Modeling, Upstream Loading and D.O. in the DWSC 2008-2009

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San Joaquin River DO TMDL TWG Meeting
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Outline

- Where we were 2 years ago
- WARMF update
- DWSC Conditions 2008-2009
- Is that what we would have expected?
- Conclusion

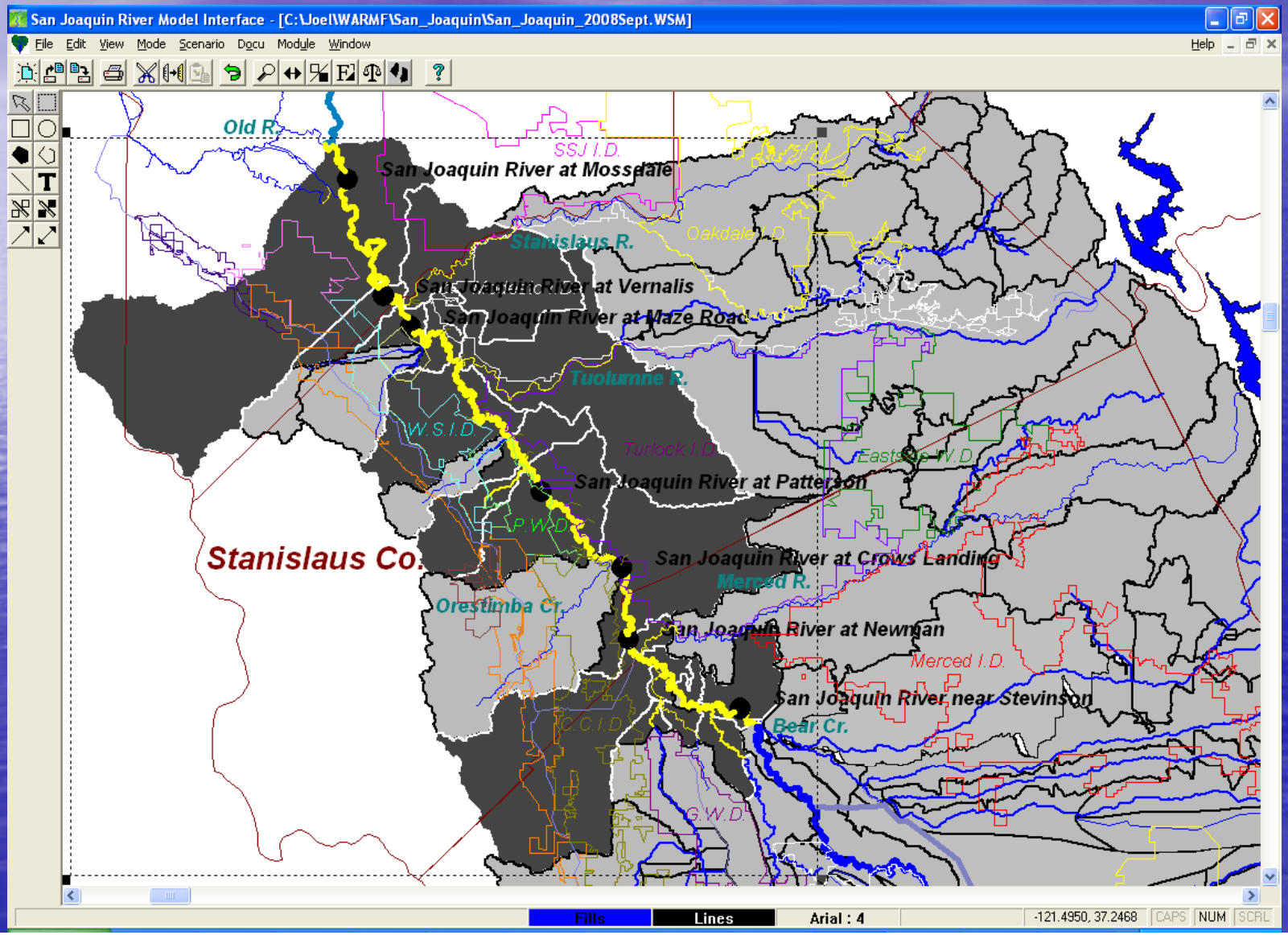
Where we were 2 years ago

- WARMF, Link-Node linked together, calibrated for 2000-2007
- San Luis Drain shutoff tested July 2007
- Model predicted reduced phytoplankton to Old River
- Little net flow past Old River, so no benefit in DWSC

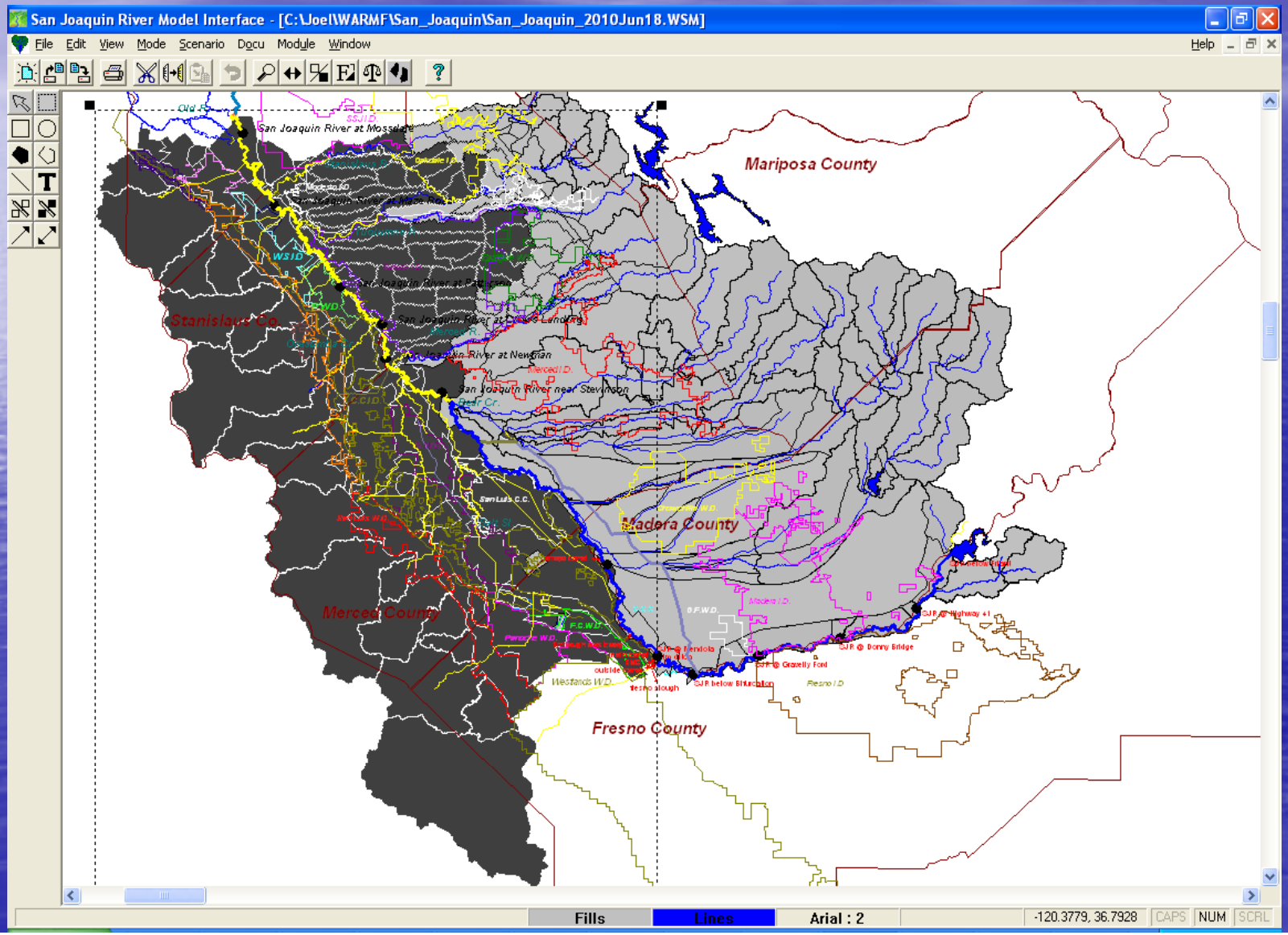
WARMF Update

- CV-SALTS project (Eastside)
  - Increased resolution
  - Detailed land use
  - Catchments realigned to follow drainage
  - Some increase in modeled land area
- Bureau of Reclamation project (Westside)
  - Increased resolution
  - Detailed land use
  - Catchments realigned to follow districts / drainage
  - Significant increase in modeled area

WARMF Before



WARMF After


San Joaquin River Model Interface - [C:\Joel\WARMF\San_Joaquin\San_Joaquin_2010Jun18.WSM]
File Edit View Mode Scenario Docu Module Window Help
Mariposa County
Stanislaus Co.
Madera County
Merced County
Fresno County
San Joaquin River at Mossdale
San Joaquin River at Newman
San Joaquin River near Stevinson
Fills
Lines
Arial : 2
-120.3779, 36.7928
CAPS
NUM
SCRL

Detailed Mass Balances

Process	TDS (lb/d)	NO_3-N (lb/d)
Total Inputs	5,560,000	30,200
Inflows from Upstream	4,520,000	19,100
Imported Water	382,000	484
Inflows from Near-surface Groundwater	486,000	8,600
Point Sources	174,000	1,800
Reaction Product	3,860	191
Total Outputs	5,780,000	30,100
Uptake / Decay / Settling	5,280	983
Diversions	1,280,000	4,860
Outflow to Downstream	4,500,000	24,300

WARMF Summary

- More detail in the San Joaquin watershed
- Results at Vernalis similar to before upgrades
- Runs until 9/30/2007

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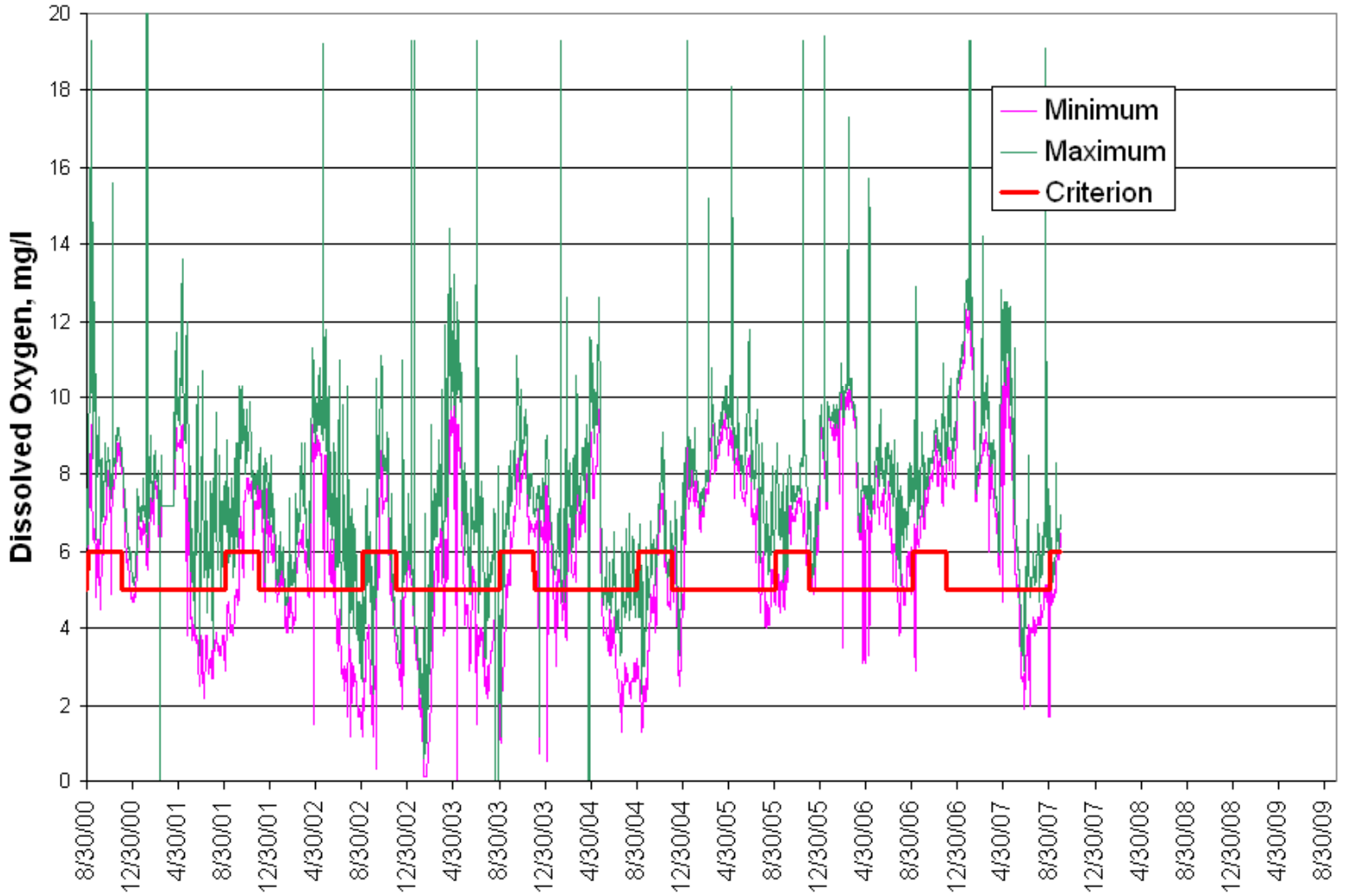
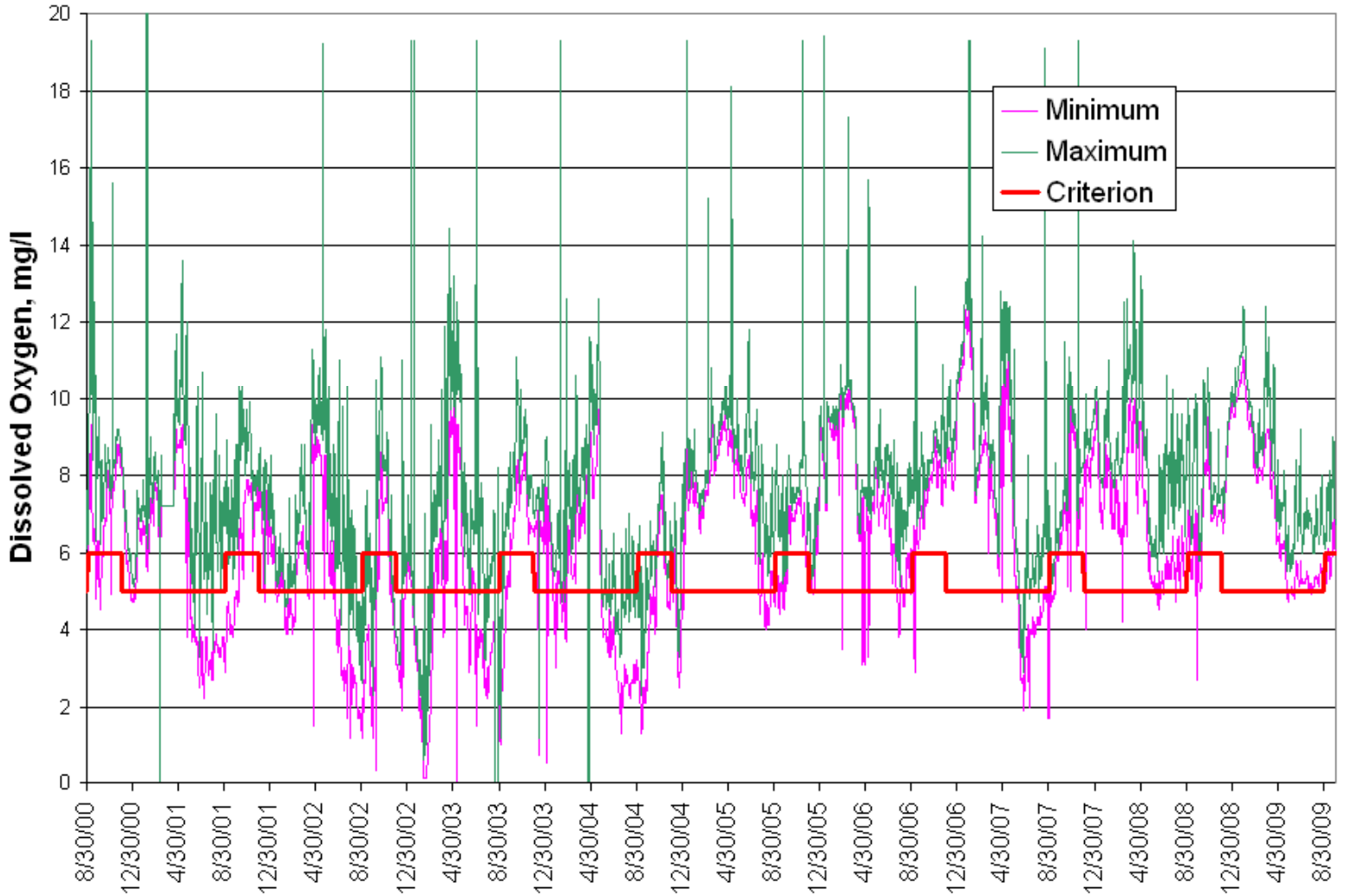
D.O. at Rough and Ready Island 2000-2007



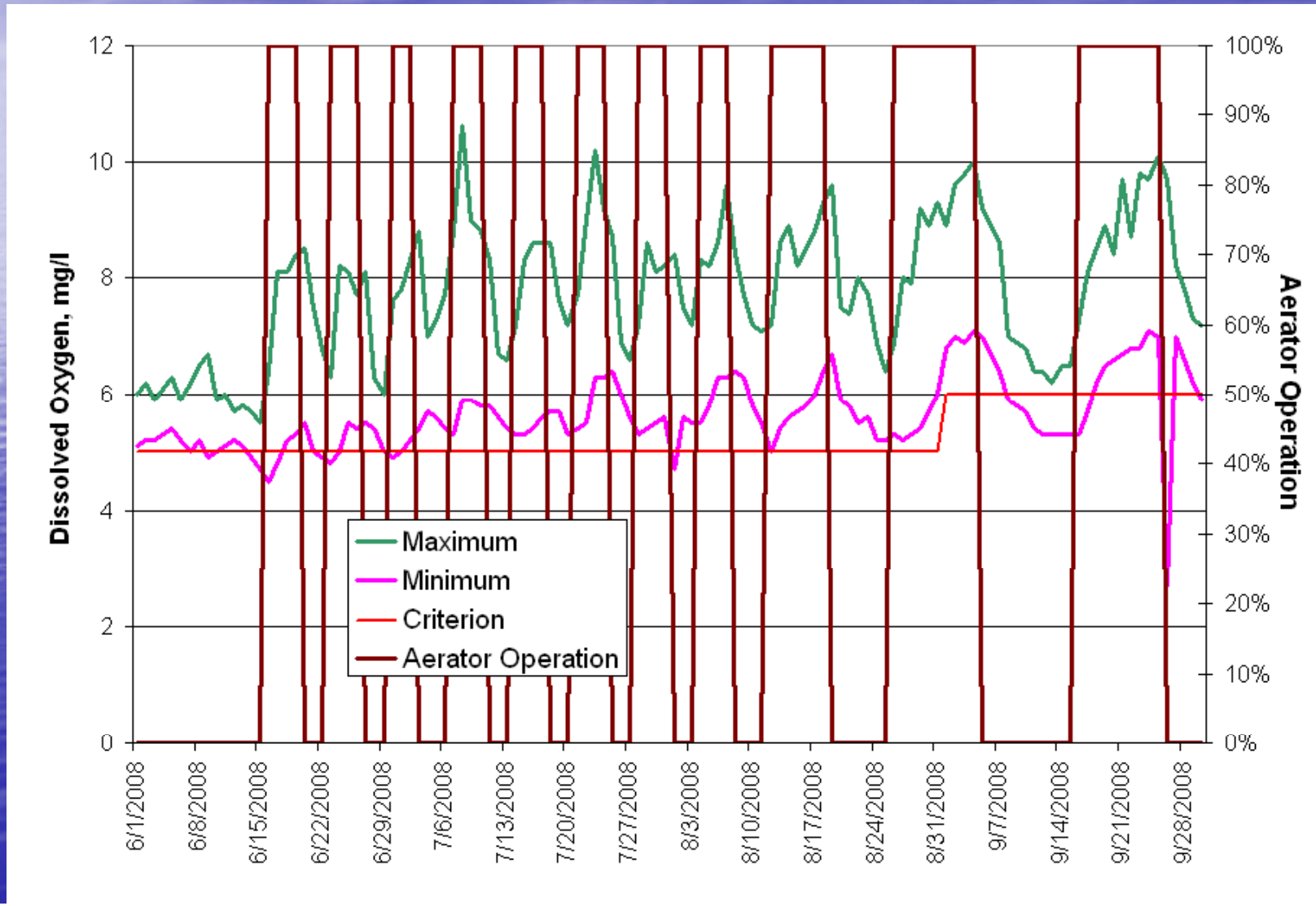
D.O. at Rough and Ready Island 2000-2009



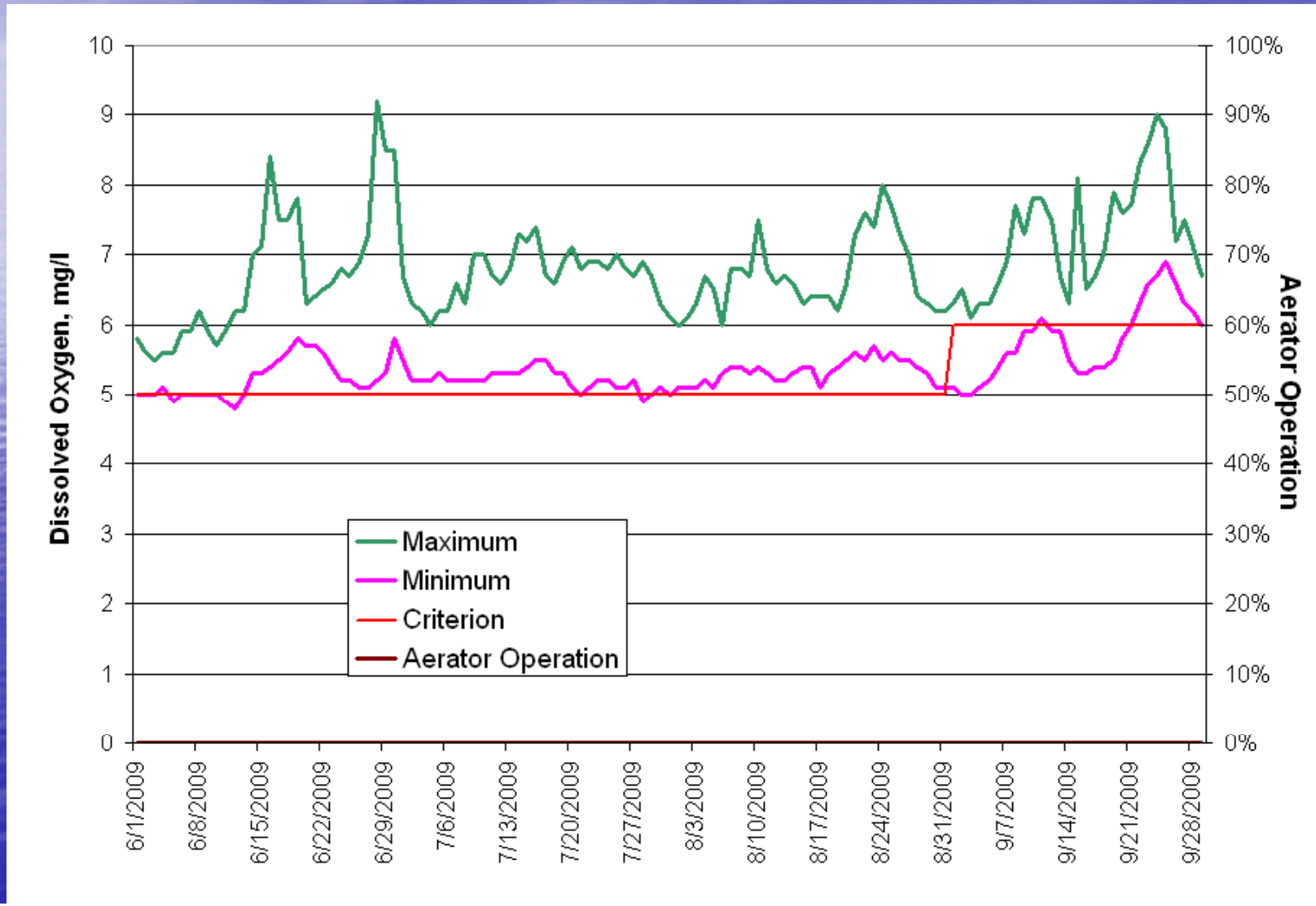
Violations in 2008-2009

- 2008: 26 violations, average 0.5 mg/l
- 2009: 39 violations, average 0.5 mg/l
- Less than previous years
- Is it aeration?
- Changes in City of Stockton discharge?
- How did upstream conditions contribute?
- Can we figure this out without modeling?

Aerator Operation vs DO (2008)



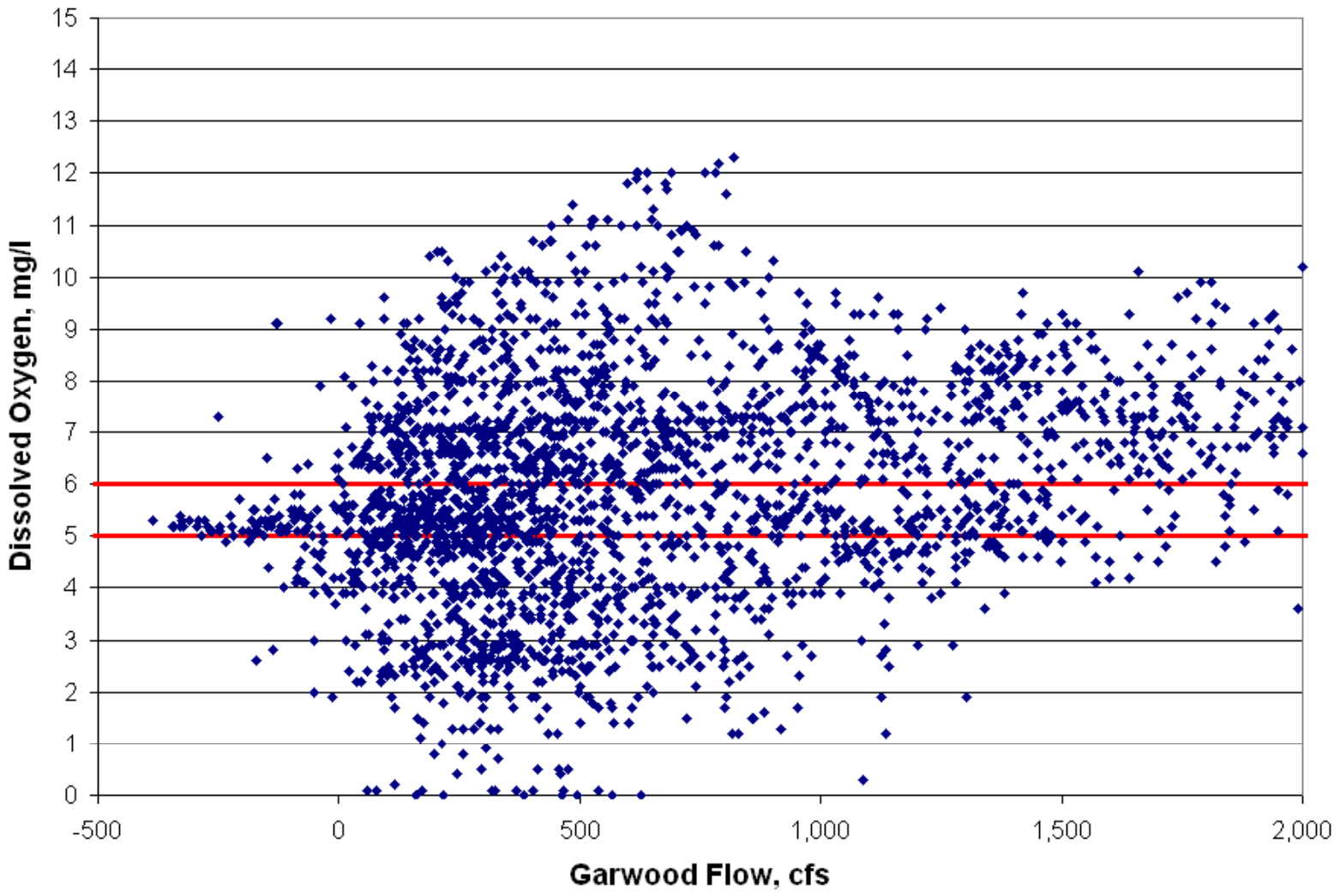
No Aerator vs DO (2009)



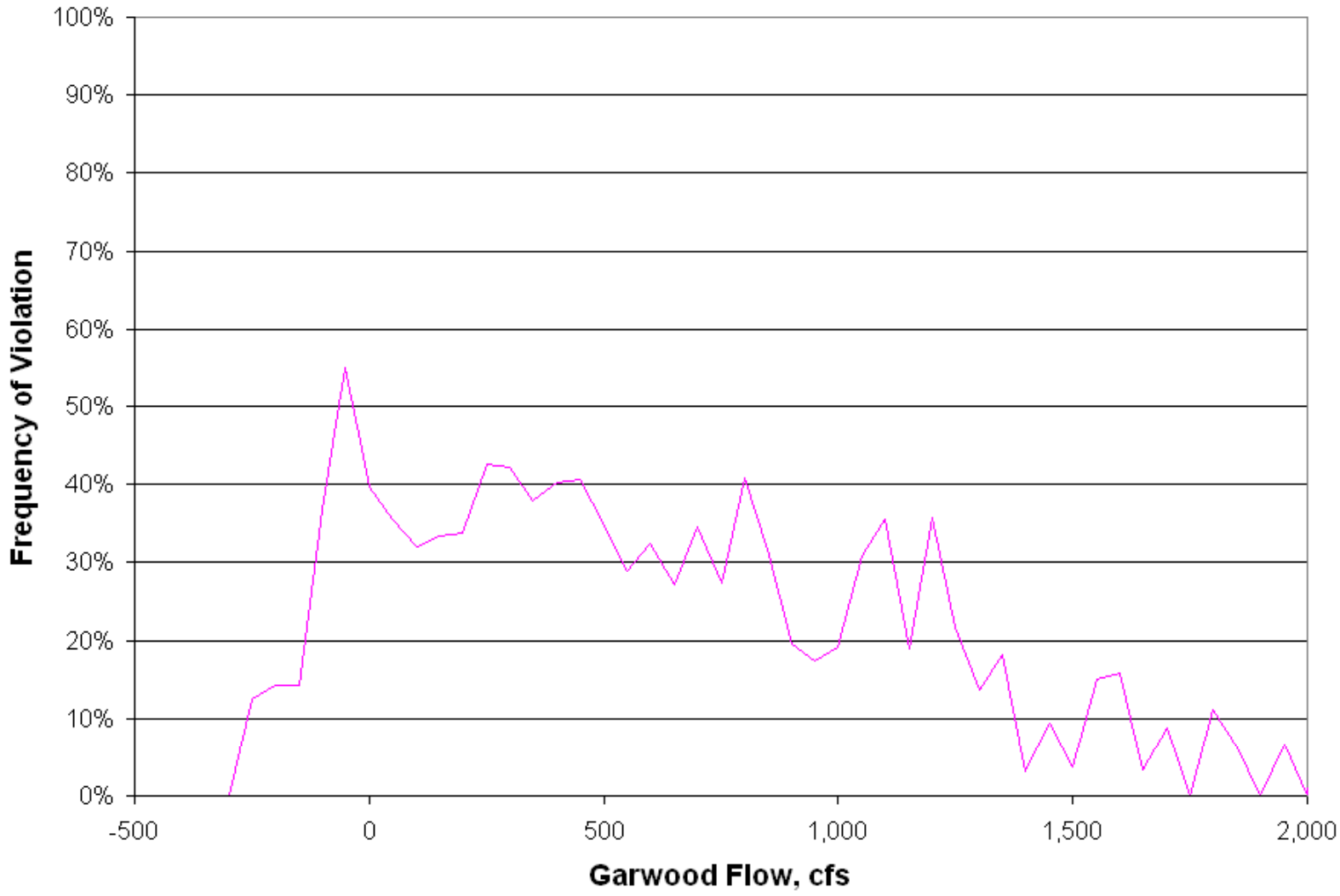
Causes of Low D.O. in DWSC

- Low flow
  - Longer residence time
  - More decay, settling of pollutants
- Loading of organic material from upstream
  - Decay of phytoplankton consumes oxygen
- Local loading
  - City of Stockton WWTP
  - Nonpoint source loading

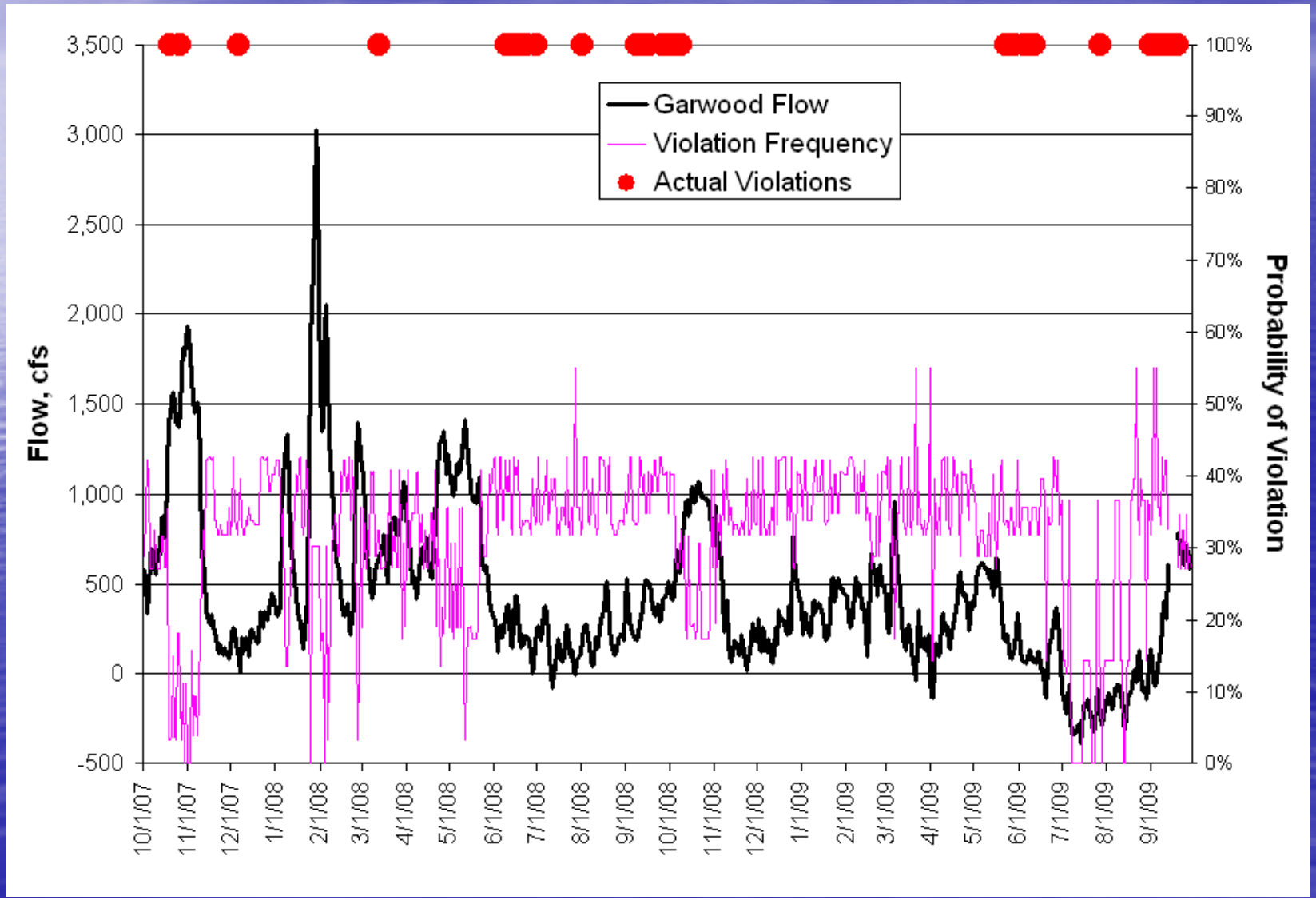
D.O. vs Flow in the DWSC



D.O. Violations vs Flow



Flow in 2008-2009

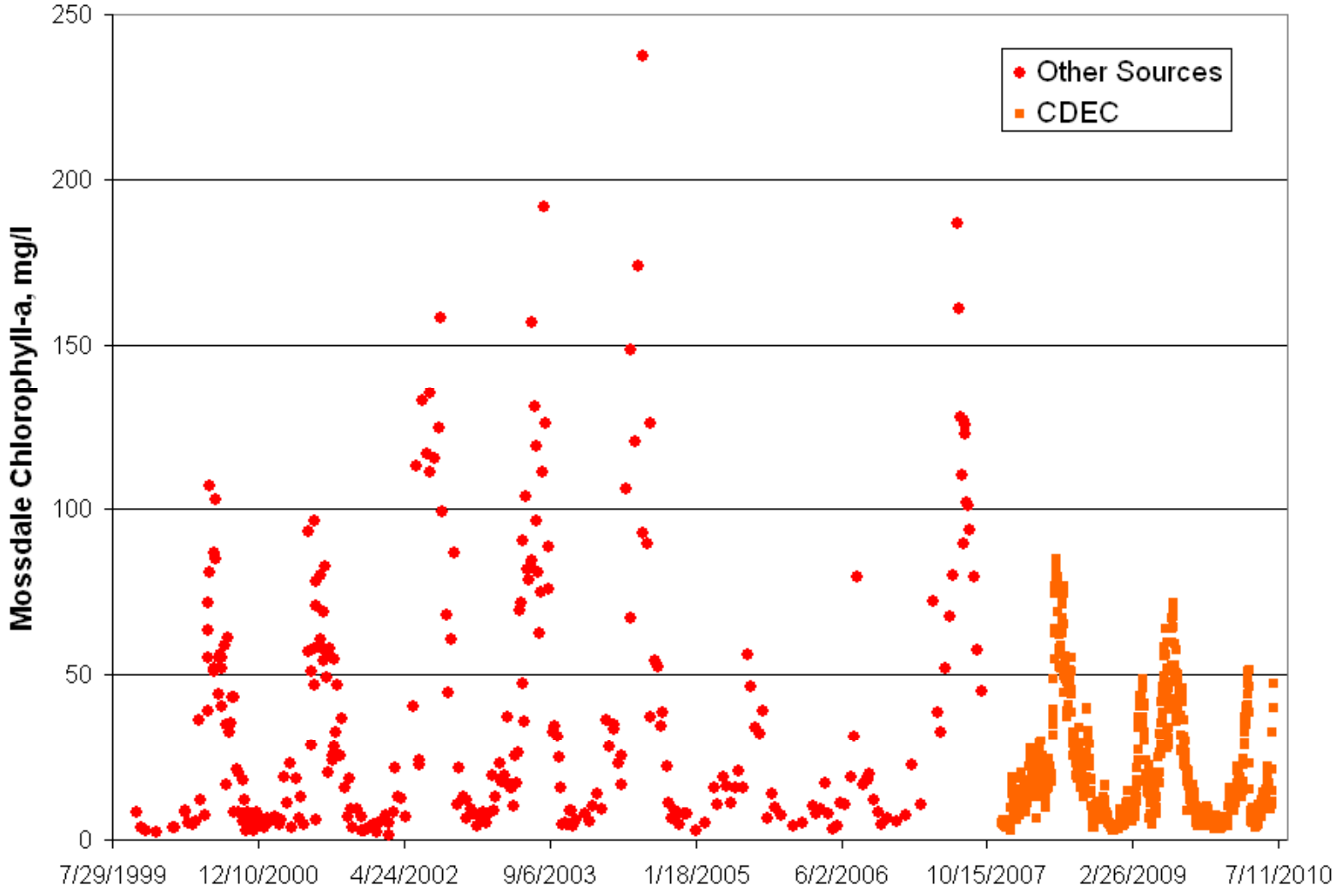


Expected Violations

- Based on historical violations vs flow
  229 violations expected 2008-2009
- Actual
  65 violations happened 2008-2009

- Low violation rate does not appear to be because of flow conditions

Phytoplankton: Mossdale



Conclusion I

- WARMF upgrades help model load from upstream watershed
  - Better for looking at effects of changing land use, irrigation water quality
- Data hasn't been expanded past 2007
  - Not much help for DWSC 2008-present

Conclusion II

- Flow conditions not helpful 2008-2009
  - Violation lower than 2001-2007 based on flow
- Aeration reduced D.O. violations in 2008
  - Not operating in 2009
- Organic loading to DWSC may have been lower from 2008-2009
  - Different data sources, collection techniques

Recommendations

- Analyze Stockton WWTP discharge data
  - Lower ammonia & BOD discharge could explain reduced violations
- Update models
  - Use them to learn what was done right