

# Summary of PCB Model Expert Panel Meeting

TMDLs for PCBs in the Delaware Estuary

March 21, 2003



# Introduction

- ❑ On March 20, 2003, the PCB Model Expert Panel met to discuss the status of development and calibration of hydrodynamic and water quality submodels by DRBC and Limno-Tech, Inc. staff.
- ❑ The following agenda items were discussed:
  - ✓ Refinements to Hydrodynamic Model and Water Quality Model for chlorides.
  - ✓ Boundary Condition Sensitivity Analyses.
  - ✓ PCB data in Woodbury Creek Marsh Core
  - ✓ Loading Inventories - Organic Carbon & Penta PCBs

# Hydrodynamic and Water Quality Model for Chlorides

- A summary of the discussions on this topic will be presented by Dr. Namsoo Suk.

# Calibration of The Hydrodynamic Model: Tidal Heights and Chloride

March 21, 2003

Delaware River Basin Commission

# Key Modifications – Part 1

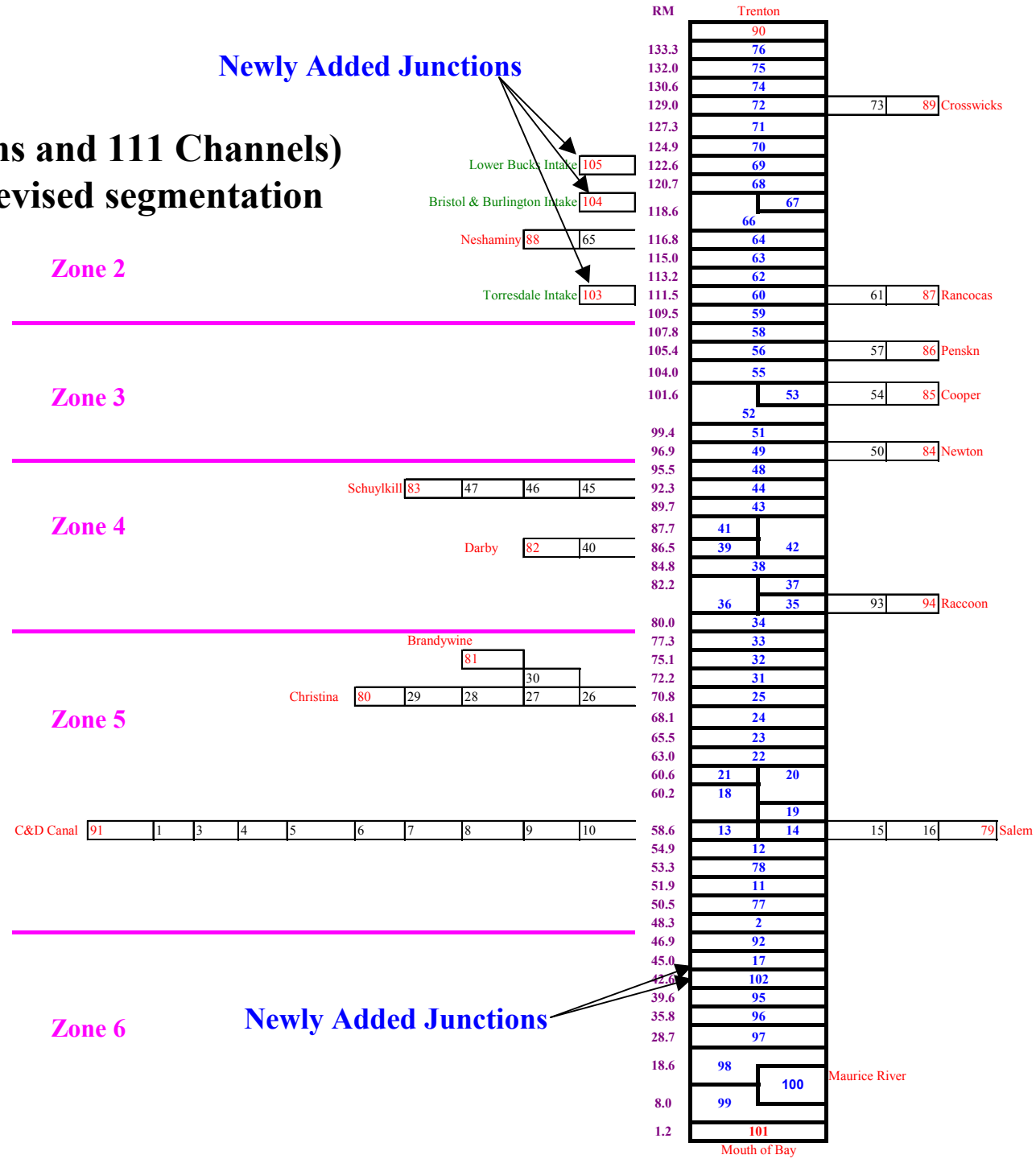
- Two junctions and channels were removed from the Salem River segments and added into Zone 6.
- Three water intake segments were added to properly simulate the in-situ mass withdrawals.
- The tidal datum shift for the boundary for the C&D Canal (at Chesapeake City) is 10 cm.

**Figure A1**

**DYNHYD5 (105 Junctions and 111 Channels)  
Schematic diagram of revised segmentation**

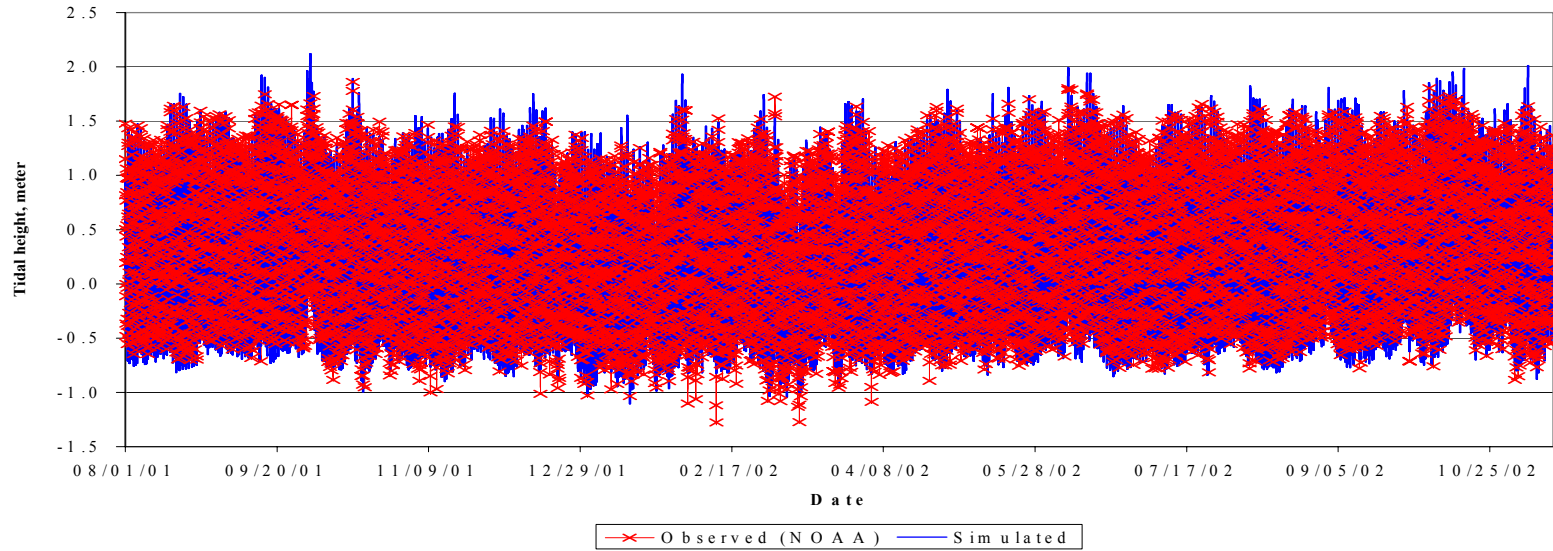
•Junction 17 and 102 are added into Zone 6 from the Salem River

•Three dummy junctions (103 ~ 105) are added for water intakes.



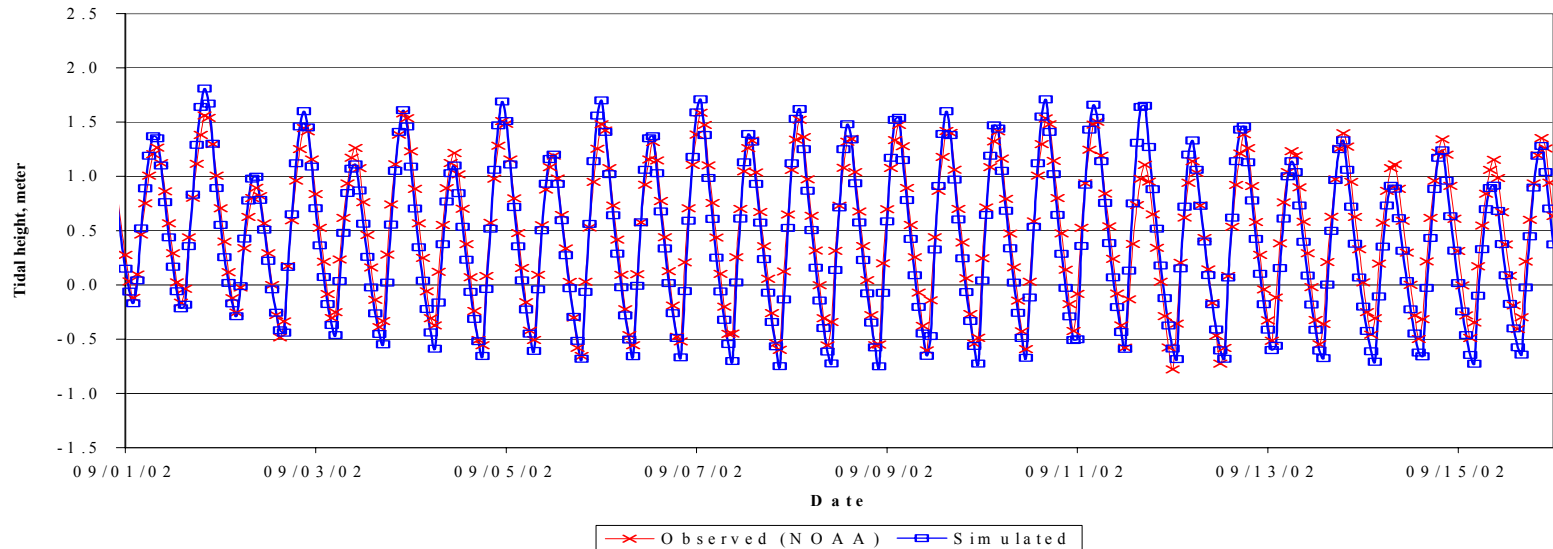
**Figure B3-1**

**Tidal height comparison at Philadelphia (R M 100)**



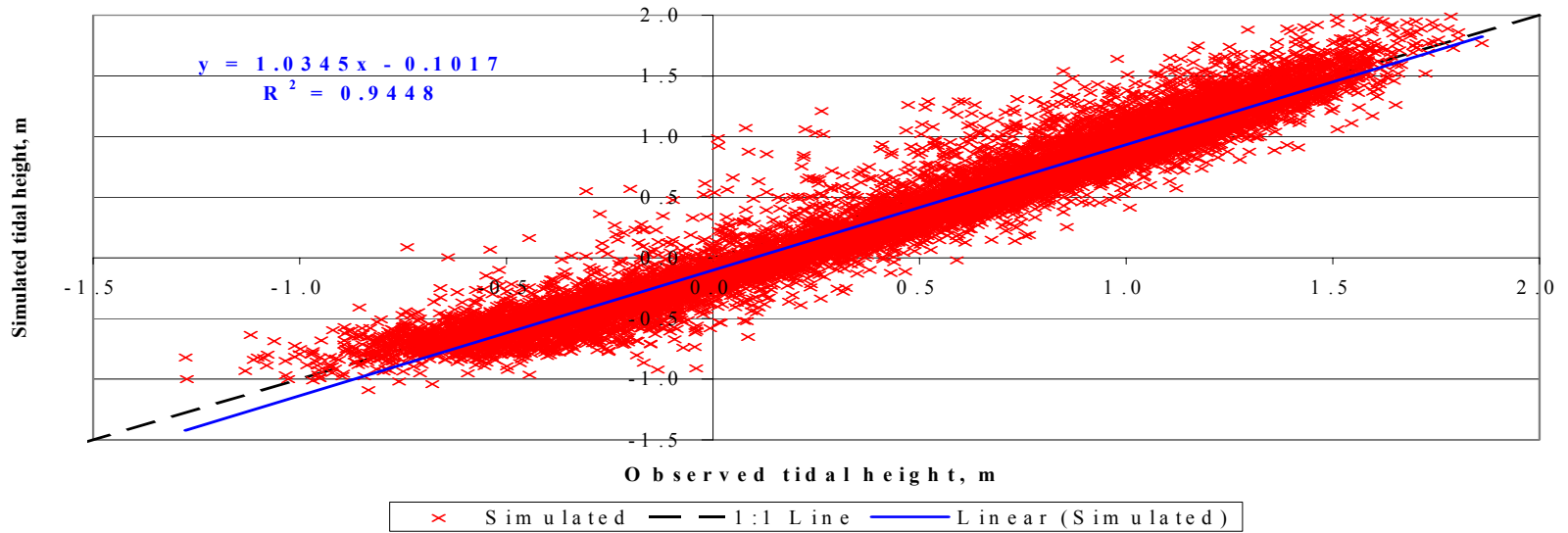
**Figure B3-2**

**Tidal height comparison at Philadelphia**



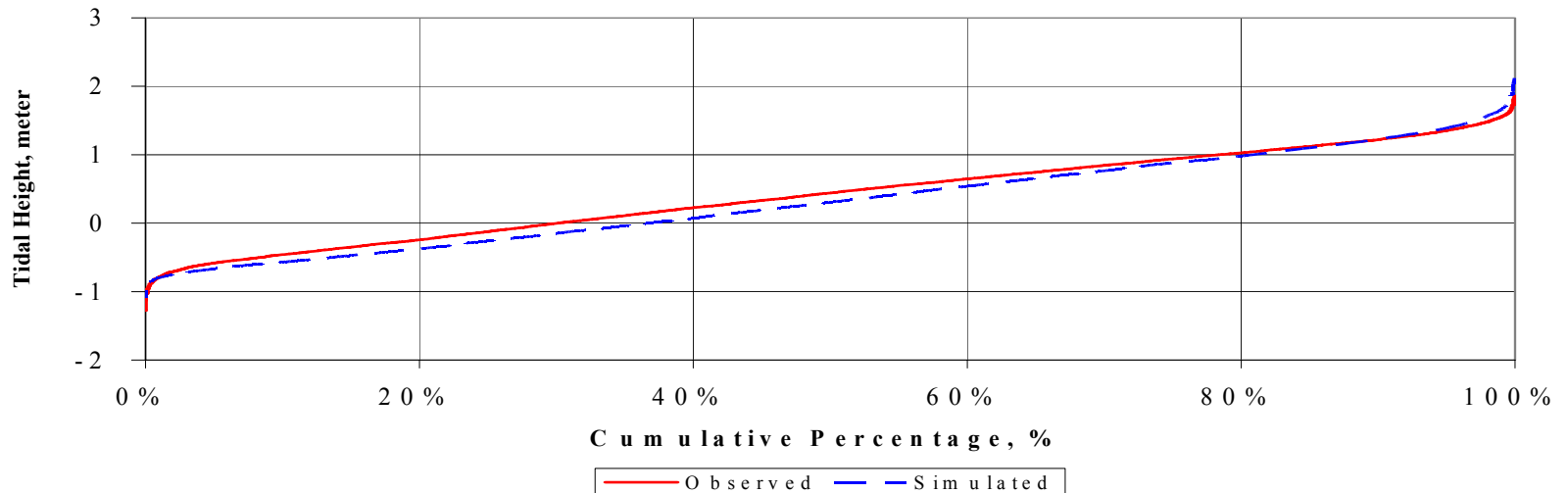
**Figure B3-3**

Observed vs. Simulated Tidal Height at Philadelphia (R M 100)



**Figure B3-4**

Cumulative Plot of Tidal Heights at Philadelphia (R M 100 - node 51)





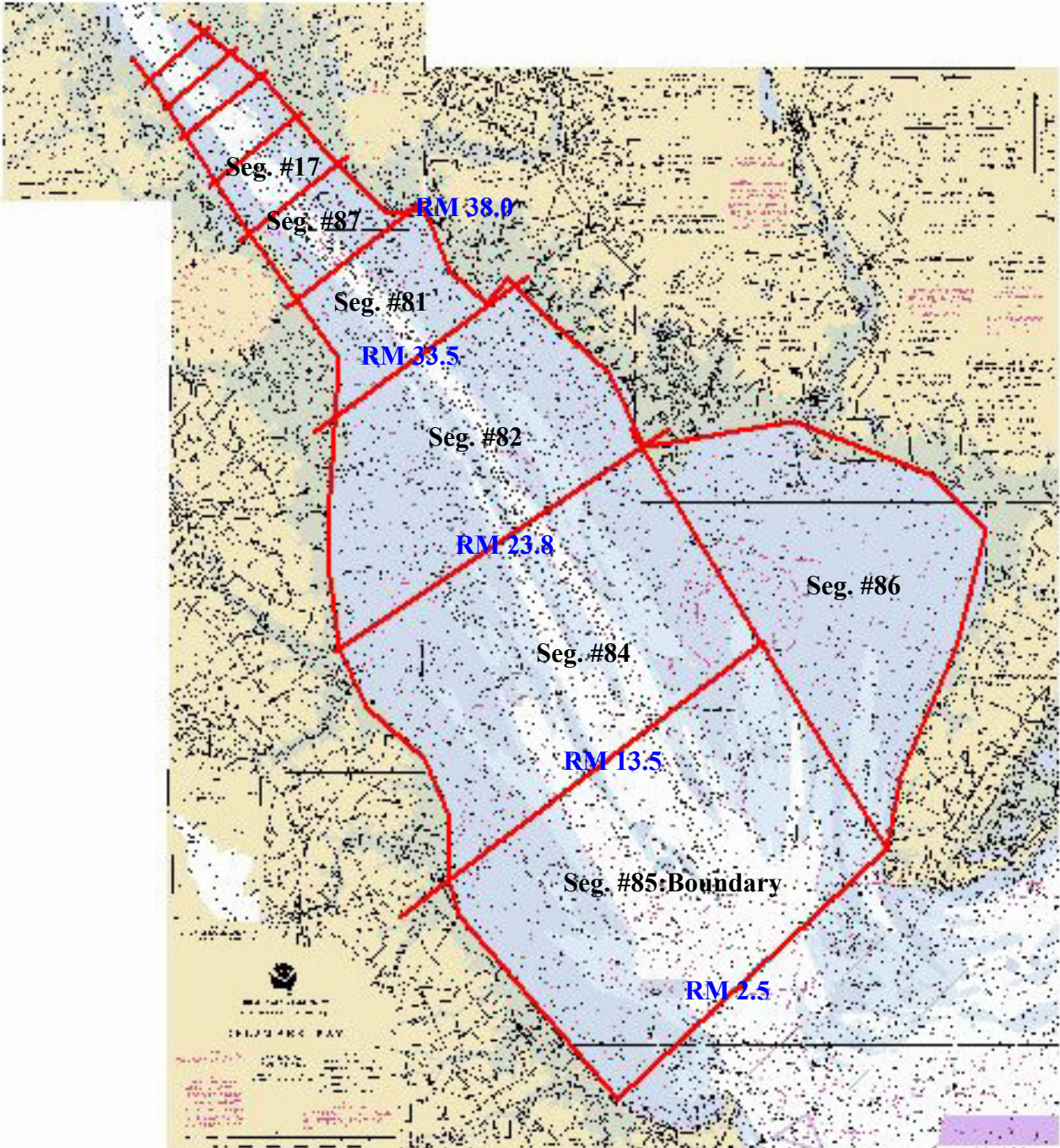
# Calibration: Regression statistics on tidal heights

Location	River Mile	Slope	Intercept	R <sup>2</sup>
Brandywine Shoal	8	0.94	0.00	0.995
Reedy Pt.	58	0.97	0.02	0.94
Philadelphia	100	1.04	-0.10	0.94
Tacony-Palmyra	107	1.04	-0.02	0.94
Burlington	118	0.98	-0.10	0.95
Newbold	127	0.95	-0.02	0.94

# Key Modifications – Part 2

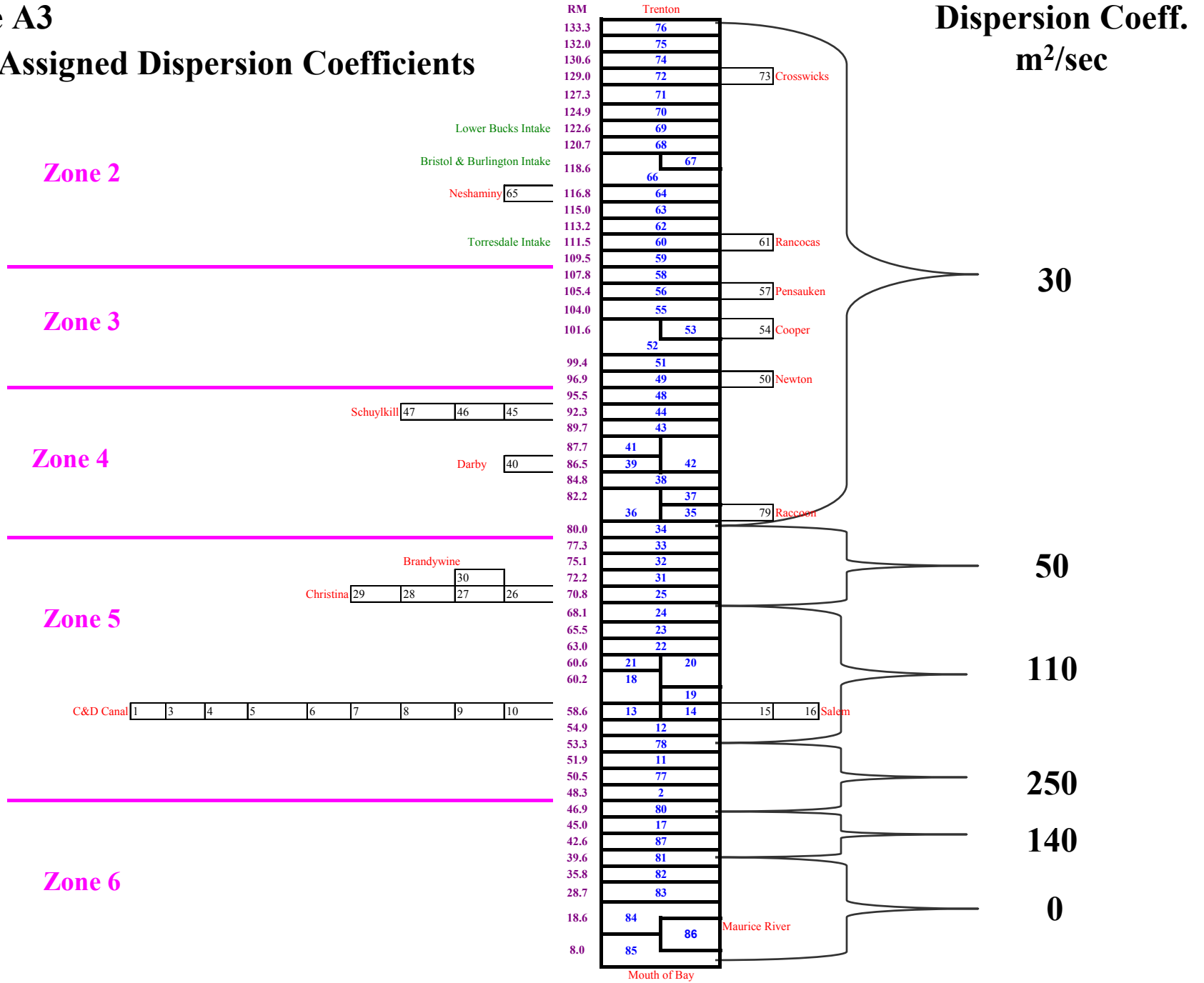
- Boundary Conditions for chloride:
  - Modified from 16,000 mg/l to 15,000 mg/l for the Mouth of the Bay.
  - Changed from 14 mg/l to 21 mg/l for the Delaware River at Trenton.
  - Changed from 18 mg/l to 34 mg/l for the Schuylkill River upstream boundary.
- Advection Factor (ADF) in TOXI5 input has changed from 0.38 to 0.37.
- Zero dispersion coefficients were assigned for the lower portion of the Delaware Bay.
- Re-assignment of the dispersion coefficients for the rest of the segments.

# Lower Bay Segmentation



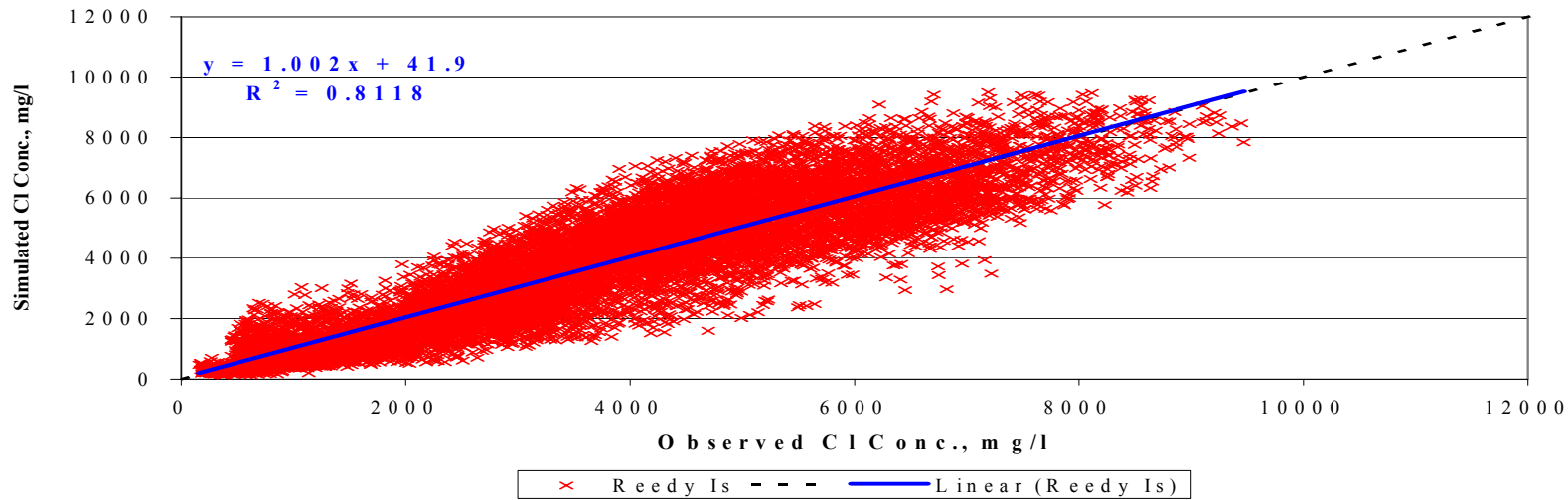
# Figure A3

## Assigned Dispersion Coefficients



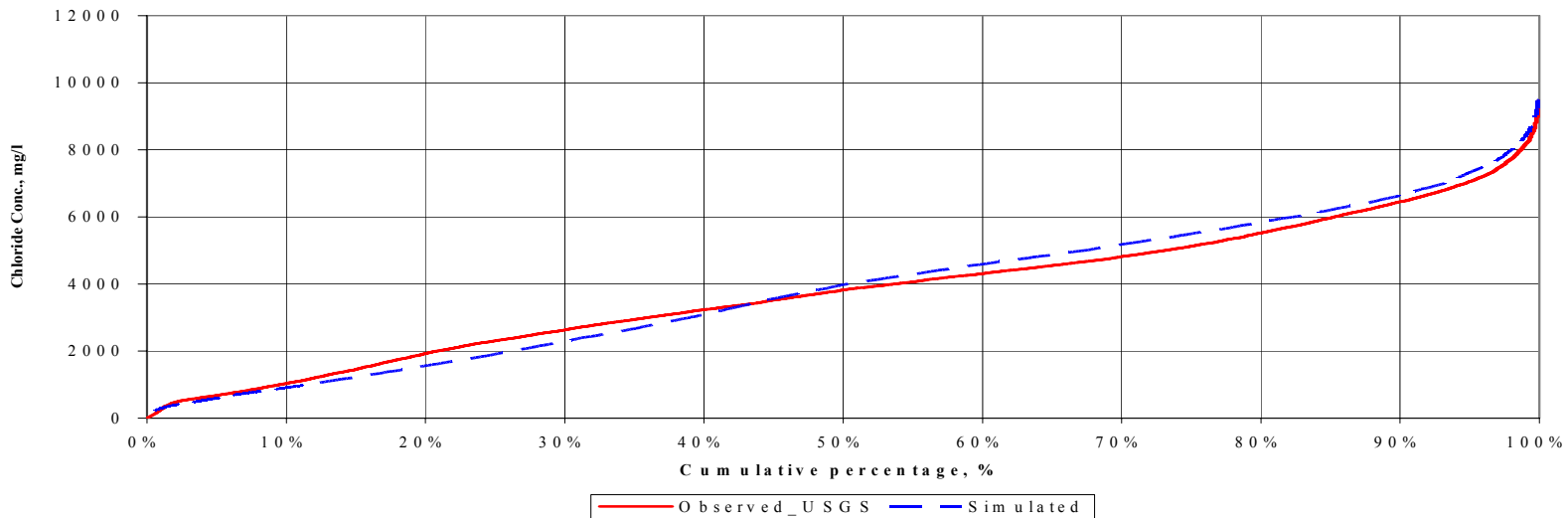
**Figure D1-3**

**Chloride Regression Plot:**  
Observed @ Reedy Is (RM 54.2) vs. Simulated @ Node 12 (54.9)

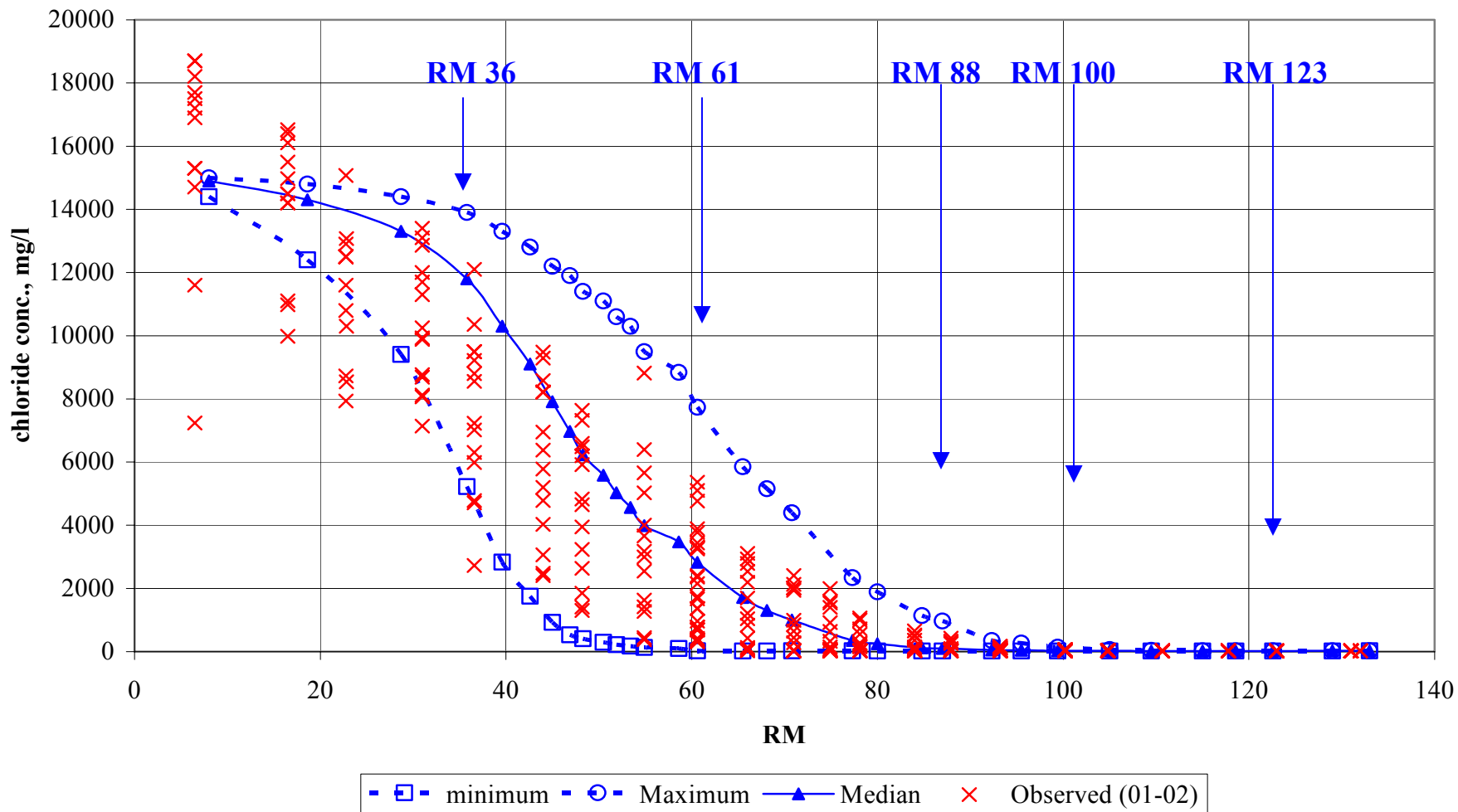


**Figure D1-4**

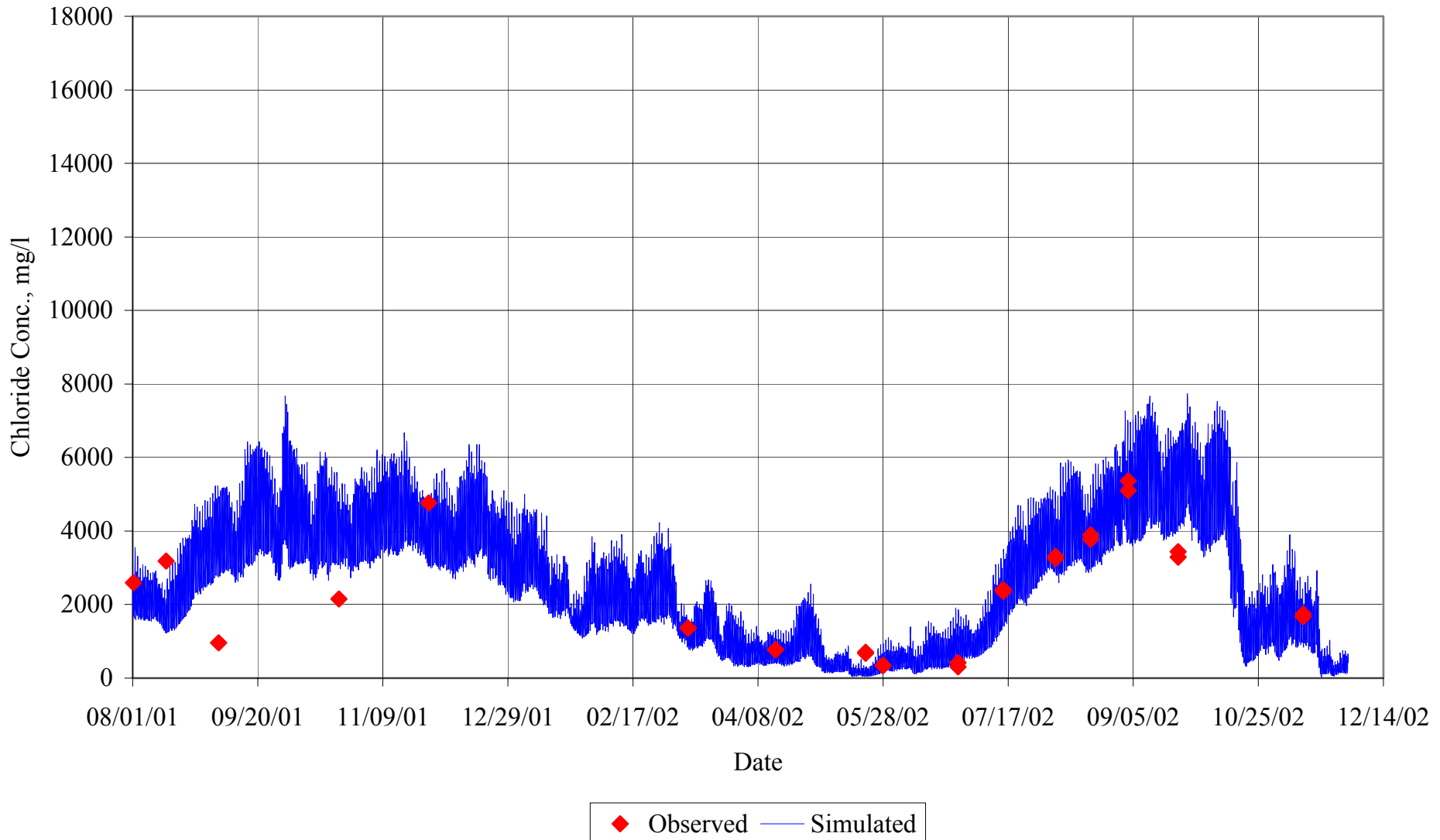
**Cumulative Plot of Observed and Simulated Chloride Concentration**  
Reedy Island: RM 54.2



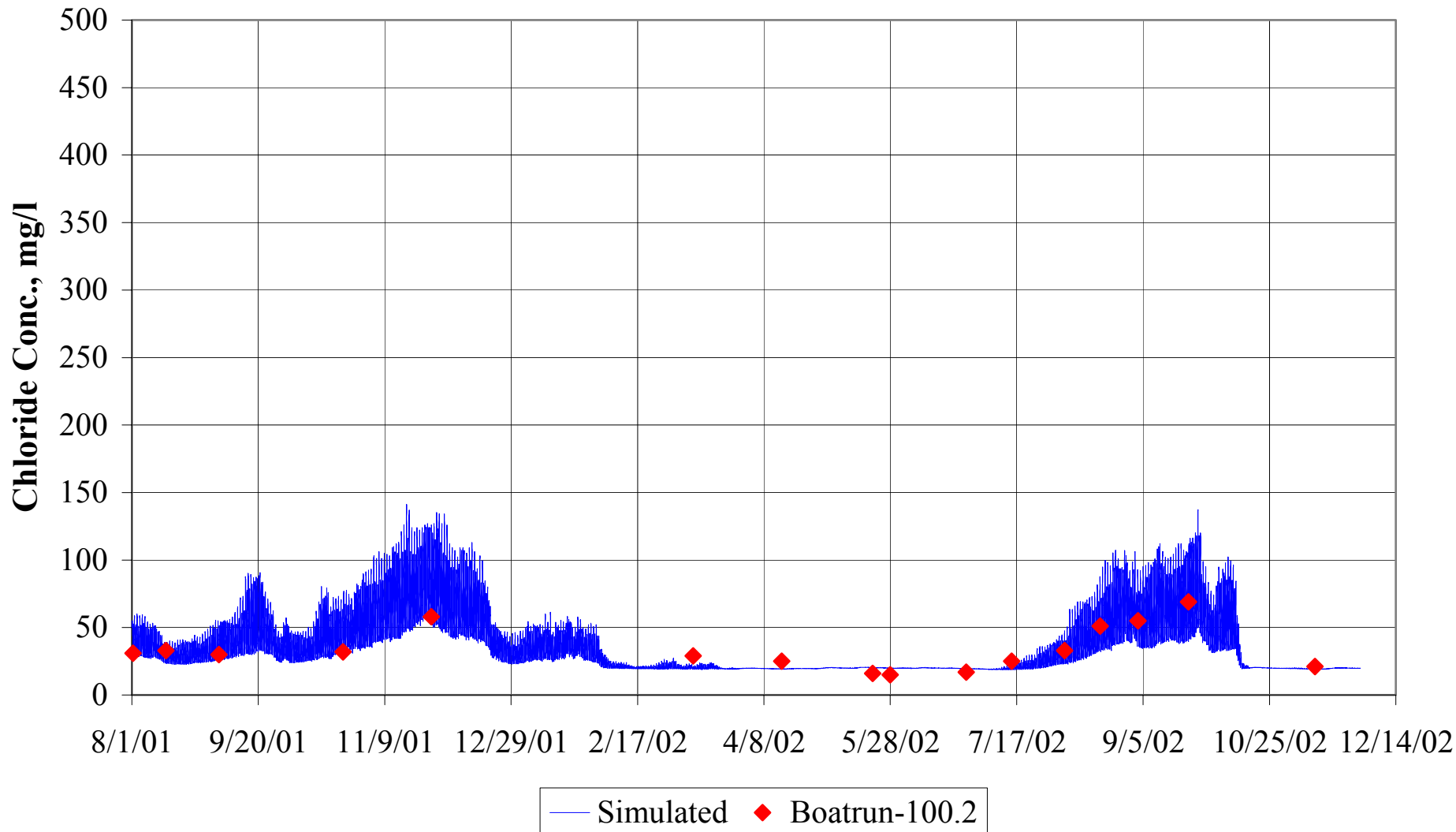
**Figure E20**      **Spatial Chloride Plot: Observed vs. Simulated**  
**Period of Sep. 1, 2001 to Nov. 29, 2002**



**Temporal Chloride Plot:**  
**Observed @Pea Patch Island (RM 60.6) vs. Simulated @Node 20 (RM 60.6)**



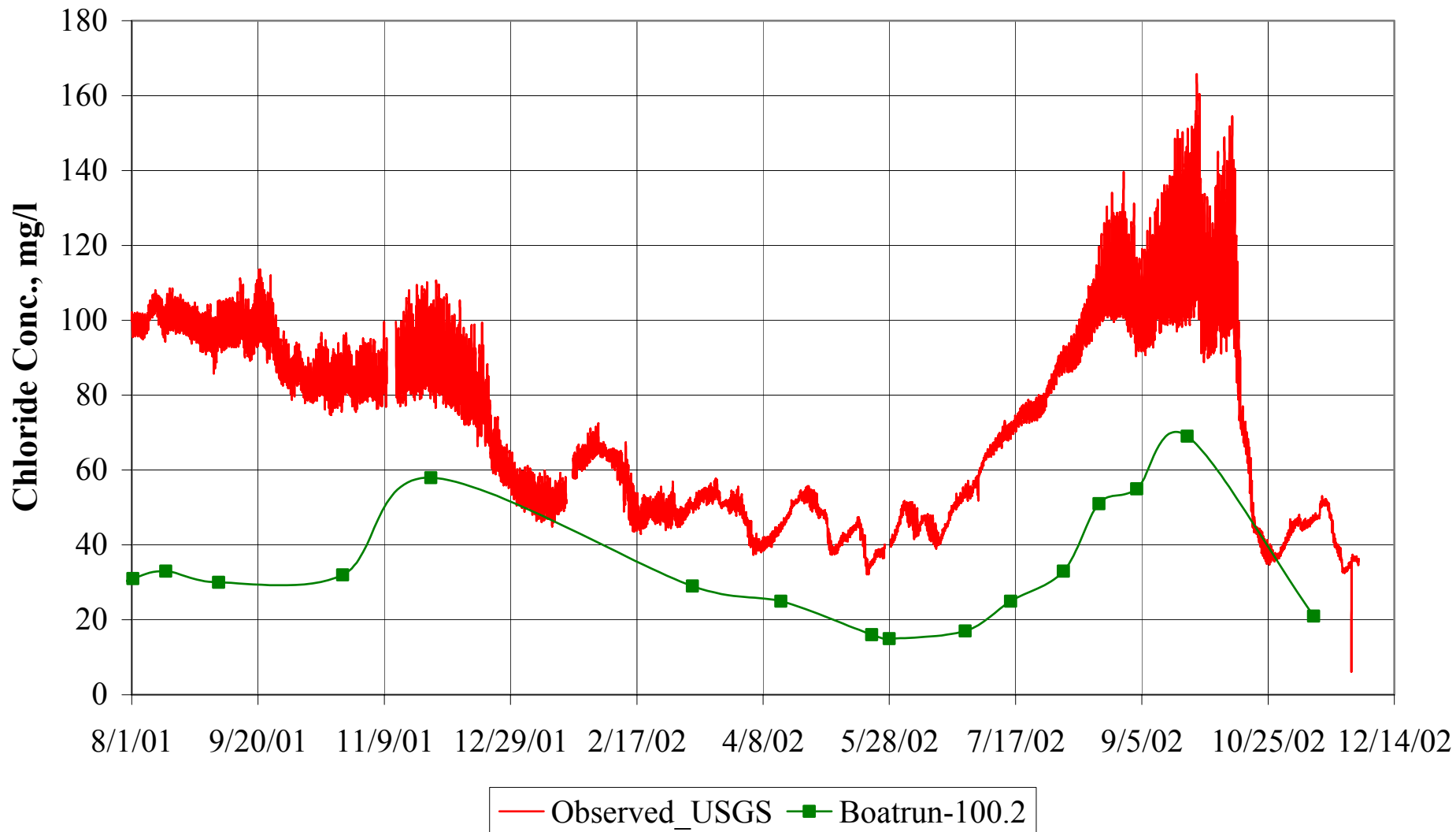
# Temporal Chloride Plot: Observed @Ben Franklin Brdg. (RM 100.5) vs. Simulated @Node 51 (RM 100)



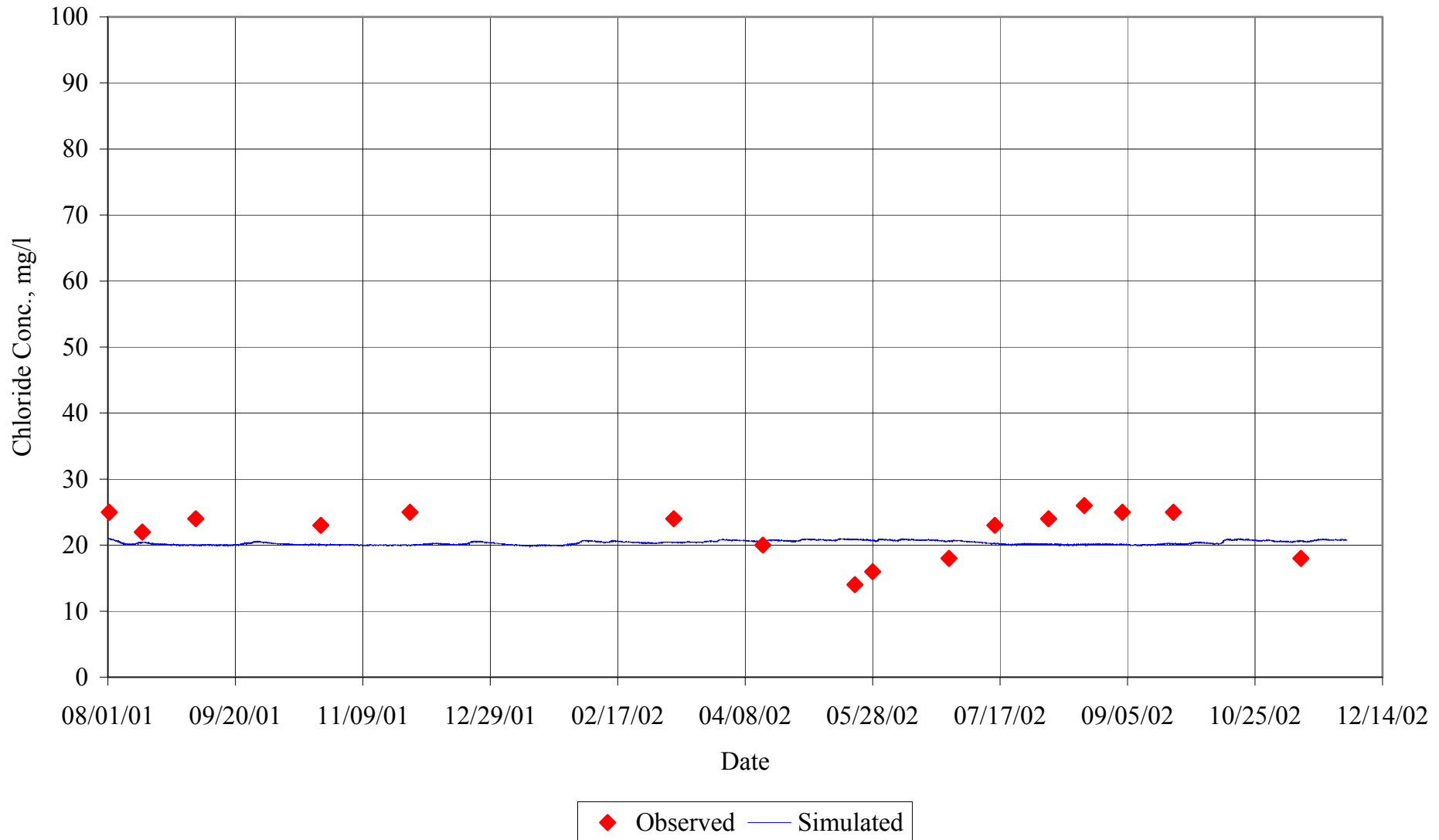


# Temporal Chloride Plot: @Ben Franklin Brdg. (RM 100.2)

## Observed USGS vs. Observed Boatrun



# Temporal Chloride Plot: Observed @Florence (RM 123.0) vs. Simulated @Node 69 (RM 122.6)



# Hydrodynamic and Water Quality Model for Chlorides

- ❑ A summary of the discussions on this topic will be presented by Dr. Namsoo Suk.
- ❑ Recommendations/Conclusions:
  - The modified hydrodynamic model properly simulates the water movements throughout the Delaware River Estuary.
  - The Expert Panel concludes that the modified hydrodynamic model is ready to be linked with the PCB model.