

**FCGMA**  
**Groundwater Management Plan**  
**Board Workshop**  
**Friday, March 9, 2007**



**FCGMA Staff**  
**Steven Bachman, PhD, UWCD**

# Workshop Subjects

- Part I: Previous Management Plan Strategies – How have they worked and where are we?
- Part II: Future Management Strategies – What are they and how effective would they be?
- Part III: Recommended Actions

# **Part I**

## **Previous/Current**

# **Management Strategies**

# 1985 Management Strategies

- Limitation of Groundwater Extractions
- Encourage Both Wastewater Reclamation and Water Conservation
- Oxnard Plain Seawater Intrusion Abatement Project
- Operating Criteria for the Oxnard Plain
- Restrictions on Upper Aquifer System Wells
- Groundwater Monitoring Program
- Contingency Plan for LAS Seawater Intrusion
- Las Posas Basin Pumping Restrictions
- Monitor FCGMA Groundwater Extractions
- Metering of Groundwater Extractions

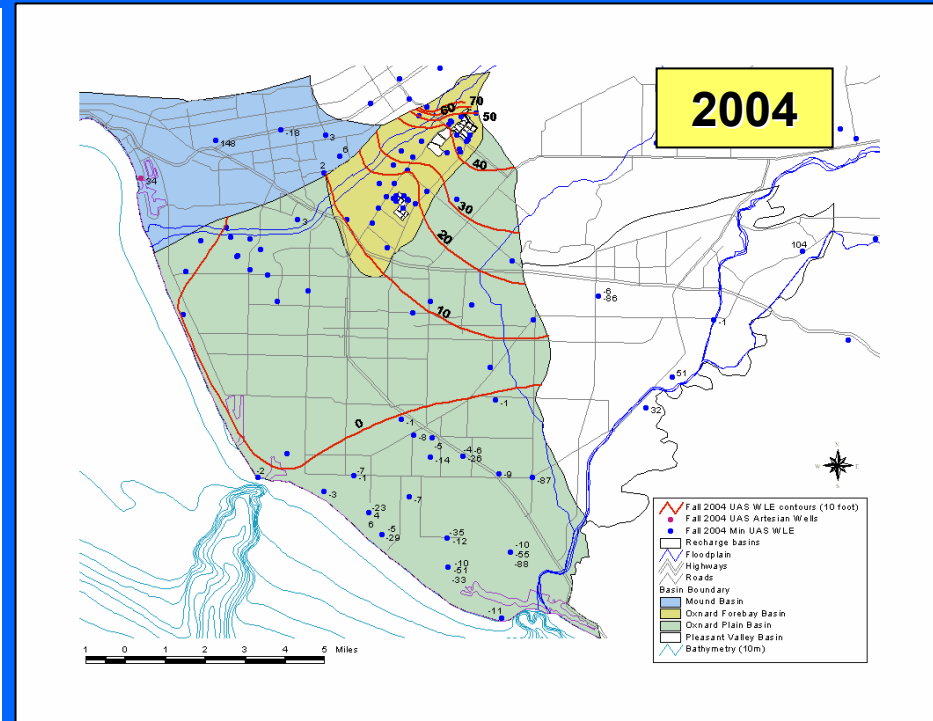
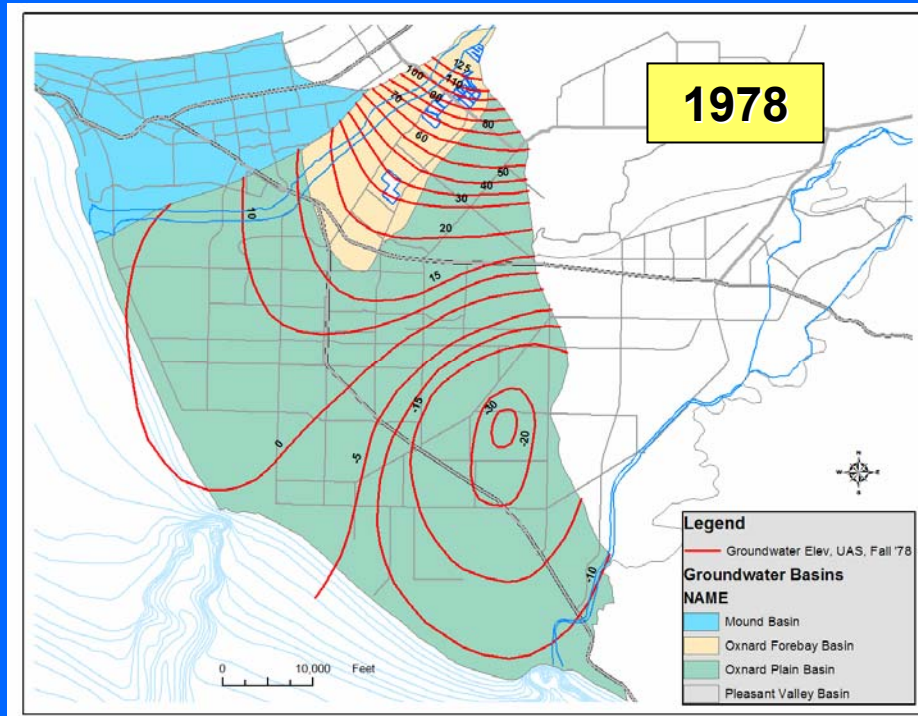
# Other Strategies Applied

- Fox Canyon Outcrop Expansion Area
- Noble Spreading Basins
- Las Posas Basin ASR Project
- Conejo Creek Diversion Project
- Supplemental M&I Water Program
- Saticoy Wellfield
- Importation of State Water
- Additional Groundwater Monitoring
- Calibration of Groundwater Meters

# How Effective Are the Strategies?

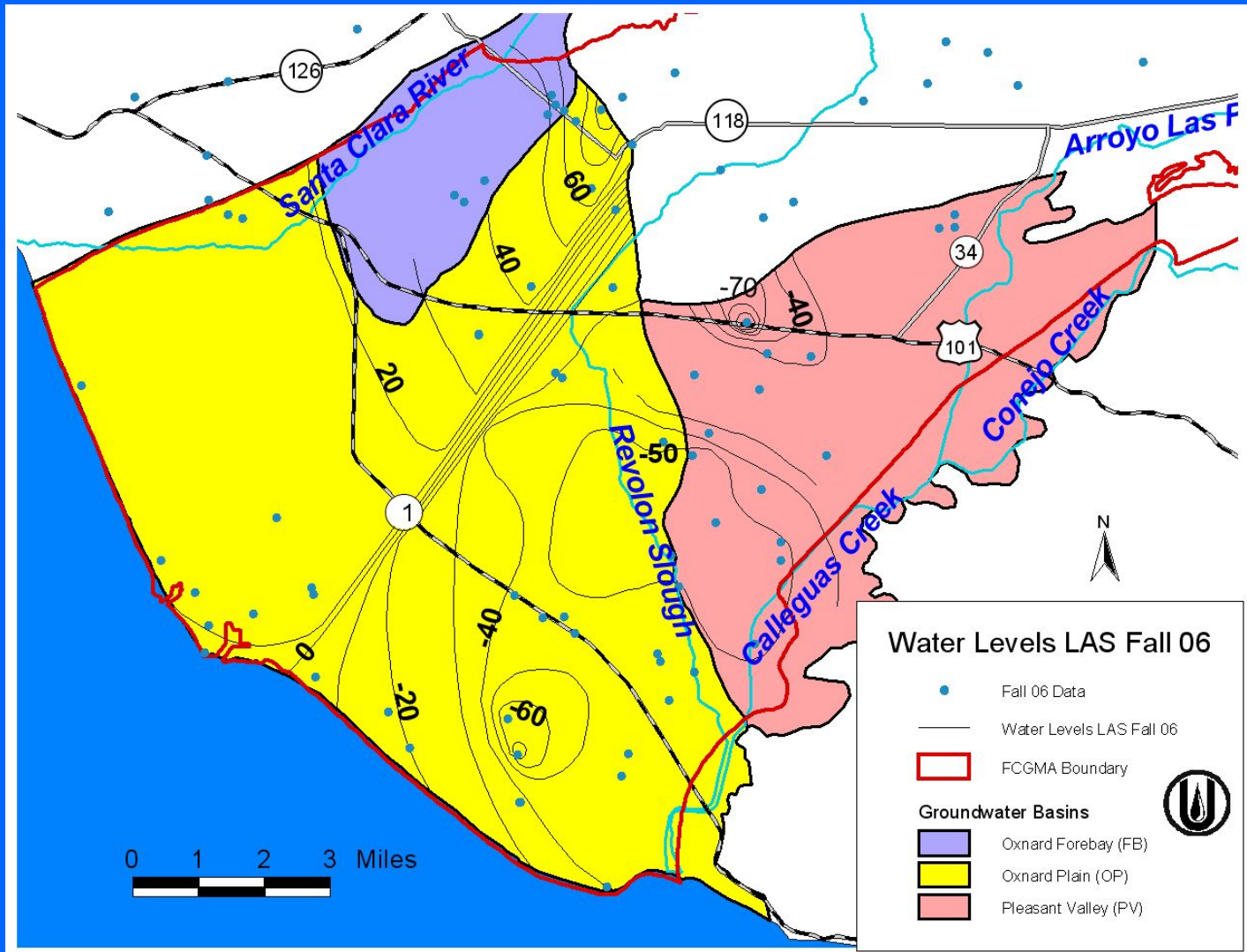
1. Current observations
2. Basin Management Objectives (BMOs)
3. Reduction in pumping vs. basin yield

# Coastal Pumping Depression



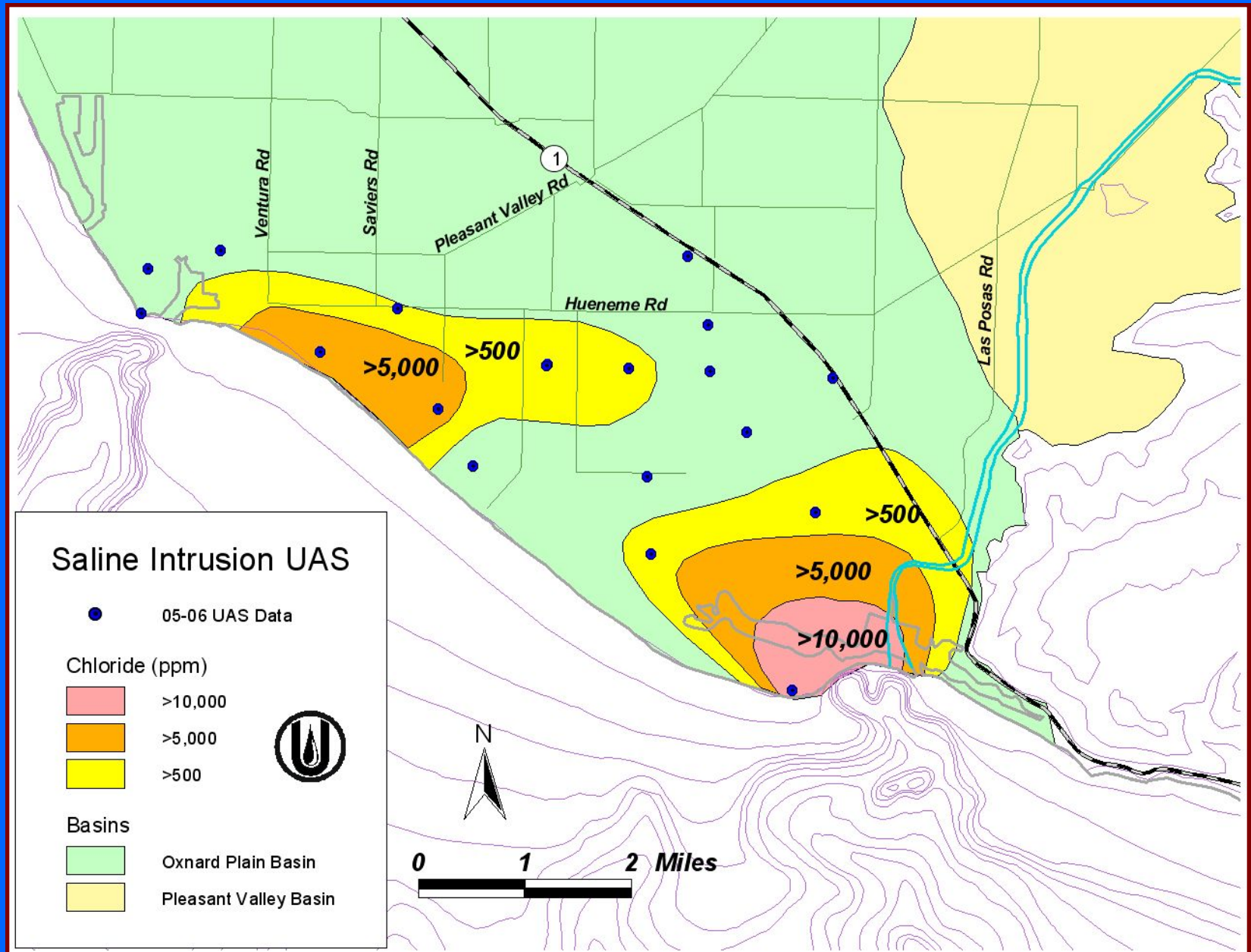
- UAS pumping depression eliminated, even in dry years

# But We Have a “New” Problem

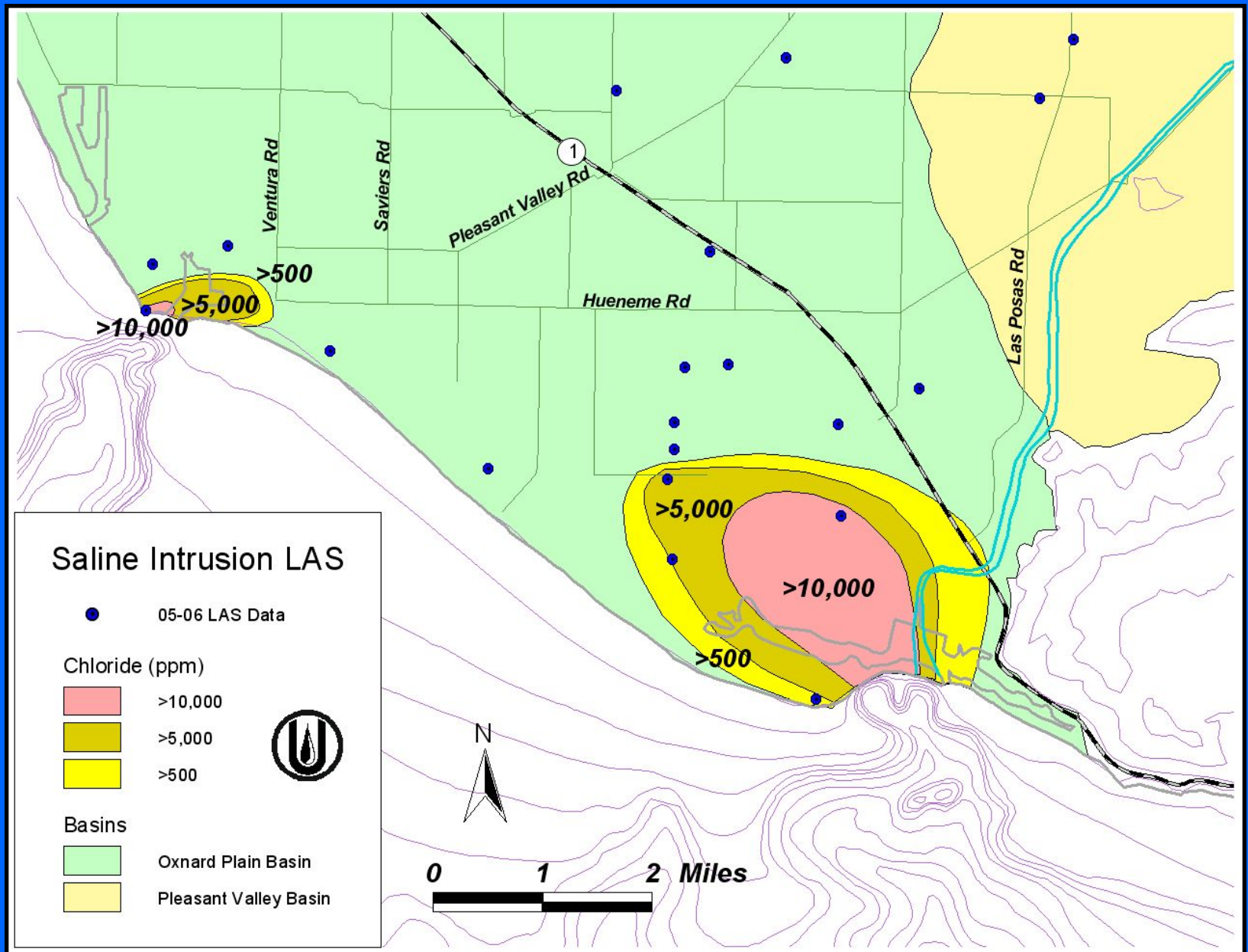


- Pumping depression in LAS

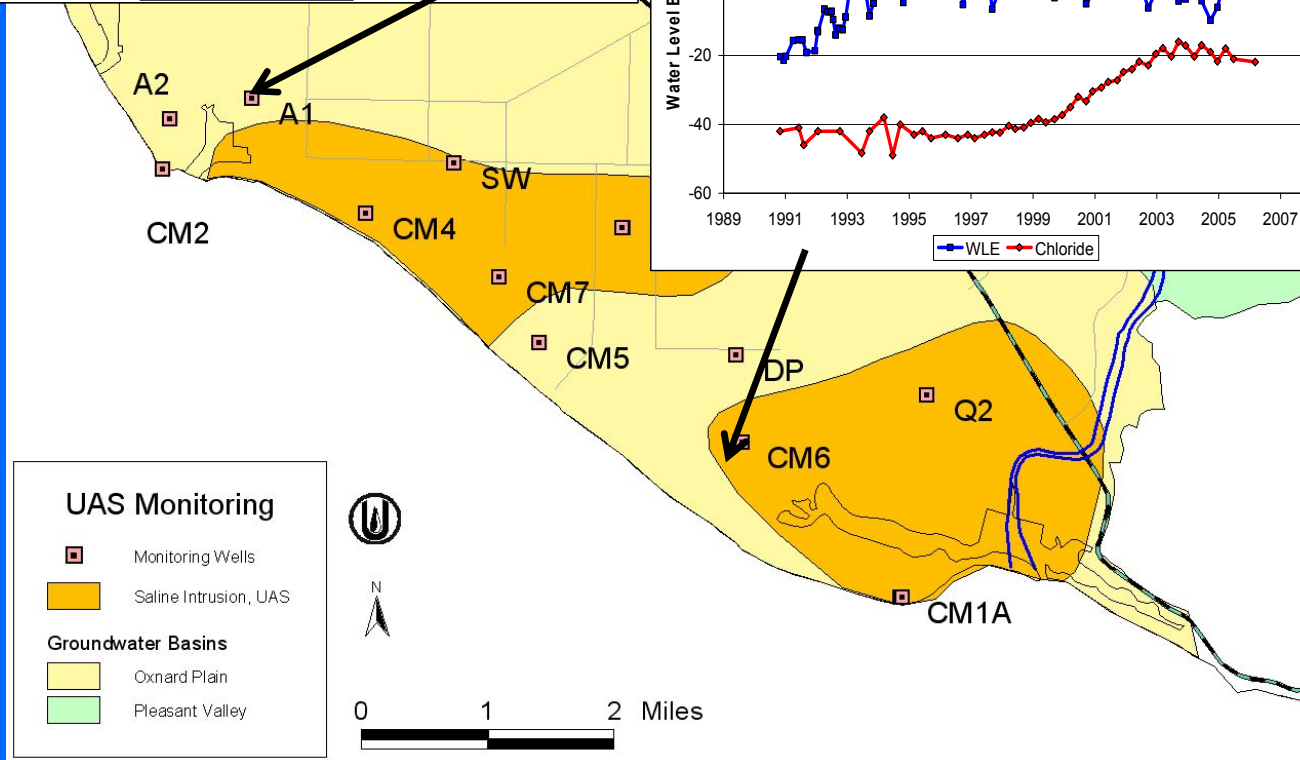
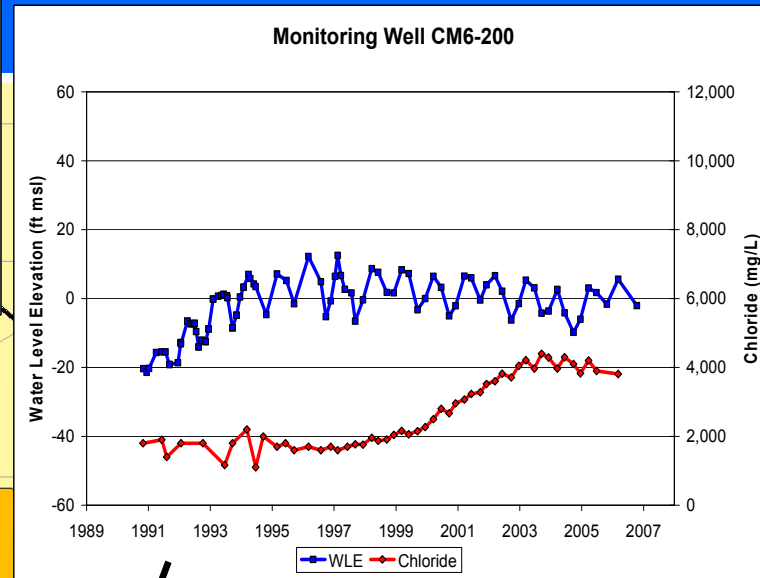
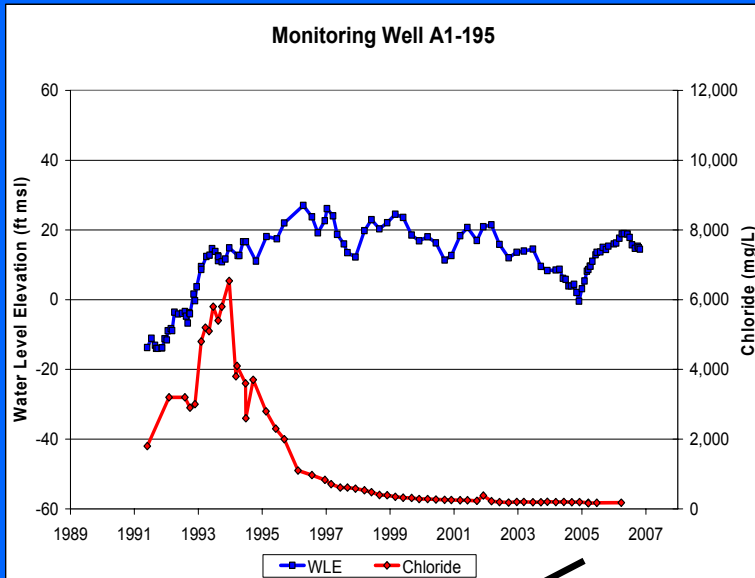
# Saline Intrusion (UAS)



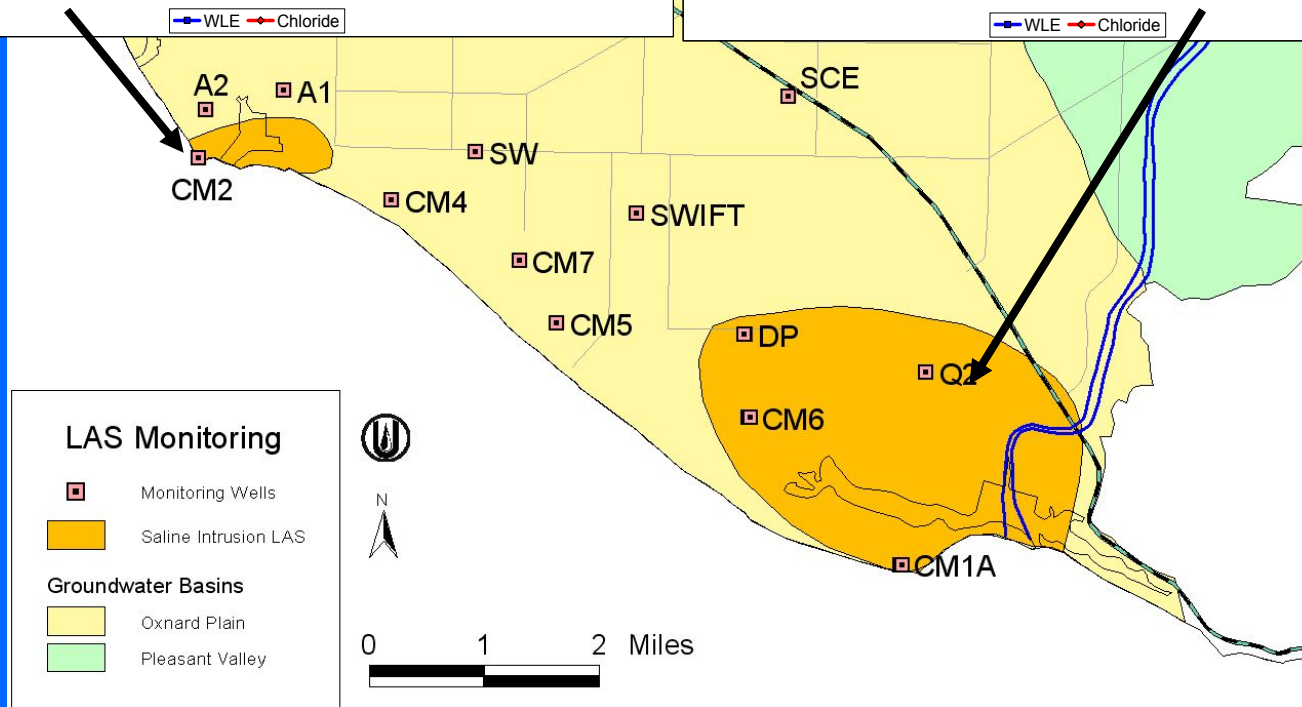
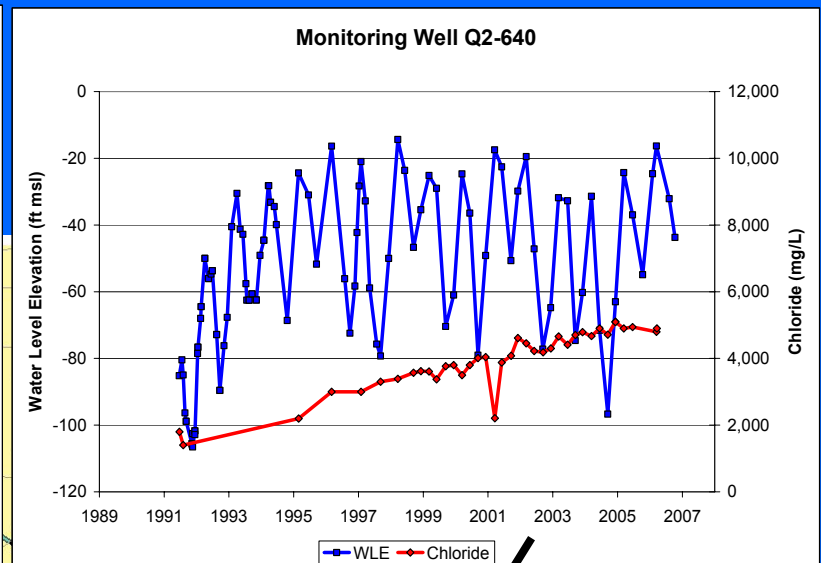
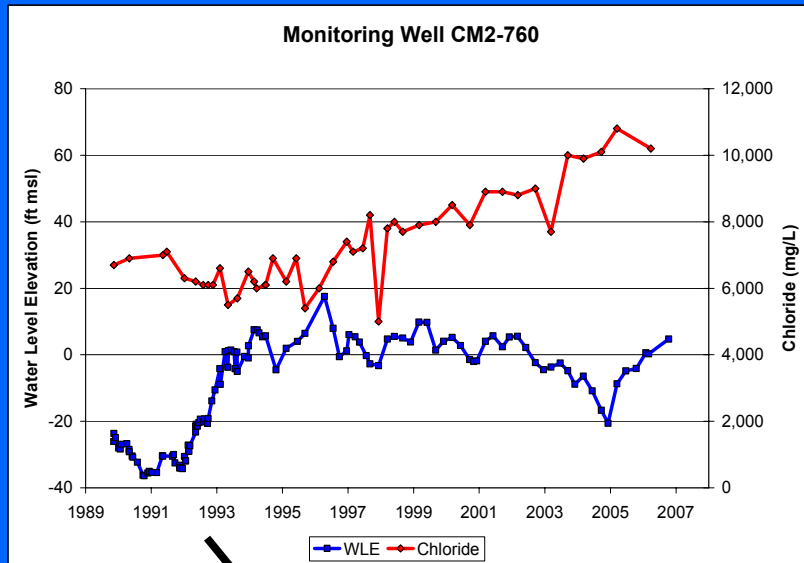
# Saline Intrusion (LAS)



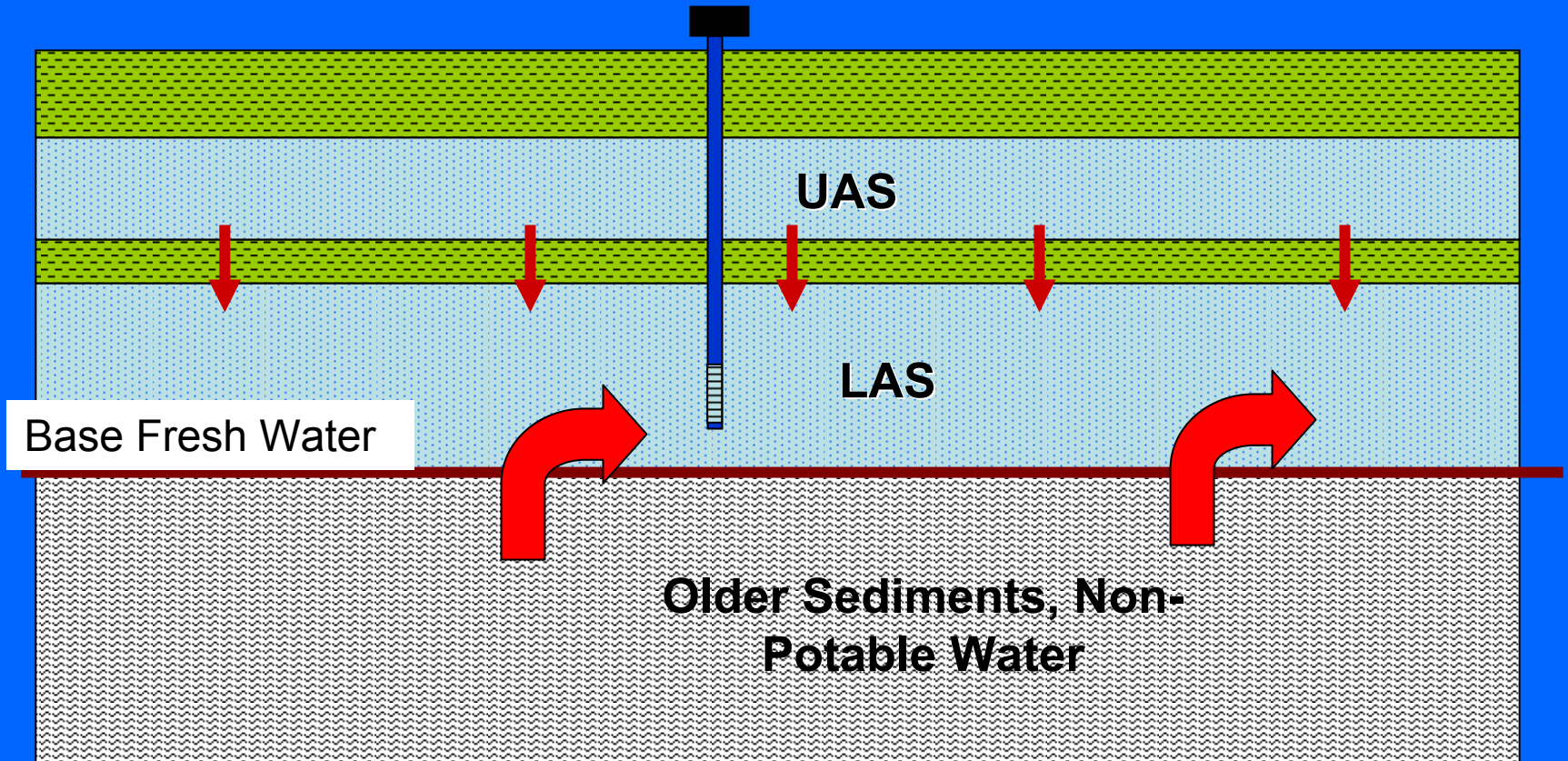
# Saline Intrusion (UAS)



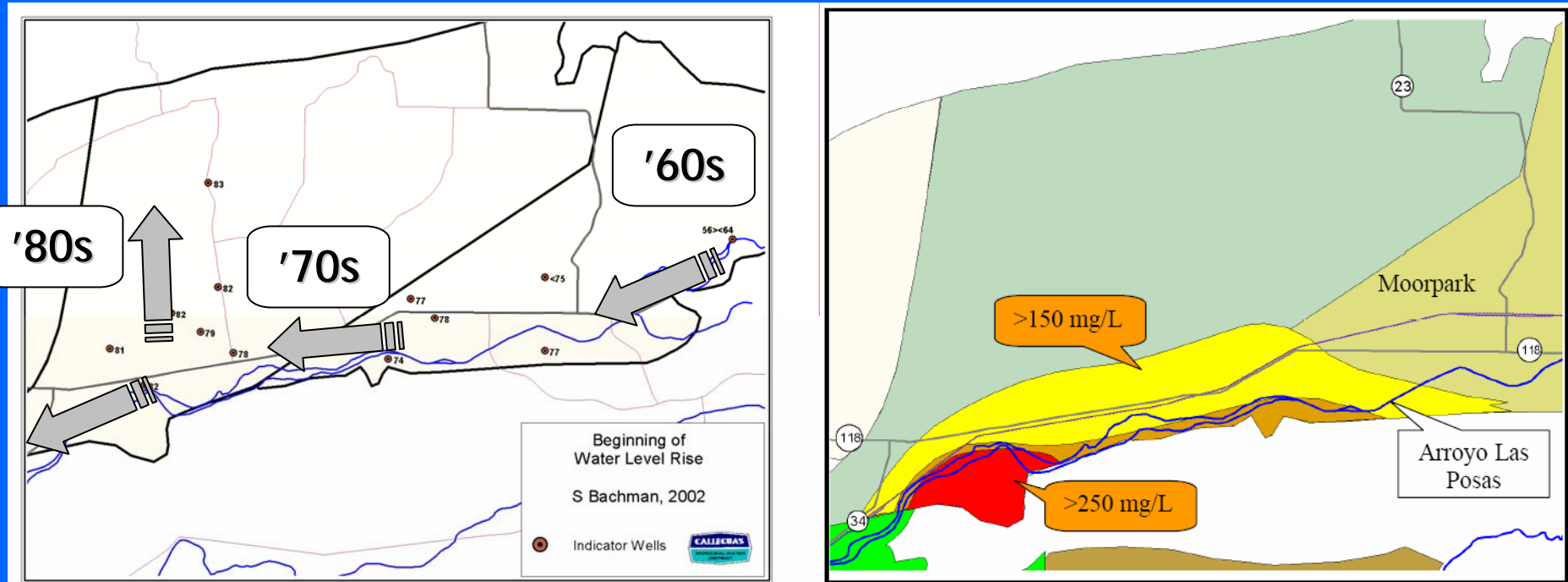
# Saline Intrusion (LAS)



# Saline Intrusion in Inland Areas

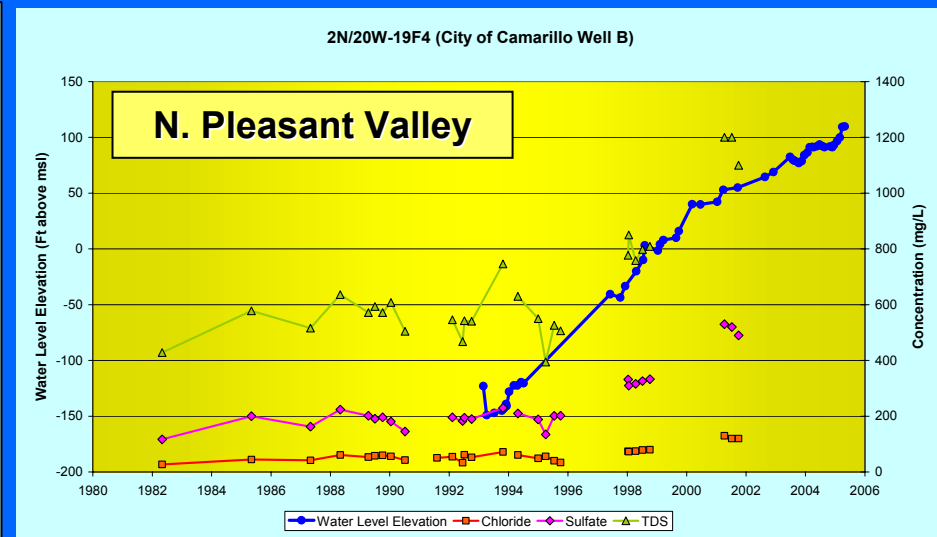
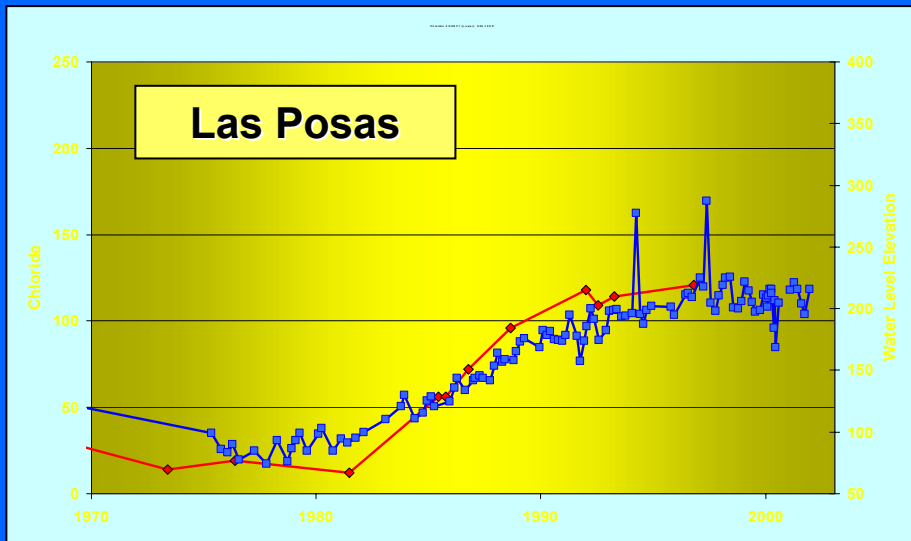


# Las Posas Basin Chlorides



- Increased flows in Arroyo Las Posas
- Chlorides also increase

# Water Quality vs. Water Levels



- Las Posas – water level ↑ water quality ↓
- N Pleasant Valley – water level ↑ water quality ↓

# Basin Management Objectives

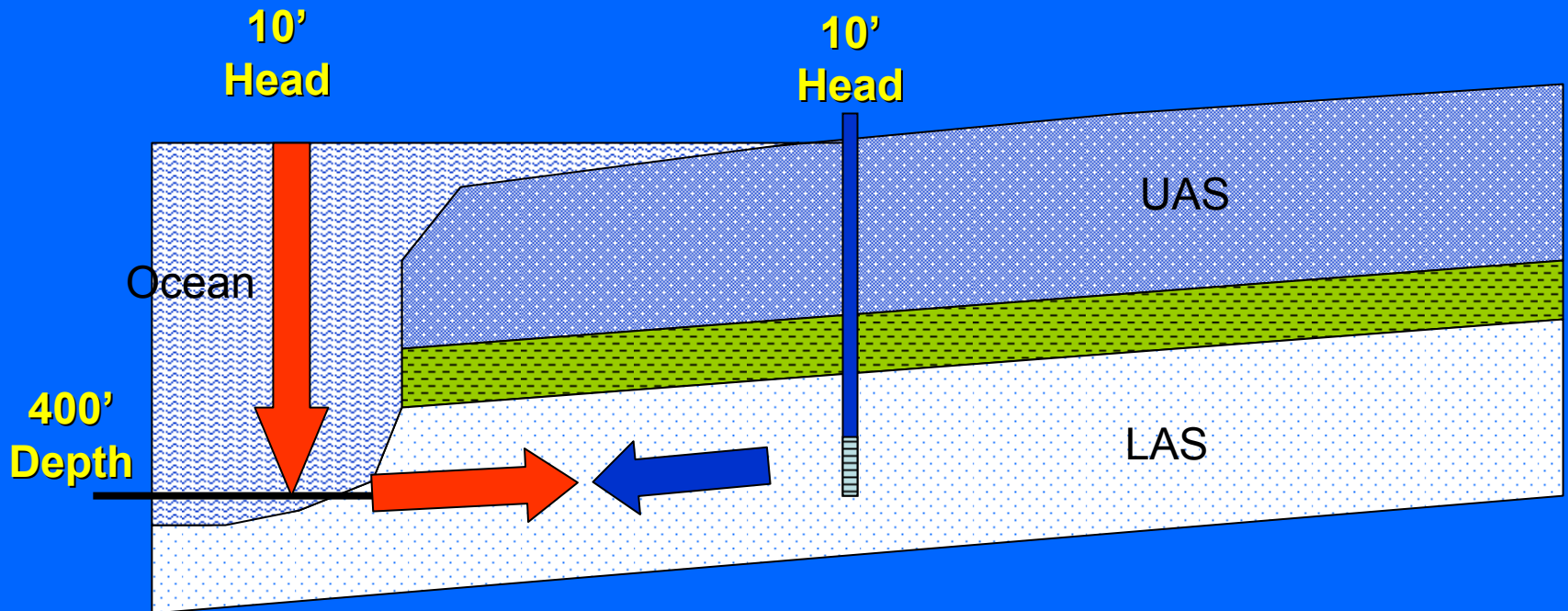
- Key “thermometer” of basin management
- Required by State
- Objective = numeric goal to protect the basin
- Can use groundwater levels and/or water quality

# How Do We Set BMOs for GMA?

- Coastline = **prevent seawater intrusion**
  - Average groundwater levels sea level+
  - Low chloride concentrations
- Inland (south Oxnard Plain and Pleasant Valley) = **prevent saline intrusion**
  - Minimize upward or downward gradient
  - Low chloride concentrations

# Problem with Dense Seawater (Lower Aquifer System)

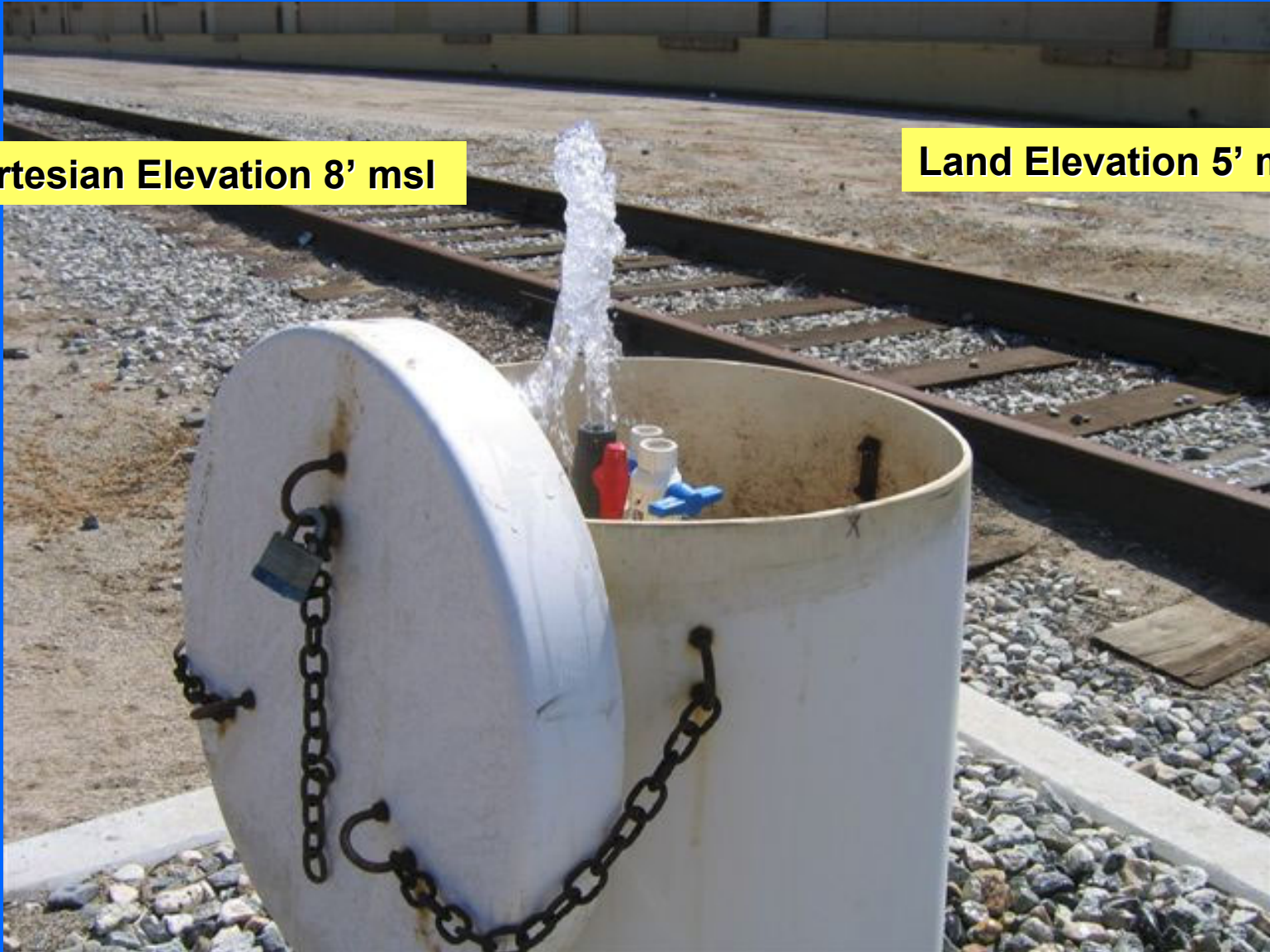
2.5' Head for every 100'  
Ocean Depth



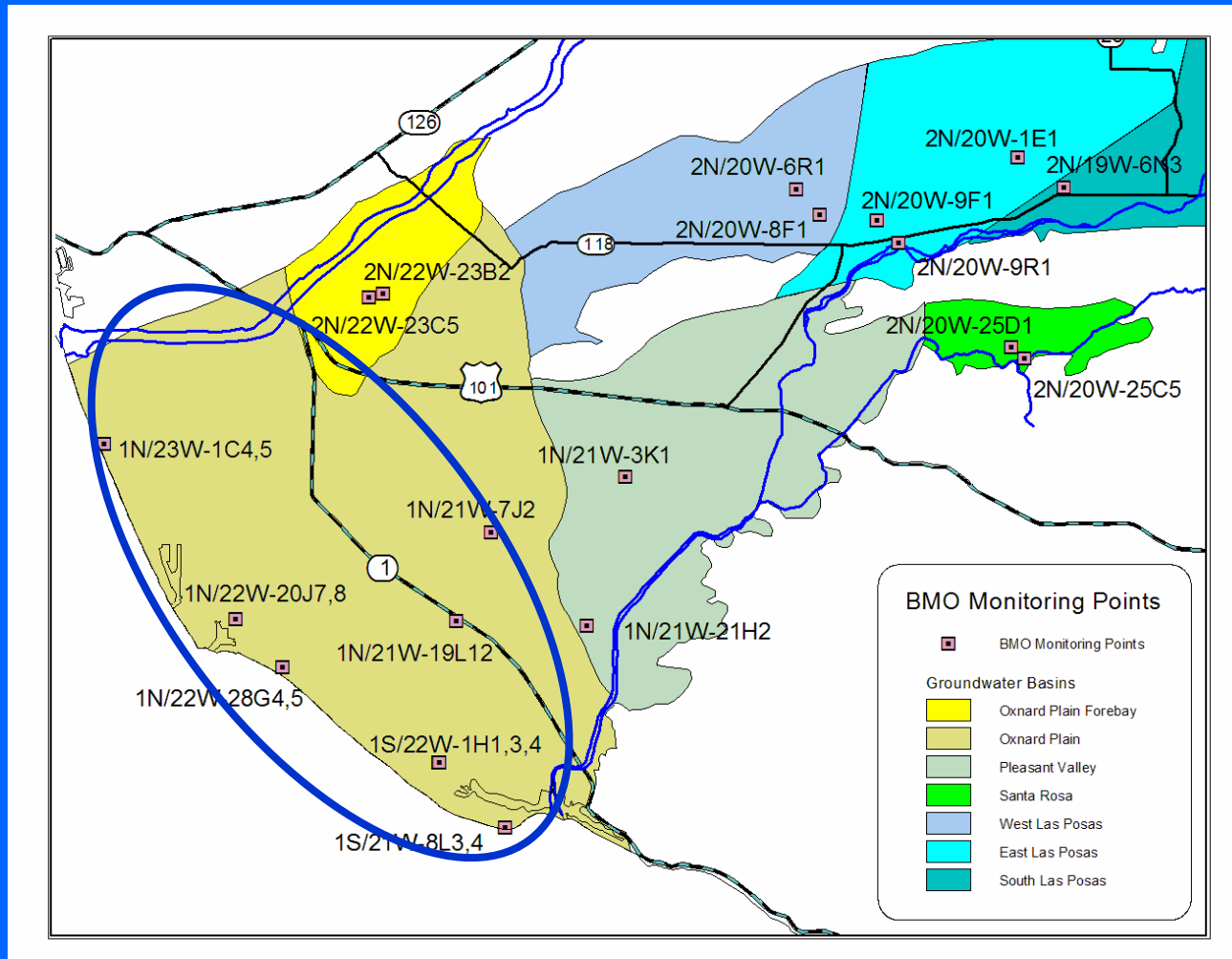
# Coastal Monitoring Well

Artesian Elevation 8' msl

Land Elevation 5' msl



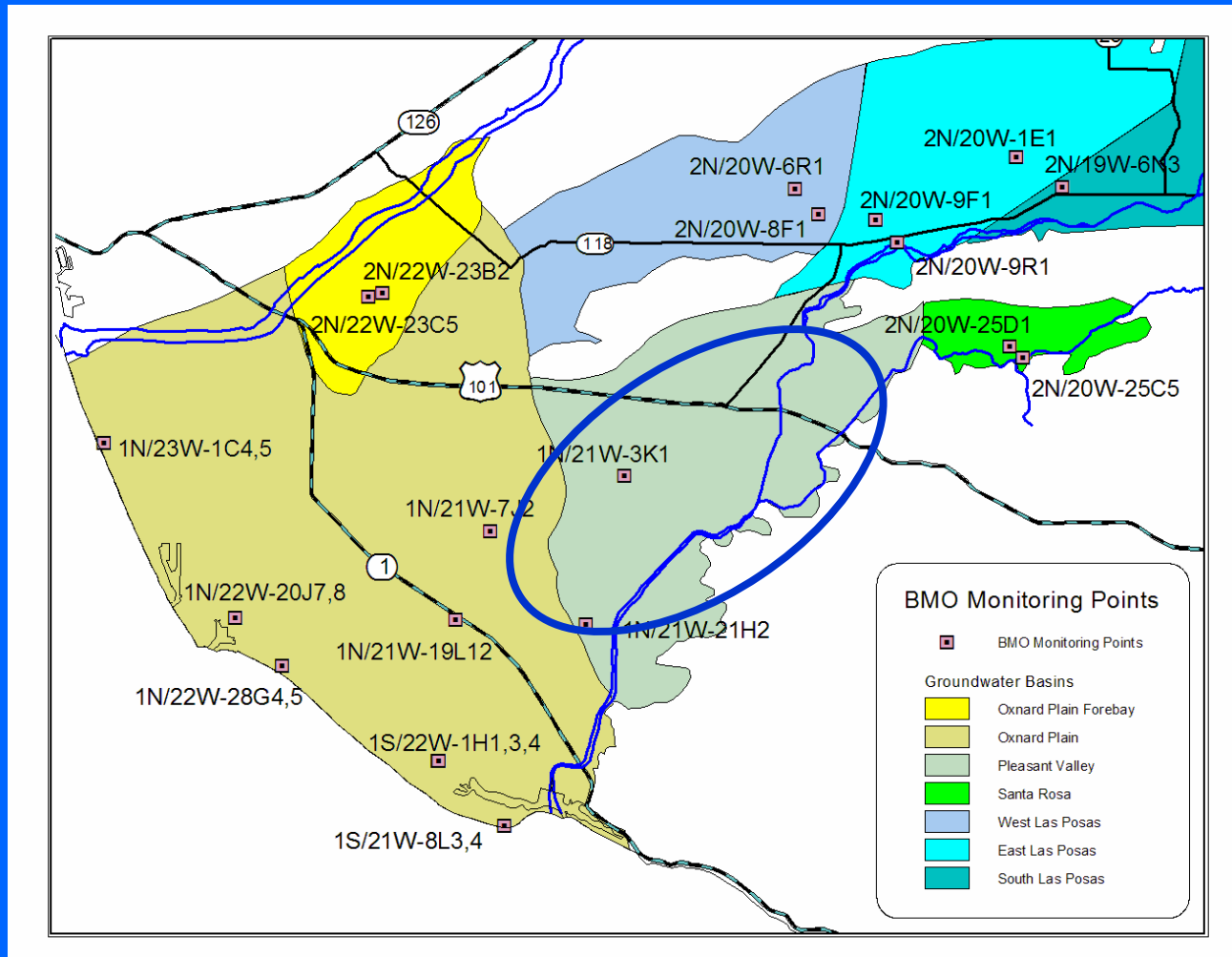
# Oxnard Plain BMOs



- UAS 3' to 6' msl
- LAS 13' to 20' msl

Chloride <150 mg/L  
Chloride <150 mg/L

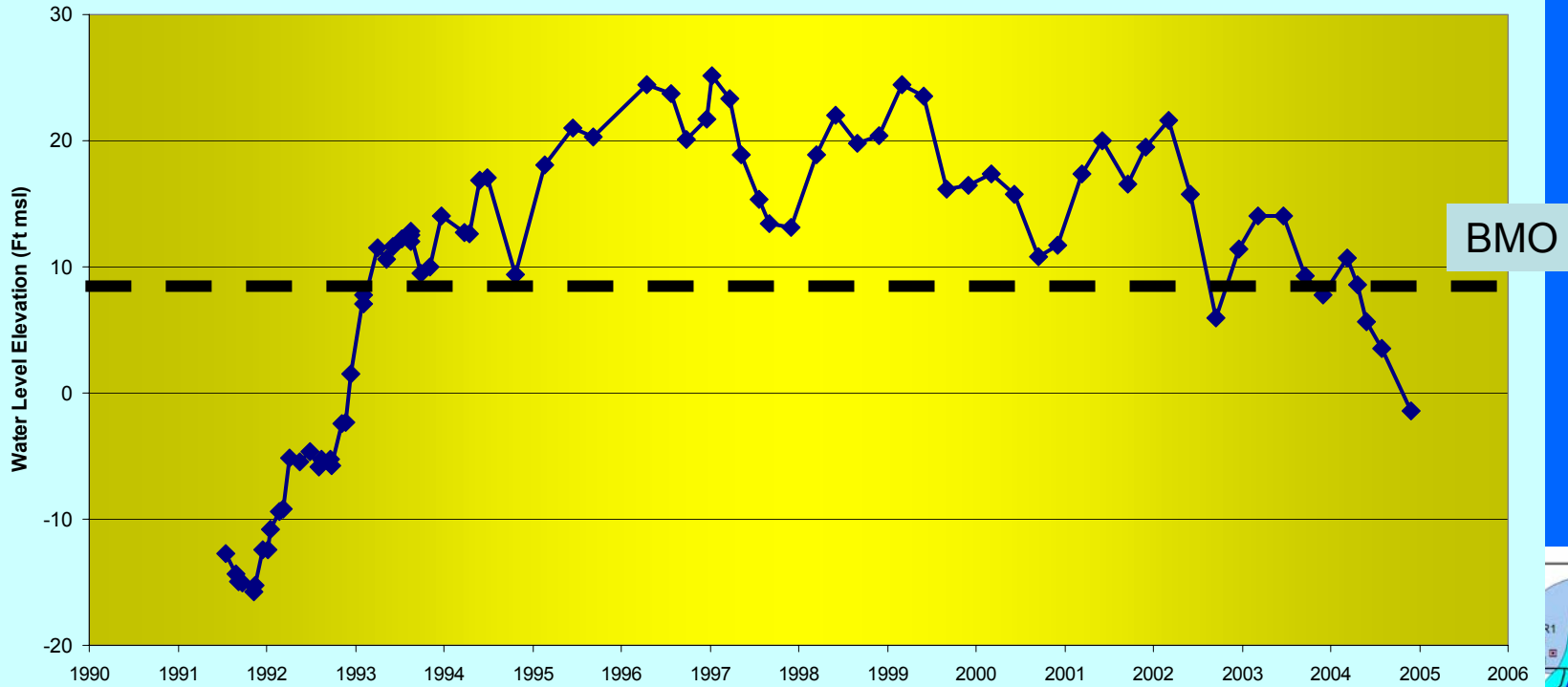
# Pleasant Valley BMOs



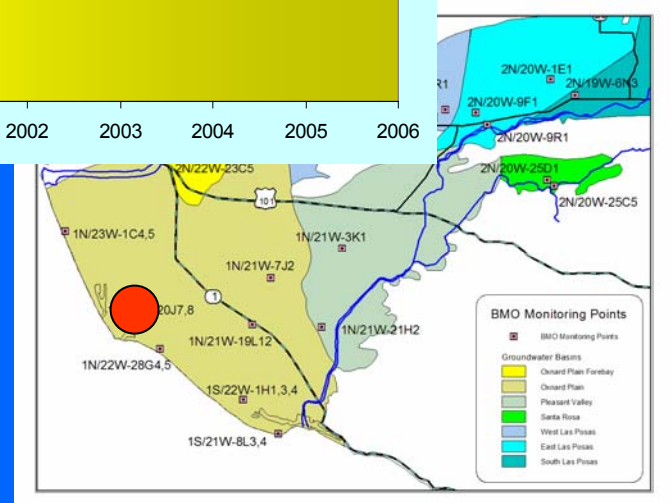
- **LAS 20' msl**      **Chloride <150 mg/L**

# How Are We Doing on BMOs?

BMO Well 1N/22W-20J7 (A1-320)

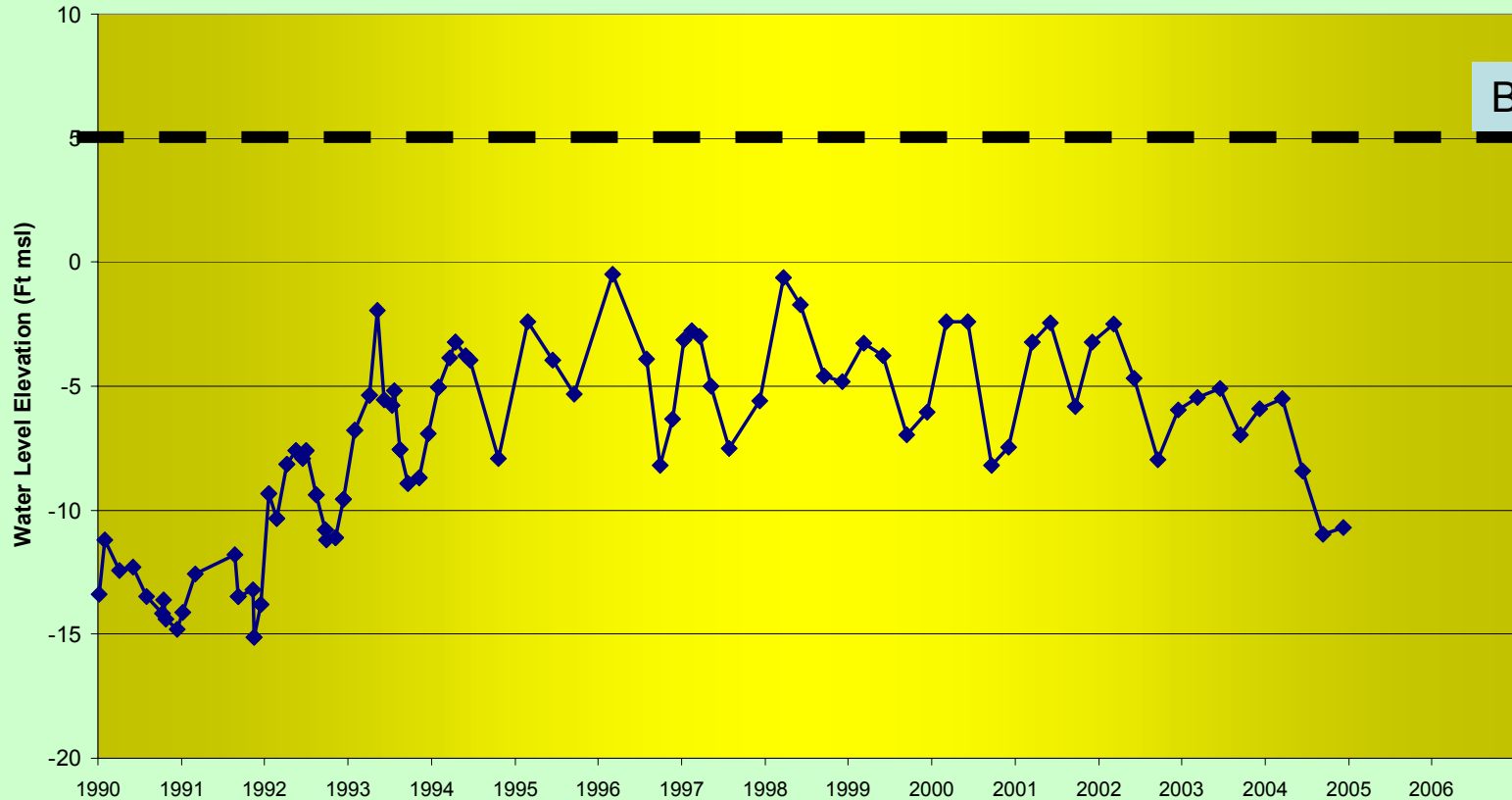


BMO

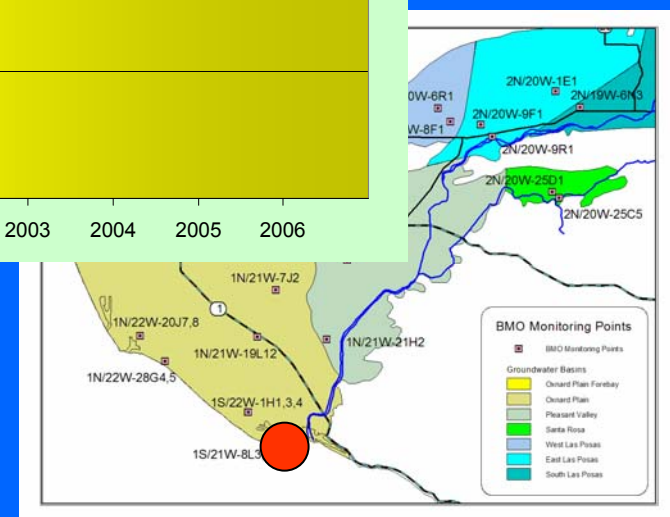


# How Are We Doing on BMOs?

BMO Well 1S/21W-8L4 (CM1A-220)

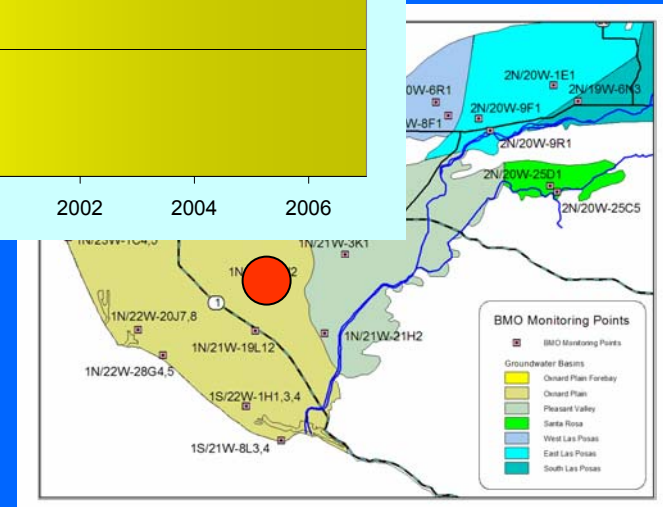
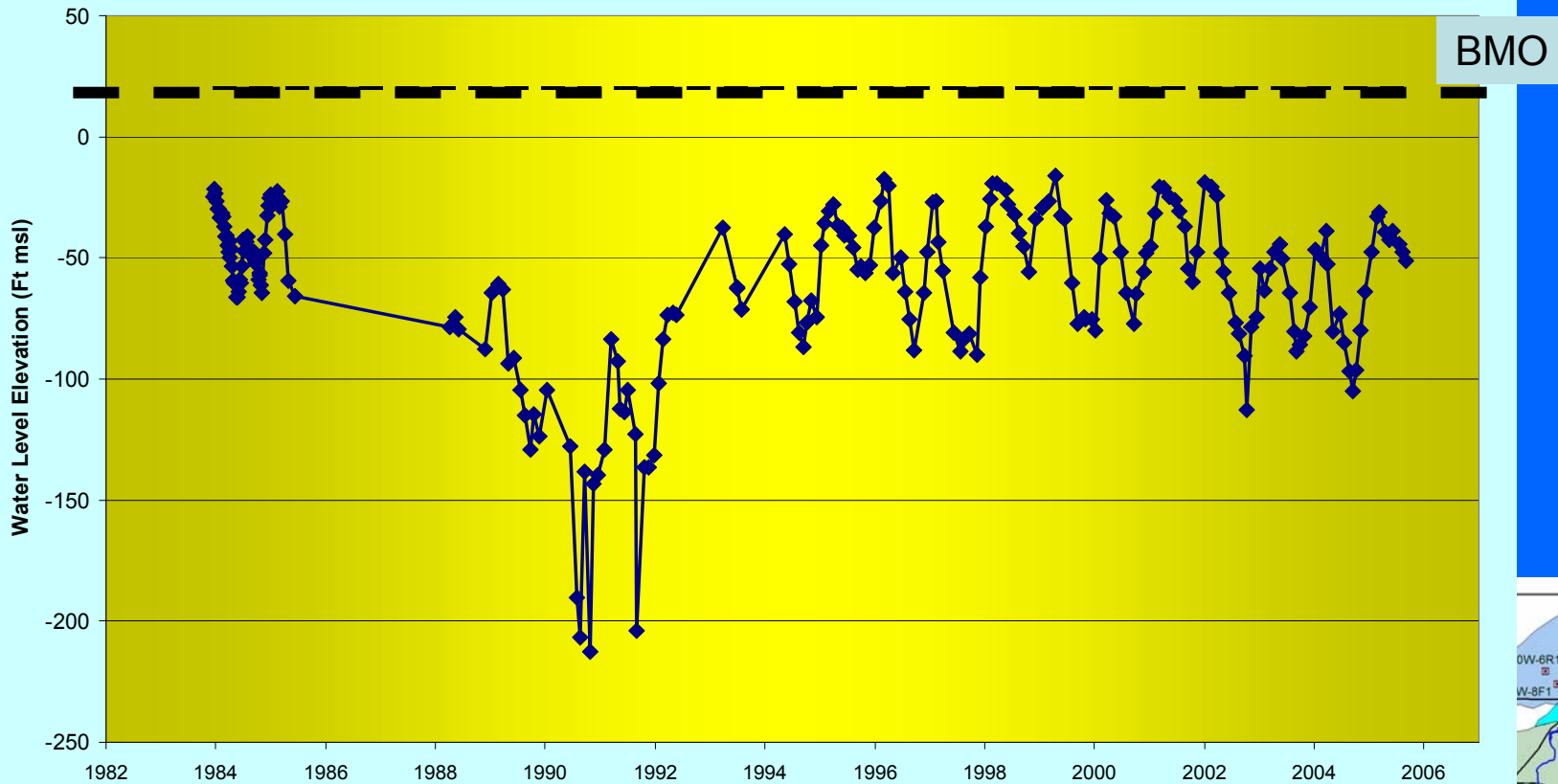


BMO

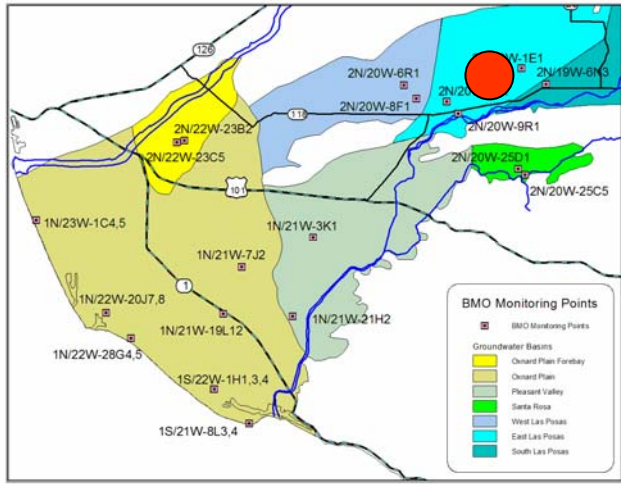


# How Are We Doing on BMOs?

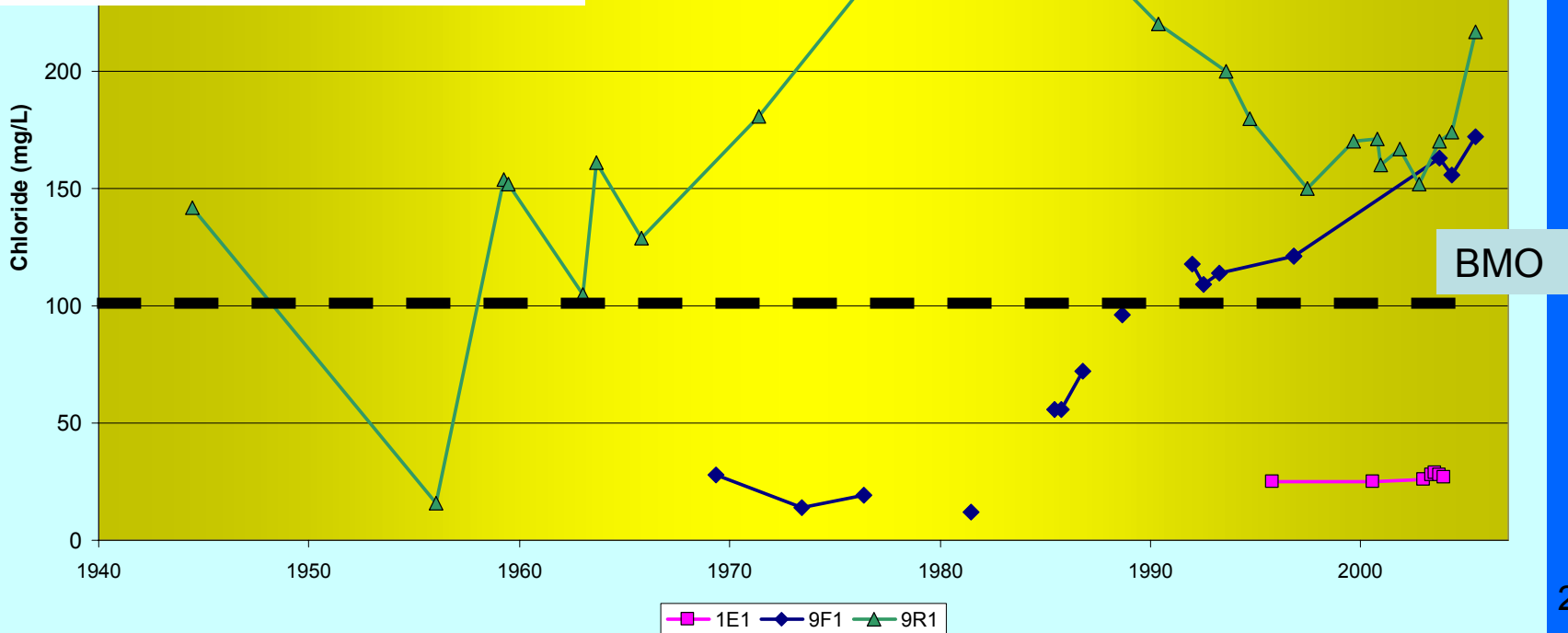
BMO Well 1N/21W-7J2 (PTP #1)



# How Are We Doing on BMOs?



MO Wells East Las Posas Basin



# Using the Groundwater Model with BMOs

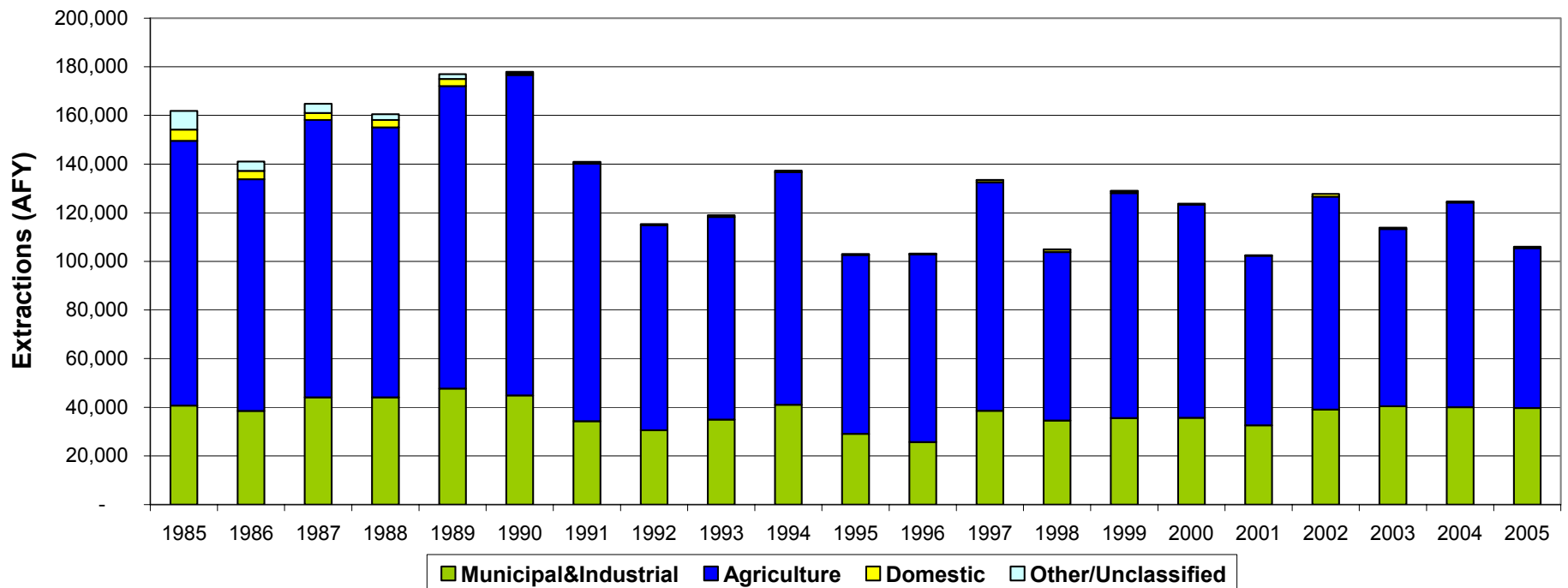
- Model includes all of FCGMA plus Santa Clara River basins
- Calibrated to historic water levels
- Model base period replicates 55 years of climatic cycles
- Model results – groundwater elevations for each quarter of base period
- Analysis of results – at BMO locations, determine % of time above BMO

# Results of Modeling vs. BMOs

- UAS results: Above BMOs 51% of the time
- LAS results: Above BMOs 5% of the time
- Is 50% of the time above BMOs good enough?

# Pumping Reductions

GMA Extractions 1985-2005



- Apparent reduction to near Basin Yield
- But overdraft continues

# Basin Yield Analysis

## ➤ Method

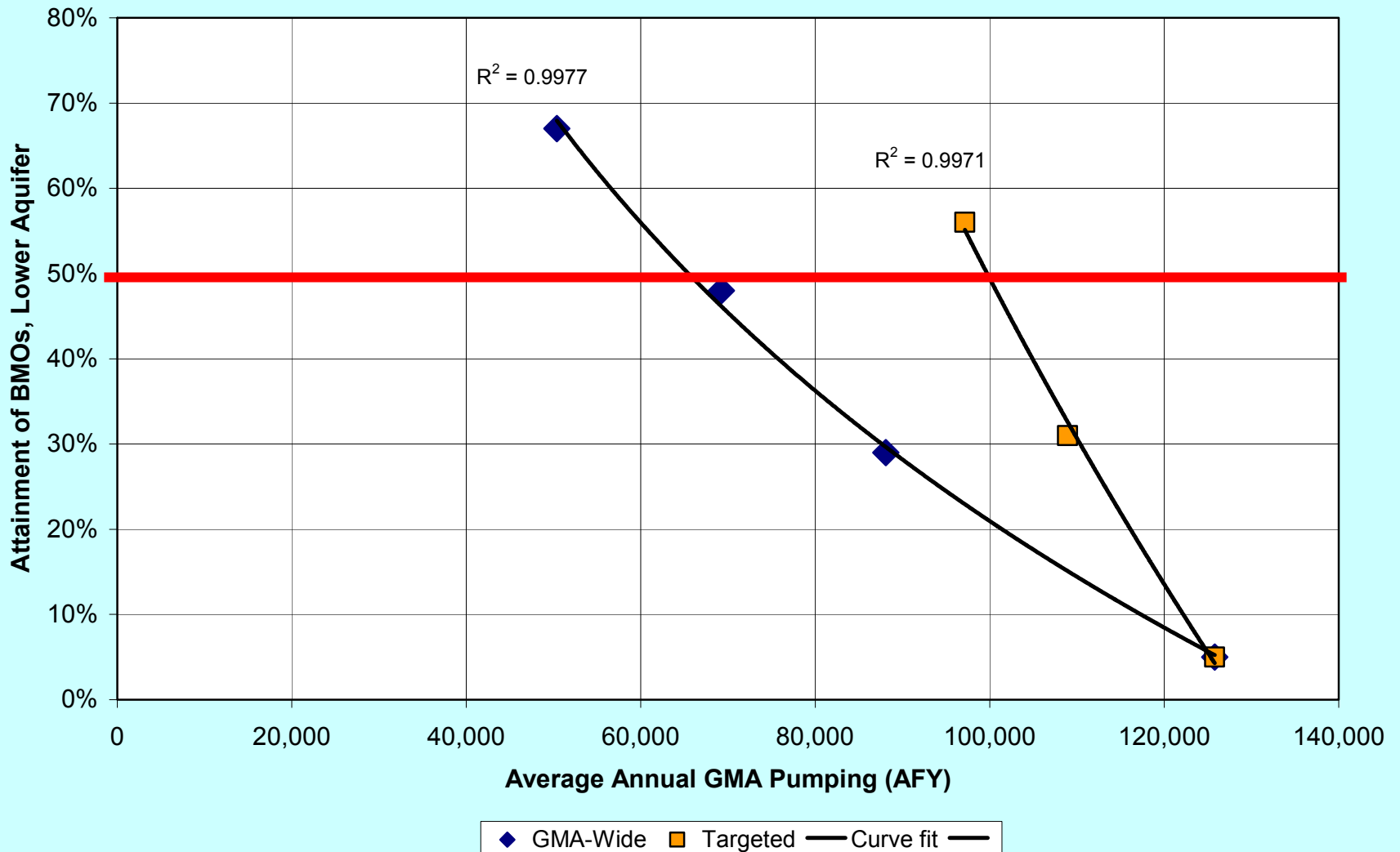
- Reduce pumping until meet water level BMOs at least 50% of the time in UAS and LAS

## ➤ Two Steps

- Reduce pumping throughout GMA until meet BMOs
- Reduce pumping only in south Oxnard Plain and Pleasant Valley until meet BMOs

# Modeling – Basin Yield

Basin Management Objectives at Varying Pumping Reductions



# How Are We Doing? -- Summary

- Current observations
  - Upper Aquifer – partially solved, but saline waters in the aquifer
  - Lower Aquifer – getting worse
- BMOs
  - Upper Aquifer – meet most BMOs
  - Lower Aquifer – as low as 0% attainment in some areas
- Yield of the basins
  - Lower the basin yield to 100,000 AFY

# **Part II**

# **Future Management**

# **Strategies**

# Strategies – 5 years

1. 5-Year Update
2. Shift Some Pumping LAS to UAS
3. Protect Current Sources of Recharge
4. Limitation on Nitrate Sources Forebay
5. Policy on Recovery of Credits from Oxnard Plain Forebay Basin
6. Verification of Extraction Reporting
7. Separate Management Strategies for Some Basins
8. FCGMA Boundary
9. Irrigation Efficiency Calculations
10. Additional Storage Projects in Overdrafted Basins
11. Penalties Used to Purchase Replacement Water
12. Additional Water Conservation
13. Shelf Life for Credits

# Strategies 5 to 10 years

1. Additional In-Lieu Recharge to South Oxnard Plain
2. Import Additional State Water
3. Further Destruction of Abandoned or Leaking Wells
4. Additional Monitoring Needs

# Strategies 10 to 15 years

1. Barrier Wells in South Oxnard Plain
2. Injection of Treated River Water into Overdrafted Basins
3. Increase Diversions from Santa Clara River
4. Shift Pumping to Northwest Oxnard Plain

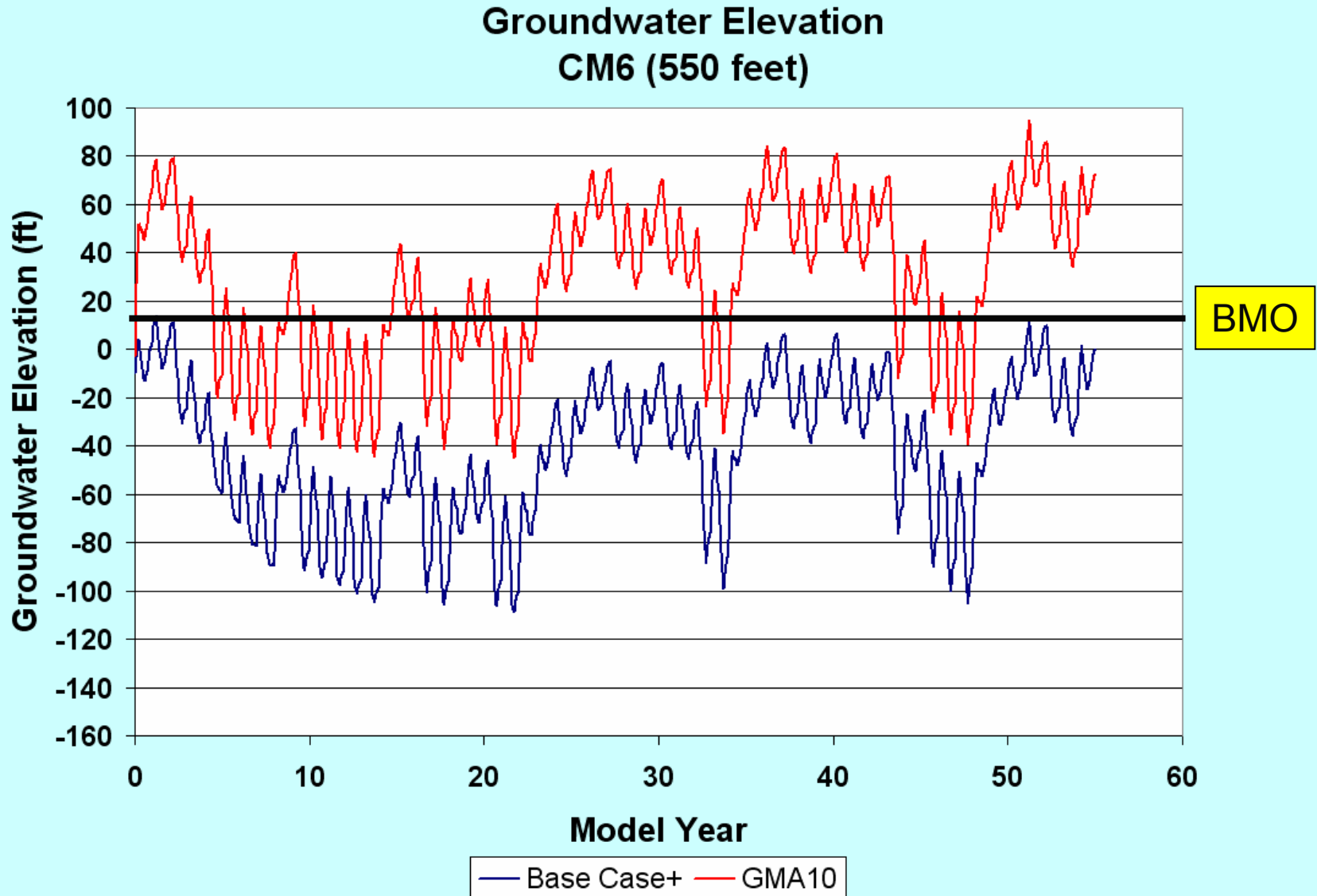
# Strategies > 15 years

1. Evaluate Further Pumping Reductions

# Effectiveness of Strategies

<i>Strategy</i>	<i>UAS ΔWL</i>	<i>Meet UAS BMOs</i>	<i>LAS ΔWL</i>	<i>Meet LAS BMOs</i>
<i>Current Strategies</i>		<b>51%</b>		<b>5%</b>
<i>Barrier Wells</i>	+11'	63%	+46'	48%
<i>GREAT Project</i>	-1'	51%	+38'	36%
<i>Injection River Water</i>	+1'	53%	+7'	11%
<i>Shift Pumping UAS</i>	-1'	50%	+8'	9%
<i>Increase River Diversions</i>	+3'	54%	+3'	8%
<i>Addtl Recharge S Oxnard</i>	+1'	53%	+4'	7%
<i>Continue 25% Reduction</i>	+1'	53%	+2'	7%
<i>Import State Water</i>	+2'	54%	+1'	7%
<i>Riverpark Recharge</i>	<1'	52%	<1'	6%
<i>Shift Pumping NW Oxnard</i>	<1'	51%	<1'	5%
<i>All Strategies</i>	<b>+15'</b>	<b>67%</b>	<b>100'</b>	<b>76%</b>

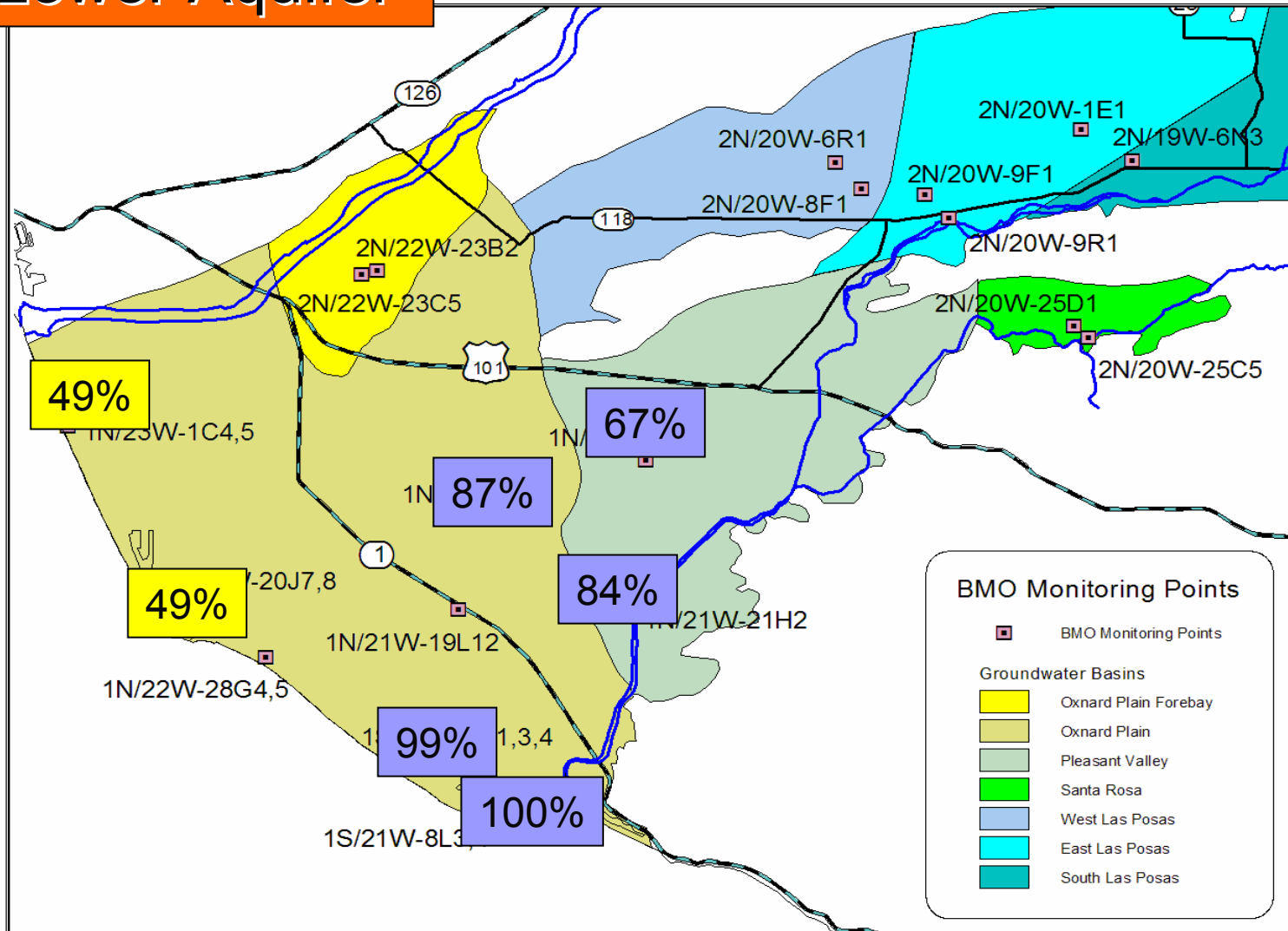
# Injection Barrier (LAS)





# Attainment of BMOs Combined Strategies

## Lower Aquifer



# A Final Sobering Thought

- We all have three choices
  - 1) Continue our collective efforts to solve the overdraft problems (leadership, money)
  - 2) Require affected areas to find their own solution – mandate 85% pumping reductions in south Oxnard Plain and Pleasant Valley basins
  - 3) Do nothing – let saline intrusion continue until aquifers unusable without treatment

# Part III

## Recommended Actions

# Action Plan Recommendations

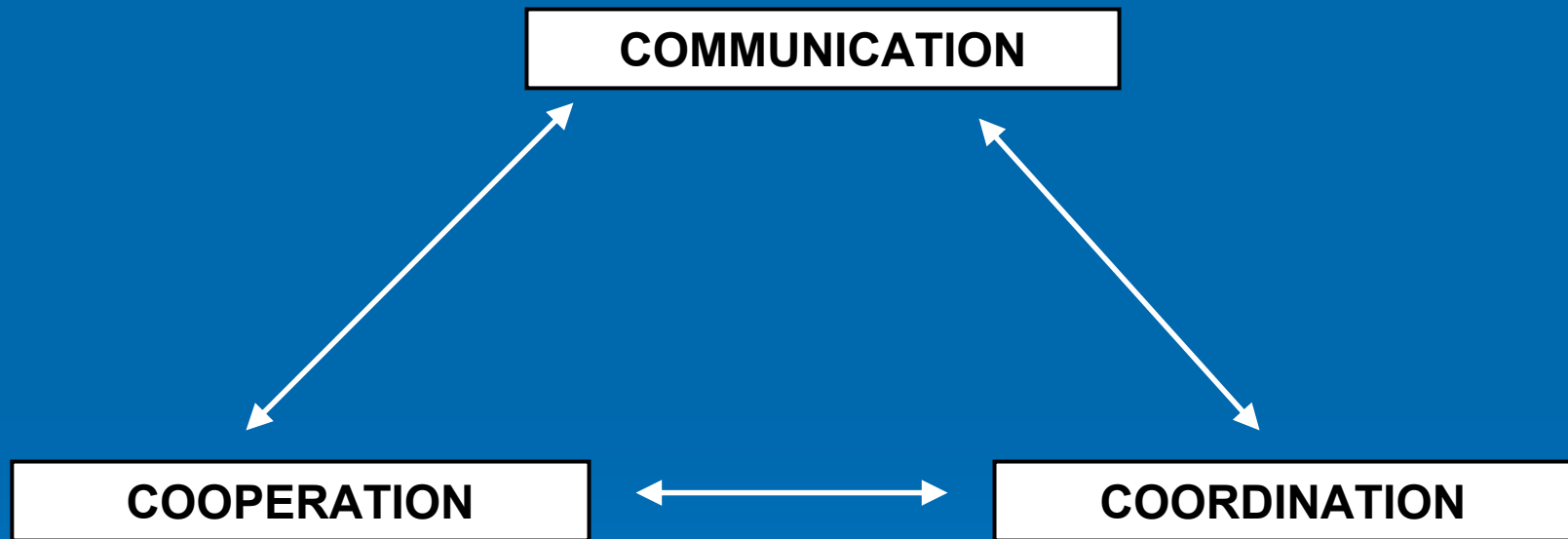
- Use combined technical/consensus process to implement strategies that will create improved planning, use, and management of groundwater resource:
  - Define specific objectives
  - Develop implementation strategy
  - Policy Implementation
  - Evaluate strategy effectiveness

# Need Consensus

- Process
- Stakeholders
- Meetings
- Deadlines

# Recommended Process

- **FOUNDATION: 3 C's of Program Management**



# Recommended Process

## ➤ Technical Advisory Group (TAG)

- Purpose: Develop/Define Specific Strategies
- Goals:
  - Identifying and quantifying net effects to aquifers
  - Developing technical implementation plan recommendations
  - Evaluating alternatives
  - Developing post-implementation monitoring plan
  - Adherence to schedule
  - 3Cs with Strategic Advisory Group (SAG)/TAG/Board

# Recommended Process

## ➤ Strategic Advisory Group (SAG)

- Purpose: Develop Implementation Recommendations/Plans
- Goals:
  - Develop final recommended implementation plans
  - Developing cost/benefit analyses
  - Developing policy recommendations
  - Completing post-implementation monitoring reports
  - Establish and maintain Schedule (TAG)
  - 3Cs with TAG/Board

# Recommended Process

## ➤ FCGMA Board

- Purpose: Policy direction and implementation
- Goals:
  - Weigh cost/benefit analyses
  - Consider/Approve implementation plans and policies
  - Oversee schedule
  - Provide resources for performance monitoring
  - 3Cs with TAG/SAG

# Recommended Process

## ➤ Adaptive Management

- Purpose: Policy direction and implementation
- Goals:
  - TAG Reports technical effectiveness
  - SAG Reports Cost/Benefit Report
  - FCGMA Considers success/effort ratio when considering future strategies
  - 3Cs with TAG/SAG

# Recommended Process

- **Ultimately:**
- All are credited with success
  - All bear responsibility for failure
  - All must learn from both successes and failures when considering future strategies

# Recommended 5-Year Strategies

## ➤ GMP Strategies Divided into 3 Areas

- Demand Management Strategies
- Supply Protection/Enhancement Strategies
- Administrative Strategies

# Recommended 5-Year Strategies

## ➤ DEMAND MANAGEMENT STRATEGIES

- Continue 25% H.A. Reduction Strategy
- Revision of Current Credit Policy
- Irrigation Efficiency Calculations
- Meter Calibration Program Implementation
- Geographic Relocation of Pumping
- GEMES Charges
- Further Allocation Reduction Strategies
- Implementation of Conservation Measures

# Recommended 5-Year Strategies

## ➤ SUPPLY PROTECTION/ENHANCEMENT STRATEGIES

- Limit OXFB Nitrate Inputs
- Import State Water
- Implementation of Recycled Water Programs
- Increased Diversions from Freeman
- Injection Barriers
- Desalting Programs
- Protect Current Diversion Programs
- Special OXFB Rules

# Recommended 5-Year Strategies

## ➤ ADMINISTRATIVE STRATEGIES

- Develop SAG/TAG
- Develop and Maintain Schedules
- Annual Monitoring/Performance Reports
- FCGMA Boundary Policy Review

# The Next Steps

- Receive Comments
- Revised Proposed Plan to Board
- Final Board Workshop
- Groundwater Management Plan and Action Plan
- Adoption
- TAG/SAG Formation
- Approved Plan Implementation

**Questions  
or  
Comments  
???**