

# DPR Surface Water Protection Program: an overview of agricultural monitoring of the Central Coast

Pedro Lima, Xin Deng, Anson Main  
Surface Water Protection Program  
California Dept. of Pesticide Regulation



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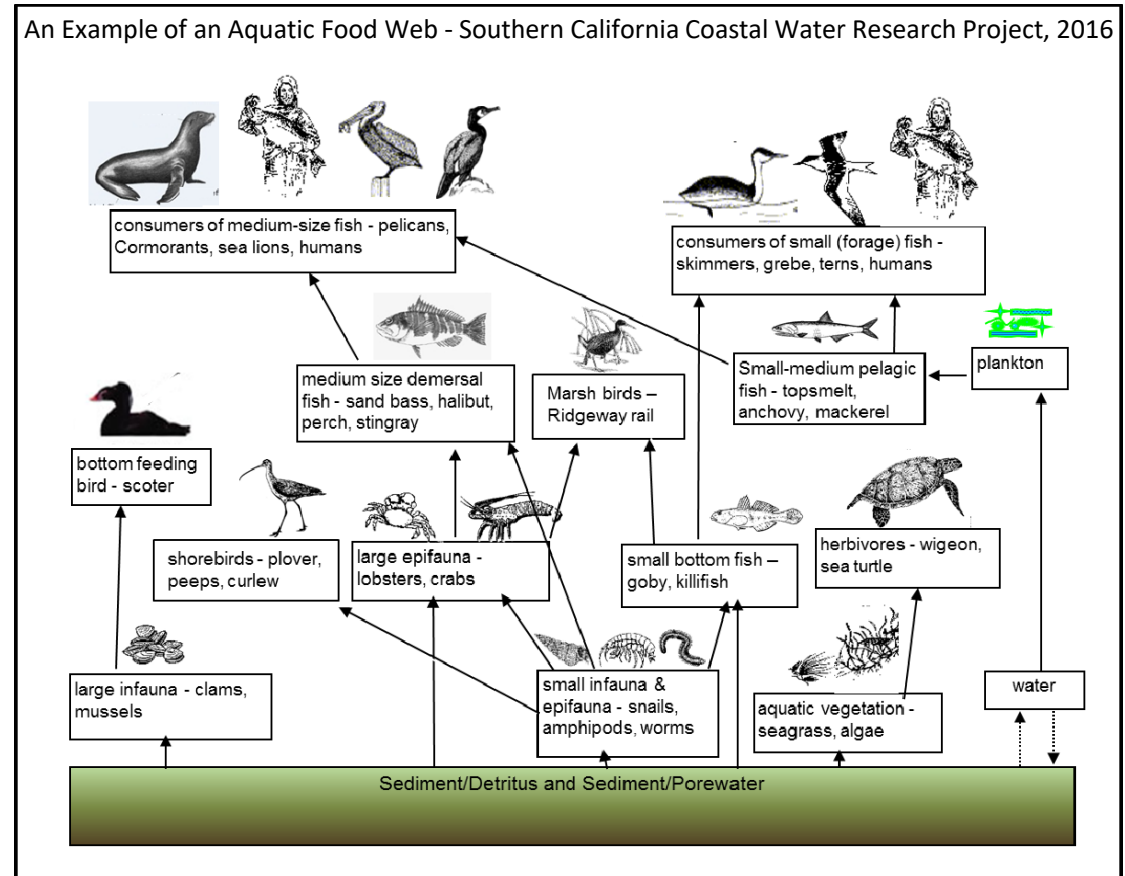
# Surface Water Protection Program (SWPP) – who are we?



- Program within DPR charged with protecting California's surface water environment from the use of pesticides.
  - ✓ General environmental protection authorities & mandates in Food and Agriculture Code (§11501, 12824 & 14102)
  - ✓ Officially established as program in 2000
- Certain aspects of program began in 1980's under CA Dept. of Food and Agriculture.
- Based in Sacramento but statewide in geographical scope
- Current staffing: **17** = 14 scientists & 3 scientific aids
  - ✓ Ecotoxicologists, modelers, analytical chemists, statisticians, ecologists, agricultural engineers

# Agricultural Monitoring Goals

- Determine the presence and concentrations of selected pesticides in agricultural surface waters
- Determine toxicity of collected water samples via UC-Davis/Granite Canyon labs
- Analyze patterns and trends in pesticide concentrations
- Evaluate potential impacts to aquatic organisms by comparing observed concentrations to aquatic benchmarks or toxicity thresholds
- Evaluate efficacy of mitigation practices



Our focus is on protecting the aquatic environment. DPR is mandated to monitor state surface waters for pesticides (CA Food and Agricultural Code).

# Site Selection

- Focus on **worst-case scenario**:
  - ✓ high level of pesticide use
  - ✓ multiple cropping seasons
  - ✓ high runoff potential via irrigation or storm runoff
- Surface Water Monitoring Prioritization (SWMP) model
- 27 sampling stations in 5 regions





# Watersheds Monitored in the Central Coast

## Current sites (2024):

### Salinas Valley (8)

Salinas River – 4 sites

Quail Creek, Chualar Creek, Blanco Drain (Cooper Rd.)\*

Salinas River (Davis Rd.)‡

Tembladero Slough – 4 sites

Alisal Creek, Rec Ditch\*

Tembladero Slough (Haro St., HWY 183)‡

### Santa Maria Valley (6)

Oso Flaco Creek – 3 sites\*

Orcutt Creek – 2 sites

Solomon Creek\*

Orcutt Creek (W. Main St.)‡

Main St. Ditch – 1 site\*



‡ = mainstem; \* = creek, ag drain, stream

# Central Coast

*Salinas and Santa Maria Valleys*

- Monitored since 2007
- Heavy agricultural production: more than 150 crops grown (Monterey County Farm Bureau, 2022)
- Climate is ideal for warm and cool-season crops





# Annual Monitoring Schedule

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- Focus on irrigation and rainfall events
- Sampling events (SoCal, n=7) coincides with:
  - Peak pesticide application period
  - Peak period for irrigation or storm runoff
- 2019: initiated annual storm sampling
  - Potential elevated pesticide detections and concentrations during storm events





# Field Collection Methods

- Grab Samples (dry and storm events)
- Autosampler (storm events)
  - Collects samples at set time intervals
  - Characterizes movement and detections of pesticides via runoff throughout a storm





# Which pesticides do we monitor?

- Surface Water Monitoring Prioritization (SWMP) Model
- Prioritizes at the watershed level
- Pesticides ranked according to:
  - Pesticide Use Reports (PUR)
  - Aquatic toxicity

Pesticide Prioritization for Surface Water Monit...

Tools Help

Configuration Advanced Options Watershed

Use patterns

Agricultural use  Urban use  "Rights of way" (site\_code=40)

Or, user-specified site\_code(s)=

PUR data

Based on PUR data from  to

Toxicity data

Acute  Chronic  Both

USEPA Aquatic Life Benchmarks

Supplemented by Benchmark Equivalent (based on FOOTPRINT PPDB)

USEPA Drinking Water Standard

USEPA Human Health Benchmark

*Note: if multiple toxicity databases are selected, the lowest toxicity value for each pesticide will be used for prioritization*



**USE (1-5) x TOX (1-8) = Score**

Pesticide	Use (lbs)	Use score	Tox (ug/L)	Tox Score	Final Score	Recom?
Permethrin	17,032	3	0.03300	7	21	Yes
Methomyl	80,895	5	4.40000	4	20	Yes
Malathion	12,634	3	0.04000	6	18	Yes
L-cyhalothrin	4,591	2	0.00004	8	16	Yes
Bifenthrin	2,405	2	0.00024	8	16	Yes
Imidacloprid	16,062	3	0.38000	5	15	Yes
Glufosinate-Ammonium	41,265	4	72.0000	3	12	Yes
PCNB	25,272	4	50.0000	3	12	No <sup>1</sup>
Pyraclostrobin	9,713	3	1.50000	4	12	Yes
Bensulide	130,365	5	140.000	2	10	Yes

**Salinas River drainage area = 2,738,422 acres**

<sup>1</sup>Analytical method not currently available.



# US EPA Aquatic Life Benchmarks

Pesticide	Acute (ng/L)	Chronic (ng/L)*
imidacloprid	385	10
bifenthrin	0.25	0.12
permethrin	3.30	4.20



*Hyalella azteca*



*Chironomus dilutus*

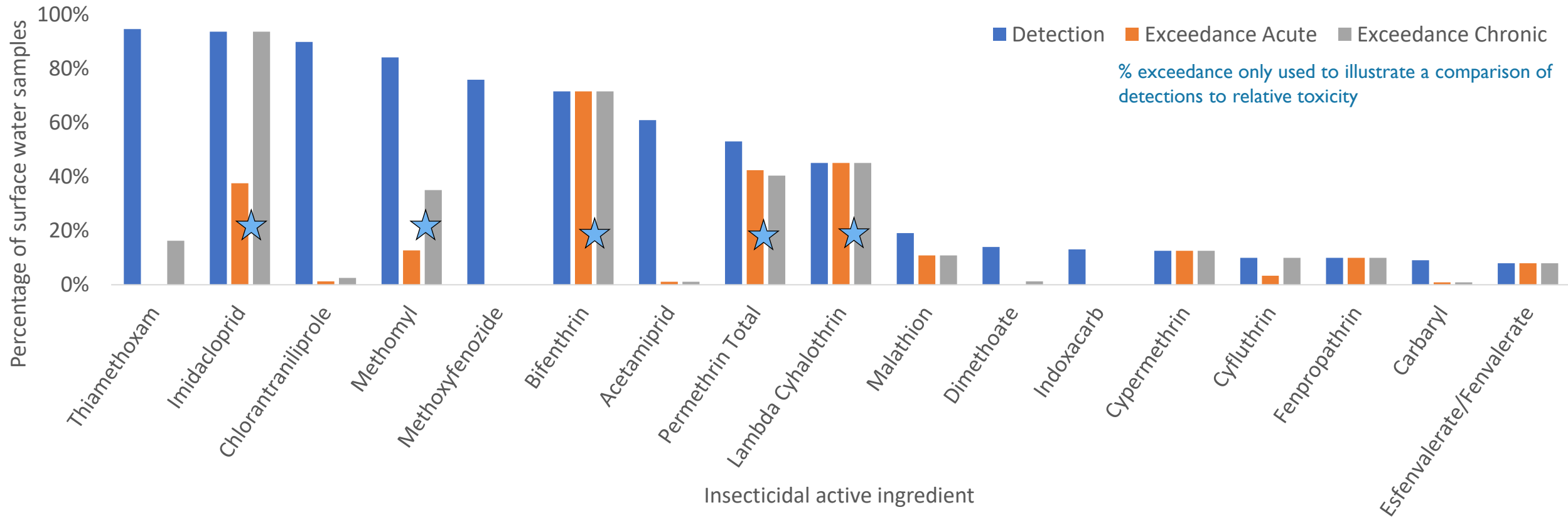
\*Benchmark (BM) exceedances are based on the lowest (either acute or chronic) BM values among various taxa





# Insecticide Detections/Benchmark Exceedances

Salinas: 2017-2021 (all data)



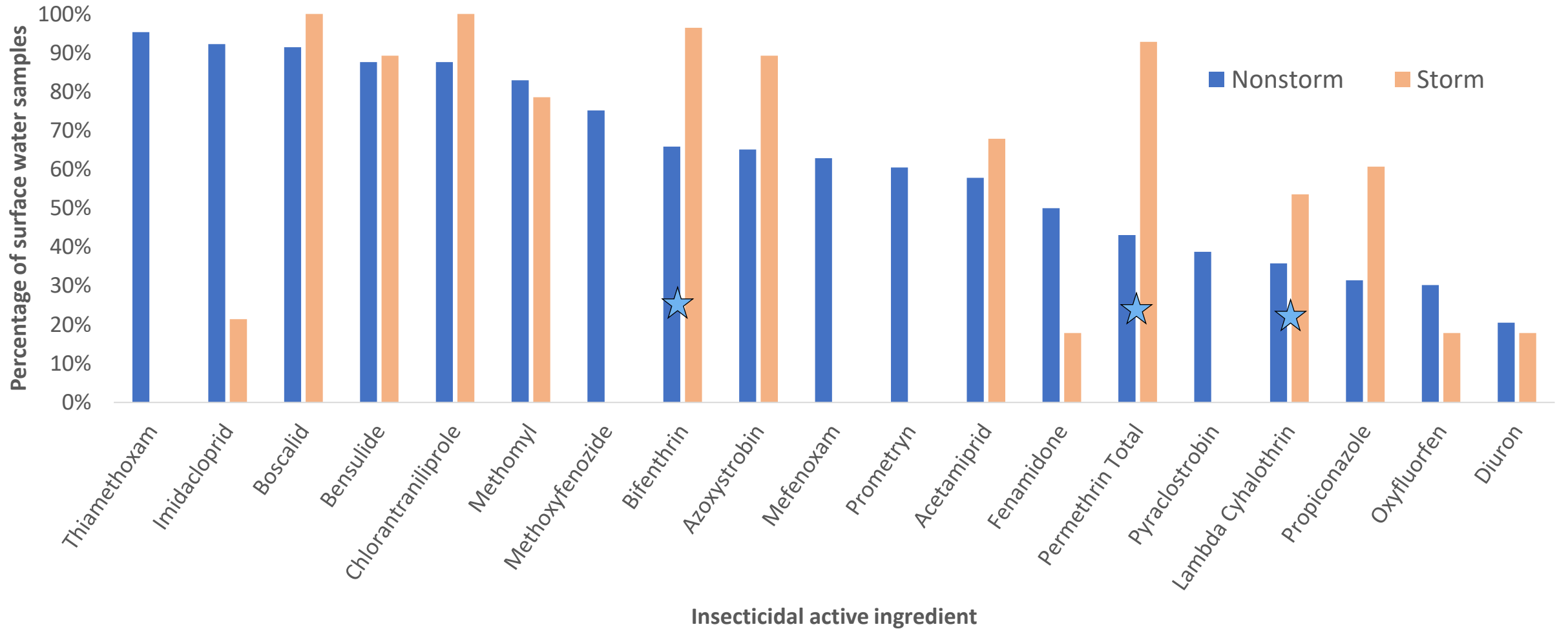
Insecticides >5% detections: **17**

Insecticides >20% lowest (acute or chronic) benchmark exceedance:  
**imidacloprid, methomyl, bifenthrin, permethrin,  $\lambda$ -cyhalothrin**



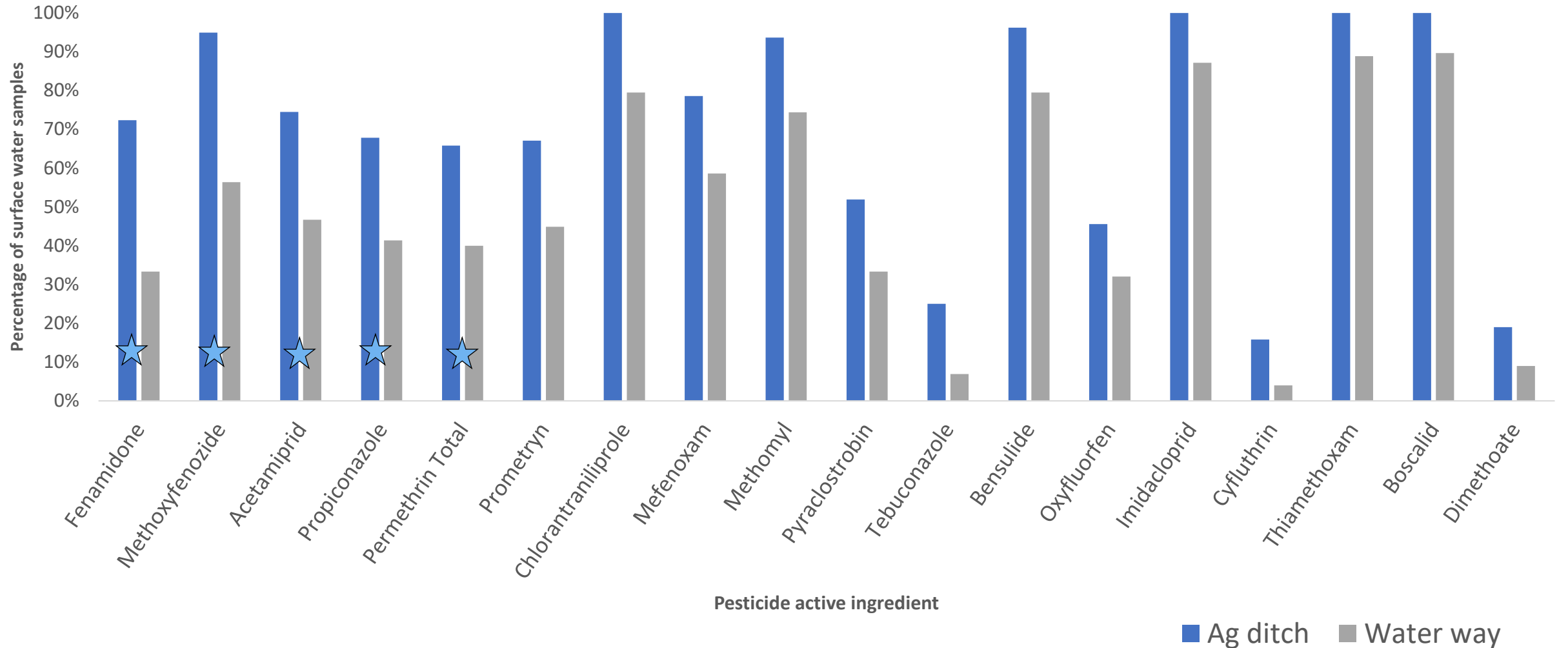
# Pesticide Detections in Storm vs Non-Storm

Salinas: 2017-2021



# Pesticide Detections in Ag. ditch vs Waterways

Salinas: 2017-2021





# Prevention: #1 Mitigation Strategy

## Use of the Pesticide Registration Evaluation Model (PREM)

	SOL	KOC	HYDRO	AERO	ANAER	FD
▶	0.2	5900	39	79	211	

Parent AI | Degrades

Use pattern

HIGH-risk use pattern:

▼

- Aquatic use
- Rice pesticide
- Urban outdoor
- Rights of way
- Alfalfa, pasture
- Almond, pistachio, walnut
- Broccoli
- Citrus
- Corn
- Cotton
- Grains
- Grape
- Lettuce
- Outdoor nursery

Application rate

Max. rate of single application (kg[AI]/ha): 0

(aquatic uses) target conc. in water (ppb): 0

Min. interval (day) between two applications: 30

Max. number of applications per year: 1

Date of the first application (dd-mm): 01 - 01

Receiving-water scenario

USEPA pond

Edit...

Run

## Registration Evaluations:

- Focus on California conditions
- Based on “high-” or “low-risk” uses
- **Recommended Decision:**
  - Support
  - Deny (i.e., do not register)
  - Conditional (add to “watch” list)





# Current collaborations and Mitigation

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**Collaboration is key!**

**Work with a range of agencies and stakeholders:**

- Central Coast Regional Water Quality Control Board (Irrigated Lands Regulatory Program: Ag Order 4.0)
- Aquatic Health Program Laboratory, UC Davis
- Granite Canyon Marine Pollution Studies Laboratory, UC Davis
- California Department of Food and Agriculture
- Monterey County, CA (Juan Hidalgo, Ag. Commissioner)





# What about structural mitigation? BMPs?

Collaborations and Mitigation Research

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## Past and Current Contracts

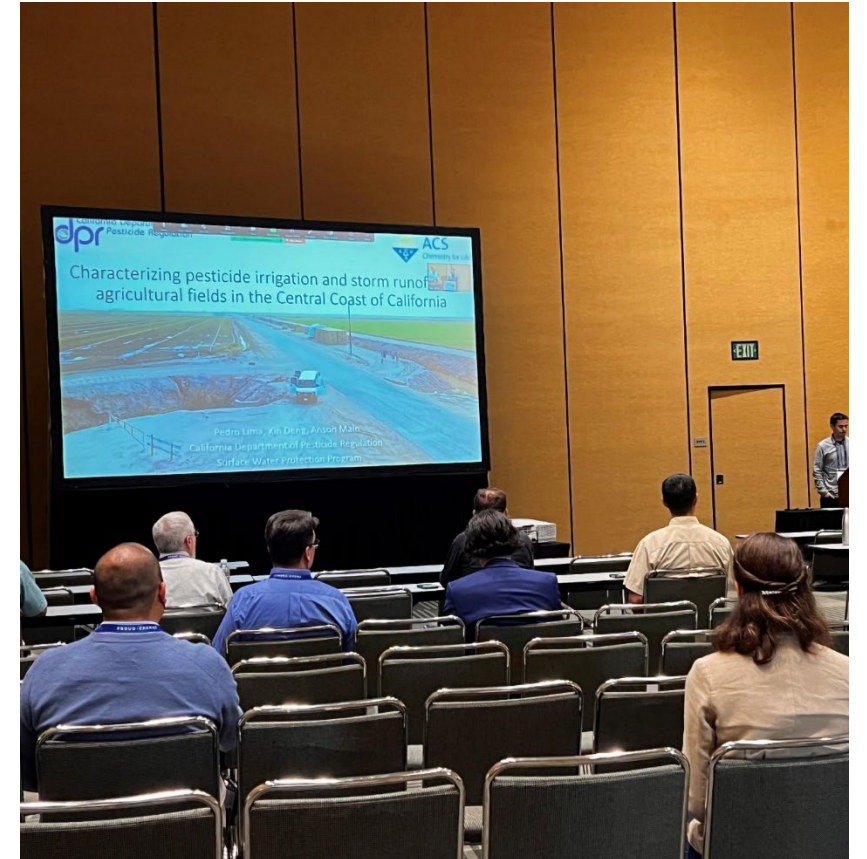
- CalBMP tool: A web-based interface tool to help guide ag. professionals to design and evaluate management practices (Central Coast local growers, Monterey Bay National Marine Sanctuary, UC Davis, Preservation INC., Water Boards)
- Vegetated ditches (UC Extension)
- Biochar (Granite Canyon Marine Pollution Studies Laboratory, UC Davis)
- Sedimentation ponds (UC Davis)





# Outreach

- Engage with stakeholders (growers, agencies) to better understand pesticide use practices
- Attend meetings to share data on water quality with stakeholders to reduce pesticide runoff and impacts to surface waters:
  - ✓ UC Entomology Seminar
  - ✓ Environmental Justice workshops
  - ✓ California Agricultural Aircraft Association (CAAA)
  - ✓ California Soil and Plant Meeting
- Looking to increase our agricultural outreach activities





# Future directions

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**STUDY 321:** Ongoing ambient study: assess trends in pesticide concentrations at long-term monitoring stations to evaluate efficacy of mitigation efforts and future needs

**STUDY 334:** Different sampling techniques (grab sampling, autosampler composite sampling, and autosampler individual sampling) will be evaluated on the characterization of pesticide concentrations in storm runoff:

- Determine peak and average pesticide concentrations in storm runoff **within watersheds of various sizes**;
- Evaluate **effects of pesticide characteristics** (solubility, hydrophobicity) on peak and average pesticide concentrations in storm runoff;
- Evaluate the **effects of storm characteristics variability** on peak and average pesticide concentrations including rainfall intensity, duration and total precipitation.

# Toward 2050... Sustainable Pest Management

## SPM: AN OVERVIEW

Sustainable pest management (SPM) is a process of continual improvement that integrates an array of practices and products aimed at creating healthy, resilient ecosystems, farms, communities, cities, landscapes, homes, and gardens. SPM examines the interconnectedness of pest pressures, ecosystem health, and human wellbeing. SPM asks each of us to become an active participant and an informed steward in the effort to enhance a healthy, thriving California.

## KEYSTONE ACTIONS

The following are the Work Group and Urban Subgroup's keystone actions - those that are urgent and foundational to the success of our collective efforts towards safer, sustainable pest management:

**A Prioritize Prevention**  
Strengthen California's commitment to pest prevention by proactively preventing the establishment of new invasive pest species, and by proactively eliminating pest-conducive conditions both in agricultural and urban settings.

**B Coordinate State-Level Leadership**  
Create an accountable and connected leadership structure to champion SPM in the field, effectively embed SPM principles across agencies, and improve coordination.

**C Invest in Building SPM Knowledge**  
Significantly invest in SPM-focused research and outreach so that all pest management practitioners have equal and adequate access to the support and resources necessary to develop and implement their own SPM system.

► **IN AGRICULTURAL PEST MANAGEMENT:**

*Secure a significant increase in SPM-trained technical advisors and funding for SPM multi-directional research and outreach.*

► **IN URBAN PEST MANAGEMENT:**

*Expand funding and infrastructure for urban SPM research, innovation, and outreach to align with and reflect the volume and impacts of pesticides used in urban contexts.*

**D Improve California's Pesticide Registration Processes and Bring Alternative Products to Market**  
Create mechanisms to improve DPR's registration review process and to prioritize and expedite safer, more sustainable alternative products to high-risk pesticides, and improve processes for evaluating currently registered pesticides.

**E Enhance Monitoring and Data Collection**  
Significantly expand and fully fund health & environmental monitoring infrastructure, data collection, and interpretation.





# In Closing...

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- Surface Water’s agricultural monitoring activities are:
  - ✓ Statewide in scope
  - ✓ Pesticide-focused, not commodity specific
  - ✓ Focused on the “worst-case scenario”
  - ✓ Adaptive (i.e. chemicals prioritization model, potential additional exploratory sites, BMPs pesticide runoff removal efficacy)
- Samples are collected to determine presence/concentration of pesticides in water and sediment and aquatic toxicity
- Long-term analysis conducted to characterize agricultural pesticide trends
- Results are used to assess efficacy of mitigation and protect surface water



# In Closing...

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- The Central Coast is a major part of our agricultural monitoring program
- We are a data driven program - we use science and technology to better inform policy
- **Collaboration is key!**
  - ✓ Interagency coordination and stakeholder engagement are a necessity for successful program function and development. We continue to engage with growers and practitioners
- **Transparency**
  - ✓ Important that pesticide users, the public, and other stakeholders understand our surface water protection mission and work





**Questions?**

Contact:  
[Pedro.Lima@cdpr.ca.gov](mailto:Pedro.Lima@cdpr.ca.gov)