

# Validation of Trading Program: Scenario Simulations



Passaic Trading Symposium  
July 15, 2008

*USEPA Targeted Watershed Grant Program*

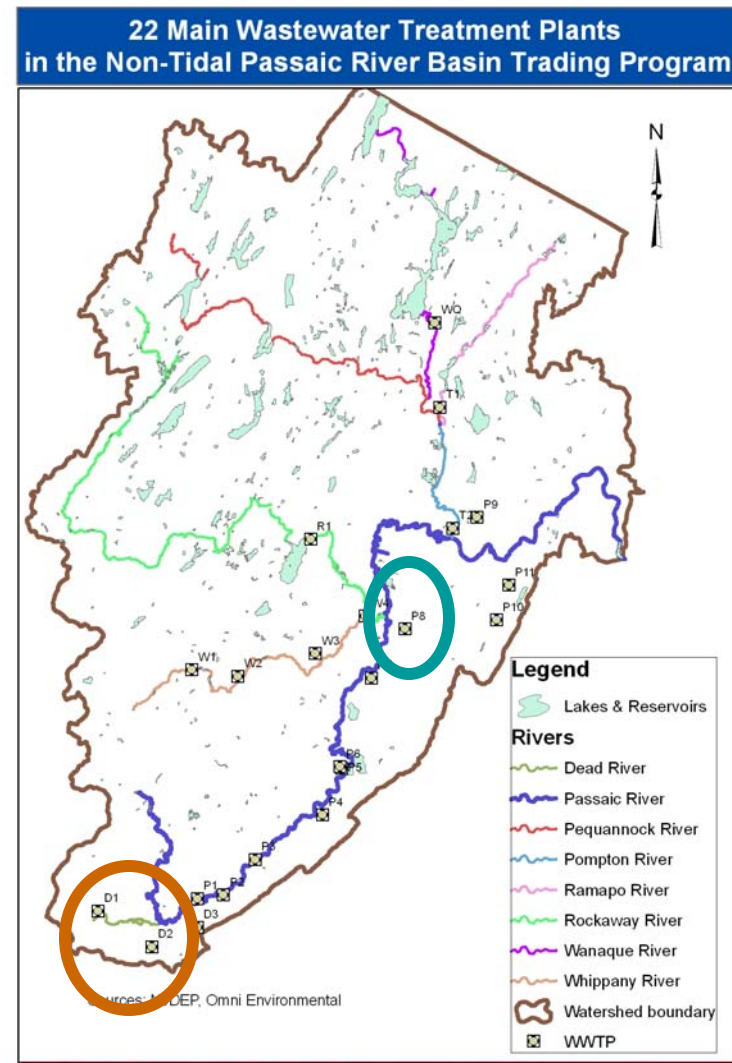


# Model validation of trading program

- Developed 13 scenarios to simulate and verify that trading approach will achieve compliance with TMDL water quality targets
- Applied trading formula and trading ratios
- Simulated variety of flow conditions
- Scenarios designed to “stress” watershed
  - Buyer upstream / seller downstream
  - Buyer and seller on different tributaries
  - Buyer and seller in different management areas
- Total 68 simulations

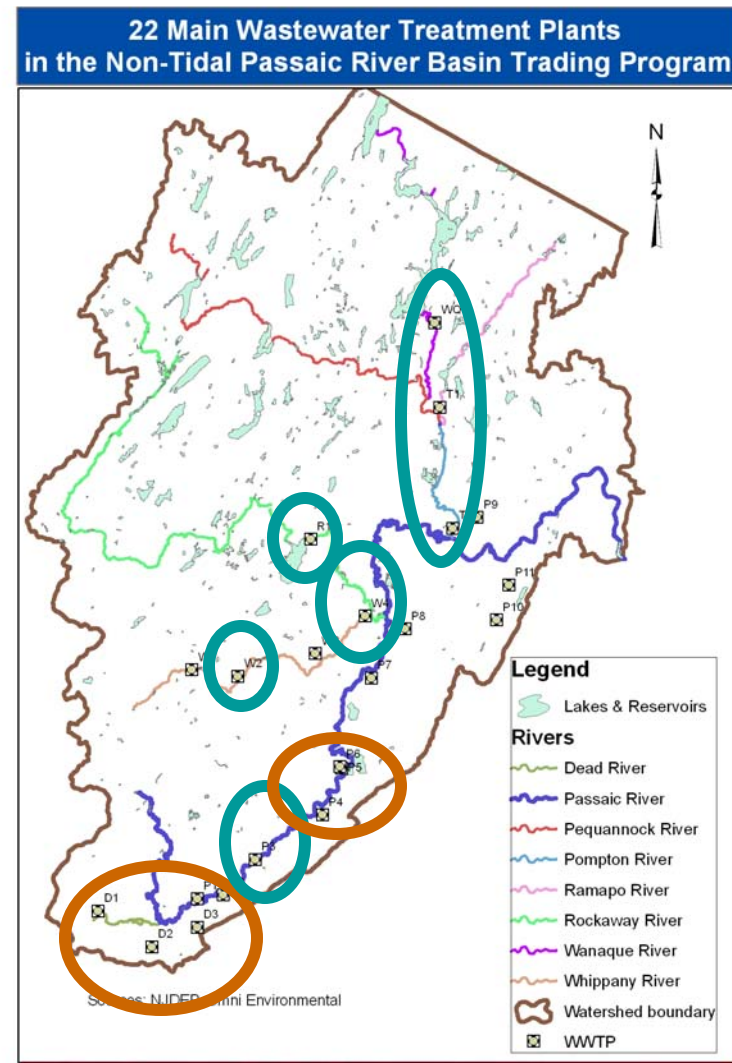
# Scenario 2

- Seller: Caldwell
- Buyers: Bernards and Warren V
- No Diversion condition as critical
- 2 different WWTP flow conditions, 2 different trading ratios
  - 4 simulations



# Scenario 8

- Sellers: Parsippany-Troy Hills, Two Bridges, Rockaway, Berkeley Heights, Morristown, Wanaque, Pompton Lakes
- Buyers: Bernards, Warren I-II, Warren IV, Warren V, Chatham Glen, Florham Park, Morris-Butterworth
- Diversion and Extreme Diversion conditions as critical
- 2 different WWTP flow conditions, 2 different trading ratios, 2 diversion conditions
  - 8 simulations

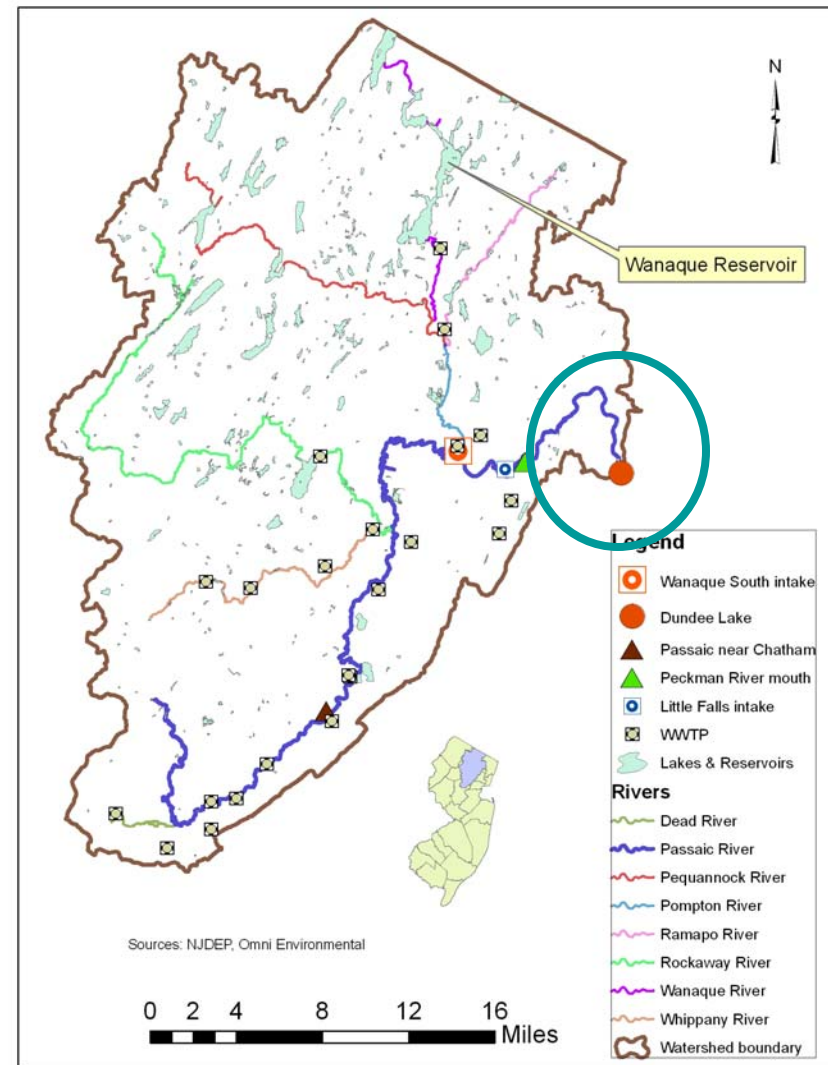


# Scenario background

- Compared 2 sets of Trading ratios (*initially*)
  - “Average”
  - “Minimum”
- Compared 2 sets of WWTP flows
  - Average flows (2004-2006)
    - Final 2007 data NA at time of simulation
  - “Dry year” flows (2004-2006)
    - Critical condition, WWTPs can discharge > 0.4 mg/l and still meet allocation
- Covered all three diversion conditions with the 13 scenarios
- 3 diversion conditions, 2 sets of WWTP flows → 6 baseline simulations

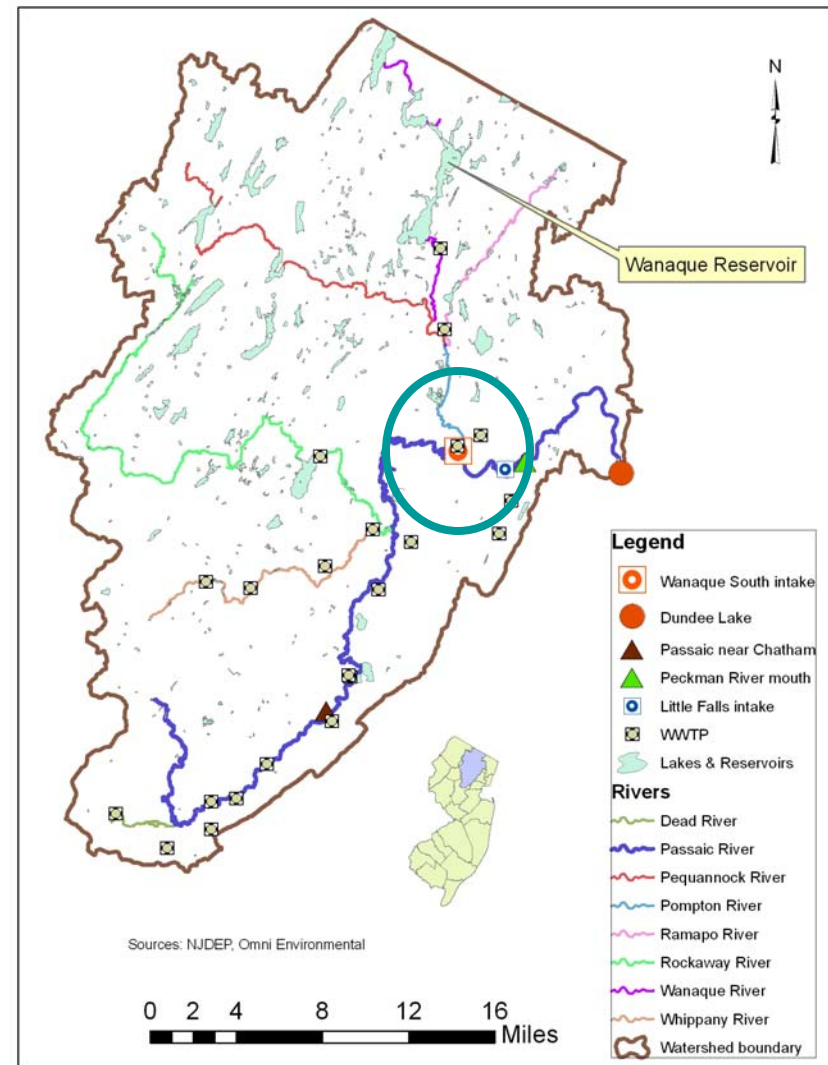
# Model validation of trading program

- Evaluated output at:
  - TMDL critical locations
    - Dundee Lake, Wanaque South intake
  - Areas of concern
    - Peckman River mouth
    - Passaic River near Chatham
    - Little Falls intake
    - Little Falls intake



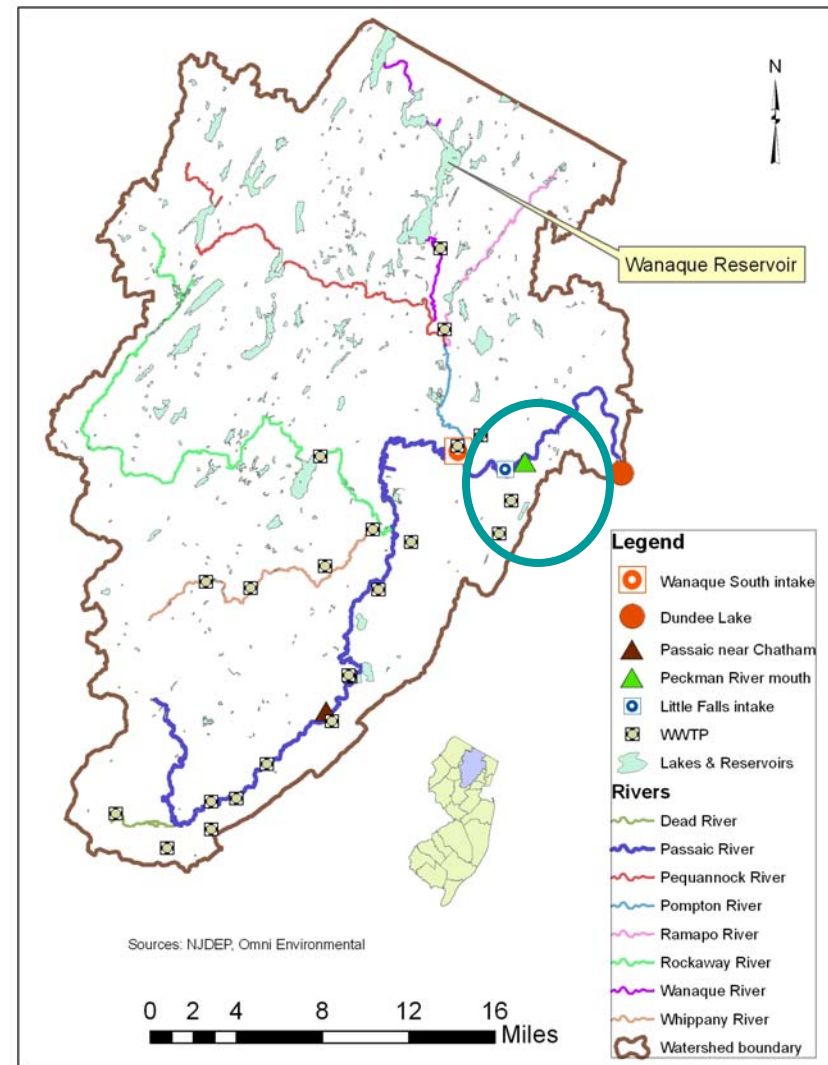
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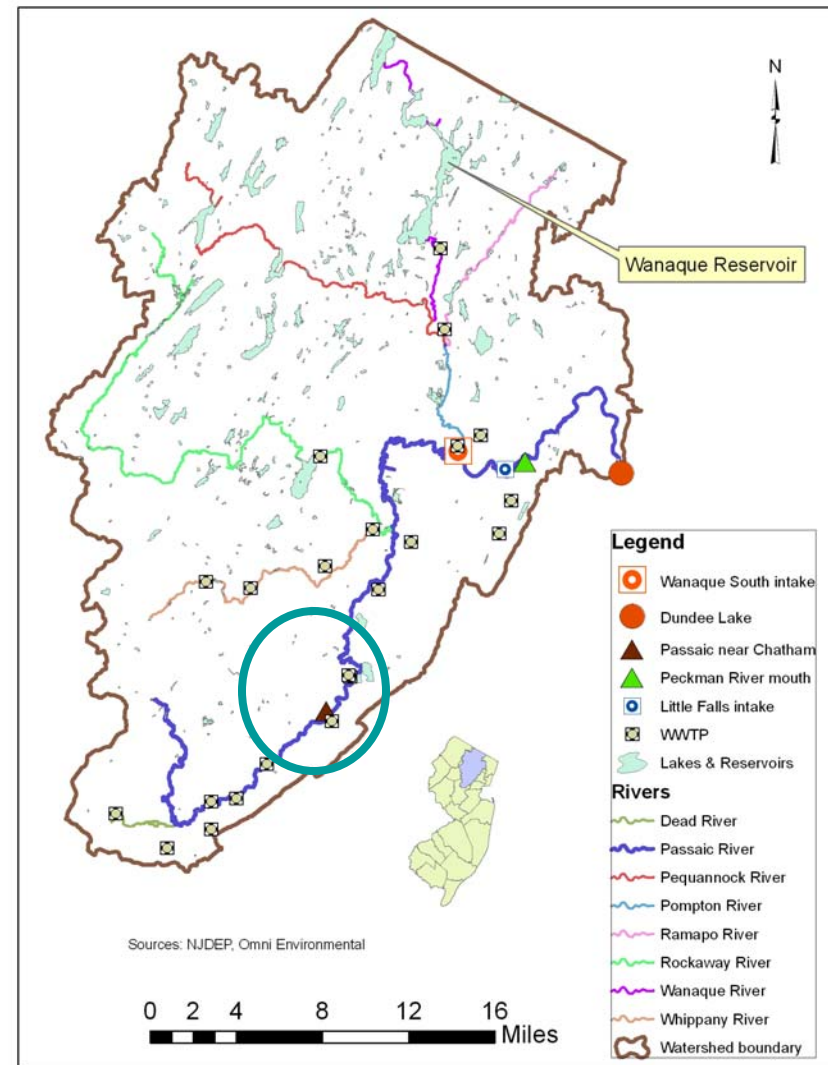
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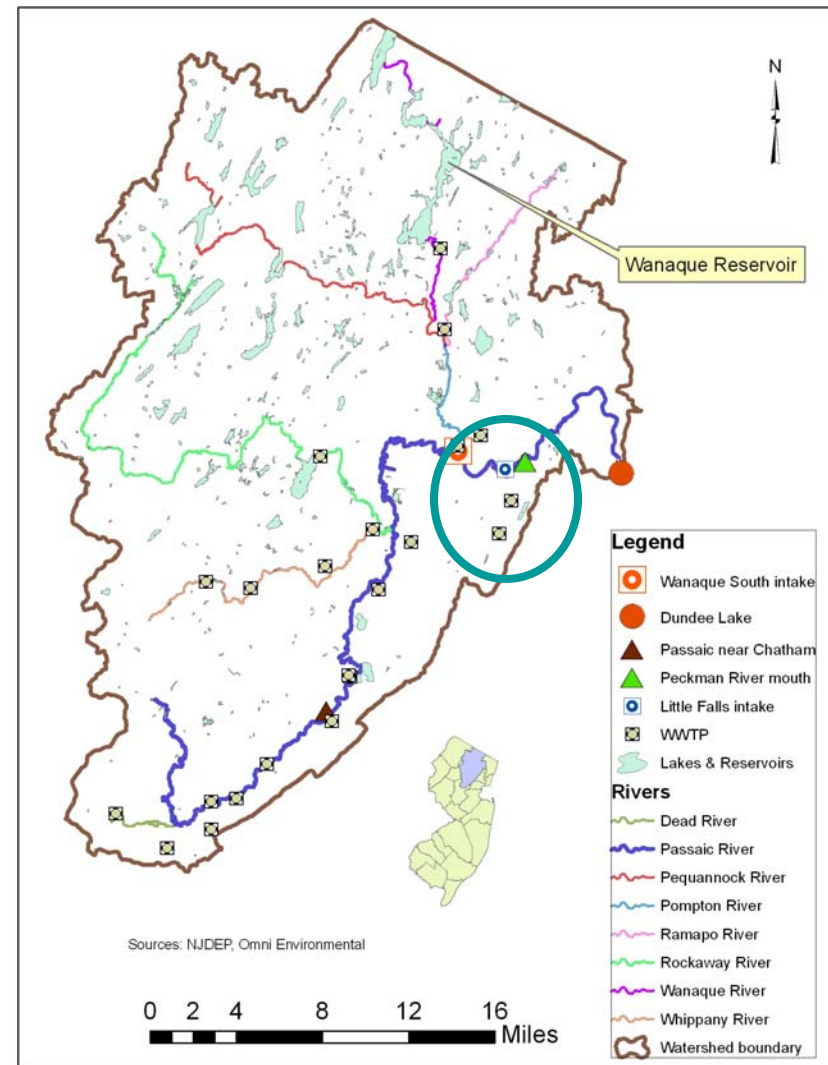
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# Initial scenario results

## TMDL critical locations

- Compared to baselines, same or less TP load diverted at WS intake in all scenarios
  - Reductions of 17 – 29% with Two Bridges as seller
- Some scenarios had seasonal average chl-*a* at Dundee Lake higher than baseline
  - Max deviation was 4% higher than baseline (i.e., 0.57 µg/l, seasonal avg.)
  - Two scenarios with “minimum” trading ratios also had exceedances

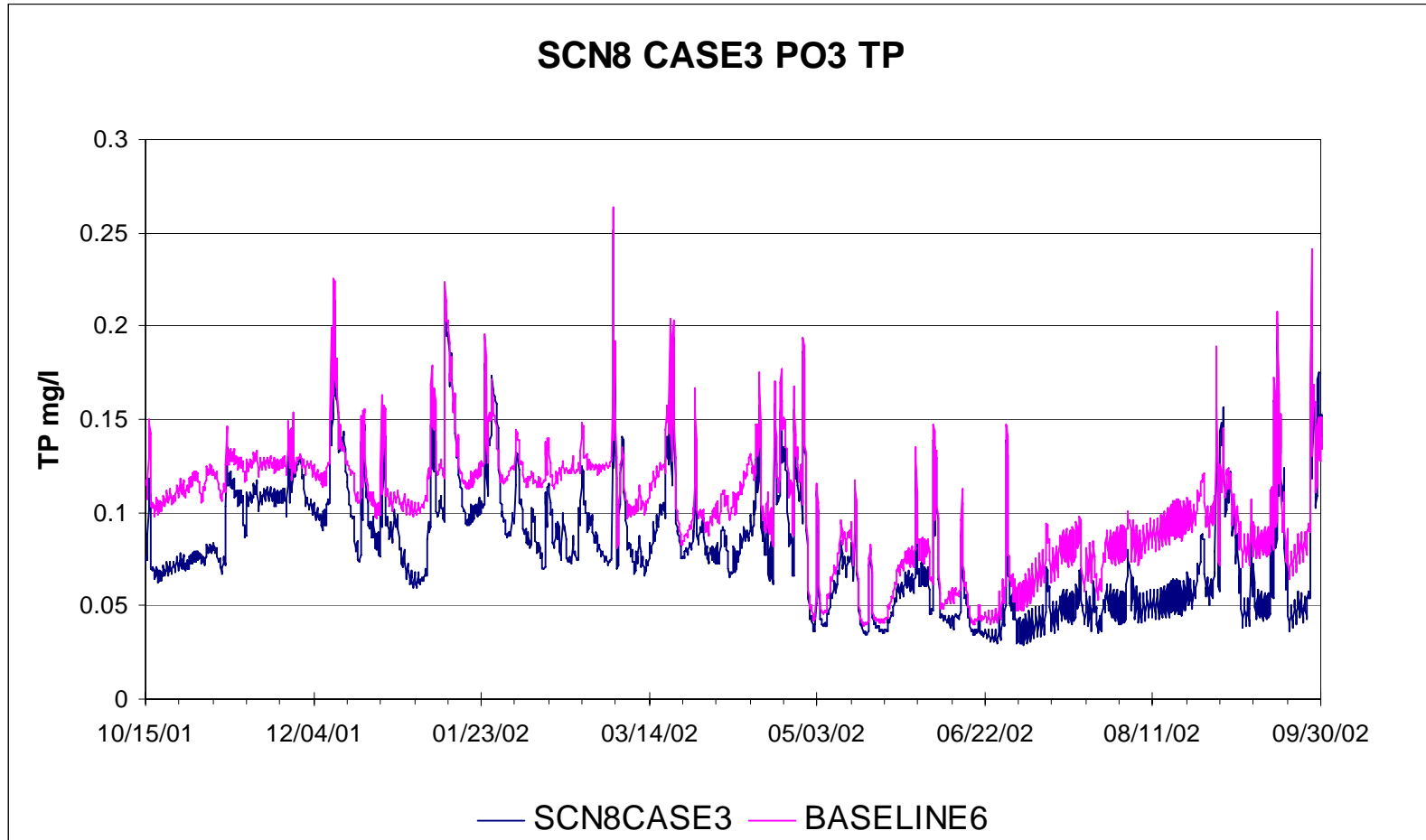
# Calibrated scenario results

- Reduced “minimum” trading ratios by 10% (Table 5-7)
  - Ratios within same point source zone kept at 1.0
- TMDL critical locations
  - All scenarios had same or less seasonal average chl-*a* at Dundee Lake than baselines
  - All scenarios had same or less TP load diverted at WS intake than baselines

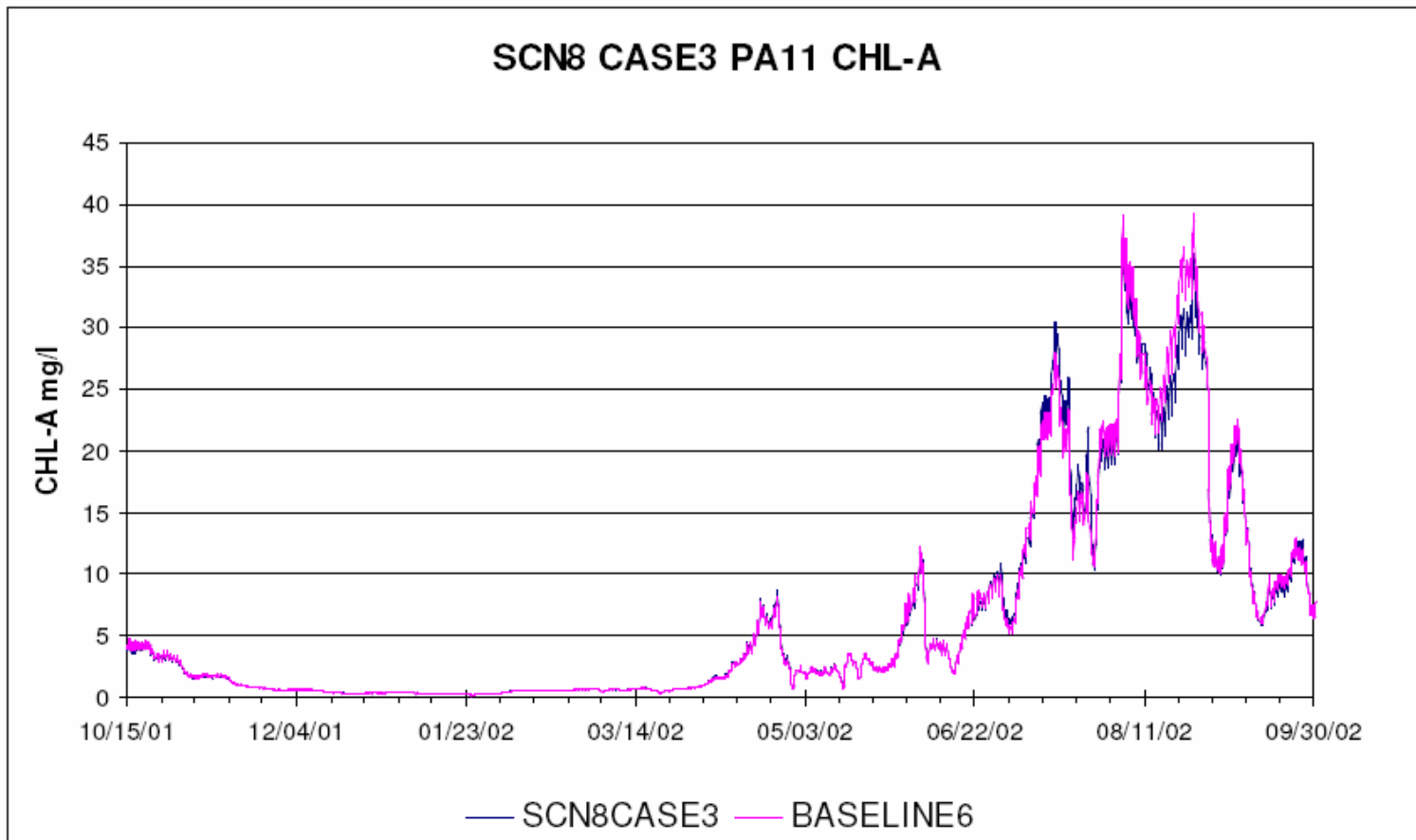
# Scenario results

- Areas of concern
  - Passaic River near Chatham, Peckman River mouth
    - Summer average DO within 0.2 mg/l of baseline
    - Max DO swing within 1.0 mg/l of baseline
    - Compliance with min. DO standard within 0.5% of baseline
  - Little Falls intake
    - Annual and summer avg. TP concentrations within 0.02 mg/l of baseline
- Trading simulations indicate low risk of hot spots using Table 5-7 trading ratios

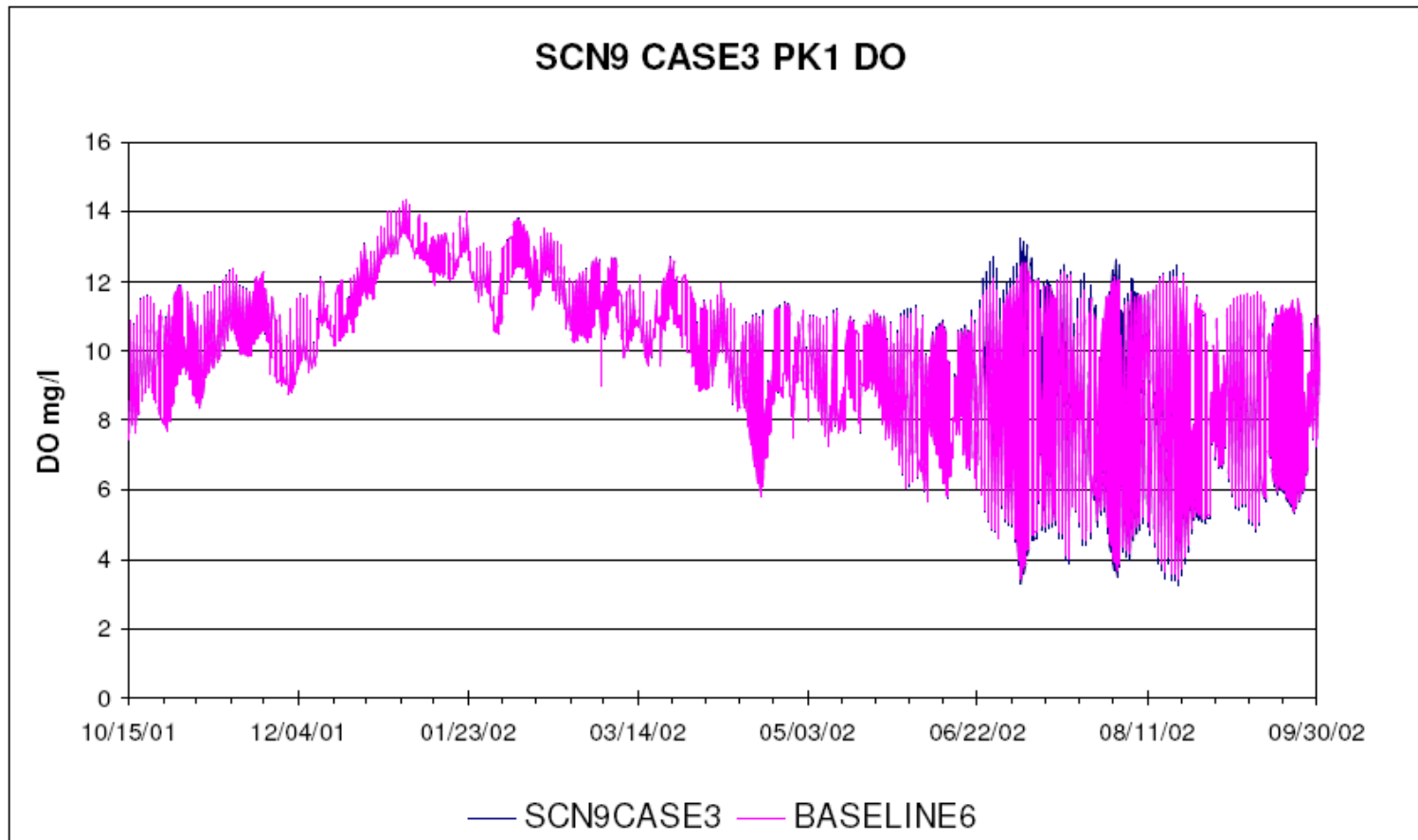
# Scenario 8, TP at Wanaque South intake critical conditions, Table 5-7 trading ratios



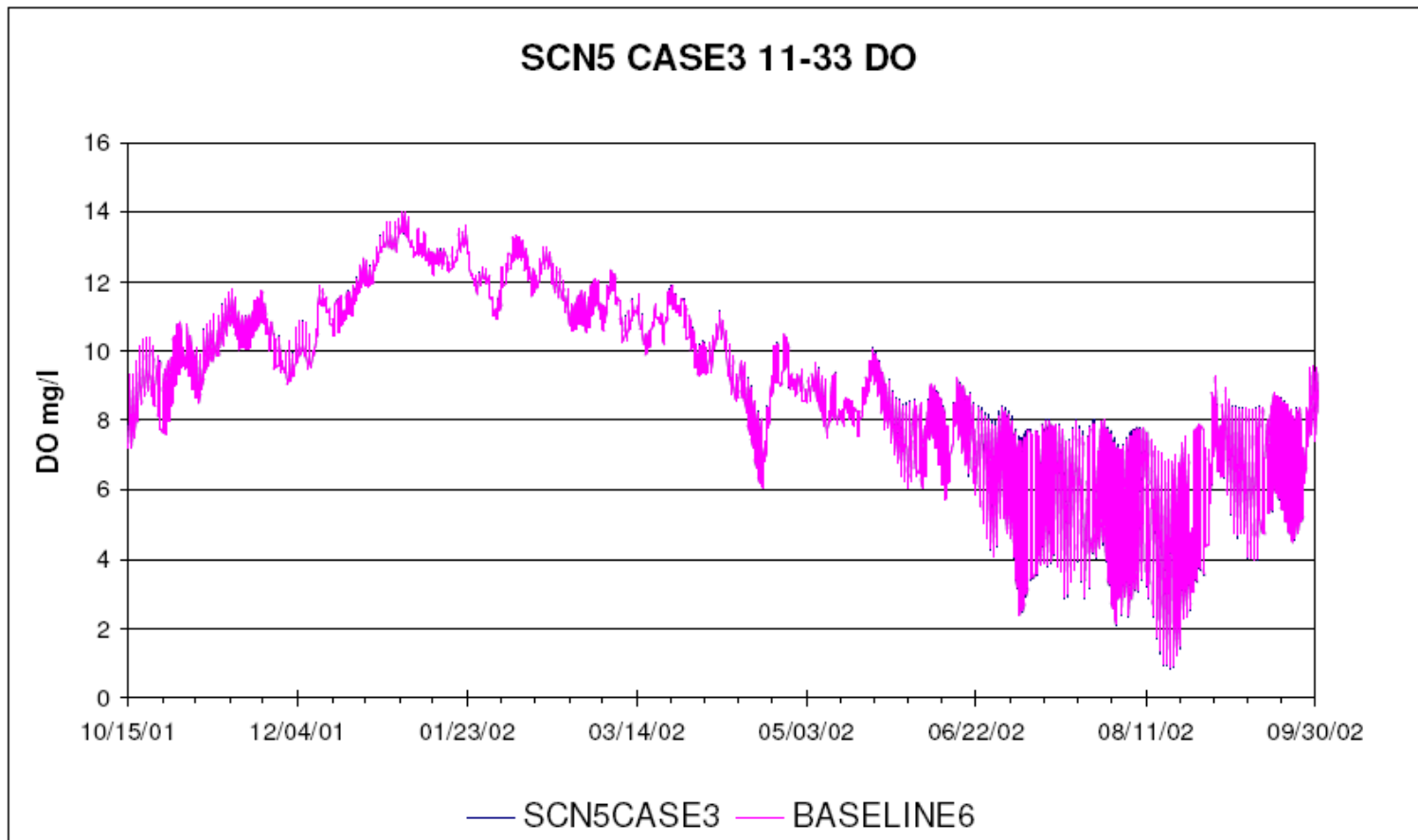
# Scenario 8, chl-a at Dundee Lake critical conditions, Table 5-7 trading ratios



# Scenario 9, DO at Peckman R. mouth critical conditions, Table 5-7 trading ratios



# Scenario 5, DO at Passaic R. near Chatham critical conditions, Table 5-7 trading ratios



# Scenario 11, TP at Little Falls intake critical conditions, Table 5-7 trading ratios

