RECLAMATION

Managing Water in the West

Recirculation Pilot Study
Preliminary Findings
August 19 - 31, 2004

U.S. Department of the Interior
Bureau of Reclamation

Overview

- Project history and overview
- Operations summary
- Water quality monitoring program

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Recirculation Pilot Study
August 19 – 31, 2004

Reclamation and the San Luis and Delta-Mendota Water Authority conducted a 12 day pilot study to measure the changes in flow and water quality in the San Joaquin River (SJR) with the release of up to 300 cfs of water from the Delta-Mendota Canal through the Newman Wasteway to be discharged into the San Joaquin River.

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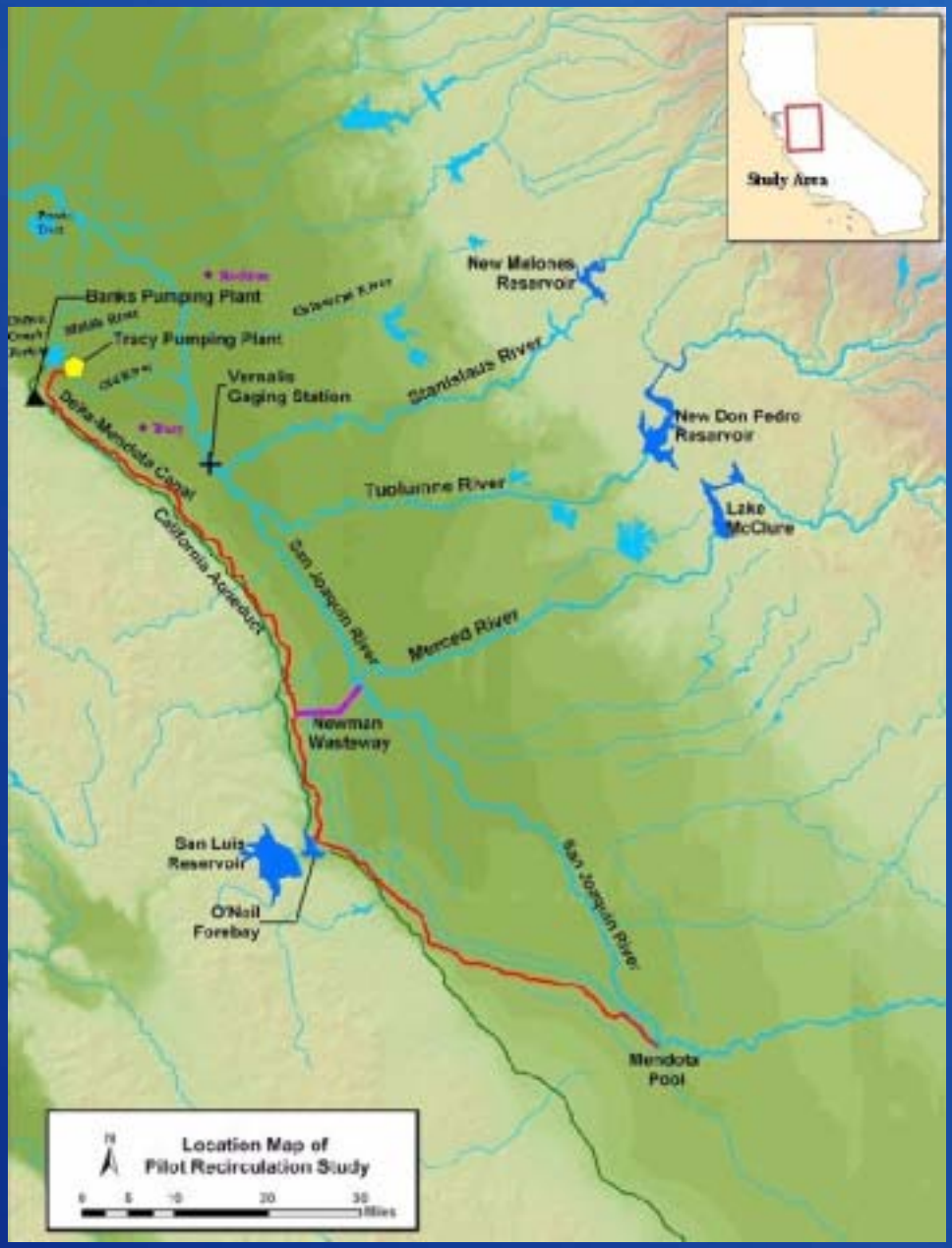

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Recirculation Pilot Study
Preliminary Findings
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- U.S. Bureau of Reclamation (Reclamation)
- U.S. Fish and Wildlife
- U.S. National Marine Fisheries Service
- Department of Water Resources
- Department of Fish and Game
- State Water Resources Control Board (SWRCB)
- Central Valley Regional Water Quality Control Board
- San Luis-Delta Mendota Water Authority
- South Delta Water Agency

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Recirculation Pilot Study

History of the Concept of Recirculation:

- State of California, Resources Agency Report in 1964
- Early Modeling Studies in 1990s
- SWRCB Decision 1641 in 2000
- CALFED ROD in 2000
- DMC Appraisal Study (Phase I) in 2003
- Pilot Recirculation Study in August 2004
- DMC Recirculation Feasibility Study authorized

  Water Supply, Reliability, and Environmental Improvement Act (Public Law 108-361) in October 2004

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Recirculation Pilot Study

Study Objectives:

- Measure changes in water quality in the Newman Wasteway and the SJR from recirculation.
- Monitor the changes in stage, flow, and salinity in the SJR at Vernalis.
- The monitoring data, assessment, findings, and conclusions of the pilot study will be included in the final report to the SWRCB.

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Implementation of Recirculation

- Recirculation Path
- Initial release
- Stabilized release
- End of release
- Operational Challenges
- Project Costs
- Considerations for future recirculation tests

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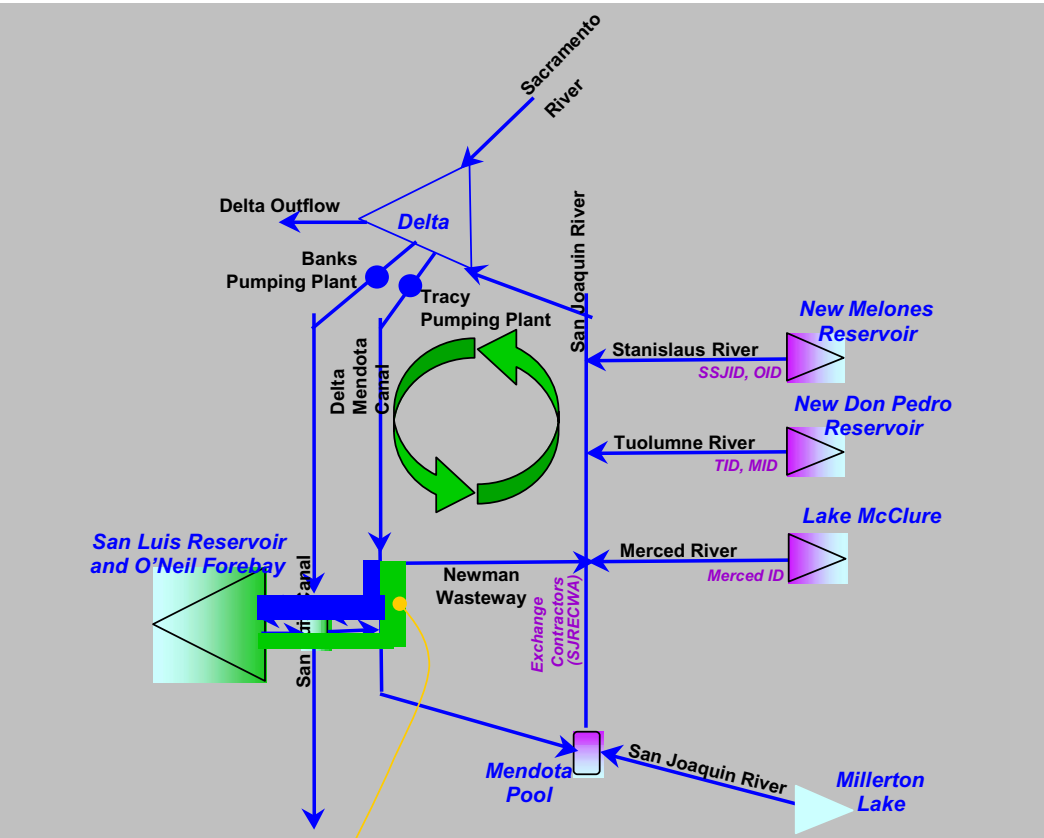
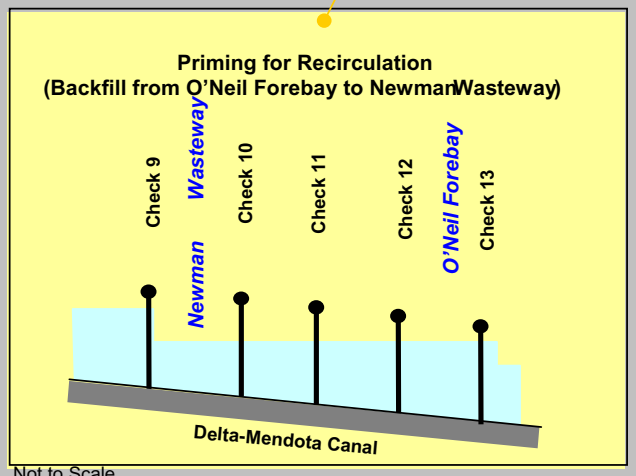
Recirculation Path

- Water pumped from Tracy Pumping Plant into DMC, displaced project water is pumped through JPOD at Banks Pumping Plant
- Water released from DMC into Newman Wasteway
- Water flows down Newman Wasteway into the San Joaquin River above Merced River Confluence
- Water travels down SJR to Delta where it is pumped back into the DMC





Not to Scale

LEGEND

- Major Storage/Facility for Recirculation
- Major Storage/Facility with VAMP Flow Responsibility
- Major Storage/Facility without VAMP Responsibility
- Major Waterway with Flow Direction
- Direction of San Luis Priming Flow
- Direction of Recirculation Flow
- Direction of Recirculation Return Flow

Initial Release

- Initial release ramped up from 0 to 300 cfs over a 5 hour period
- Response at outlet into SJR took about 12 hours.

Initial release of 25 cfs of water into the Newman Wasteway

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Newman Wasteway @ 300 cfs

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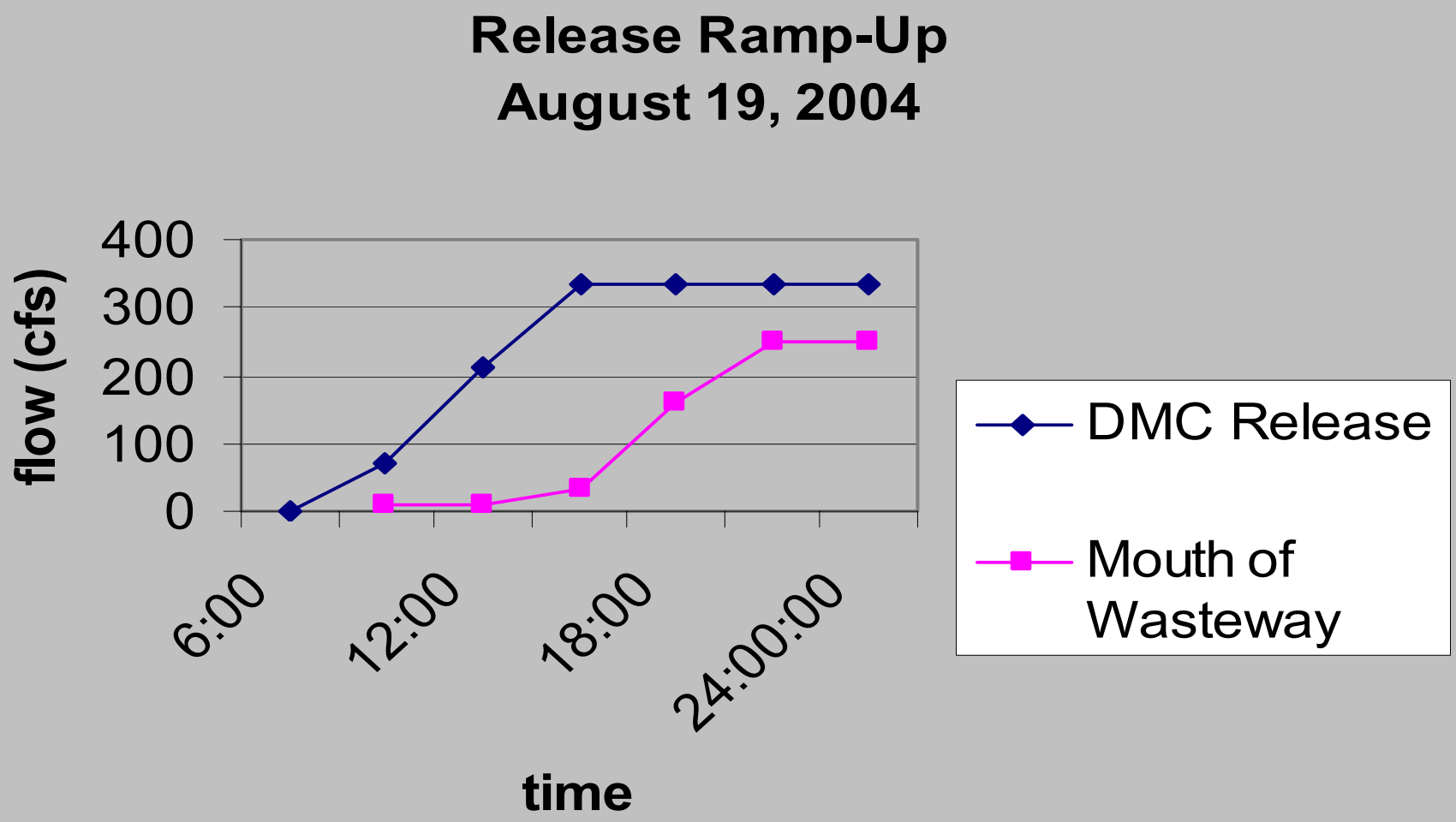
Initial Newman Wasteway Release



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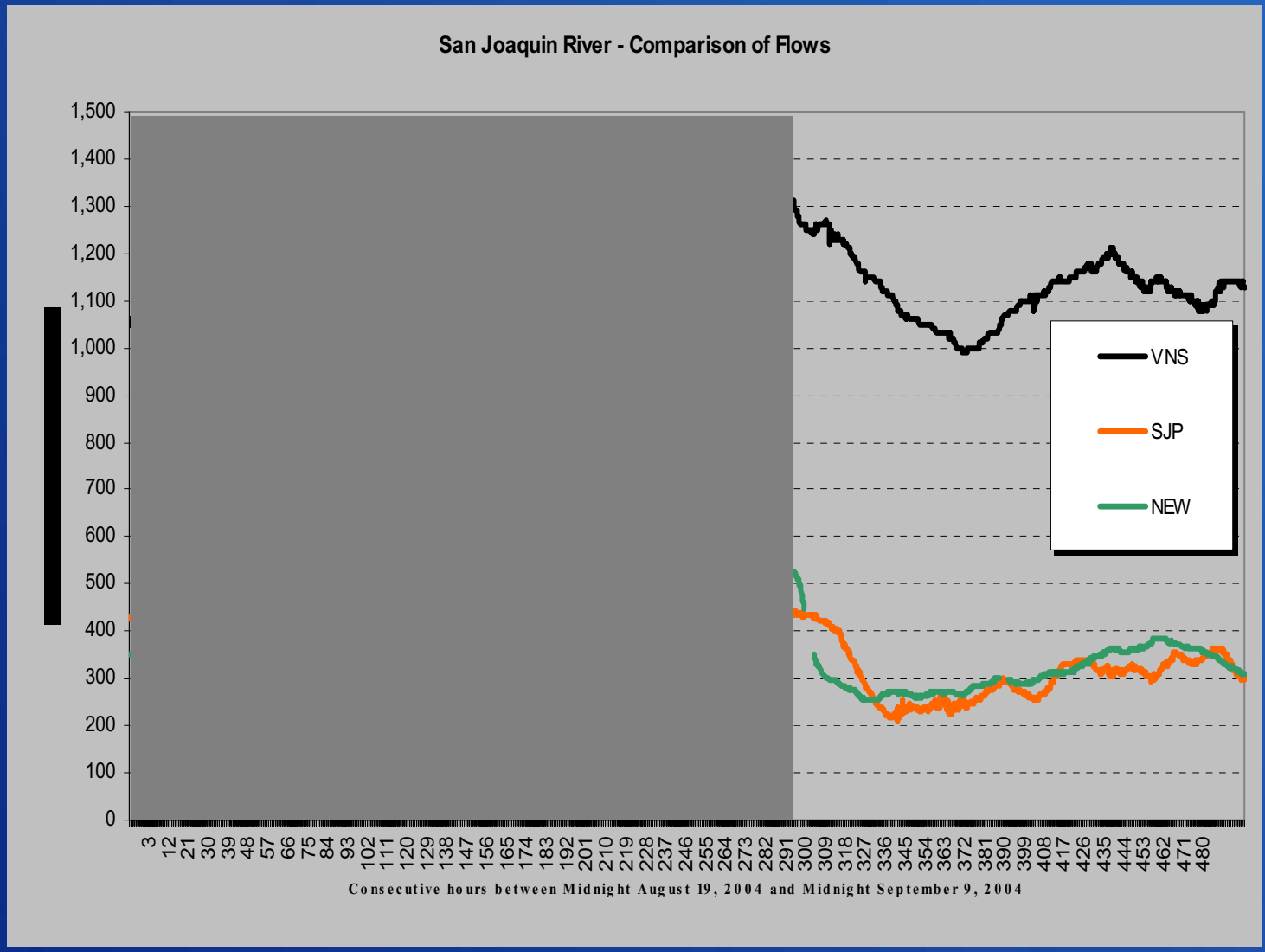
Stabilized Release

- Flows into the SJR were stabilized after 24 hrs
- Flow response at Vernalis was seen beginning at 2 days, full response at 3 days
- Average flow increase at Vernalis ranged between 200 and 250 cfs

San Joaquin River Flows



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Newman Wasteway at the SJR

August 18, 2004

August 30, 2004

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SJR at Hills Ferry (downstream of Newman Wasteway)

August 19, 2004

August 30, 2004

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Conclusion of Pilot Study

- The release to the Newman Wasteway was discontinued at 0900 on August 31, 2004
- Newman Wasteway flow continued into the SJR for approximately 2 days

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Operational Challenges

- Turbidity control
- Obstructions in wasteway (beaver dams)
- Coordination with local irrigators
- Operational impacts from incremental impacts due to increased exports (Fishery, Water Quality, and Water Level response plans)
- Export capacity availability

July 21, 2004 - Newman Wasteway Milepost 7.5

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Aug. 30, 2004 - Newman Wasteway Milepost 7.5

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Sept. 3, 2004 - Newman Wasteway Milepost 7.5

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Project Costs

- Water Cost – difficult to measure due to lack of information on inflows to SJR, but estimated to be minimal
- Power Cost – recirculation was performed using project power, incremental increase in power used due to JPOD of displaced project water
- Conveyance Cost – wheeling cost for water conveyed through California Aqueduct
- Monitoring Cost

Considerations for Future Tests of Recirculation

- Longer duration to get better estimate of stream losses
- Make sure gaging infrastructure is in place to allow estimate of losses
- Consistent flow rate as much as feasible
- Turbidity control
- Fishery concerns

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Water Quality Monitoring Plan

- Objectives
- Sampling Plan
- Field Measurements
- Toxicity Results
- Inorganic Results
- Metals Results
- Organic Results
- Future studies

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Objectives of the Monitoring Plan

- Measure changes in the water quality at the confluence with SJR
  - Mobilization of sediment
  - Unknown contaminates
  - Unknown toxicity
  - Impacts to selenium, salinity, and DO
- Present findings to the SWRCB

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Sampling Plan

- Test parameters – multi-agency
  - electrical conductivity, *E. Coli*, nutrients, dissolved oxygen, turbidity, metals, pesticides, acute toxicity etc.
- QAPP developed and implemented
- Samples collected at four locations
- Composite samples were collected during the first 18 hours – capture of the “initial flush”
- Grab samples were collected every six hours during the second and third days, then once a week.

Water Quality Monitoring Sites

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DMC - top of the Newman Wasteway

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Bottom of the Newman Wasteway

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SJR upstream of the Newman Wasteway

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SJR downstream (Hills Ferry)

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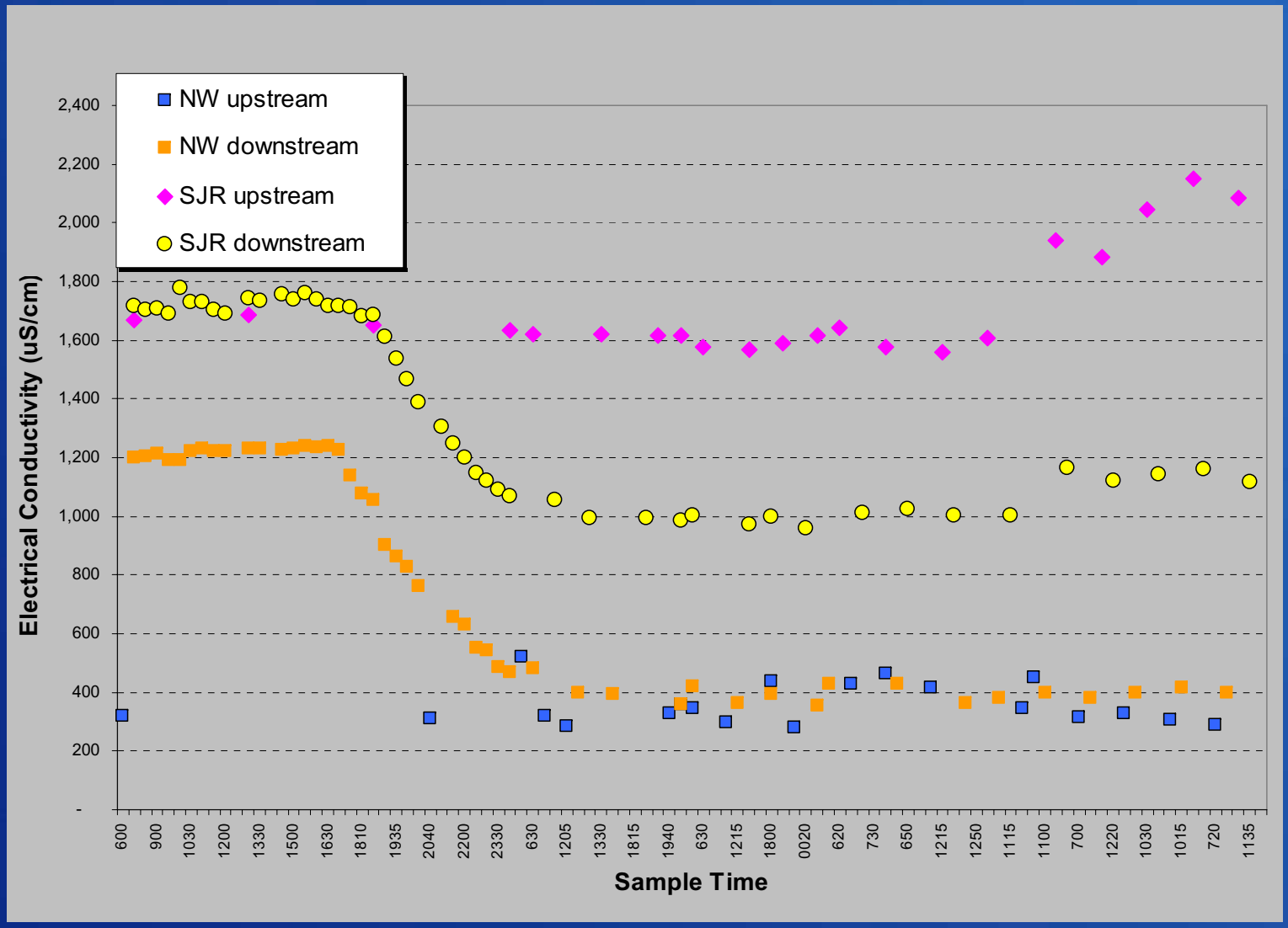
Electrical Conductivity



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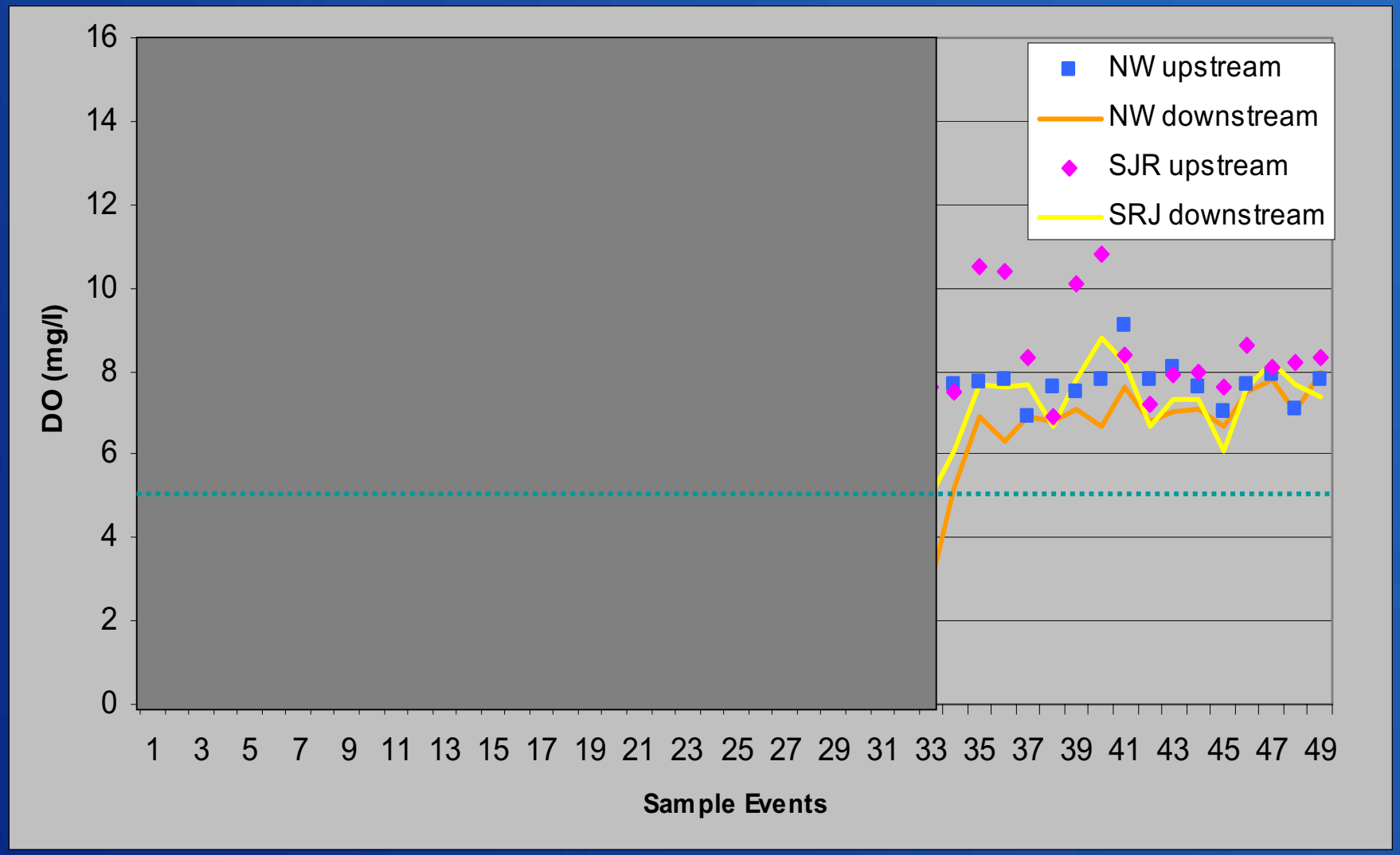
Dissolved Oxygen



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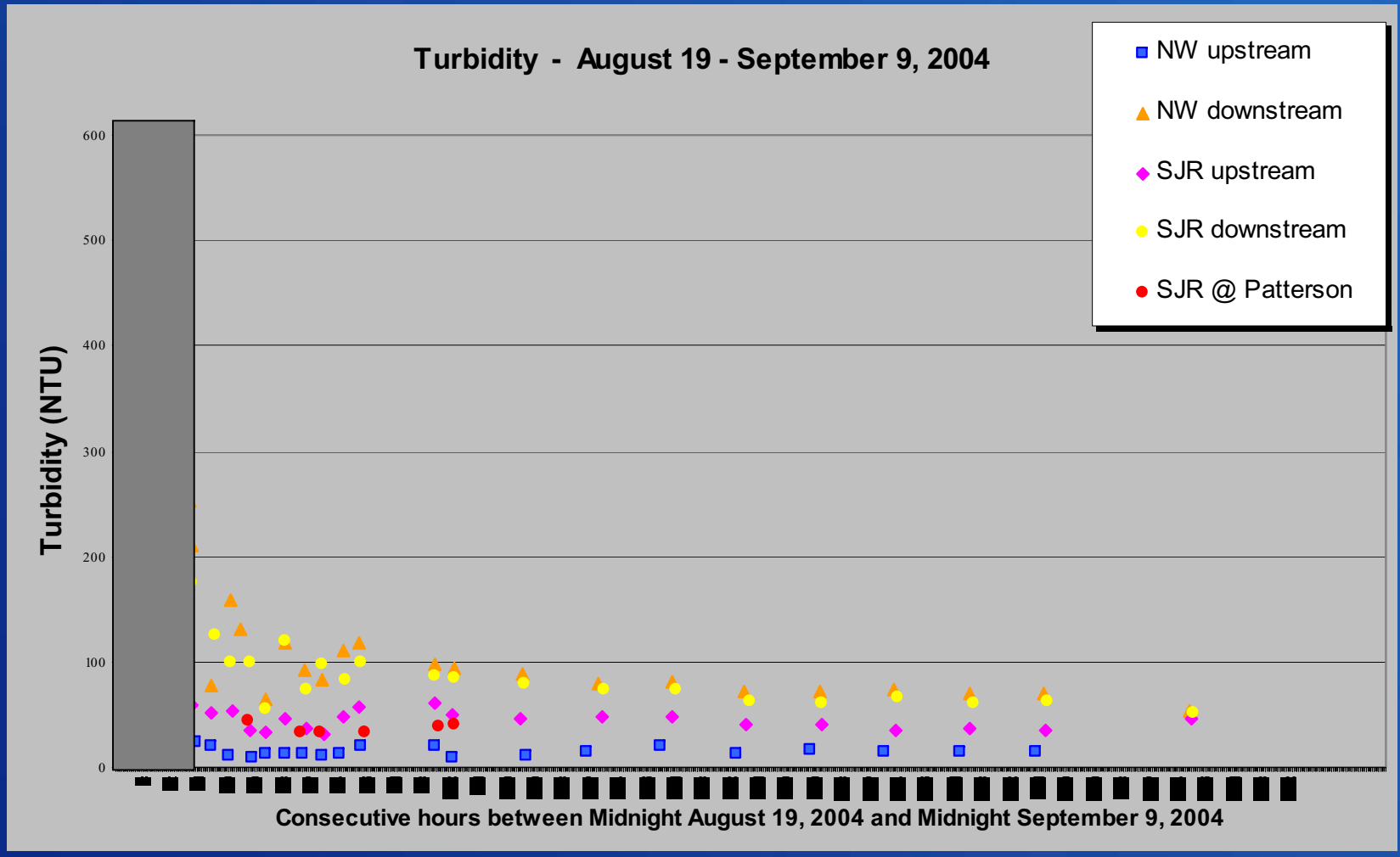
Turbidity



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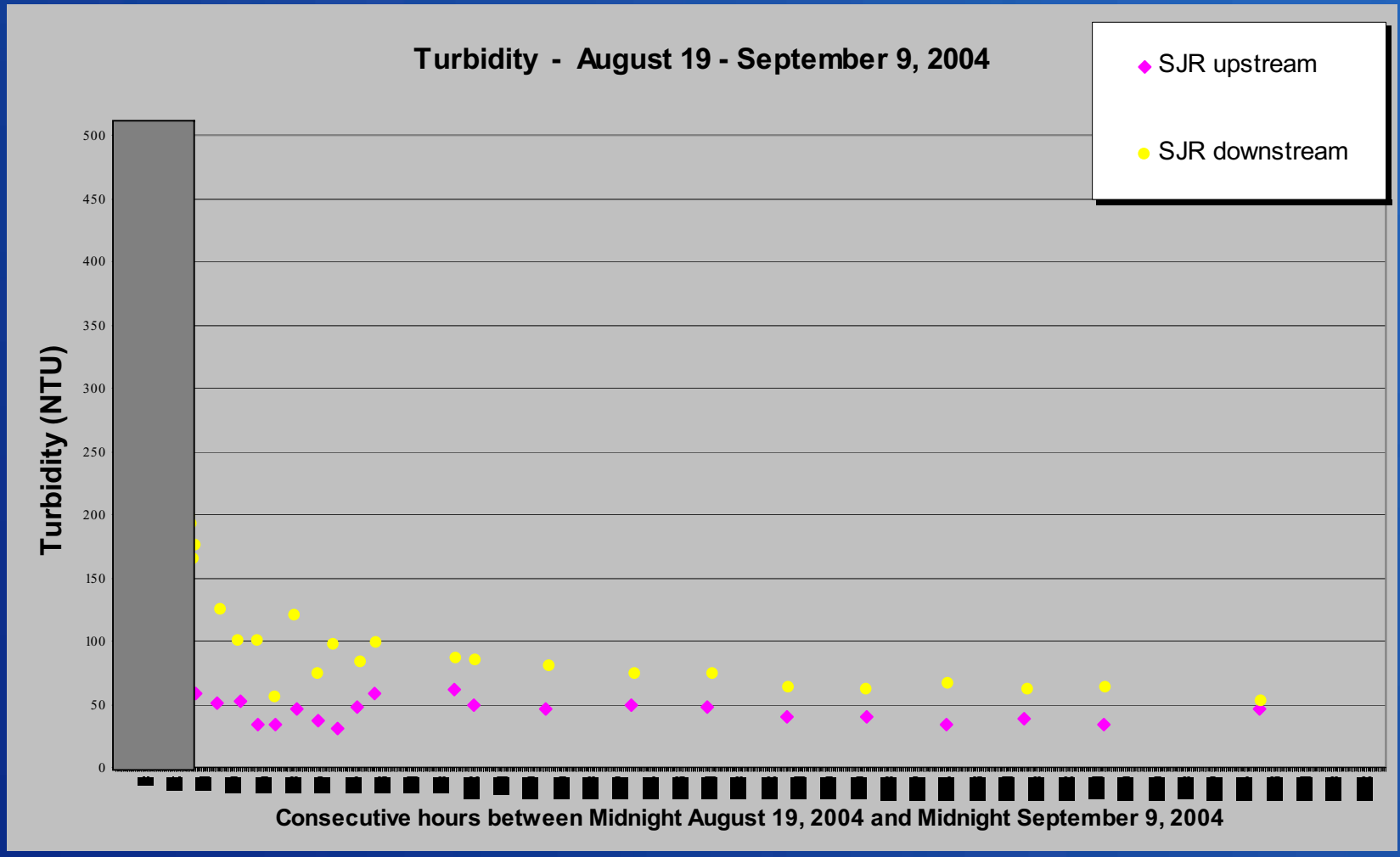
Turbidity



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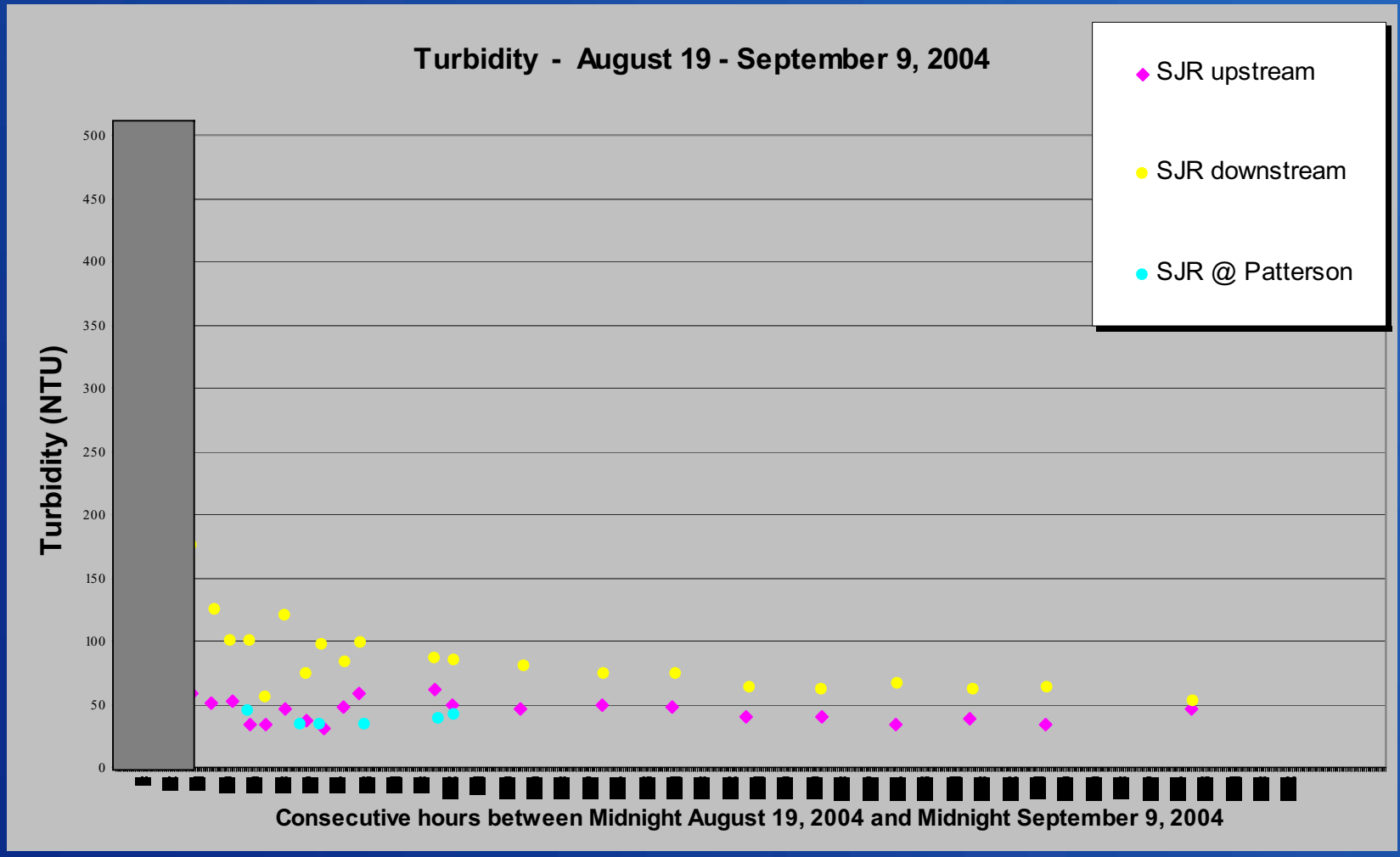
Turbidity



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Acute Toxicity

96-hour Percent Survival - Control

Static Percent Survival Aquatic Acute Definitive Test Results						
Site Name	Date	Time	Flow	Dilution (%)	P. promelas	C. dubia
NW Downstream	08/19/2004	06:00	0 CFS	6.25	100	90
				12.5	100	100
				25	100	100
				50	100	80
				100	100	70
SJR Downstream	08/19/2004	06:30		6.25	100	100
				12.5	100	100
				25	100	90
				50	95	90
				100	100	90

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Acute Toxicity

96-hour Percent Survival - 100 to 200 CFS

Static Percent Survival Aquatic Acute Definitive Test Results						
Site Name	Date	Time	Flow	Dilution (%)	P. promelas	C. dubia
NW Downstream	08/19/2004	18:10	100 – 200 CFS	6.25	100	100
				12.5	100	100
				25	100	100
				50	100	100
				100	100	90
SJR Downstream	08/19/2004	18:30		6.25	100	100
				12.5	100	100
				25	100	100
				50	95	100
				100	100	90

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Acute Toxicity

96-hour Percent Survival - 250 CFS

Static Percent Survival Aquatic Acute Definitive Test Results						
Site Name	Date	Time	Flow	Dilution (%)	P. promelas	C. dubia
NW Downstream	08/19/2004	24:00	~250 CFS @22:30	6.25	95	100
				12.5	100	100
				25	100	100
				50	95	90
				100	95	80
SJR Downstream	08/20/2004	00:30		6.25	100	100
				12.5	100	90
				25	100	100
				50	95	100
				100	100	100

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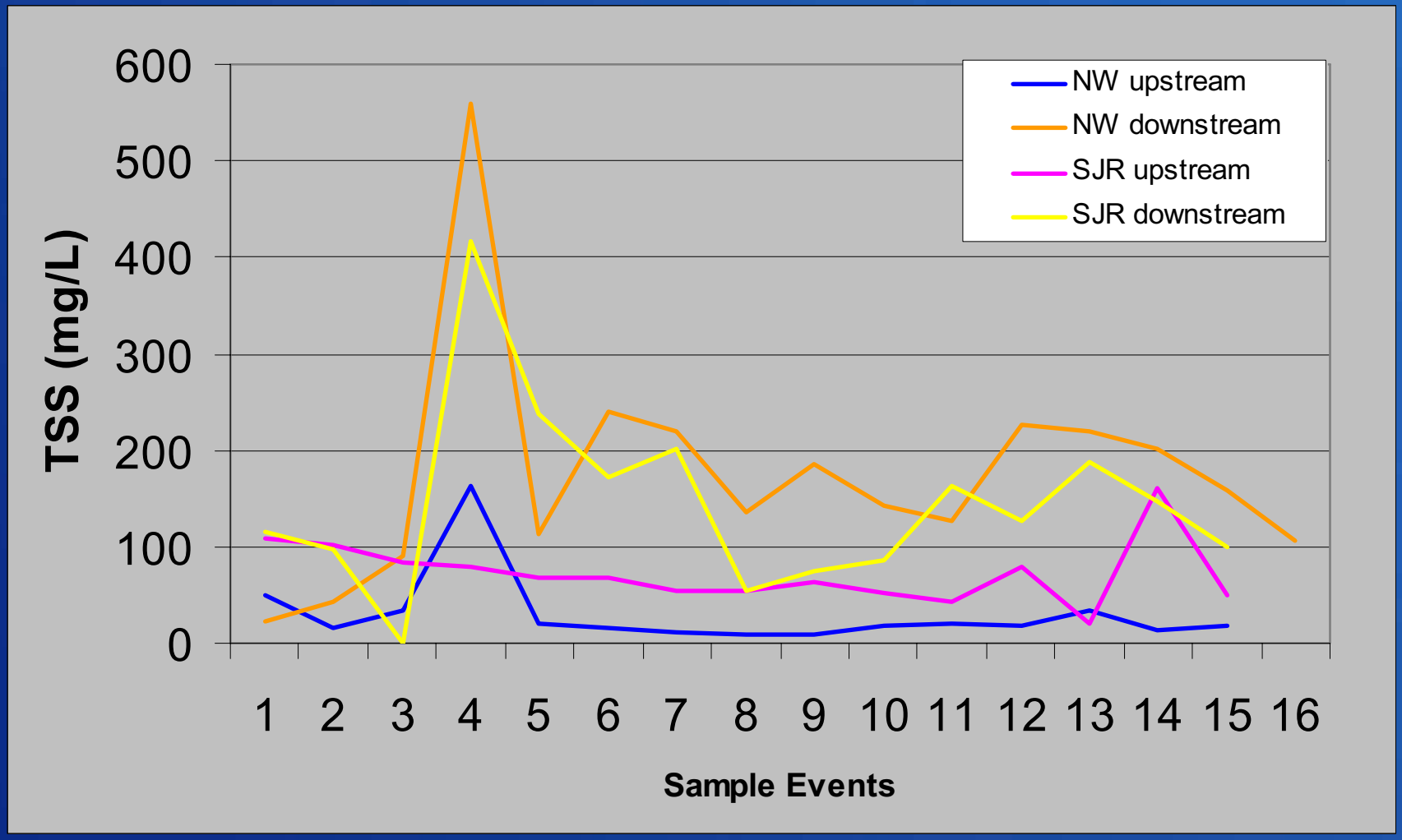
TSS



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BOD, NO_3 + NO_2 as N, Ortho P as P

Average values in the San Joaquin River during the pilot study

	Upstream	Downstream
BOD	6	4.5
NO3+NO2 as N	1.7	1.2
Ortho P as P	0.35	0.22

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Metals

Test Parameters included:

Al, Sb, As, Be, Cd, Cr III, Se, Cu, Pb, Hg, Ni, Ag, Tl, Zn

Analytical Results:

All parameters were below regulatory standards or criteria used for evaluation.

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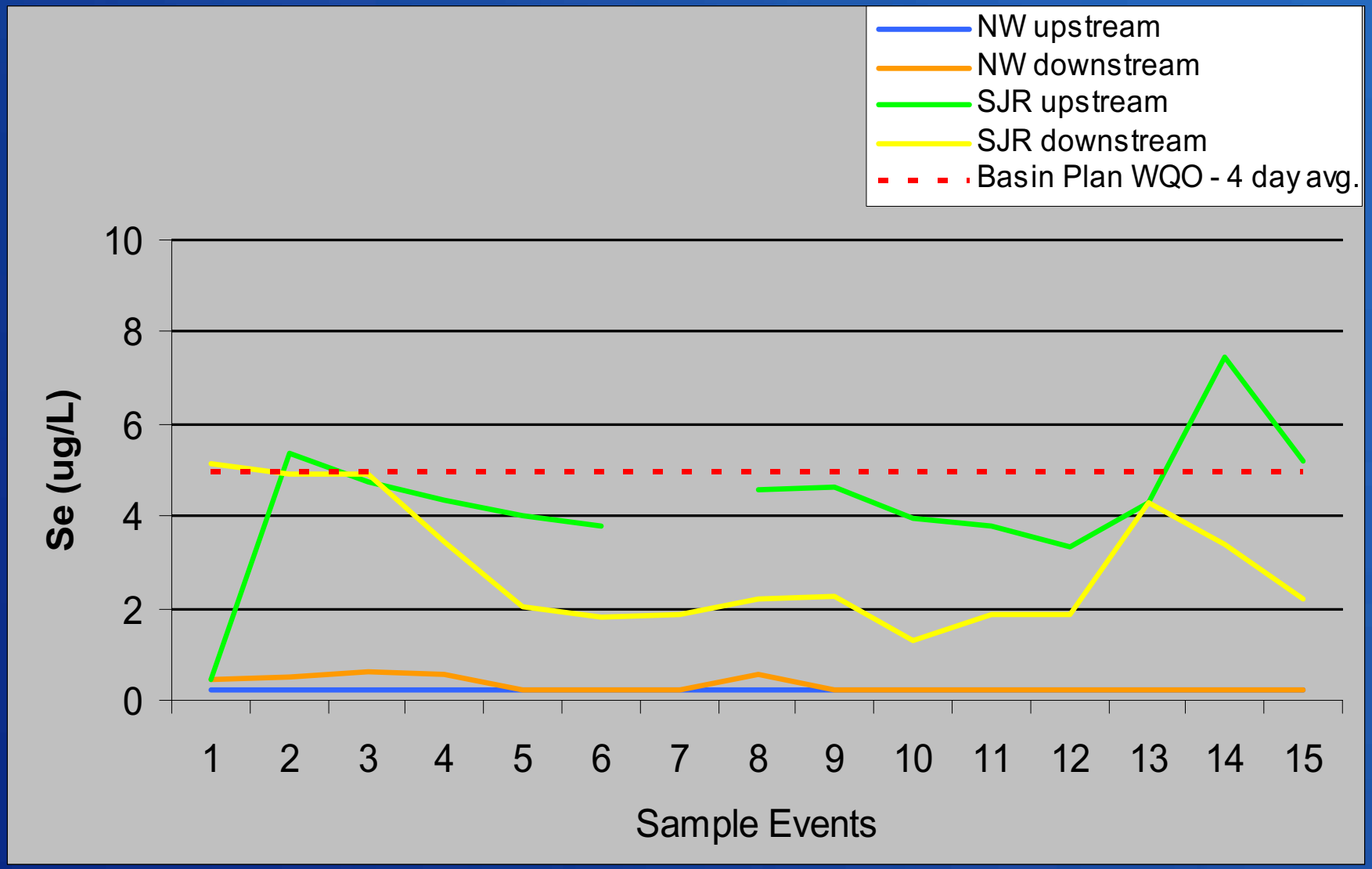
Selenium



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Organics

Analyses Included:

- Organo-chlorine Pesticides
- Herbicides
- Organo-phosphate and Triazine Pesticides
- Carbamates

Organics

Analytical results:

- 2,4-D detected in 1 sample at 0.23 ug/l
  - (SJR-D only; MCL 70 ug/l)
- DCPA (Dacthal) detected in 3 sample
  - (NW_D only; range 0.24 - 0.38 ug/l; lifetime health advisory 70 ug/l; RL=0.20ug/l)
- Metolachlor detected in all samples
  - (high value of 0.45 ug/l; EPA human health 44.0 ug/l)

Summary

Answers and Questions

- Mobilization of sediment
- Unknown contaminates
- Unknown toxicity
- Impacts to selenium, salinity, and DO

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San Joaquin River Recirculation Pilot Study

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