

Evaluating SVWMA Groundwater Effects

SVWMA Groundwater Subcommittee

September 15, 2003



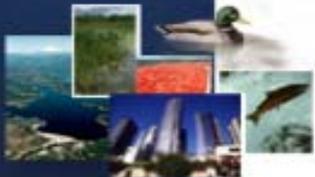
Goals/Role of Technical Measurement and Monitoring Committee

- **Develop monitoring program to evaluate performance of water management/system improvement projects**
- **Implement initial monitoring program and analyze data - refine as necessary**
- **Develop/define “New Water” criteria**
- **Assist EDC in identifying groundwater program/project effects**
- **Members include agency/district representatives with surface & g/w expertise**



Groundwater Subcommittee

- **Reports to TMMC**
- **Created to effectively address complex issues related to conjunctive use**
- **Members have specific project evaluation and/or technical expertise**
- **Charge:**
 - Develop groundwater monitoring plan
 - Analyze groundwater monitoring data

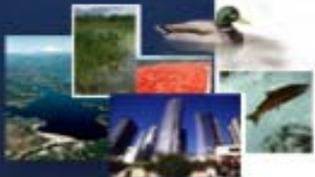
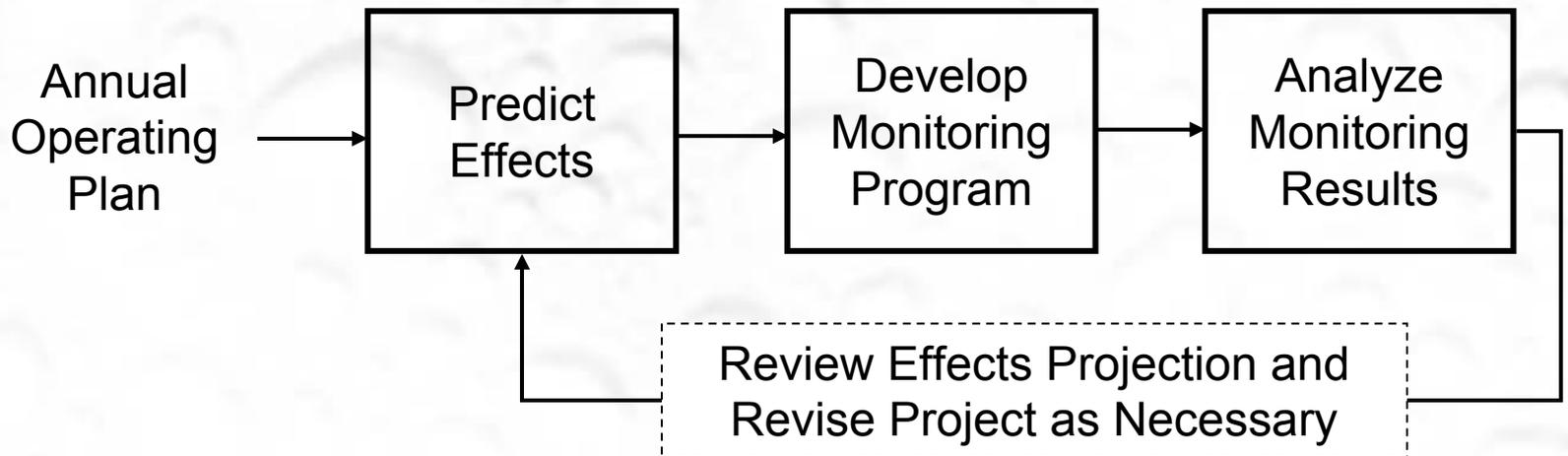


Groundwater Subcommittee Approach

- **Confirm project definitions**
- **Estimate effects based on modeling analysis**
- **Consider different monitoring needs**
 - Stream-aquifer interaction
 - Basinwide impacts (e.g. long-term drawdown and/or overdraft, subsidence, water quality)
 - Third party impacts - water levels and quality



Annual Groundwater Monitoring Approach

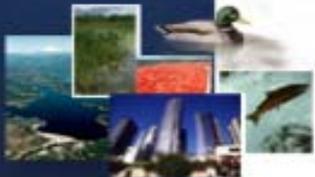


Why Do We Need Groundwater Modeling?

- **Used to predict effects of project operations on GW/SW resources**
- **Assist in developing monitoring network based on anticipated impacts**
- **Provides analytical framework for evaluation of stream-aquifer interaction**
- **Assists in evaluating impacts and mitigation for the EIS/EIR**



Evaluation Approach



Sources of Groundwater

- **Groundwater is produced from three sources:**
 - Water removed from storage in the aquifer (drawdown)
 - Water leaking from rivers and streams
 - Interception of water that would have recharged rivers and streams



Key Issues

- **Timing of pumping effects on surface streams**
- **Pumping effects on other users**

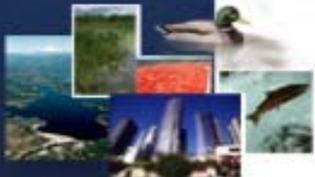


Generic Project Operations

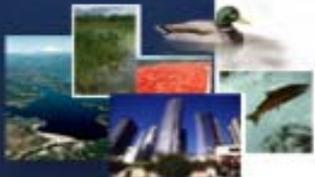
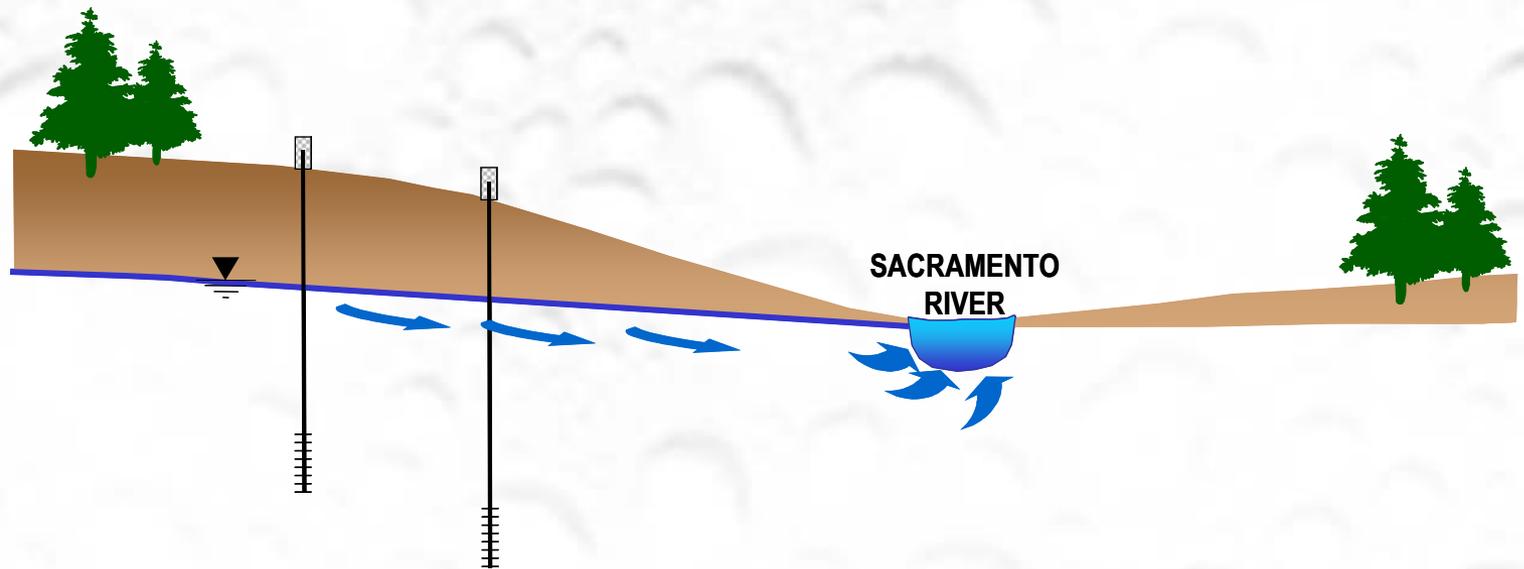
- **Drawdown during the irrigation season persists into the winter**
- **Resultant effects on streams also continues beyond the pumping season**
- **Timing of these impacts is critical factor in determining if mitigation is required**
- **Duration of impacts dependent on rate of winter aquifer re-filling**



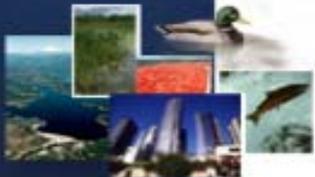
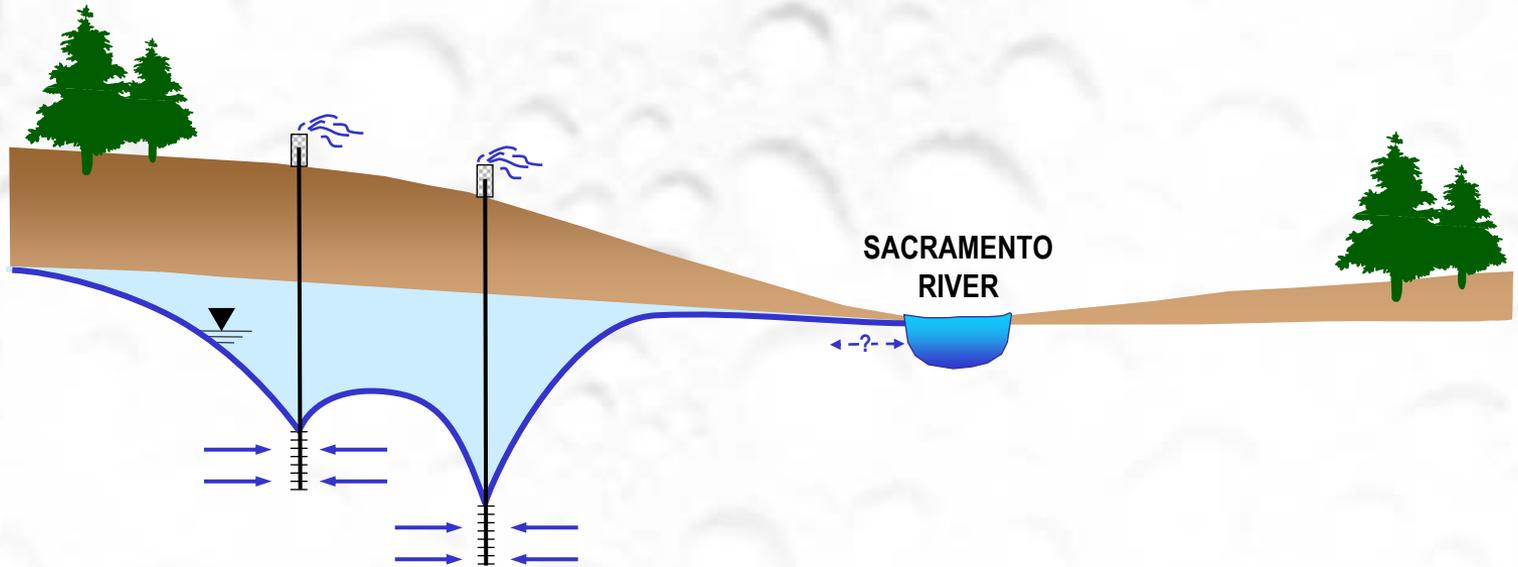
Groundwater Level Changes During Project Operation



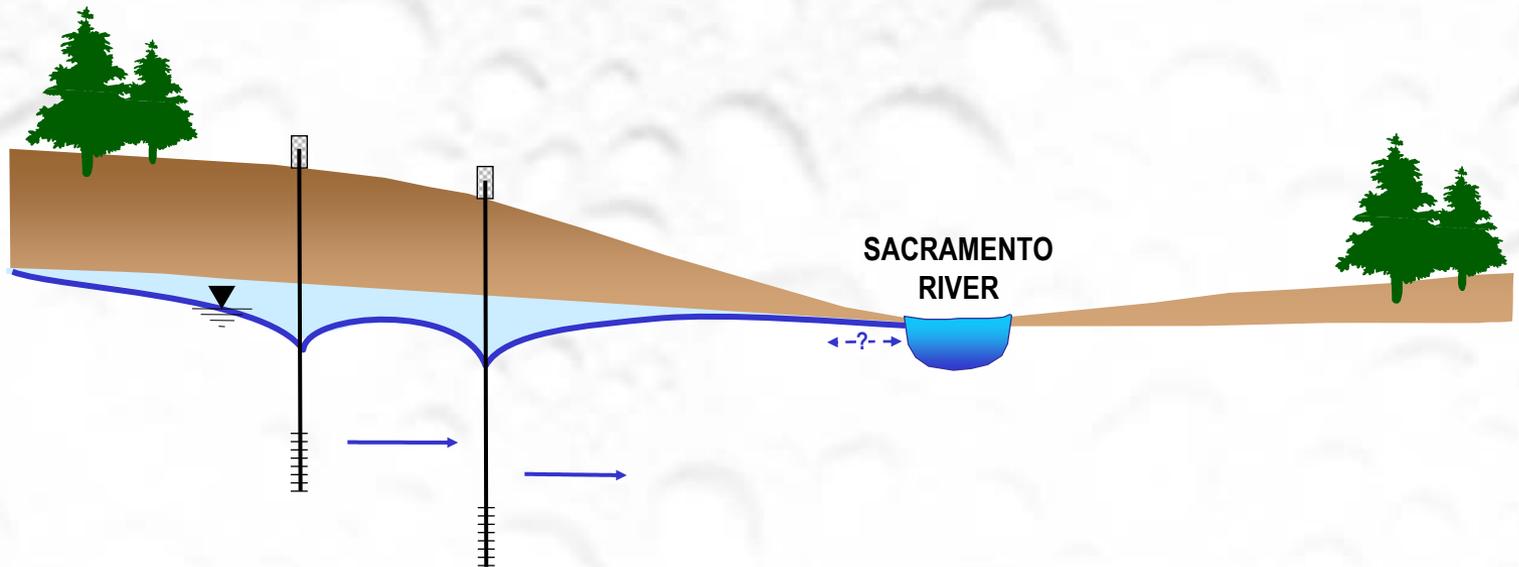
Prior to Irrigation Season



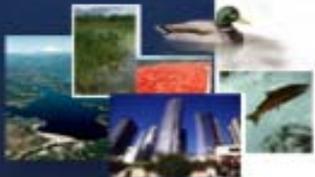
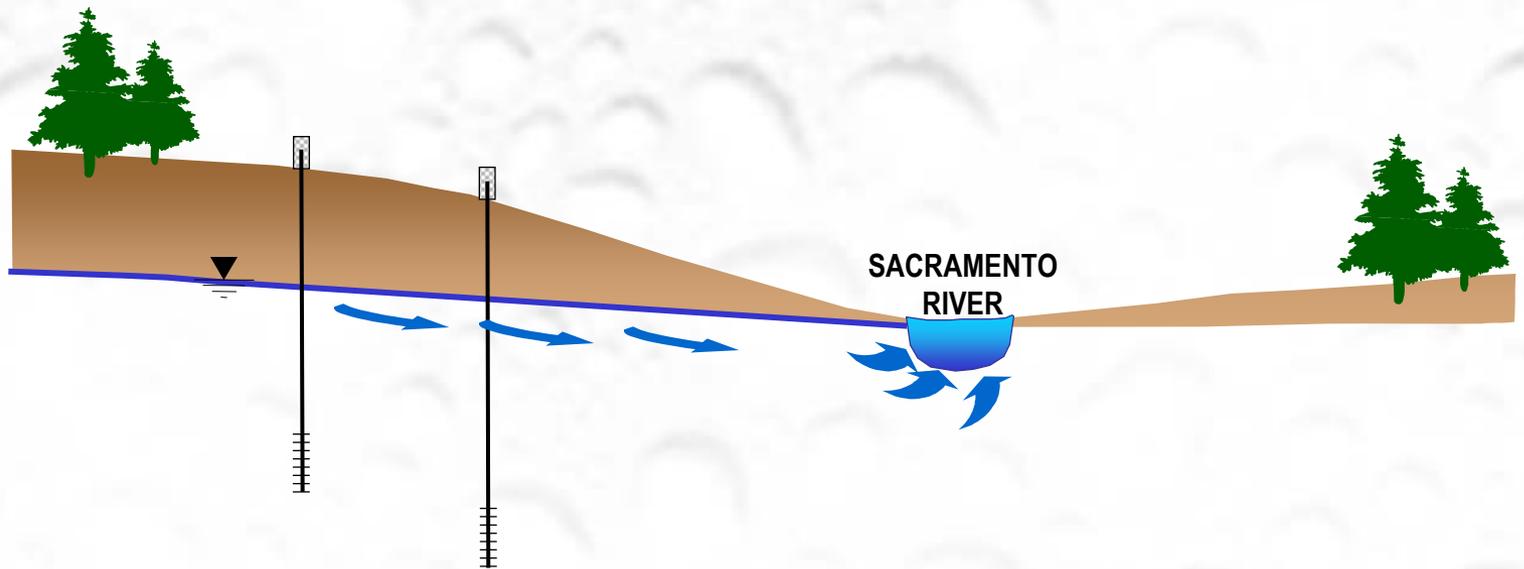
Projects in Operation



End of Operating Season (prior to winter rains)

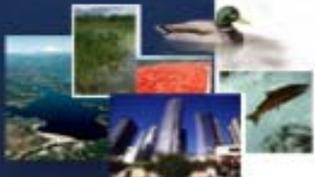


End of Winter



Approach to Evaluating the Effects of Pumping

- **Quantitative assessment of impact of pumping on groundwater levels/streams**
- **Use the results of the modeling to:**
 - Identify critical parameters to focus monitoring
 - Provide input to impact assessment and mitigation
 - Design monitoring programs

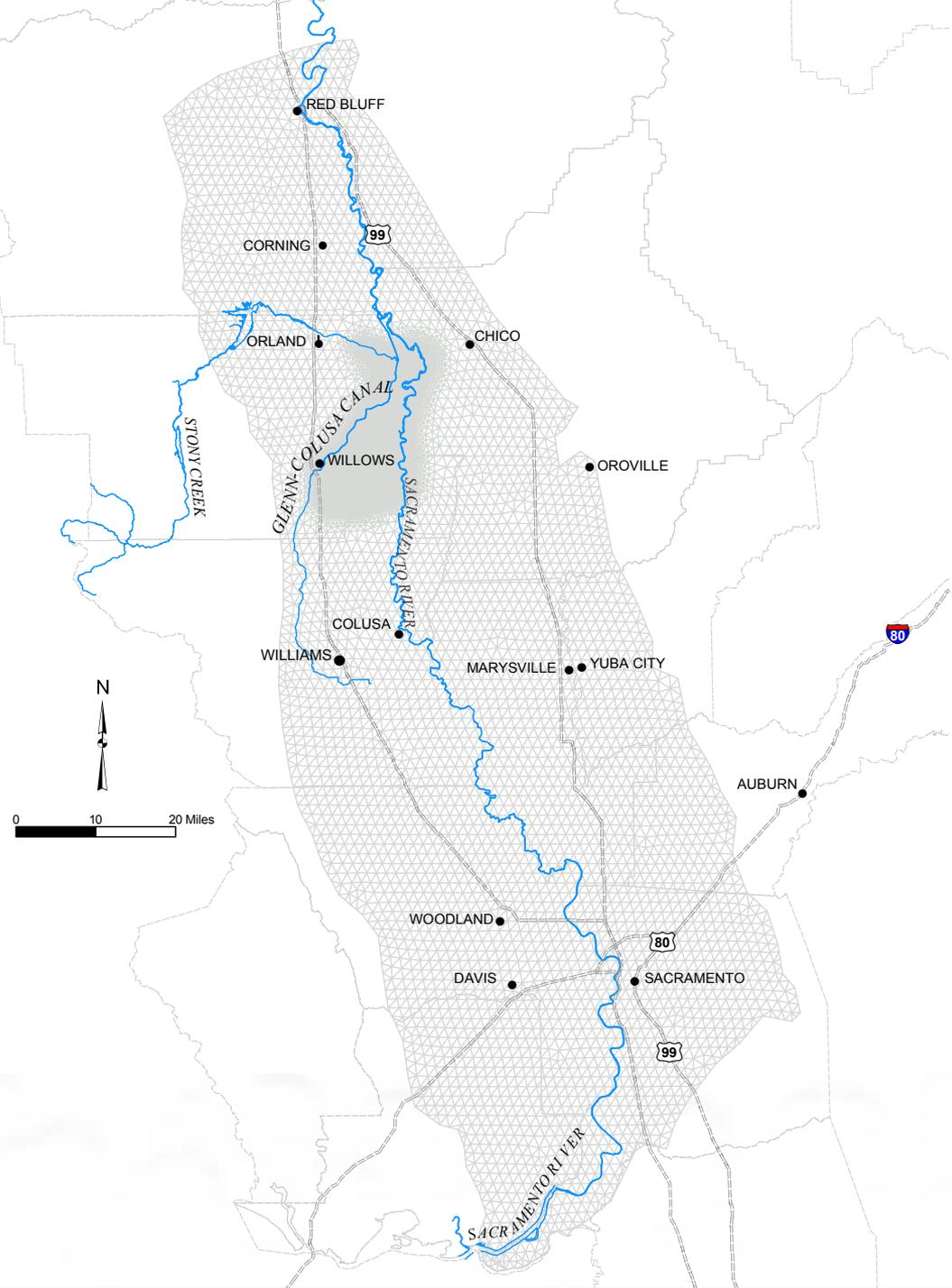


Example of the Approach

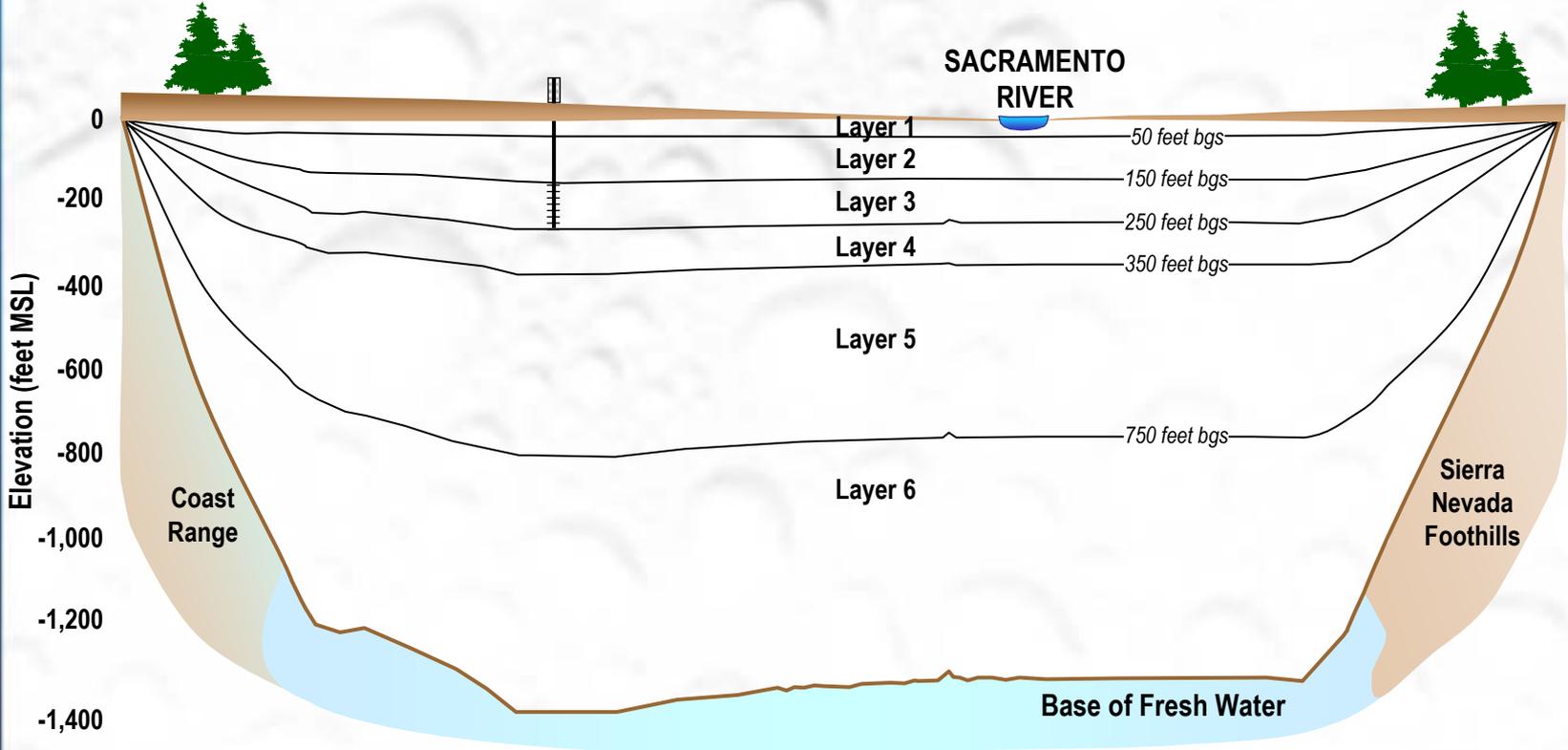
- **Developed a six layer finite element model of the entire valley**
- **Simulations predict incremental project impacts:**
 - Effects on surface streams
 - Drawdown in and near the well field



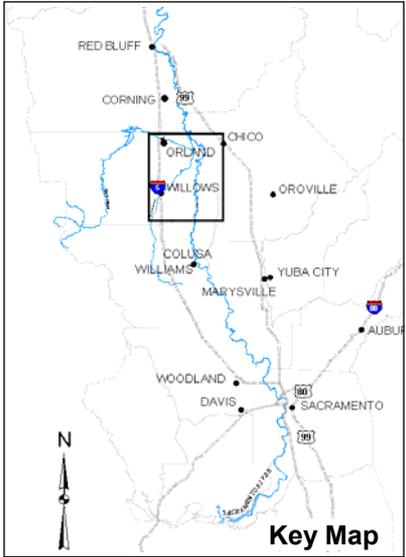
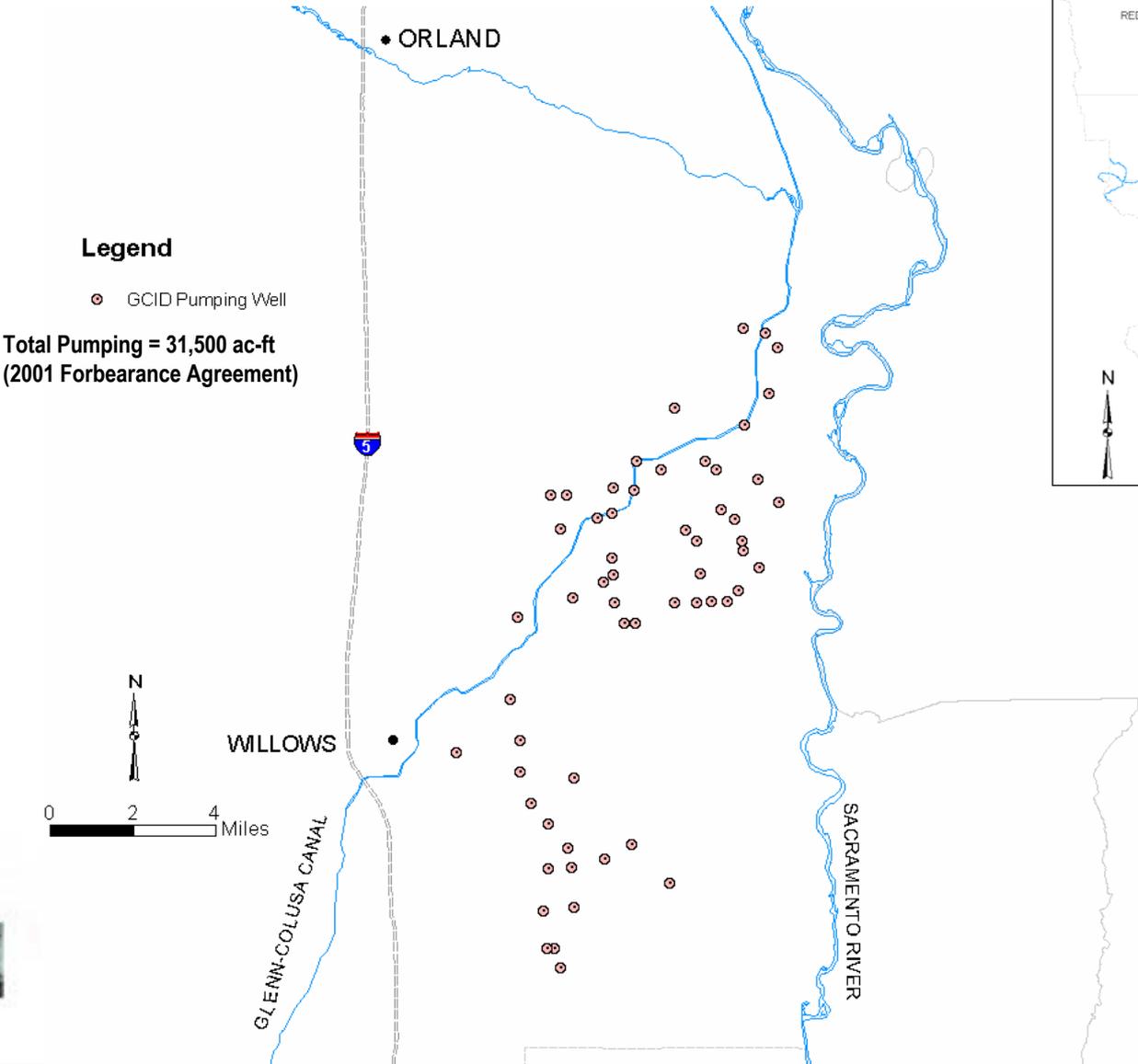
Model Grid



Cross-Section of Sacramento Valley



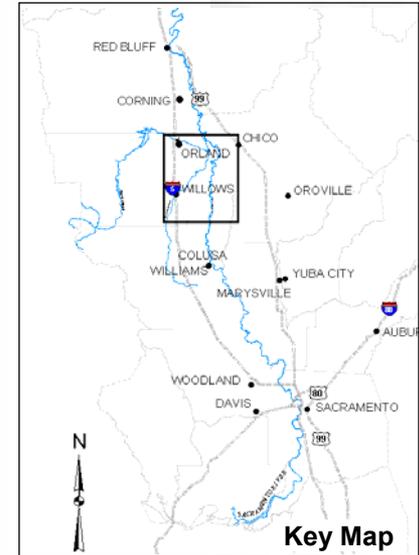
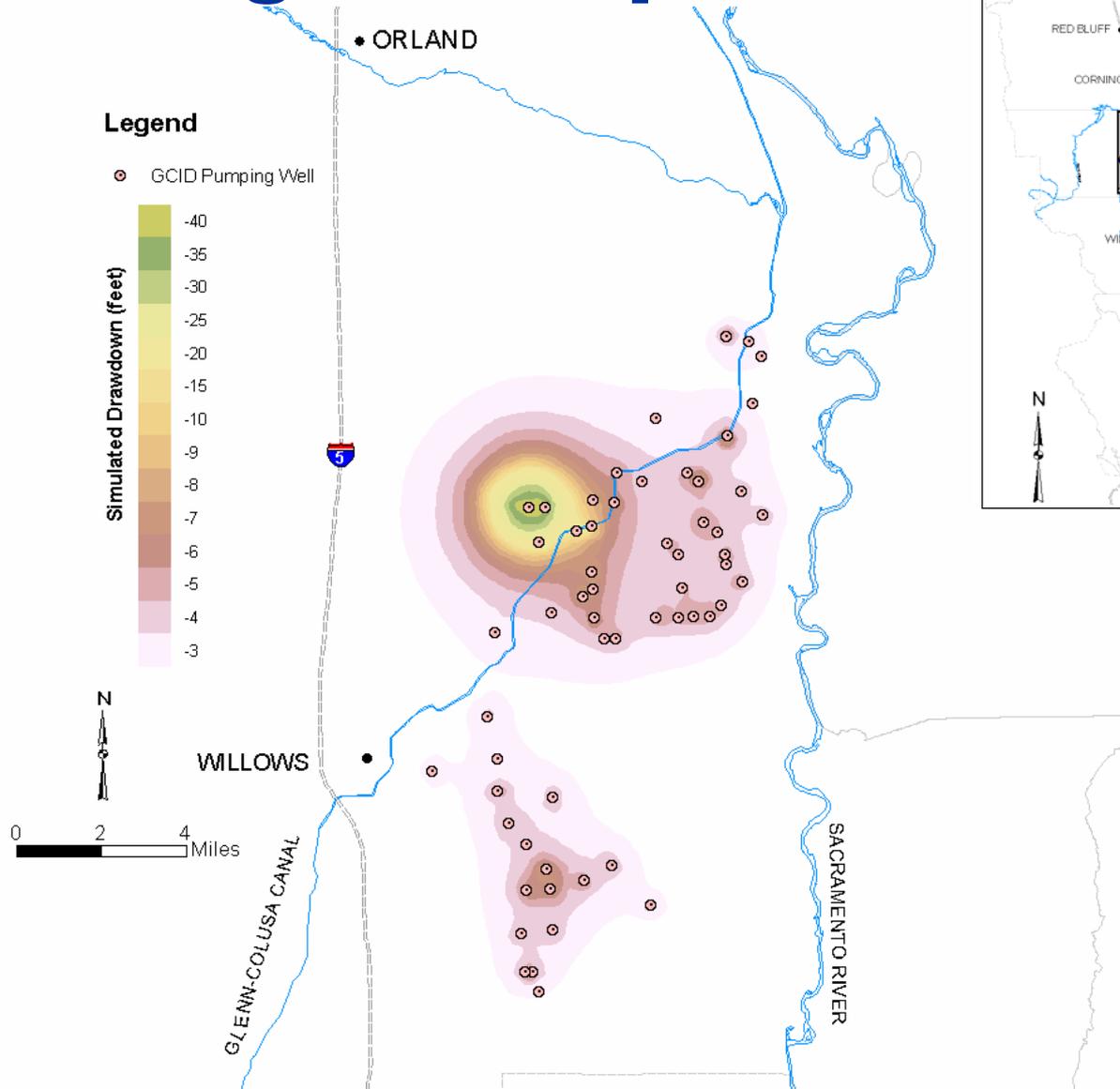
Locations of GCID wells



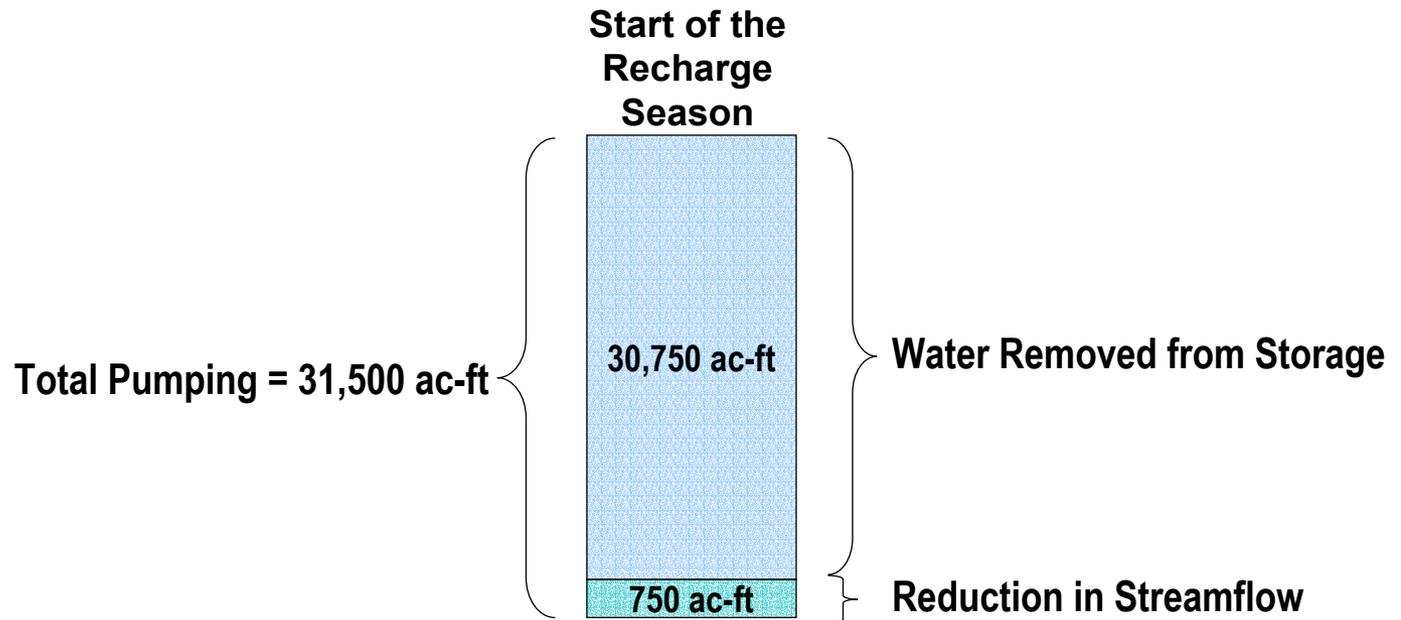
Modeling Results



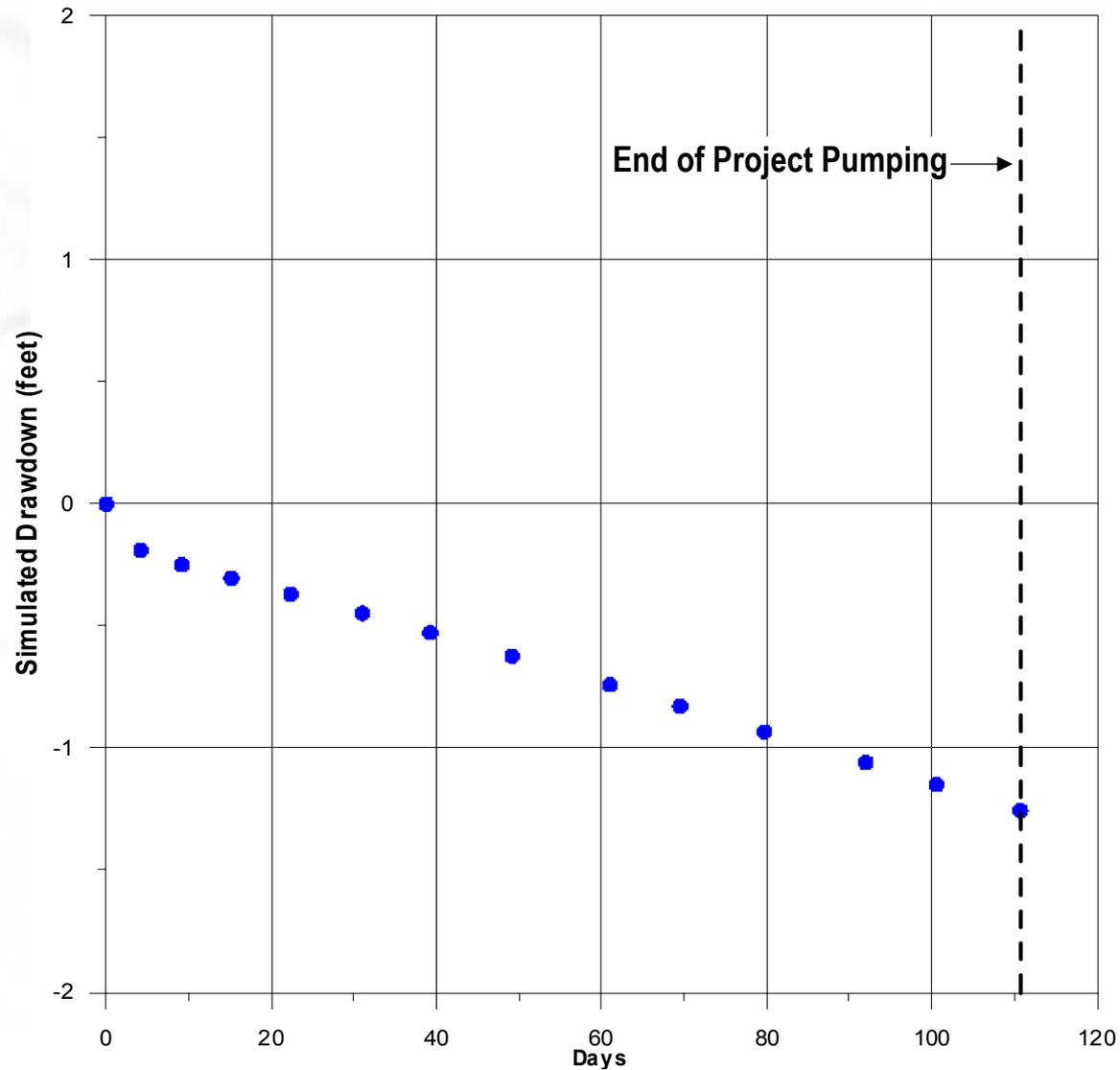
Maximum Simulated Drawdown in the Regional Aquifer



Sources of Water Pumped from Wells



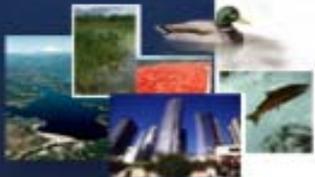
Simulated Drawdown at the River



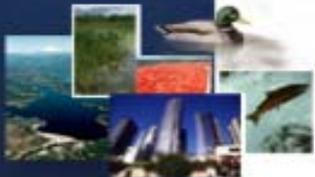
Summary of Example Application (GCID)

- **Stream infiltration: Less than 3 percent of the total pumping**
- **Pumping Impacts:**

Distance from Well (miles)	Drawdown (feet)
0.5	3 to 35
1.0	up to 20
>2.0	up to 8



Project-Wide Approach

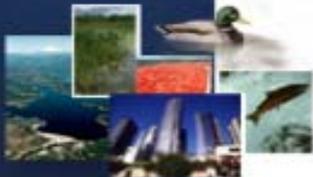


Evaluation of Proposed Projects' Effects

- **Identify location; pumping depth, rate and schedule for all projects (specific locations where possible)**
- **Compute changes in g/w levels and effect on surface streams due to project pumping**
- **Estimate amount of aquifer “refilling” needed to replenish groundwater storage**
- **Estimate likely rate of aquifer winter refilling anticipated under various climatic conditions**

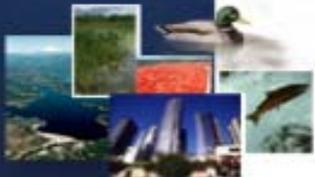


Example of Aquifer Refill (Butte Basin)



Next Steps

- **Characterize initial projects**
- **Support impact evaluation for EIS/EIR**
- **Develop initial groundwater monitoring plan**
- **Ongoing data collection and interpretation**



Evaluating SVWMA Groundwater Benefits/Impacts

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