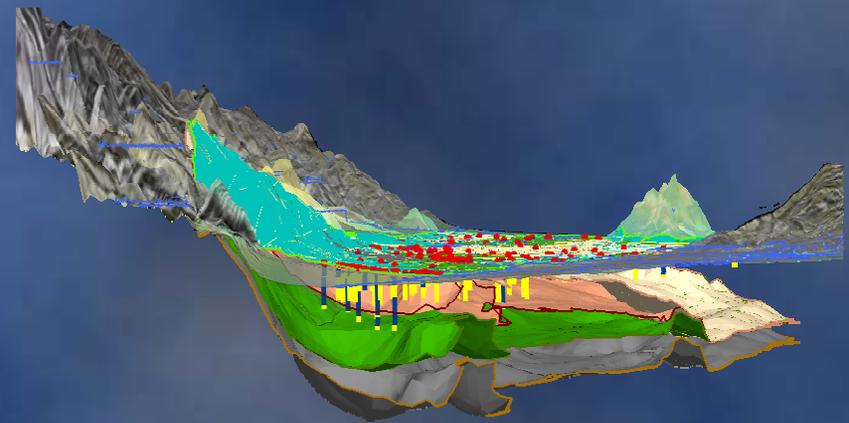


CDM

Butte Basin IWFM Model

Brian J. Heywood, P.E.



IWFM User's Group
October 28, 2008

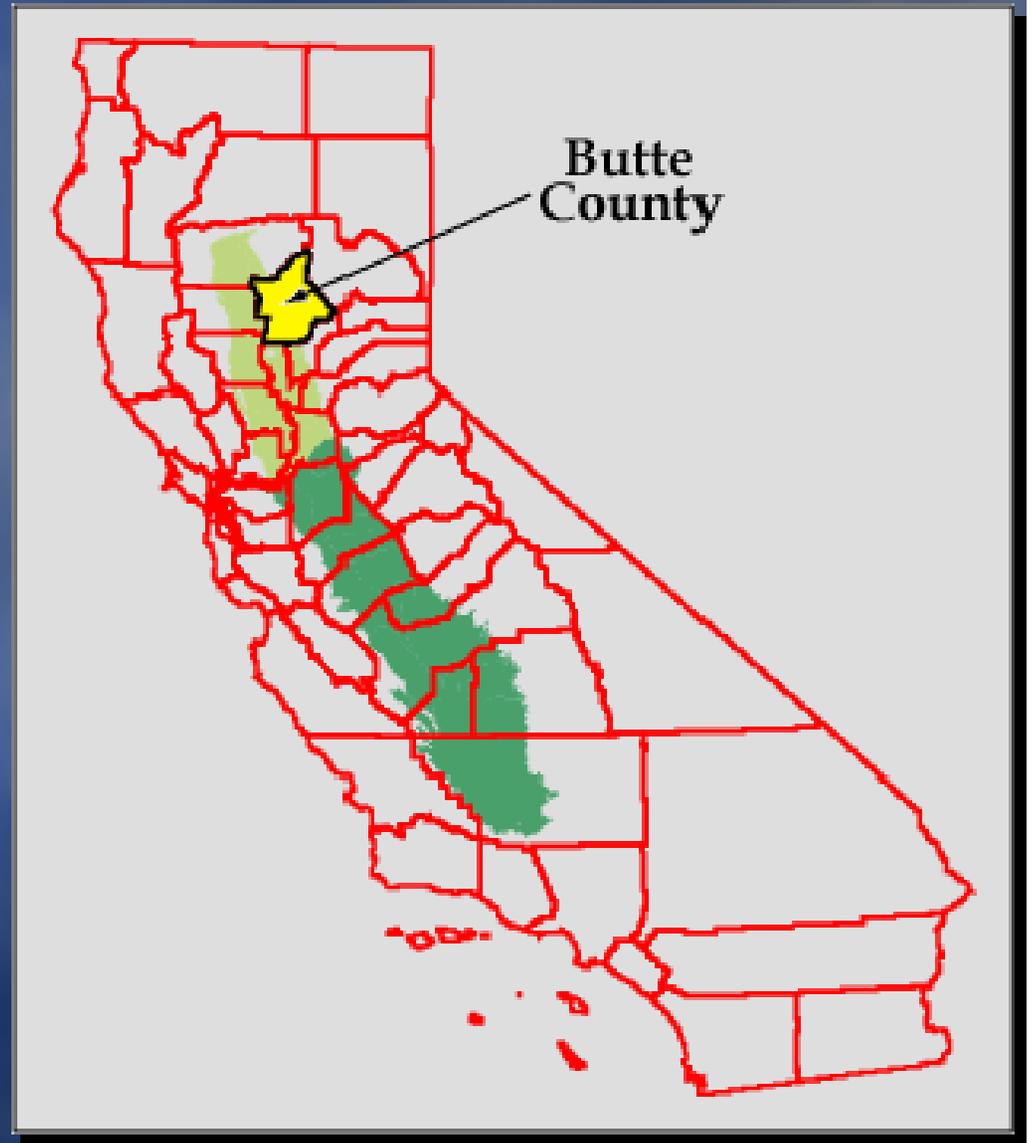
Background

- ◆ **Client: Butte County Dept. of Water & Resource Conservation**
- ◆ **Funding via USBR**
- ◆ **Review and update the Butte Basin Area Groundwater Model originally developed by BBWUA**
 - ◆ **Phase I: Review model, recommend updates**
 - ◆ **Phase II: Update, calibrate, apply**

Butte County IWFM Model

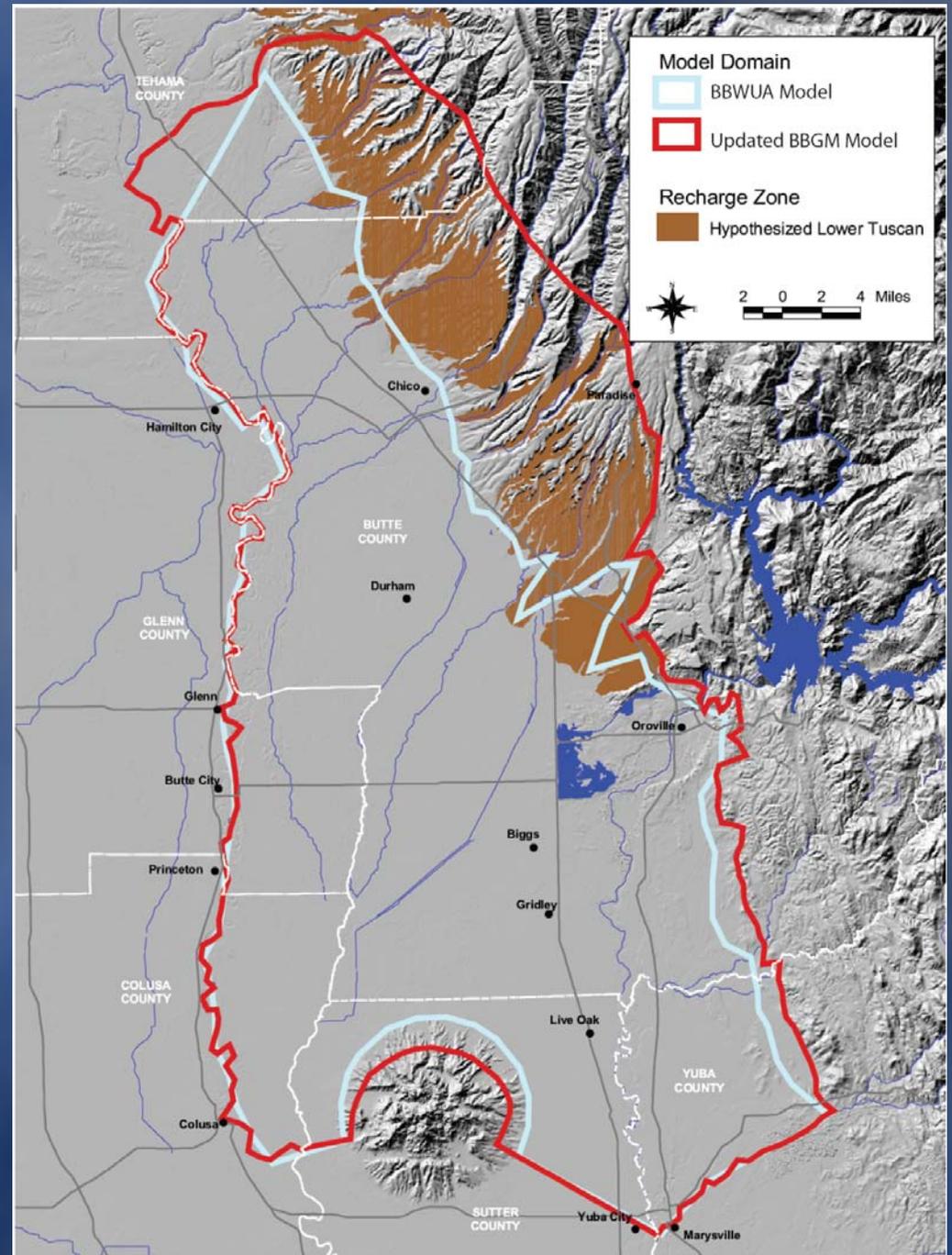
◆ Where?

- ◆ Butte County, CA
- ◆ Agriculture is predominant land use
- ◆ Surface water is primary ag. supply
- ◆ Groundwater and surface water supply municipal / industrial uses

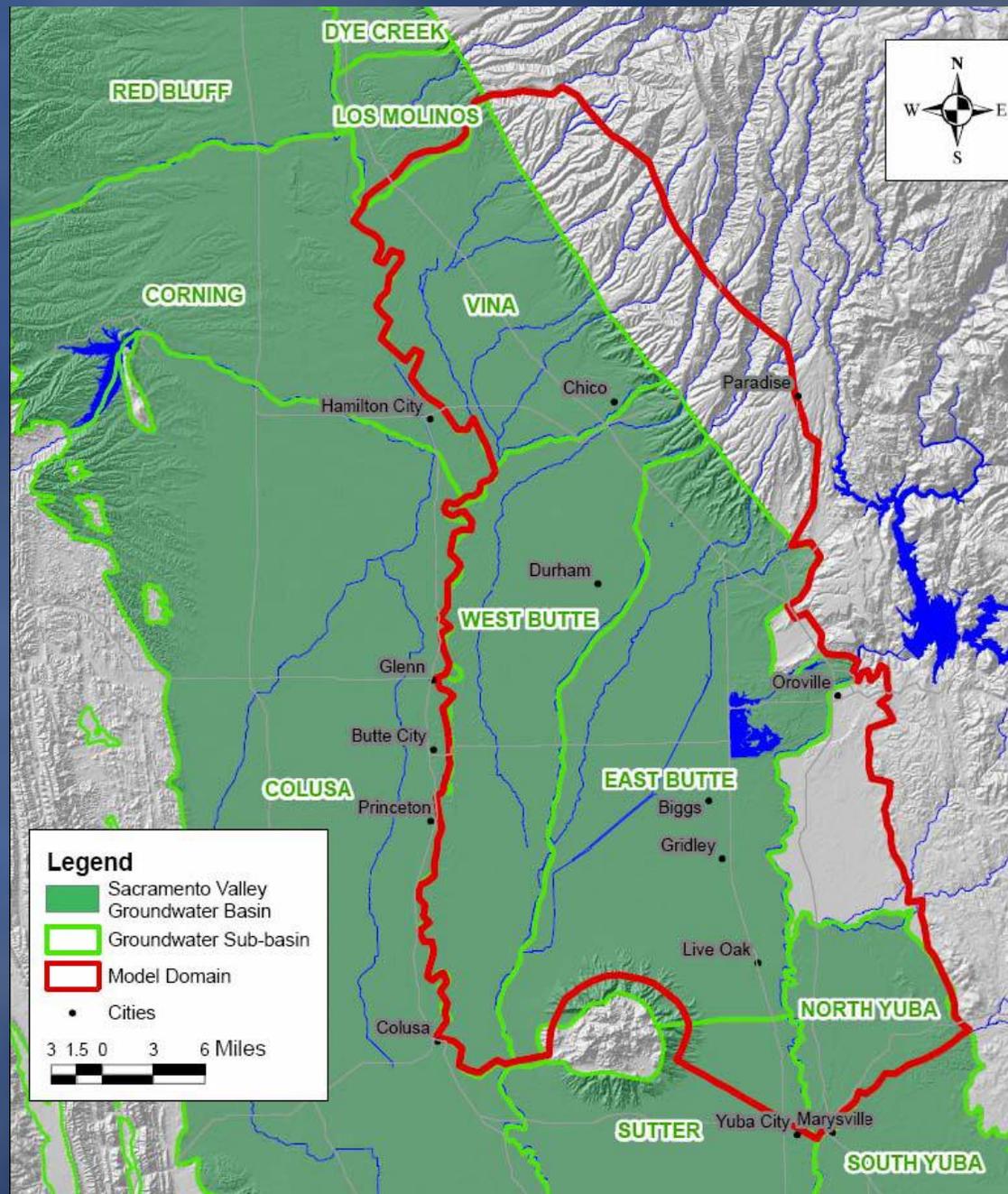


Model Domain

- ◆ River Boundaries
 - ◆ Sacramento River
 - ◆ Yuba River
 - ◆ Deer Creek
- ◆ Expanded to Include Lower Tuscan Recharge Zone

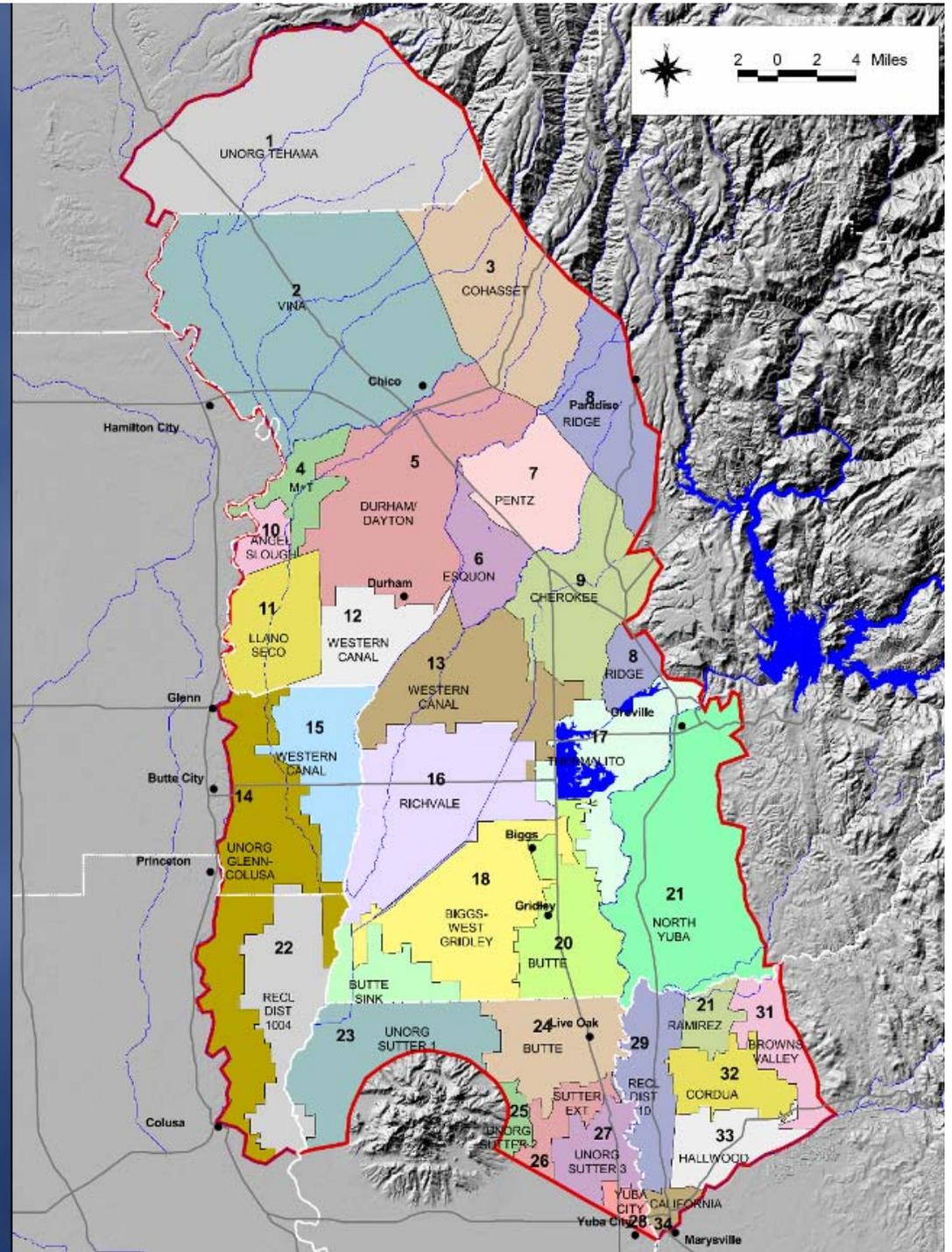


Groundwater Basins

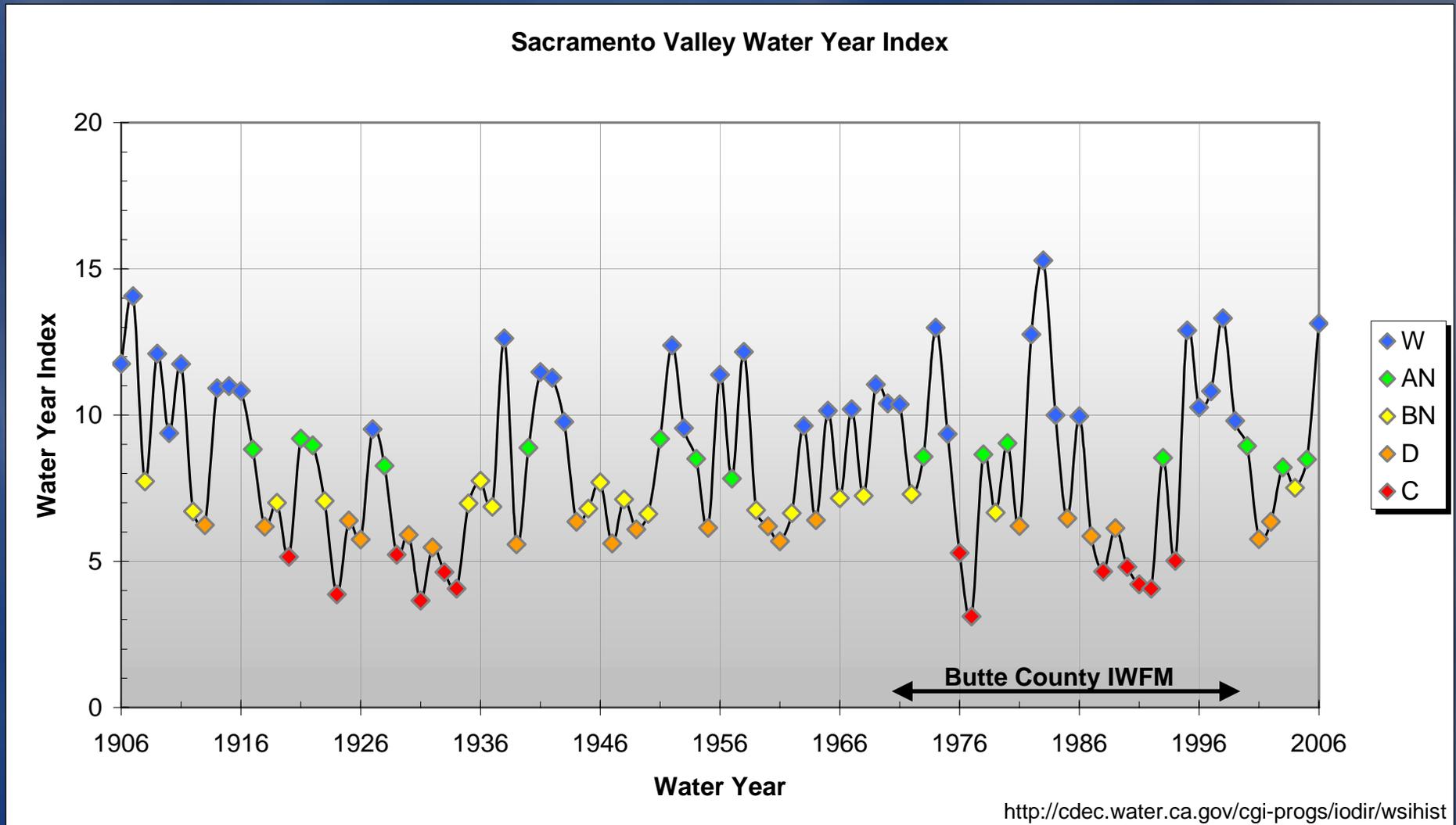


Subregions

◆ 35 subregions

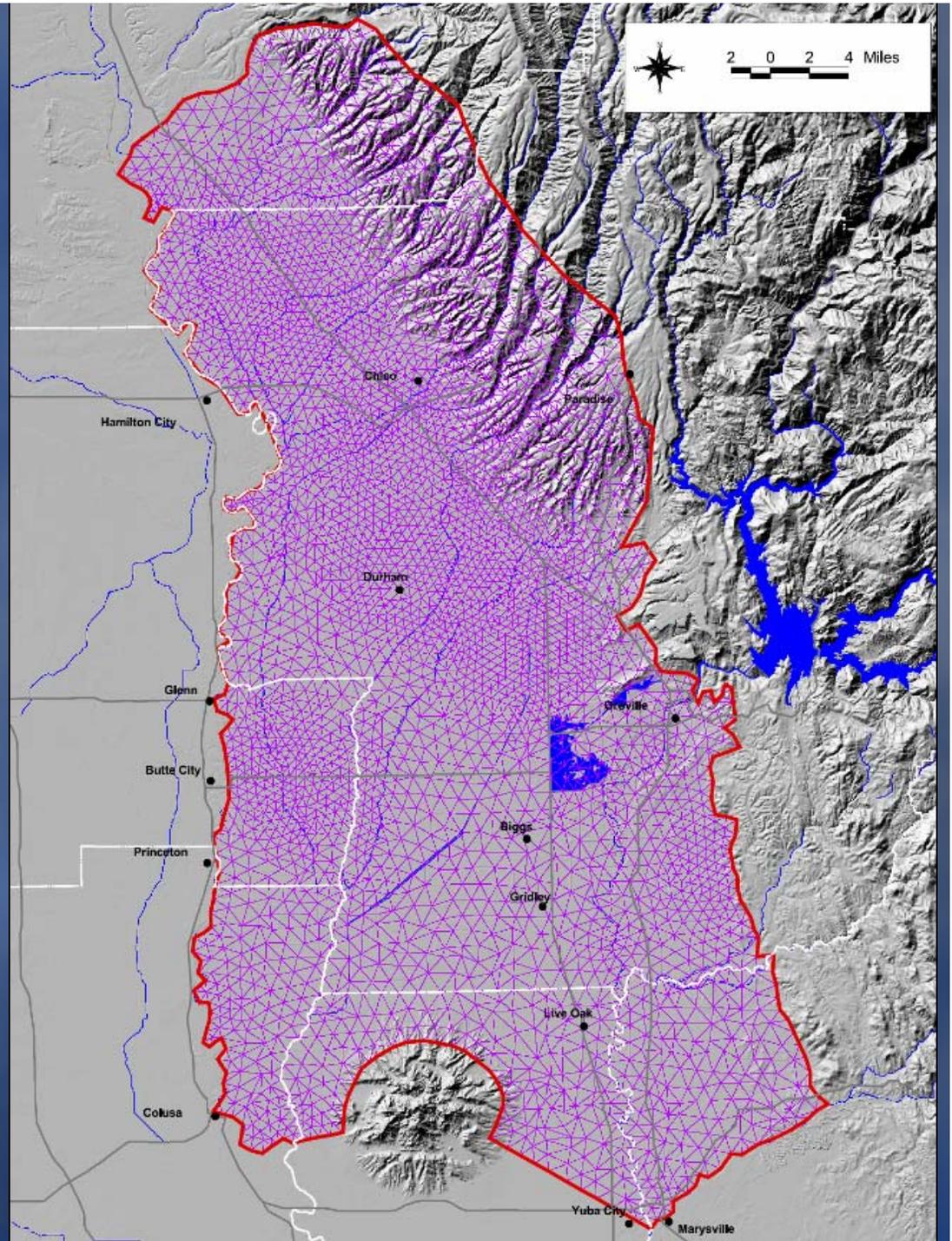


Simulation Time Period



Model Grid

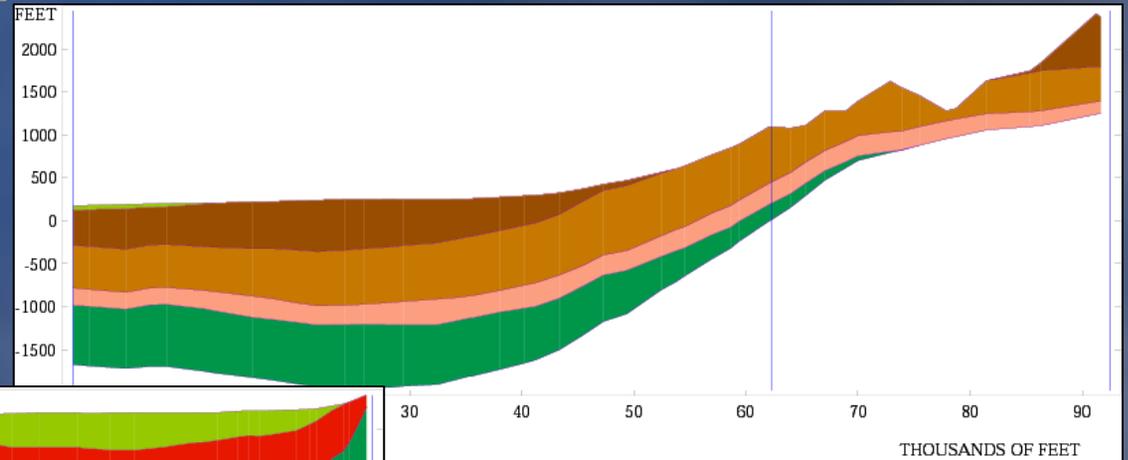
- ◆ 7,216 elements
- ◆ 3,770 nodes



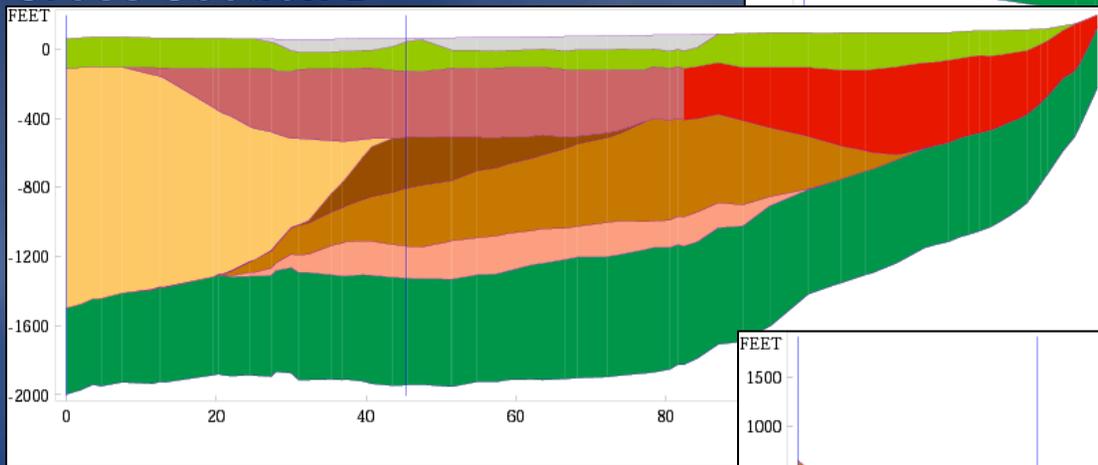
Subsurface Representation

Sections plotted from model.

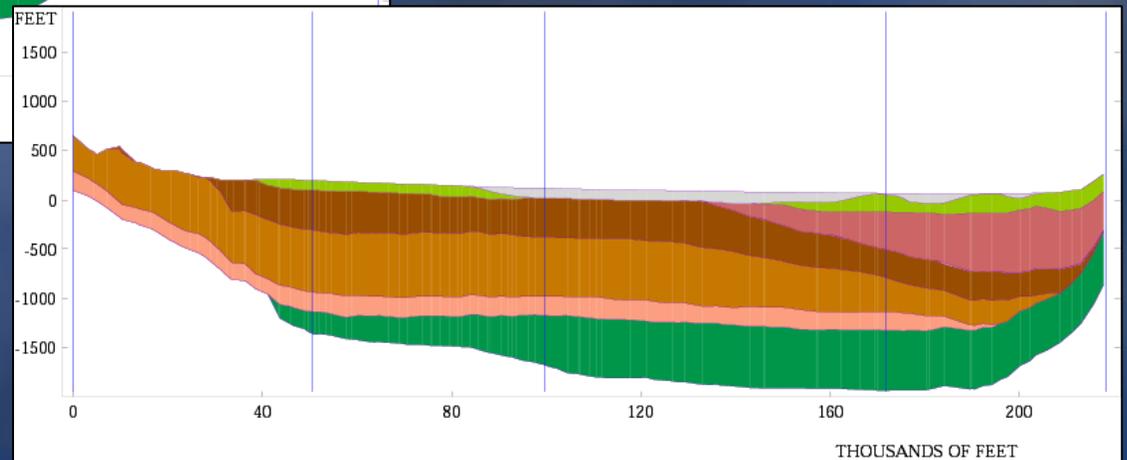
Cross Section A



Cross Section D



Cross Section E

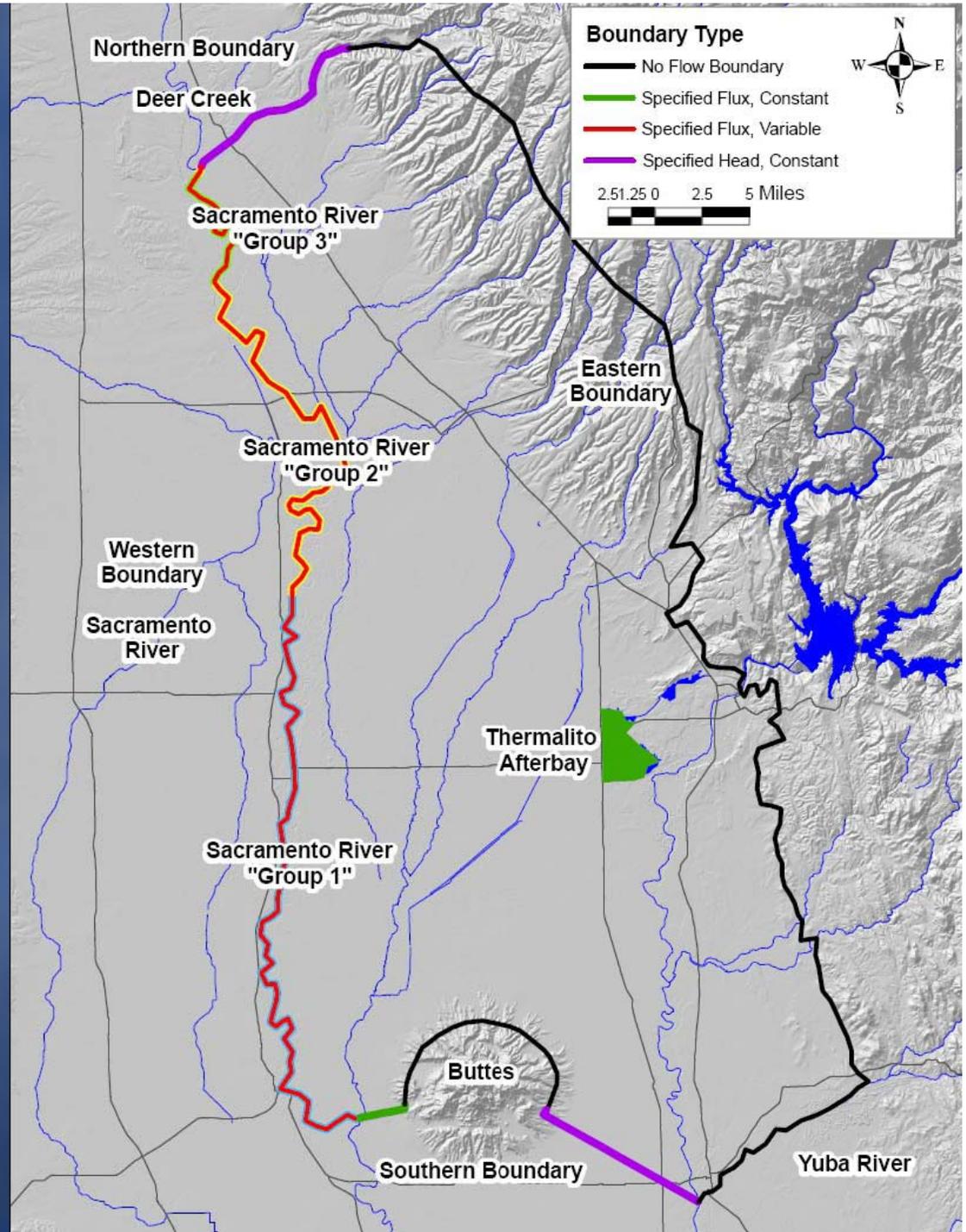


MATERIALS

- Basin
- Alluvium
- Sutter
- Tehama
- Tuscan C
- Tuscan B
- Tuscan A
- Neroly/UPG/Ione

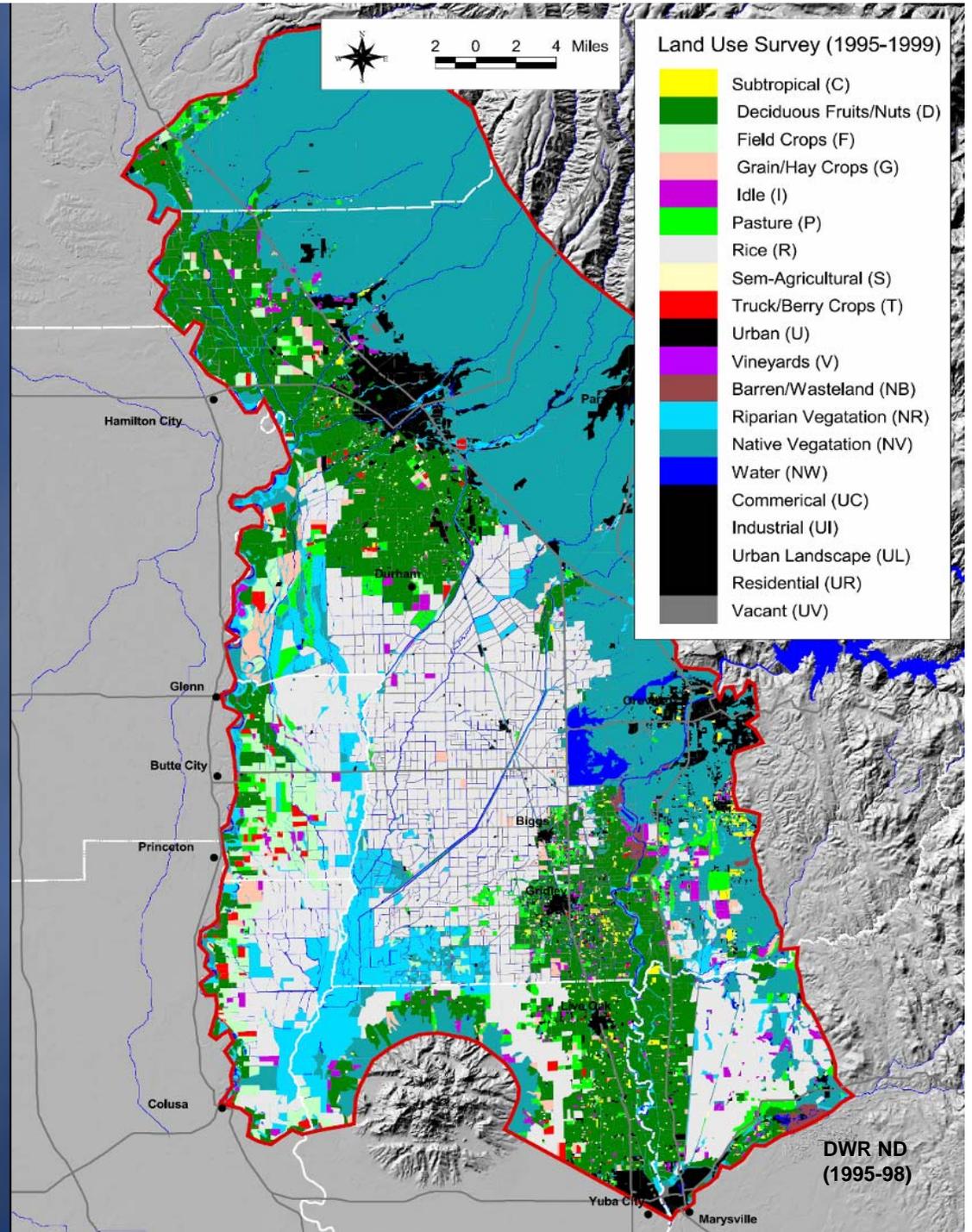
Boundary Conditions

- ◆ No Flow
- ◆ Specified Flux
 - ◆ Constant
 - ◆ Variable
- ◆ Specified Head
 - ◆ Constant



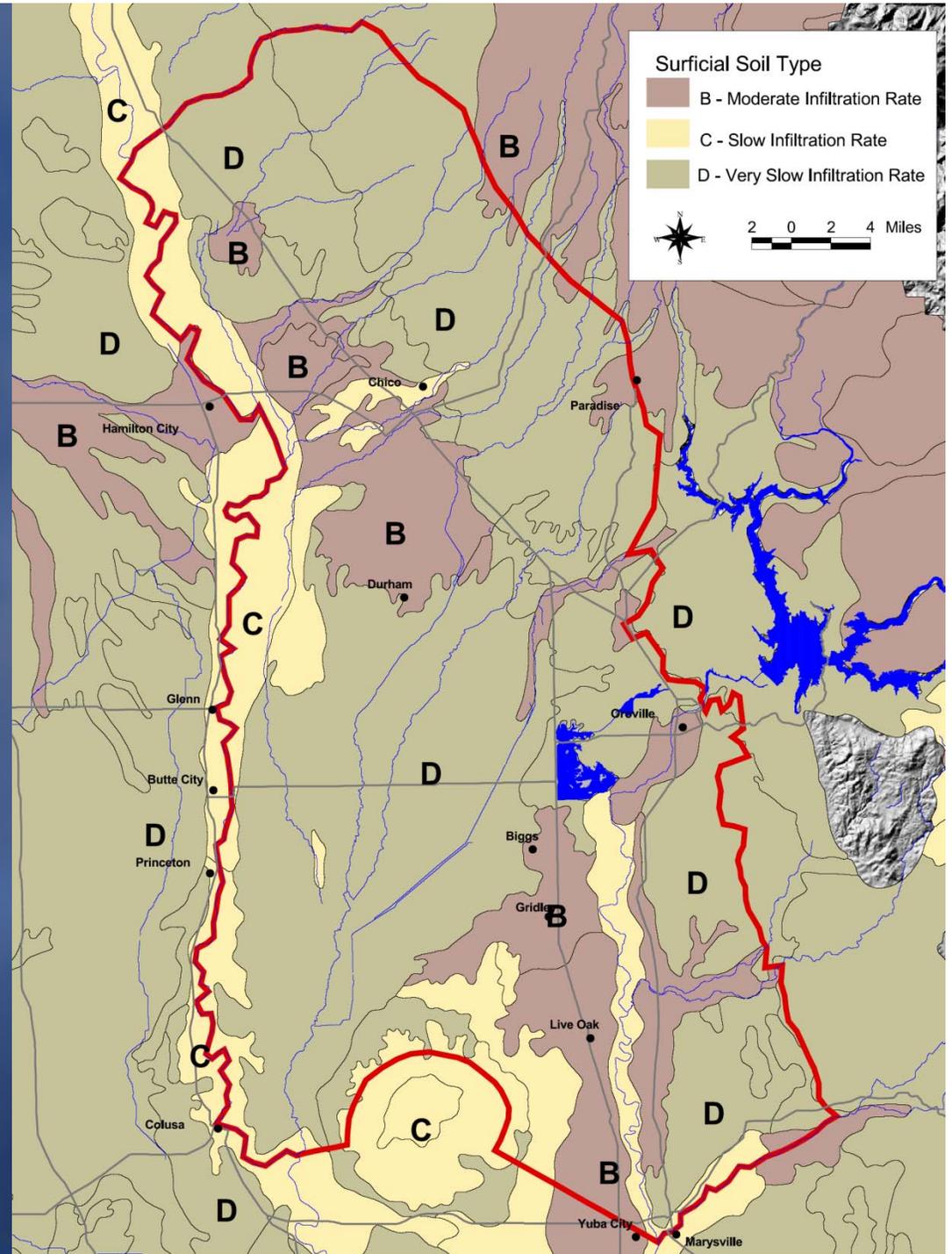
Land Use

- ◆ Agricultural
- ◆ Urban
- ◆ Native
- ◆ Riparian



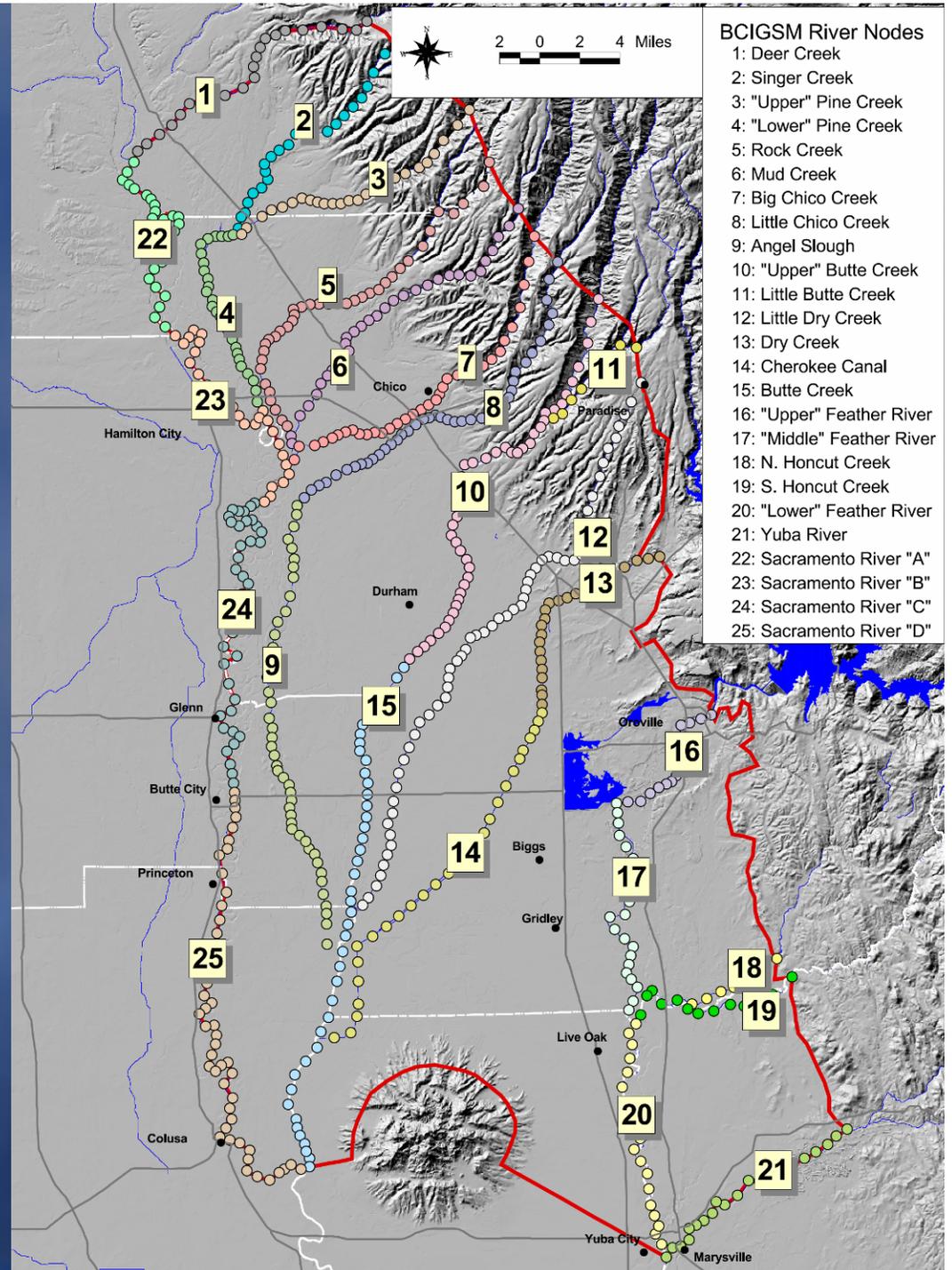
Soil Data

- ◆ State Soil Geographic (STATSGO) Data
 - ◆ USDA
 - ◆ NRCS
 - ◆ National Soil Survey Center
 - ◆ Miscellaneous Publication Number 1492

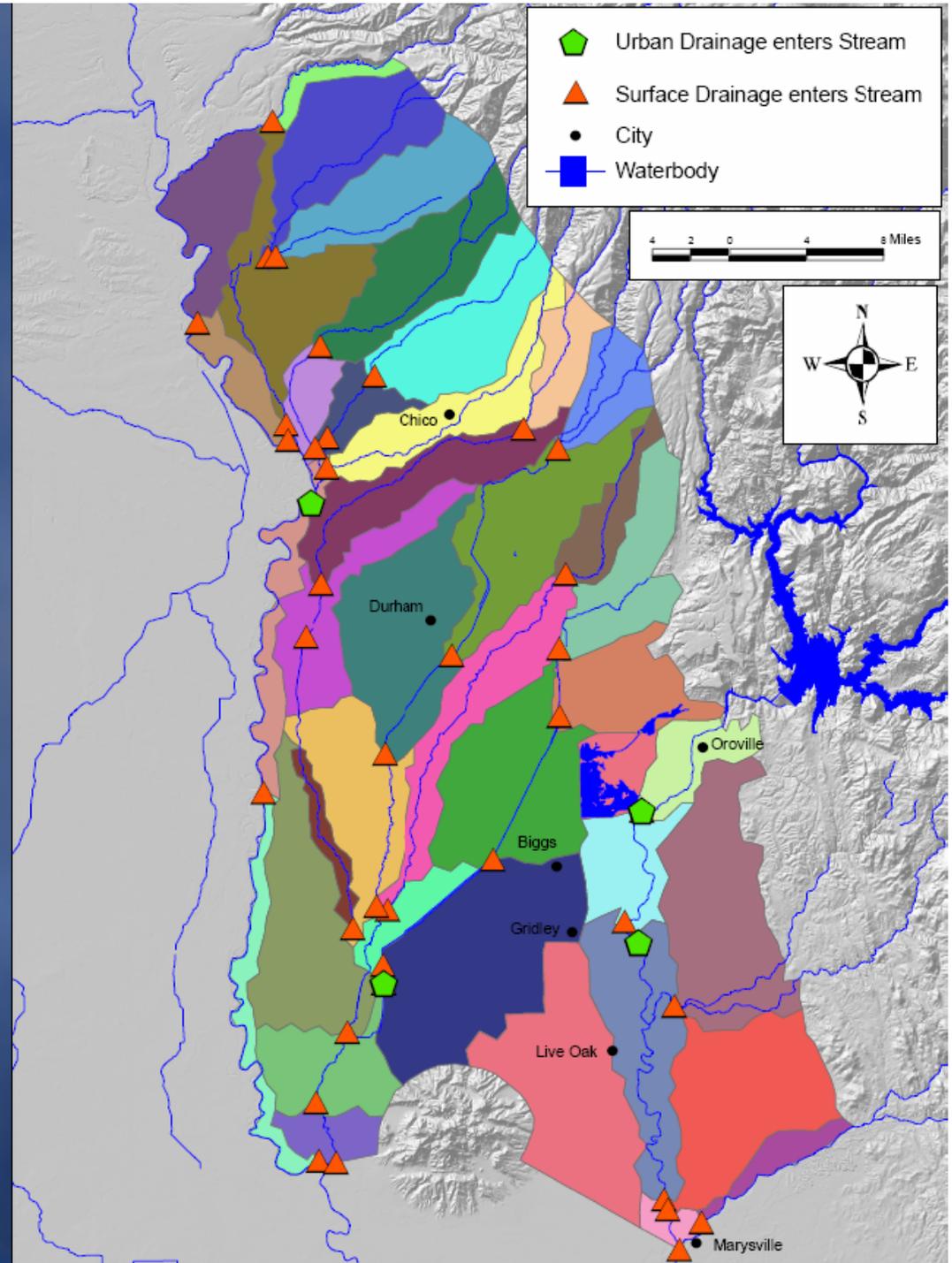


Surface Water

- ◆ 25 Reaches
- ◆ 744 river nodes

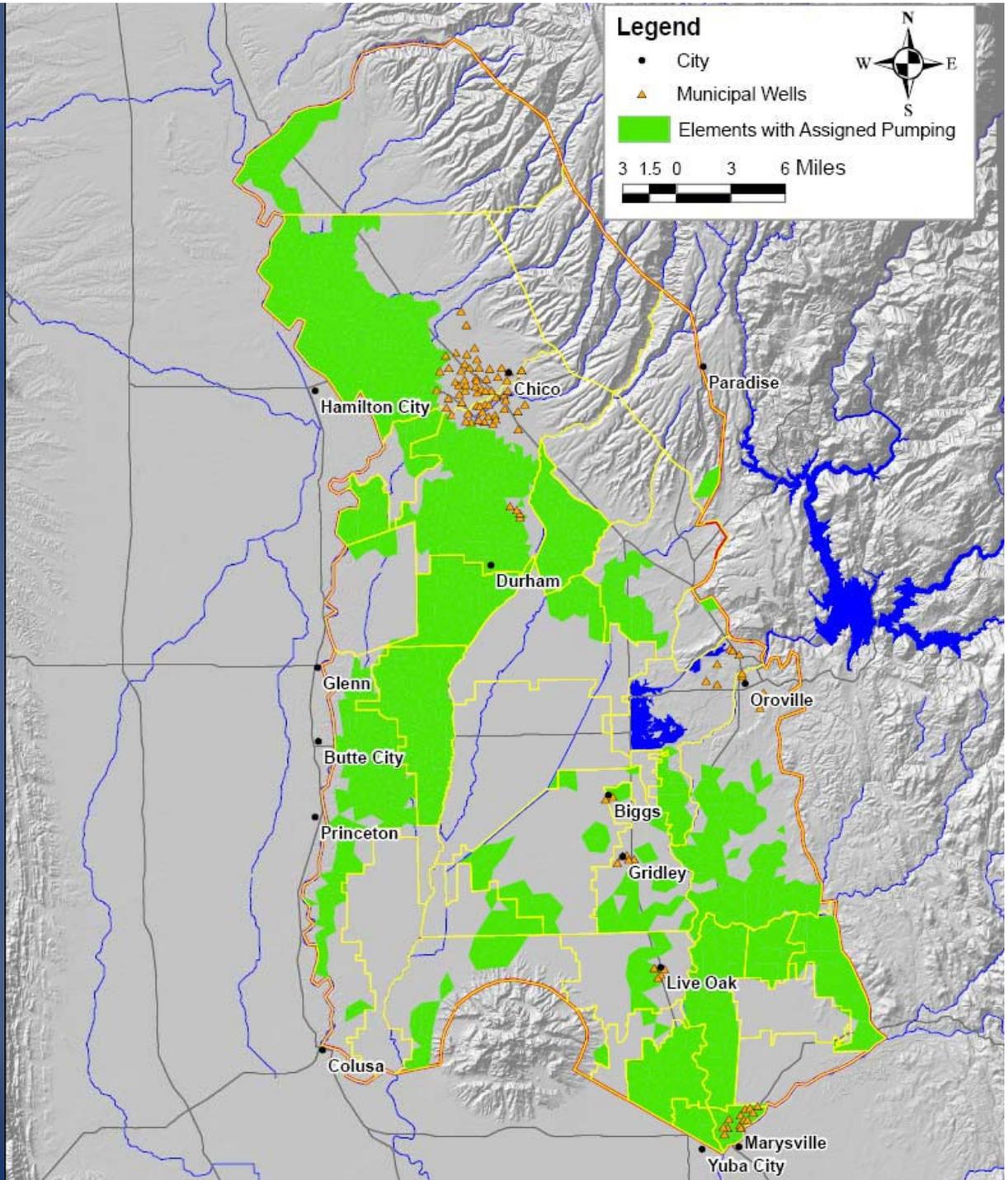


Surface Runoff



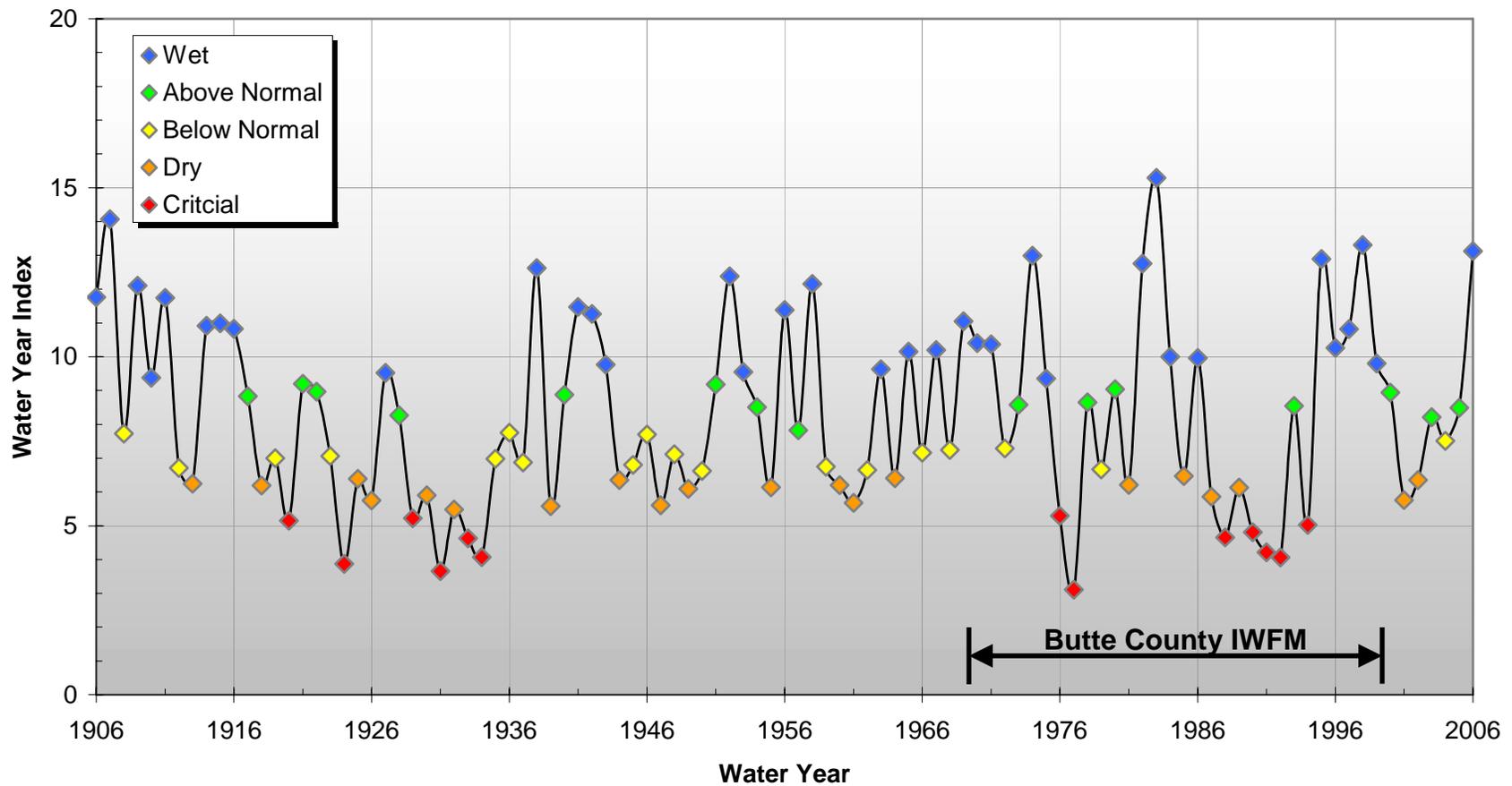
Groundwater Pumping

- ◆ Agricultural
- ◆ Urban

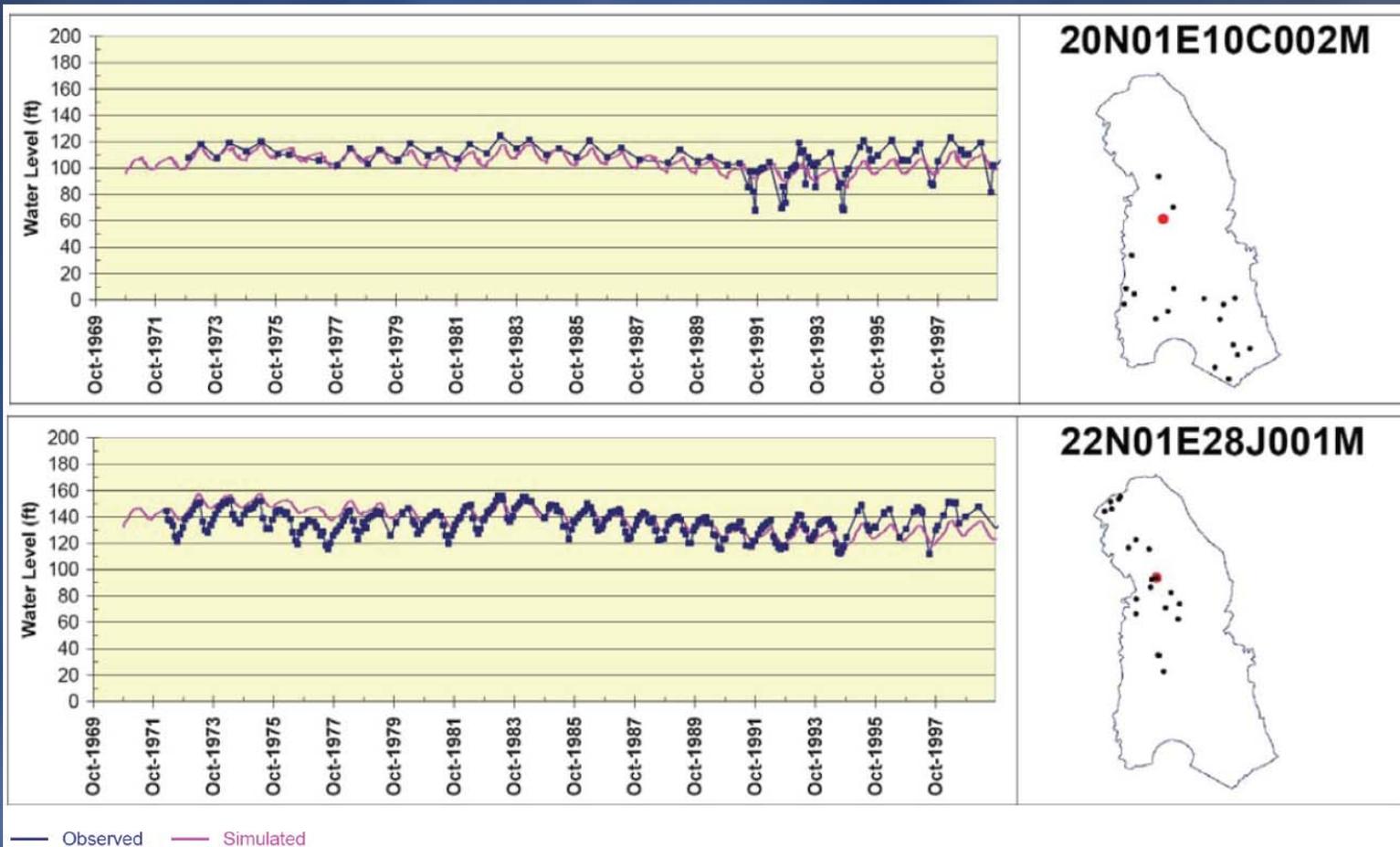


Calibration Period

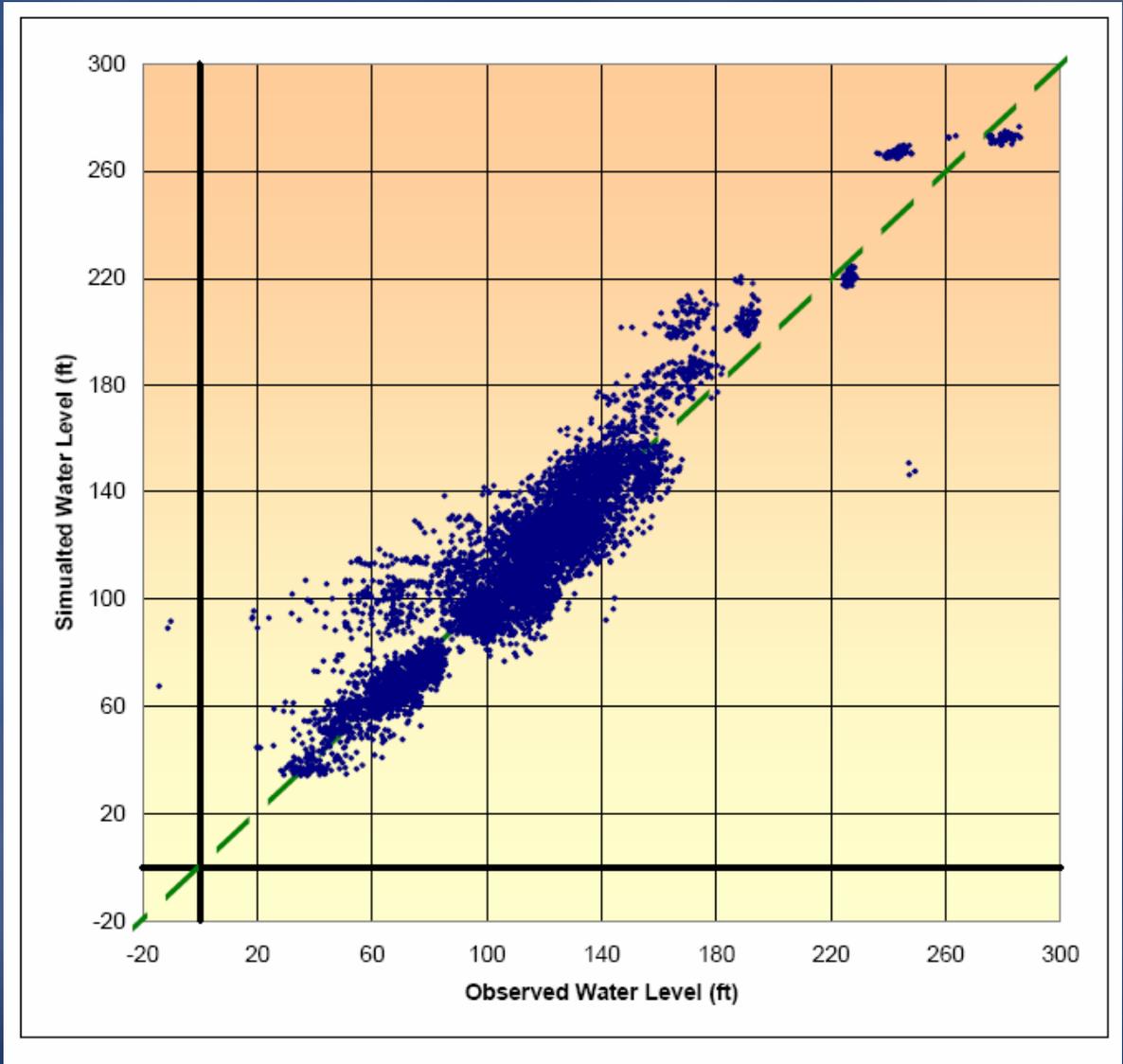
Sacramento Valley Water Year Index



Model Calibration - Groundwater

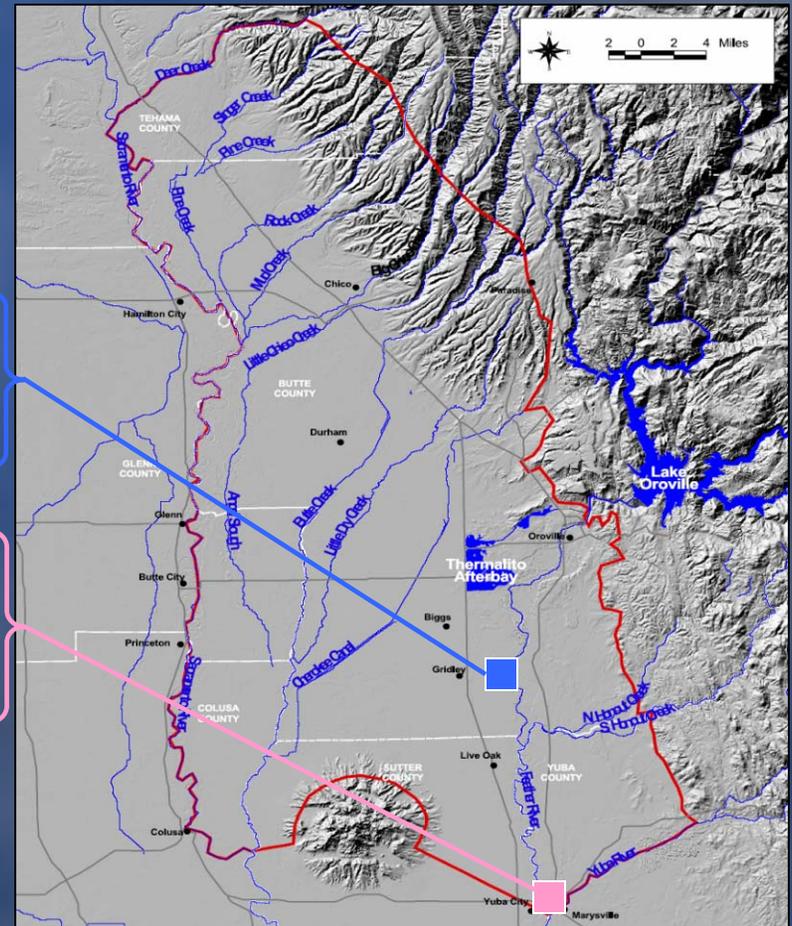
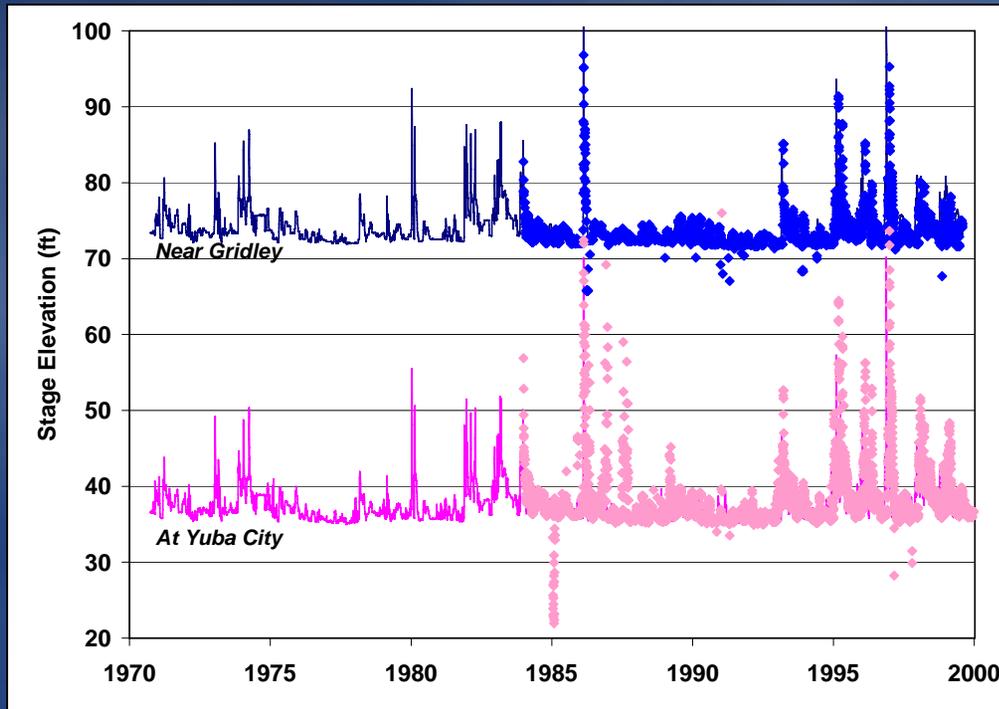


Model Calibration - Groundwater



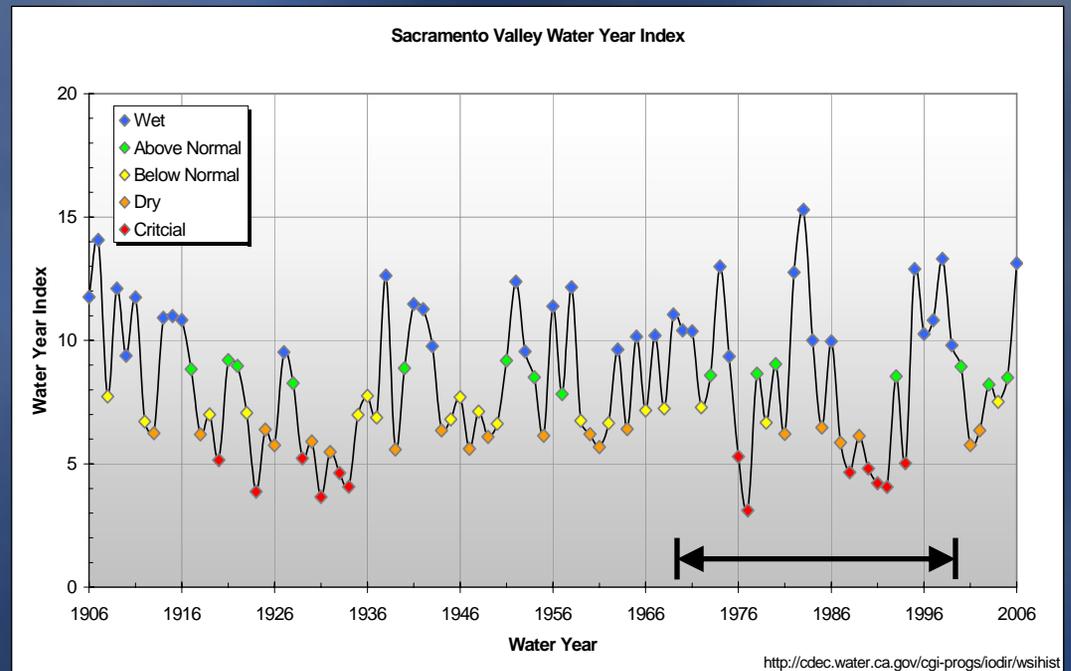
Model Calibration – Surface Water

Feather River



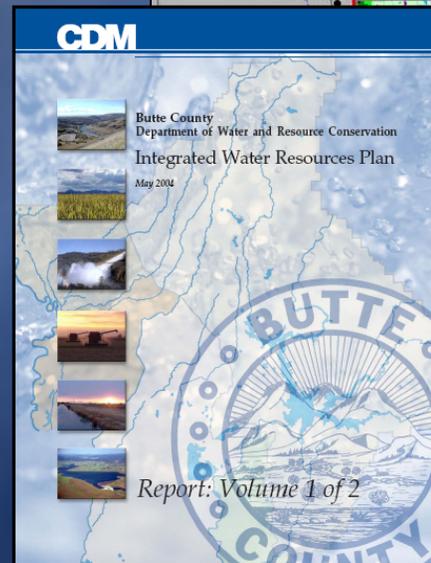
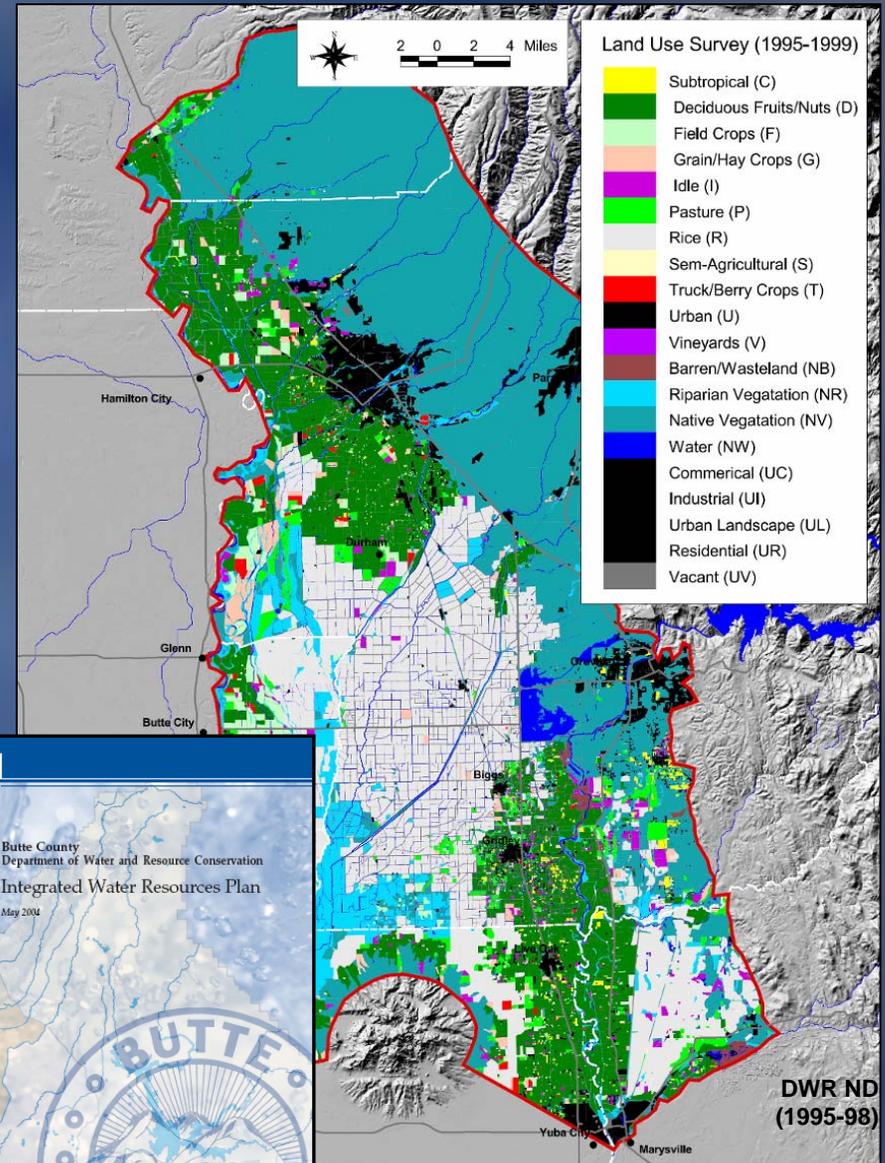
Base Case Development

- ◆ Simulation period (1970 – 1999)
- ◆ Input data requirements
 - ◆ Precipitation
 - ◆ Stream flow
 - ◆ Land use
 - ◆ Agricultural diversions



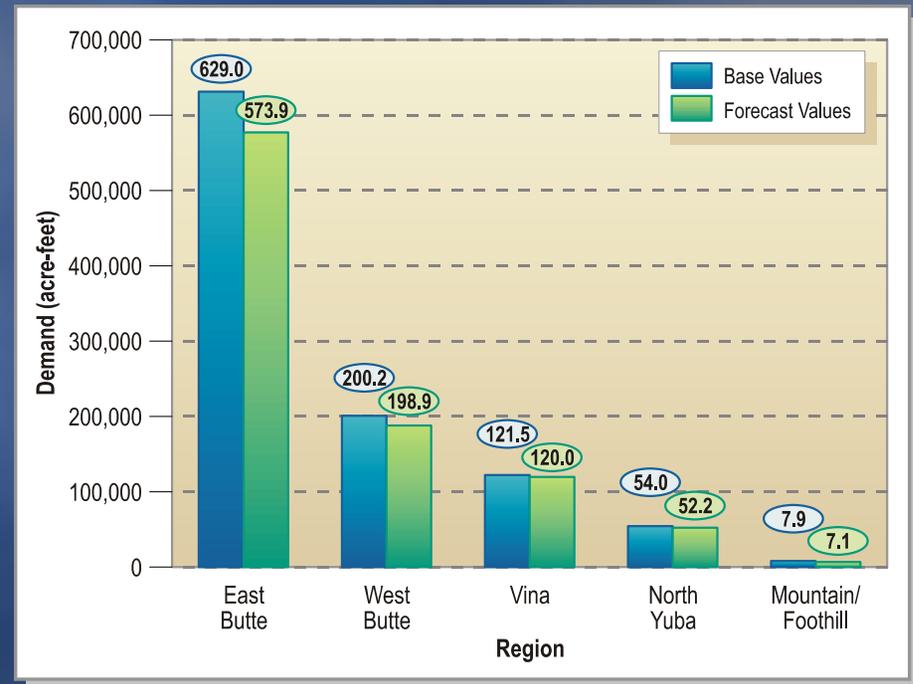
Land Use Data

- ◆ Hold land use constant year 2030
 - ◆ Urban
 - ◆ Agricultural
- ◆ Land use was projected in Butte County 2004 IWRP



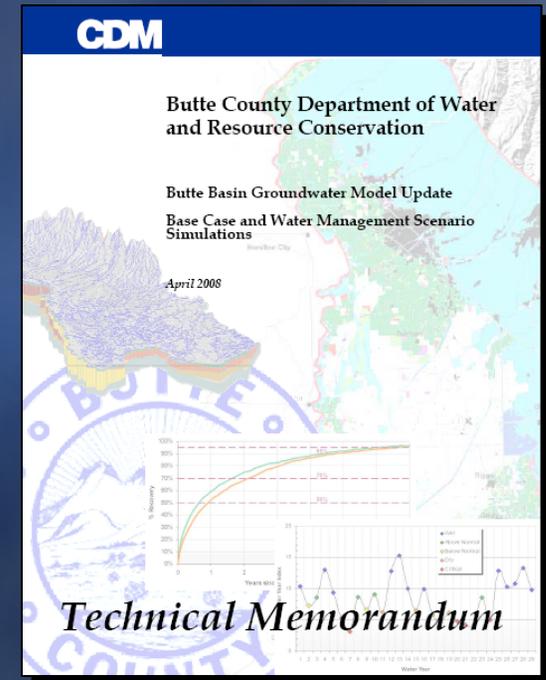
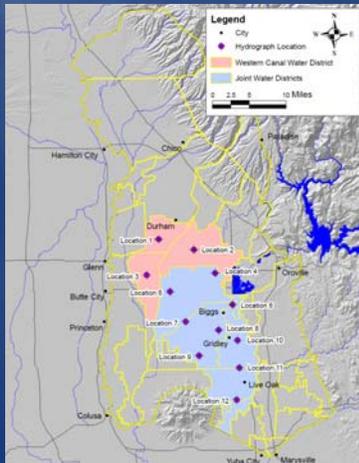
IWRP 2030 Ag Demand Forecast

- ◆ Decrease irrigated land: 3% in Vina and West Butte
- ◆ Decrease irrigated land: 1% in East Butte
- ◆ Decrease surface water delivery: 10%
- ◆ Set target irrigation efficiencies for each crop



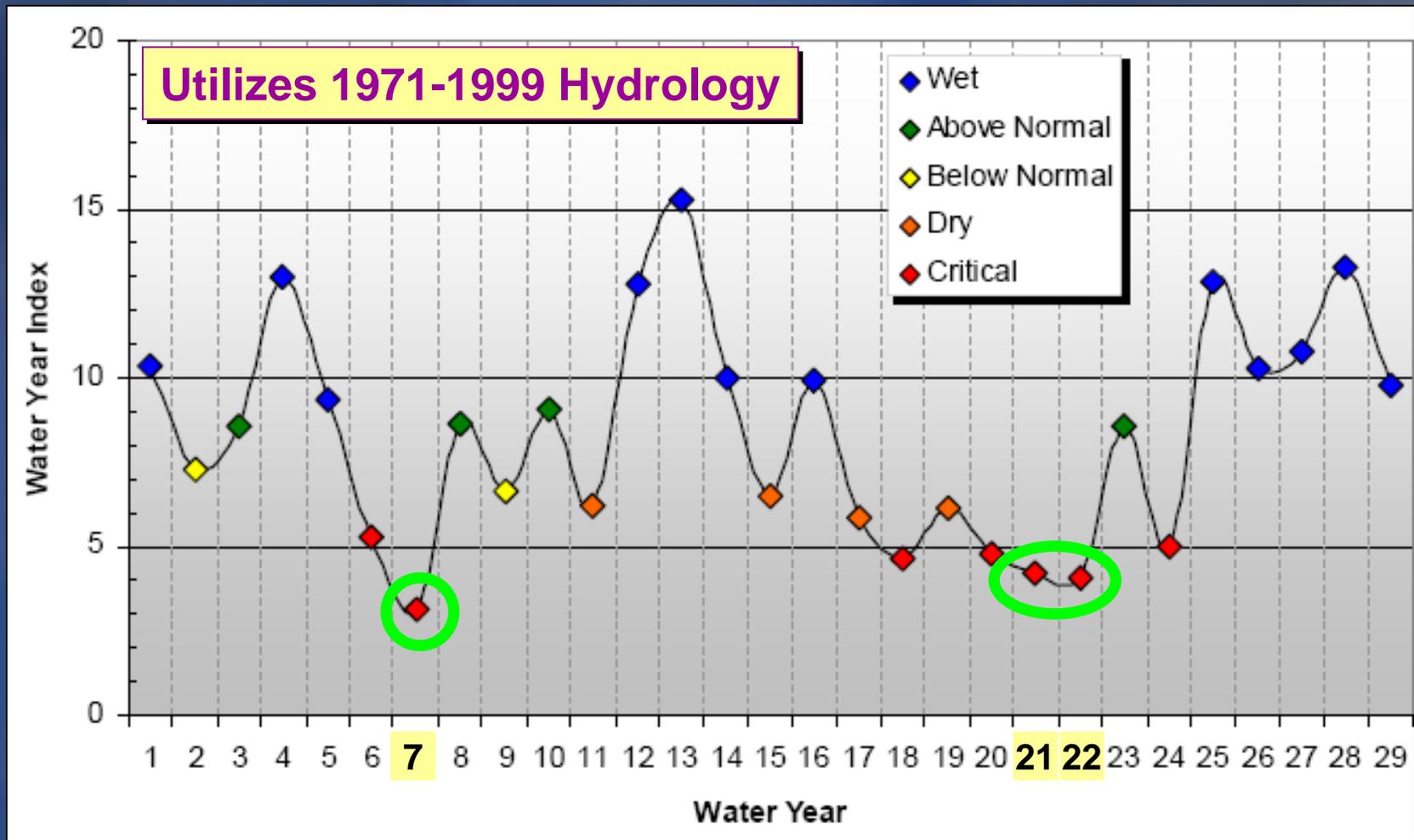
Water Management Scenario

- ◆ **Cutback of SWP Deliveries**
 - ◆ Western Canal Water District
 - ◆ Joint Water Districts
 - ◆ Maximum 50% in any individual year
 - ◆ Maximum cumulative 100% within 7 years



DWR has exercised this option historically twice (both with a maximum 50% cutback).

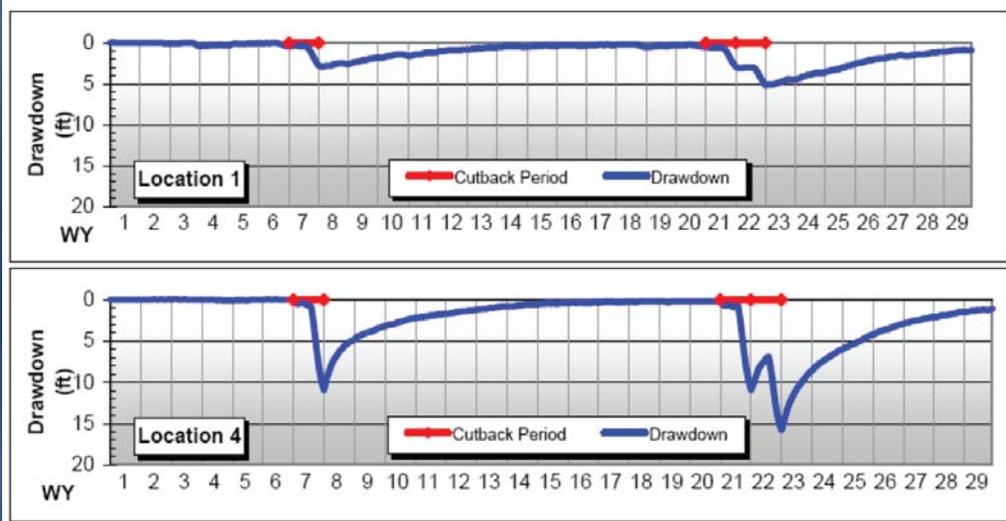
Water Management Scenario



Water and Land Use in Scenario

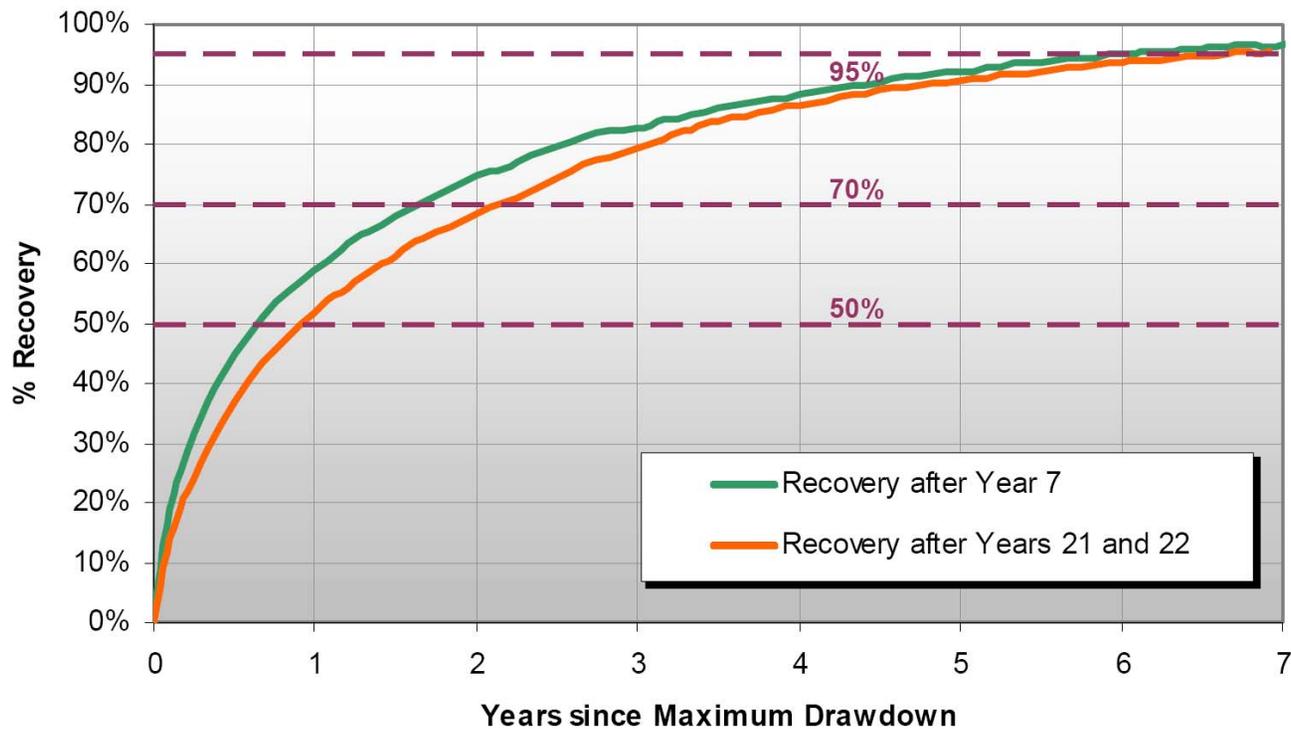
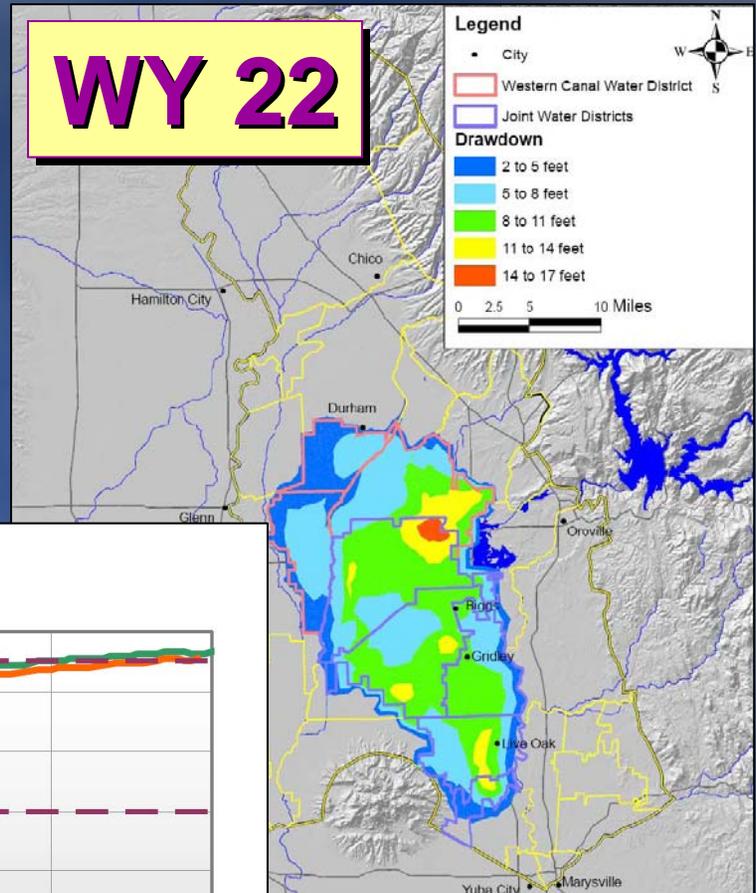
Allocation of Cutback Quantity	WCWD	JWD
Additional Groundwater Pumping (60% of Cutback)	39 TAF	115 TAF
Fallowed Land in lieu of Water Supply (40% of Cutback)	26 TAF	76 TAF

Water Level Drawdown

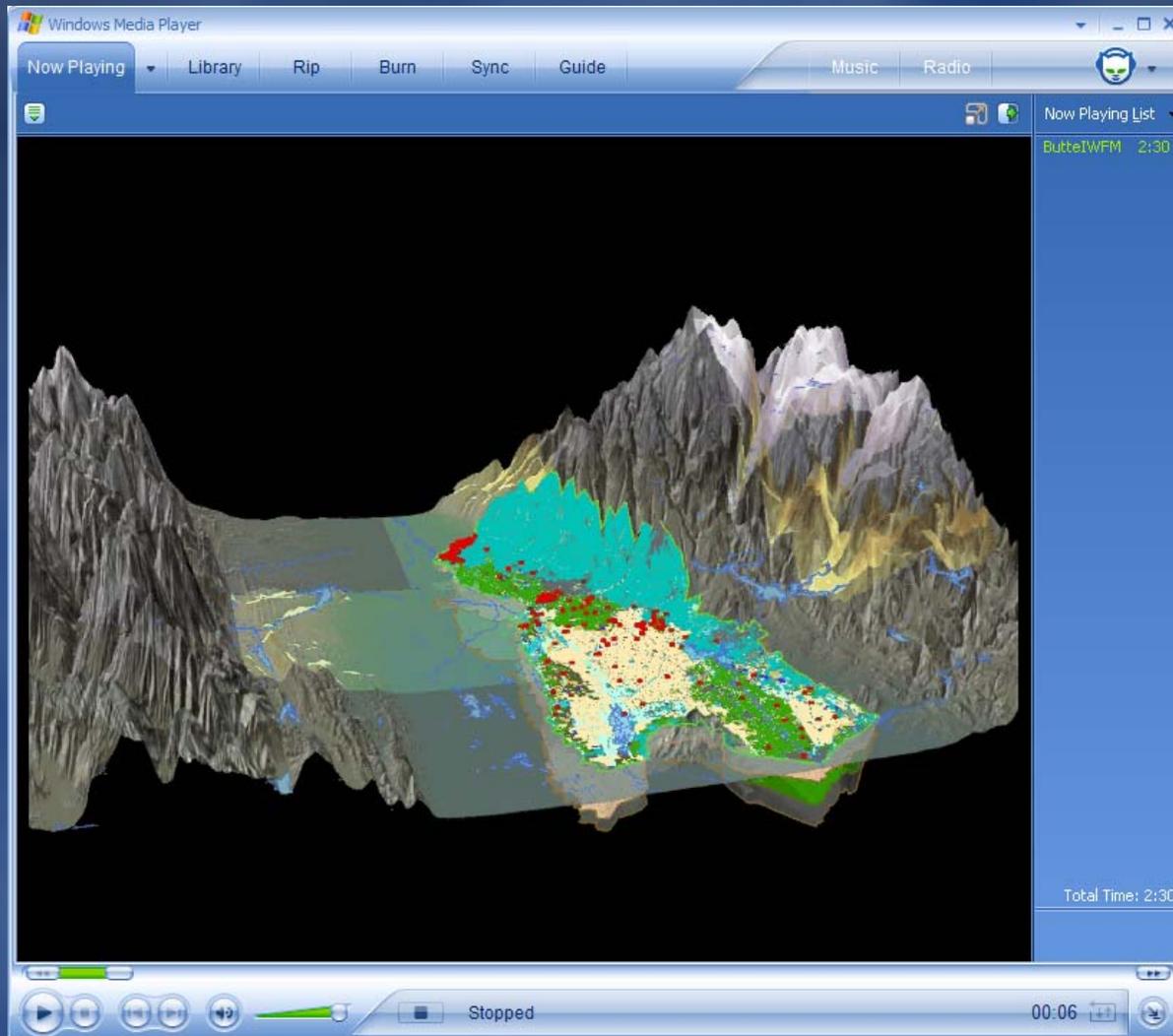


Cutback Year	Average Drawdown (feet)	Maximum Drawdown (feet)
WY 7	4.1	11.2
WY 21	4.2	11.2
WY 22	7.0	15.5

Simulated Drawdown and Recovery



Animation



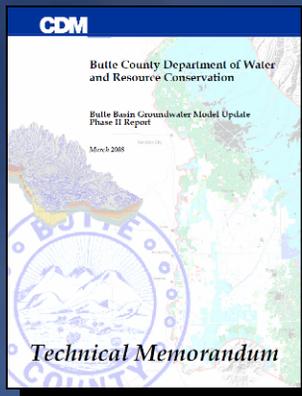
Animations include:

- **Terrain**
- **Rivers**
- **Land use**
- **Stratigraphy**
- **Wells**

Summary

- ◆ **Model calibration complete**
- ◆ **Base case developed**
 - ◆ **2030 level of development**
- ◆ **Water management scenario**
 - ◆ **SWP cutback to WCWD and JWD**

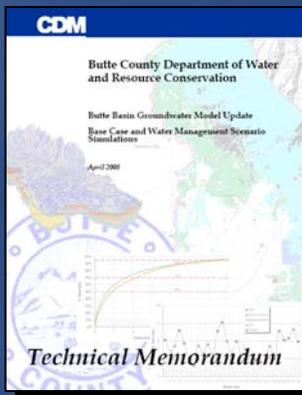
Documentation



Butte Basin Groundwater Model Update: Phase II Report

CDM

March 2008



Butte Basin Groundwater Model Update: Base Case and Water Management Scenario Simulations

CDM

April 2008

Acknowledgements

- ◆ Butte County Department of Water & Resource Conservation
- ◆ USBR Northern Area Office
- ◆ BBWUA; HCI Consultants
- ◆ CA DWR Northern District
- ◆ CA DWR Bay-Delta Office: Modeling Support Branch

Questions?

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