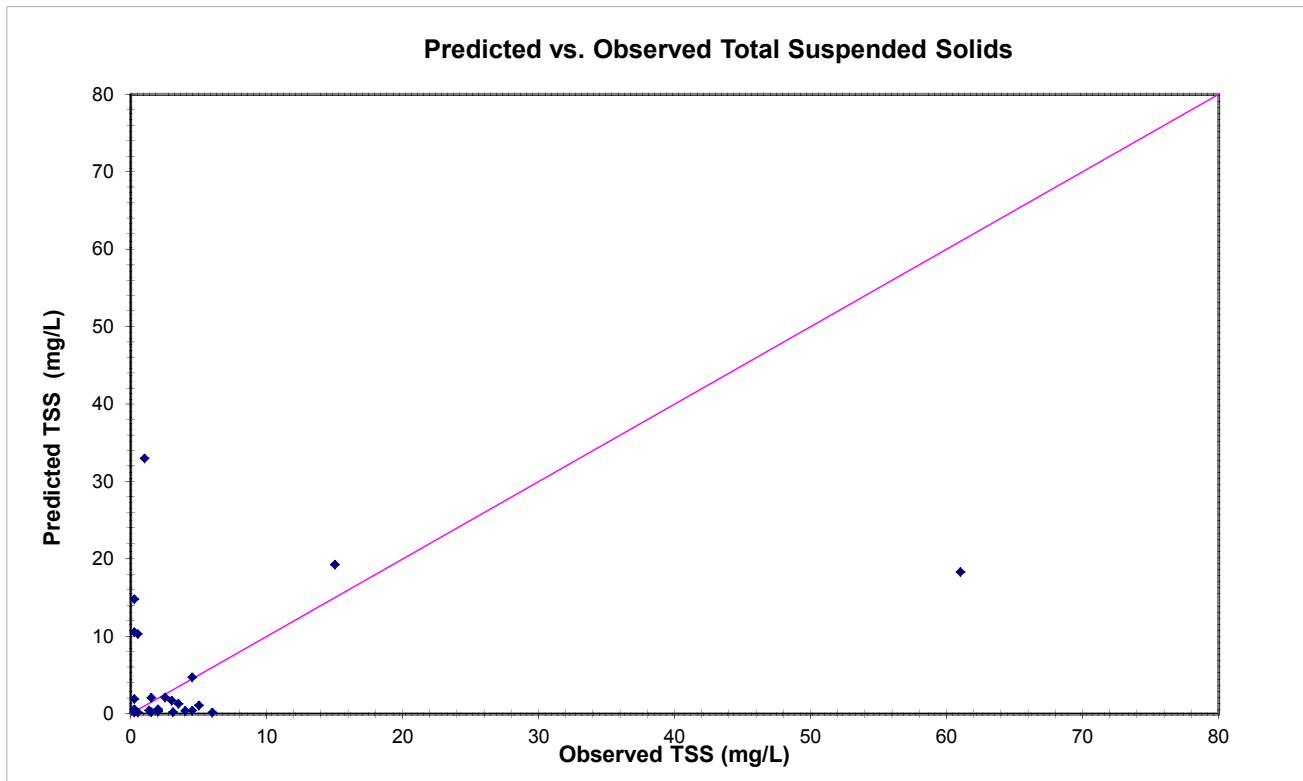
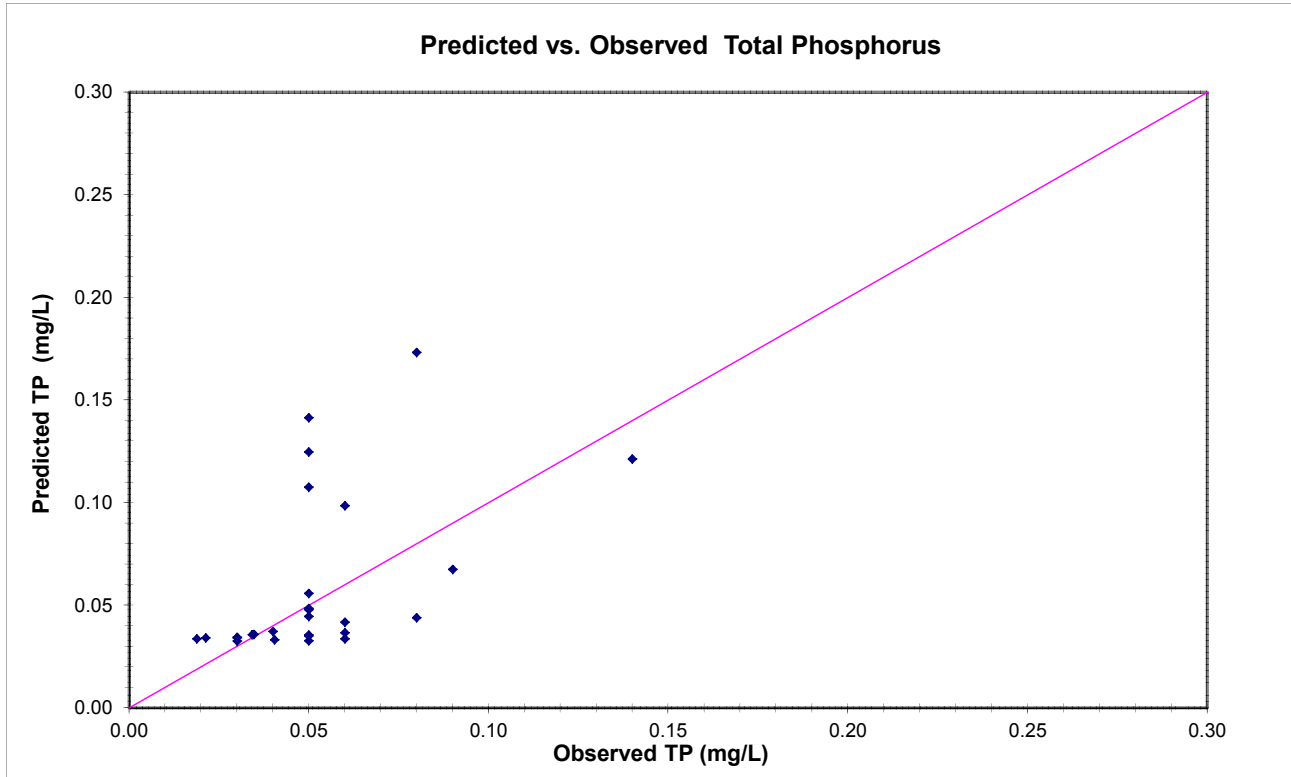


**Beden Brook / Lower Millstone River Watershed Area Model**

Goodness of Fit Graphs for TP and TSS  
Predicted vs Observed  
Residuals vs Flow  
Residuals vs Concentration

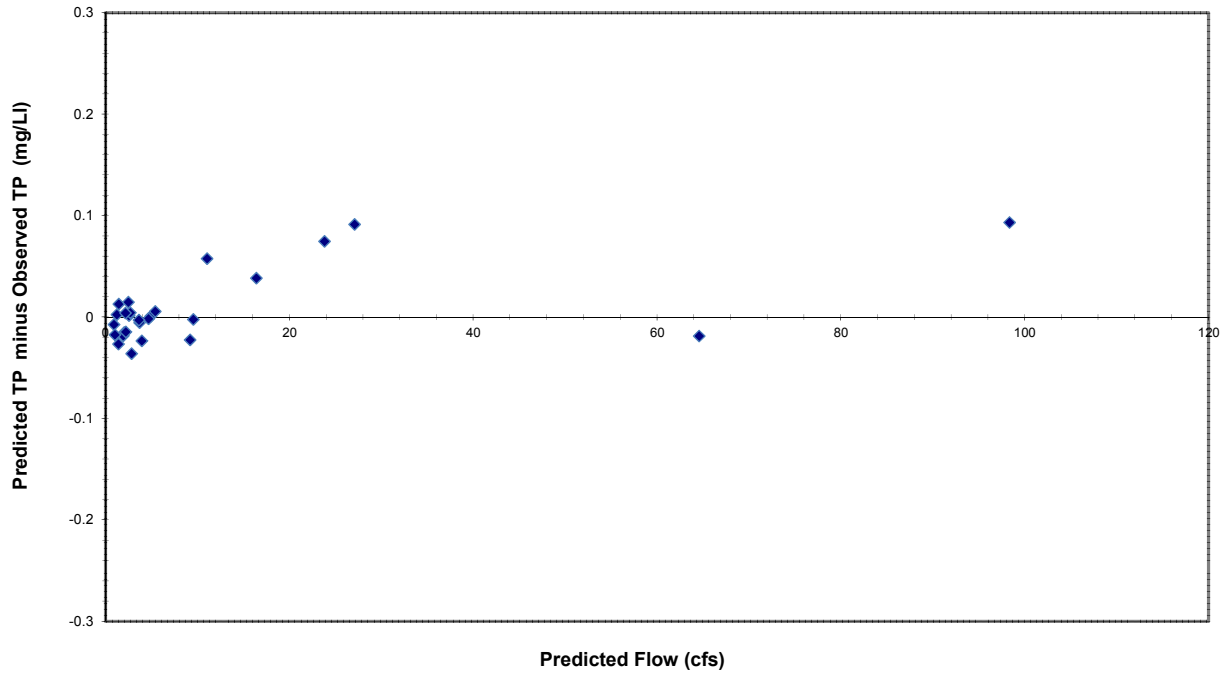


### Beden Brook Upstream SBRSA-Hopewell STP (BB1)

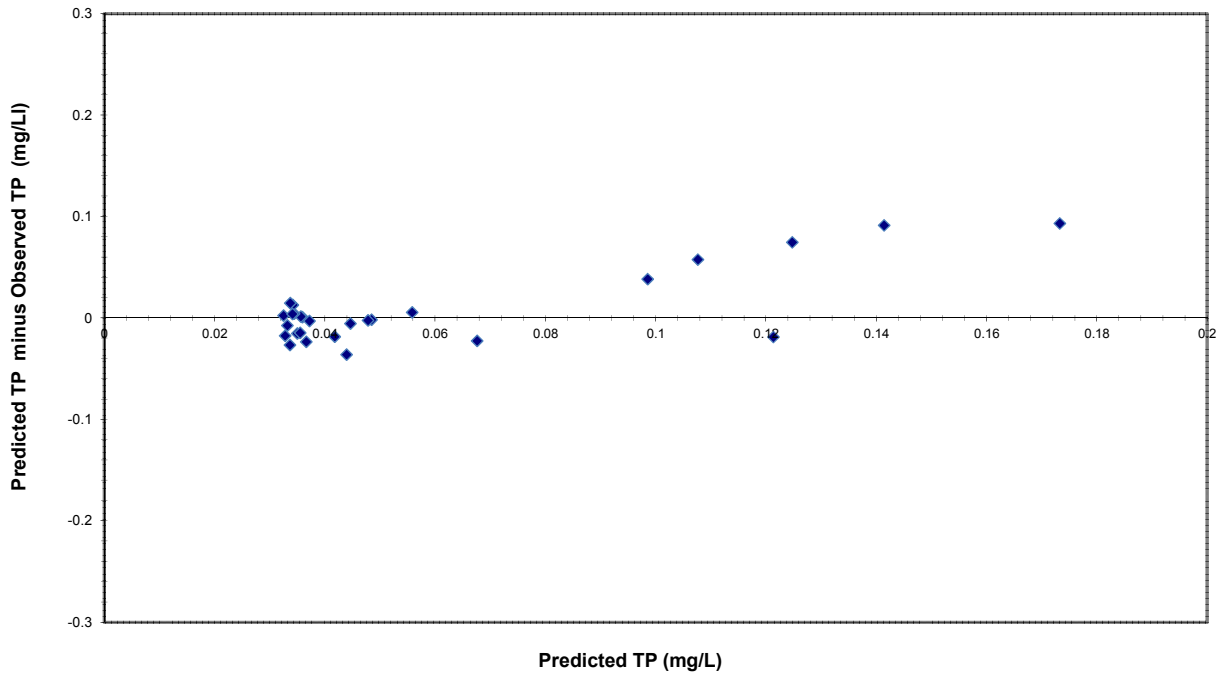


### Beden Brook Upstream SBRSA-Hopewell STP (BB1)

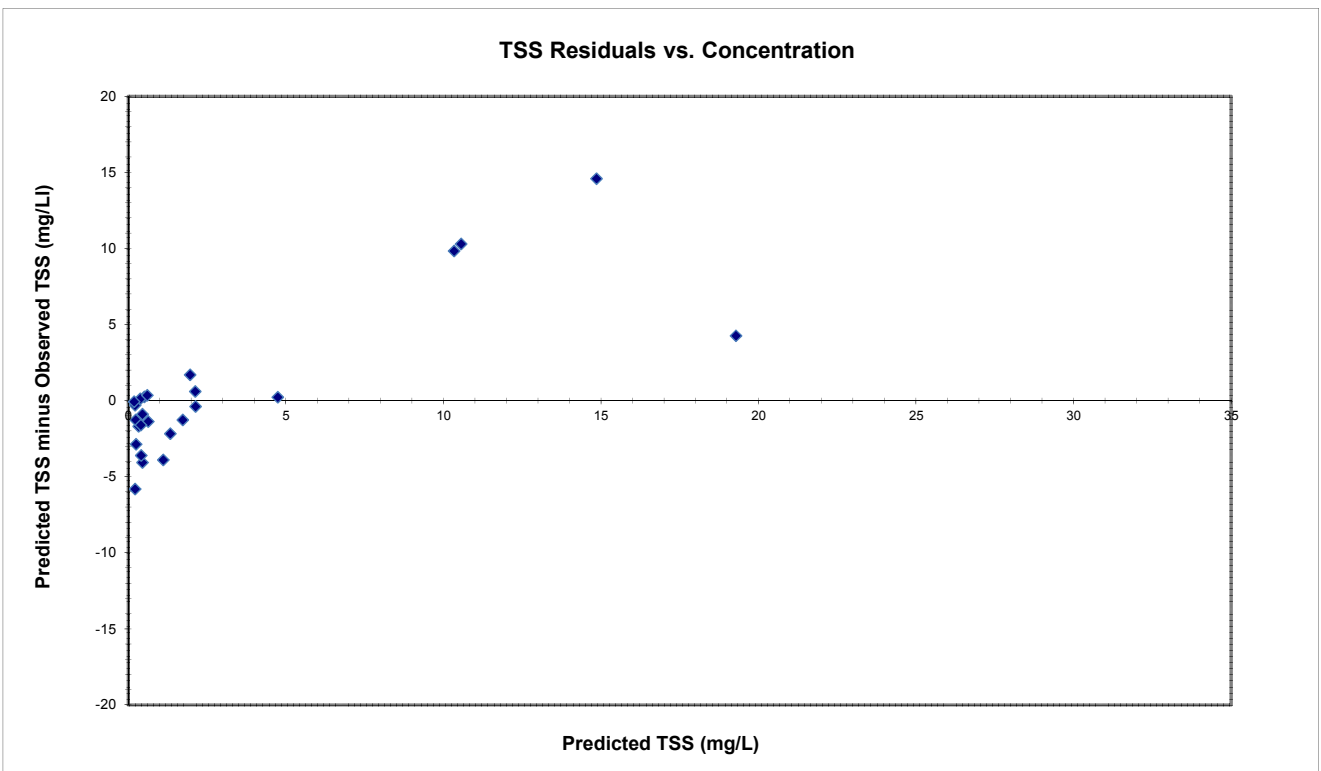
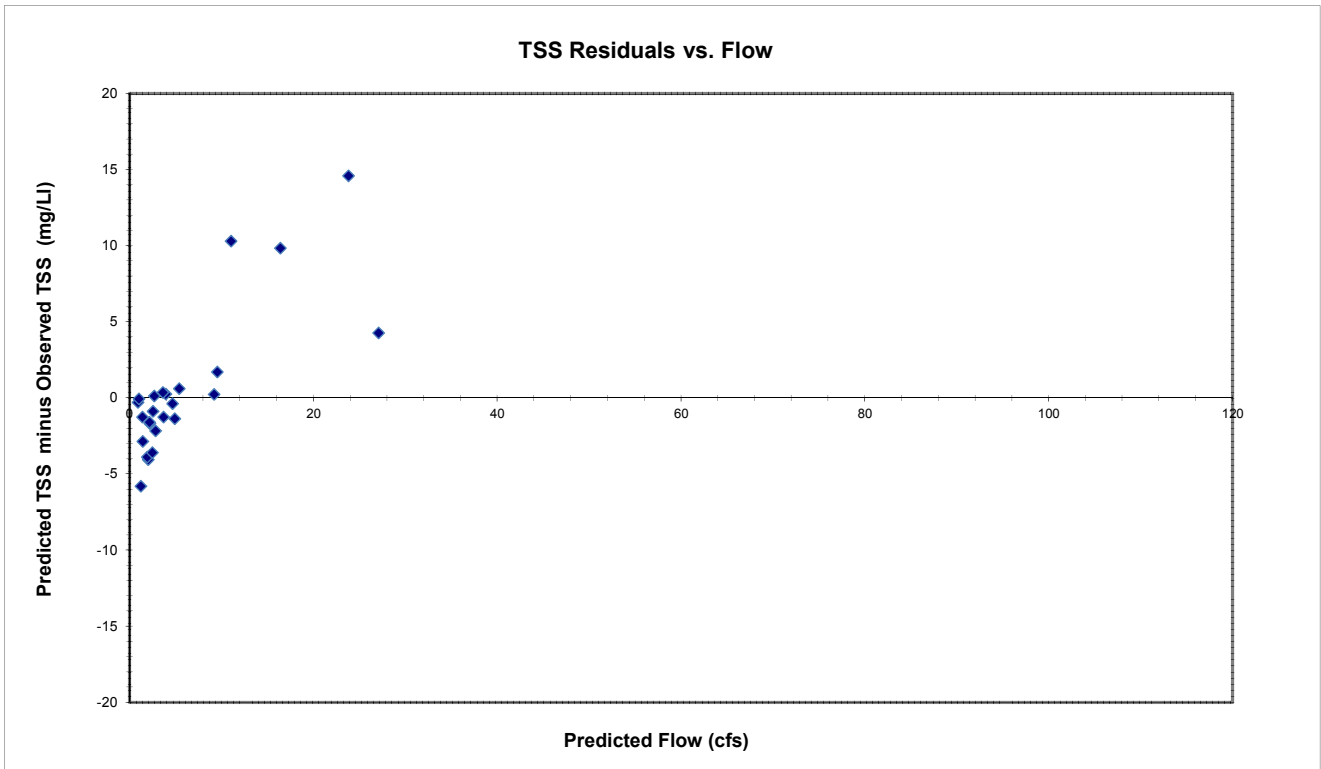
#### Total Phosphorus Residuals vs. Flow



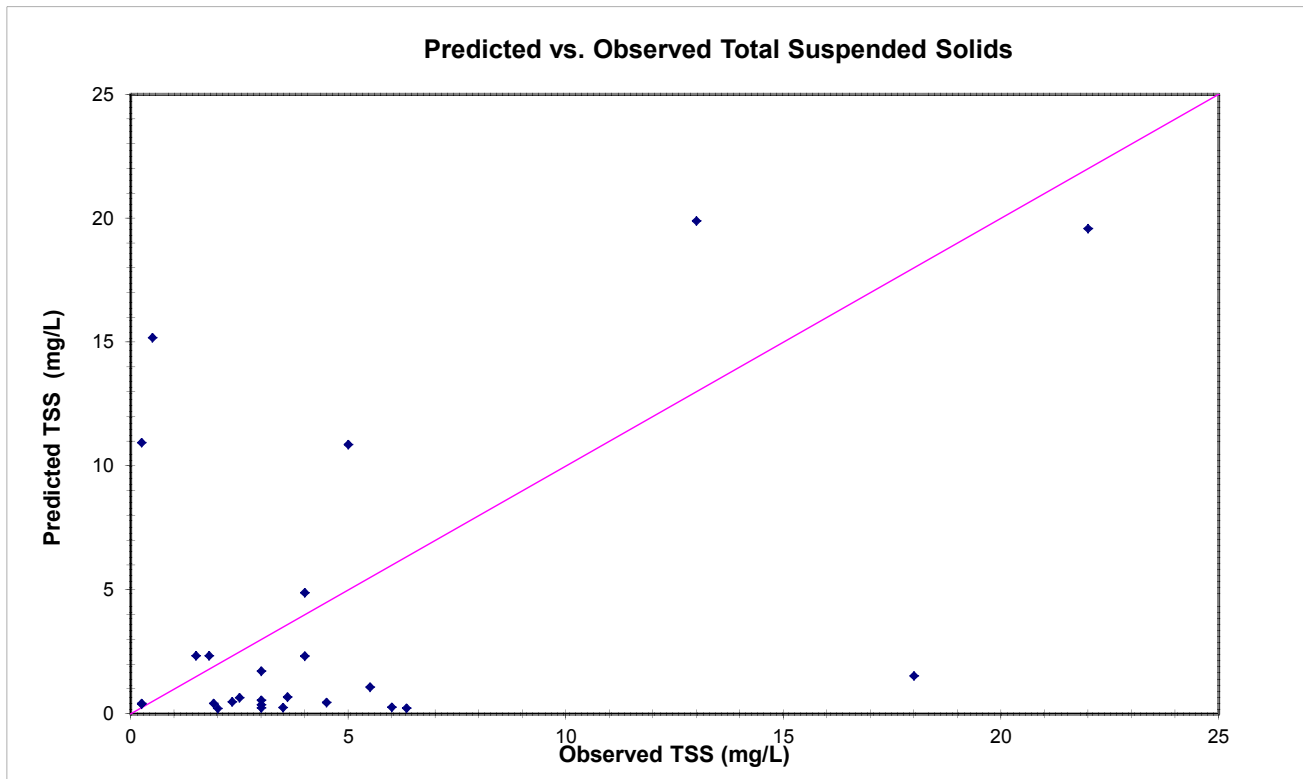
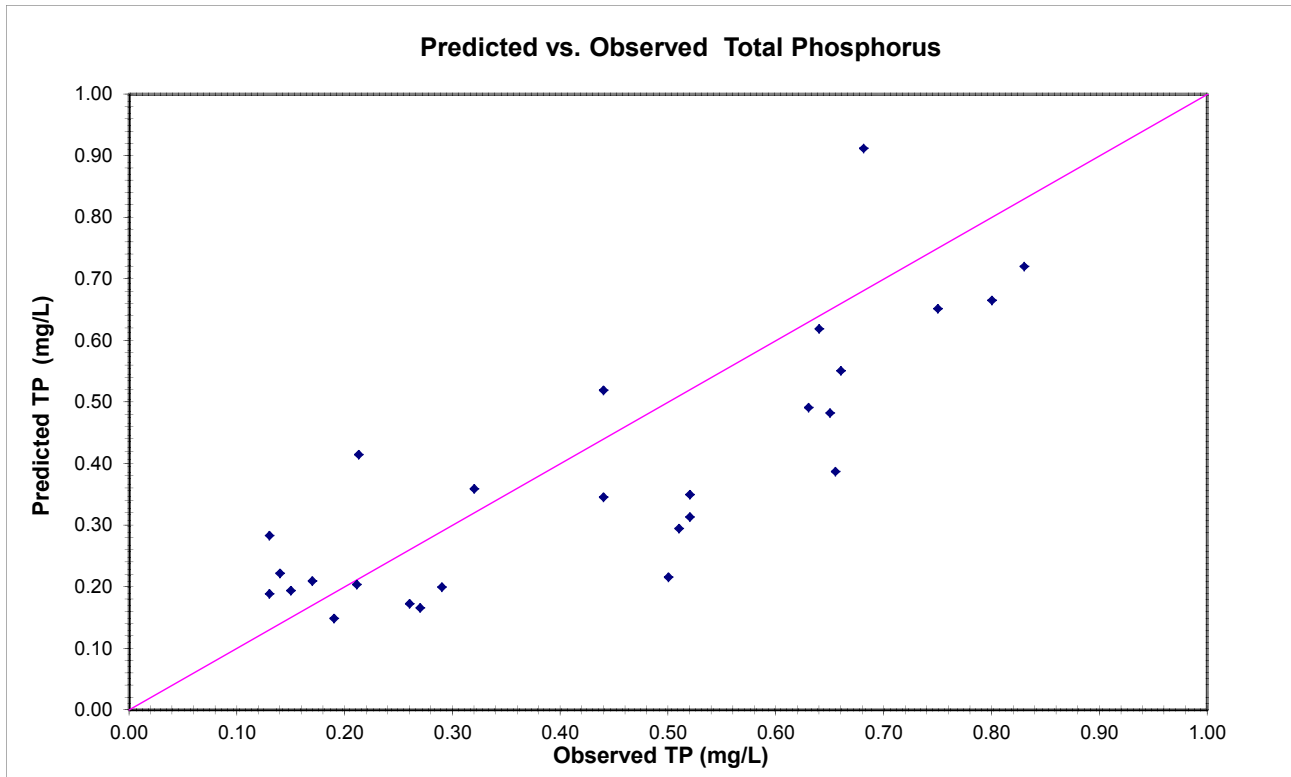
#### Total Phosphorus Residuals vs. Concentration



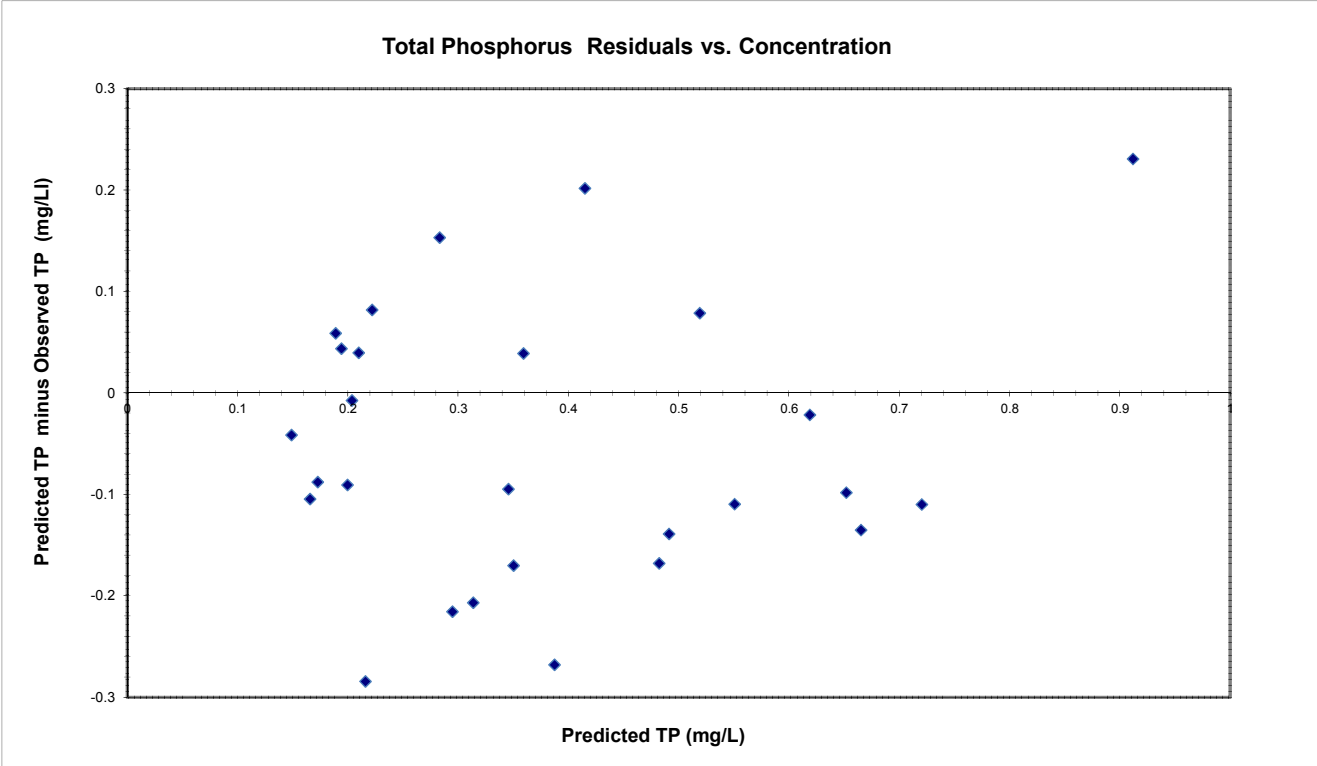
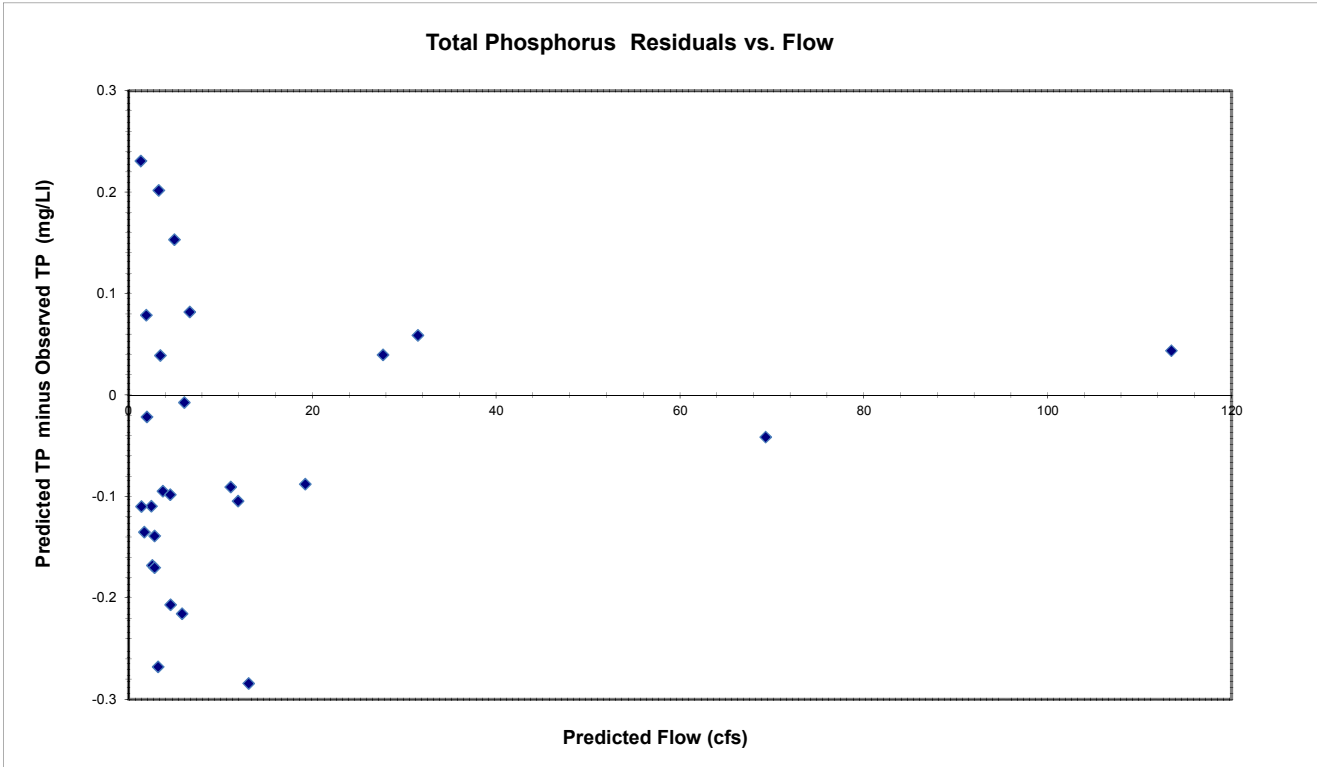
### Beden Brook Upstream SBRSA-Hopewell STP (BB1)



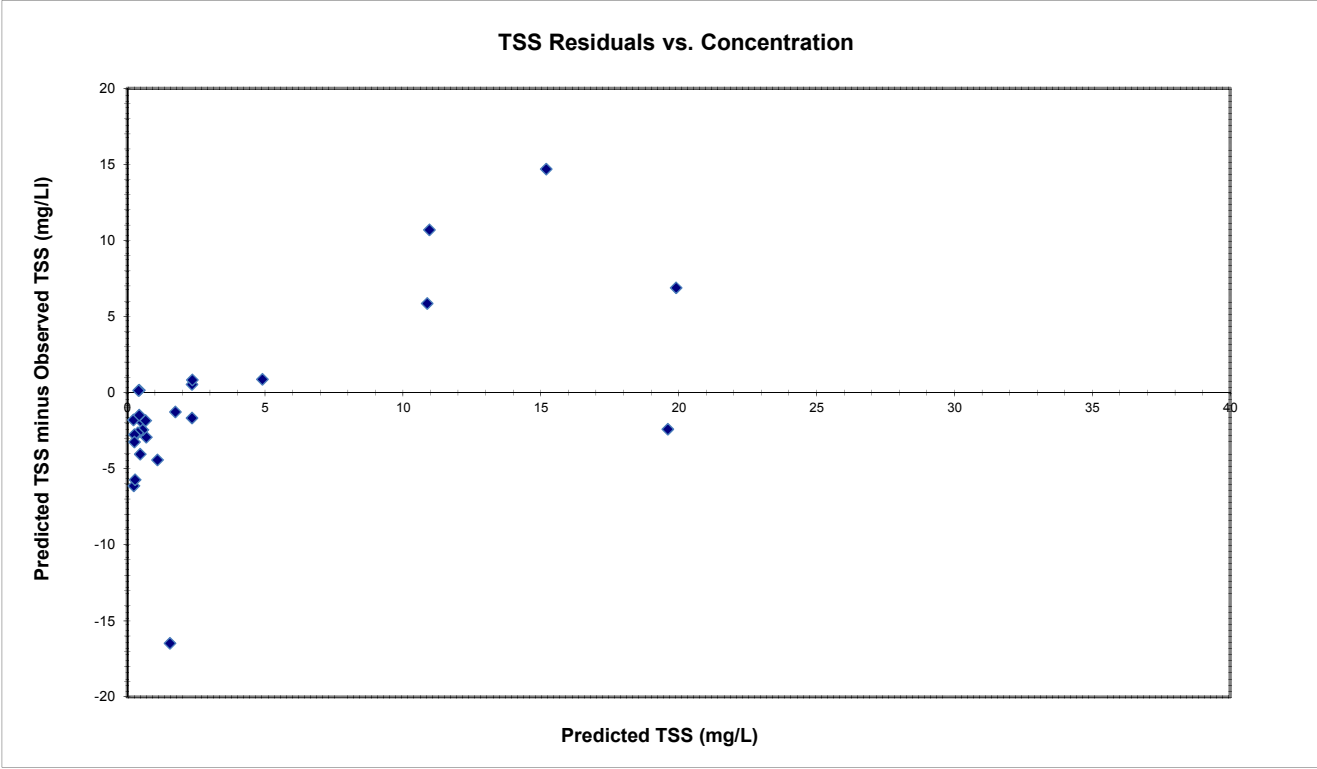
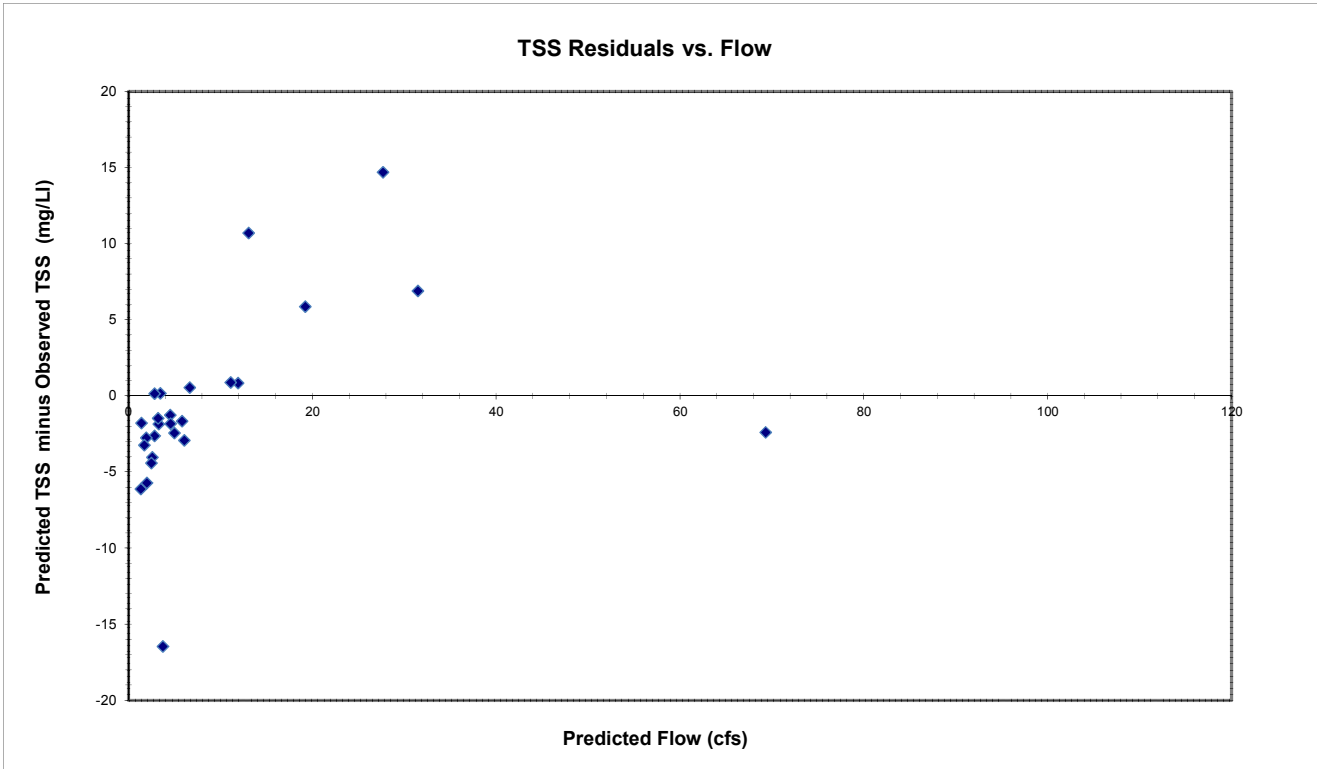
## Beden Brook Downstream SBRSA-Hopewell STP (BB2)



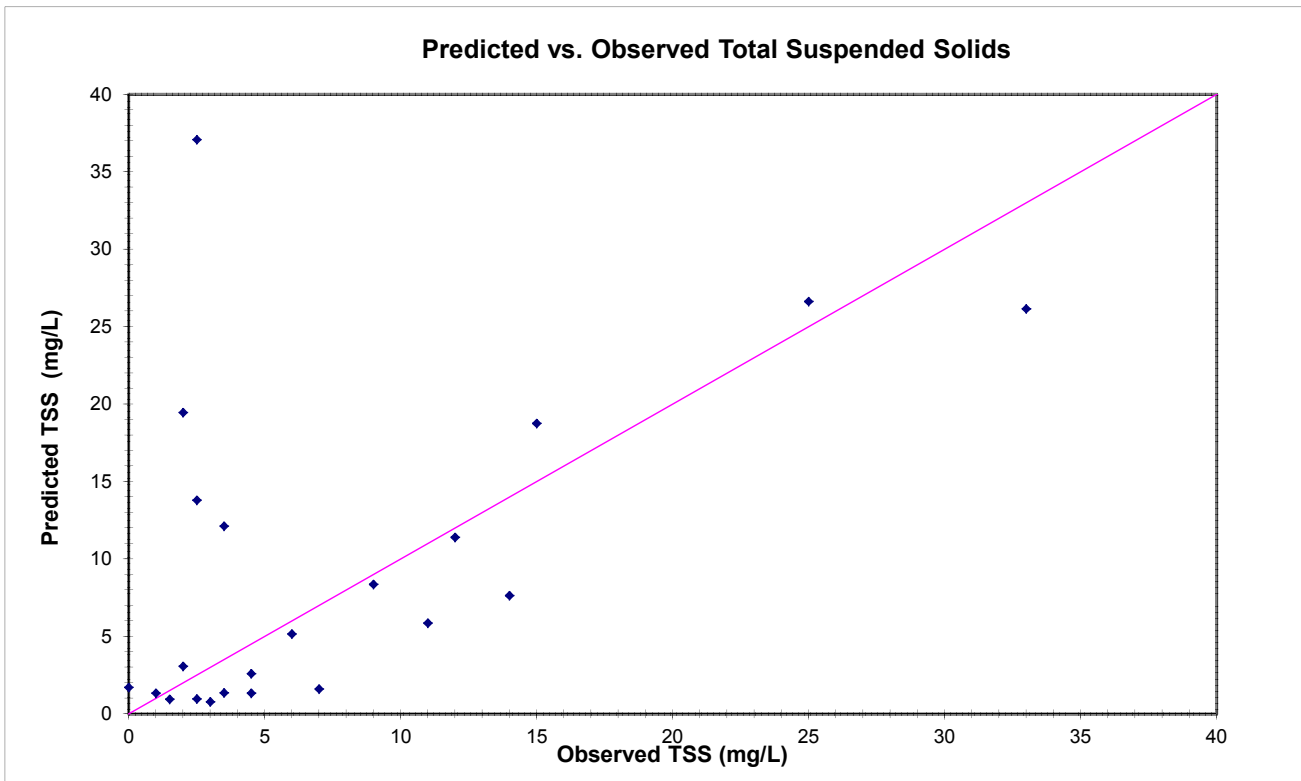
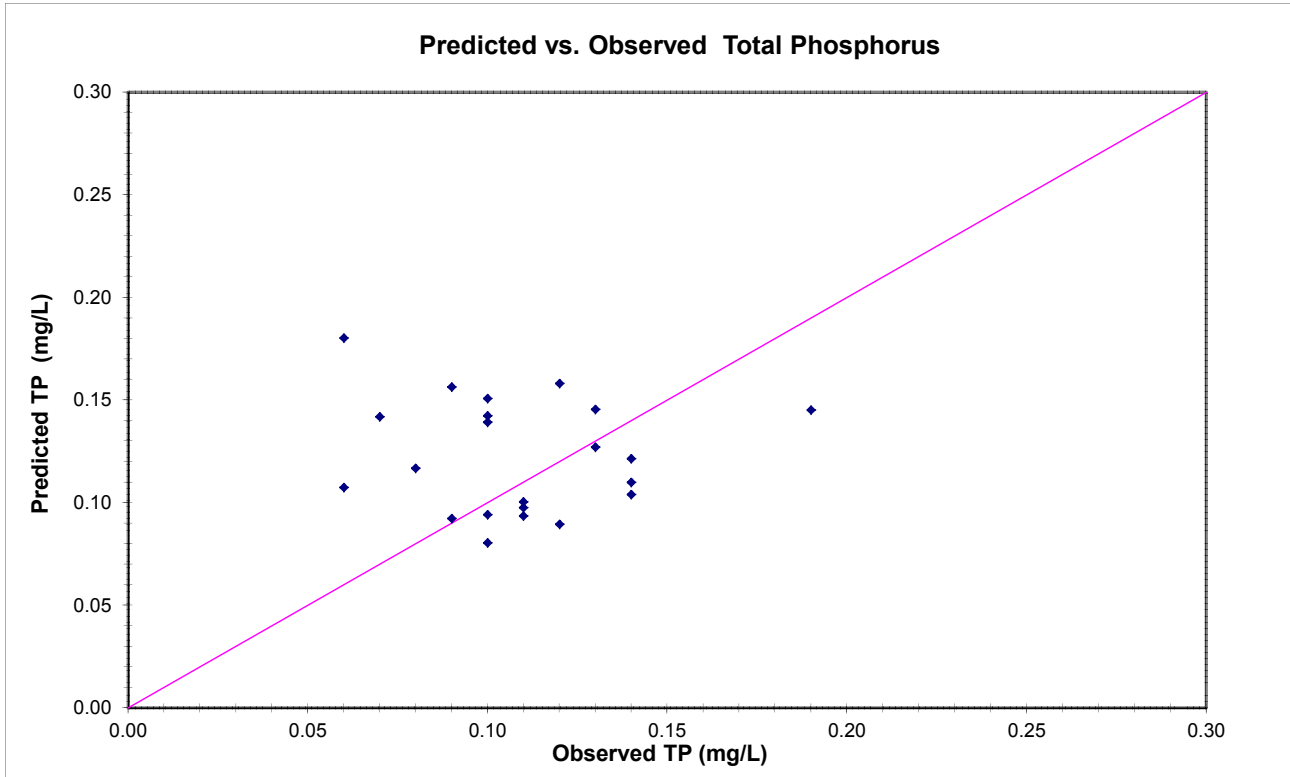
**Beden Brook Downstream SBRSA-Hopewell STP (BB2)**



**Beden Brook Downstream SBRSA-Hopewell STP (BB2)**

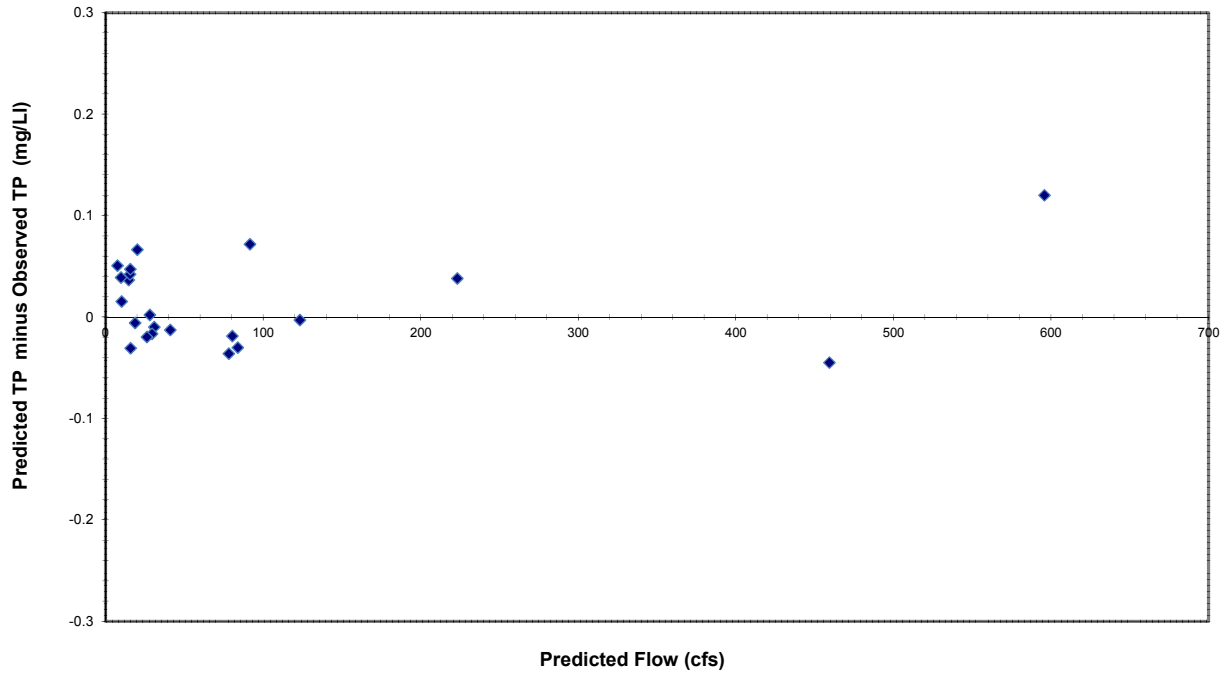


### Beden Brook Downstream Pike Brook Confluence (BB3)

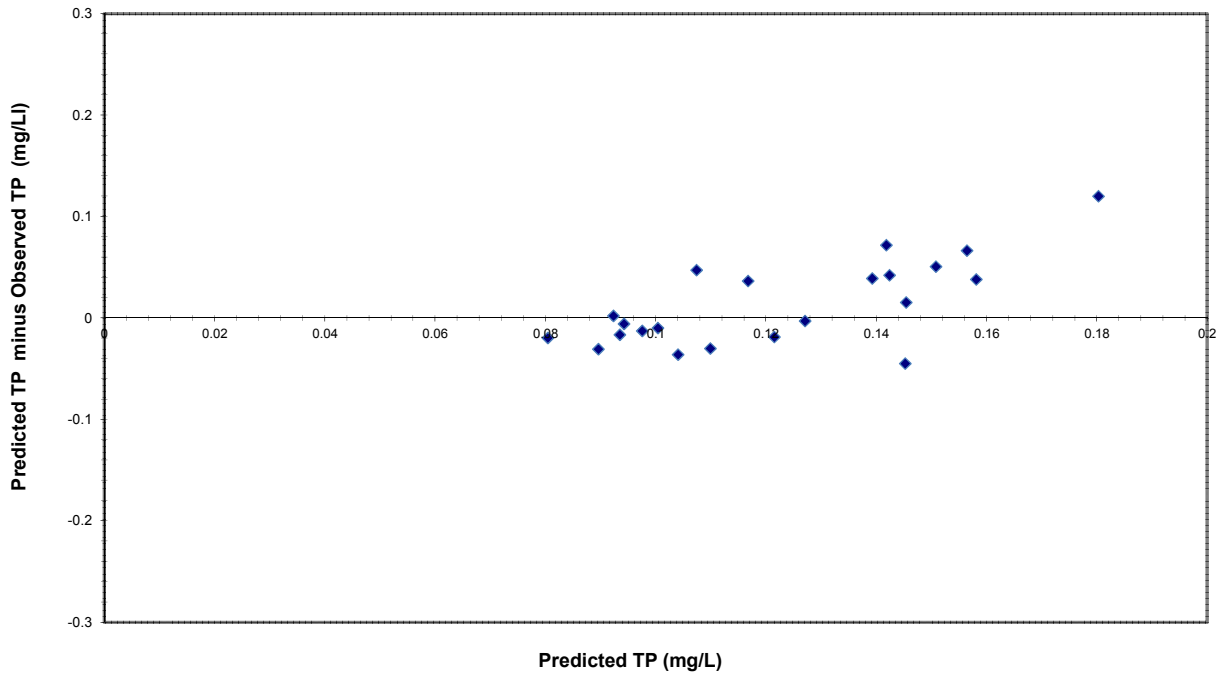


### Beden Brook Downstream Pike Brook Confluence (BB3)

#### Total Phosphorus Residuals vs. Flow

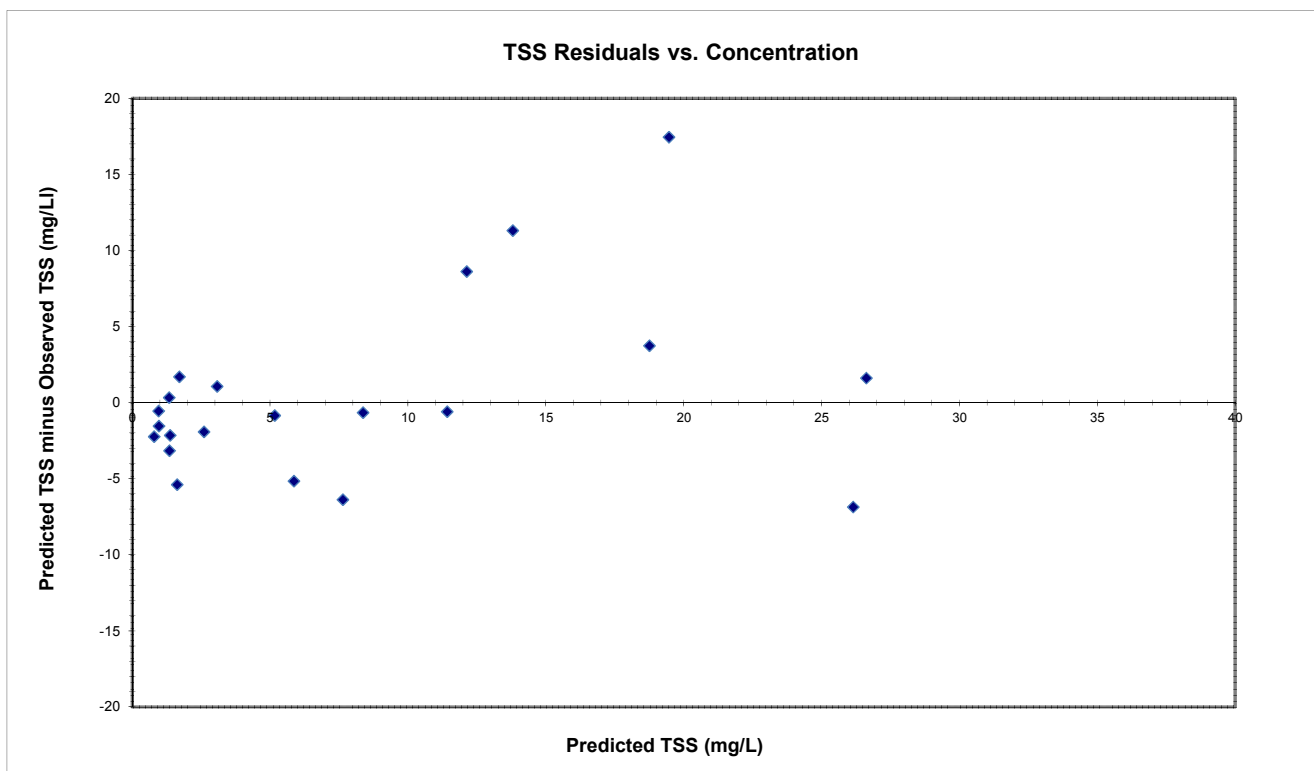
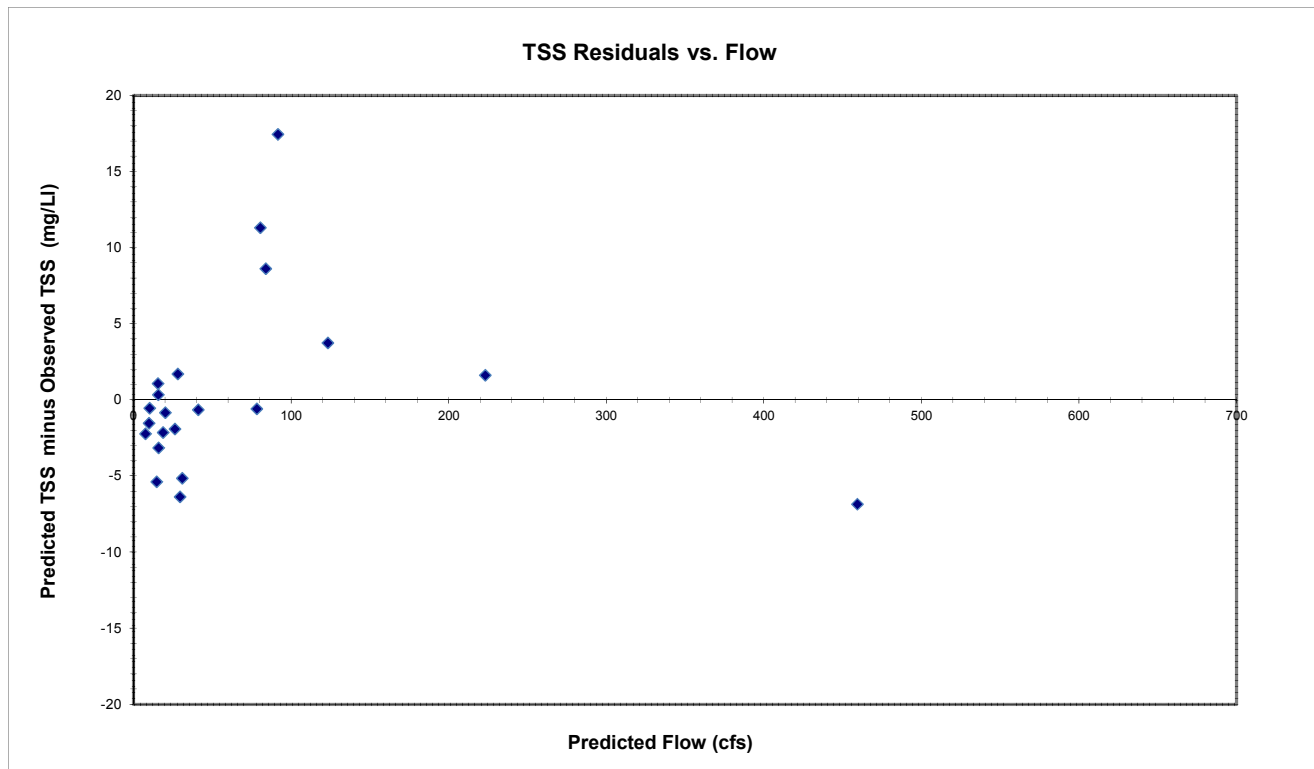


#### Total Phosphorus Residuals vs. Concentration

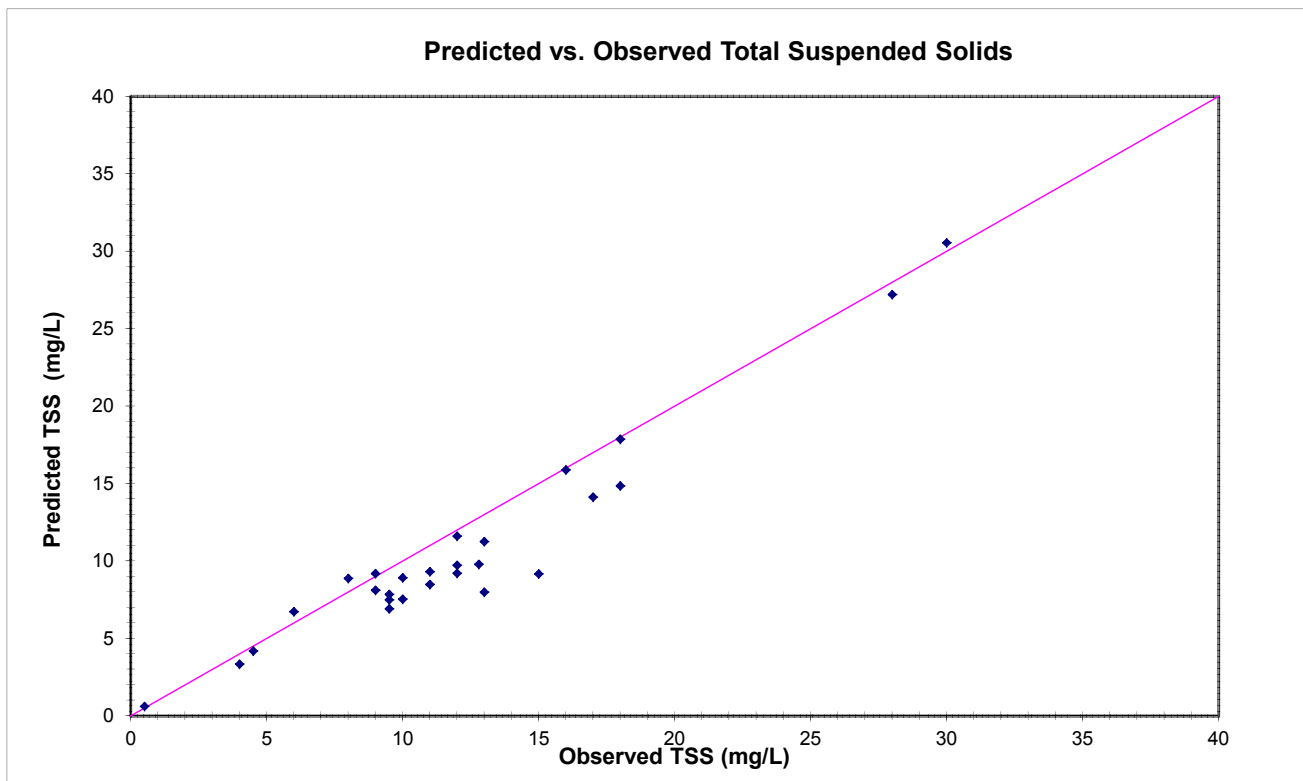
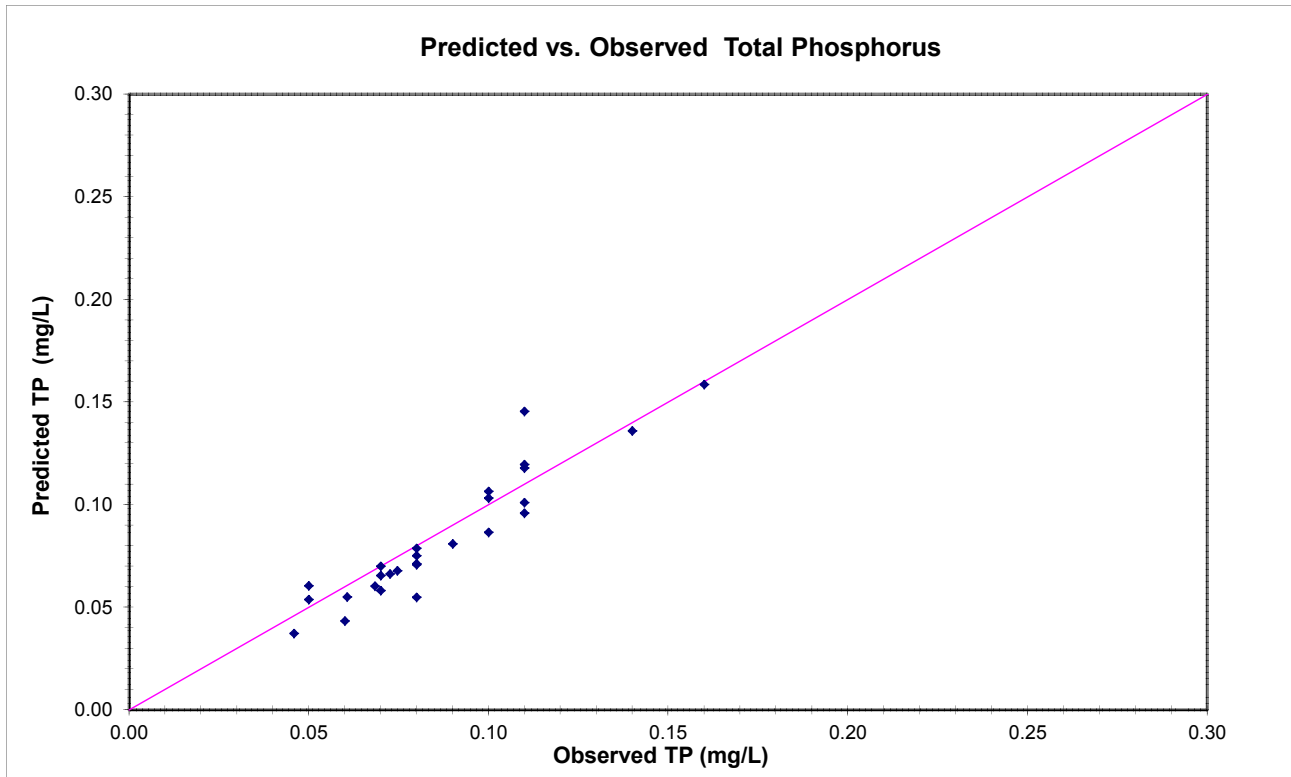




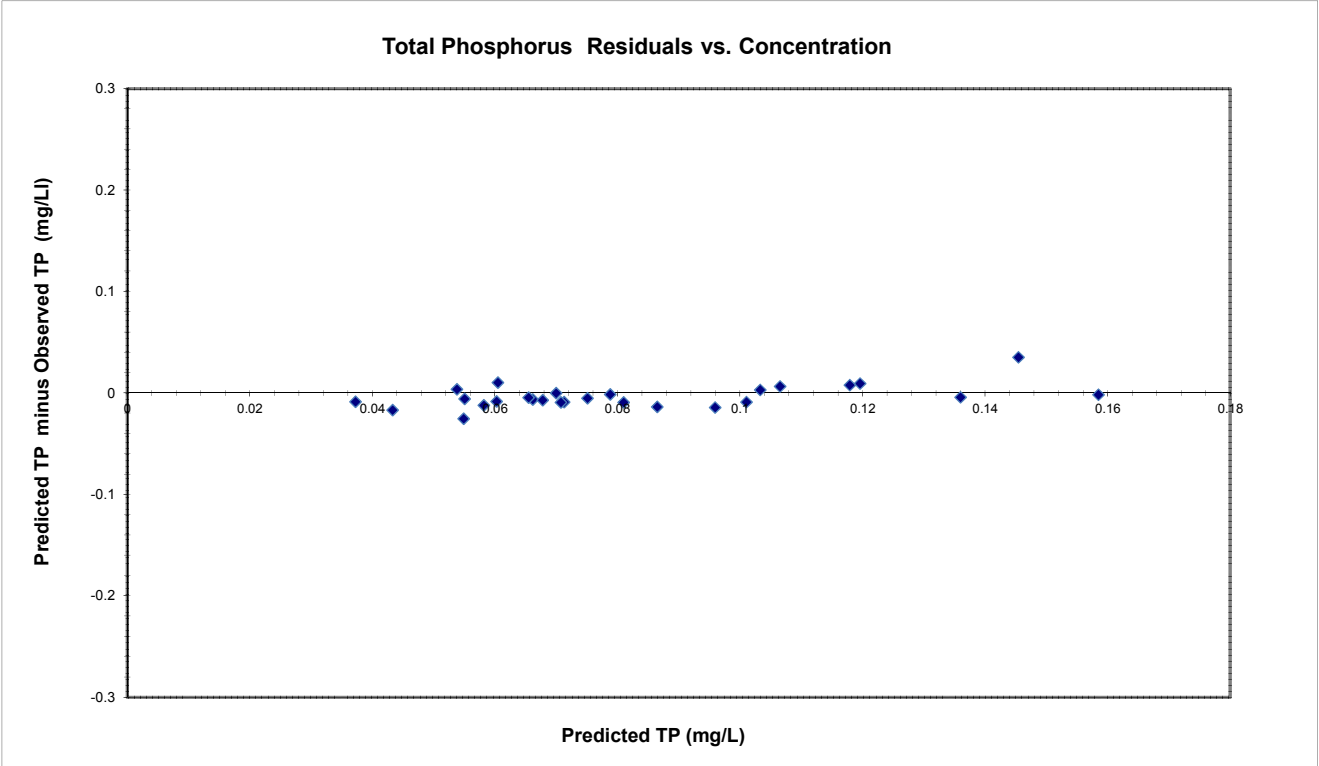
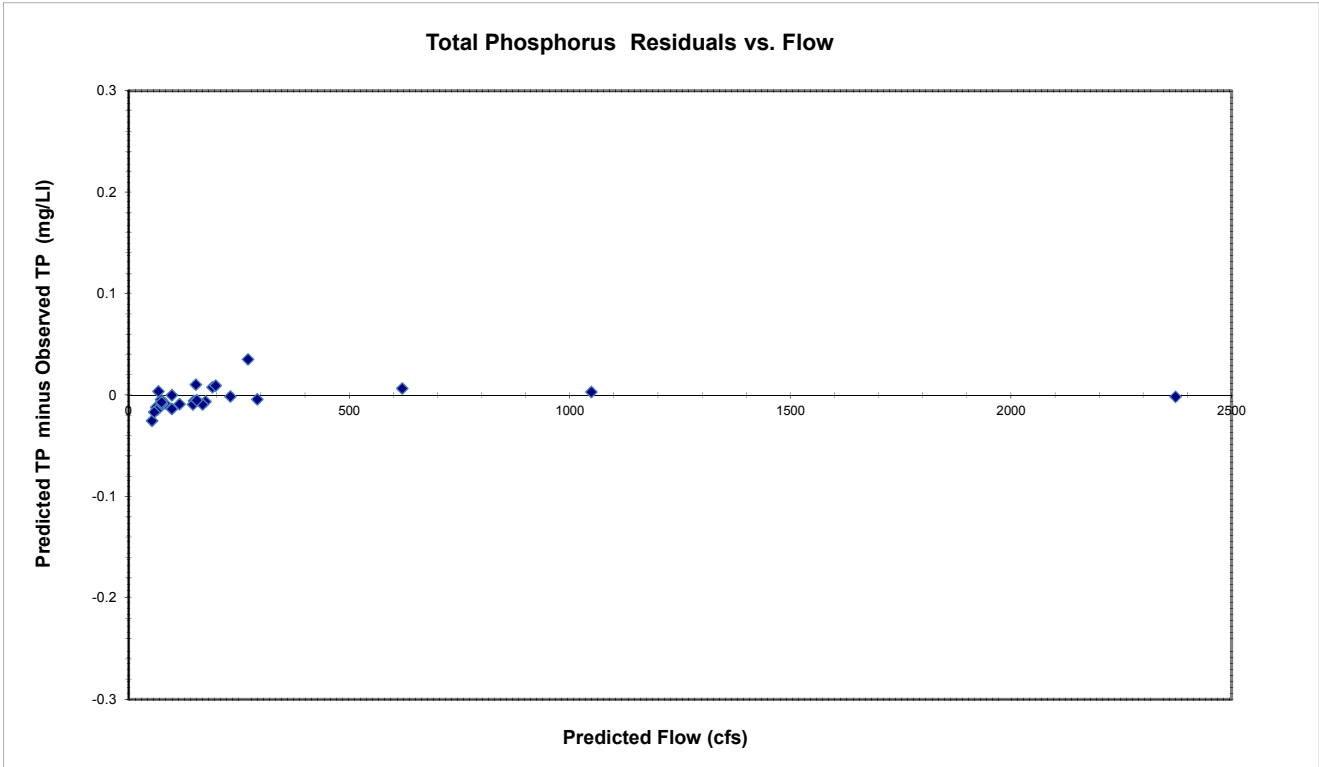
### Beden Brook Downstream Pike Brook Confluence (BB3)



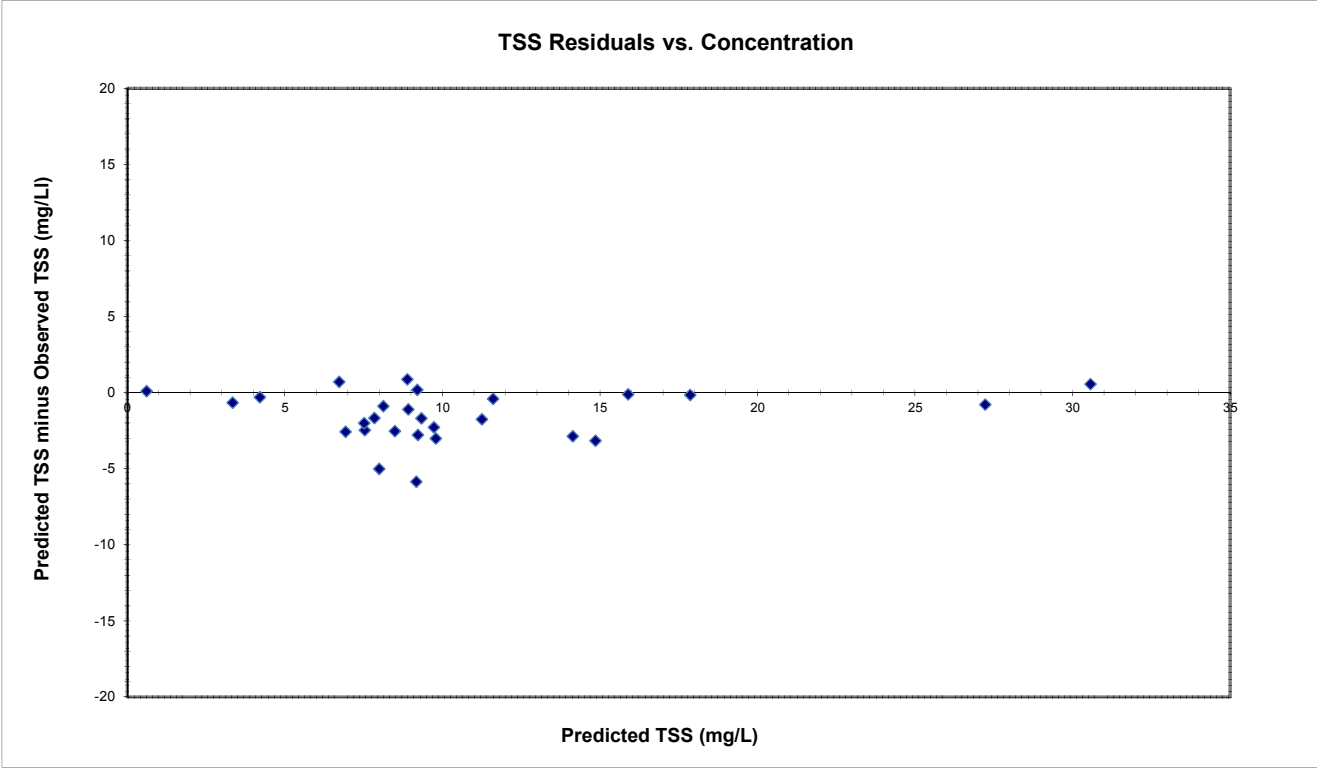
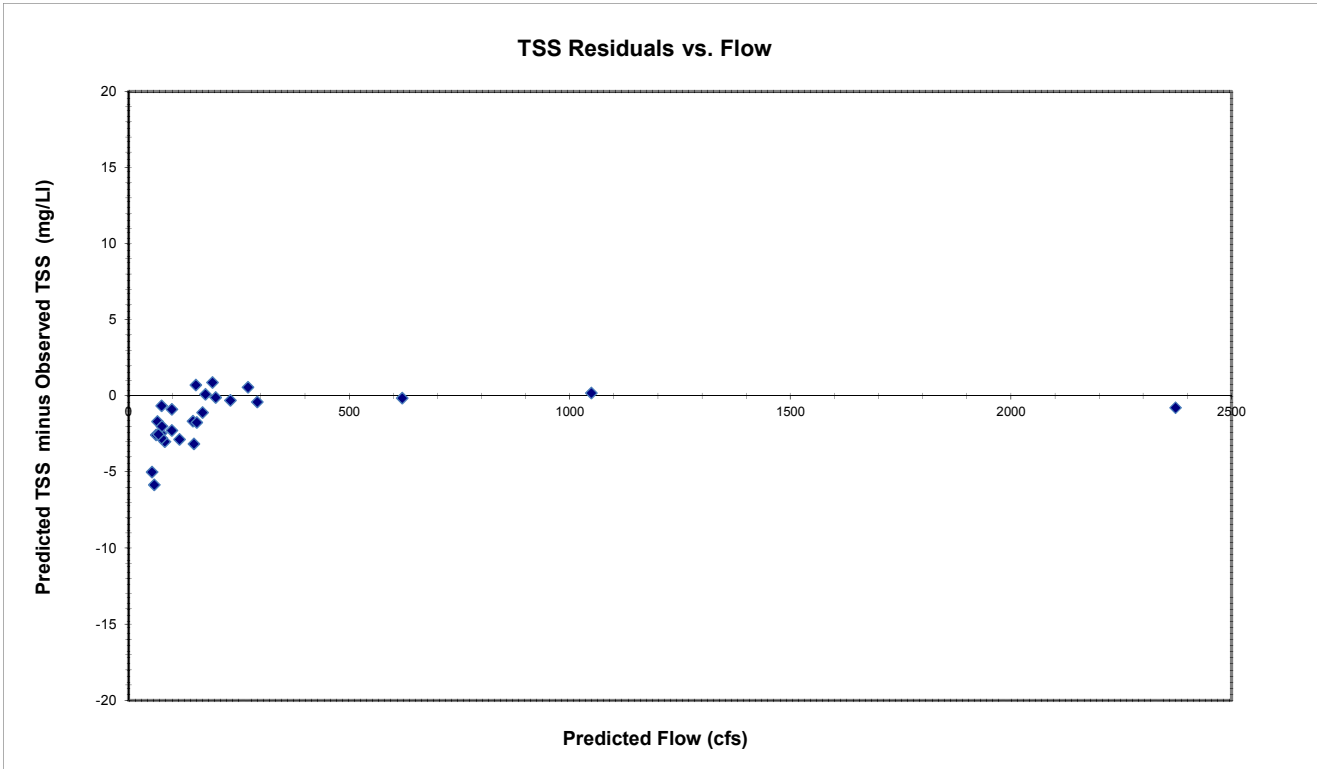
## Lower Millstone River Downstream Carnegie Lake (M2)



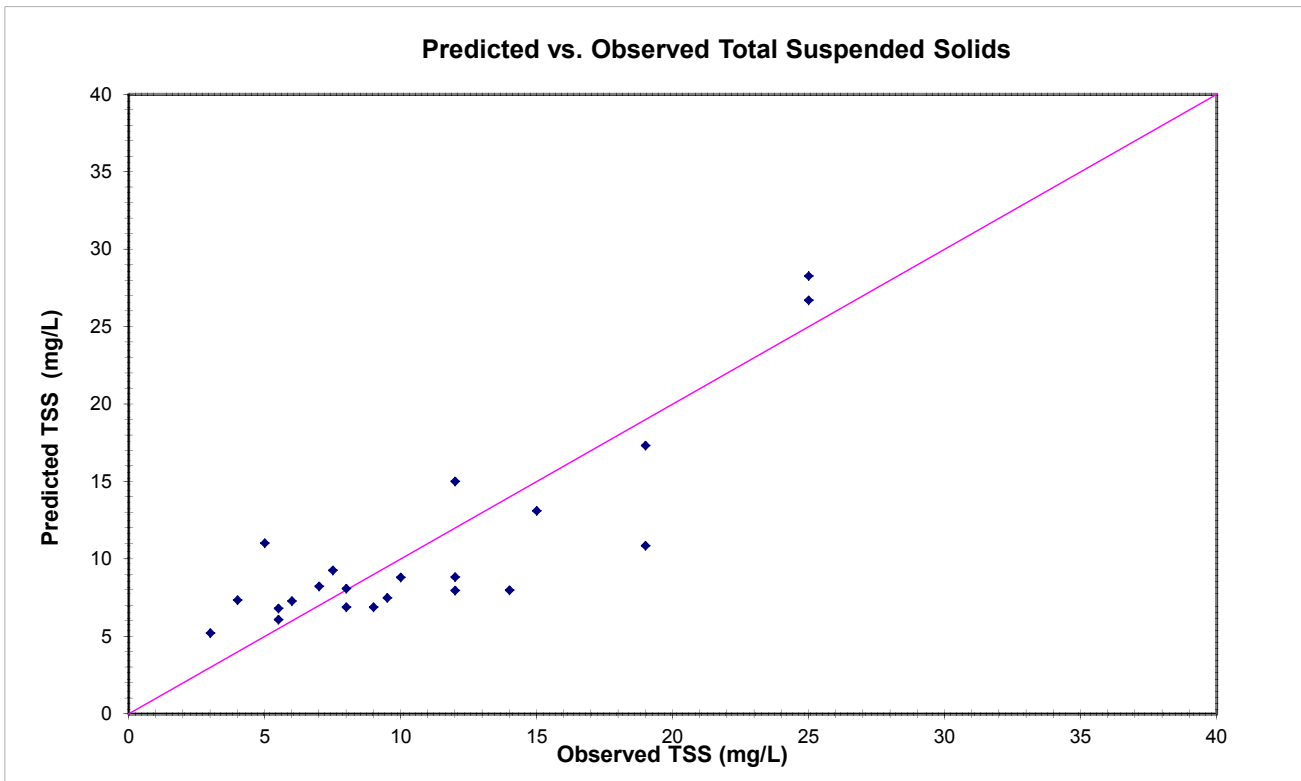
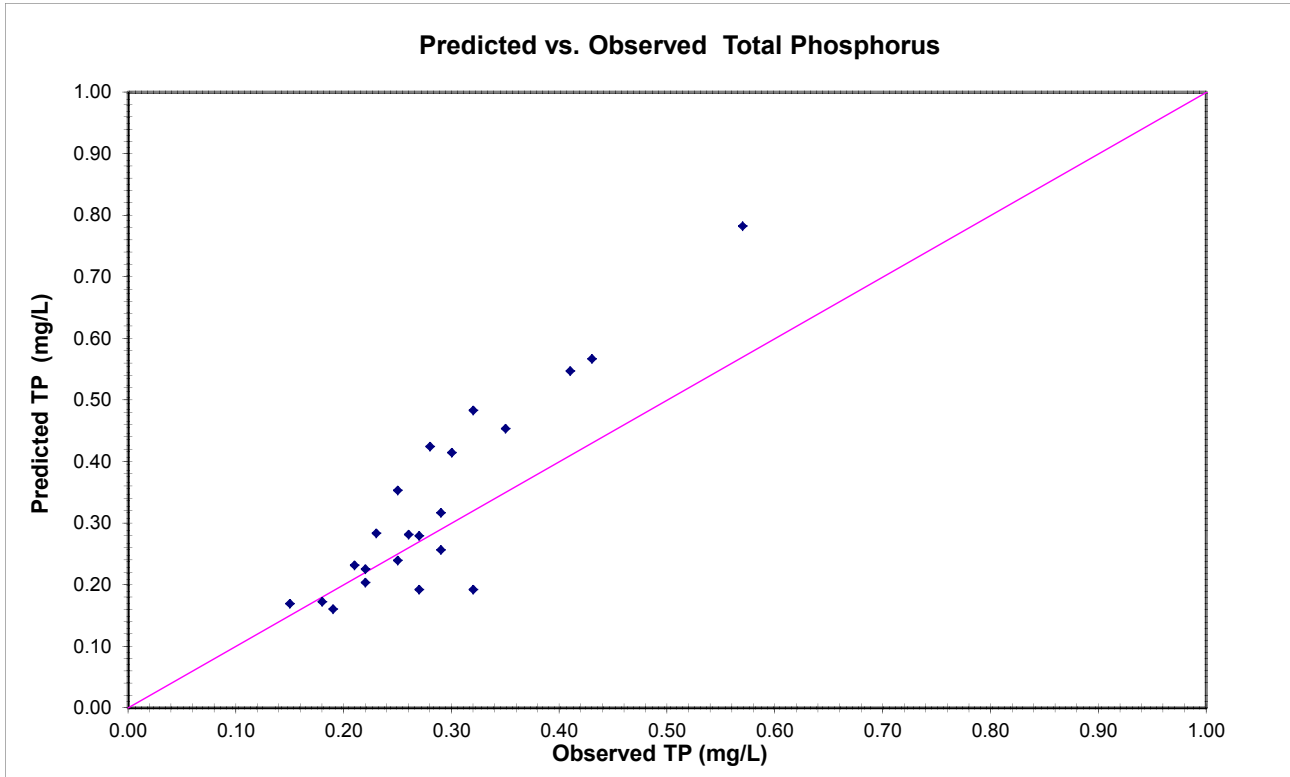
Lower Millstone River Downstream Carnegie Lake (M2)



Lower Millstone River Downstream Carnegie Lake (M2)

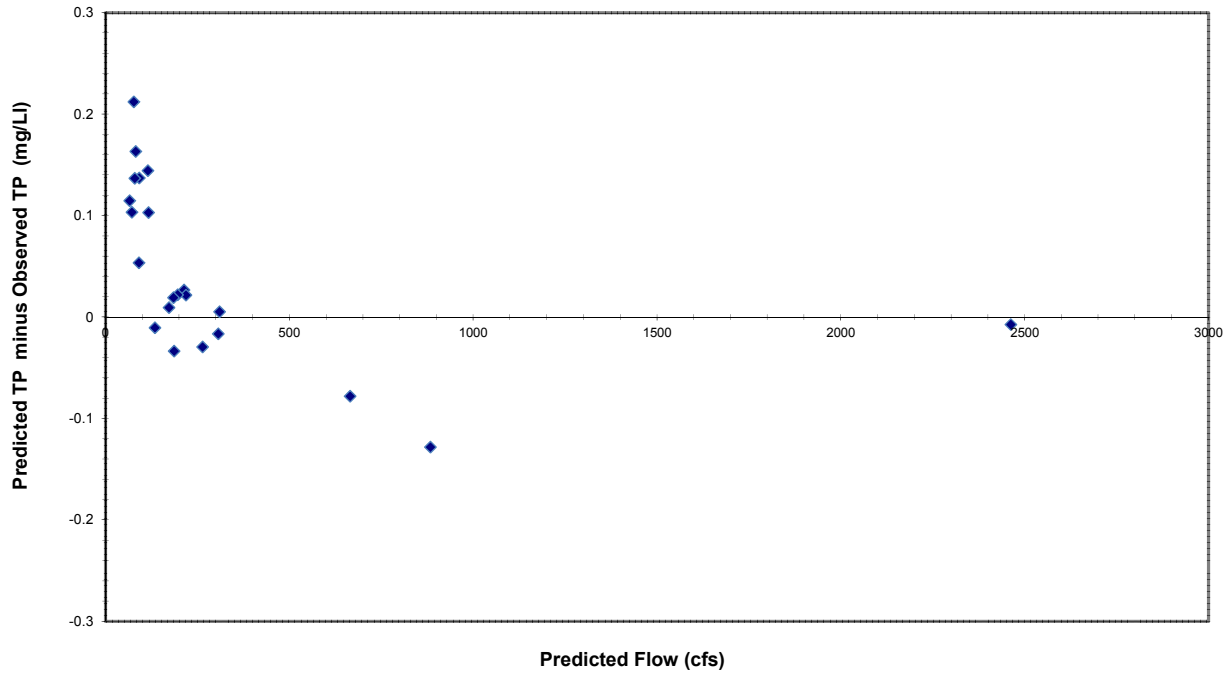


### Lower Millstone River Downstream SBRSA - River Road STP (M3)

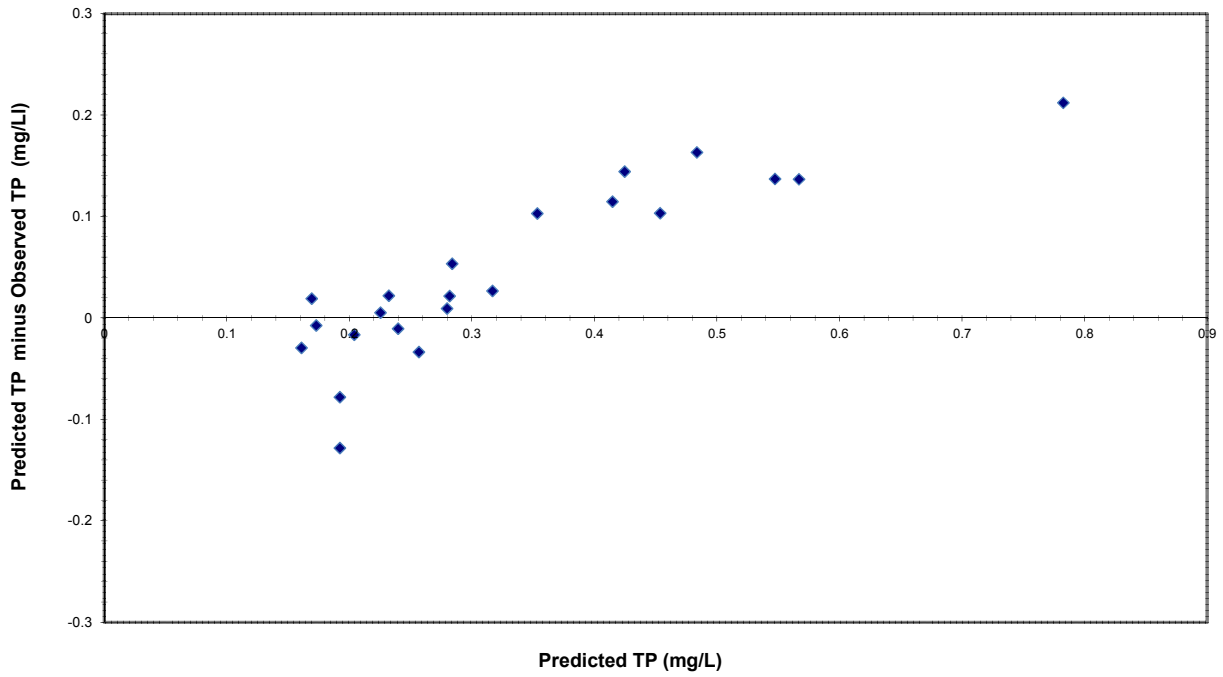


Lower Millstone River Downstream SBRSA - River Road STP (M3)

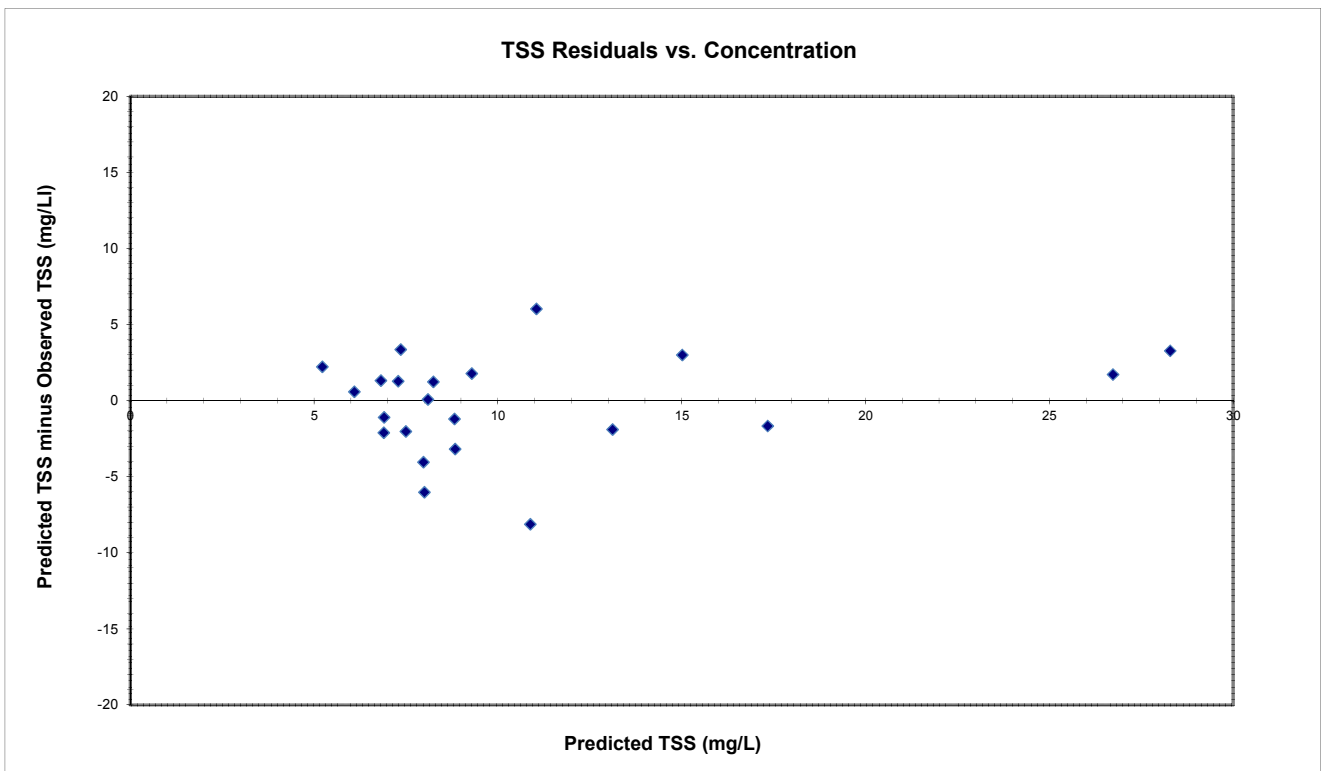
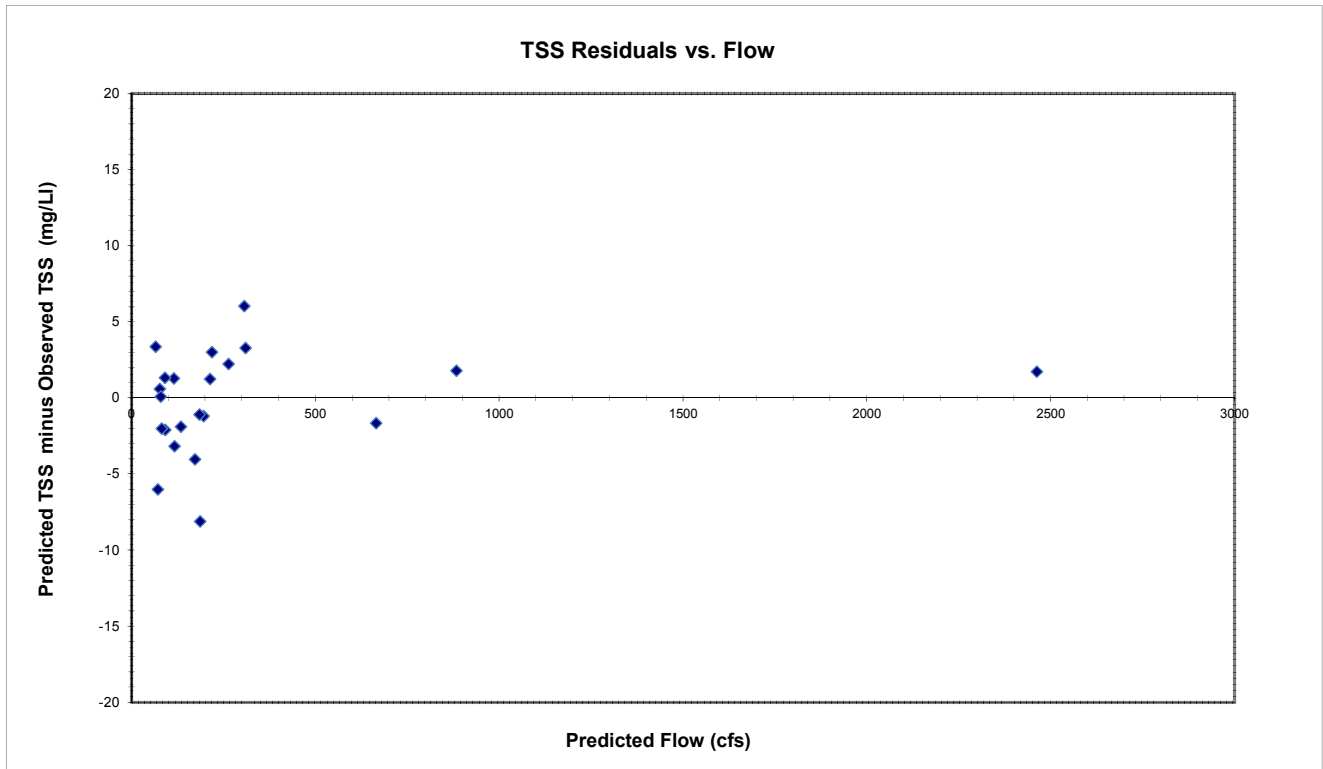
Total Phosphorus Residuals vs. Flow



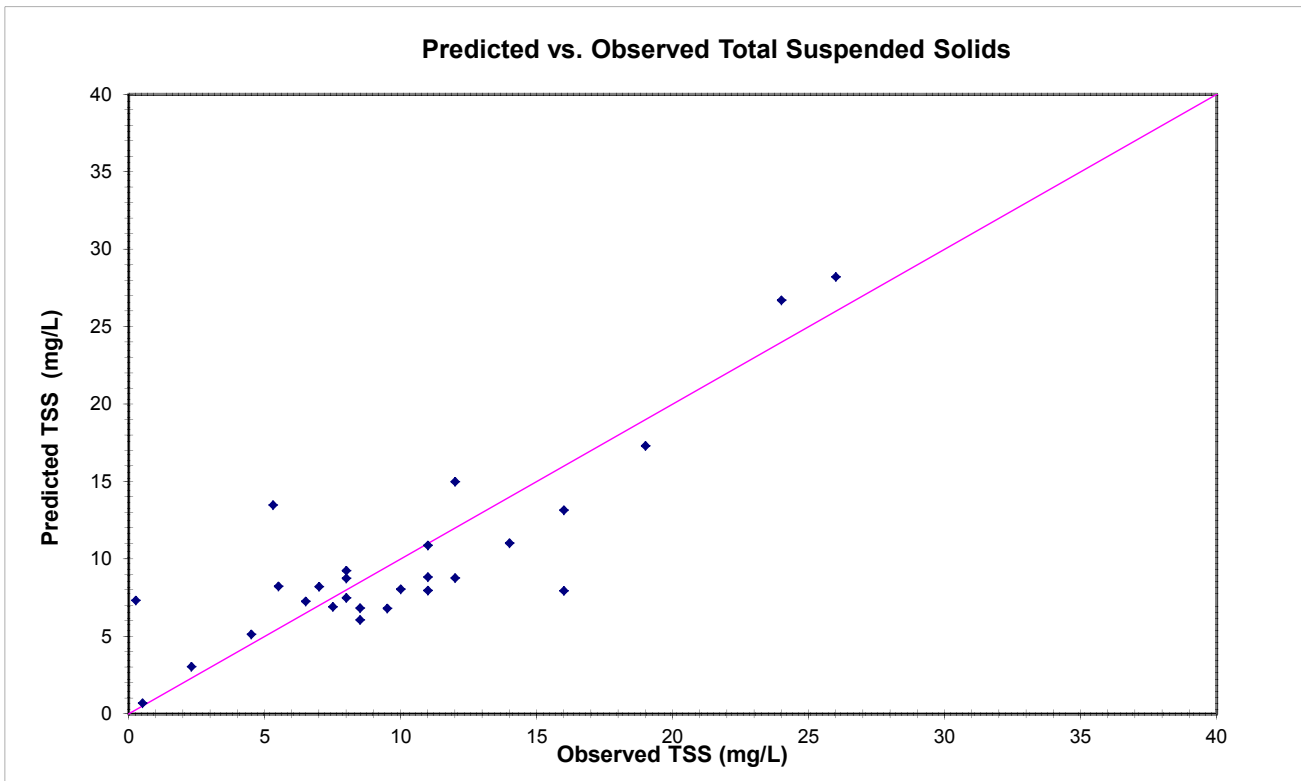
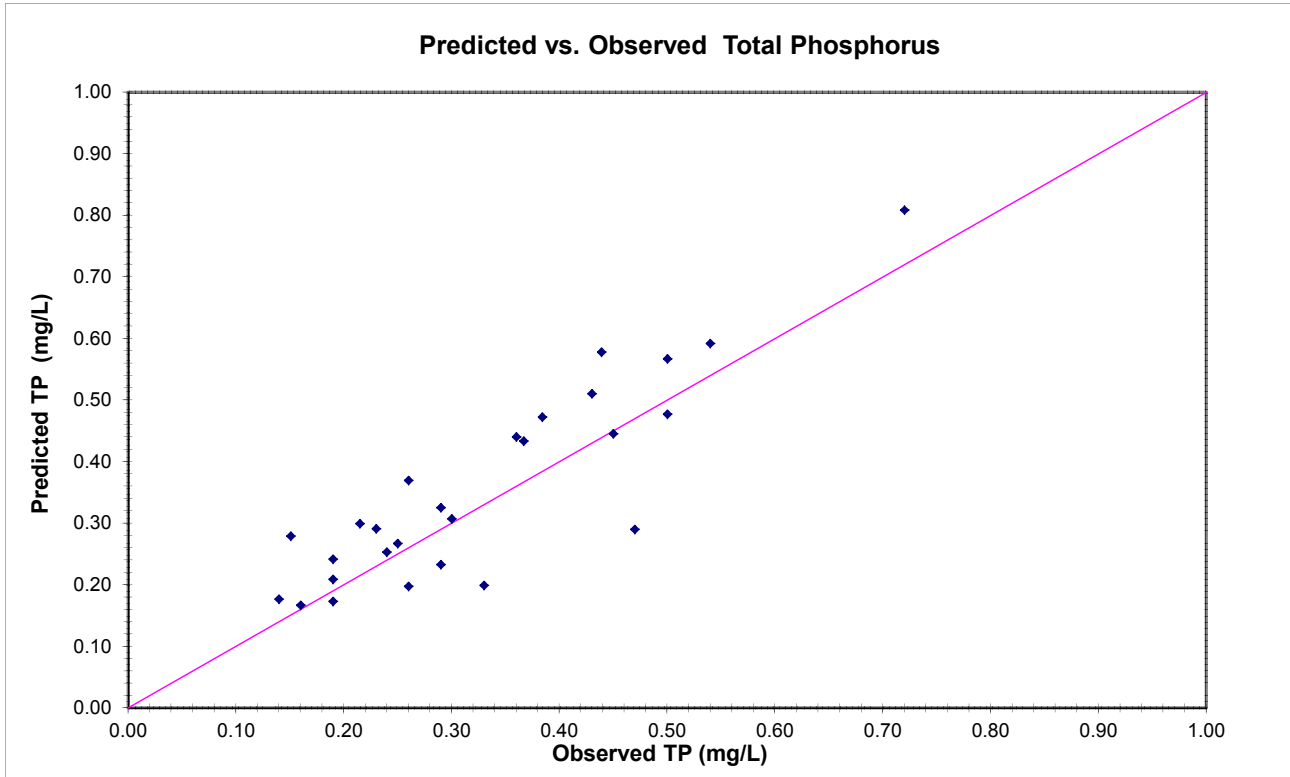
Total Phosphorus Residuals vs. Concentration



### Lower Millstone River Downstream SBRSA - River Road STP (M3)



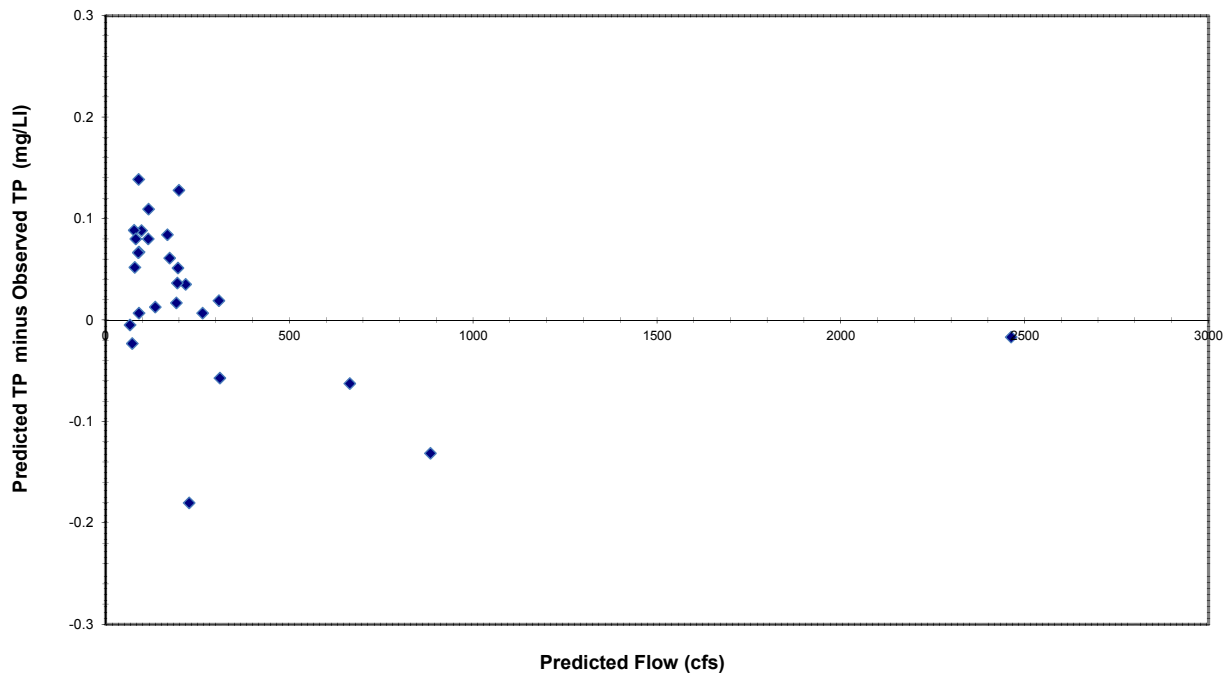
# Lower Millstone River Downstream Montgomery - Stage II STP (M4)



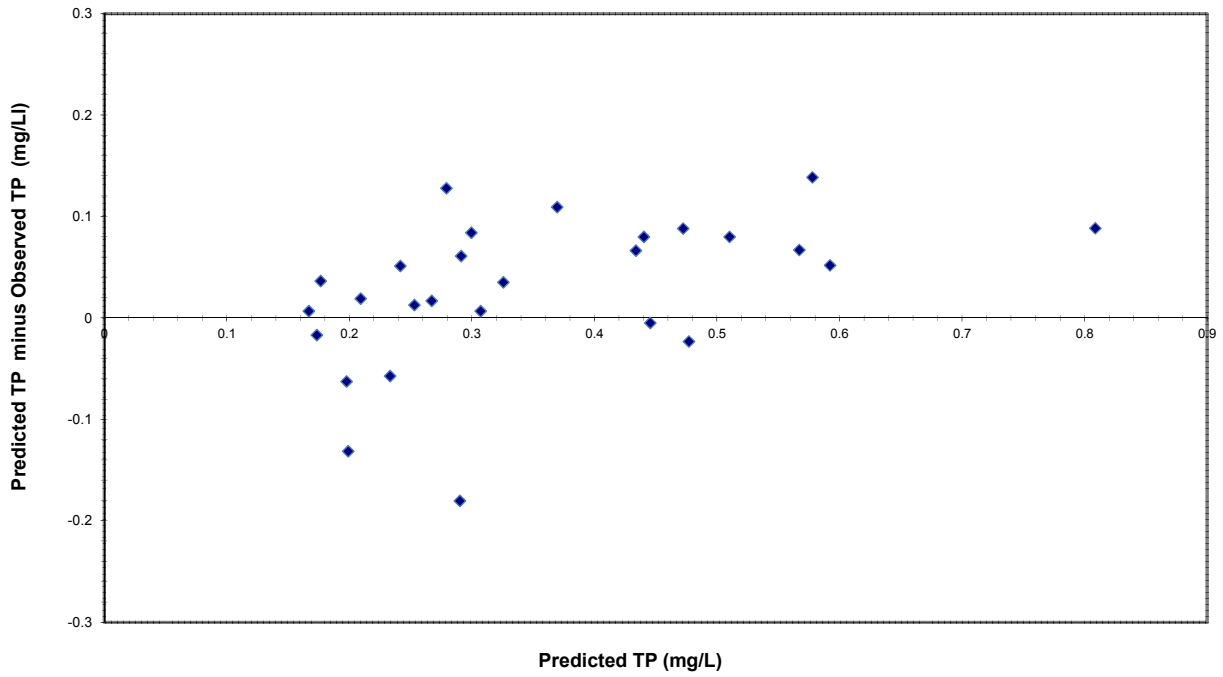


### Lower Millstone River Downstream Montgomery - Stage II STP (M4)

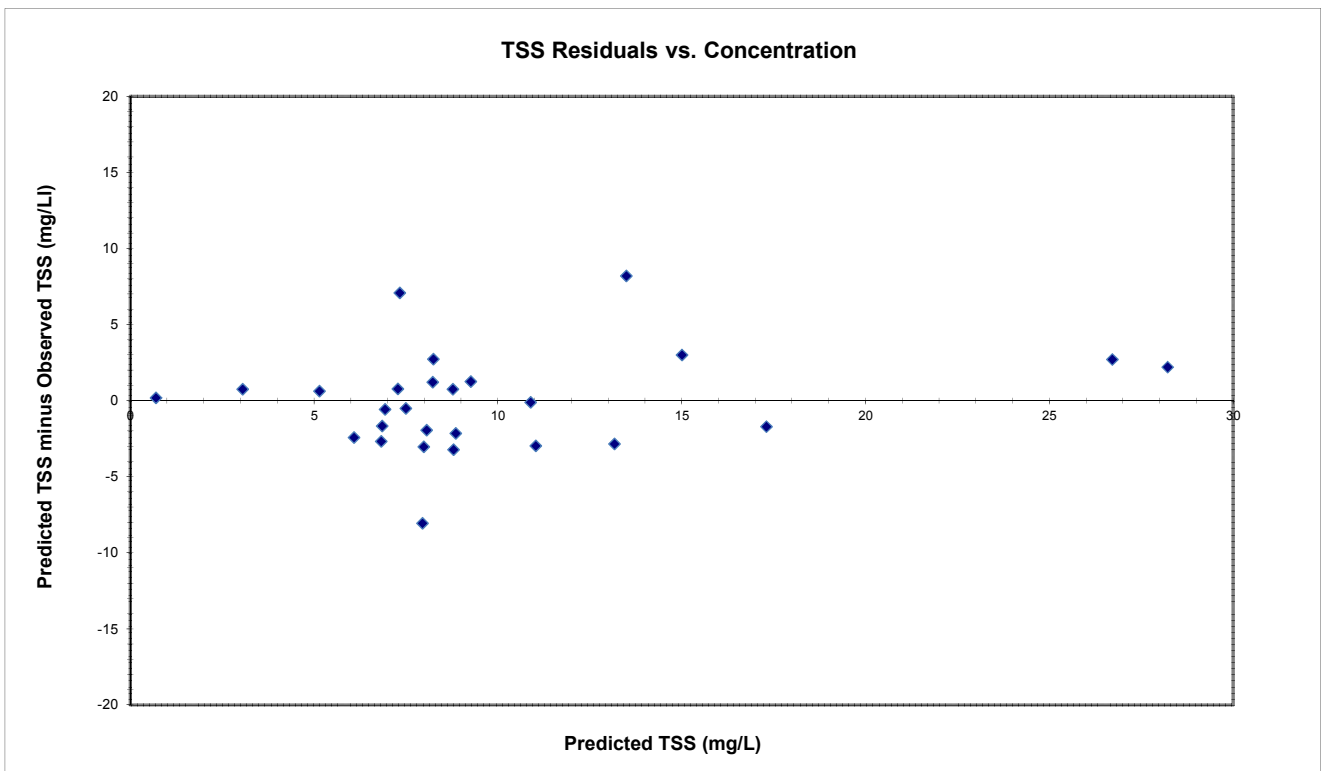
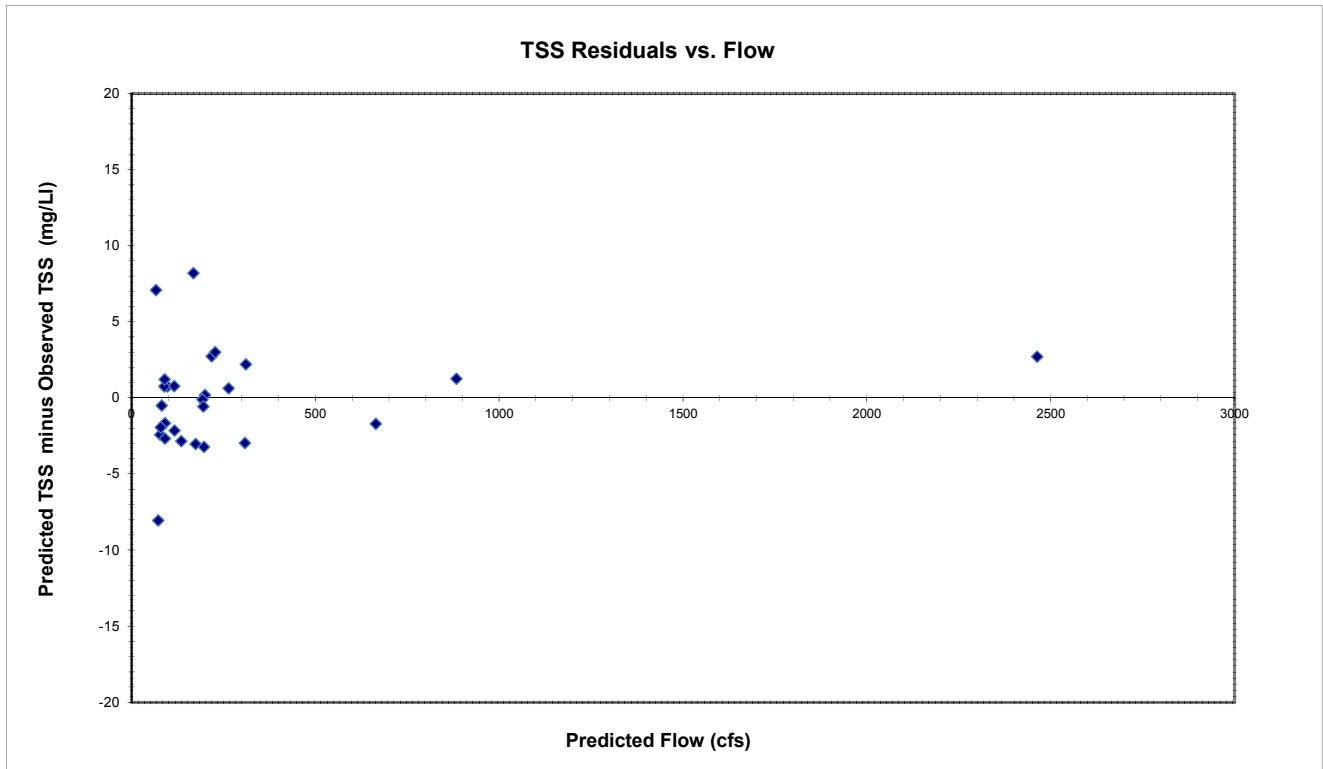
#### Total Phosphorus Residuals vs. Flow



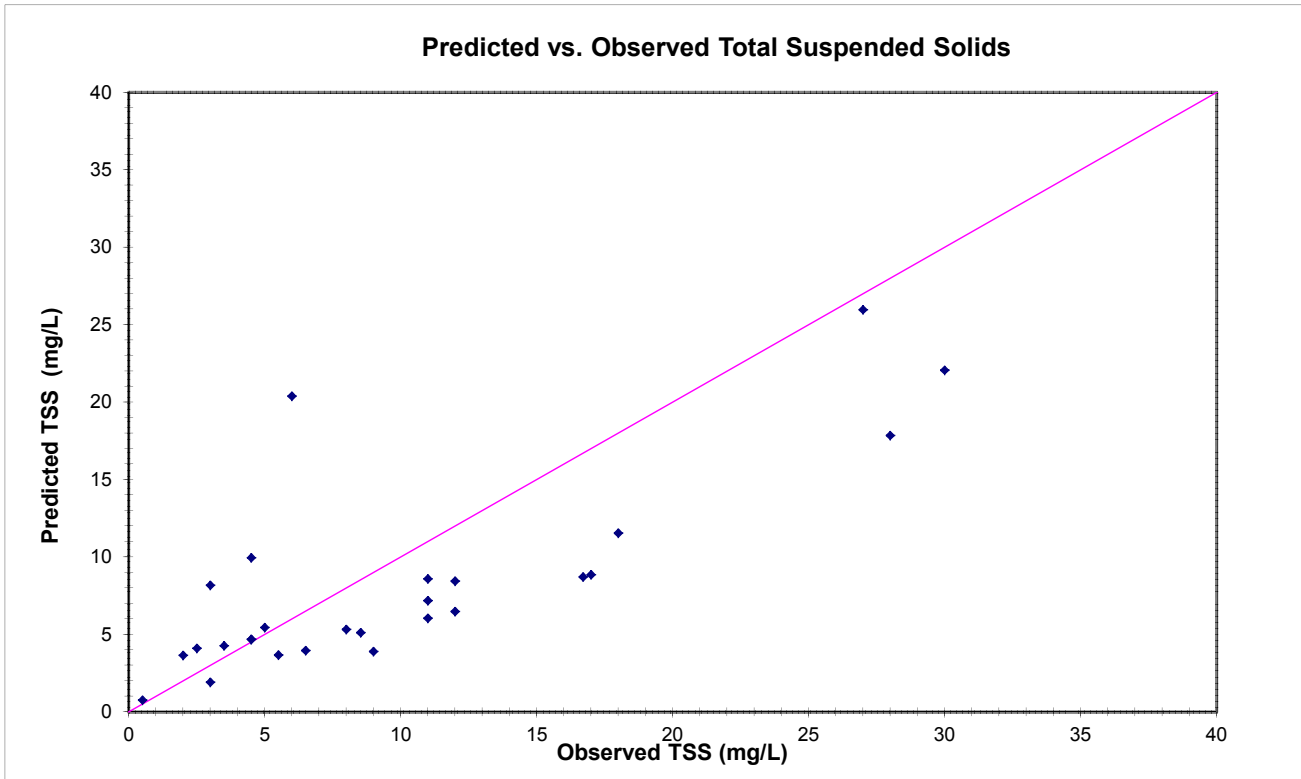
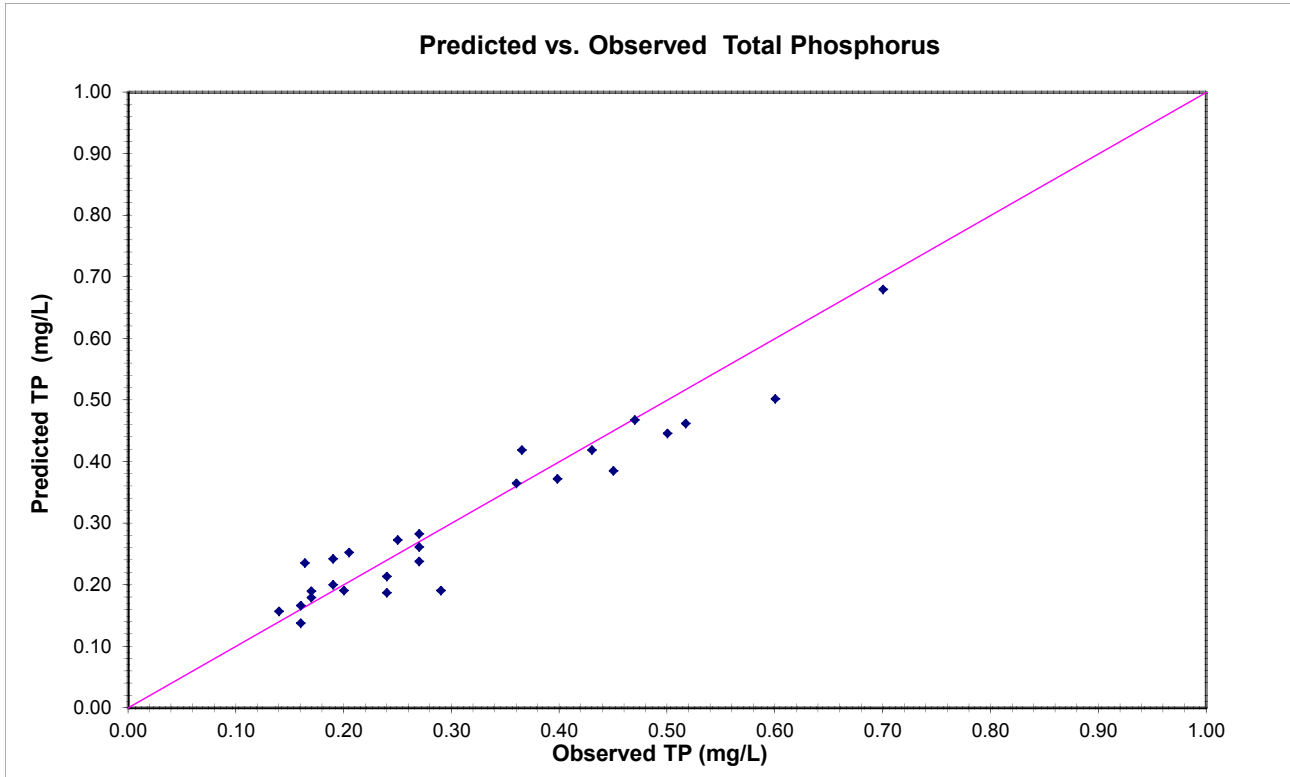
#### Total Phosphorus Residuals vs. Concentration



### Lower Millstone River Downstream Montgomery - Stage II STP (M4)

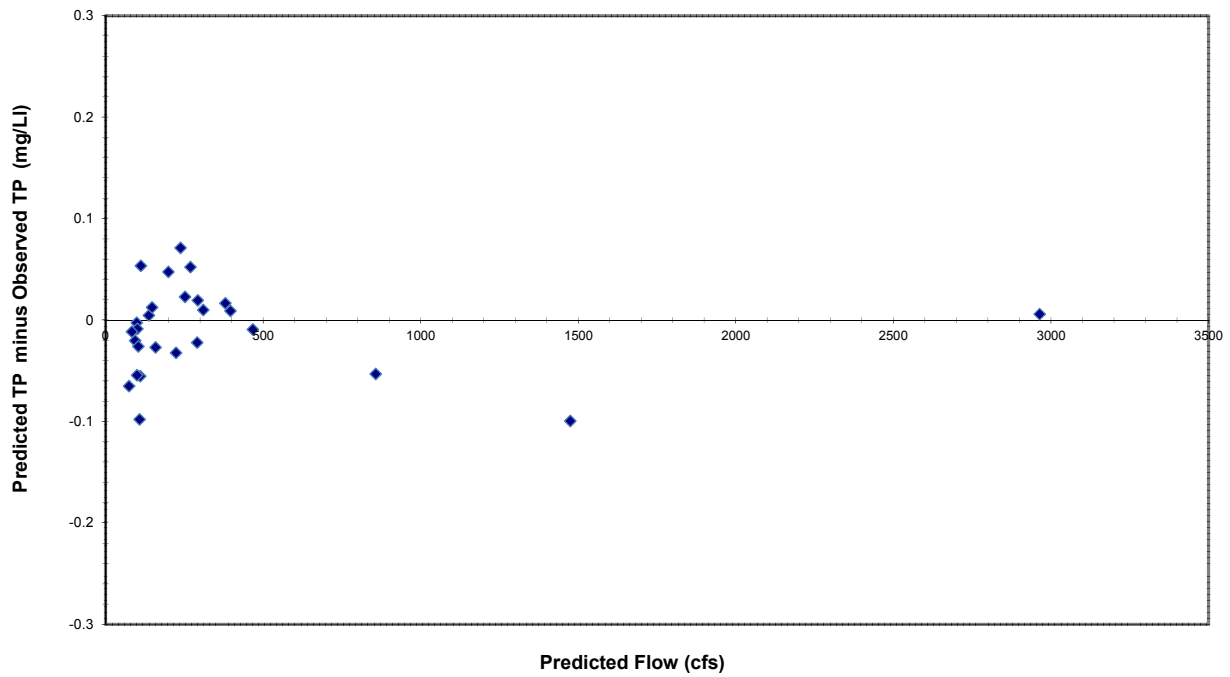


### Lower Millstone River at Griggstown (M5)

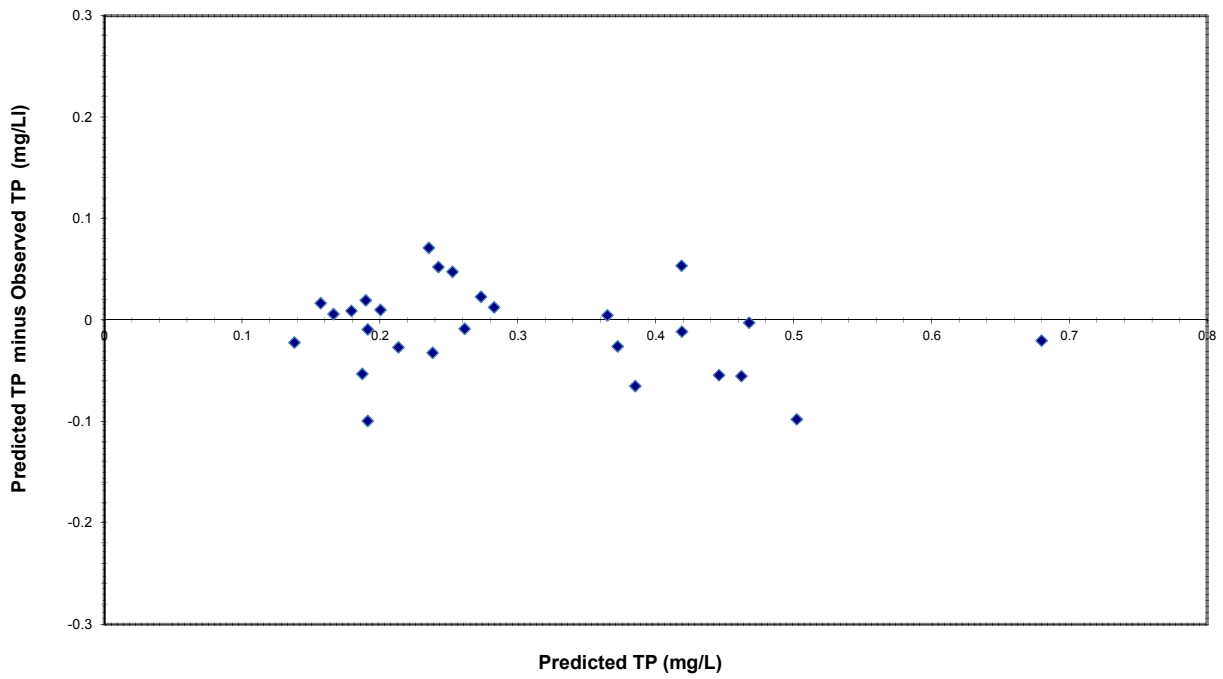


### Lower Millstone River at Griggstown (M5)

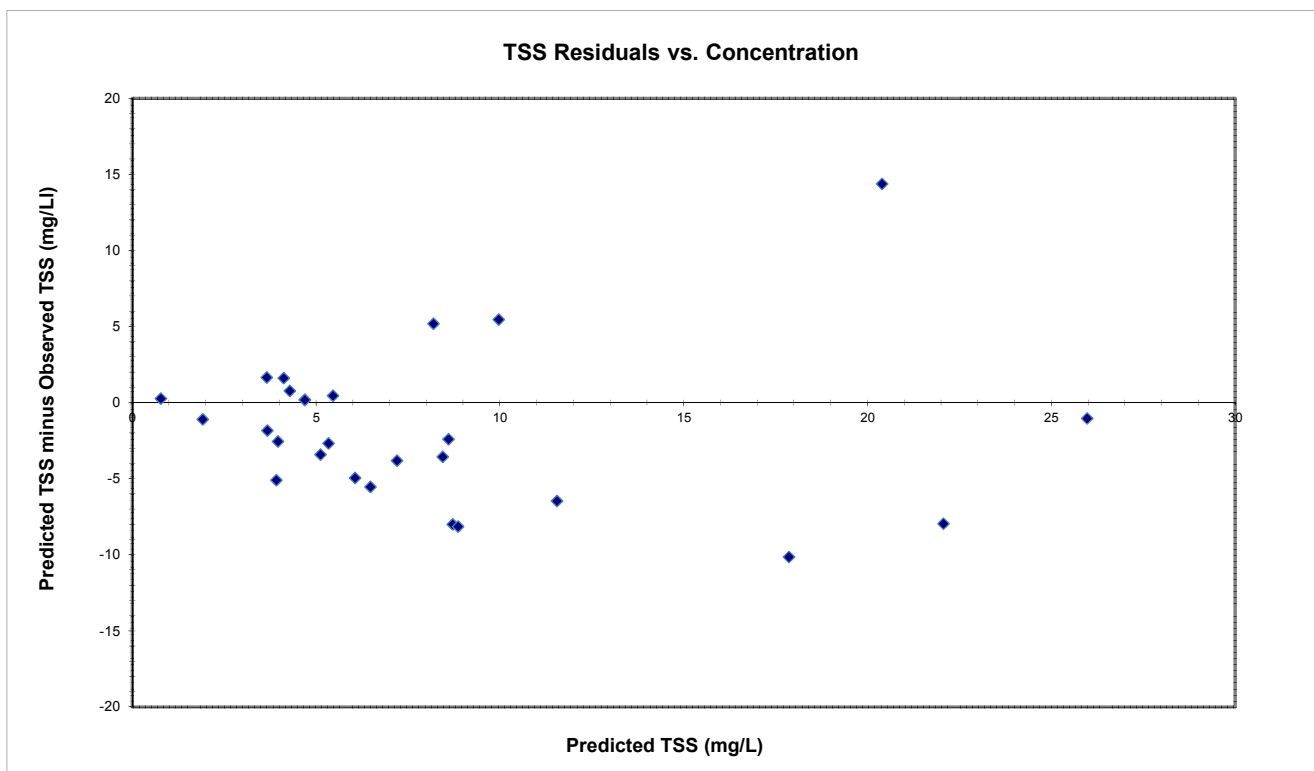
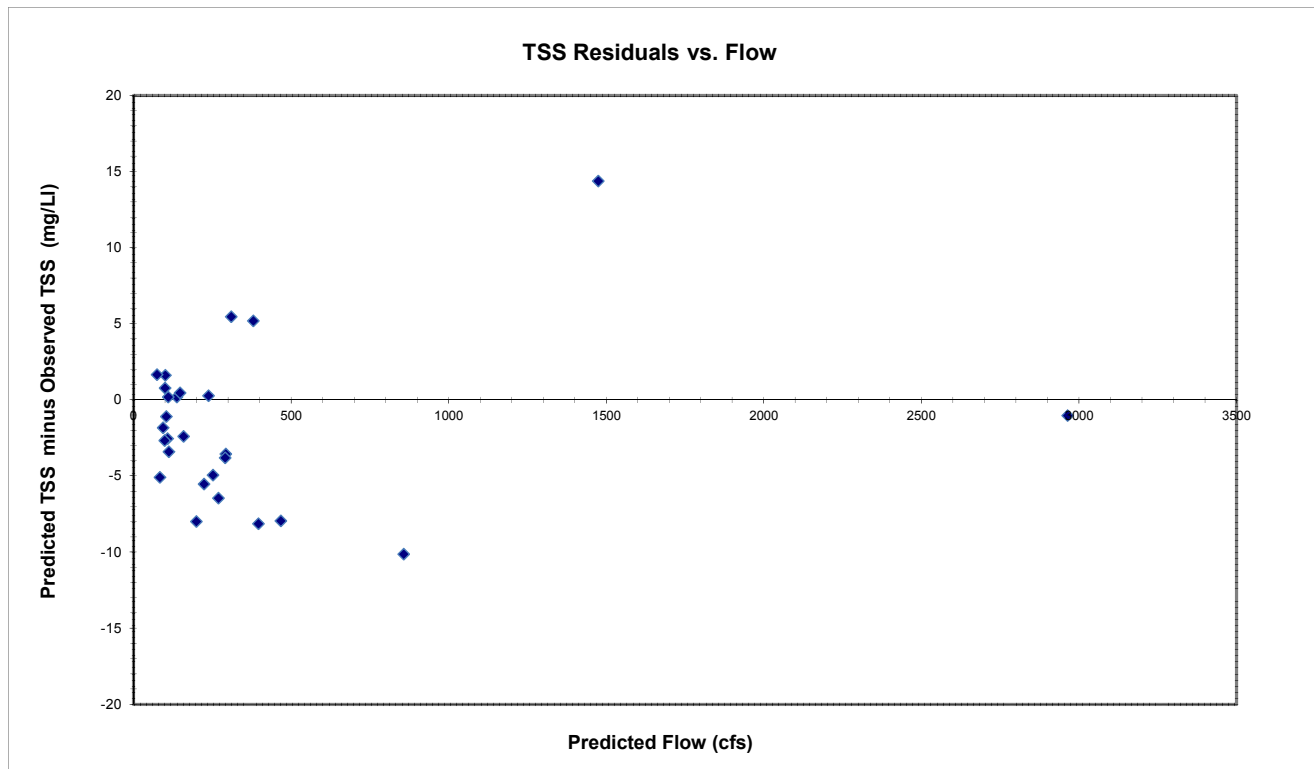
#### Total Phosphorus Residuals vs. Flow



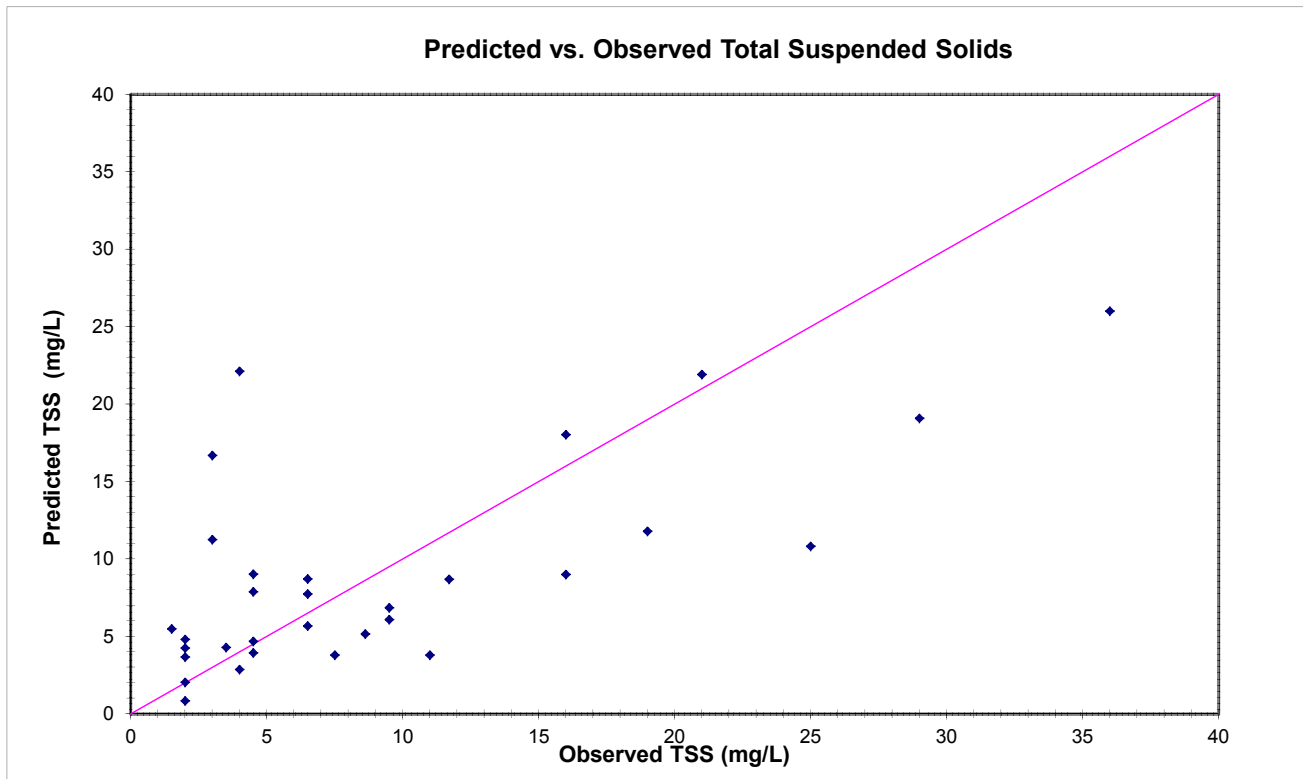
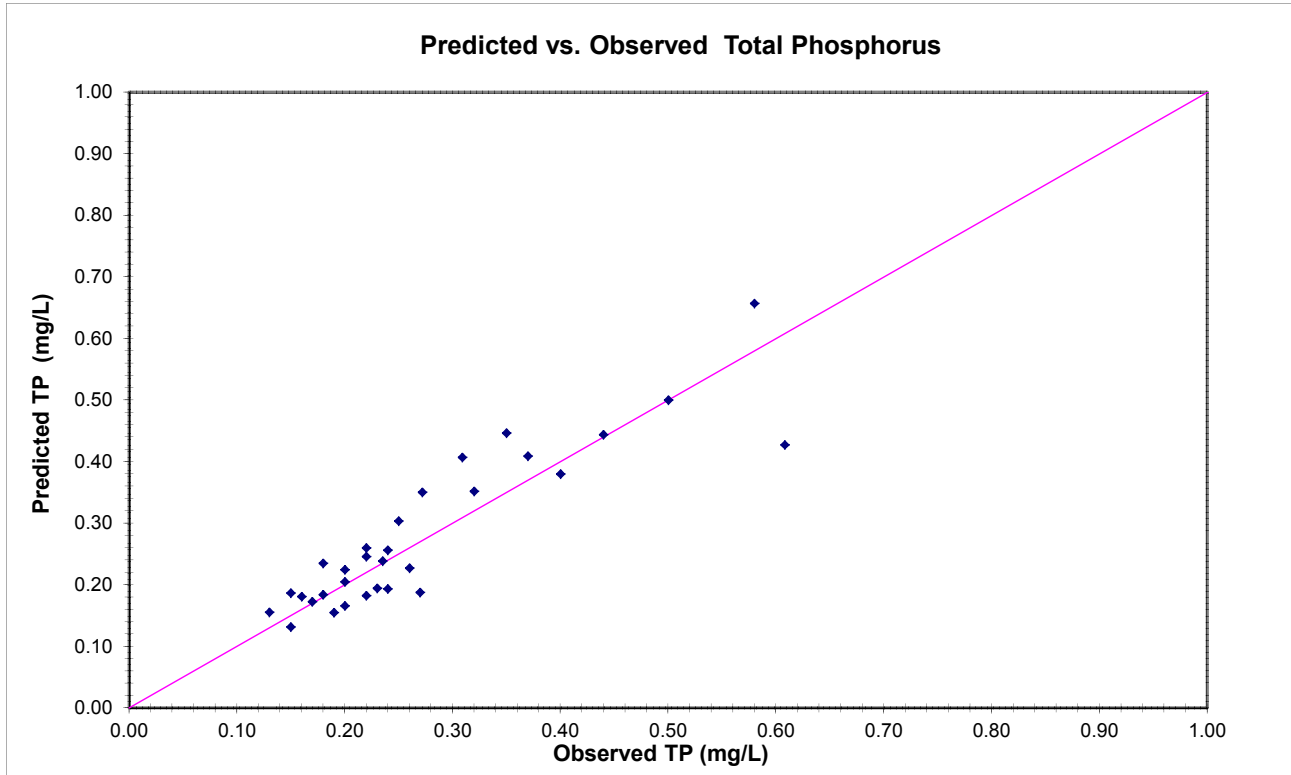
#### Total Phosphorus Residuals vs. Concentration



### Lower Millstone River at Griggstown (M5)

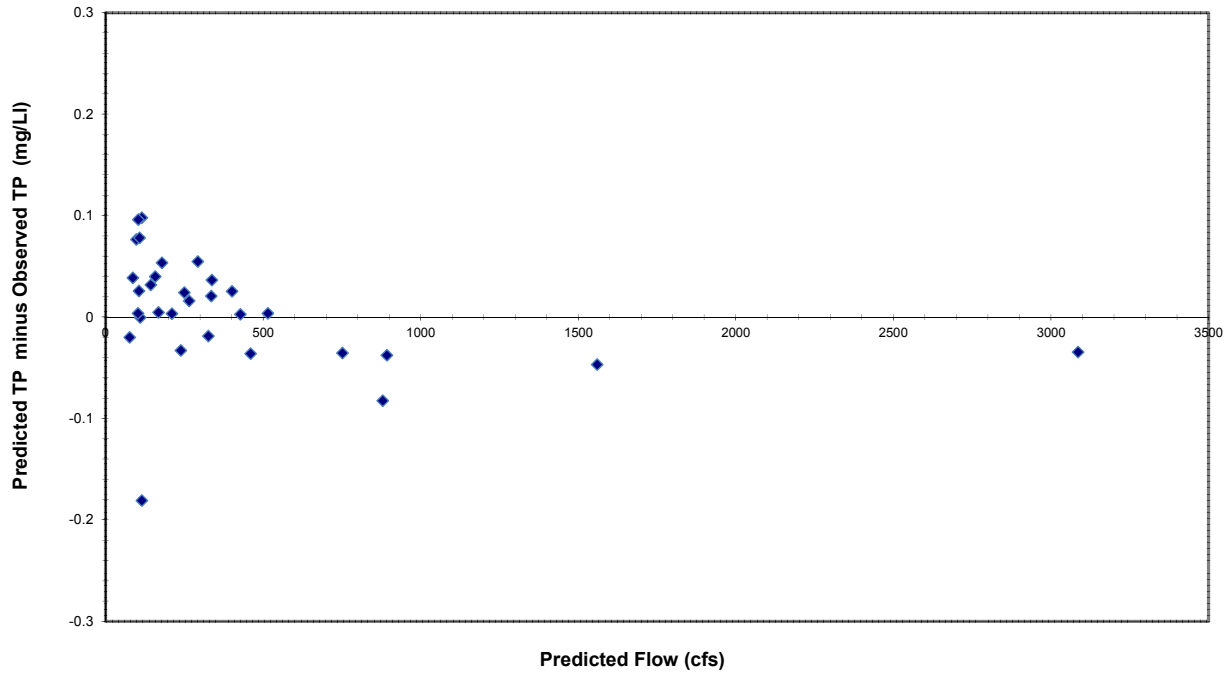


## Lower Millstone River at Blackwells Mills (M6)

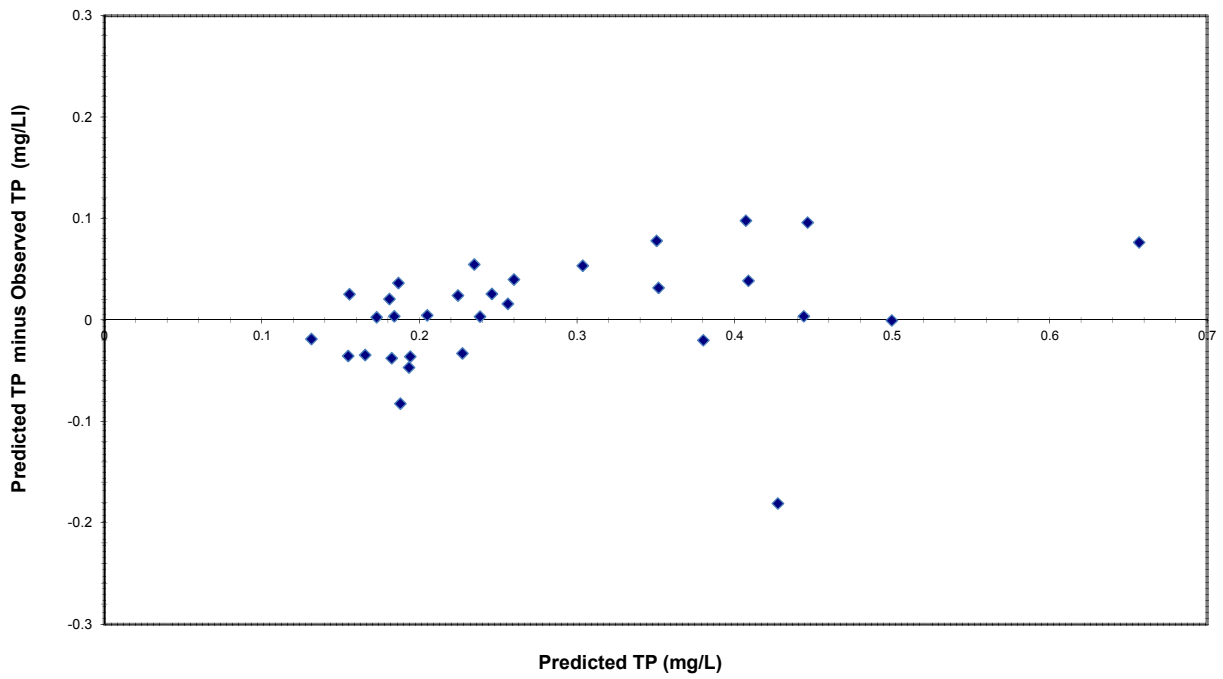


### Lower Millstone River at Blackwells Mills (M6)

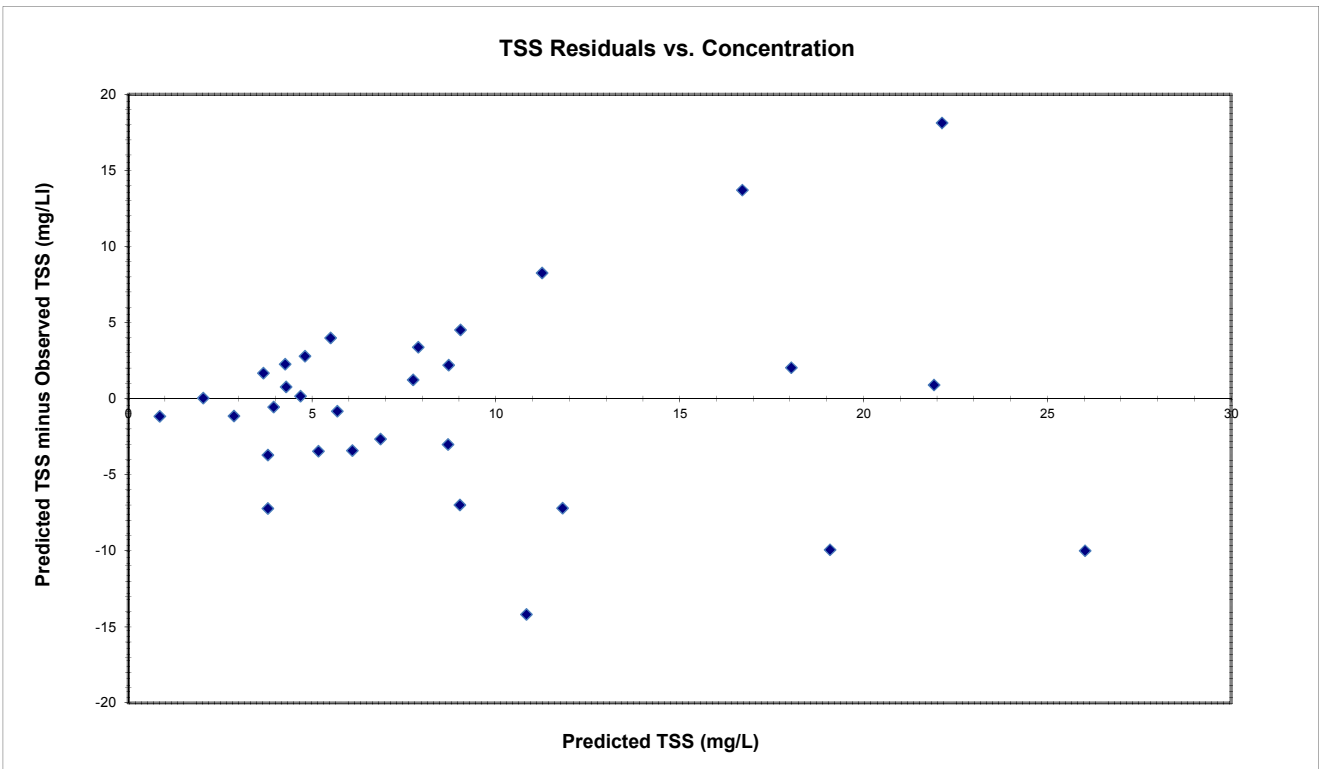
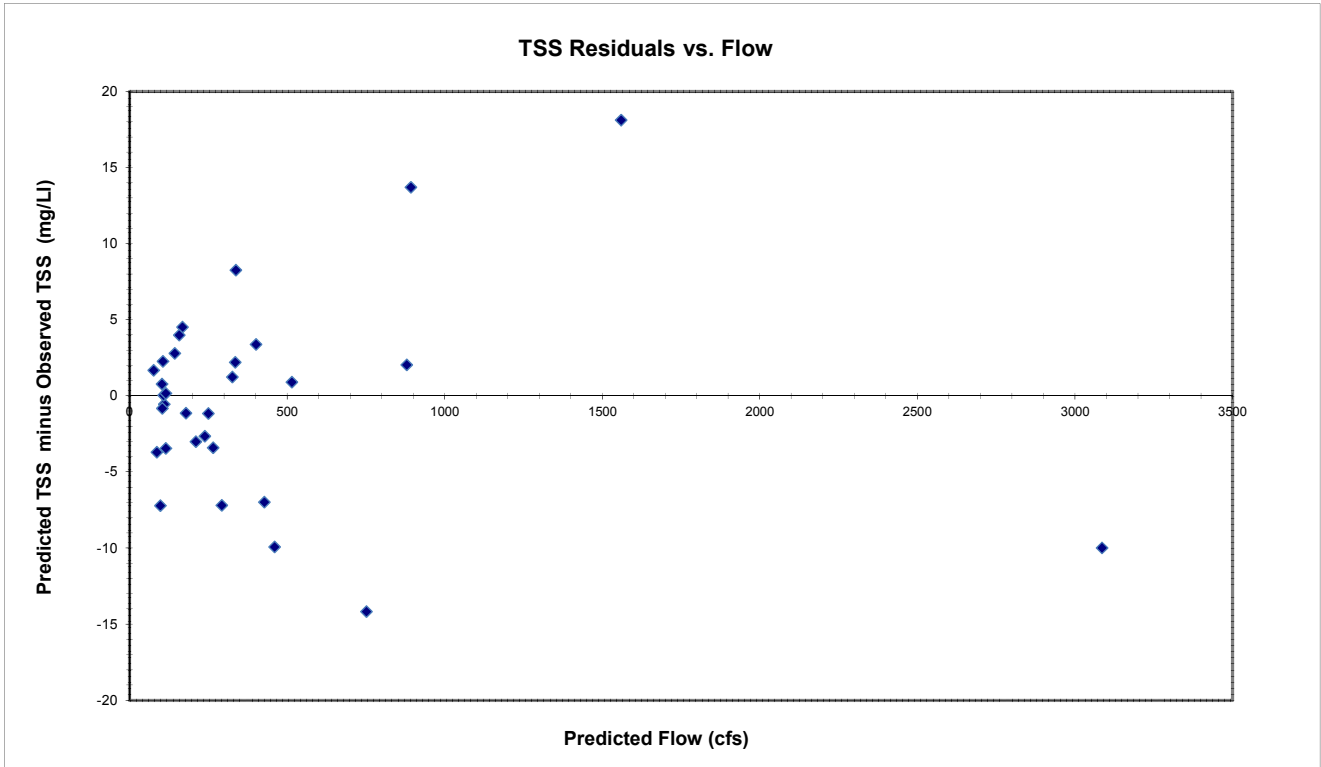
#### Total Phosphorus Residuals vs. Flow



#### Total Phosphorus Residuals vs. Concentration

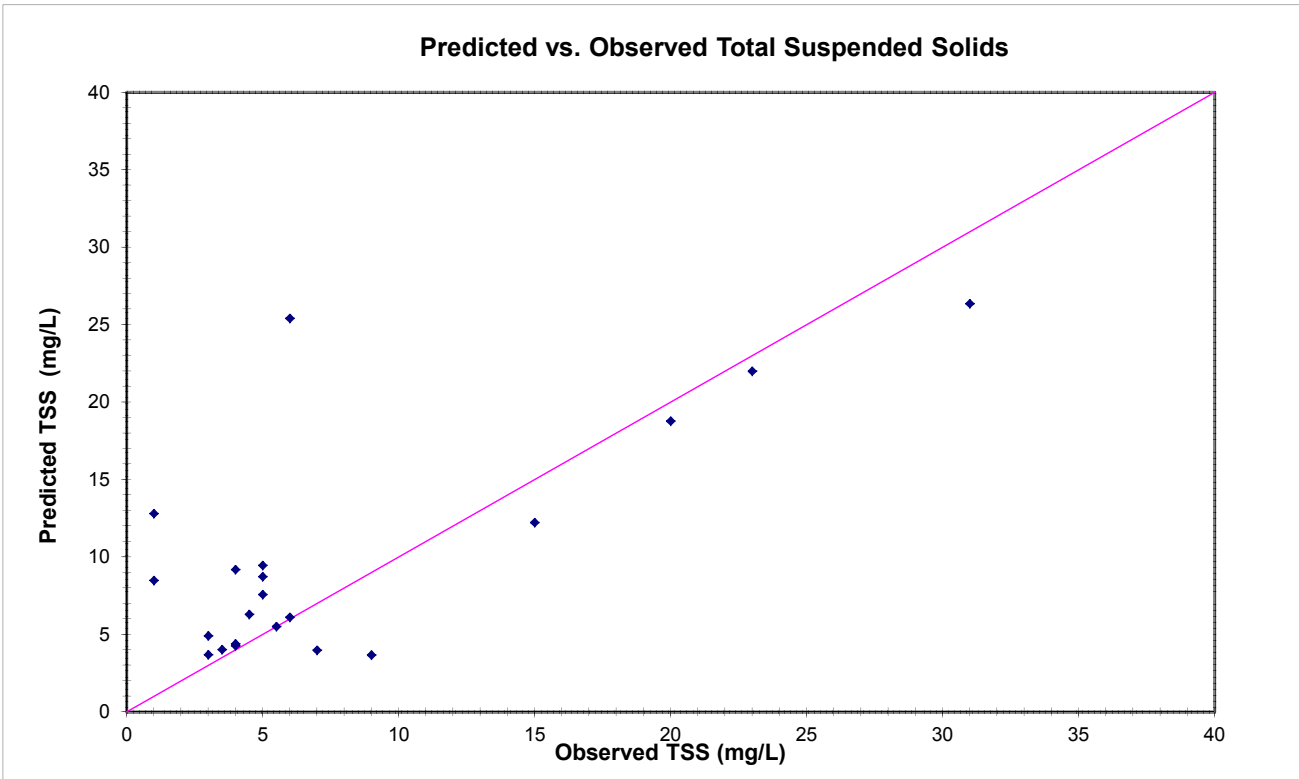
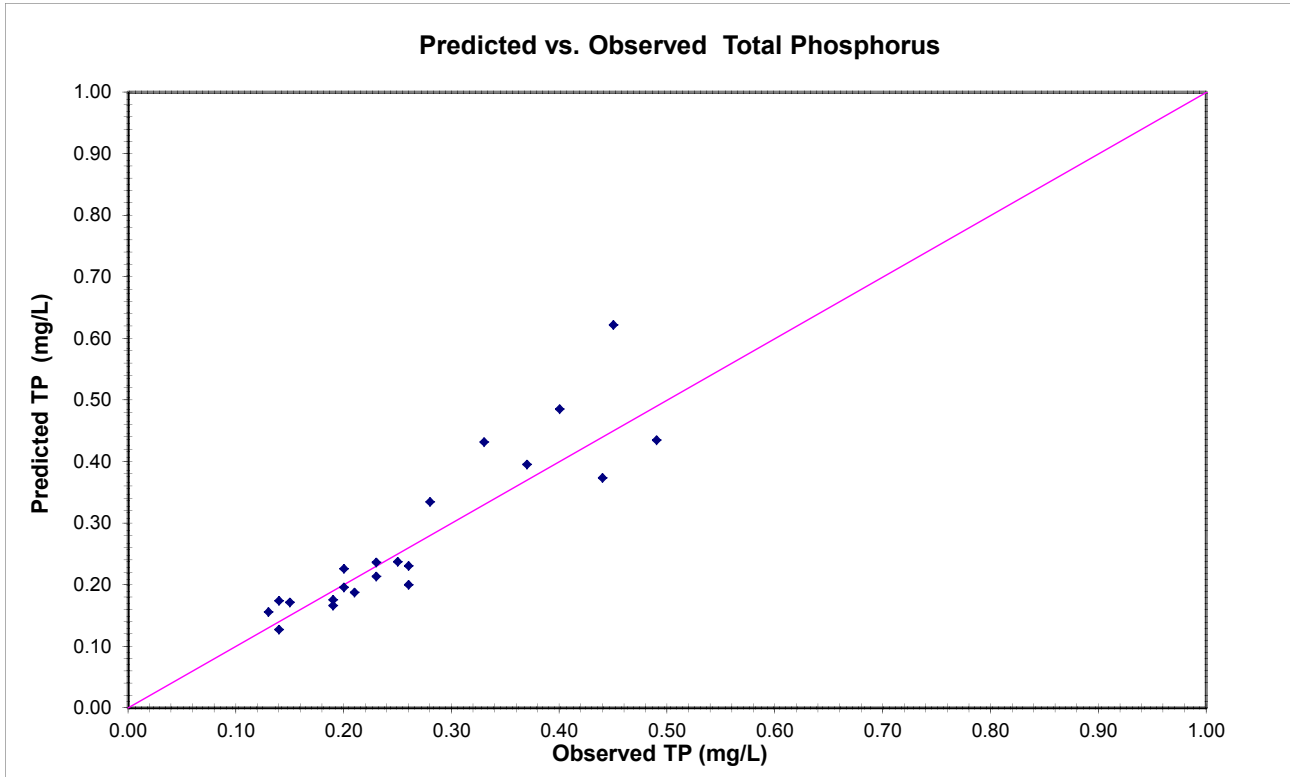


### Lower Millstone River at Blackwells Mills (M6)



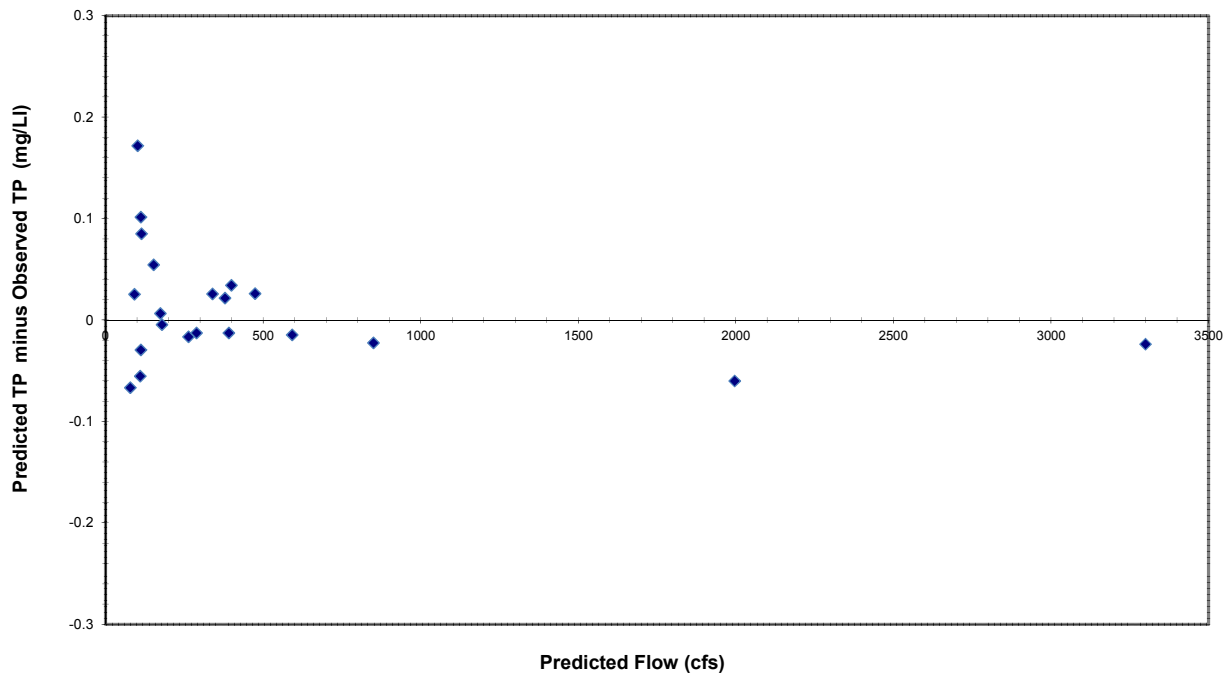


### Lower Millstone River at Manville (M7)

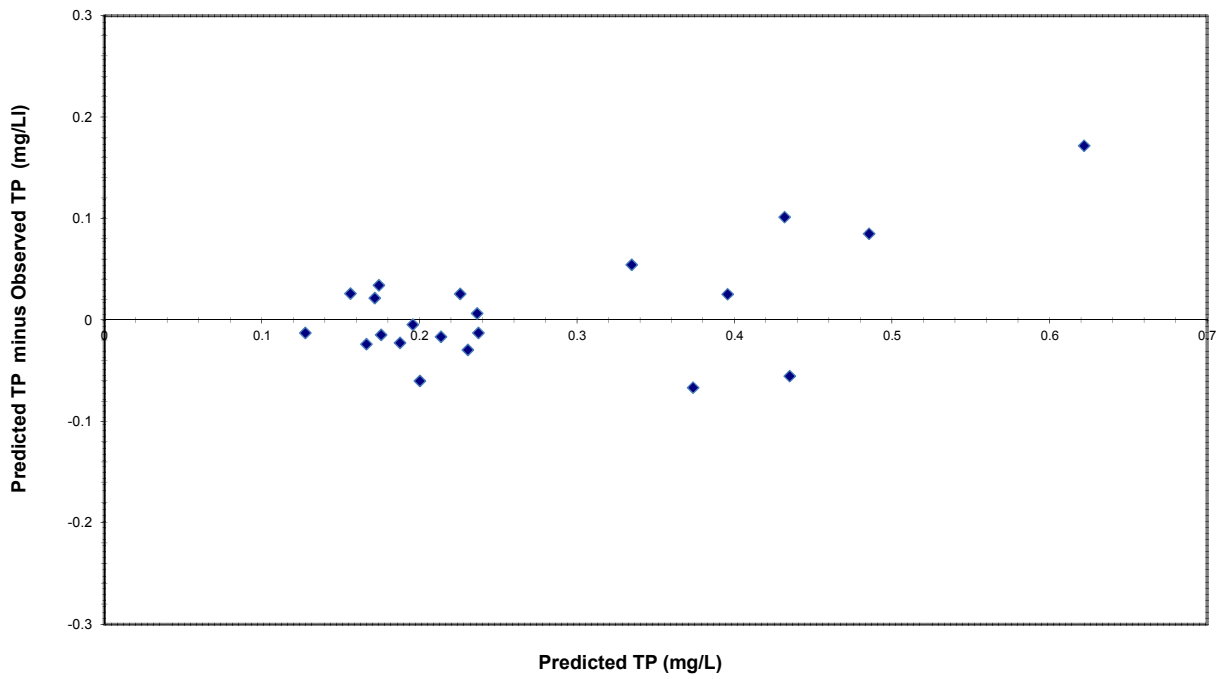


### Lower Millstone River at Manville (M7)

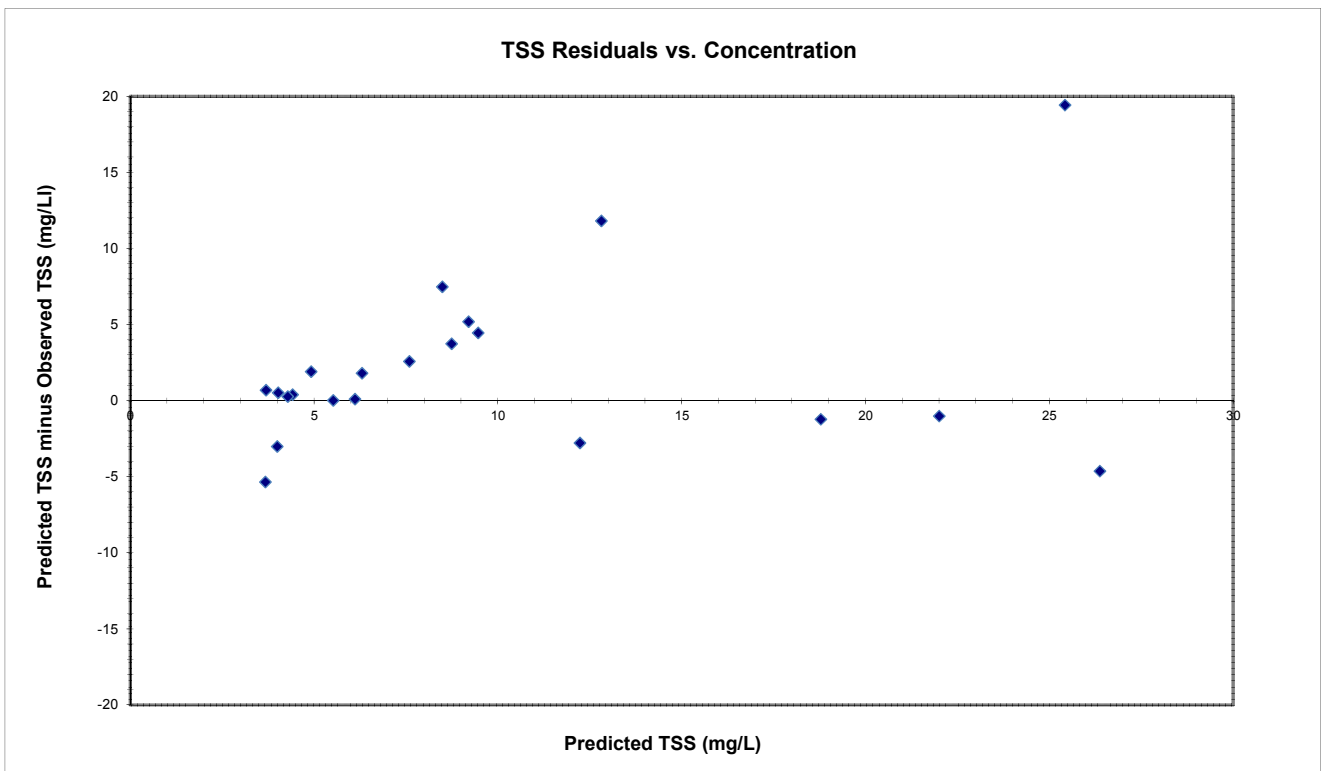
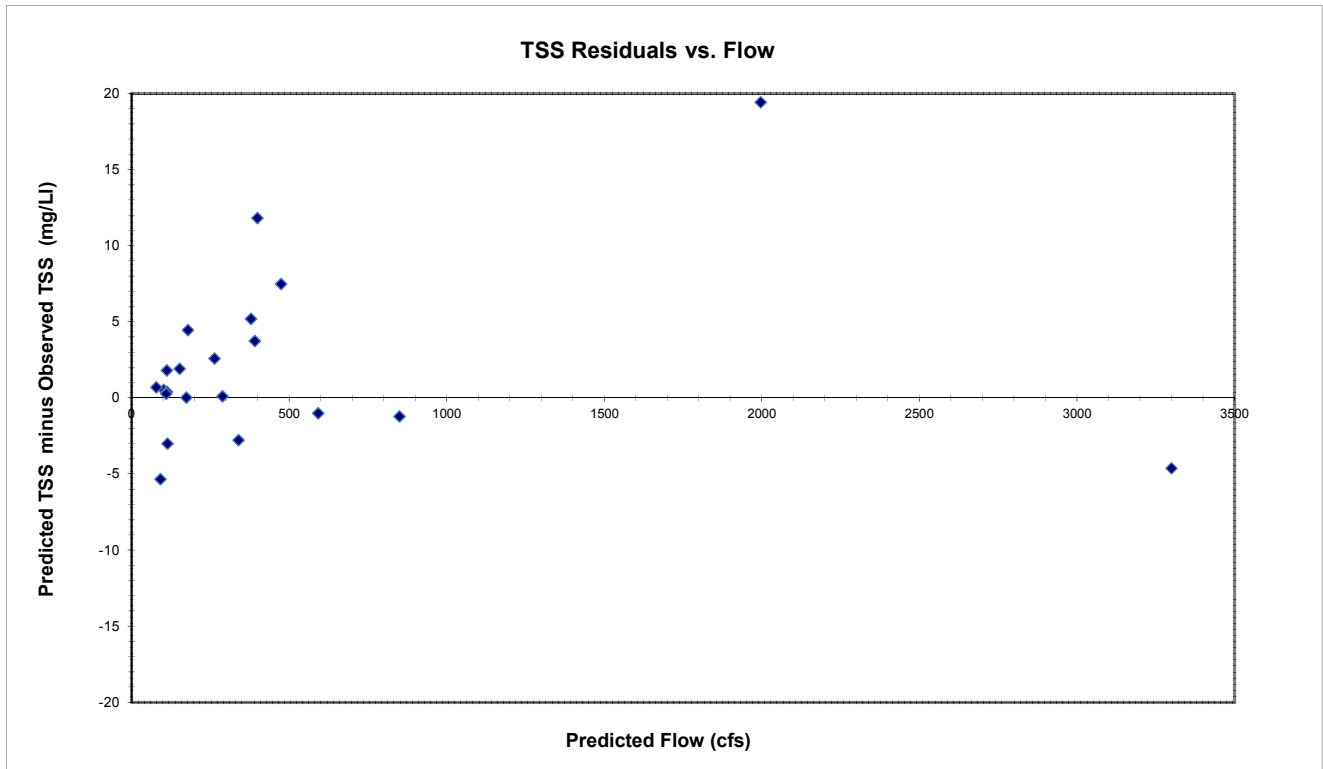
#### Total Phosphorus Residuals vs. Flow



#### Total Phosphorus Residuals vs. Concentration



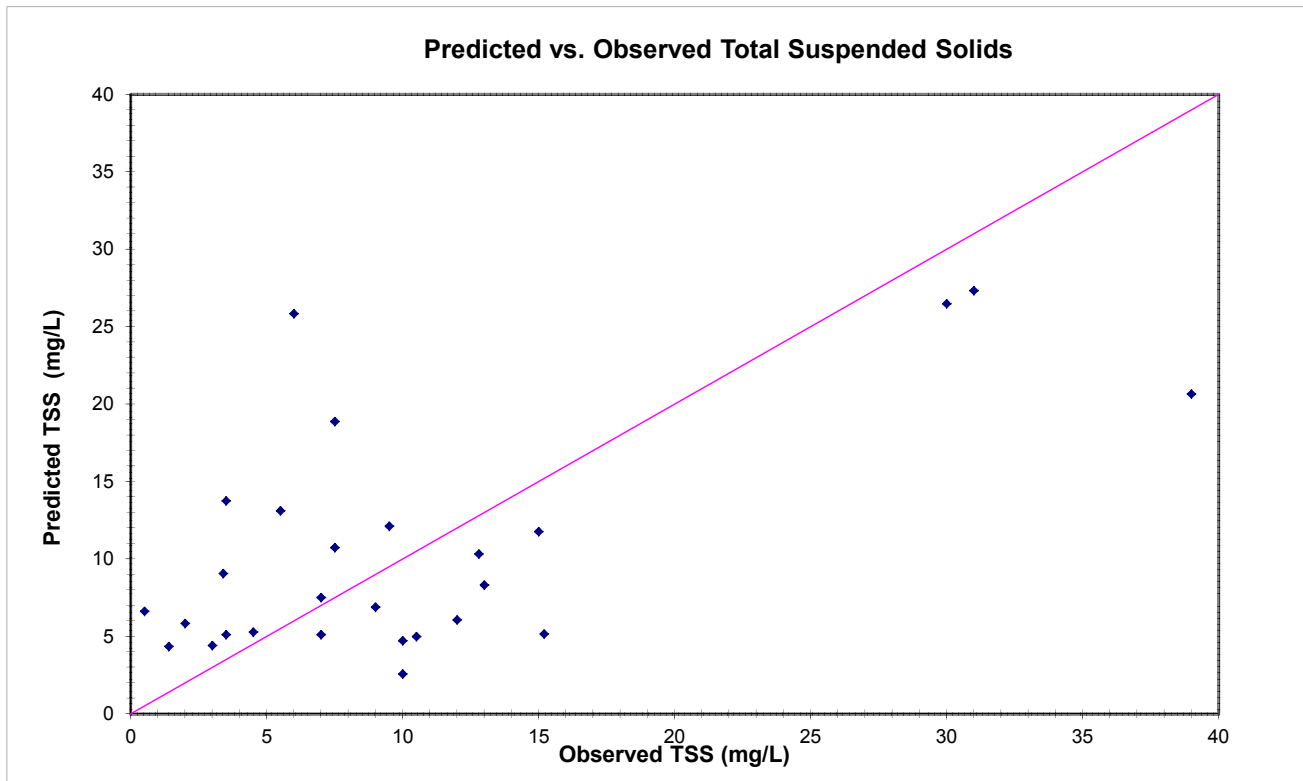
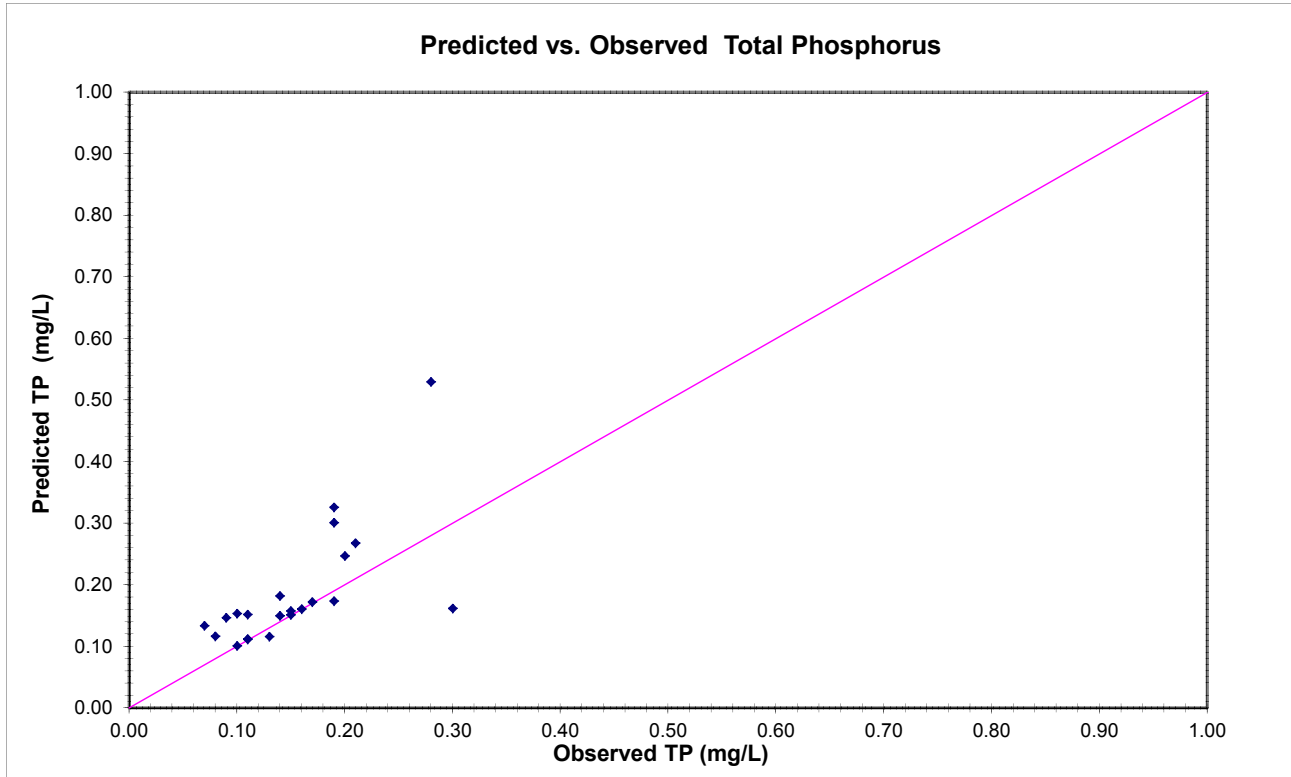
### Lower Millstone River at Manville (M7)



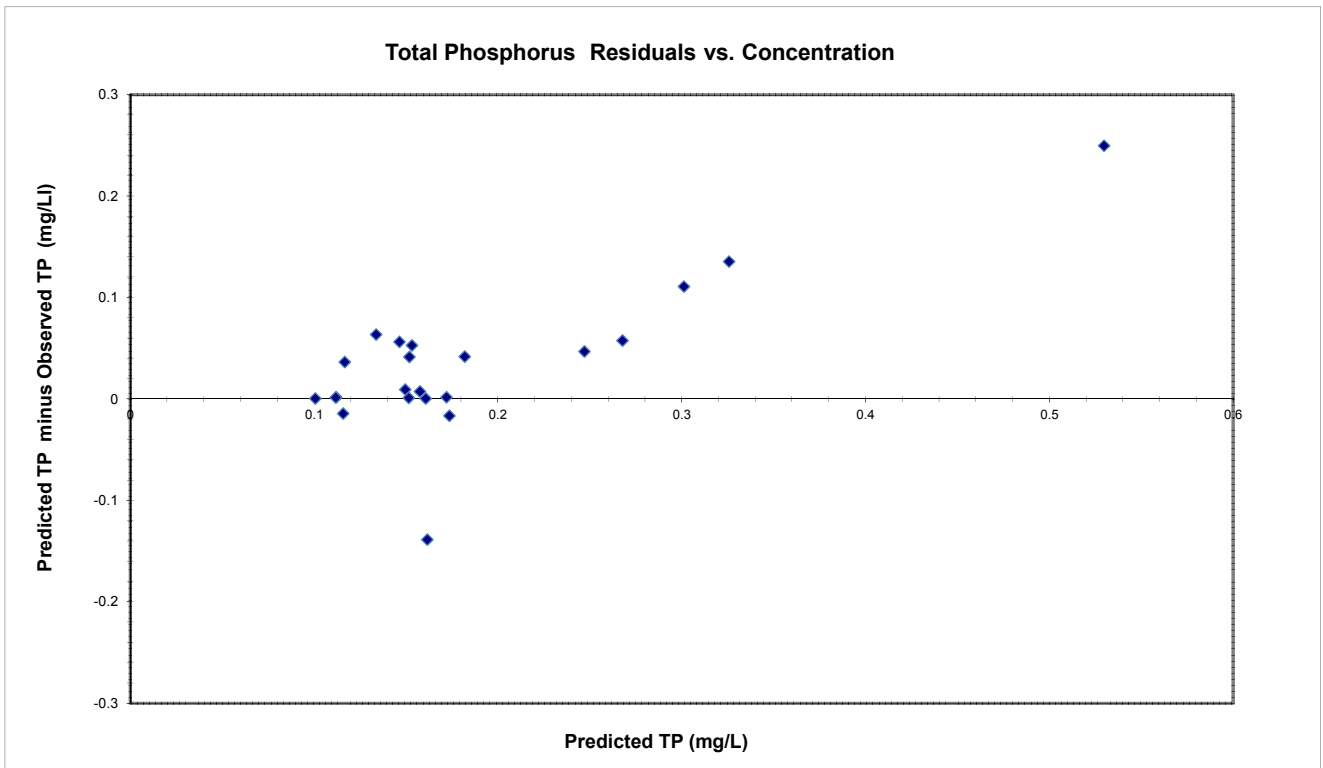
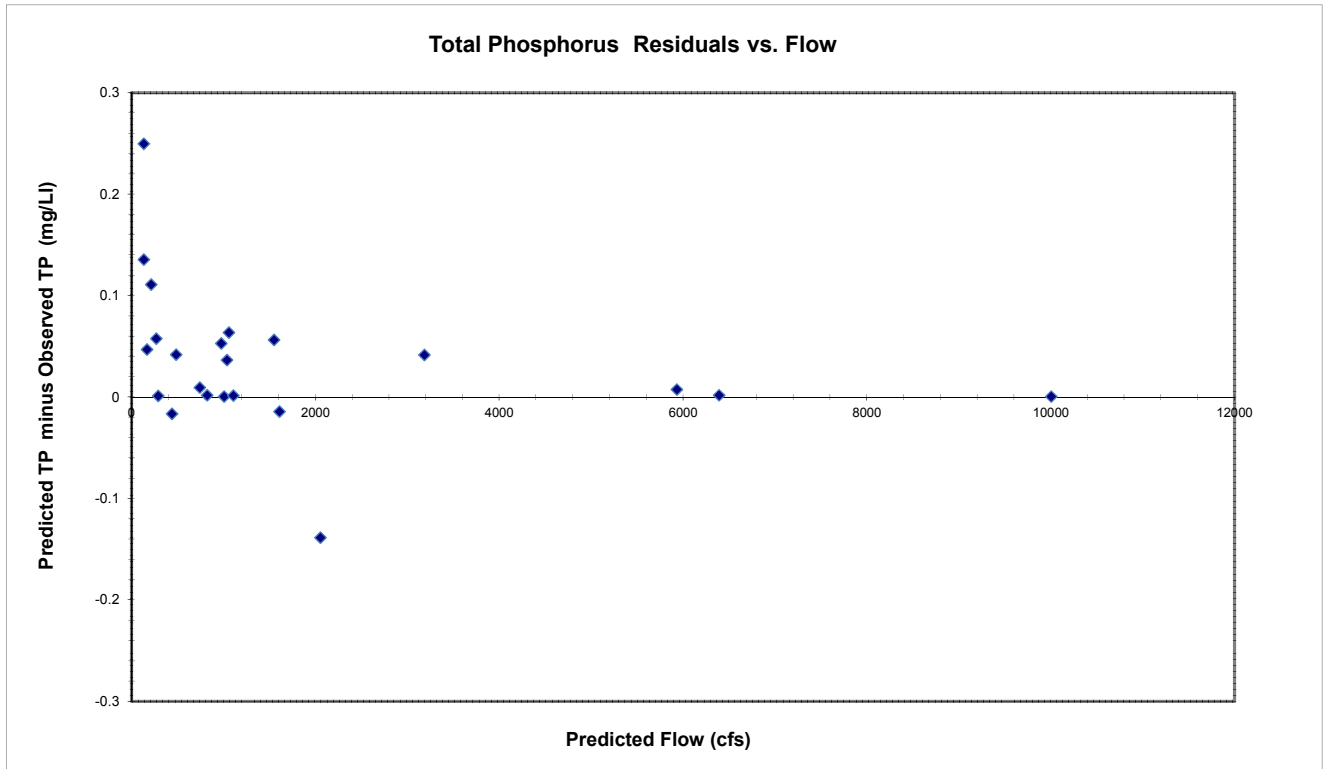
Mainstem Raritan River Watershed Area Model

Goodness of Fit Graphs for TP and TSS  
Predicted vs Observed  
Residuals vs Flow  
Residuals vs Concentration

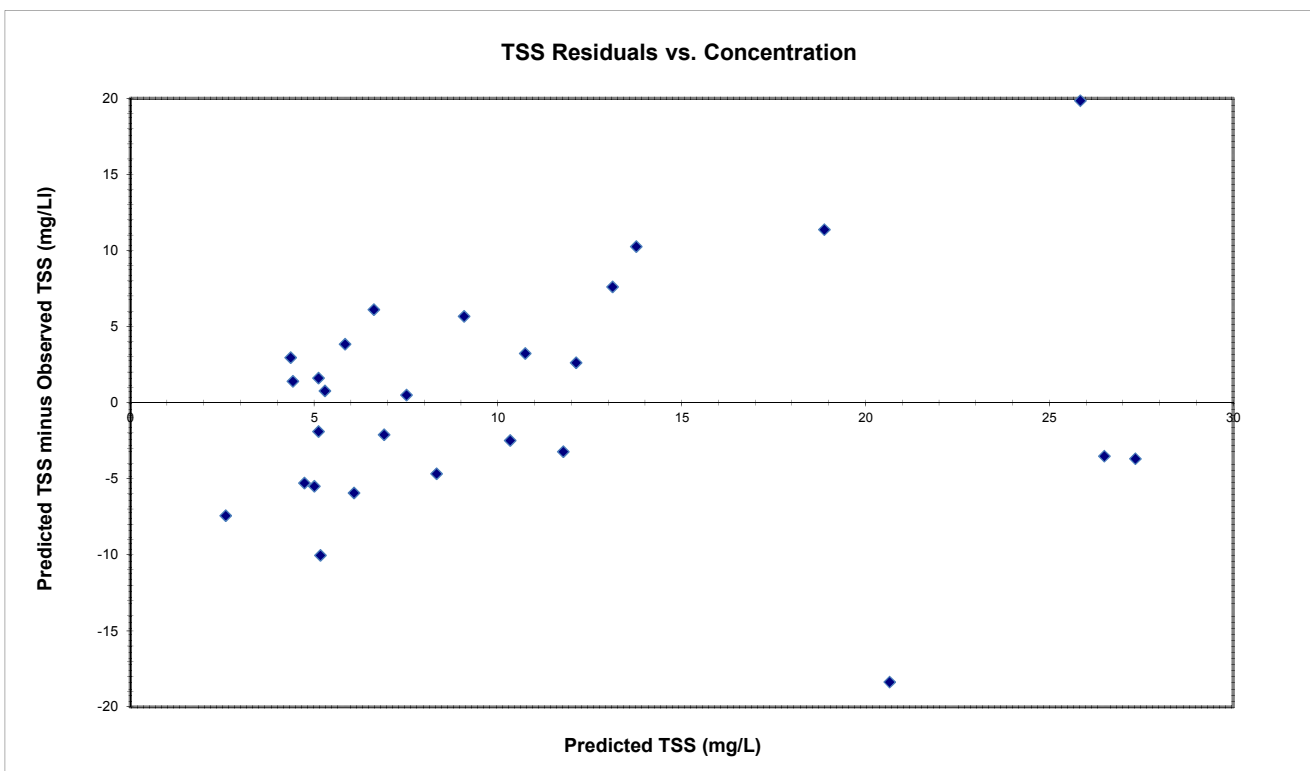
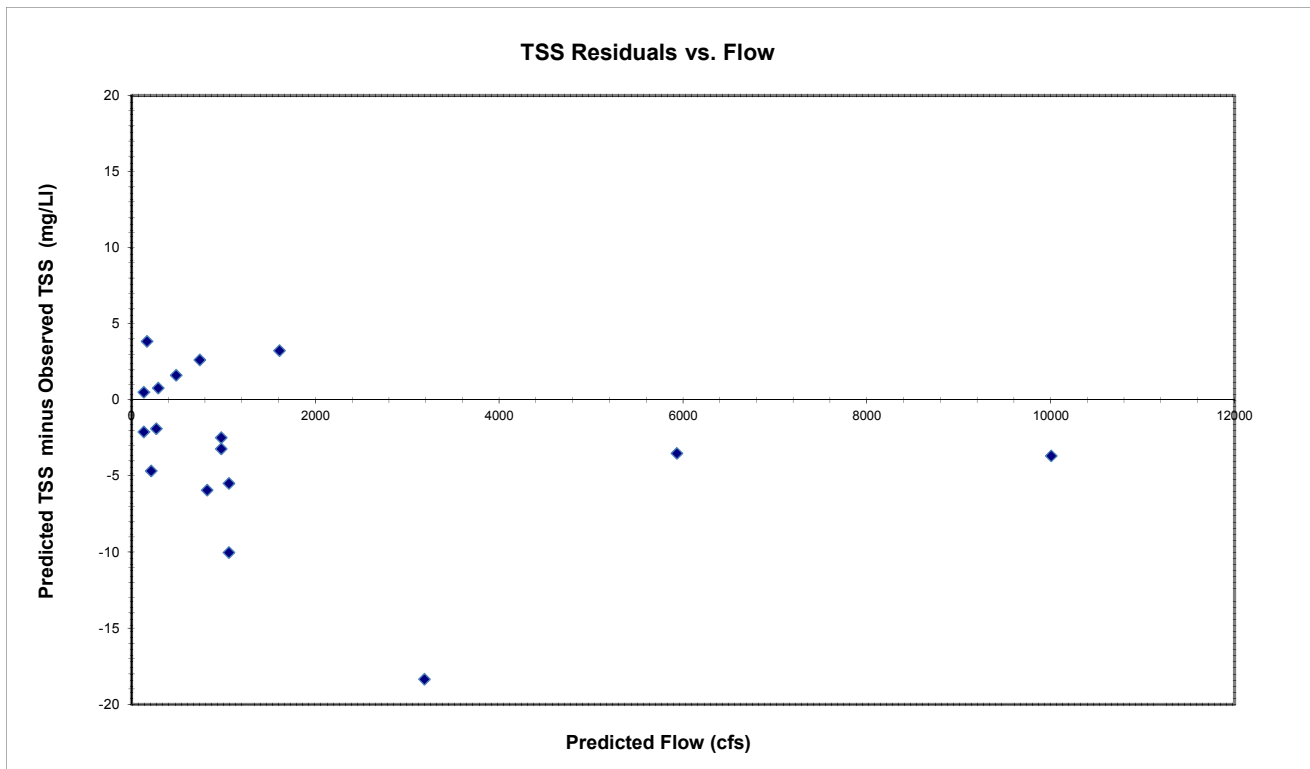
## Raritan River Downstream Millstone River Confluence (R2)



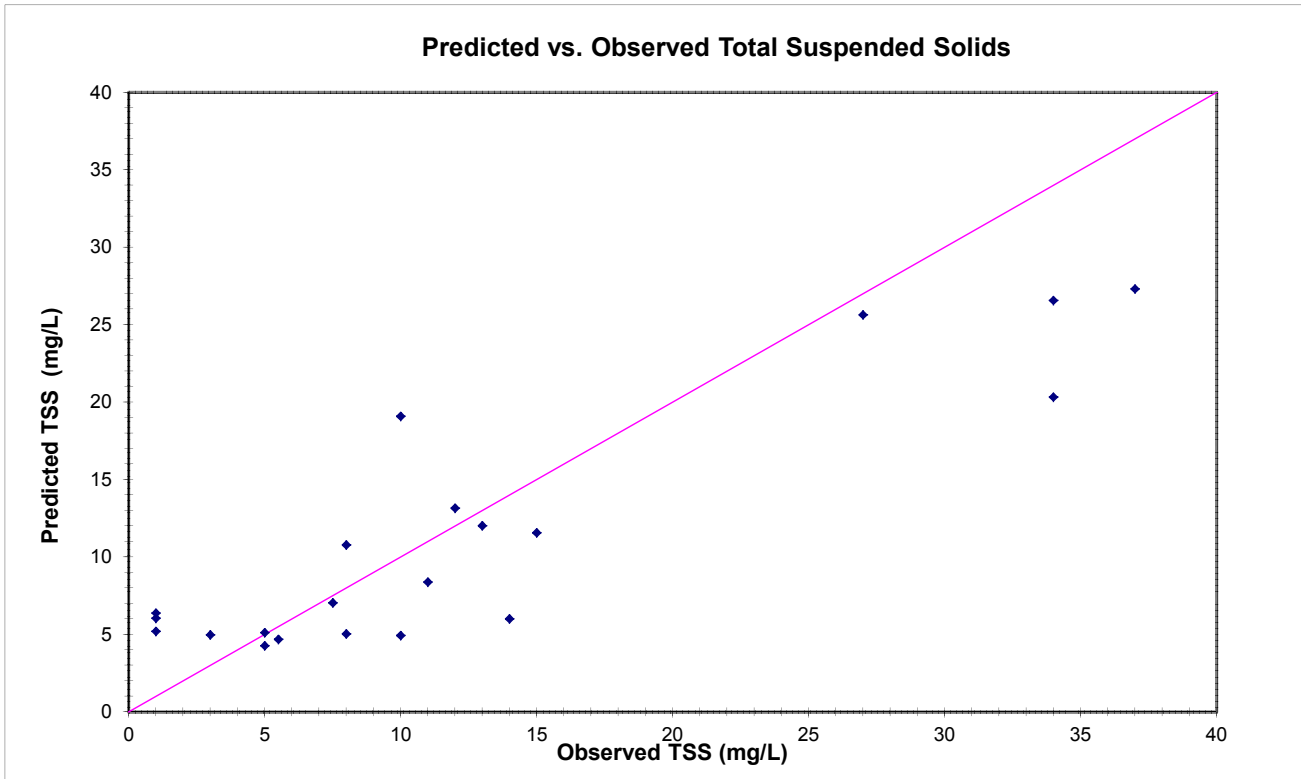
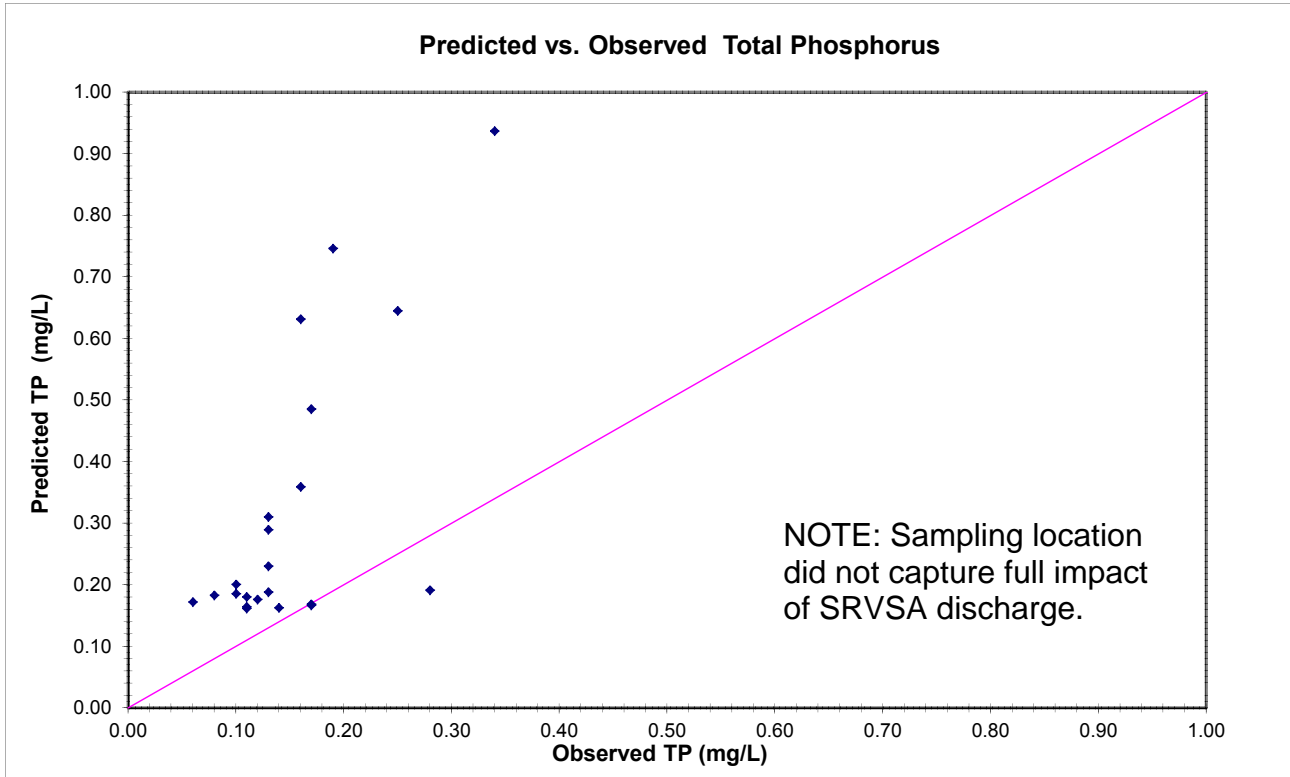
### Raritan River Downstream Millstone River Confluence (R2)



### Raritan River Downstream Millstone River Confluence (R2)



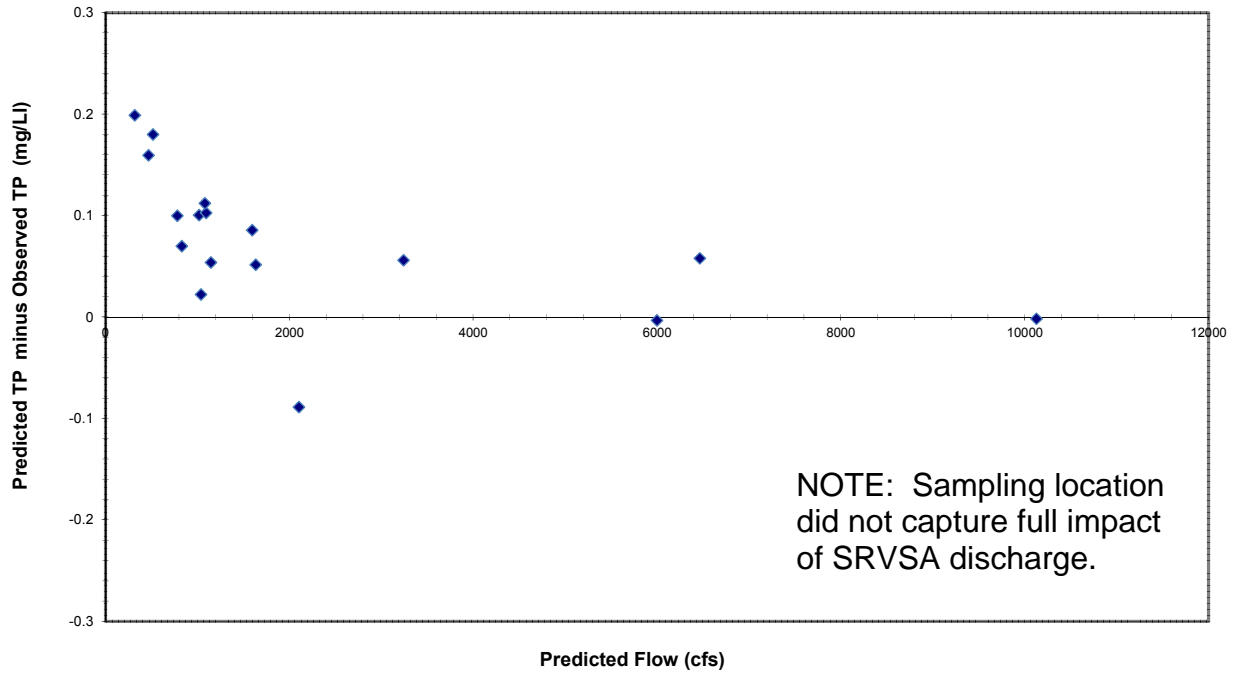
### Raritan River @ I-287 bridge (R3)



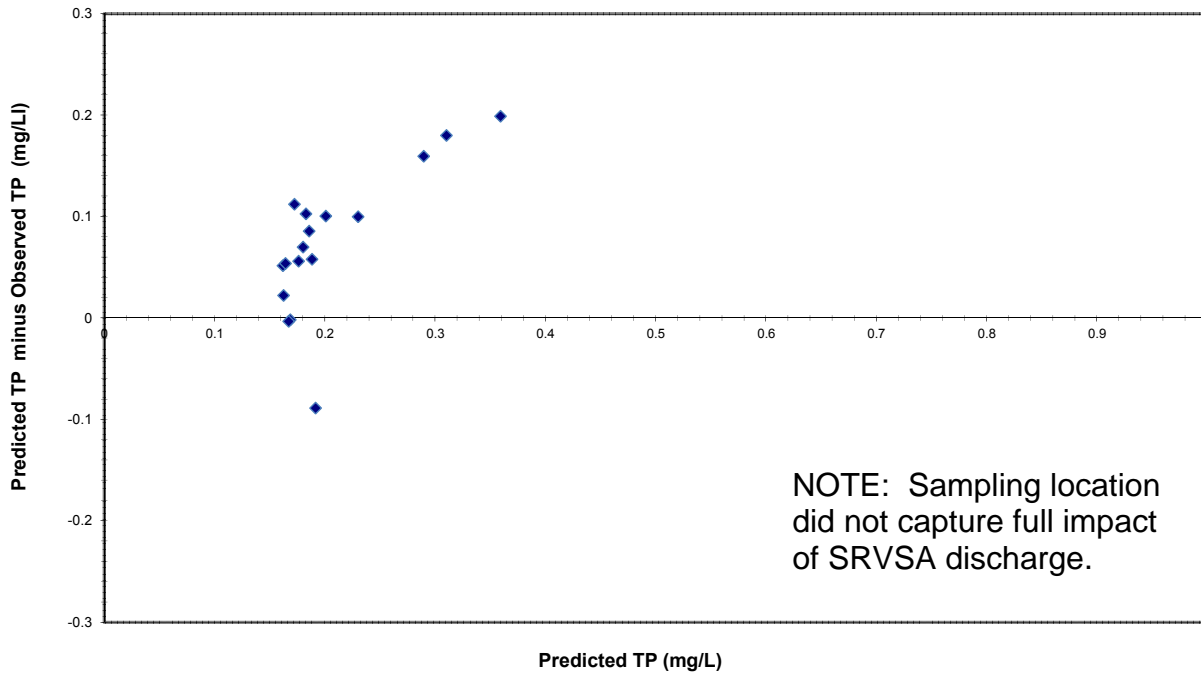


Raritan River @ I-287 bridge (R3)

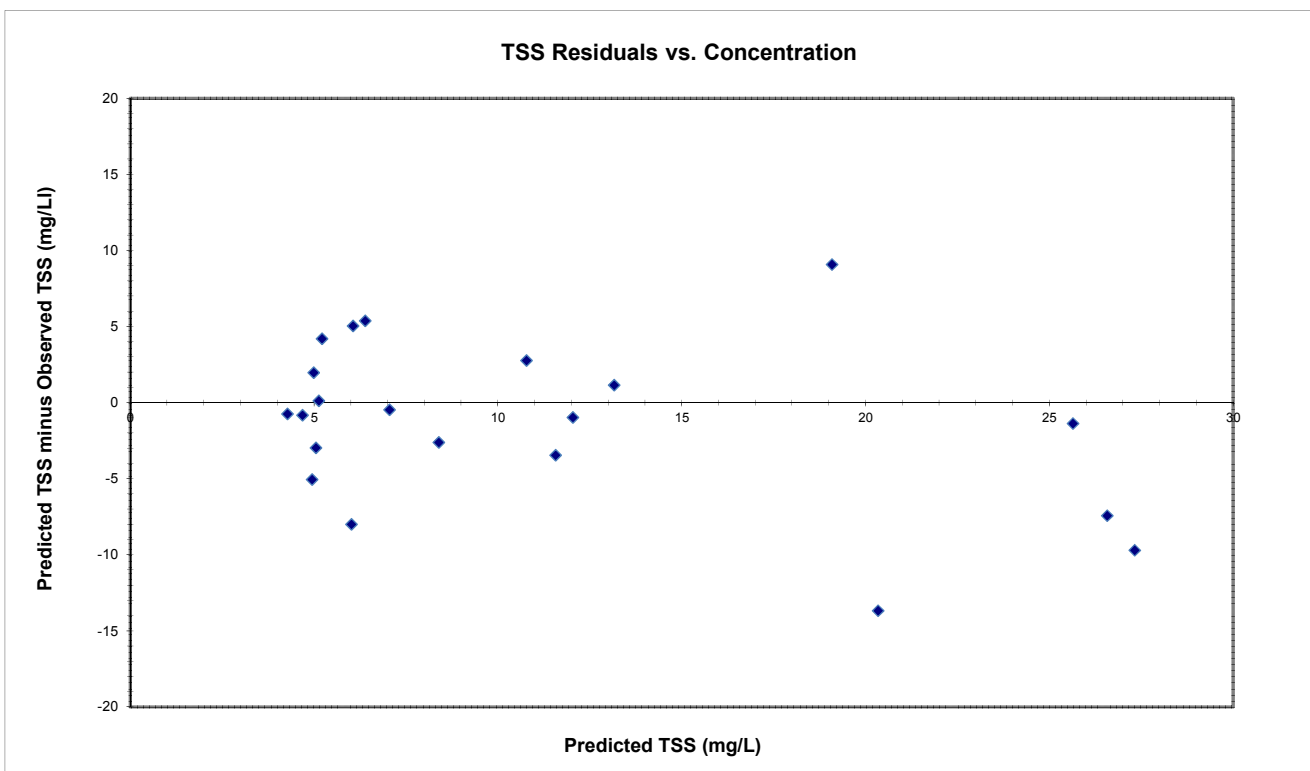
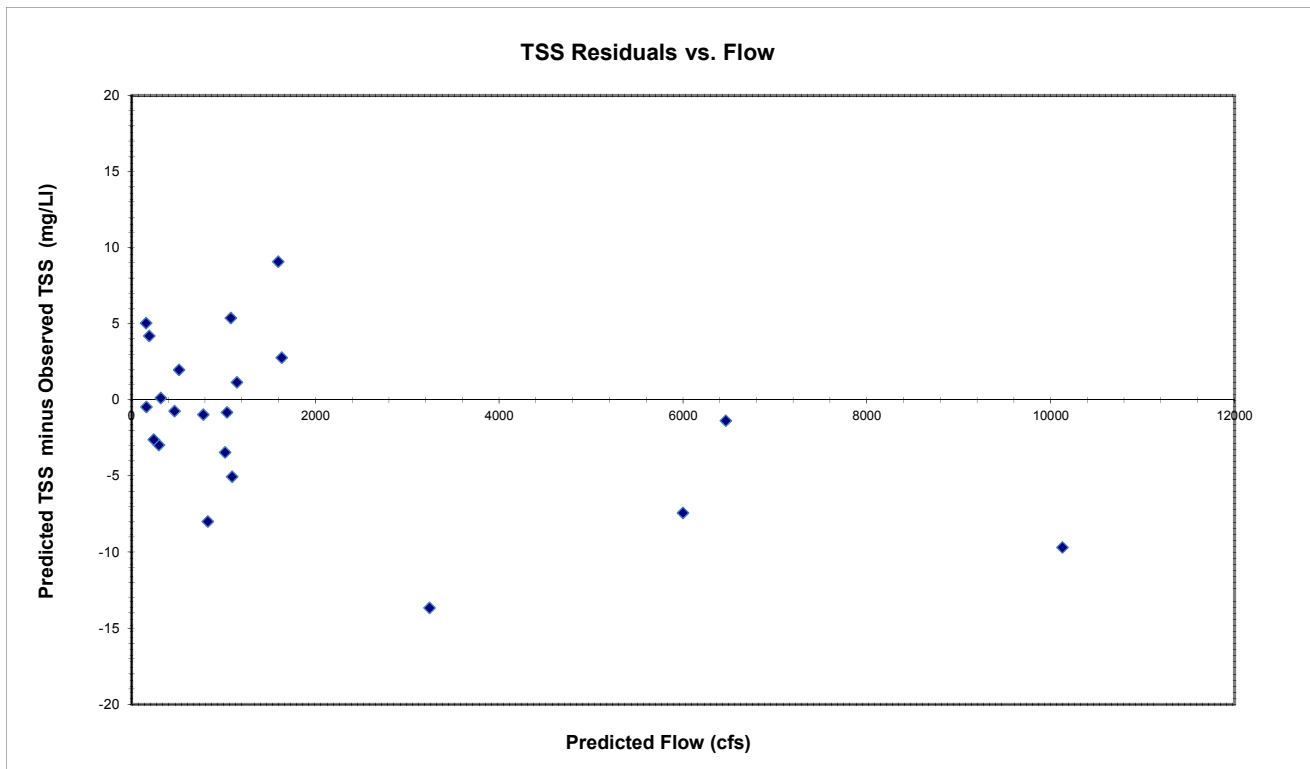
Total Phosphorus Residuals vs. Flow



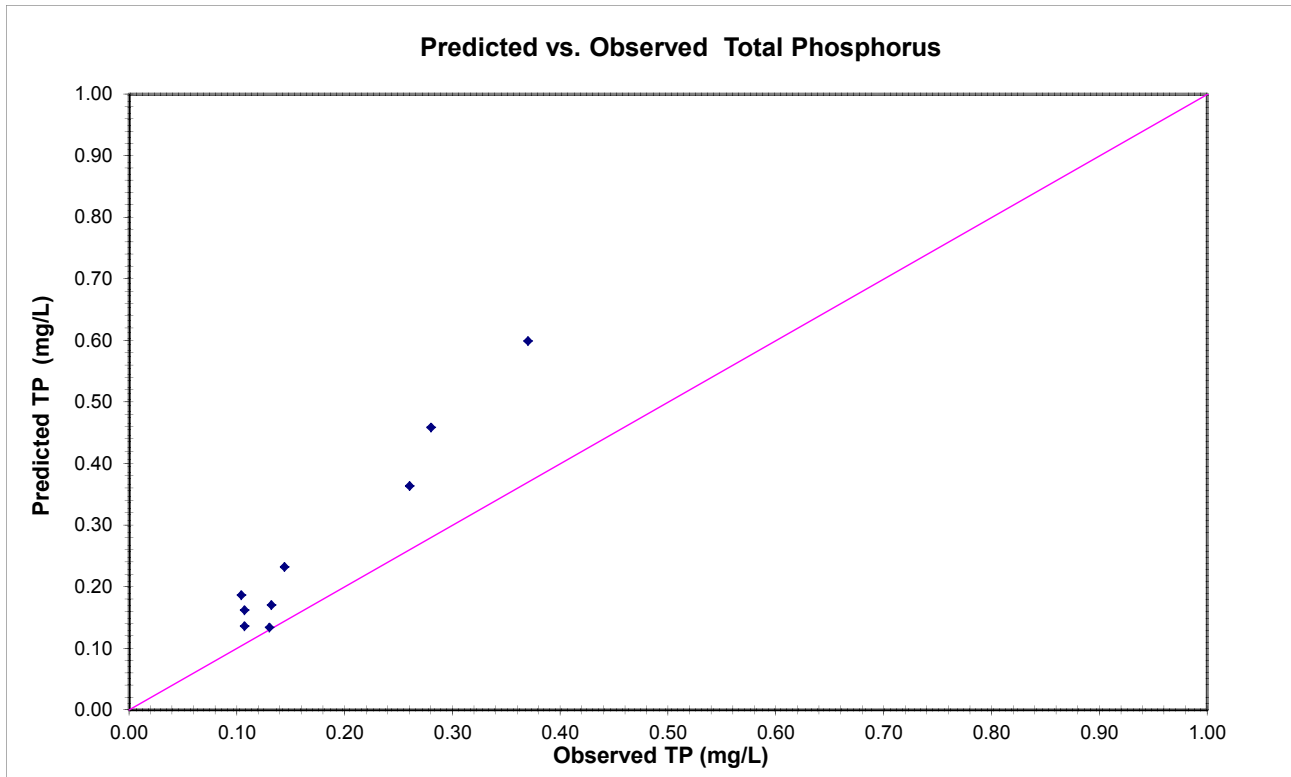
Total Phosphorus Residuals vs. Concentration



### Raritan River @ I-287 bridge (R3)

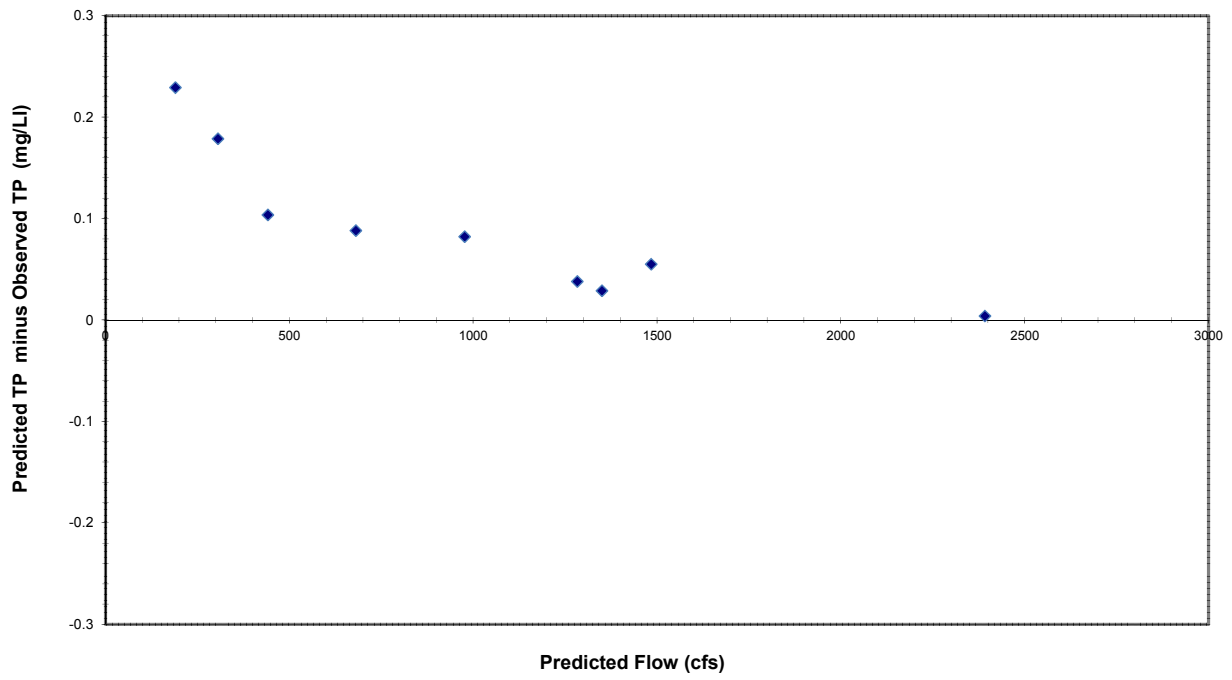


### Raritan River at Queens Bridge (1403900)

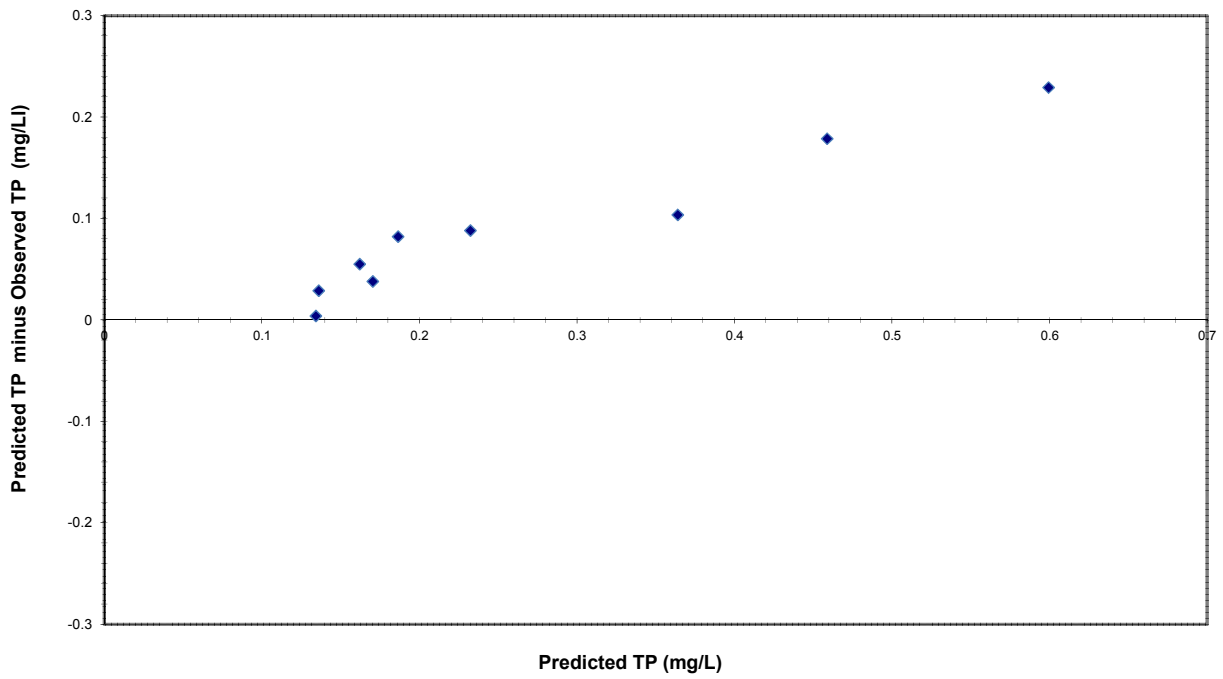


### Raritan River at Queens Bridge (1403900)

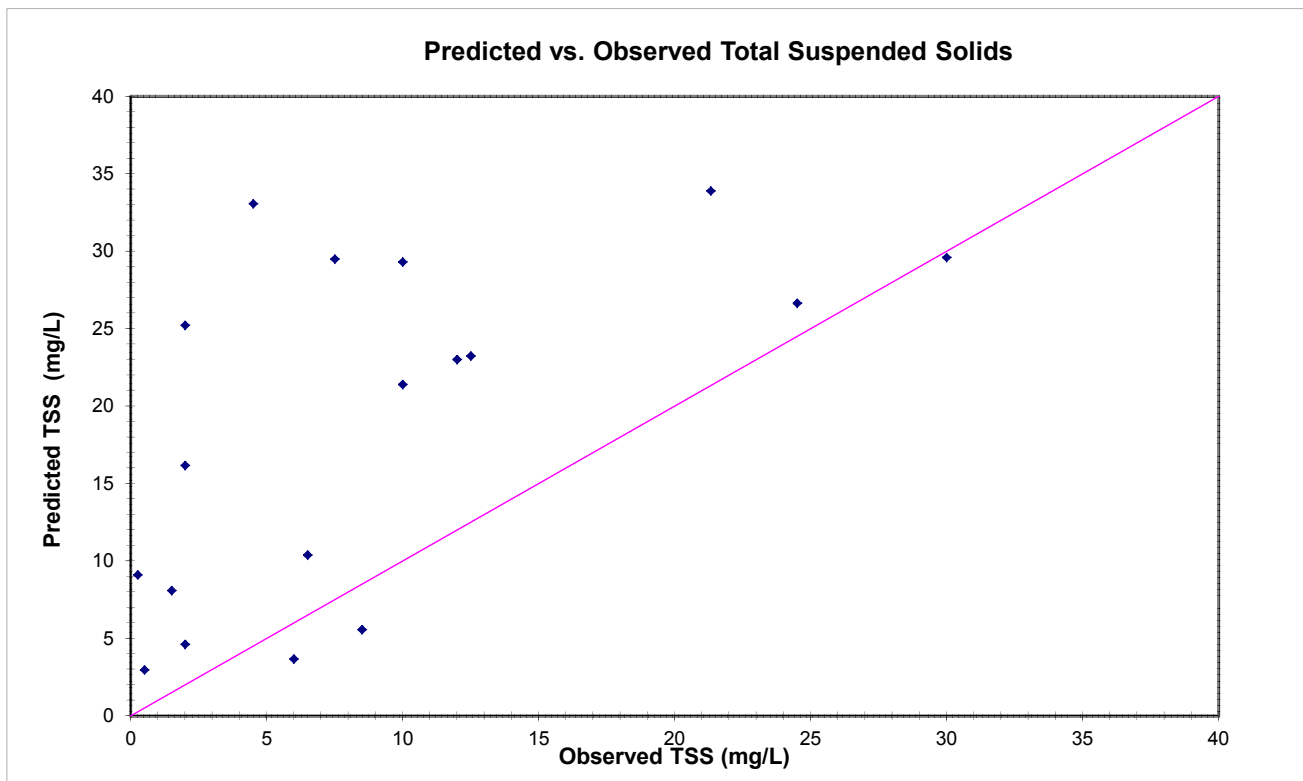
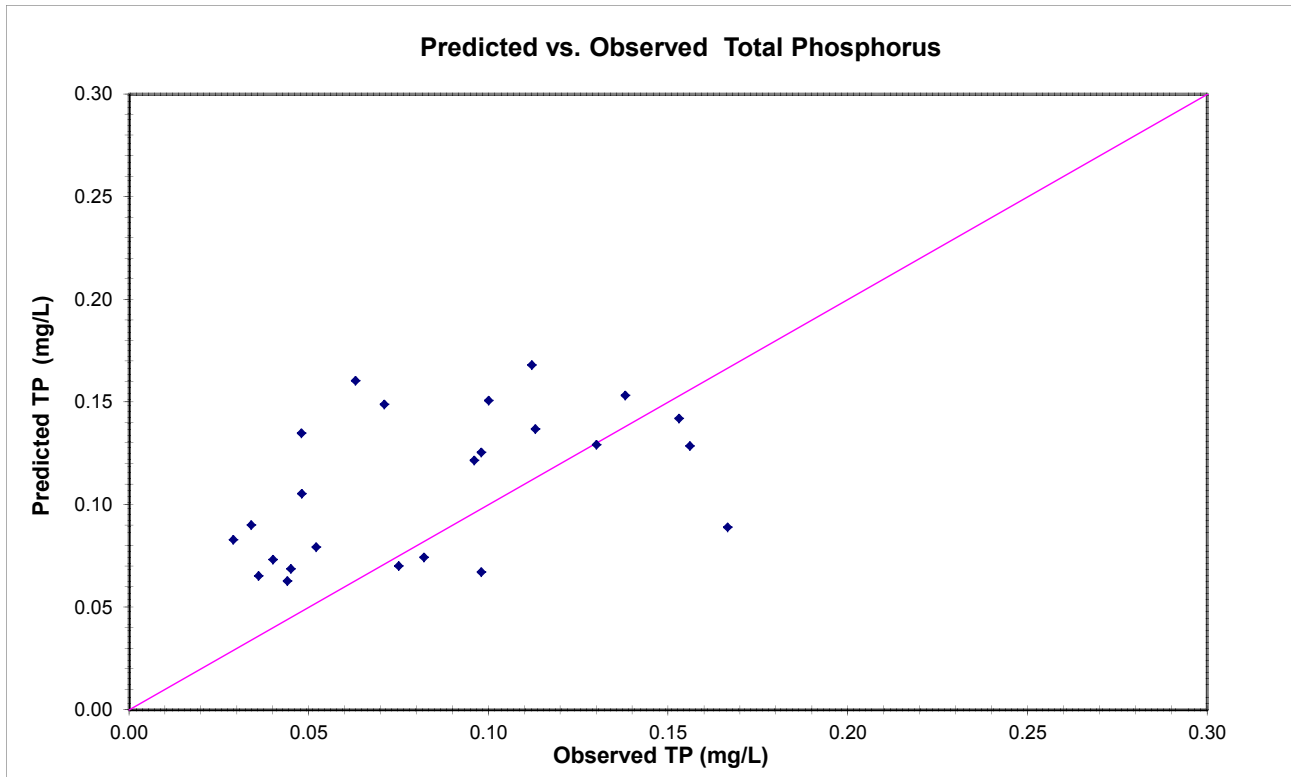
#### Total Phosphorus Residuals vs. Flow



#### Total Phosphorus Residuals vs. Concentration

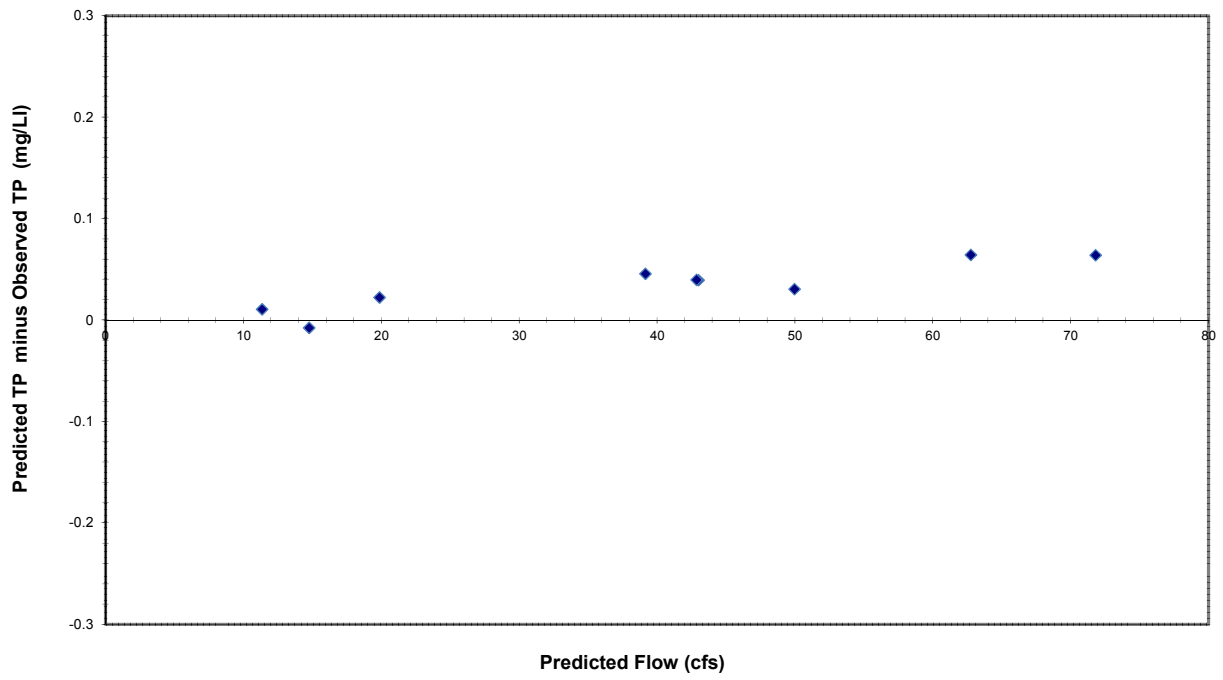


### Green Brook (Bound Brook) at Greenbrook Rd. (GB1)

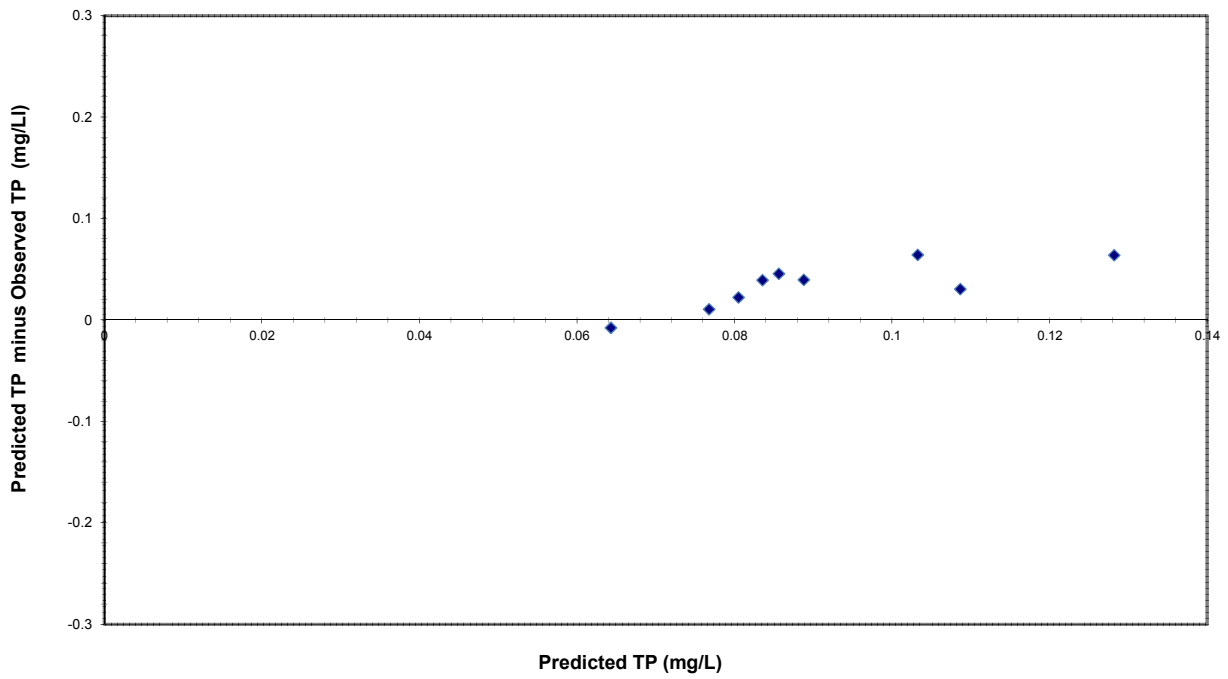


### Green Brook (Bound Brook) at Greenbrook Rd. (GB1)

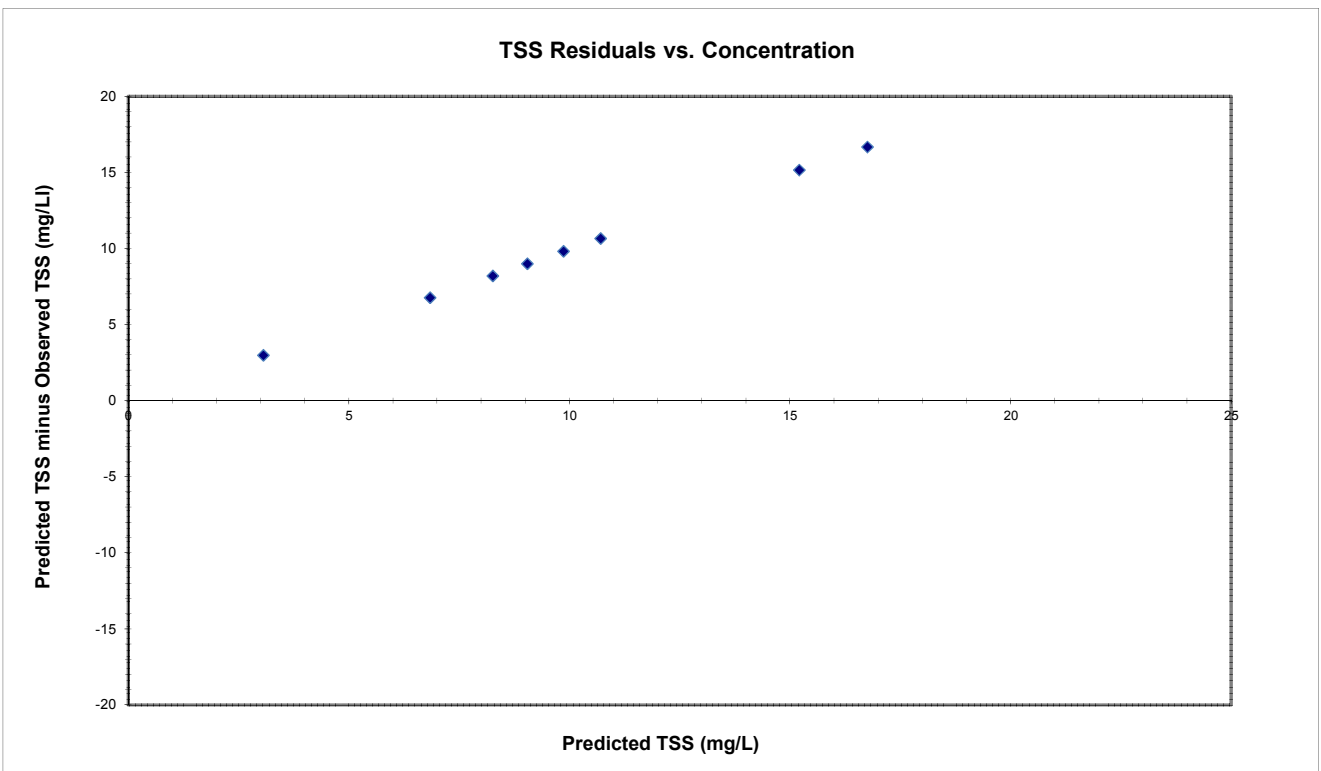
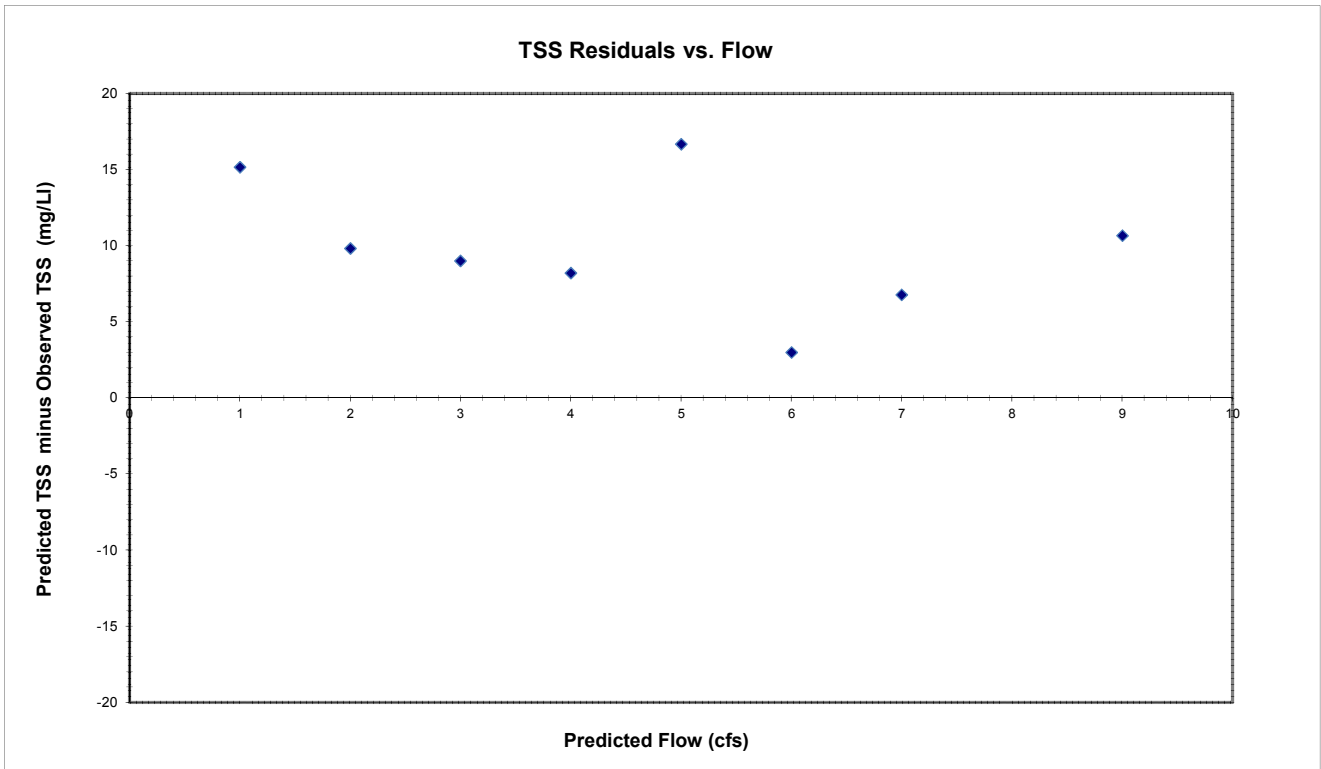
#### Total Phosphorus Residuals vs. Flow



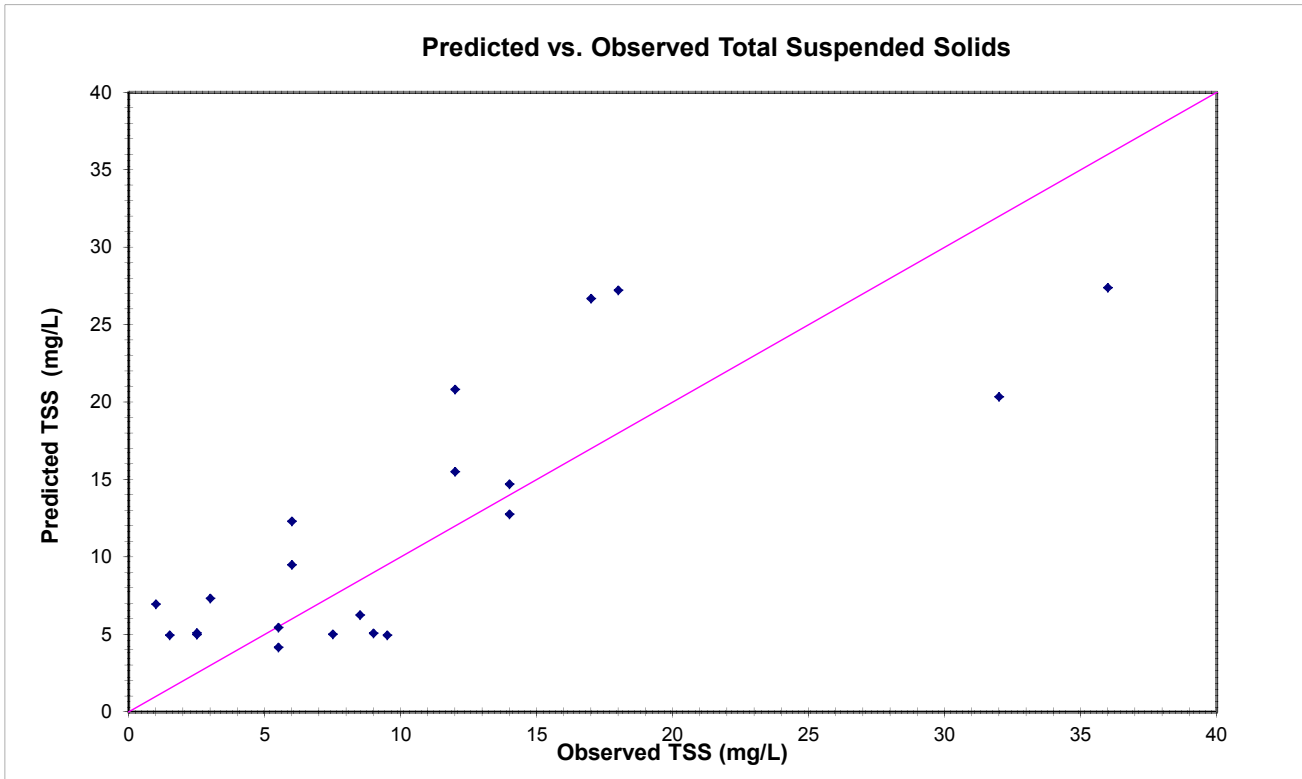
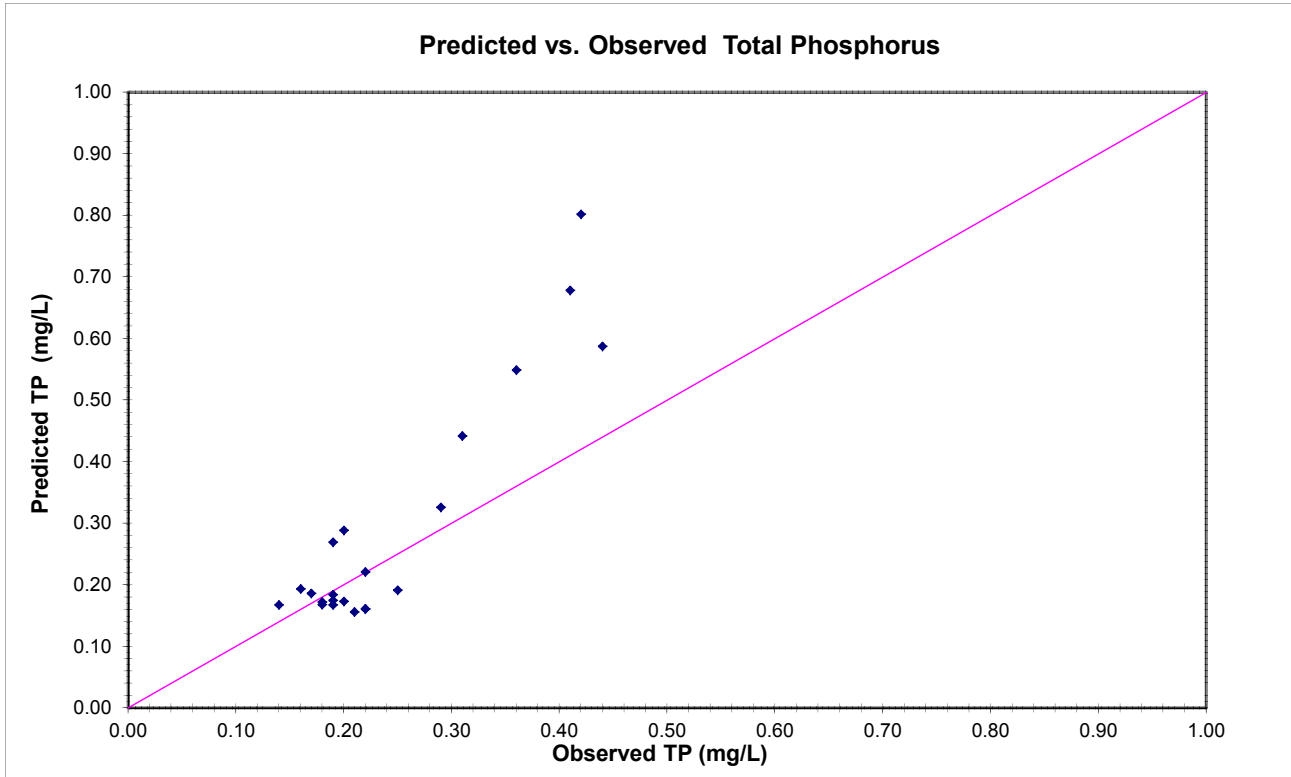
#### Total Phosphorus Residuals vs. Concentration



### Green Brook (Bound Brook) at Greenbrook Rd. (GB1)



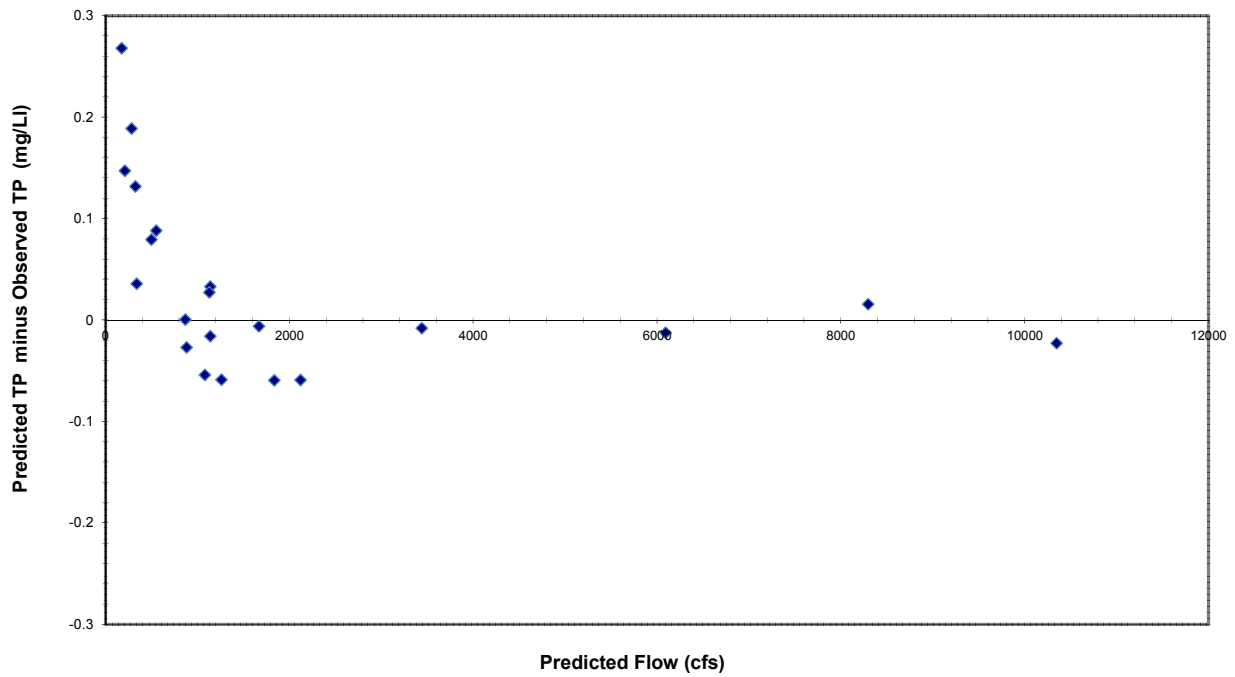
### Raritan River Upstream Fieldville Dam (R4)



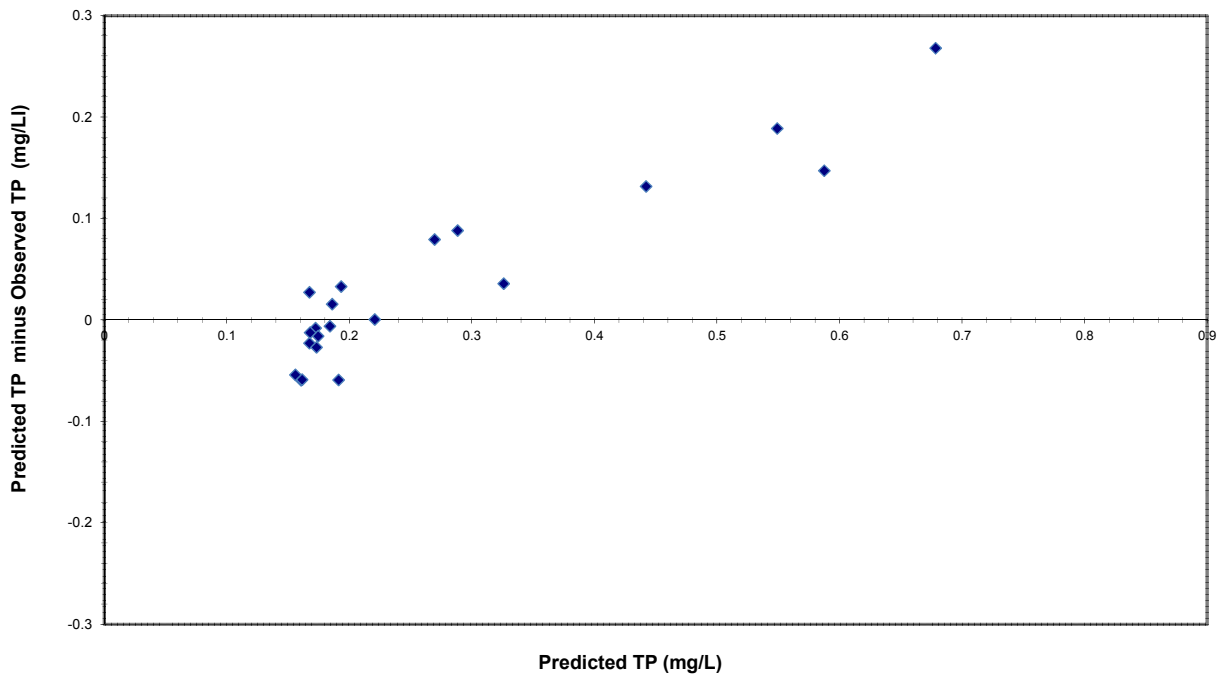


### Raritan River Upstream Fieldville Dam (R4)

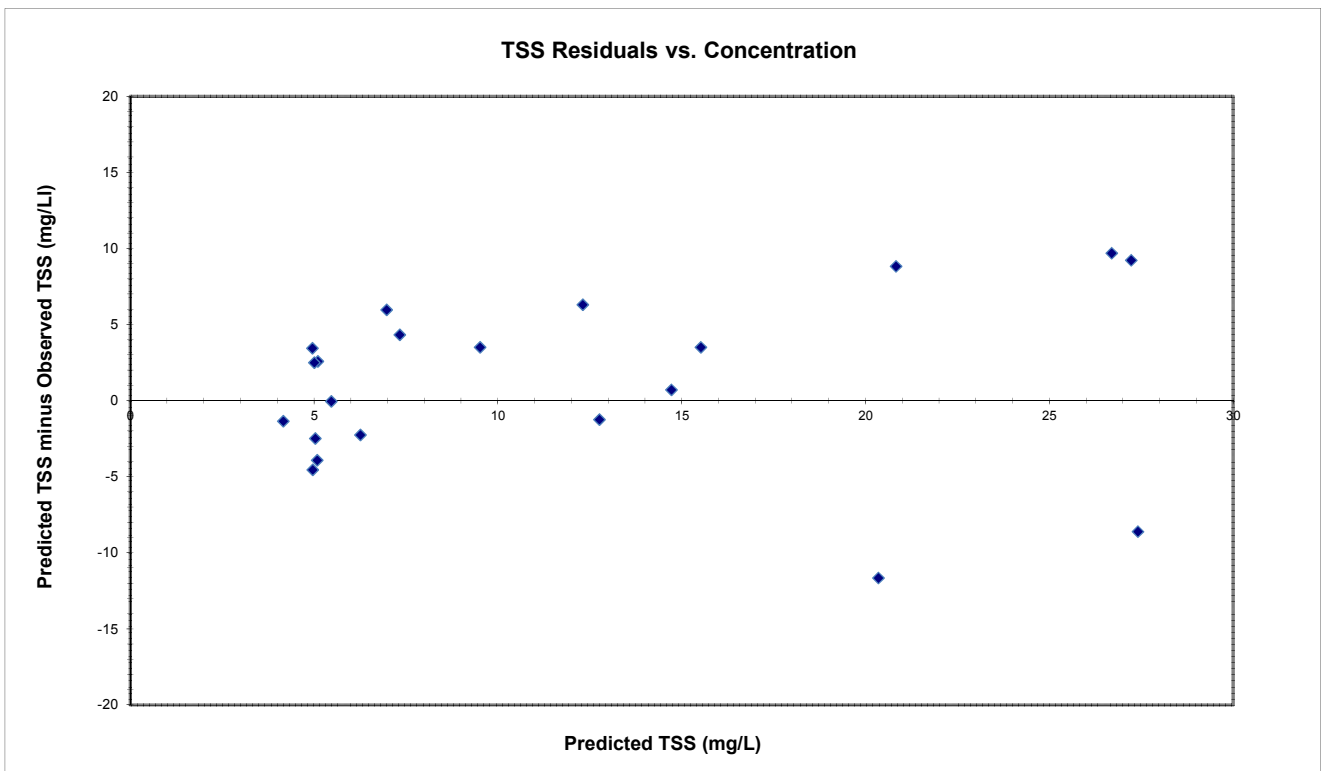
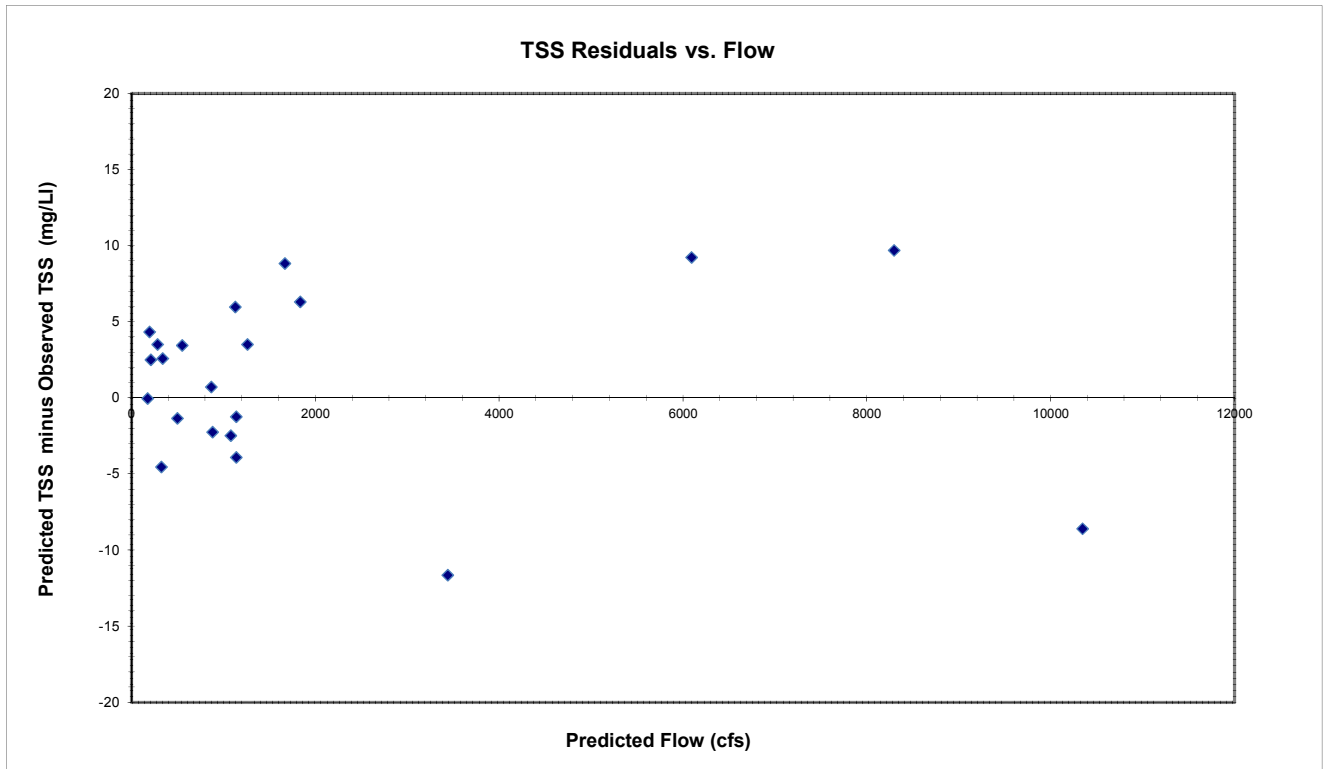
#### Total Phosphorus Residuals vs. Flow



#### Total Phosphorus Residuals vs. Concentration



### Raritan River Upstream Fieldville Dam (R4)



## **APPENDIX N**

### Erosion Vulnerability Index

## Shear Stress Analysis Routine

The shear stress analysis routine of HydroWAMIT uses the outputs of DAFLOW and calculates the average velocity and shear stress at various locations in the North and South Branch Raritan watershed (NSBranch). HydroWAMIT uses the flow and the cross-section area of the stream for each node and time step and calculates the average velocity at different locations (nodes) for each time step using the equation:

$$U = Q / A \quad (1)$$

where  $U$  is the average velocity (ft/s),  $Q$  (ft<sup>3</sup>/s) is the flow and  $A$  (ft<sup>2</sup>) is the cross-section area at a given location in the river.

The shear stress at various cross-sections is calculated using the following equation (Haestad methods, 2003):

$$\tau = \gamma R s_f \quad (2)$$

where  $\tau$  is the shear stress (lbs/ft<sup>2</sup>),  $R$  the hydraulic radius (ft) and  $s_f$  is the friction slope (ft/ft).

The friction slope can be estimated from the Manning's equation, which can be rearranged as:

$$s_f = \frac{\eta^2 U^2}{k^2 R^{4/3}} \quad (3)$$

where  $\eta$  is the Manning's roughness coefficient and  $k$  is the numerical constant (1.486 for English units and 1.0 for SI units).

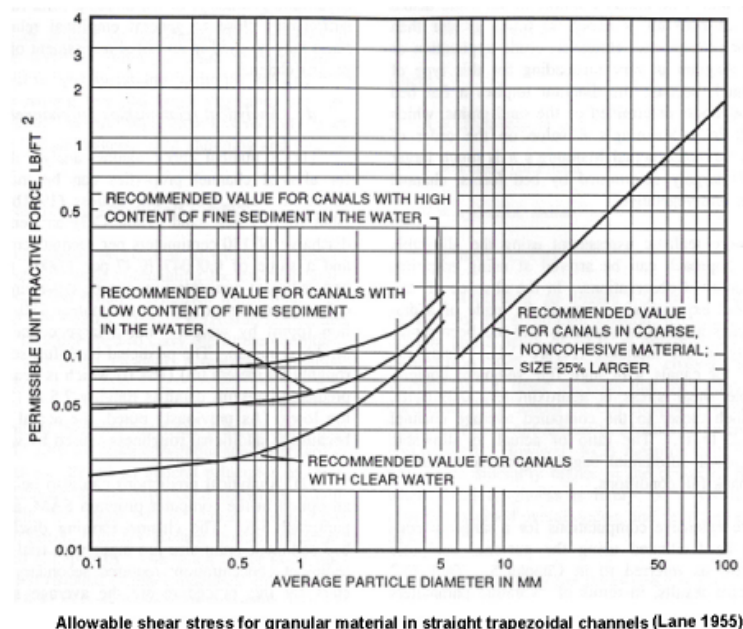
## Sediment Shear Stress Analyses

The time series of shear stress for different locations in the NSBranch watershed obtained from the output of HydroWAMIT was compared with the critical shear stress of the river banks. Critical shear stress depends on the type of sediment in the river banks, mainly the particle size distribution of the soil in the river banks. Soil data obtained from SSURGO data bases include the particle size distribution of all the areas surveyed. The data for particle size distribution is in the form of the percentage of the soil passing through the sieve numbers 4 (4.75 mm), 10 (2 mm), 40 (0.425 mm) and 200 (0.075 mm) respectively. The numbers in the parenthesis indicate the size of the openings of the sieve through which the soil particles pass. The soil data for the stream banks in the NSBranch watershed was obtained by overlaying the shape files of soil data from SSURGO data bases with those of the streams in the watershed. Once the particle size

distribution data was obtained for soils in the banks for all the streams in the watershed,  $D_{50}$  was calculated for soils present in each of the streams. The calculated  $D_{50}$  values for the soils present in all the stream banks in the watershed ranged from 0.075 to 2.82 mm.

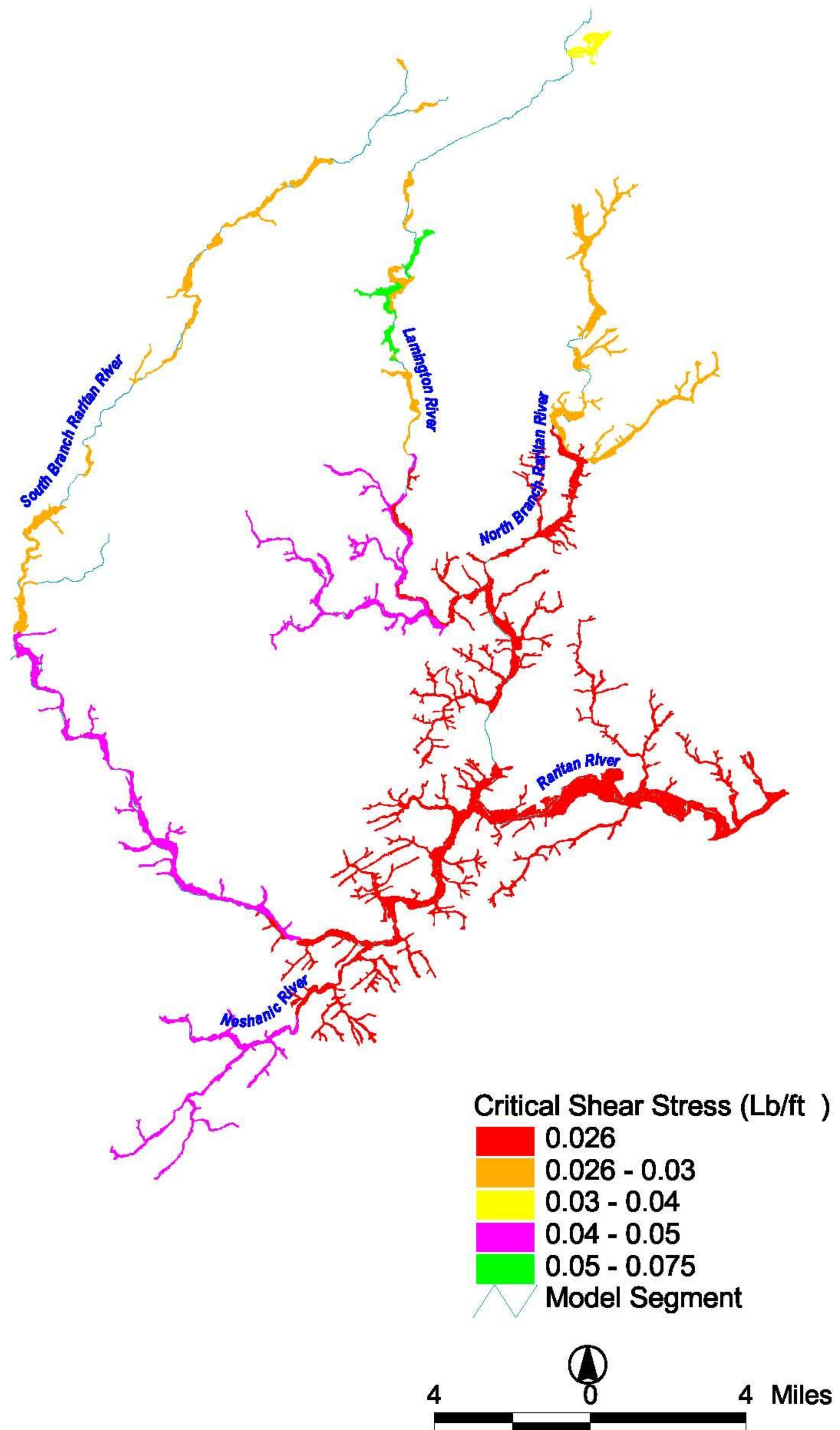
Figure 1 shown below from the USDA-NRCS Stream Restoration Design Handbook (USDA-NRCS, 2005) displays the relationship between the critical shear stress (permissible unit tractive force) for fine-grained soils and the particle size of the sediment in the river bed. The curve labeled as clear water is for the streams carrying a fine suspended sediment concentration of less than 1,000 ppm. Since all TSS concentrations measured in the NSBranch watershed were well under 1,000 ppm, the clear water curve was applied. Critical shear stress values of all the soils in the banks of all the streams in the NSBranch watershed was estimated from Figure 1 using corresponding  $D_{50}$  values. The estimated critical shear stress values ranged from 0.026 to 0.075 LB/ft<sup>2</sup>. Figure 2 shows the variation of estimated critical shear stress for the banks of all the segments in the NSBranch watershed. Note that these critical shear stress values do not account for some factors that may be important in localized areas on the stream banks, such as compaction and vegetative stabilization. In other words, some localized areas on the stream banks may exhibit more stability than reflected in the critical shear stress.

**Figure 1.**



If the shear stress in the watershed for a particular segment is more than the critical shear stress for the same segment for given flow/velocity conditions, then the river bank is considered vulnerable to erosion under those flow/velocity conditions. Comparisons of shear stress and critical shear stress were performed for all the segments in the NSBranch watershed. The ratio of calculated shear stress from the model for a given storm to the estimated critical shear stress (Shear Ratio) was calculated for all the segments for a given storm. A 1-inch storm was picked for this analysis after reviewing the rainfall data between 2002 and 2005 as 1-inch storms were the frequently occurring storms during this period of time. Shear stress values and corresponding shear ratios for all the segments in the watershed were calculated for a 1-inch storm that occurred on July 28, 2004 using HydroWAMIT. The calculated shear ratios ranged from 0 to 20 in the watershed. Given the uncertainties associated with this analysis, the absolute value of the shear ratio should not be relied upon to assess whether or not erosion occurs at a particular location and during a particular storm. However, comparing shear ratios for a given storm among various stream segments provides a useful Erosion Vulnerability Index. The higher values indicate higher potential for stream bank erosion. The distribution of shear ratio values in the watershed for a 1-inch storm is shown in Figure 3. Figures 4, 5 and 6 show the shear ratios plotted against segments for South Branch Raritan River, North Branch Raritan River and Lamington River respectively.

# Figure 2. North/South Branch Raritan River Critical Shear Stress



# Figure 3 . North/South Branch Raritan River Shear Analysis

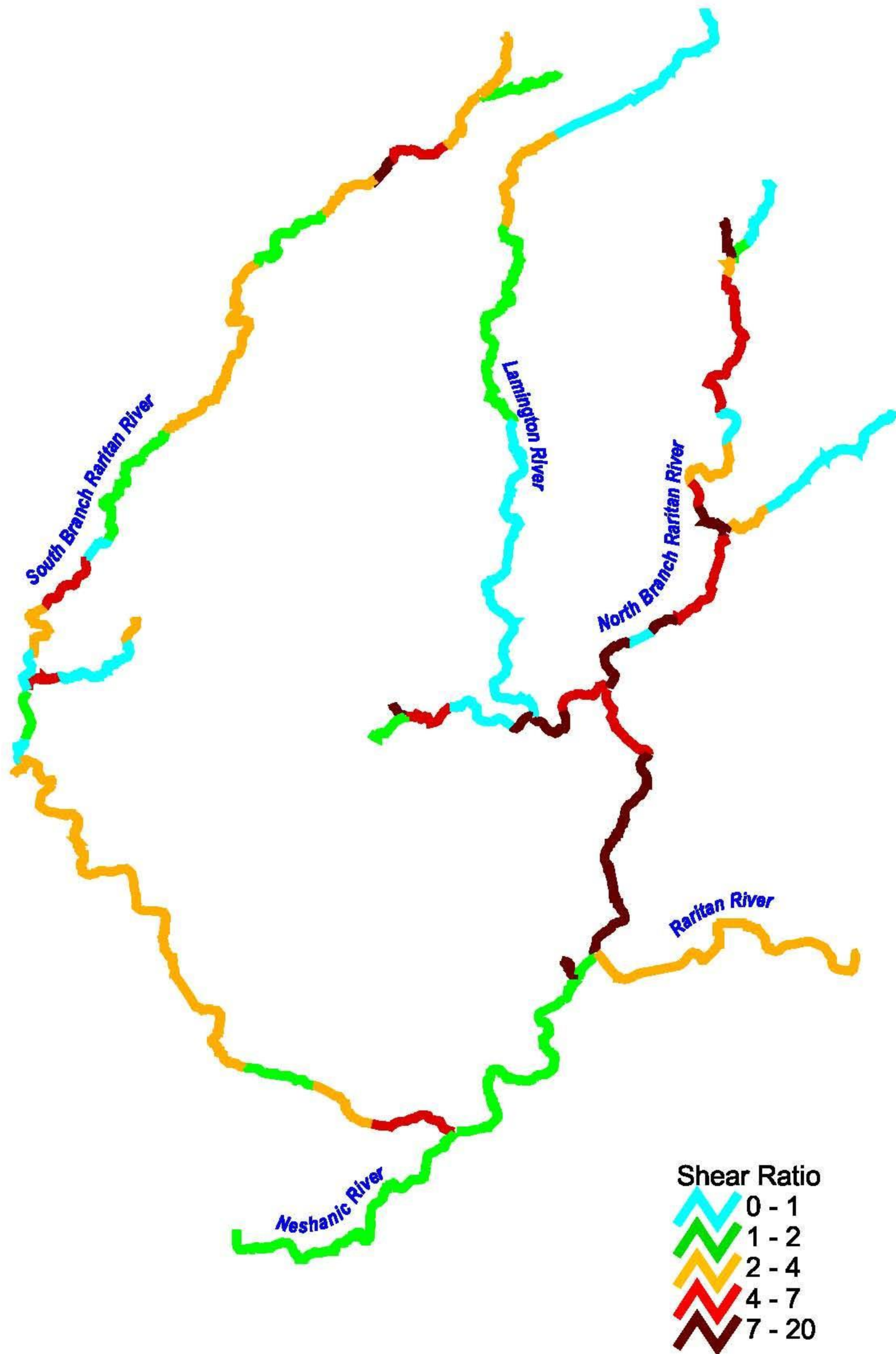
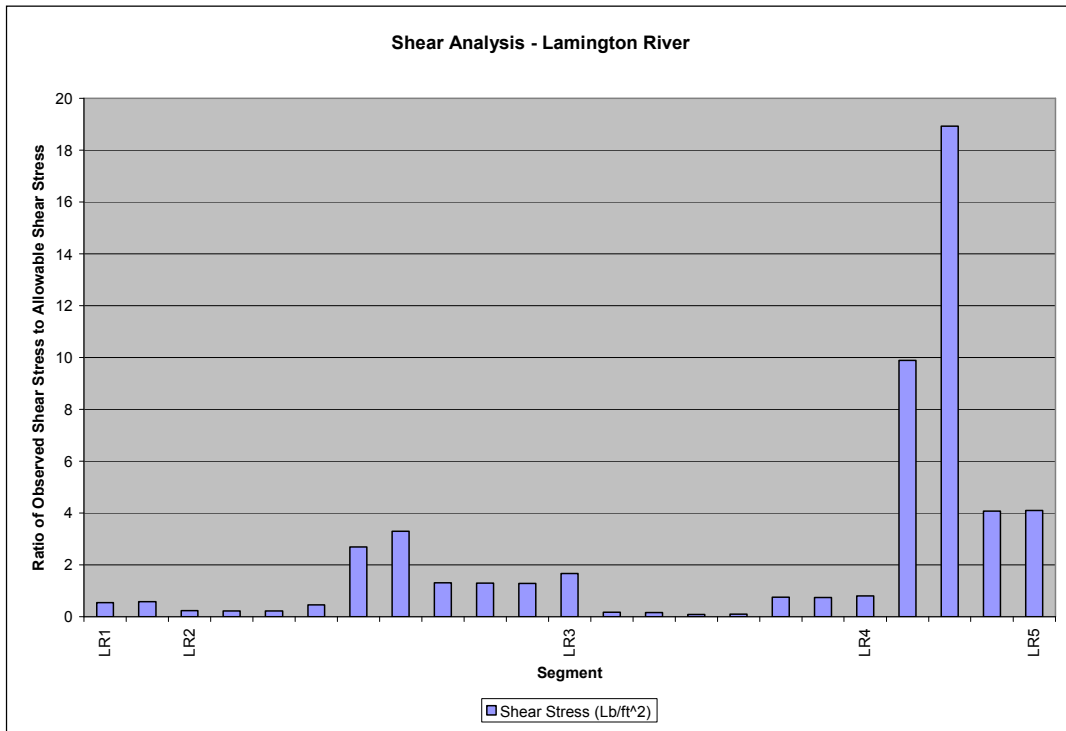






Figure 6



## **APPENDIX O**

### TMDL Evaluation Methodology for Headwater Lakes



## **TMDL Evaluation Methodology for Headwater Lakes**

“Headwater Lakes” are lakes that drain a modeled subwatershed that empties into a modeled stream. They include: Peddie Lake, Plainsboro Pond, Grovers Mill Pond, and Gordon Pond in the Upper Millstone watershed area model; and Cushetunk Lake in the North/South Branch watershed area model. These lakes are not modeled as receiving waters using WASP; they are modeled as subwatershed inputs (flows and loads) to the downstream modeled receiving water using HydroWAMIT. However, since each lake is located at the outlet of a modeled subwatershed, the loads and flows from the model were used to calculate a TMDL for each of the lakes. Furthermore, since water quality data were obtained at the inlets and outlets of each lake, these data were used to estimate the impact of each lake on the water quality in the lake and therefore on the subsequent loads delivered to the downstream modeled stream. While a daily scale hydrologic and pollutant loading model (HydroWAMIT) was applied for these analyses, it is important to recognize that the lake TMDL analyses are annual scale.

### ***Calculation of Lake TP Factors (Table 1)***

The Watershed TP Factors account for the degree to which the baseflow and runoff phosphorus concentrations at the lake inlets are different than what would be predicted based on land uses. Since these headwater subwatersheds are generally much larger than the typical subwatersheds that drain to the receiving water model, it is no surprise that these factors are generally less than one. Moreover, variation from modeled baseflow and runoff phosphorus concentrations is expected when we zoom in to any particular subwatershed. Calculations for each column are derived as follows.

- Measured Tributary Baseflow is the average measured phosphorus concentration at the lake inlet sampling location during low-flow conditions.
- Expected Tributary Baseflow is the baseflow phosphorus concentration that would be predicted based on land uses in the watershed that drains to the inlet sampling location. Since Grovers Mill Pond and Cushetunk Lake each had an active point

- source upstream of their inlet during the sampling period, the point source load (as an incremental concentration) was added to the expected inlet baseflow concentration.
- Watershed Tributary Baseflow Factor is the Measured Tributary Baseflow concentration divided by the Expected Tributary Baseflow concentration (Actual/Expected).
  - Measured Runoff is the average measured phosphorus concentration at the lake inlet sampling location during high-flow conditions.
  - Expected Runoff and Watershed Runoff Factor are back-calculated based on the observed Combined Watershed Runoff Factor (see below).
  - Total Watershed Factor is a flow-weighted average of the Tributary Baseflow Factor and Watershed Runoff Factor. It is provided to estimate the overall impact of the watershed on loads delivered to the lake, but is not actually used anywhere in the TMDL analyses.

The Lake TP Factors account for the degree to which the baseflow and runoff phosphorus concentrations at the lake outlets are different than what would be predicted based the lake inlet phosphorus concentrations and the land uses in the direct lake watershed. The Lake TP Factors represent the net influence of various lake processes on water quality in the lake. Since the lakes are conceptualized as continuous-flow stirred-tank reactors, the water quality at the outlet is representative of water quality in the lake. Calculations for each column are derived as follows.

- Tributary Baseflow Entering Lake is the baseflow phosphorus concentration that would be predicted based on land uses in the lakeshed, multiplied by the Tributary Baseflow Factor. Since Gordon Pond, Grovers Mill Pond, and Cushetunk Lake each had an active point source during the sampling period, the point source load was added as an incremental concentration before applying the Tributary Baseflow Factor.
- Tributary Baseflow Exiting Lake is the average measured phosphorus concentration at the lake outlet sampling location during low-flow conditions.
- Lake Tributary Baseflow Factor is the Tributary Baseflow Exiting Lake divided by the Tributary Baseflow Entering Lake (Out/In).

- Runoff Concentration Entering Lake is the average measured phosphorus concentration at the lake inlet sampling location during high-flow conditions. Applicable point source load was subtracted as an incremental concentration from the measured average.
- Runoff Concentration Exiting Lake is the average measured phosphorus concentration at the lake outlet sampling location during high-flow conditions. Applicable point source load was subtracted as an incremental concentration from the measured average.
- Lake Runoff Factor is the Runoff Concentration Exiting Lake divided by the Runoff Concentration Entering Lake (Out/In).
- Total Lake Factor is a flow-weighted average of the Lake Tributary Baseflow Factor and Lake Runoff Factor. It is provided to estimate the overall impact of the lake on loads within the lake, but is not actually used anywhere in the TMDL analyses.

The Combined Watershed and Lake Factors account for the combined impact of both the watershed and the lake itself on baseflow and runoff phosphorus concentrations in each lake. The Combined Tributary Baseflow Factor and the Combined Watershed Runoff Factor are applied to baseflow and runoff phosphorus concentrations that are delivered by HydroWAMIT to the downstream modeled stream from the subwatershed that drains to each lake. Calculations for each column are derived as follows.

- The Combined Tributary Baseflow Factor is the Watershed Tributary Baseflow Factor multiplied by the Lake Tributary Baseflow Factor.
- The Combined Runoff Factor is a load-weighted average ratio of measured runoff load to predicted runoff load at the lake outlet. Baseflow load and point source load (if applicable) were subtracted from both measured and modeled total loads to obtain measured and predicted runoff loads on days the outlet was sampled. Flows were obtained from HydroWAMIT.
- Combined Watershed and Lake Factor is a flow-weighted average of the Combined Tributary Baseflow Factor and Combined Runoff Factor. It is provided to estimate

the overall impact of the watershed and lake on loads within the lake, but is not actually used anywhere in the TMDL analyses.

**TABLE 1: Headwater Lake TP Factors**

Watershed TP Factors							
Lake	Measured Tributary Baseflow (mg/l TP)	Expected Tributary Baseflow (mg/l TP)	Watershed Tributary Baseflow Factor	Measured Runoff (mg/l TP)	Expected Runoff (mg/l TP)	Watershed Runoff Factor	Total Watershed Factor
Cushtunk Lake	0.043	0.056	0.77	0.089	0.139	0.64	0.67
Gordon Pond	0.057	0.069	0.83	0.085	0.151	0.56	0.63
Grovers Mill Pond	0.049	0.071	0.69	0.181	0.163	1.11	0.99
Peddie Lake	0.061	0.070	0.87	0.157	0.162	0.97	0.93
Plainsboro Pond	0.080	0.073	1.09	0.113	0.166	0.68	0.83
Average	0.058	0.068	0.85	0.125	0.156	0.79	0.81

Lake TP Factors							
Lake	Tributary Baseflow Entering Lake (mg/l TP)	Tributary Baseflow Exiting Lake (mg/l TP)	Lake Tributary Baseflow Factor	Runoff Concentration Entering Lake (mg/l TP)	Runoff Concentration Exiting Lake (mg/l TP)	Lake Runoff Factor	Total Lake Factor
Cushtunk Lake	0.042	0.095	2.26	0.088	0.138	1.56	1.74
Gordon Pond	0.057	0.070	1.23	0.084	0.107	1.29	1.27
Grovers Mill Pond	0.049	0.042	0.87	0.181	0.134	0.74	0.78
Peddie Lake	0.061	0.085	1.39	0.157	0.116	0.74	0.97
Plainsboro Pond	0.080	0.063	0.79	0.113	0.087	0.77	0.77
Average	0.058	0.071	1.31	0.125	0.116	1.02	1.11

Combined Watershed and Lake Factors			
Lake	Combined Tributary Baseflow Factor	Combined Runoff Factor	Combined Watershed and Lake Factor
Cushtunk Lake	1.746	0.994	1.19
Gordon Pond	1.022	0.723	0.80
Grovers Mill Pond	0.594	0.825	0.76
Peddie Lake	1.202	0.719	0.89
Plainsboro Pond	0.858	0.522	0.64
Average	1.084	0.757	0.86

**Calculation of Baseflow and Runoff Phosphorus Loads**

Lake Physical Data were obtained from field studies during the monitoring phase of the TMDL study. Internal Lake Loads were estimated as runoff and baseflow phosphorus loss rates. HydroWAMIT was run for a 5.67 year period (1/1/2000 – 8/31/2005) for each lake subwatershed for 0%, 20%, 40%, 60%, and 80% nonpoint source reduction scenarios. Consistent with the methodology used to simulate nonpoint source reductions throughout the Raritan TMDL study, percent reductions were applied to runoff phosphorus concentrations from urban and agricultural

areas and baseflow phosphorus concentrations were reduced using the same methodology described elsewhere. The baseflow phosphorus concentrations calculated for each lake are provided in the table below. Note that these concentrations are before the application of Watershed and Lake Tributary Baseflow Factors,

**TABLE 2: Total Phosphorus Baseflow Concentration (mg/l)**

Percent NPS Reduction	Before application of Watershed and Lake Tributary Baseflow Factors				
	Peddie Lake	Plainsboro Pond	Grovers Mills Pond	Gordon Pond	Cushtunk Lake
0%	0.0705	0.0736	0.0714	0.0689	0.0543
20%	0.0600	0.0611	0.0598	0.0592	0.0457
40%	0.0536	0.0536	0.0536	0.0536	0.0371
60%	0.0536	0.0536	0.0536	0.0536	0.0285
80%	0.0536	0.0536	0.0536	0.0536	0.0198

A mass balance budget model was performed on the headwater lakes to quantify a first order loss rate for both baseflow and runoff. The following equation can be used for a well-mixed lake:

$$V \frac{dp}{dt} = W - Qp - k_s Vp$$

Where:

V = Volume (m<sup>3</sup>)

p = total phosphorus concentration (mg/m<sup>3</sup>)

W = total P loading rate to inlet (mg/yr)

Q = outflow (m<sup>3</sup>/yr)

k<sub>s</sub> = a first order loss rate (yr<sup>-1</sup>)

HydroWAMIT simulations using the lake factors described previously were used to calculate annual baseflow and runoff phosphorus loads into and out of each lake. Baseflow and runoff per year loss rates were calculated as a function of annual loads, flow, and lake volume:

$$BaseflowLossRate = \frac{(BaseflowLoadOut - BaseflowLoadIn)}{LakeVolume \times \left( \frac{BaseflowLoadOut}{BaseflowQ} \right)}; \text{ and}$$



$$RunoffLossRate = \frac{(RunoffLoadOut - RunoffLoadIn)}{LakeVolume \times \left( \frac{RunoffLoadOut}{RunoffQ} \right)}$$

Losses can occur because of a number of processes, including settling, diffusion, burial, and uptake. Per year phosphorus loss rates (TABLE 3) were calculated based on existing condition and applied to future conditions. Negative loss rates indicate a net source in the lake. Future conditions accounted for point sources discharging at permitted flows (where applicable) and, in the case of Grovers Mill Pond, the recent dredging. Annual loads for all future scenarios are separated by land use. The difference between annual load out and annual load in each lake is represented as the internal lake load, which can be either positive or negative. In fact this is the net impact of various processes that are not explicitly simulated; however, the impact on baseflow and runoff was derived independently.

**TABLE 3: Per Year TP Loss Rates for Headwater Lakes**

Lake	Runoff Loss Rate	Baseflow Loss Rate
Cushetunk Lake	-37.3	-62.9
Gordon Pond	-41.4	-20.6
Grovers Mill Pond	31.4	10.1
Peddie Lake	24.5	-19.6
Plainsboro Pond	40.0	36.5

**Calculation of Average Inlet and Lake Phosphorus Concentrations**

Average phosphorus concentrations for all flows into each lake (“Average Inlet Concentration”) were calculated directly by simply adding up all the annual loads (except internal lake load) and dividing by the annual flow rate. The average phosphorus concentration in each lake could have been calculated the same way by including the internal lake load; however, it was instead calculated as a function of baseflow and runoff loss rates so the impact of a change in lake volume on settling (negative internal loading) could be assessed. This was relevant for Grovers Mill Pond. Average lake concentration was therefore calculated as follows:

$$AvgLakeConc = \frac{\left[ \left( \frac{BaseflowLoadsIn}{(BaseflowQ + BaseflowLossRate \times Volume)} \right) \times BaseflowQ + \left( \frac{RunoffLoadsIn}{(RunoffQ + RunoffLossRate \times Volume)} \right) \times RunoffQ \right]}{TotalQ}$$

### Expressing 0.05 mg/l Lake Phosphorus Criterion as Annual Average

NJDEP’s 0.05 mg/l total phosphorus criterion for lakes is written and regulated by the Department as a not-to-exceed value. Previous lake TMDLs by the Department have been based on annual scale analyses using the value of 0.03 mg/l total phosphorus as an annual average. As a general rule of thumb based on existing data from many lakes in New Jersey, 0.03 mg/l as an annual average is approximately equivalent to 0.05 mg/l as a not-to-exceed threshold. In reality, the relationship between not-to-exceed and annual average is a function of the ratio between runoff concentration (or baseflow concentration if it is higher than runoff concentration) and mean concentration, as well as day-to-day variability. Since the future scenarios simulate substantial reductions in runoff concentrations, and since both baseflow and runoff concentrations are quantified in the model evaluation, the annual average concentration associated with the 0.05 mg/l phosphorus criterion was assumed to vary for different reduction scenarios. Average baseflow and runoff concentration was calculated for each scenario. Obviously, the average concentration for any given scenario falls between the average runoff concentration and the average baseflow concentration. The ratio between runoff concentration (or baseflow concentration if it was higher than runoff concentration) and mean concentration (*ConcRatio*) was calculated for each scenario as an estimate of the peak-to-mean ratio. In order to account for actual day-to-day variability, *ConcRatio* was multiplied by a factor equivalent to the actual observed peak-to-mean ratio divided by the *ConcRatio* for existing conditions. Finally, the peak-to-mean ratio was divided into the 0.05 mg/l criterion in order to obtain the mean concentration associated with the 0.05 mg/l lake criterion for each scenario.

$$\text{CriterionAsAverage} = \frac{0.05\text{mg/l}}{\text{PeakToMeanRatio}}$$
$$\text{PeakToMeanRatio} = \text{ConRatio} \times \frac{\text{ObservedPeakToMean}}{\text{ExistingConcRatio}}$$
$$\text{ConRatio} = \text{Max} \left\{ \begin{array}{l} \text{RunoffConc/AvgConc} \\ \text{BaseflowConc/AvgConc} \end{array} \right\}$$

In the case of Cushetunk Lake, the analysis was performed on the inlet concentration rather than the lake concentration. The reason is that a substantial internal lake load was observed in Cushetunk Lake during both baseflow and runoff conditions. It is likely that there is an additional source between the inlet sampling location and the outlet sampling location, since it is unlikely that such a significant source originates within the lake itself. The TMDL was therefore based around satisfying the lake criterion at the inlet and identifying and removing the unknown source between the inlet and the outlet.

### *Evaluating the Natural Condition*

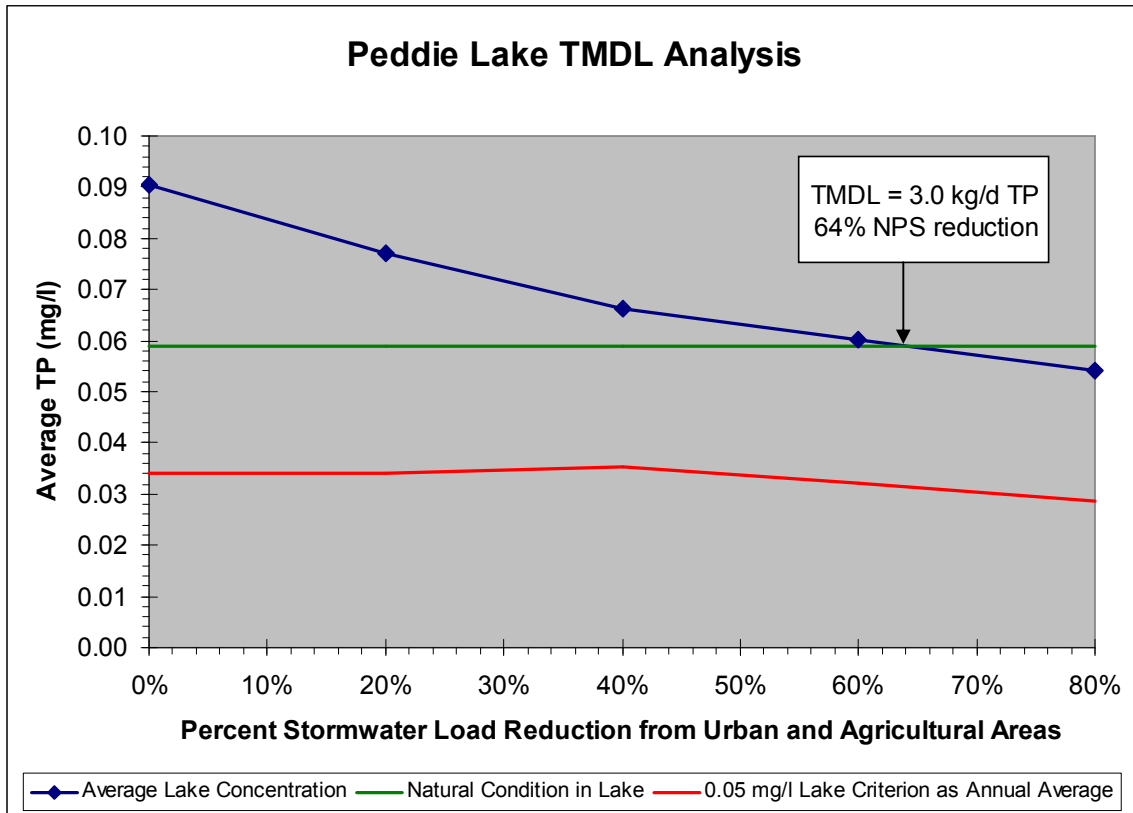
Natural condition was evaluated as an annual average total phosphorus concentration for each lake inlet and lake with the hydrologic and nonpoint source pollutant loading model (HydroWAMIT). All urban and agricultural land areas were simulated as if they were forest, and all point sources were removed. This methodology not only removes pollutant loads from urban and agricultural areas, but also simulates the hydrology (baseflow and runoff rates) associated with a natural condition. Baseflow concentrations were set to the concentration associated with forest and wetlands. Tributary Baseflow Factors and Watershed Runoff Factors were applied to baseflow and runoff concentrations.

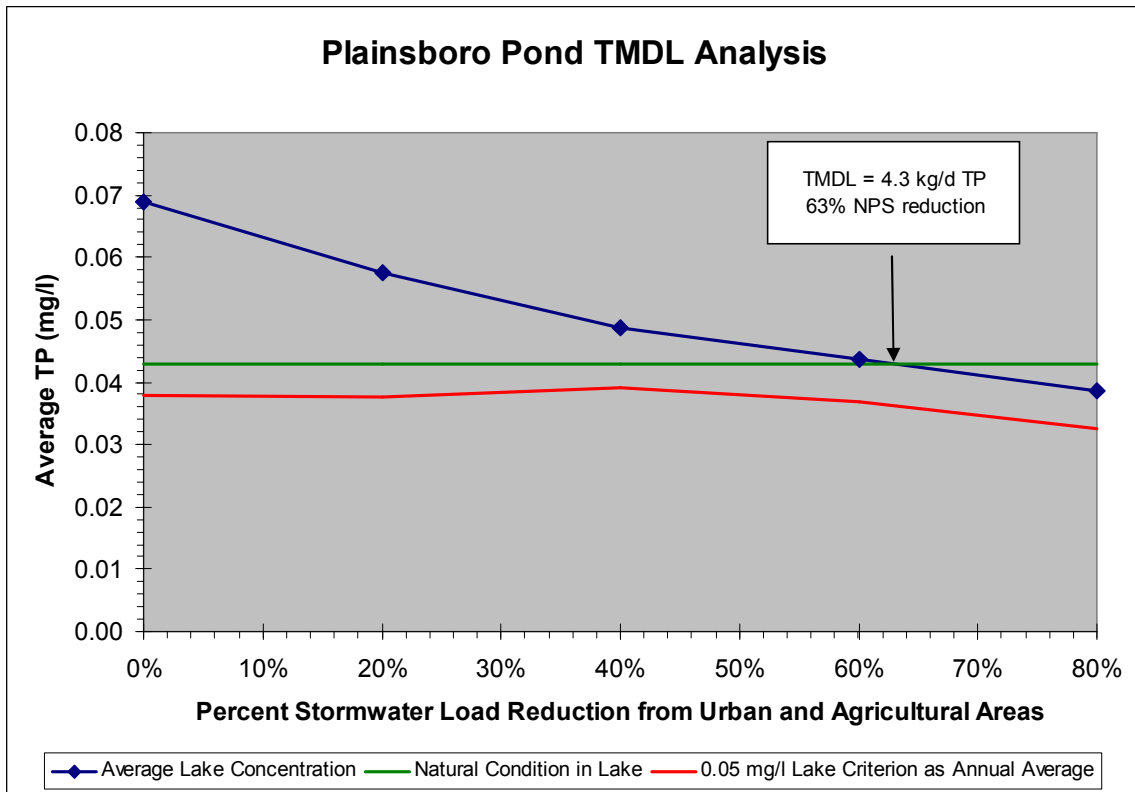
The natural condition is relevant for headwater lakes in the Upper Millstone River watershed, because the natural condition is higher than the average concentration associated with the 0.05 mg/l phosphorus criterion for lakes. The reason is that naturally-occurring tributary baseflow concentration in this watershed is relatively high. In other words, the phosphorus concentration of water flowing into these lakes during low-flow conditions would be fairly high even in the absence of anthropogenic influences. The headwater areas of the Upper Millstone River watershed are comprised of glauconitic soil formations that are high in both iron and phosphorus. Any run-of-the-river lakes in this watershed, such as the headwater lakes being

studied, can expect to receive high phosphorus loads even under natural conditions during both low and high flow conditions. The natural condition for each of the four headwater lakes in the Upper Millstone River watershed was calculated to be 0.059, 0.043, 0.040, and 0.053 mg/l total phosphorus as an annual average for Peddie Lake, Plainsboro Pond, Grovers Mill Pond, and Gordon Pond, respectively. TMDLs for each of these lakes were developed to satisfy the natural condition, since the Surface Water Quality Standards [N.J.A.C. 7:9B-1.5(c)1] state that the natural condition becomes the criterion if it is shown to exceed the criterion that would otherwise be applicable (i.e., the 0.05 mg/l not-to-exceed criterion).

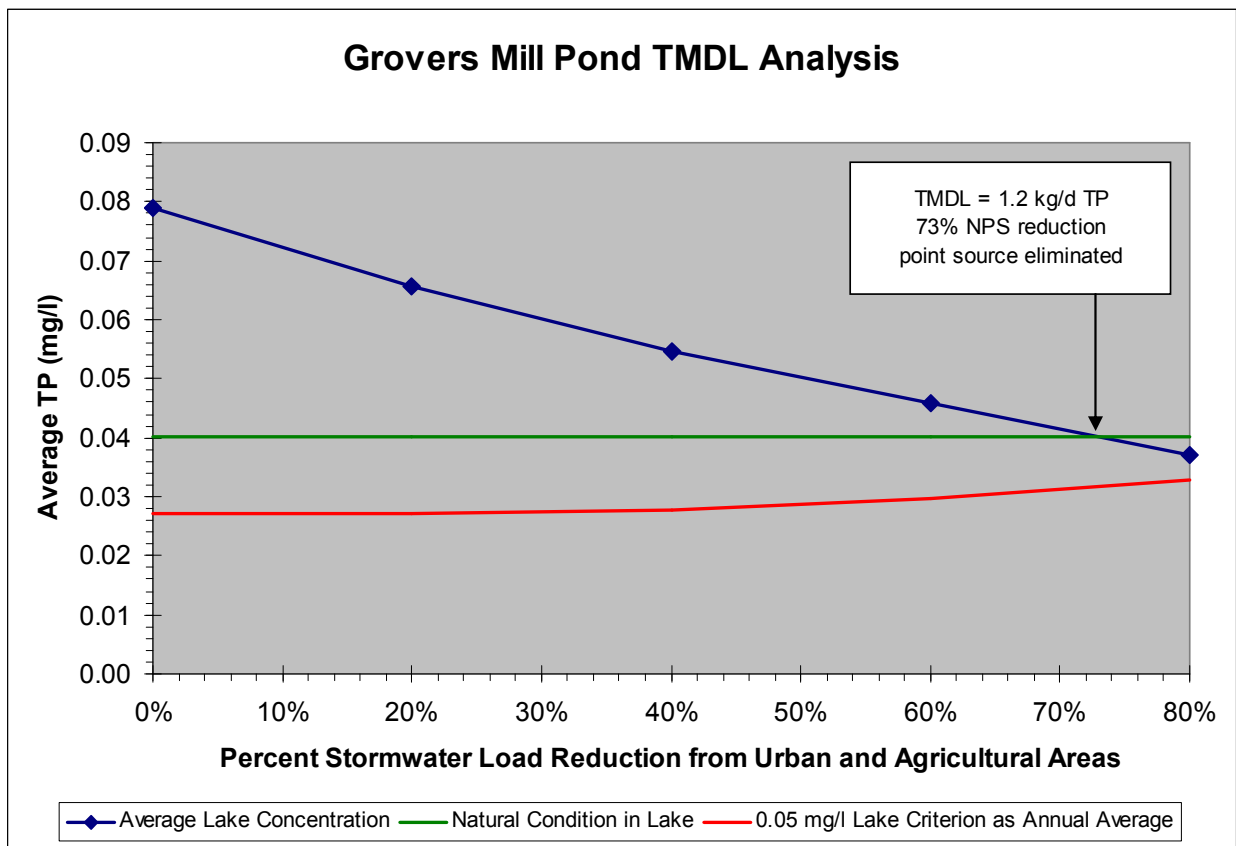
### TMDL Evaluations

Peddie Lake and Plainsboro Pond have no known point sources (other than stormwater) with their lakesheds. Therefore the percent reduction of stormwater loads from urban and agricultural areas necessary to achieve the natural condition in each lake was used to calculate the TMDL for each lake. The loading capacity (kg/d TP) and phosphorus reductions required to achieve it are provided in the graphs below for each lake.

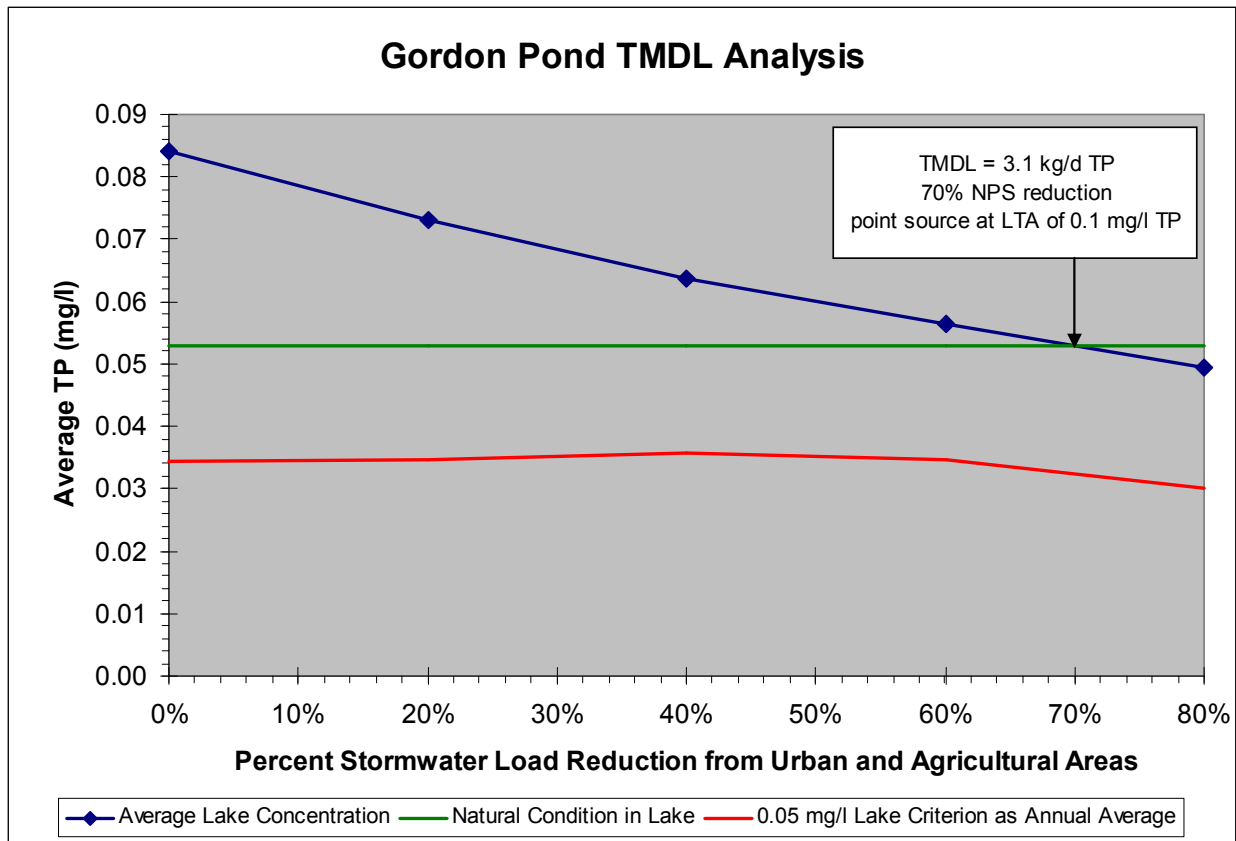




The point source within the watershed of Grover Mill Pond was set to zero flow and load, since it was recently eliminated. Therefore the percent reduction of stormwater loads from urban and agricultural areas necessary to achieve the natural condition of 0.040 mg/l average phosphorus concentration in the lake was used to calculate the TMDL for Grovers Mill Pond. The loading capacity (kg/d TP) and phosphorus reductions required to achieve it are provided in the graph below.

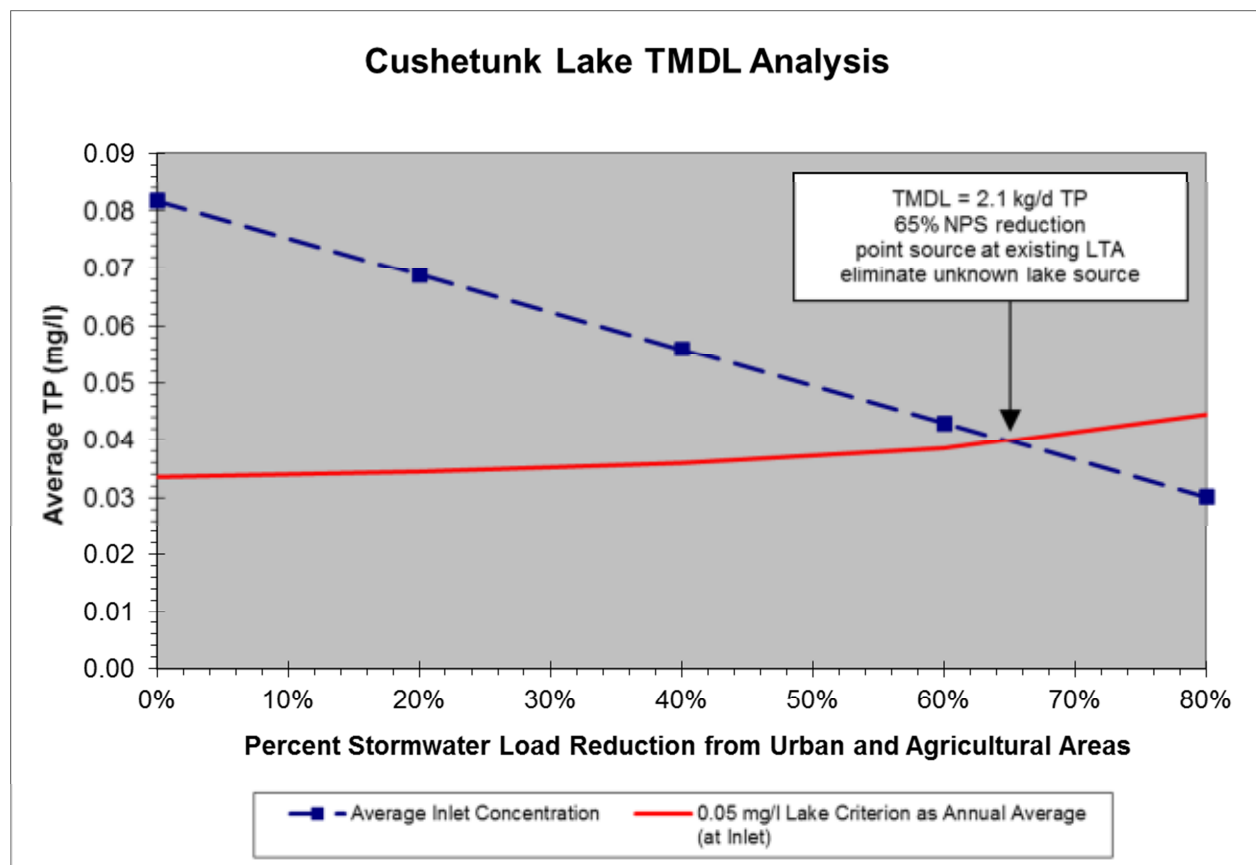


The phosphorus concentration in Gordon Pond is sensitive to the assumed effluent concentration for the point source near its inlet (PPPL – USDoE). While the current average effluent concentration is approximately 0.15 mg/l total phosphorus, the permitted flow for the facility is over four times the existing flow. Given the sensitivity of the lake concentration to effluent load, the relative difficulty in achieving nonpoint source reductions over 60%, and the fact the facility is currently discharging less than 25% of its capacity, the effluent phosphorus concentration (LTA) was set to 0.1 mg/l TP. The percent reduction of stormwater loads from urban and agricultural areas necessary to achieve the natural condition of 0.053 mg/l average phosphorus concentration in the lake was used to calculate the TMDL for Gordon Pond. The loading capacity (kg/d TP) and phosphorus reductions required to achieve it are provided in the graph below.



The TMDL for Cushetunk Lake, a headwater lake in the South Branch Rockaway Creek within the North/South Branch watershed area model, was evaluated slightly differently than the other headwater lakes. First, natural condition is not relevant, since natural baseflow phosphorus concentrations are low throughout the North/South Branch Raritan River Basin. Second, the significant increase in phosphorus observed between the inlet and the outlet of the lake under both baseflow and runoff conditions represents an unidentified source that must be mitigated in order to achieve the 0.05 mg/l criterion in the lake. Therefore the TMDL was evaluated at the inlet to the lake, with no net source (or sink) being allocated to the lake itself. Third, the point source (Round Valley Board of Ed), which is very small and located far from the lake inlet, does not impact the percent exceedance of the lake criterion even when no attenuation is assumed. Therefore, the point source was set to its existing effluent quality (2.5 mg/L, provided by NJDEP) and its permitted flow, which is over six times its existing flow. An additional 10% of load was added to the point source load to provide a Margin of Safety (MoS) for the watershed. Reserve Capacity (113 kg/yr, 0.31 kg/d) was arrived at iteratively, by increasing the load as

much as possible without requiring changes to other load allocations. The percent reduction of stormwater loads from urban and agricultural areas necessary to achieve the 0.05 mg/l criterion (expressed as an annual average) at the lake inlet was used to calculate the TMDL for Cushetunk Lake. The annual average TP concentration associated with the 0.05 mg/l criterion increases slightly as the percent NPS reduction increases. The reason is that the difference between stormwater TP concentrations and baseflow TP concentrations decreases as stormwater concentration decreases. The loading capacity (kg/d TP) and phosphorus reductions required to achieve it are provided in the graph below.





## **APPENDIX P**

### Summary of TMDL Condition

TMDL Condition for WWTP Point Sources in North-South Branch Basin



NJPDES Permit No.	Discharger	Permitted Flow (mgd)	Existing Effective Effluent Limit	Values used for TMDL Condition Simulation (mg/L) constant concentration					Explanation	Effluent Concentrations and Loads Associated with TMDL Condition*						
				May - October		November - April		TSS		May - October			November - April			TSS (mg/L)
				OrthoP	TP	OrthoP	TP			OrthoP (mg/L)	TP (mg/L)	TP (kg/d)	OrthoP (mg/L)	TP (mg/L)	TP (kg/d)	
NJ0028304	Day's Inn - Roxbury - Ledgewood Properties	0.04	0.5 mg/l TP as AML	0.090	0.556	0.127	0.556	n/a	pH at SBR4 TP at Solitude Lake TP at HUC outlets	0.08	0.50	0.08	0.11	0.50	0.08	n/a
NJ0021954	Mt Olive Twp - Clover Hill STP	0.5	1.0 mg/l TP as AML	0.090	0.690	0.127	1.111	18.9		0.08	0.62	1.18	0.11	1.00	1.89	17
NJ0023493	Washington Twp-Schooley's Mt	0.5	No Limit	0.090	0.757	0.127	0.794	11.1		0.08	0.68	1.29	0.11	0.71	1.35	10
NJ0109061	Washington Twp-Long Valley	0.244	No Limit	0.090	1.490	0.127	1.527	33.3		0.08	1.34	1.24	0.11	1.37	1.27	30
NJ0028487	NJDC Youth Correct - Mountainview	0.26	0.4 mg/l TP as AML	0.100	0.200	0.142	0.283	33.3	TP at HUC outlet pH at SBRR10	0.09	0.18	0.18	0.13	0.25	0.25	30
NJ0078018	Clinton West	0.25	2.0 mg/l TP as AML	0.100	0.200	0.142	0.283	33.3		0.09	0.18	0.17	0.13	0.25	0.24	30
NJ0035084	Exxon Research & Eng Co	0.22	0.5 mg/l TP as AML	0.100	0.200	0.142	0.283	33.3		0.09	0.18	0.15	0.13	0.25	0.21	30
NJ0020389	Town of Clinton WTP	2.03	2.0 mg/l TP as AML	0.160	2.222	0.226	2.222	33.3	pH at SBRR10 TP at HUC outlets	0.14	2.00	15.37	0.20	2.00	15.37	30
NJ0100528	Glen Meadows/Twin Oaks	0.025	No Limit	0.480	2.480	0.679	2.679	n/a		0.43	2.23	0.21	0.61	2.41	0.23	n/a
NJ0028436	Flemington Boro (wet-weather discharge)**	3.85	No Limit	0.260	0.900	0.190	0.650	38.4	Facility discharges only during storm events and therefore does not impact productivity.	n/a	n/a	n/a	n/a	n/a	n/a	n/a
NJ0022047	Raritan Twp MUA	3.8	No Limit	0.160	1.460	0.226	2.067	33.3	pH at SBRR10 TP at HUC outlets	0.14	1.31	18.90	0.20	1.86	26.75	30
NJ0000876	Hercules Kenvil Works Facility	0.135	1.0 mg/l TP as AML	0.330	0.660	0.556	1.111	n/a	TP at HUC outlet decreased productivity	0.30	0.59	0.30	0.50	1.00	0.51	n/a
NJ0022675	Roxbury Twp-Ajax Terrace	2.0	1.0 mg/l TP as AML	0.110	0.220	0.200	0.400	17.8		0.10	0.20	1.50	0.18	0.36	2.73	16
NJ0026824	Chester Shopping Center	0.011	No Limit	0.450	2.450	0.600	2.600	n/a	pH at LR5 TP at HUC outlets	0.41	2.21	0.09	0.54	2.34	0.10	n/a
NJ0022781	Valley Rd Sewer Co - Pottersville STP	0.048	No Limit	0.450	2.450	0.600	2.600	n/a		0.41	2.21	0.40	0.54	2.34	0.43	n/a
NJ0021865	Fiddler's Elbow CC - Reynwood Inc	0.03	No Limit	0.450	2.450	0.600	2.600	n/a		0.41	2.21	0.25	0.54	2.34	0.27	n/a
NJ0102563	Route 78 Office Area - Tewksbury	0.09653	New Discharge	0.072	0.144	0.128	0.256	n/a	AML associated with antidegradation limits TP at HUC outlet	0.07	0.13	0.05	0.12	0.23	0.08	n/a
NJ0023175	Clinton Twp BOE - Round Valley	0.009	No Limit	2.8 mg/l TP				n/a	Cusketunk Lake TMDL EEQ-Based Limit Satisfies Criteria	1.25	2.50	0.09	1.25	2.50	0.09	n/a
NJ0098922	Readington-Lebanon SA	1.45	No Limit	0.150	1.550	0.200	1.600	24.4	pH at LR5 TP at HUC outlets	0.14	1.40	7.66	0.18	1.44	7.90	22
NJ0021334	Mendham Boro	0.45	1.0 mg/l TP as AML	0.300	0.600	0.400	0.800	33.3	TP at HUC outlets	0.27	0.54	0.92	0.36	0.72	1.23	30
NJ0026387	Bernardsville	0.8	1.0 mg/l TP as AML	0.225	0.450	0.300	0.600	16.7		0.20	0.41	1.23	0.27	0.54	1.64	15
NJ0033995	Environmental Disposal Corporation	2.1	0.5 mg/l TP as AML	0.278	0.556	0.278	0.556	22.2		0.25	0.50	3.97	0.25	0.50	3.97	20

\*NOTE: Values in these columns represent the long-term average effluent concentrations and loads that are associated with the TMDL Condition. OrthoP values in BLUE ITALICS are important for controlling productivity and satisfying the pH criteria throughout the system. Actual effluent limits and permit conditions will be established by NJDEP.

\*\*NOTE: The actual intermittent flow reported in DMR was used to characterize the wet weather load contributions to the stream from Flemington Boro WWTP for both existing and TMDL conditions.

TMDL Condition for WWTP Point Sources in Upper Millstone Basin

NJPDES Permit No.	Discharger	Branch-Node	Permitted Flow (mgd)	Existing Effective Effluent Limit	Values used for TMDL Condition Simulation (mg/L) constant concentration			Explanation	Effluent Concentrations and Loads Associated with TMDL Condition*		
					OrthoP	TP	TSS		TP (mg/L)	TP (kg/d)	TSS (mg/L)
NJ0004243	Elementis	1-1	0.036	No Limit	0.195	0.390	n/a	TP in Carnegie Lake	0.35	0.05	n/a
NJ0029475	Hightstown Boro Advanced WWTP	2-4	1.000	1.0 mg/l TP as AML	0.065	0.130	33.3		0.12	0.44	30
NJ0023787	East Windsor Twp MUA	3-6	4.500	1.0 mg/l TP as AML	0.065	0.130	33.3		0.12	1.99	30
NJ0024104	Princeton Meadows WWTP**	4-2	1.640	1.0 mg/l TP as AML	0.065	0.130	33.3		0.12	0.73	30
NJ0023922	USDOE PPPL	8-1	0.637	No Limit	0.050	0.100	n/a	Gordon Pond TMDL	0.09	0.22	n/a
NJ0000272	David Sarnoff Research	9-2	0.096	1.0 mg/l TP as AML	0.195	0.390	n/a	TP in Carnegie Lake	0.35	0.13	n/a
NJ0031445	Firmenich Inc	9-2	0.036	1.0 mg/l TP as AML	0.195	0.390	n/a		0.35	0.05	n/a

\*NOTE: Values in these columns represent the long-term average effluent concentrations and loads that are associated with the TMDL Condition. Actual effluent limits and permit conditions will be established by NJDEP.

\*\*NOTE: The TMDL Condition for Princeton Meadows WWTP also replaced the existing ammonia concentration with the new ammonia WQBELs that were developed based on a site-specific ammonia toxicity study, and which become effective three years after the TMDL is established. The average monthly effluent limits (8 mg/l summer; 13 mg/l winter) were expressed as long-term averages (6.64 mg/l summer; 10.33 mg/l winter) for the TMDL Condition simulation.

TMDL Condition for WWTP Point Sources in Stony Brook Basin

NJPDES Permit No.	Discharger	Branch-Node	Permitted Flow (mgd)	Existing Effective Effluent Limit	Values used for TMDL Condition Simulation (mg/L) constant concentration			Explanation	Effluent Concentrations and Loads Associated with TMDL Condition*		
					OrthoP	TP	TSS		TP (mg/L)	TP (kg/d)	TSS (mg/L)
NJ0000795	Bristol-Myers Squibb Co	1-2	0.172	No Limit	0.100	0.200	5.6 May-Oct 11.1 Nov-Apr	TP in Carnegie Lake Productivity at SB3	0.18	0.12	5.0 May-Oct 10 Nov-Apr
NJ0035319	Stony Brook RSA Pennington	1-3	0.445	No Limit	0.100	0.200	5.6 May-Oct 11.1 Nov-Apr		0.18	0.30	5.0 May-Oct 10 Nov-Apr
NJ0000809	Hopewell Business Park	1-13	0.128	1.0 mg/l TP as AML	0.100	0.200	33.3		0.18	0.09	30
NJ0022110	Educational Testing Service	1-14	0.080	1.0 mg/l TP as AML	0.100	0.200	22.2		0.18	0.05	20

\*NOTE: Values in these columns represent the long-term average effluent concentrations and loads that are associated with the TMDL Condition. Actual effluent limits and permit conditions will be established by NJDEP.

TMDL Condition for WWTP Point Sources in Beden Brook Basin

NJPDES Permit No.	Discharger	Branch-Node	Permitted Flow (mgd)	Existing Effective Effluent Limit	Values used for TMDL Condition Simulation (mg/L) constant concentration			Explanation	Effluent Concentrations and Loads Associated with TMDL Condition*				
					TP May-Oct.	TP Nov.-Apr.	TSS		May - October		November - April		TSS (mg/L)
									TP (mg/L)	TP (kg/d)	TP (mg/L)	TP (kg/d)	
NJ0035301	Stony Brook RSA - Hopewell	1-2	0.300	No Limit	0.240	0.597	5.0 May-Oct 10 Nov-Apr	TP at HUC outlet ; decreased productivity	0.22	0.25	0.54	0.61	5.0 May-Oct 10 Nov-Apr
NJ0069523	Montgomery Twp - Cherry Valley STP	1-7	0.286	0.5 mg/l TP as Max Summer	0.240	0.597	4.4		0.22	0.23	0.54	0.58	4
NJ0022390	Montgomery Twp - Skillman Village (formerly NPDC)	1-14	0.500	1.0 mg/l TP as AML	0.240	0.597	n/a		0.22	0.41	0.54	1.02	n/a
NJ0023663	Carrier Foundation Rehab STP	2-3	0.040	1.0 mg/l TP as AML	0.780	1.111	n/a	TP at HUC outlet ; decreased productivity	0.70	0.11	1.00	0.15	n/a
NJ0060038	Montgomery Twp - Pike Brook	2-5	0.670	0.3 mg/l TP as AML	0.260	0.333	22.2		0.23	0.59	0.30	0.76	20
NJ0026140	J & J Consumer Products	2-7	0.063	1.0 mg/l TP as AML	0.780	1.111	n/a		0.70	0.17	1.00	0.24	n/a
NJ0067733	Montgomery Twp - Oxbridge	2-11	0.088	0.2 mg/l TP as AML Summer	0.222	1.111	n/a		0.20	0.07	1.00	0.33	n/a

\*NOTE: Values in these columns represent the long-term average effluent concentrations and loads that are associated with the TMDL Condition. Actual effluent limits and permit conditions will be established by NJDEP.

TMDL Condition for WWTP Point Sources in Lower Millstone - Raritan Basin

NJPDES Permit No.	Discharger	Branch-Node	Permitted Flow (mgd)	Existing Effective Effluent Limit	Values used for TMDL Condition Simulation (mg/L) constant concentration			Explanation	Effluent Concentrations Associated with TMDL Condition (mg/l)
					OrthoP	TP	TSS		TSS
NJ0031119	Stony Brook RSA-River Road	BedenMills 4-4	13.060	No Limit	2.45	2.46	33.3	0.1 mg/l TP criterion does not apply; possible future TMDL based on impact to Raritan River	30
NJ0026905	Montgomery Twp-Stage II	BedenMills 4-8	0.480	No Limit	3.30	3.41	33.3		30
NJ0050130	Montgomery Twp - Riverside	BedenMills 5-11	0.145	No Limit	3.28	3.28	n/a		n/a
NJ0023019	Industrial Tube Corp	BedenMills 5-19	0.012	No Limit	5.00	5.00	n/a		n/a
NJ0020036	VA Supply Depot	BedenMills 5-19	0.080	No Limit	5.00	5.00	n/a		n/a
NJ0024864	Somerset Raritan SA	Mainstem 3-4	24.300	No Limit	2.34	2.47	33.3	Follow-up monitoring to evaluate nutrient impacts and possible future TMDL	30
NJ0026727	Colorado Café	Mainstem 4-1	0.018	No Limit	1.90	1.90	n/a		n/a

\*NOTE: Values in these columns represent the long-term average effluent concentrations that are associated with the TMDL Condition.

**Raritan River Basin  
Stormwater and Nonpoint Source TMDL Condition**

WMA	HUC-14s within Study Area	Subwatershed	Model Area	Simulated Agricultural NPS Percent Reduction	Simulated Urban NPS Percent Reduction	Agricultural NPS Percent Reduction with 20% MoS	Urban NPS Percent Reduction with 20% MoS	Water Quality Targets
8	02030105010010	Drakes Brook (above Eyland Ave)	NSBranch	80% TP & TSS Reduction (20% of Existing Load)		84% TP & TSS Reduction (16% of Existing Load)		100% Compliance with 0.05 mg/l TP Criterion in Solitude Lake
8	02030105010020	Drakes Brook (below Eyland Ave)	NSBranch					
8	02030105010030	Raritan River SB (above Rt 46)	NSBranch					
8	02030105010040	Raritan River SB (74d 44m 15s to Rt 46)	NSBranch					
8	02030105010050	Raritan R SB (LongValley br to 74d44m15s)	NSBranch					
8	02030105010060	Raritan R SB (Califon br to Long Valley)	NSBranch					
8	02030105010070	Raritan R SB (StoneMill gage to Califon)	NSBranch					
8	02030105010080	Raritan R SB (Spruce Run-StoneMill gage)	NSBranch	60% TP & TSS Reduction (40% of Existing Load)	50% TP & TSS Reduction (50% of Existing Load)	68% TP & TSS Reduction (32% of Existing Load)	60% TP & TSS Reduction (40% of Existing Load)	100% Compliance with 0.1 mg/l TP Criterion & applicable TSS Criteria at HUC Outlets within Modeled Streams
8	02030105020050	Beaver Brook (Clinton)	NSBranch	60% TP & TSS Reduction (40% of Existing Load)	50% TP & TSS Reduction (50% of Existing Load)	68% TP & TSS Reduction (32% of Existing Load)	60% TP & TSS Reduction (40% of Existing Load)	
8	02030105020060	Cakepoulin Creek	NSBranch					
8	02030105020070	Raritan R SB (River Rd to Spruce Run)	NSBranch	60% TP & TSS Reduction (40% of Existing Load)	50% TP & TSS Reduction (50% of Existing Load)	68% TP & TSS Reduction (32% of Existing Load)	60% TP & TSS Reduction (40% of Existing Load)	100% Compliance with 0.1 mg/l TP Criterion & applicable TSS Criteria at HUC Outlets within Modeled Streams
8	02030105020080	Raritan R SB (Prescott Bk to River Rd)	NSBranch					
8	02030105020090	Prescott Brook / Round Valley Reservoir	NSBranch					
8	02030105020100	Raritan R SB (Three Bridges-Prescott Bk)	NSBranch					
8	02030105030010	First Neshanic River	NSBranch	65% TP & TSS Reduction (35% of Existing Load)	60% TP & TSS Reduction (40% of Existing Load)	72% TP & TSS Reduction (28% of Existing Load)	68% TP & TSS Reduction (32% of Existing Load)	100% Compliance with 0.1 mg/l TP Criterion in Neshanic River
8	02030105030020	Second Neshanic River	NSBranch					
8	02030105030030	Headquarters trib (Third Neshanic River)	NSBranch					
8	02030105030040	Third Neshanic River	NSBranch					
8	02030105030050	Back Brook	NSBranch					
8	02030105030060	Neshanic River (below FNR / SNR confl)	NSBranch	60% TP & TSS Reduction (40% of Existing Load)	50% TP & TSS Reduction (50% of Existing Load)	68% TP & TSS Reduction (32% of Existing Load)	60% TP & TSS Reduction (40% of Existing Load)	100% Compliance with 0.1 mg/l TP Criterion & applicable TSS Criteria at HUC Outlets within Modeled Streams
8	02030105040010	Raritan R SB (Pleasant Run-Three Bridges)	NSBranch					
8	02030105040020	Pleasant Run	NSBranch	60% TP & TSS Reduction (40% of Existing Load)	50% TP & TSS Reduction (50% of Existing Load)	68% TP & TSS Reduction (32% of Existing Load)	60% TP & TSS Reduction (40% of Existing Load)	100% Compliance with 0.1 mg/l TP Criterion in Holland Brook
8	02030105040030	Holland Brook	NSBranch					
8	02030105040040	Raritan R SB (NB to Pleasant Run)	NSBranch					
8	Those values in BO	Lamington R (above Rt 10)	NSBranch	60% TP & TSS Reduction (40% of Existing Load)	50% TP & TSS Reduction (50% of Existing Load)	68% TP & TSS Reduction (32% of Existing Load)	60% TP & TSS Reduction (40% of Existing Load)	100% Compliance with 0.1 mg/l TP Criterion & applicable TSS Criteria at HUC Outlets within Modeled Streams
8	02030105050020	Lamington R (Hillside Rd to Rt 10)	NSBranch					
8	02030105050030	Lamington R (Furnace Rd to Hillside Rd)	NSBranch					
8	02030105050040	Lamington R (Pottersville gage-FurnaceRd)	NSBranch					
8	02030105050050	Pottersville trib (Lamington River)	NSBranch					
8	02030105050060	Cold Brook	NSBranch					
8	02030105050070	Lamington R (HallsBrRd-Pottersville gage)	NSBranch					
8	02030105050080	Rockaway Ck (above McCrea Mills)	NSBranch					
8	02030105050090	Rockaway Ck (RockawaySB to McCrea Mills)	NSBranch					
8	02030105050110	Lamington R (below Halls Bridge Rd)	NSBranch					
8	02030105050100	Rockaway Ck SB	NSBranch	65% TP & TSS Reduction (35% of Existing Load)		72% TP & TSS Reduction (28% of Existing Load)		Compliance with 0.05 mg/l TP Criterion in Cushetunk Lake
8	02030105060010	Raritan R NB (above/incl India Bk)	NSBranch	70% TP & TSS Reduction (30% of Existing Load)		76% TP & TSS Reduction (24% of Existing Load)		100% Compliance with 0.05 mg/l TP Criterion in Ravine Lake
8	02030105060020	Burnett Brook (above Old Mill Rd)	NSBranch					
8	02030105060030	Raritan R NB (incl McVickers to India Bk)	NSBranch					
8	02030105060040	Raritan R NB (Peapack Bk to McVickers Bk) - upstream Ravine Lake	NSBranch	60% TP & TSS Reduction (40% of Existing Load)	50% TP & TSS Reduction (50% of Existing Load)	68% TP & TSS Reduction (32% of Existing Load)	60% TP & TSS Reduction (40% of Existing Load)	100% Compliance with 0.1 mg/l TP Criterion & applicable TSS Criteria at HUC Outlets within Modeled Streams
8		Raritan R NB (Peapack Bk to McVickers Bk) - downstream Ravine Lake	NSBranch					
8	02030105060050	Peapack Brook (above/incl Gladstone Bk)	NSBranch					
8	02030105060060	Peapack Brook (below Gladstone Brook)	NSBranch					
8	02030105060070	Raritan R NB (incl Mine Bk to Peapack Bk)	NSBranch					
8	02030105060080	Middle Brook (NB Raritan River)	NSBranch					
8	02030105060090	Raritan R NB (Lamington R to Mine Bk)	NSBranch					
8	02030105070010	Raritan R NB (Rt 28 to Lamington R)	NSBranch					
8	02030105070020	Chambers Brook	NSBranch					
8	02030105070030	Raritan R NB (below Rt 28)	NSBranch					
9	02030105080010	Peters Brook	NSBranch	60% TP & TSS Reduction (40% of Existing Load)	50% TP & TSS Reduction (50% of Existing Load)	68% TP & TSS Reduction (32% of Existing Load)	60% TP & TSS Reduction (40% of Existing Load)	100% Compliance with 0.1 mg/l TP Criterion & applicable TSS Criteria at HUC Outlets within Modeled Streams
9	02030105080020	Raritan R Lwr (Rt 206 to NB / SB)	NSBranch					
9	02030105080030	Raritan R Lwr (Millstone to Rt 206)	NSBranch					

**Raritan River Basin  
Stormwater and Nonpoint Source TMDL Condition**

WMA	HUC-14s within Study Area	Subwatershed	Model Area	Simulated Agricultural NPS Percent Reduction	Simulated Urban NPS Percent Reduction	Agricultural NPS Percent Reduction with 20% MoS	Urban NPS Percent Reduction with 20% MoS	Water Quality Targets
10	02030105090010	Stony Bk (above 74d 49m 15s)	Stony	80% TP & TSS Reduction (20% of Existing Load)		84% TP & TSS Reduction (16% of Existing Load)		Achieves Natural Condition in Carnegie Lake (0.05 mg/l Average TP)  and 100% Compliance with 40 mg/l TSS Criterion at HUC Outlets within Modeled Streams
10	02030105090020	Stony Bk (74d 48m 10s to 74d 49m 15s)	Stony					
10	02030105090030	Stony Bk (Baldwins Ck to 74d 48m 10s)	Stony					
10	02030105090040	Stony Bk (74d46m dam to/incl Baldwins Ck)	Stony					
10	02030105090050	Stony Bk (Province Line Rd to 74d46m dam)	Stony					
10	02030105090060	Stony Bk (Rt 206 to Province Line Rd)	Stony					
10	02030105090070	Stony Bk (Harrison St to Rt 206)	Stony					
10	02030105100010	Millstone River (above Rt 33)	Millstone					
10	02030105100020	Millstone R (Applegarth road to Rt 33)	Millstone					
10	02030105100030	Millstone R (RockyBk to Applegarth road)	Millstone					
10	02030105100040	Rocky Brook (above Monmouth Co line)	Millstone					
10	02030105100050	Rocky Brook (below Monmouth Co line)	Millstone					
10	02030105100060	Millstone R (Cranbury Bk to Rocky Bk)	Millstone					
10	02030105100070	Cranbury Brook (above NJ Turnpike)	Millstone					
10	02030105100080	Cedar Brook (Cranbury Brook)	Millstone					
10	02030105100090	Cranbury Brook (below NJ Turnpike)	Millstone					
10	02030105100100	Shallow Brook (Devils Brook)	Millstone					
10	02030105100110	Devils Brook	Millstone					
10	02030105100120	Bear Brook (above Trenton Road)	Millstone					
10	02030105100130	Bear Brook (below Trenton Road)	Millstone					
10	02030105100140	Millstone R (Rt 1 to Cranbury Bk)	Millstone					
10	02030105110020	Millstone R (HeathcoteBk to Harrison St)	Carnegie Lake	50% TSS Reduction (50% of Existing Load)		60% TSS Reduction (40% of Existing Load)	100% Compliance with 40 mg/l TSS Criterion at HUC Outlets within Modeled Streams	
10	02030105110010	Heathcote Brook	Beden/Millstone					
10	02030105110030	Millstone R (Beden Bk to Heathcote Bk)	Beden/Millstone					
10	02030105110040	Beden Brook (above Province Line Rd)	Beden/Millstone	60% TP & TSS Reduction (40% of Existing Load)		68% TP & TSS Reduction (32% of Existing Load)	100% Compliance with 0.1 mg/l TP Criterion & applicable TSS Criteria at HUC Outlets within Modeled Streams	
10	02030105110050	Beden Brook (below Province Line Rd)	Beden/Millstone					
10	02030105110060	Rock Brook (above Camp Meeting Ave)	Beden/Millstone					
10	02030105110070	Rock Brook (below Camp Meeting Ave)	Beden/Millstone					
10	02030105110080	Pike Run (above Crusier Brook)	Beden/Millstone					
10	02030105110090	Cruser Brook / Roaring Brook	Beden/Millstone					
10	02030105110100	Pike Run (below Crusier Brook)	Beden/Millstone					
10	02030105110110	Millstone R (BlackwellsMills to BedenBk)	Beden/Millstone	50% TSS Reduction (50% of Existing Load)		60% TSS Reduction (40% of Existing Load)	100% Compliance with 40 mg/l TSS Criterion at HUC Outlets within Modeled Streams	
10	02030105110120	Sixmile Run (above Middlebush Rd)	Beden/Millstone					
10	02030105110130	Sixmile Run (below Middlebush Rd)	Beden/Millstone					
10	02030105110140	Millstone R (AmwellRd to BlackwellsMills)	Beden/Millstone					
10	02030105110150	Royce Brook (above Branch Royce Brook)	Beden/Millstone					
10	02030105110160	Royce Brook (below/incl Branch Royce Bk)	Beden/Millstone					
10	02030105110170	Millstone River (below Amwell Rd)	Beden/Millstone					
9	02030105120010	Green Bk (above/incl Blue Brook)	Mainstem					
9	02030105120020	Green Bk (N Plainfield gage to Blue Bk)	Mainstem					
9	02030105120030	Stony Brook (North Plainfield)	Mainstem					
9	02030105120040	Green Bk (Bound Bk to N Plainfield gage)	Mainstem					
9	02030105120050	Middle Brook EB	Mainstem					
9	02030105120060	Middle Brook WB	Mainstem					
9	02030105120070	Cuckels Brook	Mainstem					
9	02030105120080	South Fork of Bound Brook	Mainstem					
9	02030105120090	Spring Lake Fork of Bound Brook	Mainstem					
9	02030105120100	Bound Brook (below fork at 74d 25m 15s)	Mainstem					
9	02030105120110	Ambrose Brook (above/incl Lake Nelson)	Mainstem					
9	02030105120120	Ambrose Brook (below Lake Nelson)	Mainstem					
9	02030105120130	Green Brook (below Bound Brook)	Mainstem					
9	02030105120140	Raritan R LwR (I-287 Piscatway-Millstone)	Mainstem					



Notes Regarding Effluent Concentration Values Selected for TMDL Condition

NJPDES Permit No.	Discharger	Permitted Flow (mgd)	Existing Effective Effluent Limit	Basis Used to Select Values for TMDL Condition Simulation					
				May - October		November - April		TSS	
				OrthoP	Org.P	OrthoP	Org.P		
NJ0028304	Day's Inn - Roxbury - Ledgewood Properties	0.04	0.5 mg/l TP as AML	Iterated OrthoP to 0.09 mg/l to address pH and DO at SBR4	Existing TP AML plus MoS	OrthoP level adjusted to account for winter/summer 7Q10 flows	Existing TP AML plus MoS	TSS not simulated	
NJ0021954	Mt Olive Twp - Clover Hill STP	0.5	1.0 mg/l TP as AML		Iterated OrgP to satisfy TP at Drakes Brook HUC		Existing TP AML plus MoS	Existing TSS AML plus MoS	
NJ0023493	Washington Twp-Schooley's Mt	0.5	No Limit		OrgP associated with existing TSS limit		OrgP associated with existing TSS limit	Existing TSS AML plus MoS	
NJ0109061	Washington Twp-Long Valley	0.244	No Limit		Iterated OrgP to satisfy TP at HUC		Iterated OrgP to satisfy TP at HUC	Existing TSS AML plus MoS	
NJ0028487	NJDC Youth Correct-Mountainview	0.26	0.4 mg/l TP as AML	Iterated TP to satisfy TP at Beaver Brook HUC; OrthoP = OrgP	Iterated TP to satisfy TP at Beaver Brook HUC; OrthoP = OrgP	Iterated TP to satisfy TP at Beaver Brook HUC; OrthoP = OrgP	Existing TSS AML plus MoS		
NJ0078018	Clinton West	0.25	2.0 mg/l TP as AML				Existing TSS AML plus MoS		
NJ0035084	Exxon Research & Eng Co	0.22	0.5 mg/l TP as AML				Existing TSS AML plus MoS		
NJ0020389	Town of Clinton WTP	2.03	2.0 mg/l TP as AML	Iterated OrthoP to 0.16 mg/l to address pH at SBRR10	Existing TP AML plus MoS	OrthoP level adjusted to account for winter/summer 7Q10 flows	Existing TP AML plus MoS	Existing TSS AML plus MoS	
NJ0100528	Glen Meadows/Twin Oaks	0.025	No Limit	Iterated OrthoP to 0.16×3 (very small discharger) to address pH at SBRR10	OrgP associated with existing TSS limit	OrthoP level adjusted to account for winter/summer 7Q10 flows	OrgP associated with existing TSS limit	TSS not simulated	
NJ0028436	Flemington Boro	3.85	No Limit	90th percentile of existing data	90th percentile of existing data	90th percentile of existing data	90th percentile of existing data	90th percentile of existing data	
NJ0022047	Raritan Twp MUA	3.8	No Limit	Iterated OrthoP to 0.16 mg/l to address pH at SBRR10	Iterated OrgP to satisfy TP at HUC	OrthoP level adjusted to account for winter/summer 7Q10 flows	Iterated OrgP to satisfy TP at HUC	Existing TSS AML plus MoS	
NJ0000876	Hercules Kenvil Works Facility	0.135	1.0 mg/l TP as AML	Iterated TP to 0.22×3 (very small discharger) to satisfy TP criterion at HUC; OrgP = OrthoP		Existing TP AML plus MoS; OrgP = OrthoP		TSS not simulated	
NJ0022675	Roxbury Twp-Ajax Terrace	2.0	1.0 mg/l TP as AML	Iterated TP to satisfy TP criterion at HUC outlet; OrgP = OrthoP		Iterated TP to satisfy TP criterion at HUC outlet; OrgP = OrthoP		Existing TSS AML plus MoS	
NJ0026824	Chester Shopping Center	0.011	No Limit	Iterated OrthoP to 0.15×3 (very small discharger) to address pH at LR5	OrgP associated with existing TSS limit	Iterated OrthoP to 0.2×3 (very small discharger) to address TP at HUC	OrgP associated with existing TSS limit	TSS not simulated	
NJ0022781	Valley Rd Sewer Co - Pottersville STP	0.048	No Limit					TSS not simulated	
NJ0021865	Fiddler's Elbow CC - Reynwood Inc	0.03	No Limit					TSS not simulated	
NJ0102563	Route 78 Office Area - Tewksbury	0.09653	New Discharge	TP AML associated with antidegradation limit plus MoS; OrgP = OrthoP		TP AML associated with antidegradation limit plus MoS; OrgP = OrthoP		TSS not simulated	
NJ0023175	Clinton Twp BOE - Round Valley	0.009	No Limit	Simulated in Cushetunk Lake model; EEQ plus MoS					TSS not simulated
NJ0098922	Readington-Lebanon SA	1.45	No Limit	Iterated OrthoP to 0.15 mg/l to address pH at LR5	Iterated OrgP to satisfy TP at HUC	Iterated OrthoP to 0.2 mg/l to address TP at HUC	Iterated OrgP to satisfy TP at HUC	Existing TSS AML plus MoS	
NJ0021334	Mendham Boro	0.45	1.0 mg/l TP as AML	Iterated TP to satisfy TP criterion at HUC outlet; OrgP = OrthoP		Iterated TP to satisfy TP criterion at HUC outlet; OrgP = OrthoP		Existing TSS AML plus MoS	
NJ0026387	Bernardsville	0.8	1.0 mg/l TP as AML	Iterated TP to satisfy TP criterion at HUC outlet; OrgP = OrthoP		Iterated TP to satisfy TP criterion at HUC outlet; OrgP = OrthoP		Existing TSS AML plus MoS	
NJ0033995	Environmental Disposal Corporation	2.1	0.5 mg/l TP as AML	Existing TP AML plus MoS; OrthoP = OrgP					Existing TSS AML plus MoS

Notes Regarding Effluent Concentration Values Selected for TMDL Condition

NJPDES Permit No.	Discharger	Permitted Flow (mgd)	Existing Effective Effluent Limit	Basis Used to Select Values for TMDL Condition Simulation		
				OrthoP	Org.P	TSS
<b>Upper Millstone River Watershed</b>						
NJ0004243	Elementis	0.036	No Limit	Iterated TP to 0.13×3 (very small discharger) to achieve natural condition in Carnegie Lake; OrthoP = OrgP		TSS not simulated
NJ0029475	Hightstown Boro Advanced WWTP	1.000	1.0 mg/l TP as AML	Iterated TP to 0.13 mg/l in order to achieve natural condition in Carnegie Lake; OrthoP = OrgP		Existing TSS AML plus MoS
NJ0023787	East Windsor Twp MUA	4.500	1.0 mg/l TP as AML			Existing TSS AML plus MoS
NJ0024104	Princeton Meadows STP	1.640	1.0 mg/l TP as AML			Existing TSS AML plus MoS
NJ0023922	USDOE PPPL	0.637	No Limit	Value based on Gordon Pond TMDL analysis		TSS not simulated
NJ0000272	David Sarnoff Research	0.096	1.0 mg/l TP as AML	Iterated TP to 0.13×3 (very small discharger) to achieve natural condition in Carnegie Lake; OrthoP = OrgP		TSS not simulated
NJ0031445	Firmenich Inc	0.036	1.0 mg/l TP as AML			TSS not simulated
<b>Stony Brook Watershed</b>						
NJ0000795	Bristol-Myers Squibb Co	0.172	No Limit	Iterated TP to 0.2 mg/l in order to achieve natural condition in Carnegie Lake; OrthoP = OrgP		Existing TSS AML plus MoS
NJ0035319	Stony Brook RSA Pennington	0.445	No Limit			Existing TSS AML plus MoS
NJ0000809	Hopewell Business Park	0.128	1.0 mg/l TP as AML			Existing TSS AML plus MoS
NJ0022110	Educational Testing Service	0.080	1.0 mg/l TP as AML			Existing TSS AML plus MoS

Notes Regarding Effluent Concentration Values Selected for TMDL Condition

NJPDES Permit No.	Discharger	Permitted Flow (mgd)	Existing Effective Effluent Limit	Values used for TMDL Condition Simulation (mg/l) constant concentration		
				OrthoP, OrgP May-Oct.	OrthoP, OrgP Nov.-Apr.	TSS
<b>Beden Brook / Pike Brook Watershed</b>						
NJ0035301	Stony Brook RSA - Hopewell	0.300	No Limit	Iterated TP to 0.24 mg/l to satisfy TP at HUC outlet; OrthoP = OrgP	TP level adjusted by winter/summer 7Q10 flow ratio (2.5) to satisfy TP at HUC outlet	Existing TSS AML plus MoS
NJ0069523	Montgomery Twp - Cherry Valley STP	0.286	0.5 mg/l TP as Max Summer			Existing TSS AML plus MoS
NJ0022390	Montgomery Twp - Skillman Village (formerly NPDC)	0.500	1.0 mg/l TP as AML			TSS not simulated
NJ0023663	Carrier Foundation Rehab STP	0.040	1.0 mg/l TP as AML	Iterated TP to 0.26×3 (very small discharger) to satisfy TP at HUC outlet	Existing AML plus MoS	TSS not simulated
NJ0060038	Montgomery Twp - Pike Brook	0.670	0.3 mg/l TP as AML	Iterated TP to 0.26 mg/L to satisfy TP at HUC outlet	Existing AML plus MoS	Existing TSS AML plus MoS
NJ0026140	J & J Consumer Products	0.063	1.0 mg/l TP as AML	Iterated TP to 0.26×3 (very small discharger) to satisfy TP at HUC outlet	Existing AML plus MoS	TSS not simulated
NJ0067733	Montgomery Twp - Oxbridge	0.088	0.2 mg/l TP as AML Summer	Existing AML plus MoS	Consistent with other very small dischargers to satisfy TP at HUC	TSS not simulated
<b>Lower Millstone / Mainstem Raritan River Watershed</b>						
				<b>OrthoP</b>	<b>Org.P</b>	<b>TSS</b>
NJ0031119	Stony Brook RSA-River Road	13.060	No Limit	Average existing effluent quality for OrthoP and OrgP		Existing TSS AML plus MoS
NJ0026905	Montgomery Twp-Stage II	0.480	No Limit	Average existing effluent quality for OrthoP and OrgP		Existing TSS AML plus MoS
NJ0023019	Industrial Tube Corp	0.012	No Limit	No data available; 5 mg/l TP (100% OrthoP) used		TSS not simulated
NJ0020036	VA Supply Depot	0.080	No Limit			TSS not simulated
NJ0050130	Montgomery Twp - Riverside	0.145	No Limit	Average existing effluent quality for TP; 100% OrthoP used		TSS not simulated
NJ0024864	Somerset Raritan SA	24.300	No Limit	Average existing effluent quality for OrthoP and OrgP		Existing TSS AML plus MoS
NJ0026727	Colorado Café	0.018	No Limit	Average existing effluent quality for TP; 100% OrthoP used		TSS not simulated

## **APPENDIX Q**

### Summary of TMDL Outcomes

**HUC Outlet Evaluation for TP and TSS Compliance  
(BOLD indicates designated impairment)**

HUC-14	Subwatershed	Model	Branch-Node	TP Target (mg/l)	TP TMDL % Exceed	TSS Target (mg/l)	TSS TMDL % Exceed
02030105010020	Drakes Brook (below Eyland Ave)	NSBranch	2-3	0.1	0%	40	0%
02030105010050	Raritan R SB(LongValley br to 74d44m15s)	NSBranch	3-6	0.1	0%	25	0%
02030105010060	Raritan R SB(Califon br to Long Valley)	NSBranch	3-14	0.1	0%	25	0%
02030105010070	Raritan R SB(StoneMill gage to Califon)	NSBranch	3-18	0.1	0%	25	0%
02030105010080	Raritan R SB(Spruce Run-StoneMill gage)	NSBranch	3-24	<b>0.1</b>	0%	25	0%
02030105020050	Beaver Brook (Clinton)	NSBranch	4-5	<b>0.1</b>	0%	25	0%
02030105020060	Cakepoulin Creek	NSBranch	6-1	0.1	0%	25	0%
02030105020070	Raritan R SB(River Rd to Spruce Run)	NSBranch	7-1	<b>0.1</b>	0%	<b>25</b>	0%
02030105020080	Raritan R SB(Prescott Bk to River Rd)	NSBranch	7-7	0.1	0%	<b>25</b>	0%
02030105020100	Raritan R SB(Three Bridges-Prescott Bk)	NSBranch	7-13	<b>0.1</b>	0%	<b>40</b>	0%
02030105030060	Neshanic River (below FNR / SNR confl)	NSBranch	8-2	<b>0.1</b>	0%	40	0%
02030105030070	Neshanic River (below Black Brook)	NSBranch	8-5	<b>0.1</b>	0%	40	0%
02030105040010	Raritan R SB(Pleasant Run-Three Bridges)	NSBranch	9-4	<b>0.1</b>	0%	40	0%
02030105040030	Holland Brook	NSBranch	10-1	<b>0.1</b>	0%	40	0%
02030105040040	Raritan R SB(NB to Pleasant Run)	NSBranch	11-1	<b>0.1</b>	0%	<b>40</b>	0%
02030105050020	Lamington R (Hillside Rd to Rt 10)	NSBranch	12-6	<b>0.1</b>	0%	40	0%
02030105050030	Lamington R (Furnace Rd to Hillside Rd)	NSBranch	12-8	0.1	0%	25	0%
02030105050040	Lamington R(Pottersville gage to FurnaceRd)	NSBranch	12-12	0.1	0%	25	0%
02030105050130	Lamington R(Herzog Brk to Pottersville gage)	NSBranch	12-15	0.1	0%	25	0%
02030105050090	Rockaway Ck (below McCrea Mills)	NSBranch	15-5	<b>0.1</b>	0%	40	0%
02030105050100	Rockaway Ck SB	NSBranch	14-2	<b>0.1</b>	0%	<b>25</b>	0%
02030105050070	Lamington R(Halls Bridge Rd to Herzog Brk)	NSBranch	16-4	<b>0.1</b>	0%	<b>40</b>	0%
02030105060010	Raritan R NB (above/incl India Bk)	NSBranch	17-1	0.1	0%	25	0%
02030105060030	Raritan R NB(incl McVickers to India Bk)	NSBranch	19-2	0.1	0%	25	0%
02030105060040	Raritan R NB(Peapack Bk to McVickers Bk)	NSBranch	19-11	<b>0.1</b>	0%	<b>25</b>	0%

**HUC Outlet Evaluation for TP and TSS Compliance  
(BOLD indicates designated impairment)**

HUC-14	Subwatershed	Model	Branch-Node	TP Target (mg/l)	TP TMDL % Exceed	TSS Target (mg/l)	TSS TMDL % Exceed
02030105060070	Raritan R NB(incl Mine Bk to Peapack Bk)	NSBranch	20-6	0.1	0%	40	0%
02030105060090	Raritan R NB (Lamington R to Mine Bk)	NSBranch	21-8	0.1	0%	40	0%
02030105070010	Raritan R NB (Rt 28 to Lamington R)	NSBranch	22-5	0.1	0%	40	0%
02030105070030	Raritan R NB (below Rt 28)	NSBranch	22-8	<b>0.1</b>	0%	<b>40</b>	0%
02030105080020	Raritan R Lwr (Rt 206 to NB / SB)	NSBranch	23-5	<b>0.1</b>	0%	40	0%
02030105080030	Raritan R Lwr (Millstone to Rt 206)	Mainstem	2-2	<b>0.1</b>	0%	<b>40</b>	0%
02030105090030	Stony Bk (Baldwins Ck to 74d 48m 10s)	Stony	1-1	<b>0.1</b>	0%	40	0%
02030105090040	Stony Bk(74d46m dam to/incl Baldwins Ck)	Stony	1-5	0.1	0%	40	0%
02030105090050	Stony Bk(Province Line Rd to 74d46m dam)	Stony	1-15	<b>0.1</b>	0%	40	0%
02030105090060	Stony Bk (Rt 206 to Province Line Rd)	Stony	1-21	<b>0.1</b>	0%	40	0%
02030105090070	Stony Bk (Harrison St to Rt 206)	Stony	1-27	<b>0.1</b>	0%	40	0%
02030105090090	Stony Bk- Princeton drainage	Carnegie	Lakeshed	<b>0.1</b>	0%	40	0%
02030105100010	Millstone River (above Rt 33)	Millstone	1-1	<b>N/A</b>		<b>40</b>	0%
02030105100020	Millstone R (Applegarth road to Rt 33)	Millstone	Watershed				
02030105100030	Millstone R (RockyBk to Applegarth road)	Millstone	1-2	<b>N/A</b>		40	0%
02030105100050	Rocky Brook (below Monmouth Co line)	Millstone	2-6	<b>N/A</b>		40	0%
02030105100060	Millstone R (Cranbury Bk to Rocky Bk)	Millstone	3-15	<b>N/A</b>		40	0%
02030105100090	Cranbury Brook (below NJ Turnpike)	Millstone	4-2	<b>N/A</b>		40	0%
02030105100110	Devils Brook	Millstone	8-1	<b>N/A</b>		40	0%
02030105100130	Bear Brook (below Trenton Road)	Millstone	6-3	<b>N/A</b>		40	0%
02030105100140	Millstone R (Rt 1 to Cranbury Bk)	Millstone	9-1	<b>N/A</b>		40	0%
02030105110020	Millstone R (Heathcote Bk to Harrison St)	Carnegie	Lakeshed	<b>0.1</b>	0%	40	0%
02030105110030	Millstone R (Beden Bk to Heathcote Bk)	Beden	4-13	<b>N/A</b>		40	0%
02030105110040	Beden Brook (above Province Line Rd)	Beden	1-1	0.1	0%	40	0%
02030105110050	Beden Brook (below Province Line Rd)	Beden	1-18	<b>0.1</b>	0%	40	0%

**HUC Outlet Evaluation for TP and TSS Compliance  
(BOLD indicates designated impairment)**

HUC-14	Subwatershed	Model	Branch-Node	TP Target (mg/l)	TP TMDL % Exceed	TSS Target (mg/l)	TSS TMDL % Exceed
02030105110080	Pike Run (above Cruser Brook)	Beden	2-3	0.1	0%	40	0%
02030105110100	Pike Run (below Cruser Brook)	Beden	3-1	<b>0.1</b>	0%	40	0%
02030105110110	Millstone R (BlackwellsMills to BedenBk)	Beden	5-12	<b>N/A</b>		40	0%
02030105110140	Millstone R(AmwellRd to BlackwellsMills)	Beden	5-15	<b>N/A</b>		40	0%
02030105110170	Millstone River (below Amwell Rd)	Beden	5-20	<b>N/A</b>		40	0%
02030105120130	Green Brook (below Bound Brook)	Mainstem	4-5	<b>N/A</b>		<b>40</b>	0%
02030105120140	Raritan R Lwr(I-287 Piscatway-Millstone)	Mainstem	5-3	<b>N/A</b>		<b>40</b>	0%

### Phosphorus Impairments and TMDL Outcomes in Raritan River Basin

Assessment HUC	Subwatershed	Basis for Impairment	Model Segment	Target	Outcome
NJ02030105010080-01	Raritan R SB(Spruce Run-StoneMill gage)	SDR* by NJDEP	NSB 3-19 Solitude Lake	0.05 mg/l	TMDL demonstrates 100% compliance
NJ02030105020040-01	Spruce Run Reservoir / Willoughby Brook	2010 303(d)	out of extent	n/a	Not Addressed
NJ02030105020050-01	Beaver Brook (Clinton)	2010 303(d)	NSB 4-5	0.1 mg/l	TMDL demonstrates 100% compliance
NJ02030105020070-01	Raritan R SB(River Rd to Spruce Run)	2010 303(d)	NSB 7-1	0.1 mg/l	TMDL demonstrates 100% compliance
NJ02030105020100-01	Raritan R SB(Three Bridges-Prescott Bk)	2010 303(d)	NSB 7-13	0.1 mg/l	TMDL demonstrates 100% compliance
NJ02030105030060-01	Neshanic River (below FNR / SNR confl)	2010 303(d)	NSB 8-2	0.1 mg/l	TMDL demonstrates 100% compliance
NJ02030105030070-01	Neshanic River (below Black Brk)	2010 303(d)	NSB 8-5	0.1 mg/l	TMDL demonstrates 100% compliance
NJ02030105040010-01	Raritan R SB(Pleasant Run-Three Bridges)	2010 303(d)	NSB 9-4	0.1 mg/l	TMDL demonstrates 100% compliance
NJ02030105040030-01	Holland Brook	SDR* by NJDEP	NSB 10-1	0.1 mg/l	TMDL demonstrates 100% compliance
NJ02030105040040-01	Raritan R SB(NB to Pleasant Run)	2010 303(d)	NSB 11-1	0.1 mg/l	TMDL demonstrates 100% compliance
NJ02030105050020-01	Lamington R (Hillside Rd to Rt 10)	2010 303(d)	NSB 12-6	0.1 mg/l	TMDL demonstrates 100% compliance
NJ02030105050090-01	Rockaway Ck (below McCrea Mills)	2010 303(d)	NSB 15-5	0.1 mg/l	TMDL demonstrates 100% compliance
NJ02030105050100-01	Rockaway Ck SB	2010 303(d)	NSB 14-2 Cushetunk Lake	0.1 mg/l 0.05 mg/l	TMDL demonstrates 100% compliance
NJ02030105050070-01	Lamington R(Halls Bridge Rd to HerzogBrk)	2010 303(d)	NSB 16-4	0.1 mg/l	TMDL demonstrates 100% compliance
NJ02030105060040-01	Raritan R NB(Peapack Bk to McVickers Bk)	SDR* by NJDEP	NSB 19-7 Ravine Lake	0.05 mg/l	TMDL demonstrates 100% compliance
NJ02030105070030-01	Raritan R NB (below Rt 28)	2010 303(d)	NSB 22-8	0.1 mg/l	TMDL demonstrates 100% compliance
NJ02030105080020-01	Raritan R Lwr (Rt 206 to NB / SB)	2010 303(d)	NSB 23-5	0.1 mg/l	TMDL demonstrates 100% compliance
NJ02030105080030-01	Raritan R Lwr (Millstone to Rt 206)	SDR* by NJDEP	Main 2-2	0.1 mg/l	TMDL demonstrates 100% compliance
NJ02030105090050-01	Stony Bk(Province Line Rd to 74d46m dam)	2010 303(d)	SB 1-5	0.1 mg/l	TMDL demonstrates 100% compliance
NJ02030105090060-01	Stony Bk (Rt 206 to Province Line Rd)	2010 303(d)	SB 1-21	0.1 mg/l	TMDL demonstrates 100% compliance
NJ02030105090070-01	Stony Bk (Harrison St to Rt 206)	2010 303(d)	SB 1-27	0.1 mg/l	TMDL demonstrates 100% compliance
NJ02030105090090-01	Stony Bk- Princeton drainage	2010 303(d)	Carnegie Lake	0.05 mg/l	TMDL demonstrates attainment of Natural Condition in Carnegie Lake

\*SDR = Supplemental Data Review



### Phosphorus Impairments and TMDL Outcomes in Raritan River Basin

Assessment HUC	Subwatershed	Basis for Impairment	Model Segment	Target	Outcome
NJ02030105100010-01	Millstone River (above Rt 33)	2010 303(d)	UM 1-1 Watershed	none	TMDL Condition: - demonstrates attainment of Natural Condition in headwater lakes; - demonstrates attainment of Natural Condition in Carnegie Lake.
NJ02030105100020-01	Millstone R (Applegarth road to Rt 33)	2010 303(d)			
NJ02030105100030-01	Millstone R (RockyBk to Applegarth road)	2010 303(d)	UM 1-2	none	
NJ02030105100050-01	Rocky Brook (below Monmouth Co line)	2010 303(d) SDR* by NJDEP	UM 2-6 (streams) UM 2-1 (Peddie Lake)	none 0.05 mg/l	
NJ02030105100060-01	Millstone R (Cranbury Bk to Rocky Bk)	2010 303(d)	UM 3-15	none	
NJ02030105100090-01	Cranbury Brook (below NJ Turnpike)	SDR* by NJDEP	UM 4-1 (Plainsboro Pond)	0.05 mg/l	
NJ02030105100110-01	Devils Brook	SDR* by NJDEP	UM 8-1 (Gordon Pond)	0.05 mg/l	
NJ02030105100130-01	Bear Brook (below Trenton Road)	SDR* by NJDEP	UM 6-1 (Grovers Mill Pond)	0.05 mg/l	
NJ02030105100140-01	Millstone R (Rt 1 to Cranbury Bk)	2010 303(d)	UM 9-1	none	
NJ02030105110020-01	Millstone R (HeathcoteBk to Harrison St)	SDR* by NJDEP	Carnegie Lake	0.05 mg/l	TMDL demonstrates attainment of Natural Condition in Carnegie Lake
NJ02030105110030-01	Millstone R (Beden Bk to Heathcote Bk)	2010 303(d)	BB 4-13	none	0.1 mg/l TP criterion does not apply to Lower Millstone River; possible future TMDL based on impact to Raritan River.
NJ02030105110050-01	Beden Brook (below Province Line Rd)	2010 303(d)	BB 1-18	0.1 mg/l	TMDL demonstrates 100% compliance
NJ02030105110100-01	Pike Run (below Cruser Brook)	2010 303(d)	BB 3-1	0.1 mg/l	TMDL demonstrates 100% compliance
NJ02030105110110-01	Millstone R (BlackwellsMills to BedenBk)	2010 303(d)	BB 5-12	none	0.1 mg/l TP criterion does not apply to Lower Millstone River; possible future TMDL based on impact to Raritan River.
NJ02030105110120-01	Sixmile Run (above Middlebush Rd)	2010 303(d)	BB 5-11 Watershed	none	Not Addressed
NJ02030105110130-01	Sixmile Run (below Middlebush Rd)	2010 303(d)			
NJ02030105110140-01	Millstone R(AmwellRd to BlackwellsMills)	2010 303(d)	BB 5-15	none	0.1 mg/l TP criterion does not apply to Lower Millstone River; possible future TMDL based on impact to Raritan River.
NJ02030105110170-01	Millstone River (below Amwell Rd)	2010 303(d)	BB 5-20		

\*SDR = Supplemental Data Review

### Phosphorus Impairments and TMDL Outcomes in Raritan River Basin

Assessment HUC	Subwatershed	Basis for Impairment	Model Segment	Target	Outcome
NJ02030105120080-01	South Fork of Bound Brook	2010 303(d)	MS 4-1 Watershed	none	Not Addressed
NJ02030105120090-01	Spring Lake Fork of Bound Brook	2010 303(d)			
NJ02030105120100-01	Bound Brook (below fork at 74d 25m 15s)	2010 303(d)			
NJ02030105120130-01	Green Brook (below Bound Brook)	2010 303(d)	MS 4-5	none	Follow-up monitoring to evaluate nutrient impacts and possible future TMDL
NJ02030105120140-01	Raritan R Lwr(I-287 Piscatway-Millstone)	2010 303(d)	MS 5-3		
NJ02030105120160-01	Raritan R Lwr (MileRun to I-287 Piscatwy)	2010 303(d)	downstream of extent		
NJ02030105120170-01	Raritan R Lwr (Lawrence Bk to Mile Run)	2010 303(d)			
NJ02030105120180-01	Middle Brook	2010 303(d)	MS 3-5 Watershed	none	Not Addressed
NJ02030105150010-01	Weamaconk Creek	2010 303(d)	out of extent	n/a	Not addressed - Impairments in the Duhernal lake watershed are being addressed in a separate TMDL study.
NJ02030105150030-01	McGellairds Brook (below Taylors Mills)	2010 303(d)			
NJ02030105150060-01	Matchaponix Brook (below Pine Brook)	2010 303(d)			
NJ02030105160030-01	Duhernal Lake / Iresick Brook	SDR* by NJDEP			

\*SDR = Supplemental Data Review

### TSS Impairments and TMDL Outcomes in Raritan River Basin

Assessment HUC	Subwatershed	Basis for Impairment	Model Segment	Target	Outcome
NJ02030105020070-01	Raritan R SB(River Rd to Spruce Run)	2010 303(d)	NSB 7-1	25 mg/l	TMDL demonstrates 100% compliance
NJ02030105020080-01	Raritan R SB(Prescott Bk to River Rd)	2010 303(d)	NSB 7-7	25 mg/l	TMDL demonstrates 100% compliance
NJ02030105020100-01	Raritan R SB(Three Bridges-Prescott Bk)	2010 303(d)	NSB 7-13	40 mg/l	TMDL demonstrates 100% compliance
NJ02030105040040-01	Raritan R SB(NB to Pleasant Run)	2010 303(d)	NSB 11-1	40 mg/l	TMDL demonstrates 100% compliance
NJ02030105050100-01	Rockaway Ck SB	2010 303(d)	NSB 14-2	25 mg/l	TMDL demonstrates 100% compliance
NJ02030105050070-01	Lamington R(HallsBrRd-HerzogBrk)	2010 303(d)	NSB 16-4	40 mg/l	TMDL demonstrates 100% compliance
NJ02030105060040-01	Raritan R NB(Peapack Bk to McVickers Bk)	2010 303(d)	NSB 19-11	25 mg/l	TMDL demonstrates 100% compliance
NJ02030105070030-01	Raritan R NB (below Rt 28)	2010 303(d)	NSB 22-8	40 mg/l	TMDL demonstrates 100% compliance
NJ02030105080030-01	Raritan R Lwr (Millstone to Rt 206)	2010 303(d)	Main 2-2	40 mg/l	TMDL demonstrates 100% compliance
NJ02030105100010-01	Millstone River (above Rt 33)	2010 303(d)	UM 1-1 Watershed	40 mg/l	TMDL demonstrates 100% compliance
NJ02030105100020-01	Millstone R (Applegarth road to Rt 33)	2010 303(d)			
NJ02030105110010-01	Heathcote Brook	2010 303(d)	BB 4-2 Watershed	40 mg/l	TMDL demonstrates 100% compliance
NJ02030105120180-01	Middle Brook	2010 303(d)	MS 3-5 Watershed	40 mg/l	TMDL demonstrates 100% compliance
NJ02030105120130-01	Green Brook (below Bound Brook)	2010 303(d)	MS 4-5	40 mg/l	TMDL demonstrates 100% compliance
NJ02030105120140-01	Raritan R Lwr(I-287 Piscatway-Millstone)	2010 303(d)	MS 5-3	40 mg/l	TMDL demonstrates 100% compliance
NJ02030105120160-01	Raritan R Lwr (MileRun to I-287 Pisctwy)	2010 303(d)	downstream of extent	40 mg/l	TMDL demonstrates 100% compliance (impairment occurs within spatial extent)
NJ02030105120170-01	Raritan R Lwr (Lawrence Bk to Mile Run)	2010 303(d)			
NJ02030105150010-01	Weamaconk Creek	2010 303(d)	out of extent	40 mg/l	Not addressed. Recommend delist based on WC1 and WC3 data.

### pH Impairments and TMDL Outcomes in Raritan River Basin

Assessment HUC	Subwatershed	Basis for Impairment	Model Segment	DO Target (pH Threshold)	Outcome
NJ02030105010050-01	Raritan R SB(LongValley br to 74d44m15s)	SDR* by NJDEP	NSB 3-6	none	DO swings decrease significantly. SBR4 used to evaluate TMDL for pH.
NJ2030105010060-01	Raritan R SB(Califon br to Long Valley)	SDR* by NJDEP	NSB 3-12 SBR4	13.5	TMDL demonstrates 100% compliance
NJ02030105020040-01	Spruce Run Reservoir / Willoughby Brook	2010 303(d)	out of extent	n/a	Not Addressed
NJ02030105020050-01	Beaver Brook (Clinton)	2010 303(d)	NSB 4-5	none	DO swings decrease significantly. SBRR10 used to evaluate TMDL for pH.
NJ02030105020070-01	Raritan R SB(River Rd to Spruce Run)	2010 303(d)	NSB 7-1		
NJ02030105020080-01	Raritan R SB(Prescott Bk to River Rd)	SDR* by NJDEP	NSB 7-7		
NJ02030105020100-01	Raritan R SB(Three Bridges-Prescott Bk)	SDR* by NJDEP	NSB 7-13		
NJ02030105030060-01	Neshanic River (below FNR / SNR confl)	2010 303(d)	NSB 8-2		
NJ02030105030070-01	Neshanic River (below Black Brk)	2010 303(d)	NSB 8-5		
NJ02030105040030-01	Holland Brook	SDR* by NJDEP	NSB 10-1		
NJ02030105040040-01	Raritan R SB(NB to Pleasant Run)	2010 303(d)	NSB 9-7 SBRR10	11.9	TMDL demonstrates 100% compliance
NJ02030105050090-01	Rockaway Ck (below McCrea Mills)	2010 303(d)	NSB 15-5	none	DO swings decrease significantly. LR5 used to evaluate TMDL for pH.
NJ02030105050070-01	Lamington R(HallsBrRd-HerzogBrk)	2010 303(d)	NSB 16-4 LR5	11.4	TMDL demonstrates 100% compliance
NJ02030105060090-01	Raritan R NB (Lamington R to Mine Bk)	SDR* by NJDEP	NSB 21-8	none	DO swings decrease significantly. LR5 used to evaluate TMDL for pH.
NJ02030105070030-01	Raritan R NB (below Rt 28)	SDR* by NJDEP	NSB 22-8		
NJ02030105080030-01	Raritan R Lwr (Millstone to Rt 206)	2010 303(d)	NSB 23-8		
NJ02030105110010-01	Heathcote Brook	2010 303(d)	BB 4-2 Watershed	n/a	Not Addressed. Cause of pH impairment not assessed.
NJ02030105110030-01	Millstone R (Beden Bk to Heathcote Bk)	2010 303(d)	BB 4-13	n/a	Recommend delist based on data at M3, M4, and M7
NJ02030105110170-01	Millstone River (below Amwell Rd)	2010 303(d)	BB 5-20	n/a	
NJ02030105120020-01	Green Bk (N Plainfield gage to Blue Bk)	2010 303(d)	MS 4-5 Watershed	none	Not Addressed. Cause of pH impairment not assessed.
NJ02030105130040-01	Ireland Brook	2010 303(d)	out of extent	n/a	Not Addressed
NJ02030105130060-01	Lawrence Bk (Milltown to Church Lane)	2010 303(d)			
NJ02030105150050-01	Barclay Brook	2010 303(d)			

\*SDR = Supplemental Data Review

### Dissolved Oxygen Impairments and TMDL Outcomes in Raritan River Basin

Assessment HUC	Subwatershed	Basis for Impairment	Model Segment	Target	Outcome
NJ02030105010060-01	Raritan R SB(Califon br to Long Valley)	2010 303(d)	NSB 3-12 SBR4	7.0	TMDL demonstrates improved DO.
NJ02030105030030-01	Headquarters trib (Third Neshanic River)	2010 303(d)	Neshanic Headwatershed	4.0	Outside spatial extent of stream model; NPS only - likely similar to NR1
NJ02030105030040-01	Third Neshanic River				
NJ02030105030060-01	Neshanic River (below FNR / SNR confl)	2010 303(d)	NSB 8-1 NR1	4.0	TMDL demonstrates improved DO. Low DO exacerbated by high SOD.
NJ02030105050020-01	Lamington R (Hillside Rd to Rt 10)	SDR* by NJDEP	NSB 12-3 LR2	4.0	TMDL demonstrates improved DO. Low DO exacerbated by high SOD.
NJ02030105060040-01	Raritan R NB (Peapack Bk to McVickers Bk)	2010 303(d)	NSB 19-7 Ravine Lake	4.0	DO addressed through TP TMDL in Ravine Lake.
NJ02030105100030-01	Millstone R (RockyBk to Applegarth road)	2010 303(d)	UM 1-1 UMR1	4.0	TMDL demonstrates 100% compliance
NJ02030105100050-01	Rocky Brook (below Monmouth Co line)	2010 303(d)	UM 2-4 RB4	4.0	TMDL demonstrates 100% compliance
NJ02030105100060-01	Millstone R (Cranbury Bk to Rocky Bk)	SDR* by NJDEP	UM 5-1 UMR3	4.0	TMDL demonstrates 100% compliance
NJ02030105100110-01	Devils Brook	2010 303(d)	UM 8-1 Gordon Pond	4.0	DO addressed through Gordon Pond TMDL for TP
NJ02030105100130-01	Bear Brook (below Trenton Road)	2010 303(d)	UM 6-1 Grovers Mill Pd	4.0	DO addressed through Grovers Mill Pond TMDL for TP
NJ02030105100140-01	Millstone R (Rt 1 to Cranbury Bk)	2010 303(d)	UM 9-2 M1	4.0	No basis to evaluate; TMDL achieves Natural Condition
NJ02030105110030-01	Millstone R (Beden Bk to Heathcote Bk)	2010 303(d)	BB 4-8 M4	4.0	Low DO due to naturally high SOD. Not addressed.
NJ02030105150010-01	Weamaconk Creek	2010 303(d)	out of extent	4.0	Not addressed.
NJ02030105150060-01	Matchaponix Brook (below Pine Brook)	2010 303(d)		4.0	
NJ02030105160010-01	Deep Run (above Monmouth Co line)	2010 303(d)		4.0	
NJ02030105160020-01	Deep Run (Rt 9 to Monmouth Co line)	2010 303(d)		4.0	
NJ02030105160030-01	Duhernal Lake / Iresick Brook	2010 303(d)		4.0	
NJ02030105160040-01	Deep Run (below Rt 9)	2010 303(d)		4.0	
NJ02030105160100-01	Raritan R Lwr (below Lawrence Bk)	2010 303(d)	downstream of extent	4.0	Not addressed.

\*SDR = Supplemental Data Review

## **APPENDIX R**

### **TP TMDL Allocation Tables**

**Raritan River Basin Upstream of Millstone River Confluence  
Phosphorus TMDL Allocations for Source Categories**

Long Term Average Daily Load (kg/d TP)	South Branch Raritan River Watershed			North Branch Raritan River Watershed*			Raritan River Basin Upstream of Millstone River Confluence**		
	Existing Condition	TMDL Allocation	Percent Reduction	Existing Condition	TMDL Allocation	Percent Reduction	Existing Condition	TMDL Allocation	Percent Reduction
<b>Sum of Wasteload Allocations (WLAs)</b>	<b>106.4</b>	<b>65.0</b>	<b>39.0%</b>	<b>78.2</b>	<b>30.5</b>	<b>60.9%</b>	<b>184.6</b>	<b>95.5</b>	<b>48.3%</b>
Treated Effluent from WWTP Dischargers	72.4	54.5	24.8%	44.2	17.7	60.0%	116.6	72.2	38.1%
Stormwater from Residential Land Use Areas	25.8	7.9	69.4%	23.1	8.7	62.3%	48.8	16.6	66.1%
Stormwater from Other Urban Land Use Areas	8.2	2.6	68.5%	10.9	4.2	61.8%	19.1	6.7	64.7%
<b>Sum of Load Allocations (LAs)</b>	<b>85.2</b>	<b>44.3</b>	<b>48.0%</b>	<b>62.6</b>	<b>29.7</b>	<b>52.6%</b>	<b>147.8</b>	<b>74.0</b>	<b>49.9%</b>
Boundary Inputs	11.8	11.8	0.0%	0.9	0.9	0.0%	12.7	12.7	0.0%
Tributary Baseflow	32.9	14.8	54.9%	28.3	13.1	53.8%	61.2	27.9	54.4%
Stormwater from Agricultural Land Use Areas	31.9	9.1	71.5%	25.6	7.9	69.0%	57.5	17.0	70.4%
Stormwater from Forest and Barren Land Cover Areas	2.4	2.4	0.0%	3.3	3.3	0.0%	5.7	5.7	0.0%
Stormwater from Wetlands Land Cover Areas	6.2	6.2	0.0%	4.4	4.4	0.0%	10.5	10.5	0.0%
Air Deposition onto Water Land Cover Areas	0.06	0.06	0.0%	0.06	0.06	0.0%	0.12	0.12	0.0%
<b>Total Margin of Safety (% of LC)</b>		<b>11.8</b>	<b>9.6%</b>		<b>9.0</b>	<b>12.8%</b>		<b>20.8</b>	<b>10.8%</b>
STP MoS	n/a	4.8	3.9%	n/a	2.0	2.8%	n/a	6.8	3.5%
Stormwater and NPS MoS		7.0	5.7%		7.1	10.0%		14.0	7.3%
<b>Reserve Capacity (% of WWTP load)</b>	<b>n/a</b>	<b>1.3</b>	<b>2.3%</b>	<b>n/a</b>	<b>1.3</b>	<b>7.3%</b>	<b>n/a</b>	<b>2.6</b>	<b>3.5%</b>
<b>Loading Capacity (LC)</b>	<b>191.6</b>	<b>122.3</b>	<b>36.2%</b>	<b>140.7</b>	<b>70.5</b>	<b>49.9%</b>	<b>332.3</b>	<b>192.8</b>	<b>42.0%</b>

\*NOTE: includes the portion of the mainstem Raritan River upstream of the Millstone River confluence

\*\*NOTE: equal to South Branch Raritan River Watershed plus North Branch Raritan River Watershed\*

### Carnegie Lake Basin Phosphorus TMDL Allocations for Source Categories

Long Term Average Daily Load (kg/d TP)	Upper Millstone River Watershed			Stony Brook Watershed			Carnegie Lake Direct Watershed			Total Carnegie Lake Basin*		
	Existing Condition	TMDL Allocation	Percent Reduction	Existing Condition	TMDL Allocation	Percent Reduction	Existing Condition	TMDL Allocation	Percent Reduction	Existing Condition	TMDL Allocation	Percent Reduction
<b>Sum of Wasteload Allocations (WLAs)</b>	<b>27.8</b>	<b>5.5</b>	<b>80.2%</b>	<b>20.9</b>	<b>2.3</b>	<b>89.0%</b>	<b>2.7</b>	<b>0.4</b>	<b>84.0%</b>	<b>51.3</b>	<b>8.2</b>	<b>84.0%</b>
Treated Effluent from WWTP Dischargers	15.9	3.6	77.4%	10.1	0.6	94.4%	0.0	0.0	0.0%	26.0	4.2	84.0%
Stormwater from Residential Land Use Areas	6.6	1.1	84.0%	8.1	1.3	84.0%	1.4	0.2	84.0%	16.1	2.6	84.0%
Stormwater from Other Urban Land Use Areas	5.2	0.8	84.0%	2.7	0.4	84.0%	1.2	0.2	84.0%	9.2	1.5	84.0%
<b>Sum of Load Allocations (LAs)</b>	<b>22.9</b>	<b>16.1</b>	<b>29.8%</b>	<b>14.8</b>	<b>6.1</b>	<b>58.9%</b>	<b>0.5</b>	<b>0.3</b>	<b>45.7%</b>	<b>38.1</b>	<b>22.4</b>	<b>41.3%</b>
Boundary Inputs	0.0	0.0	0.0%	0.0	0.0	0.0%	0.0	0.0	0.0%	0.0	0.0	0.0%
Tributary Baseflow	14.9	11.0	25.9%	3.2	1.0	69.2%	0.3	0.1	62.1%	18.4	12.1	34.1%
Stormwater from Agricultural Land Use Areas	3.5	0.6	84.0%	7.7	1.2	84.0%	0.1	0.0	84.0%	11.3	1.8	84.0%
Stormwater from Forest and Barren Land Cover Areas	0.1	0.1	0.0%	1.5	1.5	0.0%	0.0	0.0	0.0%	1.6	1.6	0.0%
Stormwater from Wetlands Land Cover Areas	4.3	4.3	0.0%	2.4	2.4	0.0%	0.1	0.1	0.0%	6.8	6.8	0.0%
Air Deposition onto Water Land Cover Areas	0.02	0.02	0.0%	0.02	0.02	0.0%	0.02	0.02	0.0%	0.05	0.05	0.0%
<b>Total Margin of Safety (% of LC)</b>		<b>1.0</b>	<b>4.4%</b>		<b>1.0</b>	<b>10.2%</b>		<b>0.1</b>	<b>13.6%</b>		<b>2.1</b>	<b>6.2%</b>
STP MoS		0.4	1.7%		0.1	0.7%		0.0	0.0%		0.5	1.4%
Stormwater and NPS MoS		0.6	2.7%		0.9	9.5%		0.1	13.6%		1.6	4.9%
<b>Reserve Capacity (% of WWTP load)</b>		<b>0.5</b>	<b>14.2%</b>		<b>0.05</b>	<b>8.8%</b>		<b>0.0</b>	<b>n/a</b>		<b>0.6</b>	<b>13.4%</b>
<b>Loading Capacity (LC)</b>	<b>50.6</b>	<b>23.1</b>	<b>54.4%</b>	<b>35.7</b>	<b>9.4</b>	<b>73.8%</b>	<b>3.2</b>	<b>0.8</b>	<b>74.5%</b>	<b>89.5</b>	<b>33.2</b>	<b>62.8%</b>

\*NOTE: Total Carnegie Lake Basin is the sum of the Upper Millstone River Watershed, the Stony Brook Watershed, and the Carnegie Lake Direct Watershed.



**Beden Brook Watershed  
 Phosphorus TMDL Allocations for Source Categories**

Long Term Average Daily Load (kg/d TP)	Beden Brook Watershed		
	Existing Condition	TMDL Allocation	Percent Reduction
<b>Sum of Wasteload Allocations (WLAs)</b>	<b>17.4</b>	<b>6.0</b>	<b>65.7%</b>
Treated Effluent from WWTP Dischargers	7.4	2.8	62.6%
Stormwater from Residential Land Use Areas	6.7	2.1	68.0%
Stormwater from Other Urban Land Use Areas	3.3	1.1	68.0%
<b>Sum of Load Allocations (LAs)</b>	<b>17.8</b>	<b>9.3</b>	<b>47.8%</b>
Boundary Inputs	0.0	0.0	0.0%
Tributary Baseflow	3.6	1.6	56.2%
Stormwater from Agricultural Land Use Areas	9.5	3.0	68.0%
Stormwater from Forest and Barren Land Cover Areas	1.8	1.8	0.0%
Stormwater from Wetlands Land Cover Areas	2.8	2.8	0.0%
Air Deposition onto Water Land Cover Areas	0.01	0.01	0.0%
<b>Total Margin of Safety (% of LC)</b>		<b>2.1</b>	<b>12.1%</b>
STP MoS		0.3	1.8%
Stormwater and NPS MoS		1.8	10.3%
<b>Reserve Capacity (% of WWTP load)</b>		<b>0.1</b>	<b>3.7%</b>
<b>Loading Capacity (LC)</b>	<b>35.1</b>	<b>17.4</b>	<b>50.4%</b>

**Raritan River Basin  
Phosphorus TMDL Allocations for Individual WWTP Dischargers**

NJPDES #	Facility Name	Permitted Flow (MGD)	TMDL Allocation
			Long-Term Average Load (kg/d TP)
NJ0028304	Day's Inn - Roxbury - Ledgewood Properties	0.04	0.08
NJ0021954	Mt Olive Twp - Clover Hill STP	0.5	1.53
NJ0023493	Washington Twp - Schooley's Mt	0.5	1.32
NJ0109061	Washington Twp - Long Valley	0.244	1.25
NJ0028487	NJDC Youth Correct - Mountainview	0.26	0.21
NJ0078018	Clinton West	0.25	0.21
NJ0035084	Exxon Research & Eng Co	0.22	0.18
NJ0020389	Town of Clinton WTP	2.03	15.37
NJ0100528	Glen Meadows/Twin Oaks	0.025	0.22
NJ0028436	Flemington Boro (wet weather discharge)	3.85*	11.29
NJ0022047	Raritan Twp MUA	3.8	22.82
<b>South Branch Raritan River Watershed WWTP Loading Capacity:</b>			<b>54.5</b>
NJ0000876	Hercules Kenvil Works Facility	0.135	0.41
NJ0022675	Roxbury Twp-Ajax Terrace	2.0	2.11
NJ0026824	Chester Shopping Center	0.011	0.09
NJ0022781	Valley Rd Sewer Co - Pottersville STP	0.048	0.41
NJ0021865	Fiddler's Elbow CC - Reynwood Inc	0.03	0.26
NJ0102563	Route 78 Office Area - Tewksbury	0.09653	0.07
NJ0023175	Clinton Twp BOE - Round Valley	0.009	0.09
NJ0098922	Readington-Lebanon SA	1.45	7.78
NJ0021334	Mendham Boro	0.45	1.07
NJ0026387	Bernardsville	0.8	1.43
NJ0033995	Environmental Disposal Corporation	2.1	3.97
<b>North Branch Raritan River Watershed WWTP Loading Capacity:</b>			<b>17.7</b>

\*NOTE: Flemington Boro STP is a wet weather discharge only. The TMDL Allocation is based on the average daily flow from 1/1/2002 to 8/31/2005 (0.096 MGD).

**Raritan River Basin  
Phosphorus TMDL Allocations for Individual WWTP Dischargers**

NJPDES #	Facility Name	Permitted Flow (MGD)	TMDL Allocation
			Long-Term Average Load (kg/d TP)
NJ0004243	Elementis	0.036	0.05
NJ0029475	Hightstown Boro Advanced WWTP	1	0.44
NJ0023787	East Windsor Twp MUA	4.5	1.99
NJ0024104	Princeton Meadows STP	1.64	0.73
NJ0023922	USDOE PPPL	0.637	0.22
NJ0000272	David Sarnoff Research	0.096	0.13
NJ0031445	Firmenich Inc	0.036	0.05
<b>Upper Millstone River Watershed WWTP Loading Capacity:</b>			<b>3.6</b>
NJ0000795	Bristol-Myers Squibb Co	0.1724	0.12
NJ0035319	Stony Brook RSA Pennington	0.445	0.30
NJ0000809	Hopewell Business Park	0.128	0.09
NJ0022110	Educational Testing Service	0.08	0.05
<b>Stony Brook Watershed WWTP Loading Capacity:</b>			<b>0.6</b>
NJ0035301	Stony Brook RSA - Hopewell	0.3	0.43
NJ0069523	Montgomery Twp - Cherry Valley STP	0.286	0.41
NJ0022390	Mont. Twp. - Skillman Village	0.5	0.71
NJ0023663	Carrier Foundation Rehab STP	0.04	0.13
NJ0060038	Montgomery Twp-Pike Brook	0.67	0.68
NJ0026140	J & J Consumer Products	0.0625	0.20
NJ0067733	Montgomery Twp - Oxbridge	0.088	0.20
<b>Beden Brook Watershed WWTP Loading Capacity:</b>			<b>2.8</b>

**TP Reserve Capacity  
by individual subwatershed and recommended watershed scale**

WMA	Assessment HUC	Subwatershed	Model	Outlet Branch-Node	TP (kg/d)	Watershed Scale TP (kg/d)
8	02030105010020	Drakes Brook (below Eyland Ave)	NSBranch	2-3	0.06	0.37
8	02030105010050	Raritan R SB(LongValley br to 74d44m15s)	NSBranch	3-6	0.13	
8	02030105010060	Raritan R SB(Califon br to Long Valley)	NSBranch	3-14	0.13	
8	02030105010070	Raritan R SB(StoneMill gage to Califon)	NSBranch	3-18	0.05	
8	02030105010080	Raritan R SB(Spruce Run-StoneMill gage)	NSBranch	3-24	0.04	0.41
8	02030105020050	Beaver Brook (Clinton)	NSBranch	4-5	0.02	
8	02030105020060	Cakepoulin Creek	NSBranch	6-1	0.16	
8	02030105020070	Raritan R SB(River Rd to Spruce Run)	NSBranch	7-1	0.06	
8	02030105020080	Raritan R SB(Prescott Bk to River Rd)	NSBranch	7-7	0.04	
8	02030105020100	Raritan R SB(Three Bridges-Prescott Bk)	NSBranch	7-13	0.09	0.26
8	02030105030060	Neshanic River (below FNR / SNR confl)	NSBranch	8-2	0.21	
8	02030105030070	Neshanic River (below Black Brook)	NSBranch	8-5	0.05	0.23
8	02030105040010	Raritan R SB(Pleasant Run-Three Bridges)	NSBranch	9-4	0.09	
8	02030105040030	Holland Brook	NSBranch	10-1	0.05	
8	02030105040040	Raritan R SB(NB to Pleasant Run)	NSBranch	11-1	0.09	

**TP Reserve Capacity  
by individual subwatershed and recommended watershed scale**

WMA	Assessment HUC	Subwatershed	Model	Outlet Branch-Node	TP (kg/d)	Watershed Scale TP (kg/d)
8	02030105050020	Lamington R (Hillside Rd to Rt 10)	NSBranch	12-6	0.08	0.83
8	02030105050030	Lamington R (Furnace Rd to Hillside Rd)	NSBranch	12-8	0.03	
8	02030105050040	Lamington R(Pottersville gage-FurnaceRd)	NSBranch	12-12	0.05	
8	02030105050070	Lamington R(HallsBrRd-Pottersville gage)	NSBranch	12-19	0.19	
8	02030105050090	Rockaway Ck (RockawaySB to McCrea Mills)	NSBranch	13-1	0.16	
8	02030105050100	Rockaway Ck SB	NSBranch	14-2	0.31	
8	02030105050110	Lamington R (below Halls Bridge Rd)	NSBranch	16-4	0.01	
8	02030105060010	Raritan R NB (above/incl India Bk)	NSBranch	17-1	0.01	0.27
8	02030105060030	Raritan R NB(incl McVickers to India Bk)	NSBranch	19-2	0.04	
8	02030105060040	Raritan R NB(Peapack Bk to McVickers Bk)	NSBranch	19-11	0.11	
8	02030105060070	Raritan R NB(incl Mine Bk to Peapack Bk)	NSBranch	20-6	0.03	
8	02030105060090	Raritan R NB (Lamington R to Mine Bk)	NSBranch	21-8	0.07	
8	02030105070010	Raritan R NB (Rt 28 to Lamington R)	NSBranch	22-5	0.04	0.19
8	02030105070030	Raritan R NB (below Rt 28)	NSBranch	22-8	0.06	
9	02030105080020	Raritan R Lwr (Rt 206 to NB / SB)	NSBranch	23-5	0.06	
9	02030105080030	Raritan R Lwr (Millstone to Rt 206)	Mainstem	2-2	0.03	

**TP Reserve Capacity  
by individual subwatershed and recommended watershed scale**

WMA	Assessment HUC	Subwatershed	Model	Outlet Branch-Node	TP (kg/d)	Watershed Scale TP (kg/d)
10	02030105090030	Stony Bk (Baldwins Ck to 74d 48m 10s)	Stony	1-1	0.02	0.05
10	02030105090040	Stony Bk(74d46m dam to/incl Baldwins Ck)	Stony	1-5	0.01	
10	02030105090050	Stony Bk(Province Line Rd to 74d46m dam)	Stony	1-14	0.01	
10	02030105090060	Stony Bk (Rt 206 to Province Line Rd)	Stony	1-20	0.01	
10	02030105090070	Stony Bk (Harrison St to Rt 206)	Stony	1-27	0.00	
10	02030105100010	Millstone River (above Rt 33)	Millstone	1-1 Watershed	0.10	0.51
10	02030105100020	Millstone R (Applegarth road to Rt 33)	Millstone			
10	02030105100030	Millstone R (RockyBk to Applegarth road)	Millstone	1-2	0.00	
10	02030105100050	Rocky Brook (below Monmouth Co line)	Millstone	2-6	0.07	
10	02030105100060	Millstone R (Cranbury Bk to Rocky Bk)	Millstone	3-15	0.06	
10	02030105100090	Cranbury Brook (below NJ Turnpike)	Millstone	4-2	0.13	
10	02030105100110	Devils Brook	Millstone	8-1	0.06	
10	02030105100130	Bear Brook (below Trenton Road)	Millstone	6-3	0.06	
10	02030105100140	Millstone R (Rt 1 to Cranbury Bk)	Millstone	9-1	0.03	
10	02030105110040	Beden Brook (above Province Line Rd)	Beden	1-1	0.02	
10	02030105110050	Beden Brook (below Province Line Rd)	Beden	1-18	0.05	
10	02030105110080	Pike Run (above Cruser Brook)	Beden	2-3	0.02	
10	02030105110100	Pike Run (below Cruser Brook)	Beden	3-1	0.02	

## **APPENDIX S**

TSS TMDL Allocation Tables

**Raritan River Basin Upstream of Millstone River Confluence  
TSS Loads Associated with TP TMDL Condition for Source Categories**

Long Term Average Daily Load (kg/d TSS)	South Branch Raritan River Watershed			North Branch Raritan River Watershed*			Raritan River Basin Upstream of Millstone River Confluence**		
	Existing Condition	TMDL Condition	Percent Reduction	Existing Condition	TMDL Condition	Percent Reduction	Existing Condition	TMDL Condition	Percent Reduction
<b>Sum of Wasteload Allocations (WLAs)</b>	<b>8,094</b>	<b>3,582</b>	<b>55.7%</b>	<b>7,748</b>	<b>3,346</b>	<b>56.8%</b>	<b>15,843</b>	<b>6,927</b>	<b>56.3%</b>
Treated Effluent from WWTP Dischargers	998	1,390	-39.4%	281	532	-89.6%	1,278	1,923	-50.4%
Stormwater from Residential Land Use Areas	4,879	1,492	69.4%	4,408	1,657	62.4%	9,286	3,150	66.1%
Stormwater from Other Urban Land Use Areas	2,218	699	68.5%	3,060	1,156	62.2%	5,278	1,855	64.8%
<b>Sum of Load Allocations (LAs)</b>	<b>9,723</b>	<b>5,150</b>	<b>47.0%</b>	<b>8,036</b>	<b>4,405</b>	<b>45.2%</b>	<b>17,760</b>	<b>9,555</b>	<b>46.2%</b>
Boundary Inputs	592	592	0.0%	70	70	0.0%	662	662	0.0%
Tributary Baseflow	1,201	1,201	0.0%	1,011	1,011	0.0%	2,211	2,211	0.0%
Stormwater from Agricultural Land Use Areas	6,393	1,819	71.5%	5,257	1,625	69.1%	11,649	3,444	70.4%
Stormwater from Forest and Barren Land Cover Areas	864	864	0.0%	1,214	1,214	0.0%	2,078	2,078	0.0%
Stormwater from Wetlands Land Cover Areas	674	674	0.0%	485	485	0.0%	1,160	1,160	0.0%
<b>Total Margin of Safety (% of LC)</b>	<b>n/a</b>	<b>1,003</b>	<b>10.2%</b>	<b>n/a</b>	<b>1,110</b>	<b>12.4%</b>	<b>n/a</b>	<b>2,112</b>	<b>11.3%</b>
<b>Reserve Capacity (% of WWTP load)</b>	<b>n/a</b>	<b>82</b>	<b>5.9%</b>	<b>n/a</b>	<b>57</b>	<b>10.7%</b>	<b>n/a</b>	<b>139</b>	<b>7.2%</b>
<b>Loading Capacity (LC)</b>	<b>17,817</b>	<b>9,816</b>	<b>44.9%</b>	<b>15,785</b>	<b>8,917</b>	<b>43.5%</b>	<b>33,602</b>	<b>18,733</b>	<b>44.3%</b>

\*NOTE: includes the portion of the mainstem Raritan River upstream of the Millstone River confluence

\*\*NOTE: equal to South Branch Raritan River Watershed plus North Branch Raritan River Watershed\*



**Carnegie Lake Watershed  
TSS Loads Associated with TP TMDL Condition for Source Categories**

Long Term Average Daily Load (kg/d TSS)	Upper Millstone River Watershed			Stony Brook Watershed			Carnegie Lake Direct Watershed			Total Carnegie Lake Basin*		
	Existing Condition	TMDL Condition	Percent Reduction	Existing Condition	TMDL Condition	Percent Reduction	Existing Condition	TMDL Condition	Percent Reduction	Existing Condition	TMDL Condition	Percent Reduction
<b>Sum of Wasteload Allocations (WLAs)</b>	<b>3,961</b>	<b>1,506</b>	<b>62.0%</b>	<b>2,286</b>	<b>401</b>	<b>82.5%</b>	<b>602</b>	<b>96</b>	<b>84.0%</b>	<b>6,848</b>	<b>2,003</b>	<b>70.8%</b>
Treated Effluent from WWTP Dischargers	502	953	-89.6%	20	38	-89.6%	0	0	0.0%	522	991	-89.6%
Stormwater from Residential Land Use Areas	1,615	258	84.0%	1,529	245	84.0%	272	44	84.0%	3,416	547	84.0%
Stormwater from Other Urban Land Use Areas	1,843	295	84.0%	737	118	84.0%	329	53	84.0%	2,909	465	84.0%
<b>Sum of Load Allocations (LAs)</b>	<b>2,775</b>	<b>2,060</b>	<b>25.8%</b>	<b>2,624</b>	<b>1,328</b>	<b>49.4%</b>	<b>58</b>	<b>49</b>	<b>14.9%</b>	<b>5,457</b>	<b>3,437</b>	<b>37.0%</b>
Boundary Inputs	0	0	0.0%	0	0	0.0%	0	0	0.0%	0	0	0.0%
Tributary Baseflow	1,267	1,267	0.0%	297	297	0.0%	29	29	0.0%	1,593	1,593	0.0%
Stormwater from Agricultural Land Use Areas	851	136	84.0%	1,543	247	84.0%	10	2	84.0%	2,405	385	84.0%
Stormwater from Forest and Barren Land Cover Areas	51	51	0.0%	525	525	0.0%	6	6	0.0%	582	582	0.0%
Stormwater from Wetlands Land Cover Areas	605	605	0.0%	260	260	0.0%	13	13	0.0%	877	877	0.0%
<b>Total Margin of Safety (% of LC)</b>	<i>n/a</i>	<b>172</b>	<b>4.5%</b>	<i>n/a</i>	<b>152</b>	<b>8.0%</b>	<i>n/a</i>	<b>24</b>	<b>14.4%</b>	<i>n/a</i>	<b>349</b>	<b>5.9%</b>
<b>Reserve Capacity (% of WWTP load)</b>	<i>n/a</i>	<b>103</b>	<b>10.8%</b>	<i>n/a</i>	<b>25</b>	<b>66.5%</b>	<i>n/a</i>	<b>0</b>	<i>n/a</i>	<i>n/a</i>	<b>128</b>	<b>12.9%</b>
<b>Loading Capacity (LC)</b>	<b>6,735</b>	<b>3,841</b>	<b>43.0%</b>	<b>4,909</b>	<b>1,906</b>	<b>61.2%</b>	<b>660</b>	<b>170</b>	<b>74.2%</b>	<b>12,305</b>	<b>5,917</b>	<b>51.9%</b>

\*NOTE: Total Carnegie Lake Basin is the sum of the Upper Millstone River Watershed, the Stony Brook Watershed, and the Carnegie Lake Direct Watershed.

**Lower Millstone / Raritan River Watershed  
TSS TMDL Allocations for Source Categories**

Long Term Average Daily Load (kg/d TSS)	Beden Brook Watershed (Loads Associated with Existing Condition and TMDL Condition)			Lower Millstone / Raritan River Watershed (Except Beden)*			Total Lower Millstone / Raritan River Watershed*		
	Existing Condition	TMDL Condition	Percent Reduction	Existing Condition	TMDL Allocation	Percent Reduction	Existing Condition	TMDL Allocation	Percent Reduction
<b>Sum of Wasteload Allocations (WLAs)</b>	<b>2,220</b>	<b>806</b>	<b>63.7%</b>	<b>13,791</b>	<b>8,590</b>	<b>37.7%</b>	<b>16,011</b>	<b>9,396</b>	<b>41.3%</b>
Treated Effluent from WWTP Dischargers	60	115	-89.6%	3,127	4,325	-38.3%	3,187	4,439	-39.3%
Stormwater from Residential Land Use Areas	1,269	406	68.0%	5,835	2,334	60.0%	7,103	2,740	61.4%
Stormwater from Other Urban Land Use Areas	891	285	68.0%	4,829	1,932	60.0%	5,720	2,217	61.2%
<b>Sum of Load Allocations (LAs)</b>	<b>3,085</b>	<b>1,789</b>	<b>42.0%</b>	<b>42,171</b>	<b>25,741</b>	<b>39.0%</b>	<b>45,255</b>	<b>27,531</b>	<b>39.2%</b>
Boundary Inputs**	0	0	0.0%	39,091	23,575	39.7%	39,091	23,575	39.7%
Tributary Baseflow	205	205	0.0%	460	460	0.0%	665	665	0.0%
Stormwater from Agricultural Land Use Areas	1,905	610	68.0%	1,523	609	60.0%	3,428	1,219	64.4%
Stormwater from Forest and Barren Land Cover Areas	668	668	0.0%	399	399	0.0%	1,067	1,067	0.0%
Stormwater from Wetlands Land Cover Areas	306	306	0.0%	698	698	0.0%	1,004	1,004	0.0%
<b>Total Margin of Safety</b>	<b>n/a</b>	<b>325</b>	<b>11.1%</b>		<b>1,219</b>	<b>3.4%</b>		<b>1,544</b>	<b>4.0%</b>
<b>Reserve Capacity (% of WWTP load)</b>	<b>n/a</b>	<b>14</b>	<b>12.2%</b>	<b>n/a</b>	<b>156</b>	<b>3.6%</b>	<b>n/a</b>	<b>171</b>	<b>3.8%</b>
<b>Loading Capacity (LC)</b>	<b>5,305</b>	<b>2,934</b>	<b>44.7%</b>	<b>55,961</b>	<b>35,707</b>	<b>36.2%</b>	<b>61,266</b>	<b>38,641</b>	<b>36.9%</b>

\*NOTE: Lower Millstone / Raritan River Watershed includes the Millstone River watershed downstream of Carnegie Lake and the portion of the non-tidal mainstem Raritan River watershed downstream of the Millstone River confluence.

\*\*NOTE: Boundary Inputs to Lower Millstone / Raritan River Watershed include the Raritan River upstream of the Millstone River confluence and Carnegie Lake.

**Raritan River Basin  
 TSS TMDL Allocations for Individual WWTP Dischargers**

NJPDES #	Facility Name	Permitted Flow (MGD)	TMDL Allocation
			Long-Term Average Load (kg/d TSS)
NJ0031119	Stony Brook RSA-River Road	13.06	1482.8
NJ0026905	Montgomery Twp-Stage II	0.48	54.5
NJ0050130	Montgomery Twp - Riverside	0.145	16.5
NJ0023019	Industrial Tube Corp	0.012	0.9
NJ0020036	VA Supply Depot	0.08	9.1
NJ0024864	Somerset Raritan SA	24.3	2758.9
NJ0026727	Colorado Café	0.0175	2.0
<b>Lower Millstone-Raritan Watershed WWTP Loading Capacity:</b>			<b>4325</b>

**TSS Reserve Capacity  
 by individual subwatershed and recommended watershed scale**

WMA	Assessment HUC	Subwatershed	Model	Outlet Branch-Node	TSS (kg/d)	Watershed Scale TSS (kg/d)
10	02030105110030	Millstone R (Beden Bk to Heathcote Bk)	Beden	4-13	13	48
10	02030105110110	Millstone R (BlackwellsMills to BedenBk)	Beden	5-12	13	
10	02030105110140	Millstone R(AmwellRd to BlackwellsMills)	Beden	5-15	22	
10	02030105110170	Millstone River (below Amwell Rd)	Beden	5-20	0	
9	02030105120130	Green Brook (below Bound Brook)	Mainstem	4-5	73	109
9	02030105120140	Raritan R Lwr(I-287 Piscatway-Millstone)	Mainstem	5-3	36	

## **APPENDIX T**

Electronic Documentation