Up-Date on the Up-Stream DO TMDL Project ERP-02D-P63

William Stringfellow
Chief Principal Investigator

Director
Environmental Engineering Research Program
School of Engineering & Computer Science
University of the Pacific

UNIVERSITY OF THE PACIFIC
Environmental Engineering Research Program

Project Participants

- **Local & Regional**
  - **SJ Valley Drainage Authority, SJ River Group Authority, University of the Pacific, Jones & Stokes, Systech**
- **Federal**
  - **Berkeley National Laboratory, US Geological Survey**
- **State**
  - **UC Davis, Department of Water Resources, Fresno State, UC Berkeley**

UNIVERSITY OF THE PACIFIC
Environmental Engineering Research Program

Project Objectives

- Provide a comprehensive understanding of the sources and fate of oxygen demand in the watershed
- Provide a comprehensive understanding of the growth and decay of algae in the San Joaquin River
- Provide a comprehensive understanding of the sources and fate of nutrients in the watershed

UNIVERSITY OF THE PACIFIC
Environmental Engineering Research Program

Project Tasks

- Establish a comprehensive monitoring and data gathering program
  - Task 4, 5, 8, & 10
- Develop comprehensive model for nutrients and algae in the SJR
  - Tasks 6 & 11
- Close data gaps using directed scientific studies
  - Task 4, 7,8, & 9

UNIVERSITY OF THE PACIFIC
Environmental Engineering Research Program

Monitoring & Data Gathering

- Water quality data collection
- Flow data collection
- QA program & data analysis
- Up-grade existing stations
- Establish station between Mossdale & DWSC

UNIVERSITY OF THE PACIFIC
Environmental Engineering Research Program

Modeling & Data Transfer

- Create SJR model that better represents the conditions of the SJR upstream of the DWSC
- Develop “user-interface” for SJR model
- Calibrate the model against the information collected in the monitoring & data gathering programs
- Data system for transfer between collection, modeling, and SWAMP database

UNIVERSITY OF THE PACIFIC
Environmental Engineering Research Program

Directed Scientific Studies

- **Longitudinal studies to establish sub-watershed sources of nutrients and oxygen demand**
- **Continuous monitoring to understand diurnal signal and measurement variability**
- **Stable isotope studies to differentiate sources of nutrients and carbon**

UNIVERSITY OF THE PACIFIC
Environmental Engineering Research Program

Directed Scientific Studies

- Flow-unit (dye) studies to determine gains and losses of nutrients and algae in the critical tidal reach between Mossdale and Channel Point
- Algal ecology studies examining zooplankton impacts on algal growth
- Development of rapid techniques for algal assessment

UNIVERSITY OF THE PACIFIC
Environmental Engineering Research Program

Monitoring & Data Gathering

- **Accomplishments**
  - Established "Core" & "Intermittent" grab sampling program
  - Establishment of flow & EC monitoring stations
  - Identification of two candidate locations for new station in tidal reach above DWSC
- **Challenges**
  - Equipment failures for Hydrolab sondes
  - High flows

UNIVERSITY OF THE PACIFIC
Environmental Engineering Research Program

Grab Sampling Program

- 20 Core stations SJR & tributaries
  - Same as listed in Table B-1
- All sites sampled in same day
- Includes all Dahlgren & USGS sites from previous study
- 472 samples collected this year
- > 90% QA score

UNIVERSITY OF THE PACIFIC
Environmental Engineering Research Program

Measurements - Grab Sample

- Chlorophyll
- BOD_{10}
- CBOD
- NBOD
- TOC/DOC
- Ammonia nitrogen
- Nitrate nitrogen
- Total nitrogen
- o-Phosphate
- Total phosphate
- Total iron
- Total suspended solids
- Volatile suspended solids
- Alkalinity
- pH
- Turbidity (NTU)
- Incident light
- Dissolved oxygen
- Specific conductivity
- Temperature
- Algae cell counts
- Stable isotopes
- Lipids

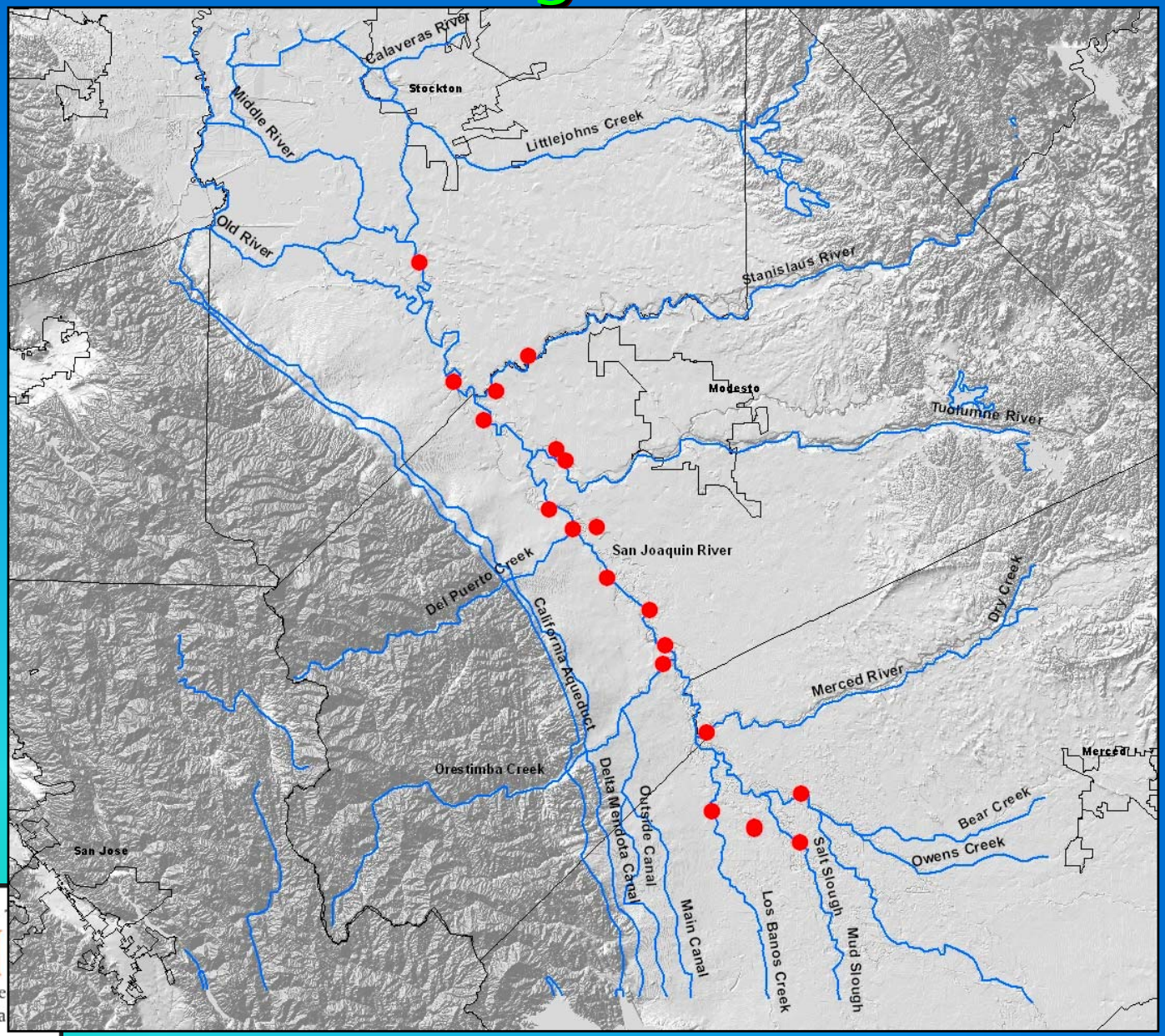
UNIVERSITY OF THE PACIFIC
Environmental Engineering Research Program

Core Grab Sample Stations

- Los Banos Creek at Highway 140
- Mud Slough near Gustine
- San Luis Drain End
- Salt Slough at Lander Avenue
- SJR at Lander Avenue
- Merced River at River Road
- Orestimba Creek at River Road
- SJR at Crows Landing
- Turlock ID Harding Drain
- SJR at Patterson
- Del Puerto Creek Flow Station
- SJR Laird Park
- Turlock ID Westport Drain Flow Station
- Tuolumne River at Shiloh Bridge
- Modesto ID Lateral 5 to Tuolumne
- Modesto ID Miller Lake
- SJR at Maze
- SJR at Vernalis
- Stanislaus River at Caswell Park
- SJR at Mossdale

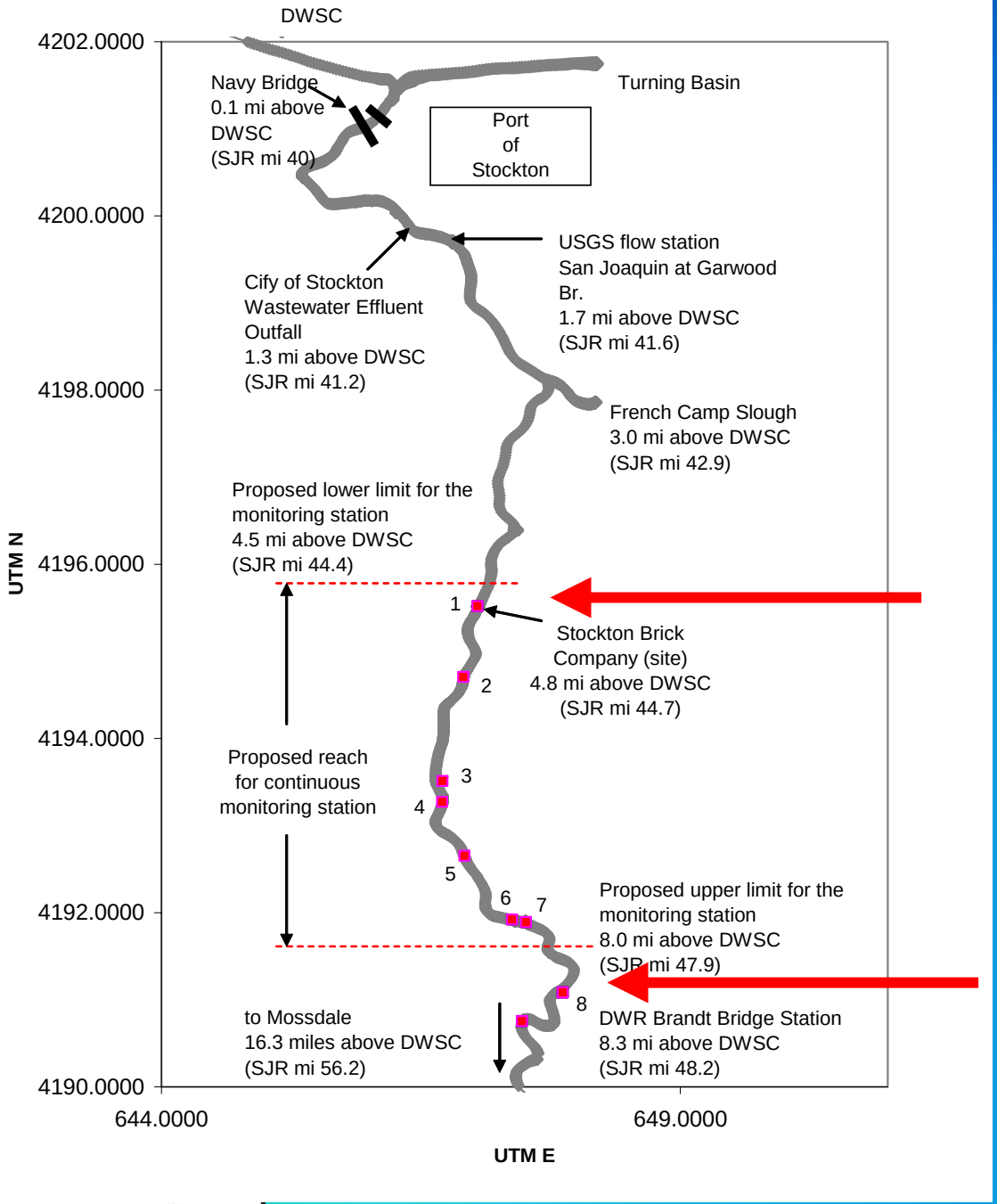
UNIVERSITY OF THE PACIFIC
Environmental Engineering Research Program

Core Program Sites



UNIVERSITY OF
PACIFI
Environmental Engine
Research Progra

New Tidal Zone Flow Station



Stockton Brick Company

DWR Brandt Bridge Station

Modeling & Data Handling

- Major accomplishments
  - Model user interface completed
  - Data Atlas up-dated includes new tributary information
- Challenges
  - DSM-2 model has proven unwieldy for biological modeling, difficult to use for non-expert
  - WARMF (EPA watershed) model as alternative

UNIVERSITY OF THE PACIFIC
Environmental Engineering Research Program

Directed Scientific Studies

- Major accomplishments
  - Four flow-unit (dye-chase) studies in tidal reach
  - Started measurement of grazing impact on algal growth
  - Stable isotope studies initiated
  - Initiated statistical study of WQ on secondary tributaries
  - Initiated longitudinal studies of individual watersheds

UNIVERSITY OF THE PACIFIC
Environmental Engineering Research Program

Revised Project Schedule

- Project end date
  - June 2008
- Interim research & monitoring reports
  - March of 2006, 2007
- Interim modeling reports
  - September 2006, 2007
- Final report
  - Draft final March 2008
  - Final May 2008

UNIVERSITY OF THE PACIFIC
Environmental Engineering Research Program