Balancing Pest Management Needs and Water Quality

Parry Klassen
CURES

Cal-IPC 2005 Symposium

Cures

Coalition for Urban/Rural Environmental Stewardship

www.curesworks.org

- Non-profit organization: agricultural, urban projects
- Promote stewardship, proper use of pesticides
- Parry Klassen, Executive Director

Balancing Pest Management Needs and Water Quality

Can it be done in this regulatory climate?

Irrigated Lands Conditional Waiver

"Conditional Waiver" of Waste Discharge Requirements for Discharges from Irrigated Lands

- Sacramento, San Joaquin River and Tulare Lake Basin

Adopted by Regional Board

July 11, 2003

Irrigated Lands Conditional Waiver

Applies to All Irrigated Lands

- Cropland
- Irrigated pasture
- Managed wetlands
- Nurseries

No dry land farming or native pasture

Discharges Covered

- Surface runoff (irrigation tailwater)
- Subsurface drainage disharged to surface
- Operational spills (irrigation canals)

- Storm water runoff

“Waters of the State”

- Applies to waters in public and private channels
- Applies to waters in natural and constructed waterways
- No exceedances of state/federal water quality criteria, numerical or narrative

Grower Options for Conditional Waiver

- Form / join watershed coalition
  - So growers / irrigators don't need to file individual waste discharge requirements
  - Per acre charges to cover costs

- Individual discharger
  - Individual Waste Discharge Requirement (WDR) for each farm or discharger
  - Annual permit can range from $600 to thousands based on the threat to water quality

Why Water Coalitions?

- Economies of scale
- Reduced cost for landowners/operators
- Effective means to solve non-point source water quality problems

Watershed Coalitions

Organizational structure

- **Agricultural interests**
- **Irrigation districts**
- **Some develop non profit organizations**

Central Valley Coalitions

- **Sacramento Valley Water Quality Coalition**
  10 Regional Subwatershed groups
  - David Guy
    Aaron Ferguson
- **California Rice Commission**
  - Tim Johnson
- **San Joaquin County & Delta Water Quality Coalition**
  - John B. Meek
- **Westside San Joaquin River Watershed Coalition**
  Joseph C. McGahan
- **East San Joaquin Water Quality Coalition**
  - Parry Klassen
    Coalition for Urban/Rural Environmental Stewardship
  - Wayne Zipser
    Stanislaus County Farm Bureau
- **Southern San Joaquin Valley Water Quality Coalition**
  - David Orth, Kings River Conservation District
- **Westlands Water District**
  - Thaddeus Bettner
- **Root Creek Water District**
  - James Provost

Why monitor and for what?

Central Valley Coalition Monitoring Plan Goals

- To assess sources and impacts of waste in discharges
- Track progress towards lowering discharges and meeting TMDL goals
- Identify sources and extent of pollution, develop solutions based on BMPs

Constituents of Concern

Includes any constituent that can affect the quality of waters of the State

- **Pesticides**
- **Nutrients (N, P, K)**
- **Salt/boron**
- **Selenium**
- **Sediment**
- **E coli**
- **Metals**

Ambients

- **Flow**
- **Temperature**
- **pH**
- **EC**
- **Turbidity**
- **Dissolved Oxygen**
- **Total Organic Carbon**

Synthetic Pyrethroids

- Common names
  - Bifenthrin
  - Cyfluthrin
  - Cyhalothrin
  - Cypermethrin
  - Deltamethrin
  - Fenpropathrin
  - Esfenvalerate
  - Permethrin
  - Tralomethrin
  - Zeta-cypermethrin
- Trade names
  - Capture; Brigade
  - Baythroid
  - Karate; Warrior
  - Ammo
  - Decis
  - Danitol
  - Asana
  - Pounce; Ambush
  - Scout
  - Fury

Major Crops Uses for Pyrethroids (lbs)

Crops	1997	1998	1999	2000	2001	2002	2003
PISTACHIO	11208	15025	14603	26806	15979	22877	31673
LETTUCE, HEAD	50013	51484	30896	32004	32657	28763	29390
ALMOND	**26618**	**26108**	**25653**	**24241**	**28036**	**28810**	**26809**
LETTUCE, LEAF	22103	22668	14821	15564	17281	18047	20045
ALFALFA	**26670**	**27155**	**28559**	**35799**	**20858**	**20122**	**19940**
COTTON	**25032**	**28167**	**16302**	**14963**	**17192**	**17326**	**19332**
ORANGE	9787	8888	6599	2869	6844	8670	9133
CORN (FORAGE - FODDER)	5907	6554	5520	6418	15896	7846	8696
TOMATO, PROCESSING	**9407**	**10384**	**9660**	**6503**	**5578**	**4799**	**7595**
PEACH	**9238**	**10047**	**8543**	**10877**	**10624**	**10232**	**7454**
CORN, HUMAN CONSUMPTION	**6924**	**7444**	**7292**	**6180**	**4934**	**7062**	**7154**
WALNUT	**6539**	**8284**	**6308**	**4501**	**4544**	**3856**	**4653**
TOMATO	2991	3491	2803	2448	2507	2624	3555
NECTARINE	669	812	918	1381	1070	1145	1050
STRUCTURAL PEST CONTROL	**307259**	**344711**	**336189**	**417104**	**421371**	**486737**	**567483**

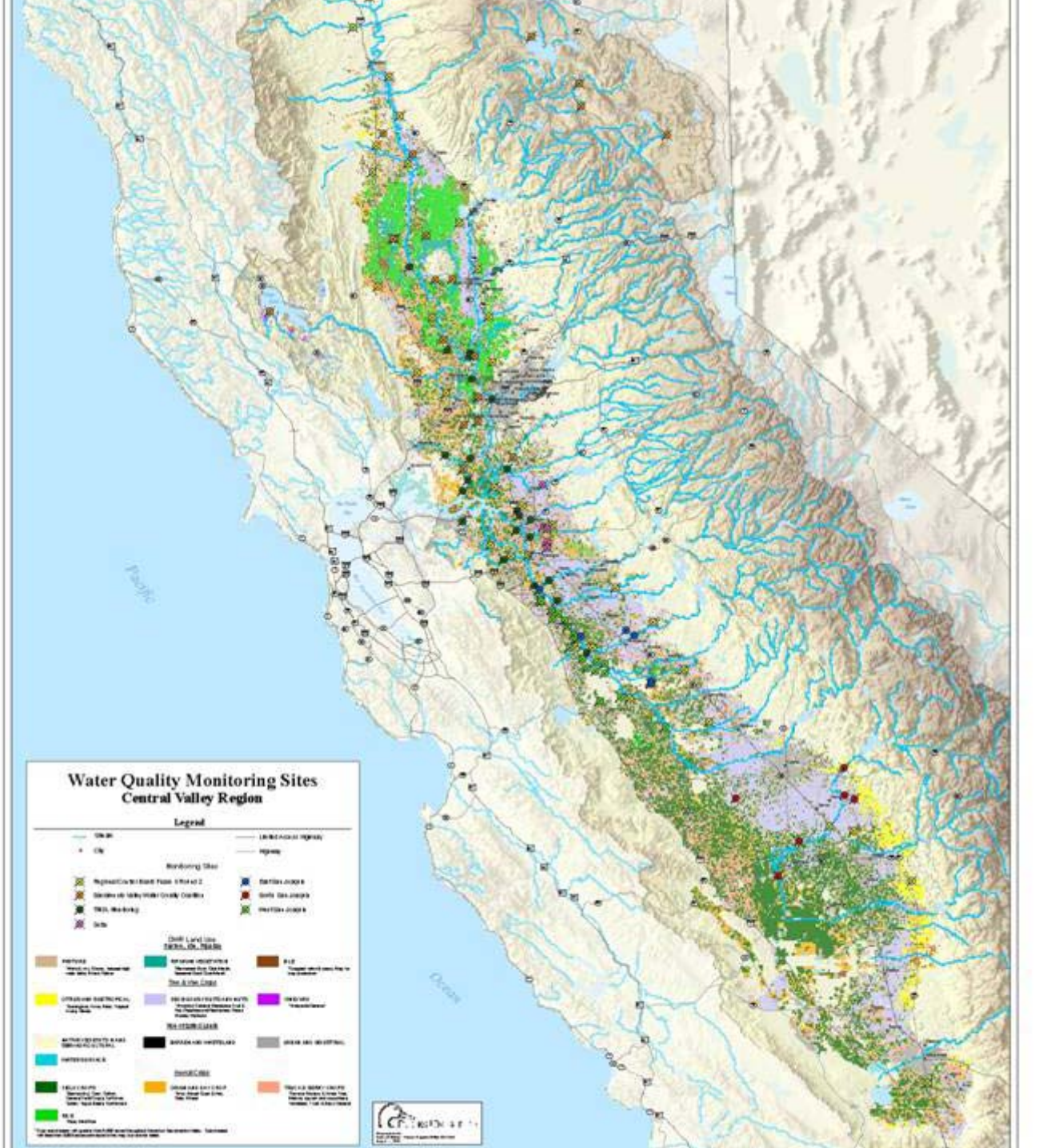
Central Valley
Water Monitoring Programs

Coalition funded

- Phase 1: began July 1, 2004
- Phase 2: no later than 2 years after starting phase 1
- Phase 3: no later than 2 years after starting phase 2

Regional Water Board funded

- Phase 1: Completed 2003 by UC Davis / Victor de Vlaming
- Phase 2: Managed by UC Davis / Michael Johnson
  - *25 + sites in Central Valley 2004 - 2006*
  - *$3 million budget*


Water Quality Monitoring Sites
Central Valley Region
Legend
Pacific
Ocean

Water Monitoring Requirements

- Water column
  - Toxicity testing
  - Water chemistry
    - 303d listed constituents
- Sediment toxicity test

Sampling Schedule (water column)
- Monthly during irrigation season
- Two winter storms events

Sampling Schedule (sediment)
- Spring/Fall

All field sampling followed Quality Assurance Project Plan (QAPP)

Water Monitoring Requirements

Toxicity Testing

- Species representing three trophic levels
  - Water flea (Ceriodaphnia dubia)
  - Fathead minnow (Pimephales promelas).
  - Green algae (Selanastrum capricornutum),

Toxicity Identification Evaluation (TIE)

- Performed in three phases to identify a cause(s),
  - Phase I: identify general class of contaminant responsible for toxicity
  - Phase II: identify specific contaminant
  - Phase III: confirmatory analysis

After three phase TIE…

Sufficient information generally available to ID contaminant causing toxicity.

- Not uncommon to complete TIE and be unable to identify a specific class of contaminant responsible for toxicity.
- Then assigned “unknown toxicity”

Water Monitoring Requirements

Sediment Toxicity Testing

- Pore water (water between sediment particles)
  - Pore water contains dissolved (bioavailable) fraction of the contaminant(s).
  - Toxicity tests performed same manner as water column tests

- Intact sediments (bed of waterway)
  - Testing organisms (U.S. EPA protocols): Hyalella azteca
  - Species broadly distributed/found naturally in Central Valley.
  - Live on or in sediment; exposed to the contaminants in pore water
- Collecting sediment cores
  - Remove top layer of sediment with a stainless steel scoop
  - Fine sediments used in toxicity tests. Coarse sediments tend to consist of sand and retain very few contaminants.

Event 1
July 31, 2004

Water Chemistry analysis

August Road Drain

- Dimethoate: 0.31 µg/L
- TDS: 1400mg/L

Duck Slough

- Chlorpyrifos (Lorsban): 0.045 µg/L .
  - Duplicate sample taken at Duck Slough showed no detection of chlorpyrifos.

- Trifluralin (Treflan): 0.045 µg/L .
  - Trifluralin was not detected in the original sample but was detected in the duplicate.

Event 3
September 29, 2004

- Toxicity Tests: All sites
  - Ceriodaphnia: no toxicity
  - Fathead minnows: no toxicity
- Duck Slough
  - Algal test: Significantly reduced growth of algae

Water chemistry analysis

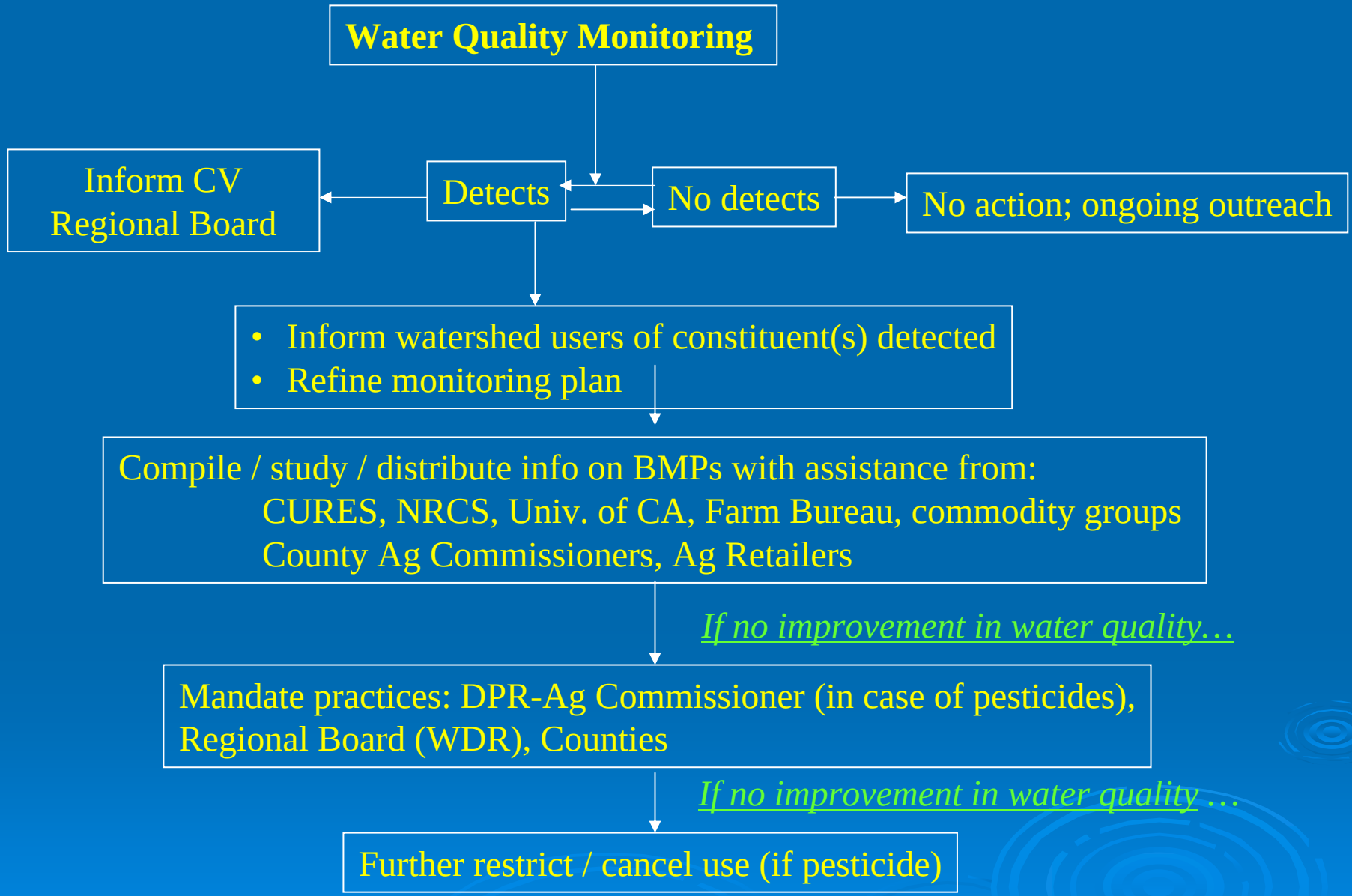
- Duck Slough
  - Esfenvalerate at 0.05 µg/L
- August Road Drain
  - Diazinon at 0.026 µg/L

Westside San Joaquin River Watershed Coalition

Storm Runoff Monitoring Results
Del Puerto, Ingram, Hospital, Orestimba Creeks

- December 29, 2004
  - Diazinon
  - Dimethoate

  - Prowl
  - Simazine
  - Triflurilan (Treflan)
  - Prometryn

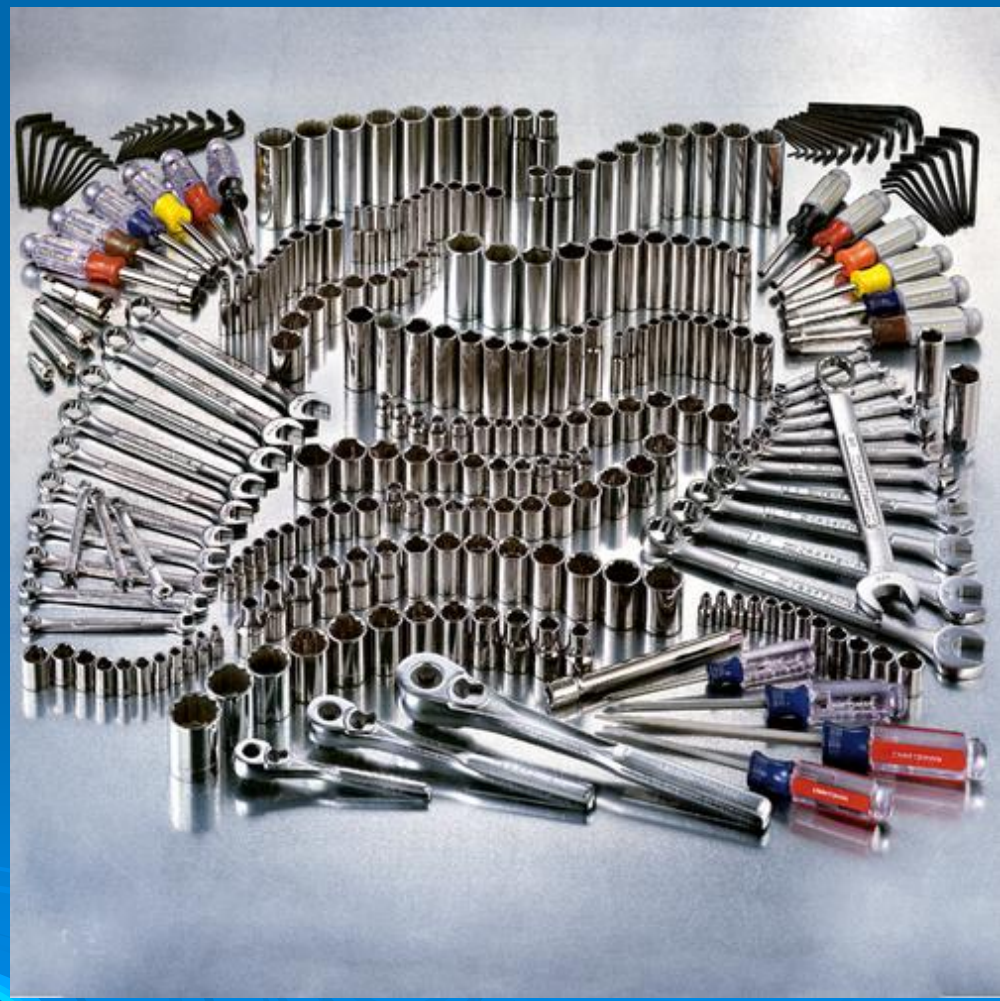

Water Quality Monitoring
Inform CV Regional Board
Detects
No detects
No action; ongoing outreach
• Inform watershed users of constituent(s) detected
• Refine monitoring plan
Compile / study / distribute info on BMPs with assistance from:
CURES, NRCS, Univ. of CA, Farm Bureau, commodity groups
County Ag Commissioners, Ag Retailers
If no improvement in water quality…
Mandate practices: DPR-Ag Commissioner (in case of pesticides), Regional Board (WDR), Counties
If no improvement in water quality …
Further restrict / cancel use (if pesticide)

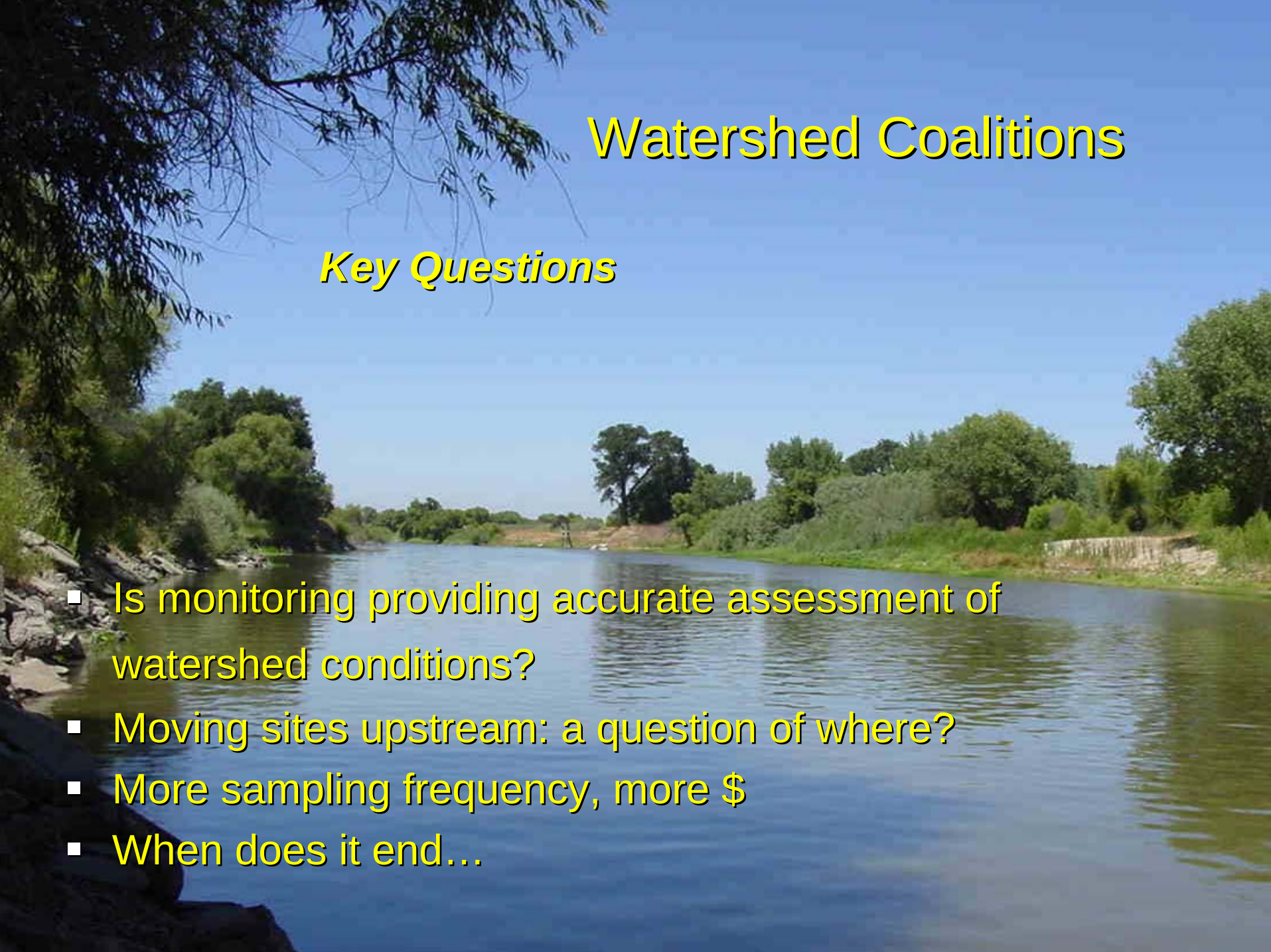
Action Plan
Approaches for BMPs
(Best Management Practices)

- ***Goal: Create list of options***

- Application BMPs
  - Lower label rates
  - Mix and load properly
  - Calibrate equipment
  - New sprayer technology

- Site BMPs (orchard)
  - Cover crops: native perennials, legumes
  - Grassy row centers during dormancy
  - Vegetative filter strips
  - Grassed waterways
  - Drainage management





Watershed Coalitions

Key Questions

- Is monitoring providing accurate assessment of watershed conditions?
- Moving sites upstream: a question of where?
- More sampling frequency, more $
- When does it end…

Coalition Sampling Ag Drains

Waterway Characteristics

- Low flows
- Multiple in-flows (irritation tailwater, natural runoff)
- Can have medium to high sediment loads

2005 Coalition Sampling Programs

- Monitor for pesticides used upstream of sampling site
- Many pesticides do not have established water quality criteria
- Default criteria: LD50 / 10

Watershed Coalitions

Key Questions

- Can multiple constituents found in a sample create matrix “noise” that reduces accuracy of the results, creating false positives or false negatives?

What does it mean?

Accurate data interpretation key to actions

- **Can policy makers use the information**
- **What is the level of confidence in its accuracy**