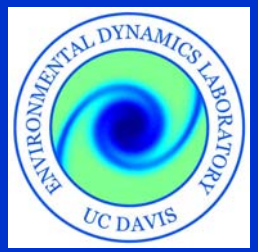
Hydrodynamic and Oxygen Modeling of the Stockton Deep Water Ship Channel ERP–02D–P51



Civil & Environmental Engineering

UC DAVIS

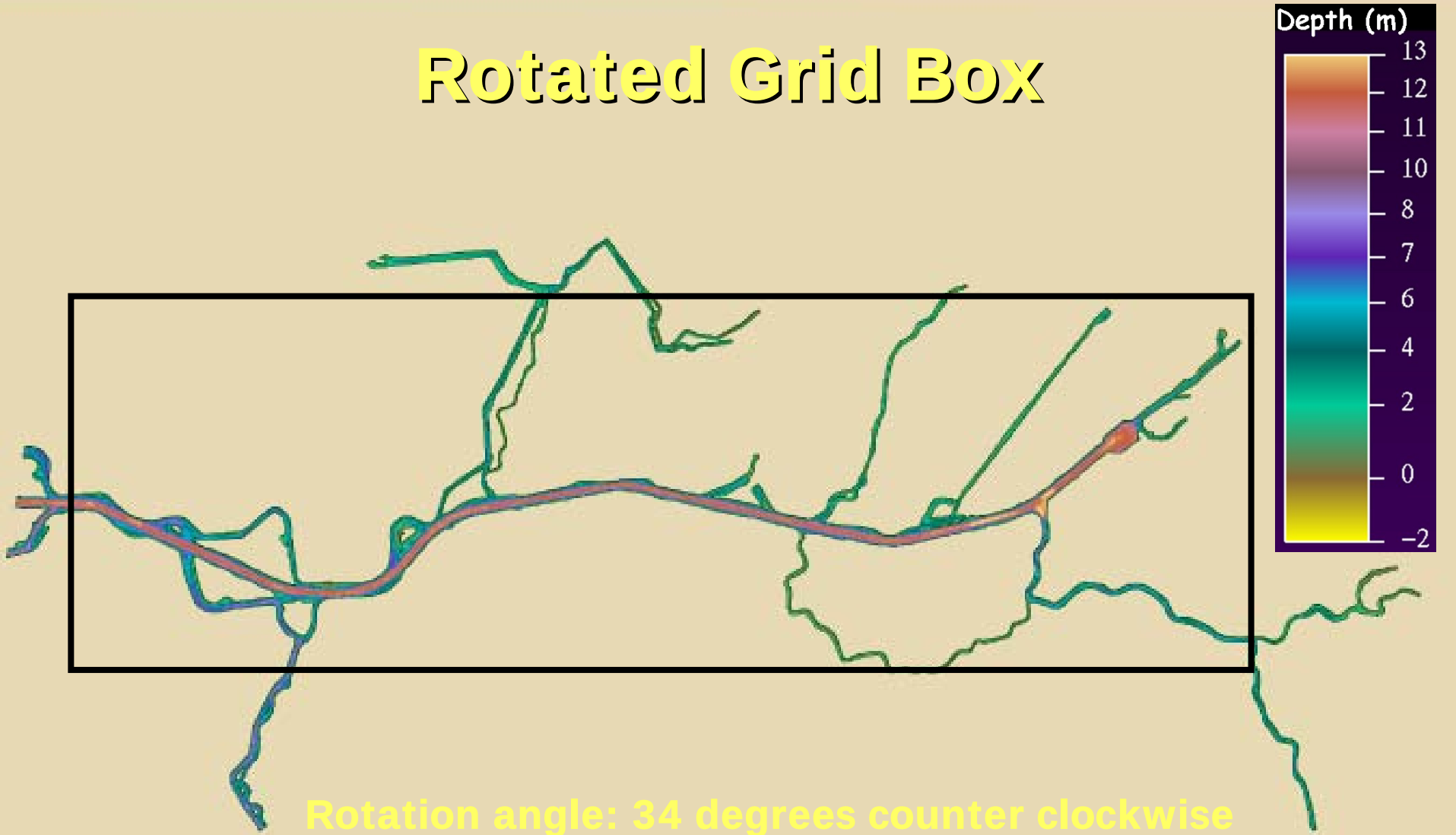
Semi-implicit 3D (Si3D) Model

Developed by USGS (Pete Smith) as part of the Interagency Ecological Program for San Francisco Bay/Delta

Support provided by:

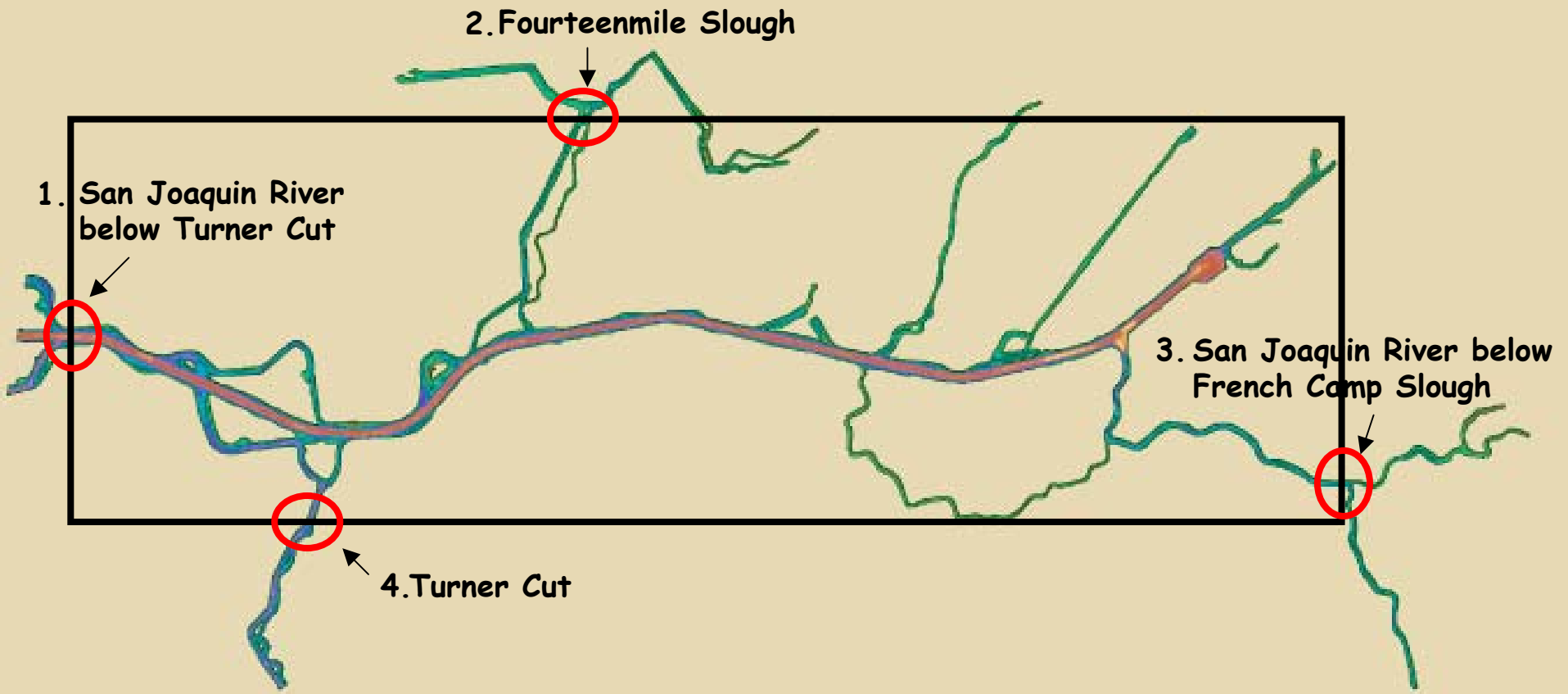
- **U.S. Geological Survey**
- **CA Dept. of Water Resources**
- **U.S. Bureau of Reclamation**

Rotated Grid Box

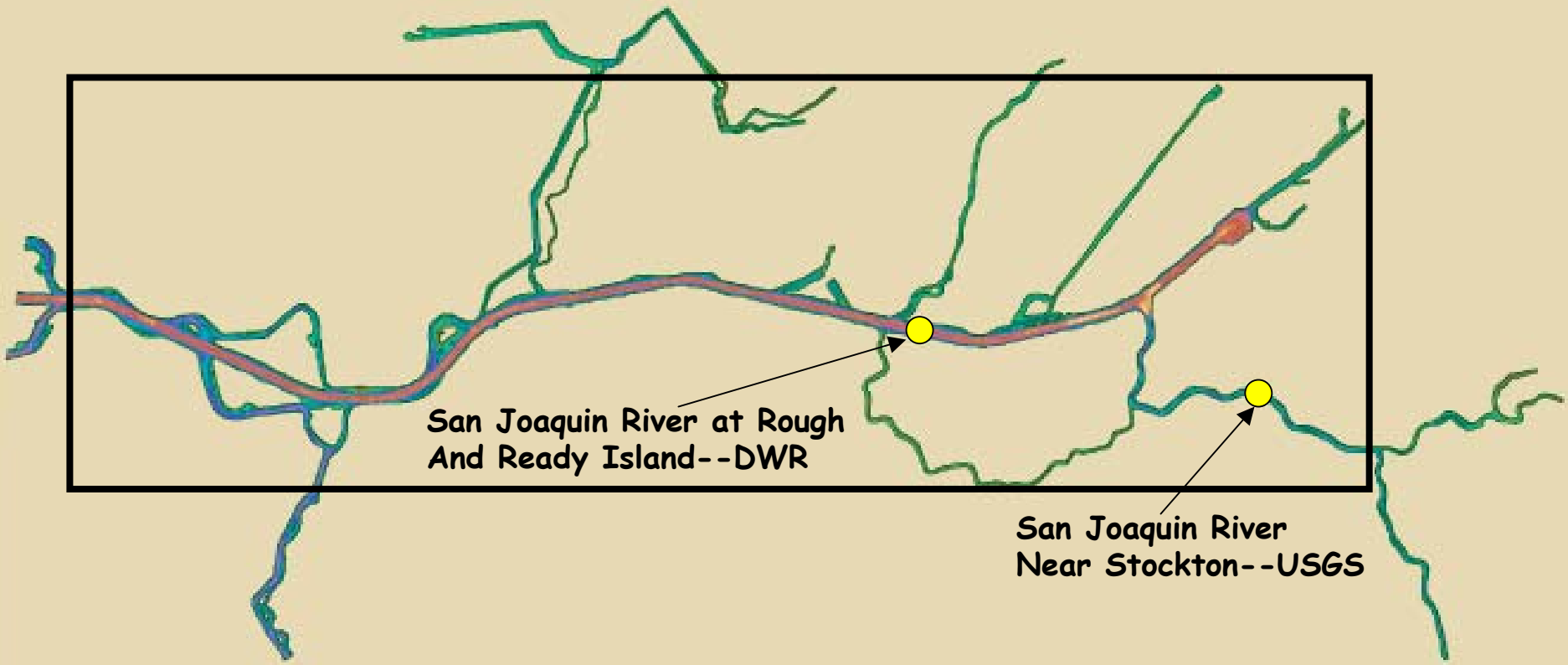


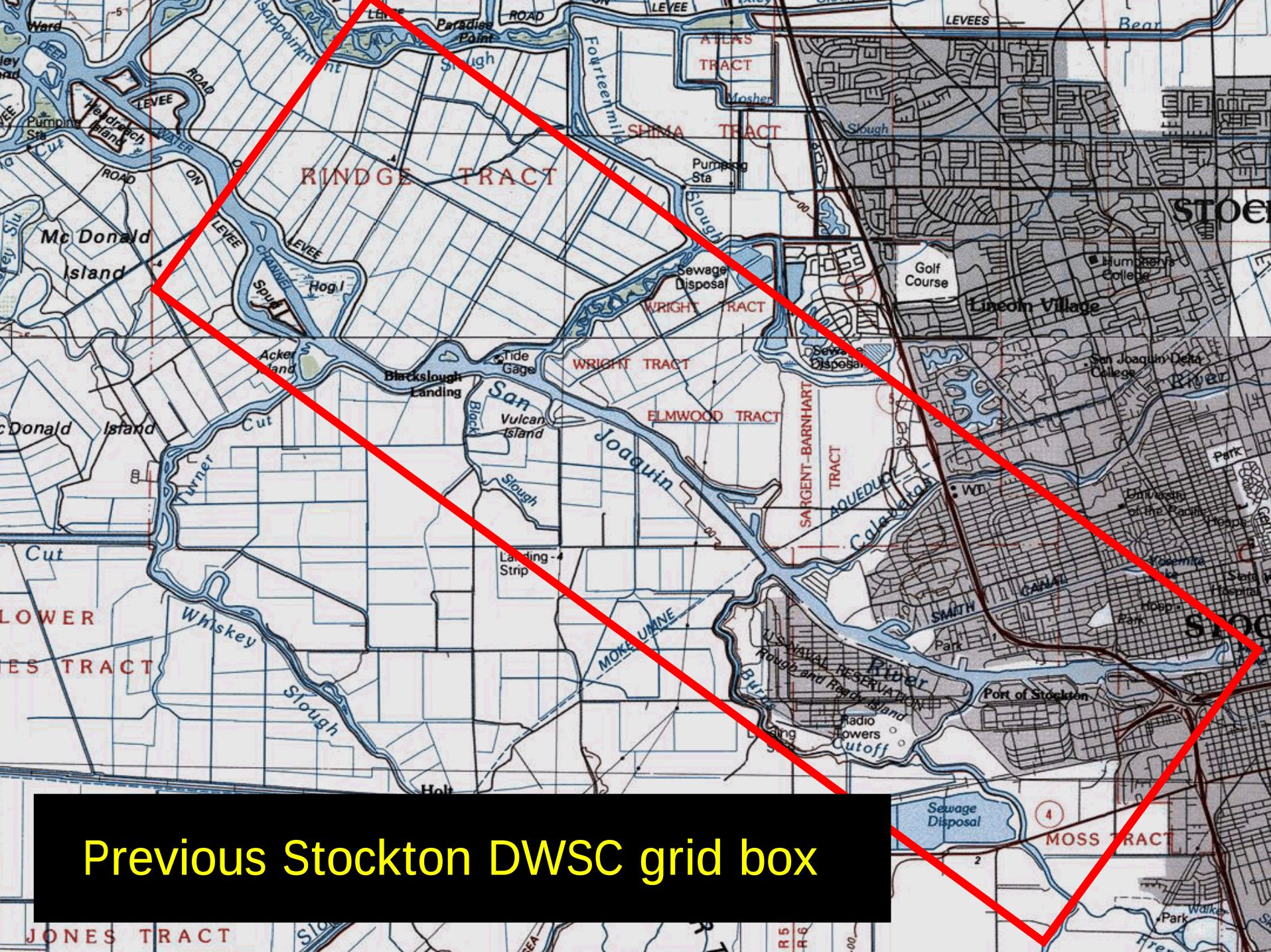
Rotation angle: 34 degrees counter clockwise

Boundary Condition Locations

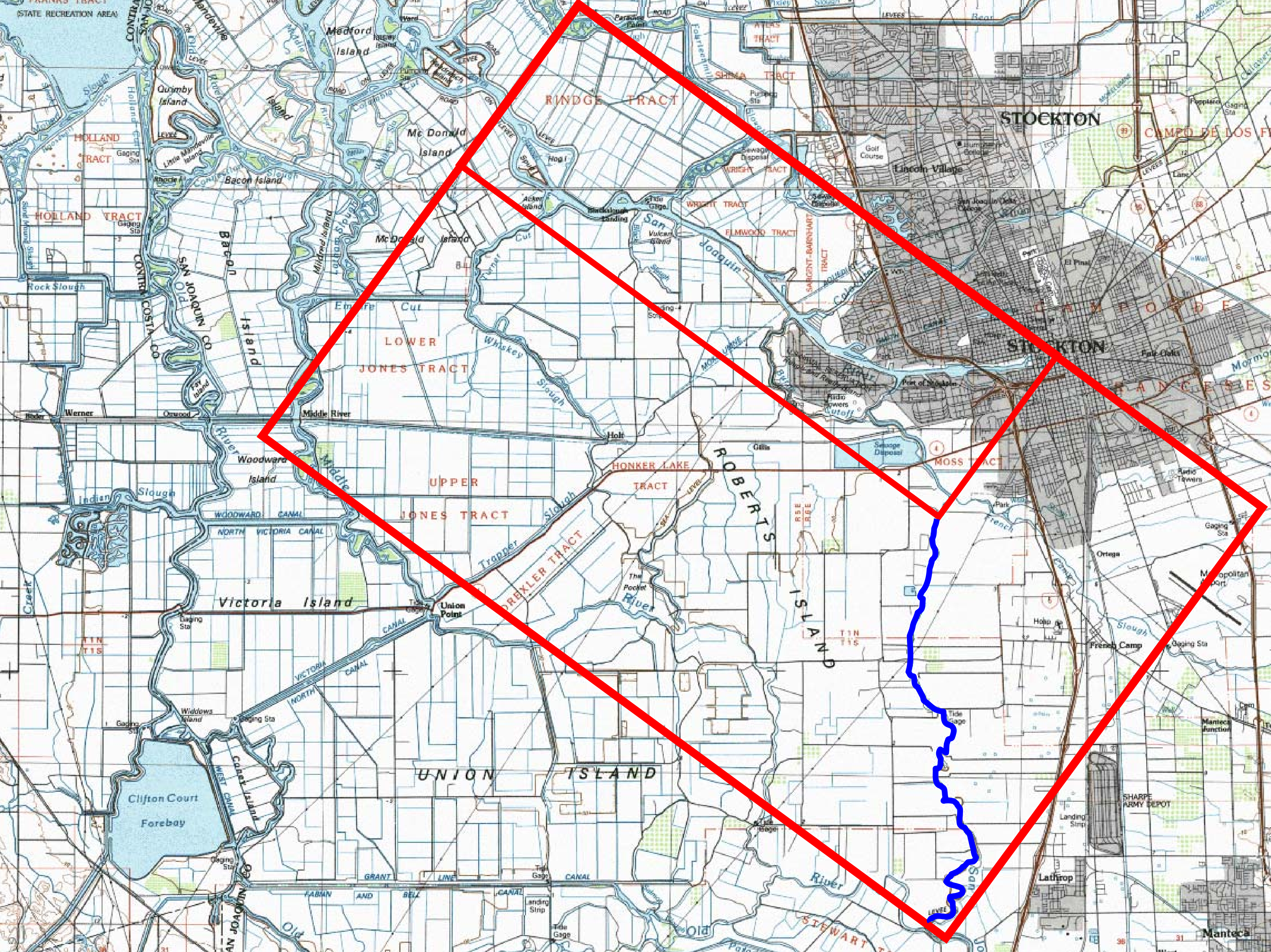


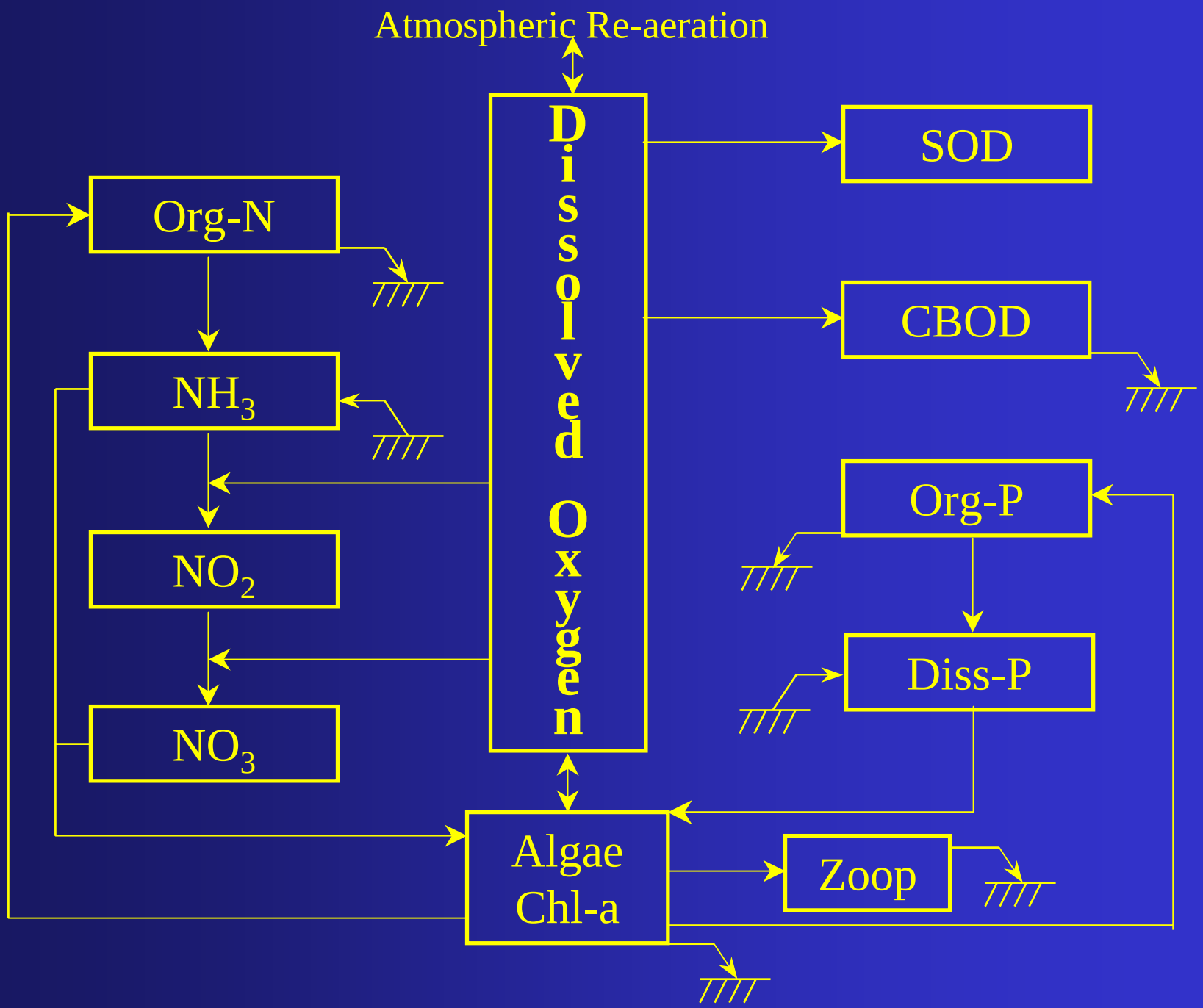
Internal Flow Conditions





Previous Stockton DWSC grid box


STOCKTON
Lincoln Village
CAMPO DE LOS FRANCESES
RINDGE TRACT
SHIMA TRACT
WRIGHT TRACT
ELMWOOD TRACT
SARGENT-BARNHART TRACT
Medford Island
Quimby Island
Mc Donald Island
Bacon Island
HOLLAND TRACT
Rock Slough
CONTRA COSTA CO
SAN JOAQUIN CO
Bacon Island
Mildred Island
Empire Cut
LOWER JONES TRACT
Whiskey Slough
Middle River
Holt
Woodward Island
UPPER JONES TRACT
HONKER LAKE TRACT
ROBERTS ISLAND
MOSS TRACT
Sewage Disposal
Port of Stockton
Indian Slough
WOODWARD CANAL
NORTH VICTORIA CANAL
Trapper Slough
DREXLER TRACT
Victoria Island
Union Point
The Pocket
Widdows Island
Clifton Court Forebay
UNION ISLAND
GRANT LINE CANAL
FABIAN AND BELL CANAL
Old River
French Camp
Ortega
SHARPE ARMY DEPOT
Lathrop
Manteca
Manteca Junction
Metropolitan Airport
STEWART TRACT
San Joaquin River
Tide Gage
Gaging Sta


Atmospheric Re-aeration
Dissolved Oxygen
SOD
CBOD
Org-N
NH3
NO2
NO3
Org-P
Diss-P
Algae
Chl-a
Zoop

Phytoplankton Growth

$$\frac{\partial Chla_i}{\partial t} = G - (R + M) - Z$$

$$G = G_{max} \cdot \vartheta^{T-20} \cdot Chla_i \cdot Min\left\{f(I_i), f(P_i), f(N_i)\right\}$$

$$(R + M) = \left(k_r + k_m\right) \cdot \vartheta^{T-20} \cdot Chla_i$$

$$Z = k_z \cdot f(Z)$$

Model Development Goals
(May – December)

- Extend and bend hydrodynamic model
- Obtain 2004 boundary conditions
- Run 20-meter grid (current grid)
- Create meteorological flux files 00, 04
- Add temperature model to SI3D
- Incorporate WQ algorithms into SI3D
- Develop hydrodynamic transformation
- Run 20-meter bent grid with WQ

Model Development Goals
(May – December)

- Bend hydrodynamic model ..... **Apr 29**
- Obtain 2004 boundary conditions .....**May 20**
- Run 20-meter grid (current grid) ..... **Jun 1**
- Create meteorological flux files 00, 04 ..... **May 20**
- Add temperature model to SI3D ..... **Jun 1**
- Incorporate WQ algorithms into SI3D ..... **Oct 1**
- Develop hydrodynamic transformation ..... **Dec 1**
- Run 20-meter bent grid with WQ ..... **Dec 1**