DPR Surface Water Monitoring Program

California Water Quality Science Symposium
June 29, 2016

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Environmental Monitoring Branch
Department of Pesticide Regulation
Program Overview
Monitoring Objectives

- Monitor California surface waters to determine the presence of pesticides
- Determine if concentrations are at levels that are potentially toxic to aquatic species
- Source identification
- Evaluate seasonal trends
- Evaluate regional trends
Monitoring Prioritization

- Automated ranking system of currently registered active ingredients
- Based on reported use (PUR), aquatic benchmarks, and physiochemical properties
- Prioritize to watershed level
- Different use patterns (crop, structural, etc.)
## Urban Prioritization

<table>
<thead>
<tr>
<th>Pesticide</th>
<th>Use (lbs)</th>
<th>Use score</th>
<th>Benchmark (ppb)</th>
<th>Tox score</th>
<th>Final score</th>
<th>Recom</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIFENTHRIN</td>
<td>118,154</td>
<td>5</td>
<td>0.0013</td>
<td>7</td>
<td>35</td>
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<tr>
<td>PERMETHRIN</td>
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<td>0.002</td>
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<tr>
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<td>IMIDACLOPRID</td>
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</table>

## Ag Prioritization

<table>
<thead>
<tr>
<th>Pesticide</th>
<th>Use (lbs)</th>
<th>Use score</th>
<th>Benchmark (ppb)</th>
<th>Tox score</th>
<th>Final score</th>
<th>Recom</th>
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</thead>
<tbody>
<tr>
<td>CHLORPYRIFOS</td>
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</table>
Urban - Where we sample

Northern California
Stormdrains – 5 sites
Receiving waters – 7 sites

Southern California
Stormdrains – 5 sites
Receiving waters – 10 sites
Sampling Protocol

- 2008 – Present
- 4 – 5 events per year
  - 2 storm events
  - 2 dry season
- Sites located at storm drains and receiving waters
- Water samples analyzed for ~35 pesticides
- Water quality and flow recorded
Statewide Exceedances 2009-2016

- Detection
- Exceedance

* Pesticides with FD<10% not shown
Regional Differences

Frequency of Detection (%)

NorCal
SoCal

2,4-D, Bifenthrin, Fipronil, Triclopyr, Fipronil sulfone, Imidacloprid, Dicamba, Desufinyl fipronil, Diuron, Permethrin, Cyfluthrin, Pendimethalin, Carbaryl, Malathion, Fipronil amide, MCWA, Deltamethrin, λ-Cyhalothrin

* Pesticides with average FD<10% not shown
Stormwater

Dry Season

Rain Event
Seasonality

* Pesticides with average FD<10% not shown
Hydrological Effects

Frequency of Detection (%)

- **Storm Drain**
- **Receiving Waters**

* Pesticides with average FD<10% not shown
Water Toxicity

SD = Storm Drain
RW = Receiving Waters
Dash = Mean

96-hr Survival (%)

H. azteca

SD
Dry
Storm

RW
Toxicity Unit = OC Normalized Concentration
LC50 value
Sediment Toxicity Unit Contributions

- Bifenthrin: 74%
- Cyfluthrin: 8%
- Cypermethrin: 8%
- Deltamethrin: 7%
- Permethrin: 2%
- Cyhalothrin: 1%
- Esfenvalerate: <1%
- Fenpropathrin: <1%
- Resmethrin: <1%
Agriculture - Where we sample

Northern California
Ag Drain – 6 sites
Receiving waters – 2 sites

Southern California
Ag Drain – 8 sites
Receiving waters – 8 sites
Sampling Protocol

- 2007 – Present
- 11 events per year
  - 6 events in Salinas Valley
  - 3 events in Santa Maria Valley
  - 2 events in Imperial Valley
- Sites located at agricultural ditches and drains, and receiving waters
- Water samples analyzed for ~30 pesticides
- Water quality and flow recorded
Statewide Exceedances 2011-2015

Frequency (%)

- Imidacloprid
- Bensulide
- Methoxyfenozide
- Methomyl
- Azoxystrobin
- Bifenthrin
- Oxyfluorfen
- Chlorpyrifos
- Pendimethalin
- Permethrin
- λ-cyhalothrin
- Diazinon
- Malathion
- Pyraclostrobin
- Dimethoate
- Trifluralin
- Cypermethrin
- Esfenvalerate

Detection
Exceedance
Surface Water Database (SURF)

Oldest Record  1986
Agencies       25
Counties       54
Sites          >1,500
Records        488,954 Water
                72,177 Sediment

Google fusion table interface:
http://www.cdpr.ca.gov/docs/emon/surfwtr/surfcont.htm
Mitigation Efficacy

Buffer zone
Water quality treatment pond
Constructed wetland
Vegetated buffer strip
Grassed waterway

Cover crops
Charcoal Filters
Bioreactors
Enzymes
Regulatory Action

- Surface Water Regulations
  - Pyrethroids

- Restricted Use Classification
  - Chlorpyrifos (Ag)

- Product Cancellation
  - Carbofuran