

Central Valley Regional Water Quality Control Board

San Joaquin River Basin
Diazinon and Chlorpyrifos TMDL
Implementation Framework
September 10, 2002



Workshop Agenda

- Introduction and welcome
- San Joaquin River TMDLs Status and Basin Plan Amendment timeline
- Implementation framework
 - Regulatory authorities
 - Regulatory controls
 - Non-Regulatory controls
- Implementation practices for chlorpyrifos and diazinon
- Concurrent implementation of TMDLs

Introduction & Status

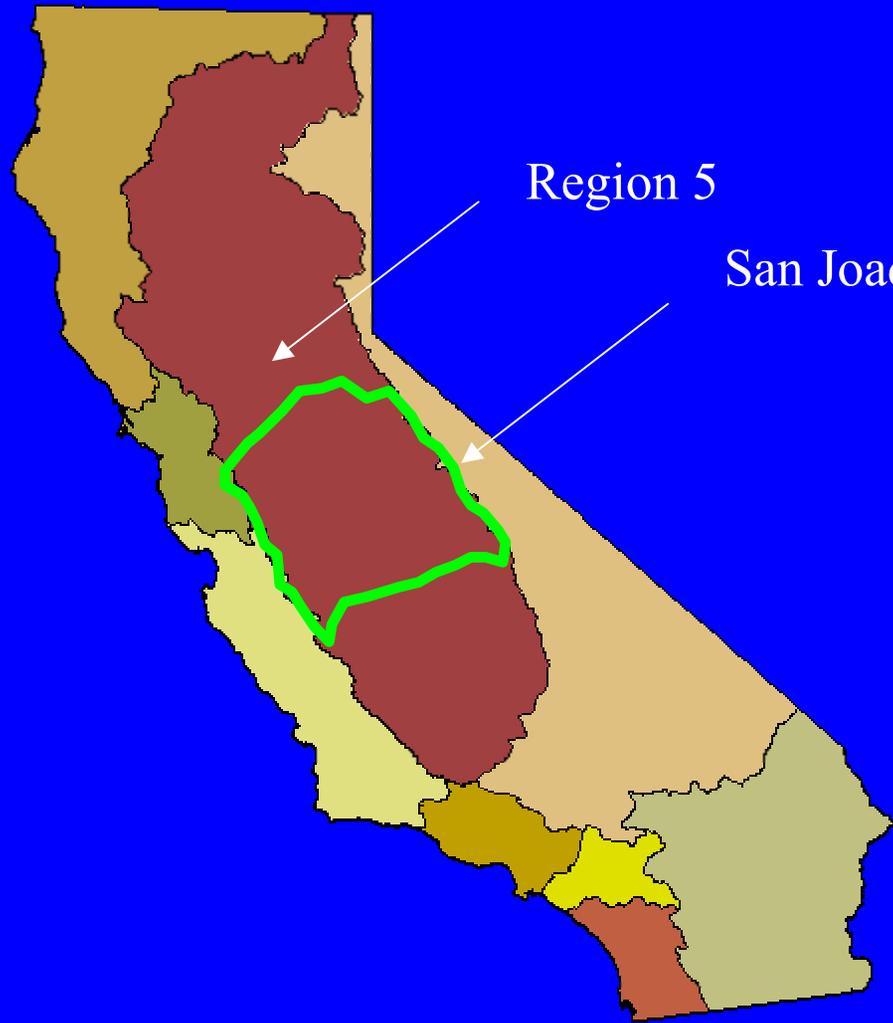
Les Grober

Introduction

- Meeting logistics
- Time constraints
- Questions and comments at the end
- Introduction of Regional Board staff

TMDL & Basin Plan Amendment Timeline

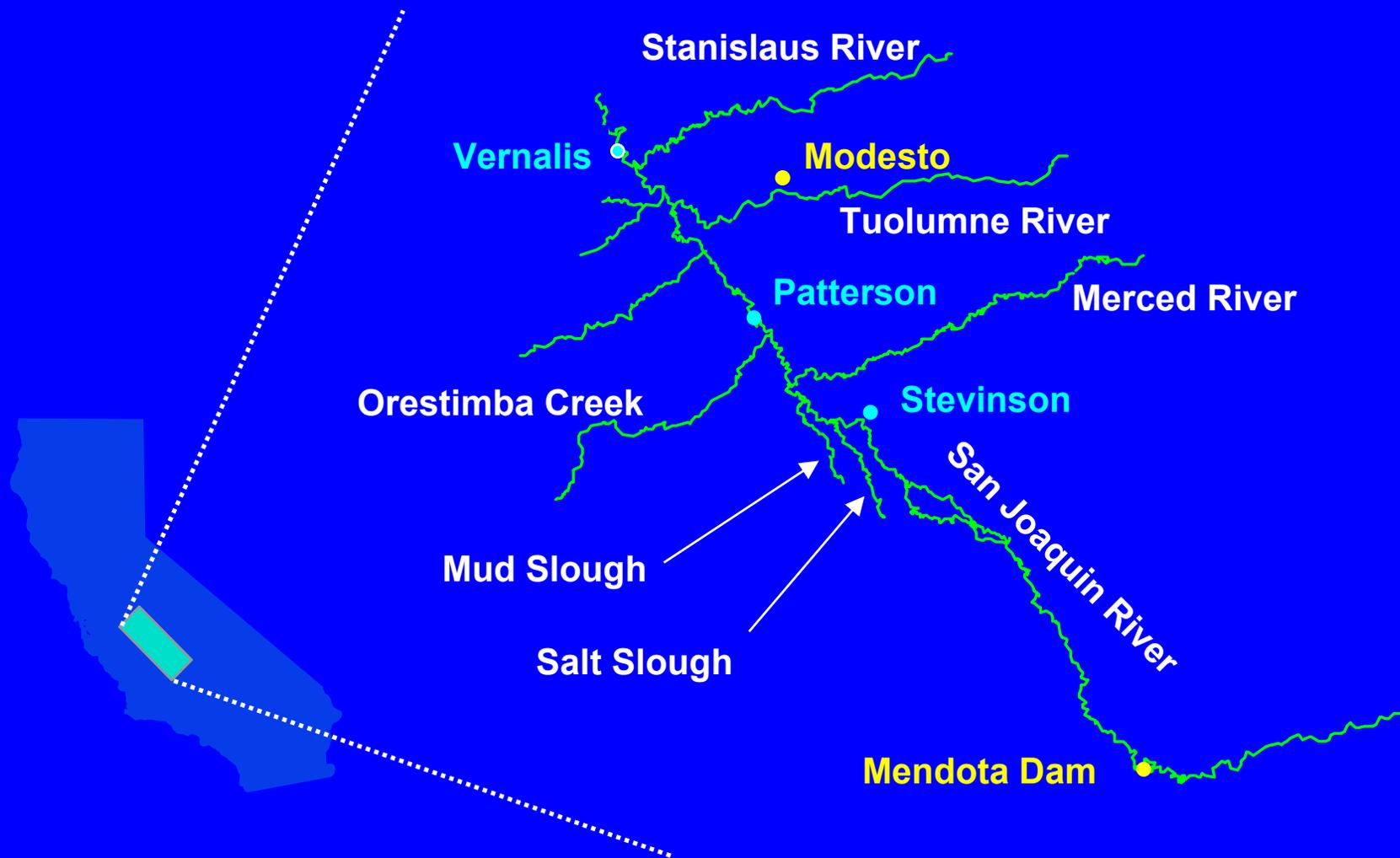
Workshop on Draft TMDL & Implementation Framework	July 2002
Workshop on Draft Program of Implementation	August/ September 2002
Draft Staff Report to Peer Review	September/ October 2002
Public Review Draft	November 2002
Board Workshops/Revised Drafts	December 2002/ March 2003
Board Hearing	June 2003
State Board	October 2003
Office of Administrative Law	December 2003
U.S. EPA	March 2004

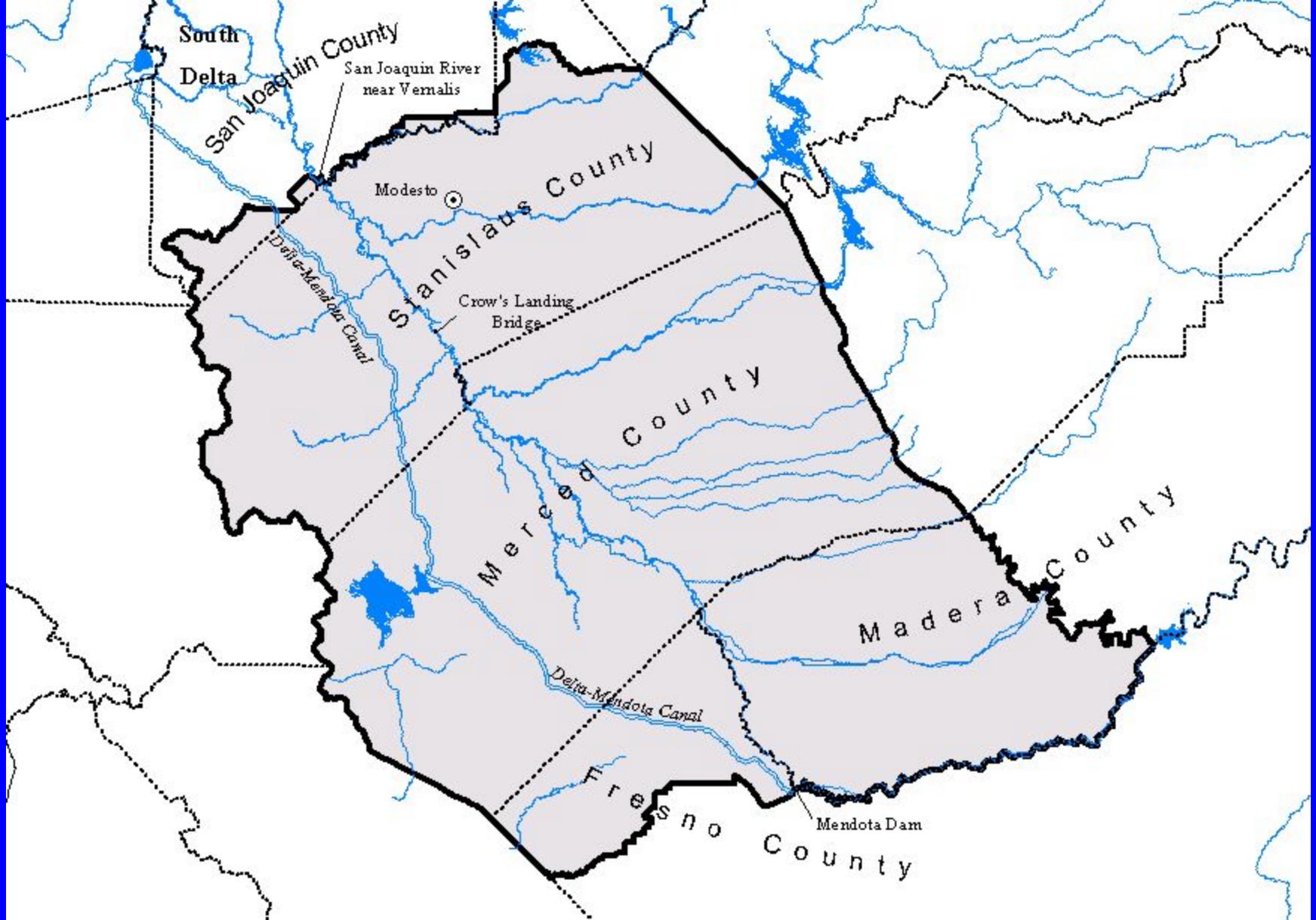


Region 5

San Joaquin River Basin

Project Area for OP Pesticides TMDL





San Joaquin River TMDL Status

- Chlorpyrifos and Diazinon TMDL
- Salt and Boron TMDL
- Dissolved Oxygen TMDL
- Selenium TMDL

Implementation Framework

Shakoora Azimi

Les Grober

Marshall Lee

Implementation Framework

- Regulatory authorities
- Regulatory controls
- Non-Regulatory controls

Regulatory Background

- Federal Clean Water Act
- Porter-Cologne Water Quality Control Act

Regulatory Background

- Federal Clean Water Act
 - Requires States to identify waterbodies not attaining water quality standards
 - Sets priorities for addressing pollutant problems
 - Establishes a TMDL for each identified waterbody

Regulatory Background

- Porter-Cologne Water Quality Control Act
 - Establishes responsibilities and authorities of the State Water Resources Control Board and Regional Water Quality Control Boards
 - Water Quality Objectives
 - Program of Implementation
 - Basin Plan

Assumptions

- Water quality objectives for diazinon and chlorpyrifos will be adopted for the San Joaquin River
- Load limits for agriculture will be established
- No urban contribution (or waste load allocations)
- Two seasons of use but no load allocation may be proposed for irrigation season
- Compliance will be monitored in the SJR (though other monitoring may be required)

Assumptions (continued)

- Basin Plan cannot compel adoption of specific methods of compliance nor compel specific action by other agencies
- A group may design a specific implementation program (and provide implementation oversight) but Regional Board would need to approve that program

Implementation Framework Regulatory Authorities

Les Grober
Marshall Lee

Legal Authorities

- Legal authorities reviewed include:
 - Regional Water Quality Control Board
 - Dept. of Pesticide Regulation and County Agricultural Commissioners
 - U.S. Environmental Protection Agency (FIFRA)
 - Counties
 - Water Districts
 - Joint Powers Authority

Legal Authorities

Regional Water Quality Control Board

- Implements and enforces Federal and State water quality acts:
 - Clean Water Act
 - Porter Cologne
- Nine Regional Boards in the State - Central Valley Region is largest
- Basin Plan contains:
 - Beneficial Uses
 - Water Quality Objectives
 - Program of Implementation

Legal Authorities

Regional Water Quality Control Board

- Clean Water Act responsibilities include:
 - Issuing National Pollutant Discharge Elimination System (NPDES) permits to point sources of pollution and certain stormwater discharges
 - Developing Total Maximum Daily Loads (TMDLs) for waters not meeting standards

Legal Authorities

Regional Water Quality Control Board

- Implementation of TMDLs:
 - Beneficial uses may be reviewed and evaluated
 - Numeric water quality objectives may be proposed
 - Program of Implementation is needed

Legal Authorities

Regional Water Quality Control Board

- Factors considered in setting water quality objectives:
 - Beneficial uses
 - Environmental characteristics of the watershed
 - Water quality condition that could reasonably be achieved
 - Economic considerations
 - Need for housing and to develop and use recycled water

Legal Authorities

Regional Water Quality Control Board

- Program of Implementation must include:
 - Description of the nature of the actions necessary to achieve objectives
 - Time schedule for actions to be taken
 - Description of surveillance to determine compliance

Implementation Framework

Legal Authorities

- U.S. Environmental Protection Agency
 - Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)
 - Requires registration of all pesticides
 - Requires labeling on all pesticides as to their proper use and disposal
 - Classifies pesticides as restricted use or general use
 - Requires certification by State of all users of restricted use pesticides

Implementation Framework

Legal Authorities

- Counties
 - Have broad authority to supply water and provide for drainage services
 - Are prohibited from regulating any matter related to the sales and use of pesticides

Implementation Framework

Legal Authorities

- Water Districts
 - 11 general types of water districts
 - Special acts have created numerous water districts
 - Responsibilities can include one or more of the following:
 - Irrigation, reclamation, drainage, diversion, storage, flood control, management, and distribution of water

Implementation Framework

Legal Authorities

- Joint Powers Authority/Regional Drainage Authority
 - Allows new authority to form with joint authorities of the member public agencies
 - Has been used by San Luis & Delta-Mendota Water Authority to address selenium in the San Joaquin Valley
 - San Joaquin River Group Authority- Vernalis Adaptive Management Program

Implementation Framework
Department of Pesticide
Regulation (DPR) Mandates

Marshall Lee

DPR General Mandates

To protect the environment from environmentally harmful pesticides by prohibiting, regulating, or ensuring proper stewardship of those pesticides

(Food and Agricultural Code, Section 11501)

DPR General Mandates

- To prohibit or regulate the use of environmentally harmful materials
- To take whatever steps necessary to protect the environment
(FAC 14102)

DPR Mandate to Mitigate

- DPR shall endeavor to eliminate from use in the state any pesticide that endangers the agricultural or nonagricultural environment
- Appropriate restrictions may be placed on their use

(FAC 12824)

Restricted Materials

Director shall designate a pesticide a restricted material if the pesticide presents:

- Hazard to the environment from drift onto streams and lakes
- Hazard related to persistent residues in the soil resulting ultimately in contamination of waterways, estuaries or lakes, with consequent damage to fish, wild birds, and other wildlife
- Other significant hazards

(FAC 14004.5)

Pesticide Use Permits

- To buy or use a restricted material, a person must obtain a permit from the County Agricultural Commissioner (CAC)
- If the CAC determines that an adverse effect is likely, he/she may deny the permit or condition the permit so that site-specific practices must be followed (FAC 14006.5)

Pesticide Use Permits

- DPR provides CACs with suggested permit conditions
- CACs must have the ability to issue site-specific permits—they may follow DPR suggestions or structure their own restrictions

Use Requirements

DPR shall adopt regulations that govern the use and possession of restricted materials that are injurious to the environment
(FAC 14005)

CAC-Authorized Permits

CACs are authorized to require permits for agricultural uses of pesticides that are not designated restricted materials if the CAC first determines that the pesticide would present an undue hazard when used under local conditions (FAC 14006.6)

Cancellation

DPR may cancel the registration of, or refuse to register, a pesticide that has demonstrated serious uncontrollable adverse effects either within or outside the agricultural environment
(FAC 12825)

Suspension

DPR may suspend the registration of a pesticide if the use of the pesticide poses an immediate substantial danger to persons or to the environment

(FAC 12826)

Reevaluation

- If DPR finds that a significant adverse impact has occurred or is likely to occur, the pesticide involved shall be reevaluated
(Title 3, California Code of Regulations (CCR), Section 6220)
- Under a reevaluation, DPR may require pesticide registrants to submit additional data to determine the nature or extent of the potential hazard or identify appropriate mitigation measures
(3 CCR 6192)

Reevaluation

DPR may conclude reevaluation in several ways:

- Data show no significant adverse effects; no additional measures are needed
- Data show additional mitigation is needed; DPR may adopt regulations or may work with registrants and U.S. EPA to revise pesticide labels to mitigate hazards
- If adverse effects cannot be mitigated, DPR cancels or suspends the registration

Review

- DPR authorities that may help mitigate adverse effects on water quality:
 - Restricted material status for environmentally hazardous pesticides
 - Permit conditions
 - Use requirements
 - CAC-Authorized Permits
 - Cancellation
 - Suspension
 - Reevaluation

Additional Note

Label changes may avoid reliance on restrictive regulatory action to resolve environmental problems caused by pesticides

Implementation Framework Regulatory and Non-Regulatory Controls

Les Grober

Process for Developing Program of Implementation

Develop List of Regulatory and Non-regulatory Control Options

- Prohibition of discharge
- NPDES Permits
- Stakeholder led effort
- Waste Discharge Requirements
- MOUs, MAAs
- Others

Evaluate Control Options Based On :

- Consistency with other policies
- Cost to dischargers
- Other factors
- Cost to state
- Feasibility

Select Best Available Control Options (short list of options)

- Most feasible
- Most effective
- Most cost effective

Process for Developing Program of Implementation

Develop Alternatives

based on combinations of selected control options
Ranging from
No Action -----to-----Full Regulatory



Evaluate Control Options Based On :

- Consistency with other policies
- Cost to state
- Cost to dischargers
- Feasibility
- Other factors



Select Preferred Alternative

Regional Water Quality Control Board

- Options to regulate discharges :
 - Waste Discharge Requirements
 - Nature of the discharge are prescribed
 - Site specific or general
 - Waiver of Waste Discharge Requirements
 - Requirement for WDRs may be waived if not against the public interest
 - Waivers are conditional-- may be terminated at any time
 - Prohibition of Discharge
 - Regional Board can identify areas or conditions under which discharge of certain wastes is not permitted

Regulatory Controls

- What's needed?
 - Identify regulatory mechanism (prohibition, WDR, waiver of WDRs)
 - Identify entity responsible for oversight
- Result: matrix of regulatory options versus responsible entities

Matrix of Options

	Entity Responsible for Implementation Oversight			
Option	Stakeholder or Other Group	Local District	USEPA, DPR, or Ag Commissioners	Regional Board
Prohibition of Discharge				
WDRs				
Waiver of WDRs				

1. Prohibition of Discharge

Options	Stakeholder Group	Local District	USEPA/ DPR/ CAC	Regional Board
All surface waters				X
Tributaries				X
Conditional management plan submittal	X			
Conditional management plan submittal				X
Conditional – DPR/USEPA action			X	X

Implementation Framework Options

- Options under Prohibition of Discharge Alternative
 - Prohibitions can apply to certain areas or under certain conditions

Implementation Framework Options

- Prohibition focused on certain areas
(Regional Board would provide direct oversight of implementation)
 - Discharge can not contain diazinon and chlorpyrifos above objectives (Option 1.a.1.)
 - Discharge from tributaries can not contain diazinon and chlorpyrifos above objectives (Option 1.a.2.)

Implementation Framework Options

- Prohibition focused on certain conditions (Regional Board would provide direct oversight of implementation)
 - Discharge can not contain diazinon and chlorpyrifos unless approved management practices are followed (Option 1.b.3.)

Implementation Framework Options

- Prohibition focused on certain conditions (Other entity would provide direct oversight of implementation)
 - Discharge can not contain diazinon and chlorpyrifos unless management plan developed by stakeholder group is followed (Option 1.b.1.)
 - Discharge can not contain diazinon and chlorpyrifos unless DPR (or EPA) take action to change regulations to meet water quality objectives by a specific date (Option 1.b.2.)

2. WDRs

Options	Stakeholder Group	Local District	USEPA/ DPR/ CAC	Regional Board
Individual WDRs				X
Individual WDRs		X		
General WDRs			X	
General WDRs				X

Implementation Framework Options

- Waste Discharge Requirements
 - Waste Discharge Requirements issued to “person” (including public/private entity) discharging waste
 - Waste Discharge Requirements can be general (applying to a category of discharge) or individual

Implementation Framework Options

- Waste Discharge Requirements – Individual
 - Submittal of individual report of waste discharge required
 - Could be issued to:
 - Individual farmer/land owner (Option 2.a.1)
 - Water districts that have responsibility for drainage management (Option 2.a.2)

Implementation Framework Options

- Waste Discharge Requirements – General
 - Would apply to discharges from agricultural land upon which diazinon is applied
 - Would require a “Notice of Intent” –less paperwork/ no or smaller fee than individual WDR
 - Could keep the Ag Commissioner (Option 2.b.1) or Regional Board (Option 2.b.2) in reviewing plans to meet the Waste Discharge Requirement

3. Waiver of WDRs

Options	Stakeholder Group	Local District	USEPA/ DPR/ CAC	Regional Board
Management Plan Submittal	X			
Management Plan Submittal				X
DPR/ US EPA Action			X	

Implementation Framework Options

- Waiver of Waste Discharge Requirements
 - Waste Discharge Requirements can be conditionally waived if not against the public interest
 - Waiver could apply if a management plan approved by a stakeholder group (Option 3.a.1) or Regional Board (Option 3.a.2) is being followed
 - Waiver could also be based on action by EPA, DPR, and or the CAC to regulate use to address the water quality problem (Option 3.a.3)

Regulatory Controls Alternatives

- Several options are being considered for each alternative; for example, a prohibition of discharge may:
 - Be conditioned upon submittal of a management plan
 - A stakeholder group or Regional Board may have responsibility of direct oversight
 - Be conditioned upon action by CDPR

Regulatory Controls

Current Policy

- Current Regional Board policy for Pesticide Discharges (from Basin Plan)
 - Control of discharge achieved through implementation of management practices that minimize or eliminate discharge
 - Board will adopt prohibition or waste discharge requirements if water quality objectives violated despite DPR actions

Non-Regulatory Control

- Education and outreach
- Volunteer effort (self-determined)
- ?

Evaluation Criteria

- Criteria that will be used to evaluate options and develop a recommended approach
 - Feasibility
 - Time needed to implement the alternative
 - Accountability
 - Flexibility
 - Limitations on pesticide use and pest management options

Evaluation Criteria

- Criteria that will be used to evaluate options and develop a recommended approach
 - Certainty in meeting water quality objectives
 - Government cost
 - Grower cost
 - Registrant cost
 - Consistency with State and Federal laws and policies

Process for Developing Program of Implementation

Develop List of Regulatory and Non-regulatory Control Options

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- MOUs, MAAs
- Others

Evaluate Control Options Based On :

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Select Best Available Control Options (short list of options)

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Process for Developing Program of Implementation

Develop Alternatives

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Evaluate Control Options Based On :

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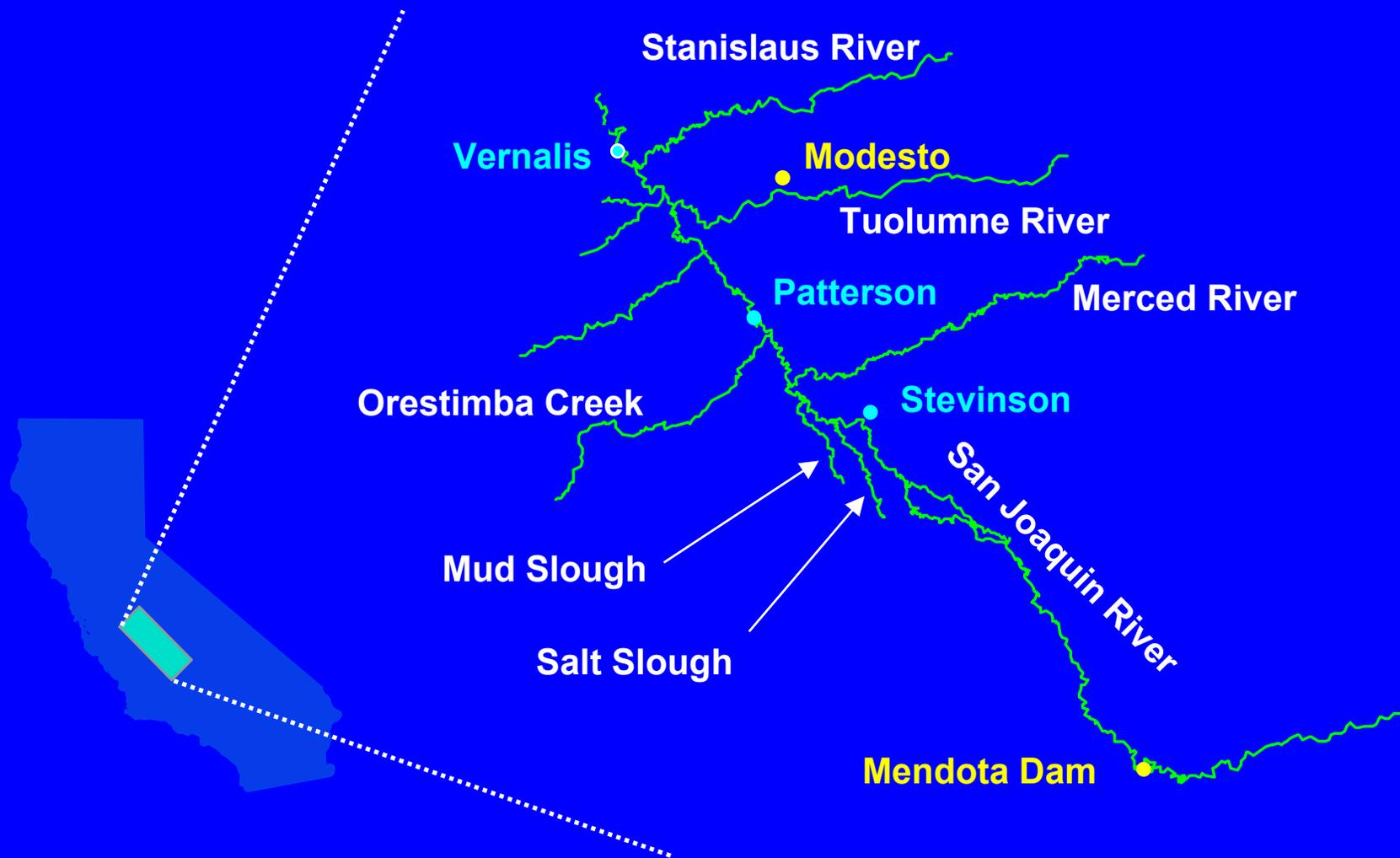
Select Preferred Alternative

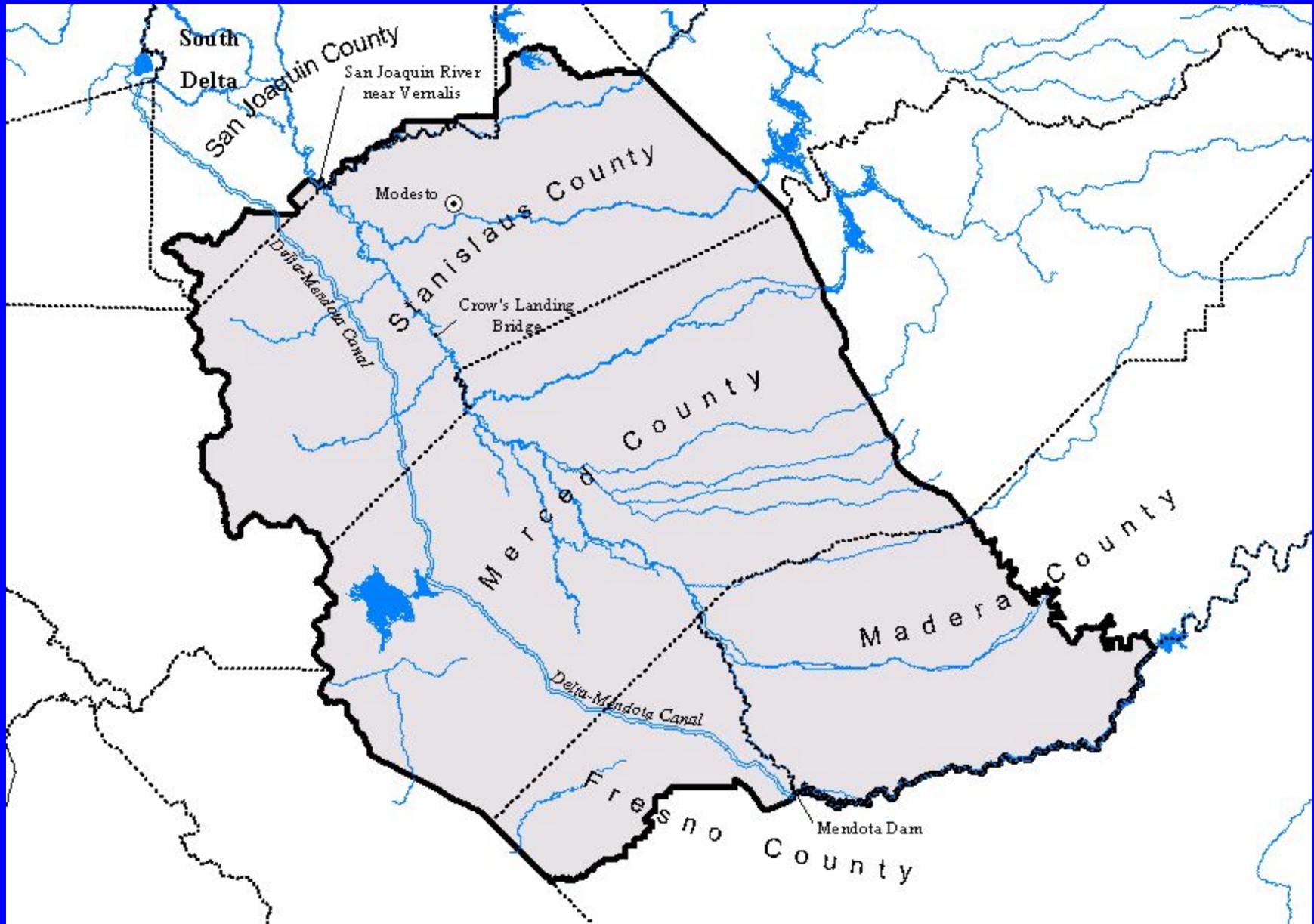
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Implementation Practices for Diazinon and Chlorpyrifos

Diane Beaulaurier
Shakoora Azimi

Project Area for OP Pesticides TMDL





Implementation Practices for Diazinon and Chlorpyrifos

- Pesticide application technologies and practices
- Pest management practices
- Vegetation management practices
- Water management practices
- Monitoring

Pest Application Technologies and Practices

- Good housekeeping practices
 - Containing mixing and loading areas to eliminate spillage
 - Regular equipment inspection to identify and eliminate leaks and other unintended discharges
 - Proper calibration of nozzles and pressure regulators to ensure accurate flow

Pest Application Technologies and Practices

- Improved mixing and loading procedures
 - Training
 - Planning
 - Site selection
 - Temporary or permanent containment facilities
 - Collection sumps for mixing/loading

Pest Application Technologies and Practices

- Improved formulations for dormant spray
 - Microencapsulated diazinon has been used for indoor applications
 - Research needs to be conducted to determine its usefulness for dormant spray application
 - May reduce drift and/or run-off
- Precision spray equipment
 - Commonly used in Europe
 - Better sprayer design, nozzle design
 - Better targeting of crop, better spray capture
 - Use of GPS/GIS for precision & accountability

Pest Management Practices

- USEPA re-registration changes for chlorpyrifos
 - Retail sales for residential uses ended 12/01
 - Agricultural changes apply only to apples, tomatoes and grapes
 - For apples, pre-bloom dormant application only
 - For tomatoes, use is cancelled effective 12/00
 - For grapes, tolerance is lowered for dormant applications

Pest Management Practices

- Proposed USEPA re-registration changes for diazinon for urban uses
 - Retail sales for indoor residential uses to end 12/02
 - Retail sales for outdoor residential uses to end 12/04

Pest Management Practices

- Proposed USEPA re-registration changes for diazinon for agricultural uses
 - Cancellation of all granular uses
 - Deletion of aerial application for all uses
 - Deletion of foliar application on all vegetable crops
 - Application rate reduction
 - Establishment of crop-specific restricted entry intervals

Pest Management Practices

- Proposed USEPA re-registration changes for diazinon (cont.)
 - Cancellation of all seed treatment uses
 - Require engineering controls for all uses
 - Reduction in the number of applications of diazinon per growing season
 - Application limitations and labeling on orchard crops
 - Cancellation of uses on certain specific crops

Pest Management Practices

- Current practice –
 - Dormant oil (DO) with OPs
- Alternative practices -
 - Reduced application rates
 - Early season application
 - No dormant application or DO only with in-season OP application as needed
 - Alternate year DO & OP with yearly DO only
 - DO and other OP, pyrethroid or carbamate

Pest Management Practices

- Alternative practices (cont.)
 - DO and Spinosad for Peach Twig Borer
 - DO and Bt for Peach Twig Borer
 - Pheromone disruption for Peach Twig Borer
- Costs
 - Current practice = \$77-\$122 per acre, per application
 - Alternatives range from \$62-\$181 per acre, per application
- Changing pest management practices alone is not enough
 - Improvements in pesticide application and water management will also be needed to improve water quality.

Vegetation Management Practices

- Conservation buffers and cover crops
 - Vegetated waterways
 - Contour buffer strips
 - Vegetative barriers
 - Field borders
 - Filter strips
 - Riparian forest buffer
 - Constructed wetlands

Conservation buffers

- Filter strips – Strips of perennial vegetation at edge of field, separating field from waterway



Conservation buffers

- Contour buffer strips – strips of perennial vegetation alternated with wider cultivated strips farmed on land contour. Most effective at trapping pesticides



Vegetation management practices

- Maintenance and effectiveness
 - Natural berms and channels can form over time and must be leveled to retain the buffer's effectiveness
 - Buffers must be sited as close to field as possible, and so that water runs over the buffer area at a rate slow enough to cause sediment fallout and pesticide trapping and infiltration

Vegetation management practices

Pesticide Trapping Efficiencies of Buffers

Chlorpyrifos 57-79%

(from Boyd et. al. 1999)

Chlorpyrifos 62-99%

(from Cole et al, 1997)

Vegetation management practices

Trapping Efficiencies of Buffers vs. Soil Adsorption Coefficient (K_{oc})

Diiflufenican 62-99% ($K_{oc} = 1990$)

Diazinon NA ($K_{oc} = 1445$)

Lindane 72-100% ($K_{oc} = 1100$)

Studies of 17 other pesticides showed 50-100% trapping efficiencies (see Table 3-5)

Vegetation management practices

- Costs
- Funding
- Technical Assistance

Vegetation management practices

- Costs
 - Variable and site specific
 - Costs for plants range from \$18-\$81/per acre
 - ½ acre hedgerow buffer in Yolo County cost \$2000 to install and \$1000 for periodic maintenance
 - A ½ acre buffer will control runoff for a much larger number of total acres.

Vegetation management practices

- Funding
 - Grower investment
 - Environmental Quality Incentive Program (EQIP) grants (NRCS/RCD), \$7.7m FY 02-03 in CA
 - Pesticide Research Investigation of Source, Mitigation (PRISM) grants from SWRCB (\$10m State bond funds for pesticide projects)
- Technical assistance
 - Available from NRCS/RCDs

Water Management Practices

- Application
- Water Storage and Drainage Control
- Additives

Some practices may apply to irrigation season (in-season) only, some may apply to in-season and dormant season

Water Management Practices

- Application
 - Surface irrigation (in-season)
 - Sprinkler irrigation (in-season)
 - Micro-irrigation (in-season)
 - Irrigation scheduling (in-season)

Water Management Practices

- Water Storage and Drainage Control
 - Irrigation water storage (in-season)
 - Berms (in-season and dormant season)
 - Water and sediment control basins (in-season and dormant season)
 - Tailwater recovery systems/water recycling (in-season)
 - Vegetated drainage ditches (in-season and dormant season)
- Irrigation water additives (in-season)
 - Can increase infiltration and reduce sediment loss

Summary

- Low risk to water quality-
 - Orchards that do not drain to surface waters and that are not located along waterways, and control drift
 - Orchards that reduce or eliminate the use of pesticides that impact water quality
 - Orchards that reduce sediment transport and water runoff to surface waters
 - Orchards that minimize spray drift

Summary

- Eliminating the risk to water quality requires new management practices, not simply substituting new pesticides
- Precision engineering control of pesticide application is available and is improving.
- Conservation buffers can significantly reduce pesticide impacts to water quality
- A combination of management measures will usually be needed, tailored to site conditions
- Technical assistance and funding are available

Monitoring

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Monitoring

- Compliance Monitoring
- Current Monitoring
 - Storm season (Dormant Spray)
 - Irrigation Season Monitoring
 - Toxicity
 - Bioassessment
 - Atmospheric Deposition Monitoring

Compliance Monitoring

- Porter-Cologne requires a description of the monitoring that will be done to determine compliance with objectives
- Need to establish monitoring goals in the Basin Plan
- Specific monitoring plan would be developed later

Compliance Monitoring

- Monitoring will be the responsibility of dischargers
- Entity overseeing the implementation program may take on responsibility for monitoring
- Regional Board will conduct limited compliance monitoring

Compliance Monitoring

- Goal of monitoring is to determine:
 1. Compliance with established water quality objectives for diazinon and chlorpyrifos
 2. Compliance with established load allocations for diazinon and chlorpyrifos
 3. Degree of management practices implementation
 4. Efficacy of management practices

Compliance Monitoring

- Types of monitoring/evaluation needed to achieve goals:
 - Water quality and flow monitoring (goals 1,2,4)
 - Pesticide use evaluation (goals 2,3)
 - Monitoring adoption of improved management practices (goal 3)

Compliance Monitoring

- Water quality and flow monitoring
 - Main stem river sites (goals 1,2)
 - Tributary and subarea sites (goal 2)
 - Field scale (goals 2,4)

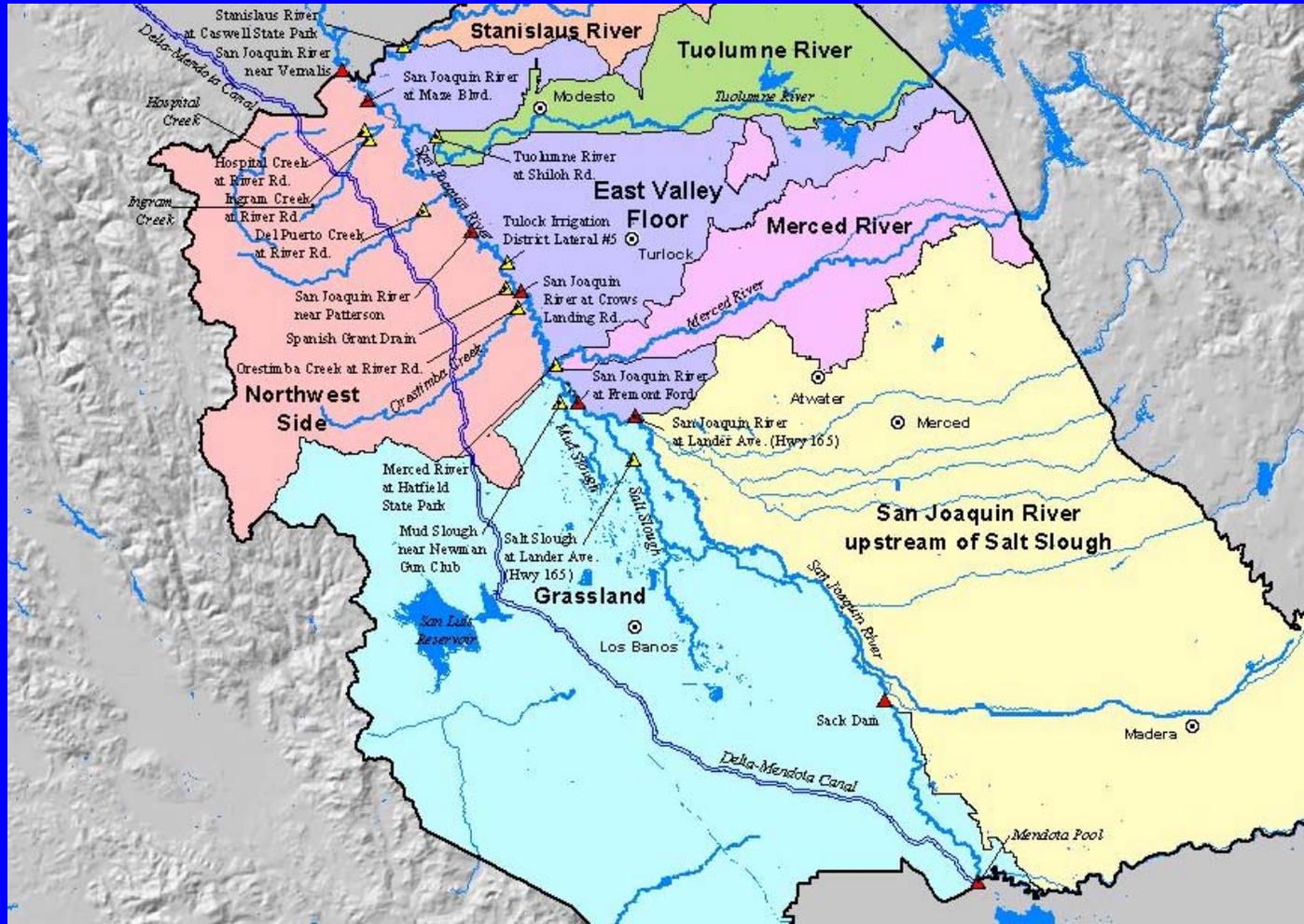
Water Quality and Flow Monitoring

- To determine compliance with WQO
 - A single site within each reach will be used to determine compliance
 - Sampling during dormant spray application and irrigation seasons
 - It is assumed that the river is sufficiently mixed at compliance sites

Recommended Monitoring Sites for Meeting Monitoring Goal #1

Site	Sampling Point
San Joaquin River Near Vernalis	On the west bank of the San Joaquin River at the south side of the Airport Way bridge or Airport Way bridge
San Joaquin River at Maze	On the west bank of Highway 132 bridge or from Highway 132 bridge
San Joaquin River at Patterson	North of Patterson bridge at the fishing access off of Poplar Ave
San Joaquin River at Crows Landing	On the southeast side of Crows Landing bridge. Access via Gun Club
San Joaquin River upstream of Merced River	On the west bank of San Joaquin River approximately 30 yards south of Merced River. Access to the site is via Hills Ferry Road.
Fremont Ford	At Fremont Ford on the west bank of the San Joaquin River at Highway 140
San Joaquin River at Lander Ave.	On the northwest corner of Lander Ave bridge over the San Joaquin River
Sack Dam	East of Highway 33 at Das Palos via Valeria Ave
Mendota Pool	To be determined

Recommended Monitoring Sites



Monitoring For Allocation Based on Subarea

- Monitoring conducted to determine the pesticide load
- Monitoring will be established
 - at sites near the mouth of watershed (subarea)
 - at sites in the tributaries upstream of diazinon and chlorpyrifos use area

Recommended Monitoring Sites for Meeting Monitoring Goal #2

Subarea / Source Area	Monitoring Sites and Sampling Points
Stanislaus River	Stanislaus River at Caswell Park Stanislaus River upstream (to be determined)
Tuolumne River	Tuolumne River on Shiloh Rd Tuolumne River upstream (to be determined)
Merced River	Merced River downstream of the Hatfield State Park Merced River upstream
Northwest	Ingram Creek, Hospital Creek, Del Puerto Creek, Orestimba Creek, Spanish Grant Drain
East Valley Floor	Turlock Irrigation District (TID) 5
Grassland	Salt Slough and upstream of Salt Slough Mud Slough and upstream of Mud Slough
Upstream of Salt Slough	San Joaquin River at Lander Ave

Monitoring Effectiveness of Management Practices

- To assess the effectiveness of specific practices
- Field level evaluation
 - To quantify the amount of load reduction

Current Monitoring Plan

- Water Quality Analysis
- Toxicity Testing
- Bioassessment
- Atmospheric Deposition

Water Quality Monitoring

- Chemical analysis
- Flow measurement
- Field measurement

Current Water Quality Monitoring

- Storm season (December through February)
 - Twelve to fifteen sampling sites
 - Samples are collected before, during, and after storms
- Irrigation season (March through August)
 - Weekly and biweekly sampling
 - Twelve to fifteen sites including major tributaries and small drainages

Toxicity Testing

- San Joaquin River near Vernalis
 - An integrator site that receives agricultural runoff from several upstream tributaries
- Stanislaus River, Merced River, Orestimba Creek and Del Puerto Creek
 - To provide data from representative eastside and westside input into San Joaquin River

Toxicity Testing

- To augment the current pesticide monitoring in San Joaquin River Basin
 - Toxicity testing is important to help address issues of bioavailability
 - If pesticide use in the watershed is changing
- Toxicity tests measure compliance with the Basin Plan narrative objective

Toxicity Testing

- Acute and chronic toxicity test
- Toxicity Identification Evaluation
- Chemical analysis

Bioassessment

- Direct measure of the ability of a waterbody to support aquatic life

Bioassessment

- Bioassessment of macroinvertebrate and algae communities
- Bioassessment is conducted to:
 - document the existing conditions
 - assess association between the communities and habitat characteristics

Bioassessment

- Five sites within San Joaquin River Basin were assessed in 2001
 - USGS National Ambient Water Quality Assessment protocols were used for characterization of stream habitat
 - results will be used to establish existing conditions and, to the extent possible, assess the relative importance of habitat quality and water quality



Wet and Dry Deposition of Pesticides in the Central Valley

CVRWQCB TMDL meeting
September 10, 2002

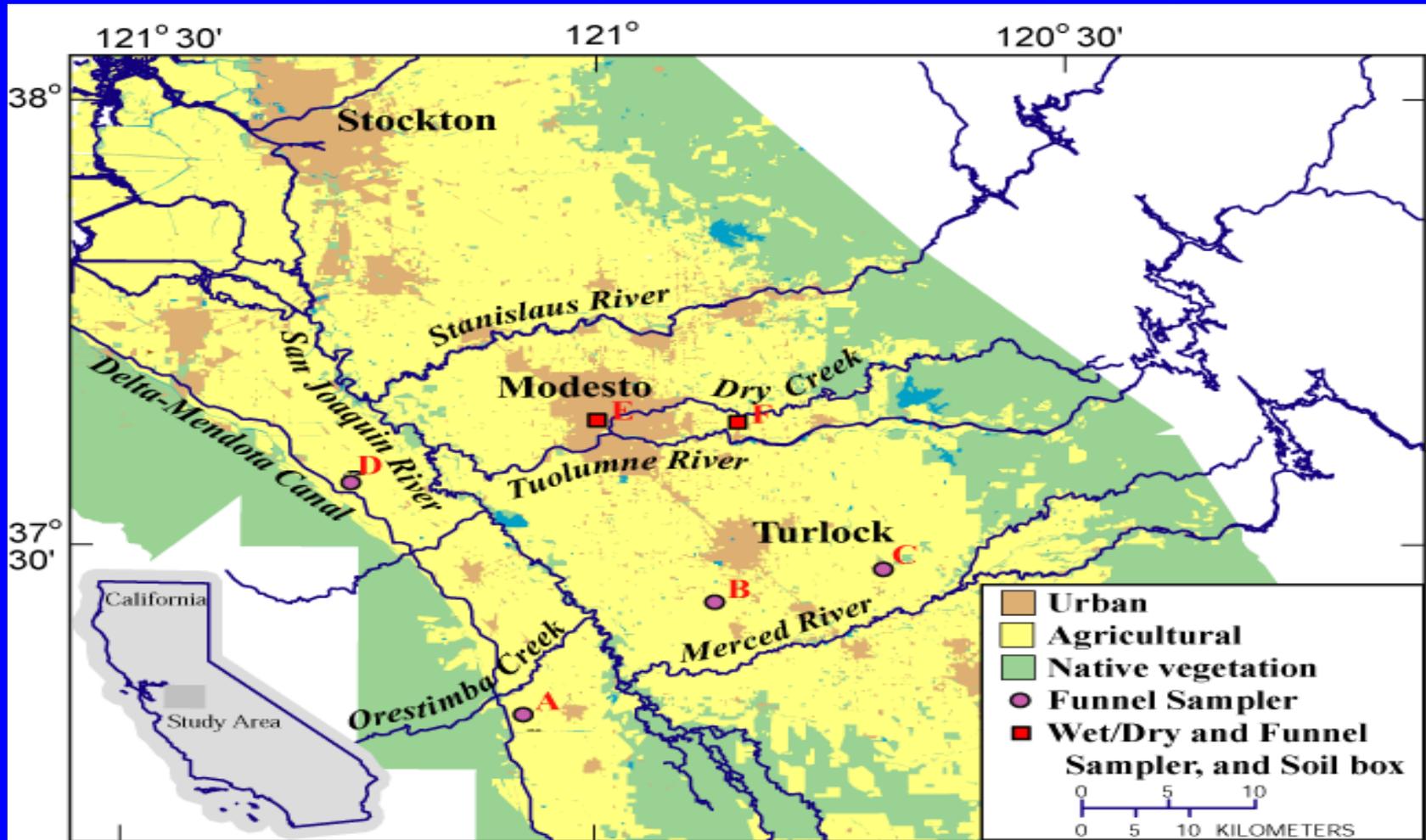
Mike Majewski, Research Chemist

Celia Zamora, Hydrologist

Study Objectives

- Collect wet and dry deposition samples using funnels (1/02 – 7/03), automatic wet/dry samplers (1/02 – 7/03), and soil boxes (8/02 – 7/03)
- Samples will be analyzed at USGS National Water Quality Laboratory in Denver, CO for diazinon, chlorpyrifos, and 43 other pesticides
- Evaluate the contribution of wet and dry deposition of diazinon and chlorpyrifos in the Central Valley

San Joaquin Valley Wet/Dry Sampling Sites



- A Newman Raingage @ Wasteway Levee
- B Turlock Raingage near Idaho Road
- C Turlock Airport Raingage

- D Westley Raingage at Pump Bldg. 6
- E MID at MID Rooftop in Modesto, CA
- F MID at Albers Road Gage Rooftop

Automatic wet/dry sampler, Modesto



Automatic wet/dry sampler, Modesto



Automatic wet/dry sampler, MID Main Canal



Funnel sampler, Newman Wasteway



Funnel sampler, WSID pump #6



Soil box sampler



Replacement Pesticides

- Chlorpyrifos and Diazinon use have declined in recent years
- Market moving to other pesticides
- Potentially problematic:
 - Other organophosphorus pesticides
 - Carbamates
 - Pyrethroids
- Need to avoid creating new problems

Pesticides of Concern in the SJR Basin

Pesticide	Family	Main Use	Conc. At Vernalis 1993 (µg/L)	Conc. At Vernalis 2000 (µg/L)	Chronic Criteria (µg/L)
Chlorpyrifos	OP	almonds, walnuts	0.04	0.007-0.105	0.014 _a
Diazinon	OP	almonds	0.6	0.01-0.0947	0.05 _a
Disulfoton	OP	urban	N/A	N/A	0.1 _b
Dachtal	OC	truck crops	0.1	N/A	20 _b
Carbaryl	CA	peaches, vineyards	0.15	0.01-0.21	0.3 _b
Eptam	CA	corn, almonds	0.1	0.002-0.009	0.19 _b
Cyanazine	TR	cotton, corn	0.12	0.004-0.017	3 _b
Simazine	TR	almonds, vineyards	0.3	0.02-3.76	4 _b
Methidathion	OP	peaches, fruit trees	N/A	N/A	5.1 _b
Pyrethroids Bifenthrin Cyfluthrin Cypermethrin Cyhalothrin Esfenvalerate	Pyrethroids	peaches, fruit trees	N/A	N/A	0.02 _b 0.01 _b 0.43 _b 0.37 _b 0.19 _b

Please see next slide for footnotes.

Pesticides of Concern

Footnotes

OP -- organophosphorus; TR -- triazine; CA -- carbamate;

I -- insecticide; AM -- amide; MI – miscellaneous.

OC – organochlorine.

MDL: limit of detection. LOQ: limit of Quantitation.

GC/MS -- gas chromatography/mass spectrometry.

(A) chronic criteria DFG study using EPA method.

(B) US EPA ECOTOX database.

LOQs for Pyrethroid is based on individual compound.

Concurrent Implementation of TMDLs

- San Joaquin River Basin TMDLs
- San Joaquin River Salt and Boron Basin
Plan Amendment
- Ag Waivers

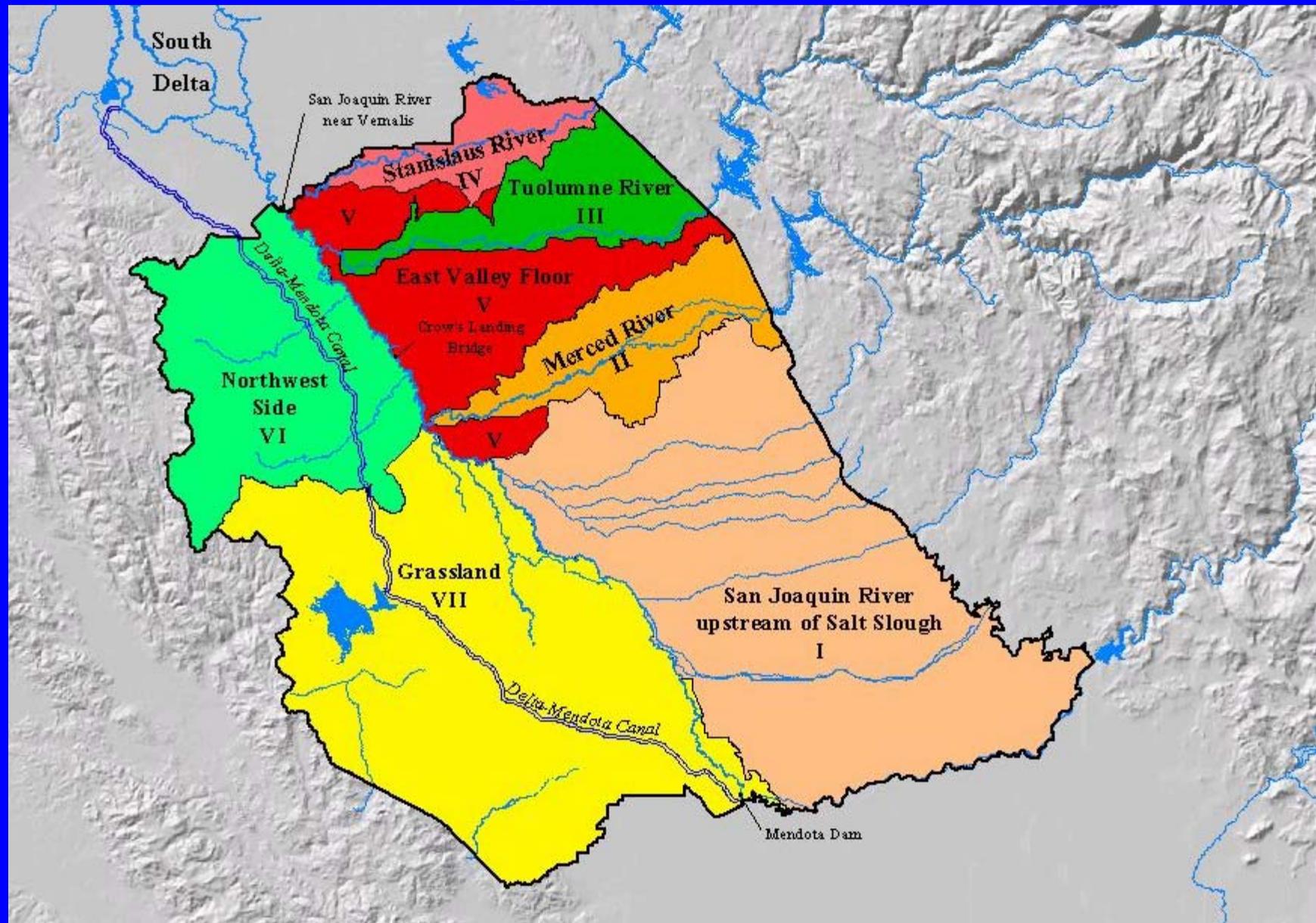
San Joaquin River Basin TMDLs

TMDL	Technical TMDL	Basin Plan Amendment / USEPA Approval
San Joaquin River selenium	August 2001	1996 / March 2002
San Joaquin River salt & boron	January 2002	June 2003
San Joaquin River diazinon & chlorpyrifos	July 2002	June 2003
Delta Waterways (Deep Water Ship Channel) Dissolved Oxygen	June 2003	June 2004

SJR Selenium TMDL

- Main source of selenium:
97,000 acre Drainage Project Area
- Program of Implementation, Basin Plan Amendment, and Waste Discharge Requirements in place prior to completion of TMDL
- TMDL load limits established to meet selenium water quality objectives in the SJR

Lower San Joaquin River Basin Sub-areas



SJR Selenium TMDL Success

- Regulated and coordinated discharge from 97,000 acre Drainage Project Area
- Partnership between USBR, San Luis and Delta Mendota Water Authority, and the Grassland Area Farmers
- Successful implementation and operation while under Waste Discharge Requirements

Salt and Boron TMDL

- Source area: 2.9 million acres
- TMDL Report submitted to USEPA in January 2002
- Load allocation for subareas in project area
- Phased TMDL: load limits based on meeting only Vernalis objectives
- Consideration given to:
 - Source water quality
 - Import of salts
 - Need for salt balance

Salt and Boron TMDL

- Base load allocations evenly distributed throughout basin– no load allocations during certain critical flow periods
- Framework accounts for degraded supply water quality
- Responsibility for meeting salt load limits is shared by dischargers and the USBR
- Basin Plan Amendment by June 2003

Dissolved Oxygen TMDL

- Stakeholder process
- Source analysis
 - Non-point sources in upper watershed (nutrients, algae)
 - Wastewater treatment plants
 - Channel volume
 - Reduced flows
- Load allocation considerations
 - Organic matter, nutrients, algal production, local WWTP, tidal barrier operation, flow, deep water ship channel

Dissolved Oxygen TMDL

- Possible Regional Board Actions:
 - Ag discharges may not qualify for waiver
 - Point sources may not get NPDES permit
 - No water quality certification for channel dredging
 - May recommend to State Board to not approve water transfers

TMDL Challenges

- Possible restrictions on ability to discharge from agricultural or wetland areas
- Possible limits on municipal discharges
- Possible limits on ability to transfer water
- USBR responsibility for impaired water supply
- Limits to what can be achieved through regulatory authority of Regional Board

San Joaquin River Salt and Boron Basin Plan Amendment

- New salt and boron water quality objectives upstream of Vernalis
- New objectives will be incorporated into TMDL
- Beneficial uses may be reviewed

Next Steps

- Draft Basin Plan Amendment staff report:
 - Beneficial uses
 - Water quality objectives
 - Program of implementation
 - TMDL elements (loading capacity, allocations, margin of safety)
 - Surveillance and monitoring

How You Can Contribute

- Provide feedback on:
 - Draft Implementation Framework
(provide ideas on implementation alternatives)
 - Participate in Draft Basin Plan Amendment Workshops (December and March)

