CALIFORNIA ENVIRONMENTAL HEALTH TRACKING PROGRAM

Agricultural Pesticide Use Mapping and Proximity to Public Schools

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PUBLIC HEALTH INSTITUTE®

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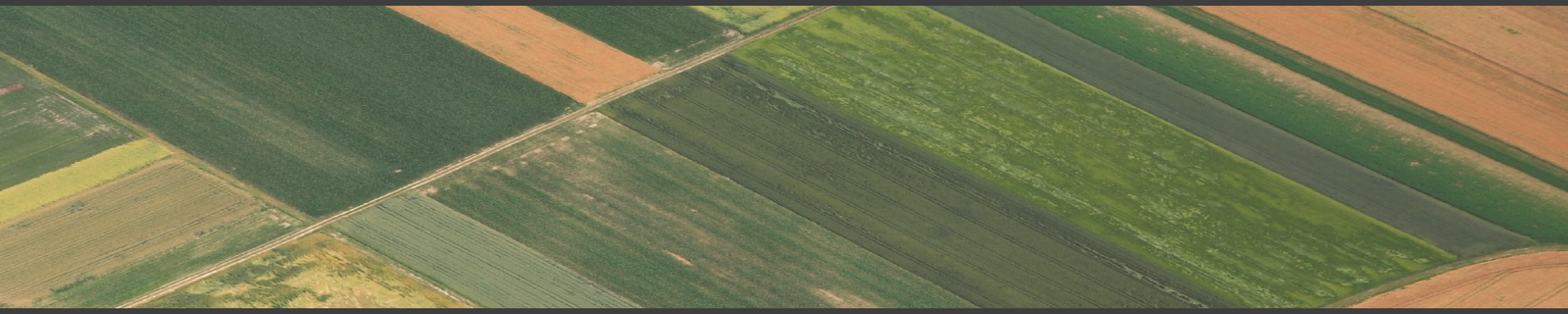
Presentation Overview

- Pesticides and School Report
- Pesticide Mapping
- Use of Mapping Tools for Biomonitoring



About the California Environmental Health Tracking (CEHTP) Program

Mission

Provide data and information on diseases and environmental threats to inform environmental and public health programs, research, and policies

1) Improve the availability, relevance, and utility of environmental public health data and information
2) Build stakeholder capacity and promote community engagement with public health data
3) Inform public health actions in California including research, policies, and practices

- Collaboration between California Department of Public Health and the Public Health Institute

- Primarily funded by U.S. Centers for Disease Control and Prevention

Pesticides and Schools Study Overview

- Descriptive study released in 2014
- Assess poundage and types of agricultural pesticides applied near schools in 2010
  - For top 15 counties in CA (by total agricultural pesticide use)
  - Data from:
    - Dept. of Pesticide Regulation (CDPR) Pesticide Use Reports (PUR), 2010
    - Department of Education (CDE) Public Schools Database, 2010/11
    - County Agricultural Commissioners (CAC) field border data
    - Department of Water Resources (DWR) Land Use Survey data
- Structural pesticide use (buildings & play fields) was not included in this study

Pesticides and Children's Health

- Childhood exposure to pesticides
  - Children likely more susceptible to the effects of pesticides than adults
  - Children eat & drink more than adults relative to body weight
  - Children play outdoors & engage in hand-to-mouth behavior
  - Neurological and physiological development (both prenatal and postnatal) are both complex and precisely choreographed

- Children spend a substantial portion of their life at school or on school grounds

Does Proximity Equal Exposure?

Not necessarily; but may increase the risk of exposure

- Some pesticides, e.g. methyl bromide, detected in air up to 70 km from application site
- Large percentage of pesticide illness (45%) associated with fumigant drift (NIOSH)
- Proximity to fields associated with higher levels of pesticide metabolites in children (CHAMACOS)

Basic Methods

1) Select counties

2) Determine school boundaries*

3) Select pesticide categories based on health concern

4) Link school boundaries to pesticide data*

5) For each pesticide category, calculate pounds used near schools

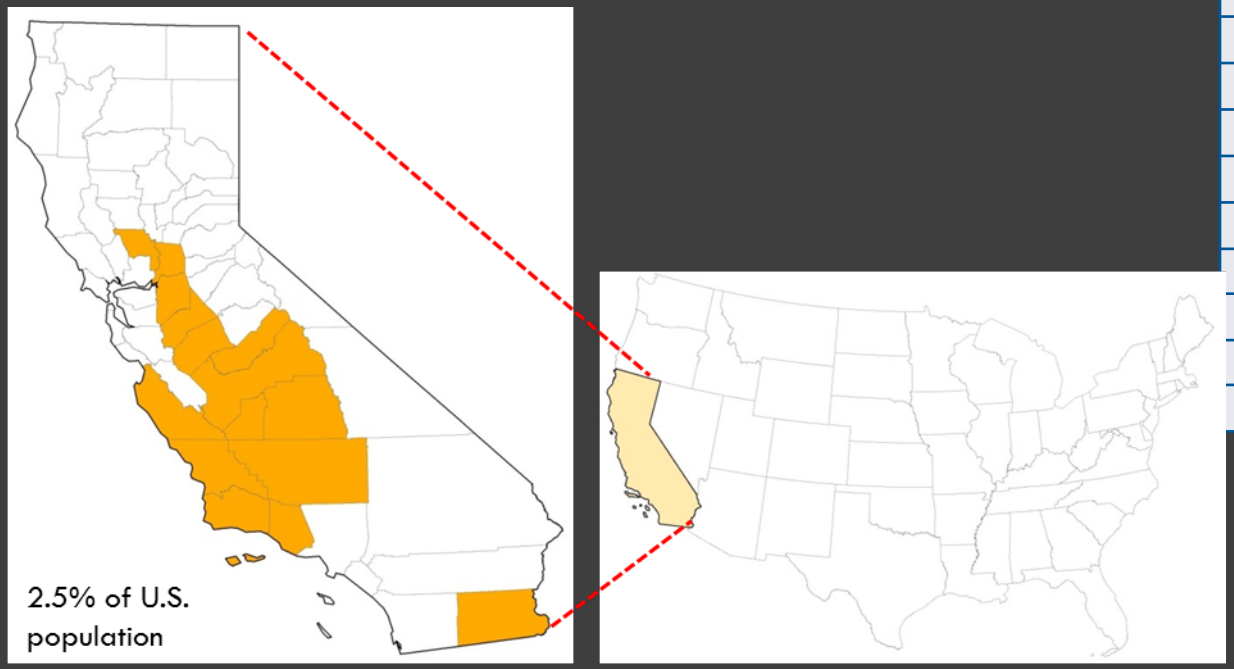
6) Conduct demographic analysis by race/ethnicity and income proxy

* Utilizes new data infrastructure developed by CEHTP

Step 1: Select Counties

- California accounts for ~23% of national agricultural pesticide use
- Counties selected account for ~85% of agricultural pesticides applied in California

These 15 counties may account for ~19% of the entire country's pesticide use



County	Total agricultural pesticides in 2010 (lbs)
Fresno	27,777,500
Kern	21,454,117
Tulare	8,867,756
San Joaquin	8,687,822
Madera	8,582,823
Monterey	8,203,711
Merced	7,180,641
Ventura	6,495,235
Kings	6,105,752
Stanislaus	5,072,403
Imperial	4,163,596
Santa Barbara	4,109,958
Sacramento	3,291,915
San Luis Obispo	2,570,651
Yolo	2,496,139

Step 2: Determine School Boundaries

- Public schools, kindergarten-12th grade (2,511 schools total)
- Using school boundaries increases geographic accuracy & resolution
  - Geocoded points are occasionally erroneous
  - Parcel boundaries incorporate buildings, playgrounds, and fields

Step 3: Pesticide Categories

Six pesticide groups selected for public health relevance and categorized by known health effects and regulatory status:

1) Carcinogens
2) Developmental and reproductive toxicants
3) Cholinesterase inhibitors
4) Toxic air contaminants
5) Fumigants
6) Priority pesticides for assessment and monitoring

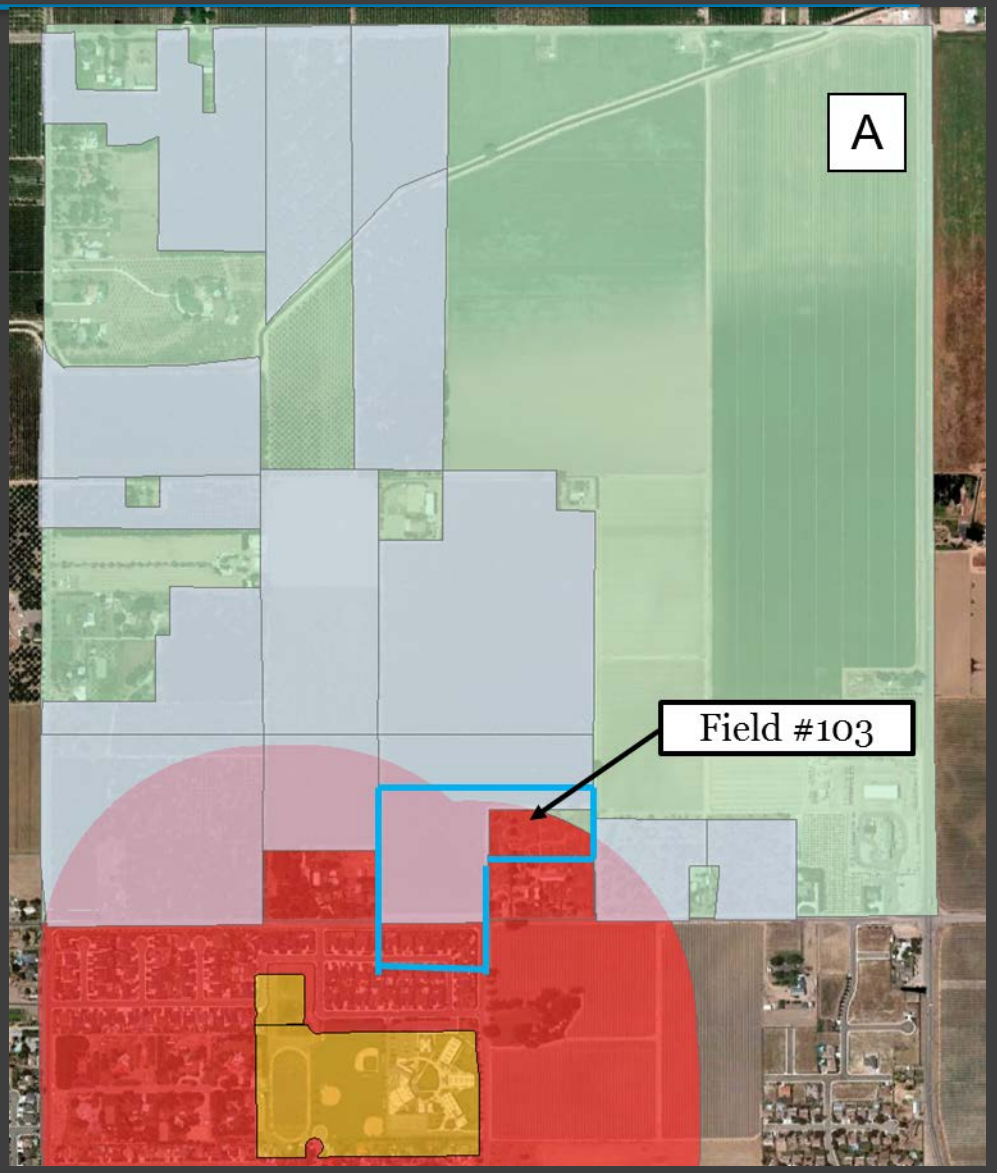
Step 4: Linkage
CAC field border data

Best Linkage Used for ~80% of applications

1) For Field #103
   - 100 lbs of pesticide X were applied to walnuts in Field #103
   - 55% of the field lies within ¼ mile of the school
2) How much of pesticide X was applied within ¼ mile of the school?
   - Estimate: 55 lbs
3) Algorithm repeats for each field/pesticide combination of interest to estimate total pounds

Good Data Linkage: DWR land-use data (~19% appl)

Crudest Data Linkage: CDPR section level data (<1%)



Take Home Findings

- 36% of schools (899 schools) had pesticide use nearby
- A small percentage of schools (top 5%) had large amounts applied within ¼ mile ranging from 2,600-28,000+ lbs
- Hispanic children were 91% more likely than White children to attend schools in the highest quartile of use
- Pesticide use near schools varied among counties

Top Pesticides

Top 10 pesticides of public health concern applied within ¼ mile of schools in 15 agricultural counties

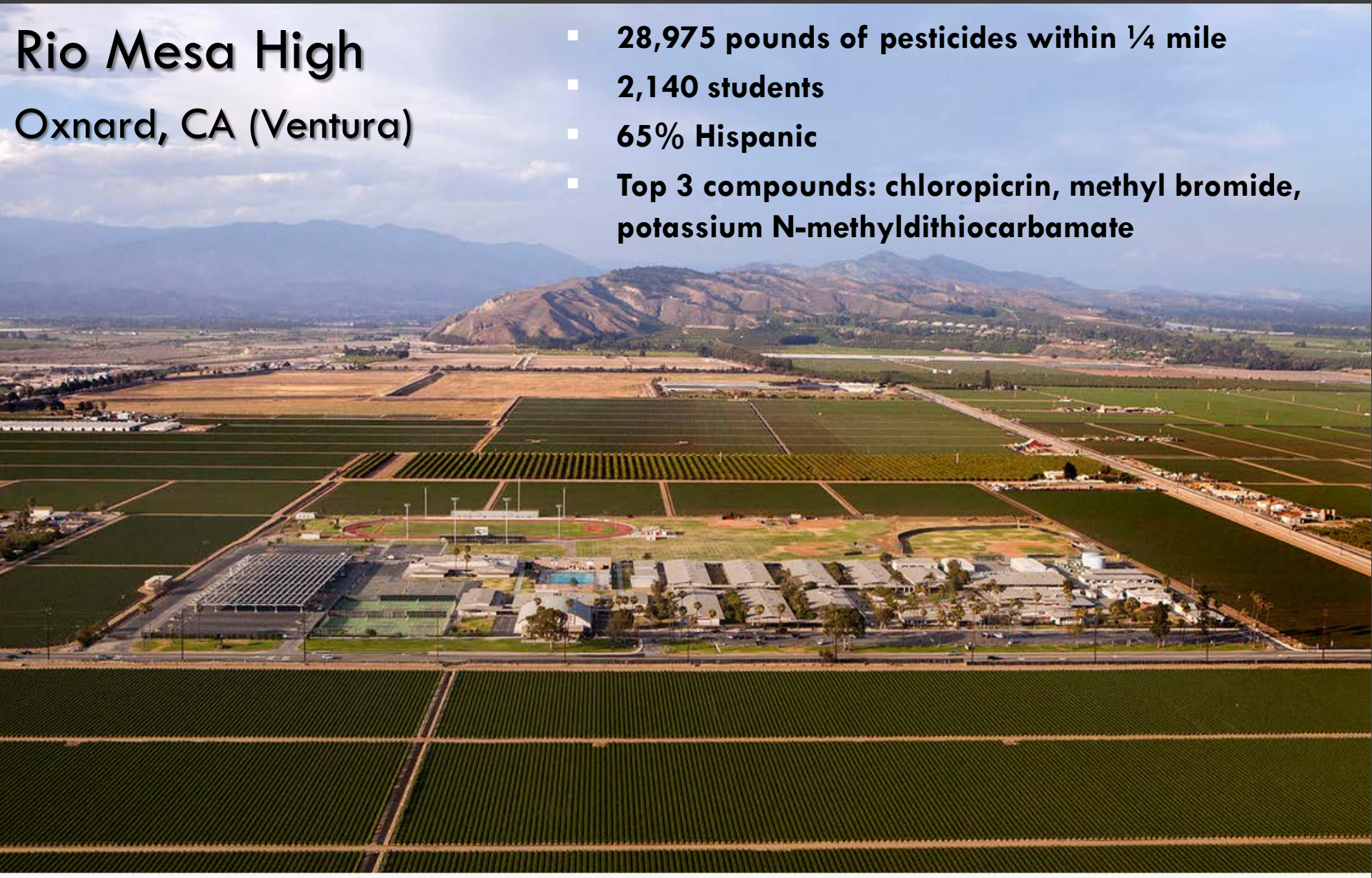
	Pesticide ingredient	Total pounds applied	Restricted material?	Chemical persistence*
1	Chloropicrin	150,285	Yes	Low: 4 days in soil; 8 hrs in air
2	1,3-Dichloropropene	136,241	Yes	Moderate to high: 69 days
3	Methyl bromide	85,112	Yes	Moderate: 50 days
4	Metam-sodium	37,920	Yes	Low to moderate: 7-14 days
5	Potassium N-methyldithiocarbamate	19,141	Yes	Low to moderate: 7-14 days
6	Captan	8,790	No	Moderate: 20 days
7	Pendimethalin	8,198	No	Moderate: 40 days
8	Chlorpyrifos	7,769	No	High: 60-120 days
9	Paraquat dichloride	6,543	Yes	Highly persistent: 1,000 days
10	Malathion	6,322	No	Low to moderate: 3-7 days

*Classification as 'low', 'moderate', 'high', or 'highly persistent' based on U.S. EPA PBT Final Rule (40 CFR 372, 1999)

Rio Mesa High

Oxnard, CA (Ventura)

- **28,975 pounds of pesticides within ¼ mile**
- **2,140 students**
- **65% Hispanic**
- **Top 3 compounds: chloropicrin, methyl bromide, potassium N-methyldithiocarbamate**



Rio Mesa High School in Oxnard, Calif., is surrounded by strawberry fields on all four sides.

Credit: Sam Hodgson for CIR

Source: https://beta.cironline.org/reports/californias-strawberry-industry-is-hooked-on-dangerous-pesticides/

Recommendations + Data Needs

- Routine and standardized collection, digitization, and reporting of agricultural field locations

- An accurate, complete, and publicly accessible database of:
  - Pesticides applied on school properties (> SB 1405)
  - School property boundaries (> GreenInfo Network)

- Ongoing surveillance of the use of pesticides of public health concern near schools and other sensitive land uses

May 26, 2015

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Schoolkids must be protected from pesticides

HIGHLIGHTS
Children need to be protected when farmers apply pesticides near schools
State is holding public workshops to draft balanced regulations

BY BRIAN R. LEAHY
Special to The Bee

California is the nation's most populated state and its farmers are the most productive. The result is that farms are frequently located near where people work and live.

To address some of the challenges that proximity creates, the California Department of Pesticide Regulation will be hosting a series of public workshops, starting Thursday in Sacramento, to help us create new rules.


Brian Leahy

Most farms are industrial by nature, with dangerous equipment, noise, dust and chemicals, including pesticides. We want children to be safe in our schools, yet because land use is a local affair, school locations are exempt from the General Plan and other measures designed to ensure thoughtful planning. As a result, schools are sometimes built on prime agricultural land in the middle of existing farm operations. What kind of logic is that?

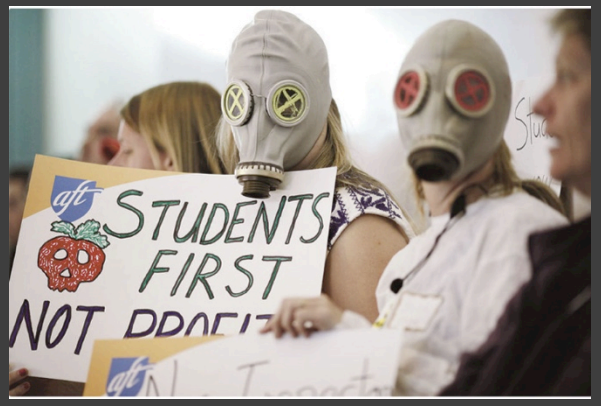
Modern farms rely on pesticides, and so it is our department's responsibility to create strong regulations to keep schoolchildren and staff safe. California has the most protective regulations in the nation, building upon the federal Environmental Protection Agency's pesticide program.

Because our children can never be too safe, I have asked my staff to draft a new statewide regulation to focus on what must occur when a farm near a school wants to apply pesticides. It will clearly define the responsibilities of the farmers, detail the information that must be given to schools and add restrictions on pesticides used when schoolchildren are present.

There are two keys to a successful statewide strategy: good communication and reasonable restrictions. Our goal is to adopt a consistent policy to address these two key concerns.

Actions Following Report

- State plan to create standardized ***buffers*** around schools and/or ***notifications*** to schools
  - CDPR held town halls to gather input
  - Proposed regulations expected summer 2016, open for comments



Central Valley farmworkers and environmentalists protest pesticide spraying on farms near schools, from outside an elementary school in West Fresno at risk. (Sasha Khokha/KQED)

Stakeholder Message to DPR following Report

Spring/Summer 2014, stakeholders began to advocate that CDPR improve pesticide and school regulations

- Noted compounds of concerns: Chlorpyrifos, chloropicrin, and 1,3-dichloropropene specifically noted
- Latino children disproportionately affected by pesticide use
- Need for consistent statewide buffer zones
- Need for better notifications to schools
- Need modernized electronic database tracking pesticide applications & fields
- Need to monitor pesticide use near schools, and annual report on pesticide use trends near schools

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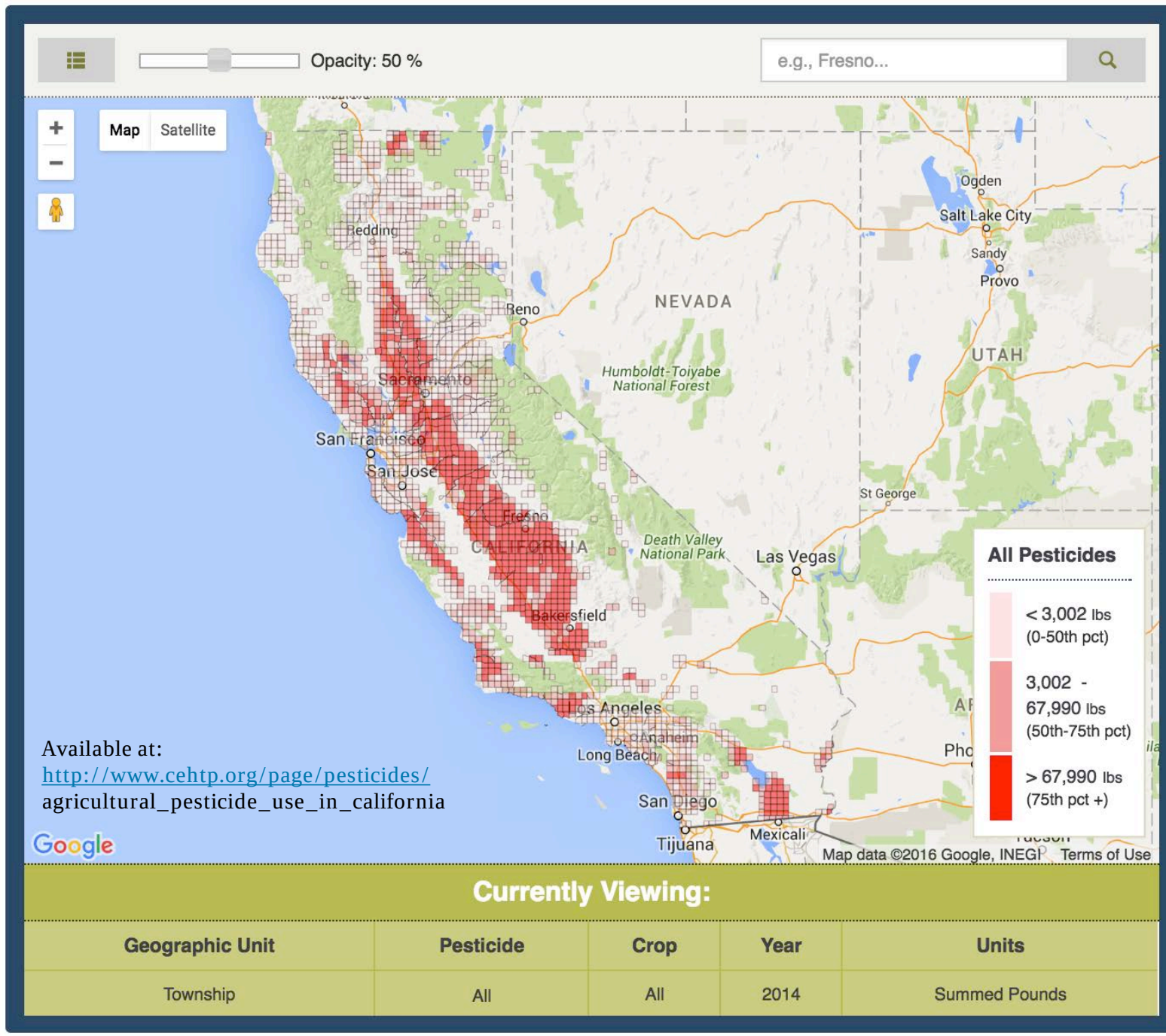
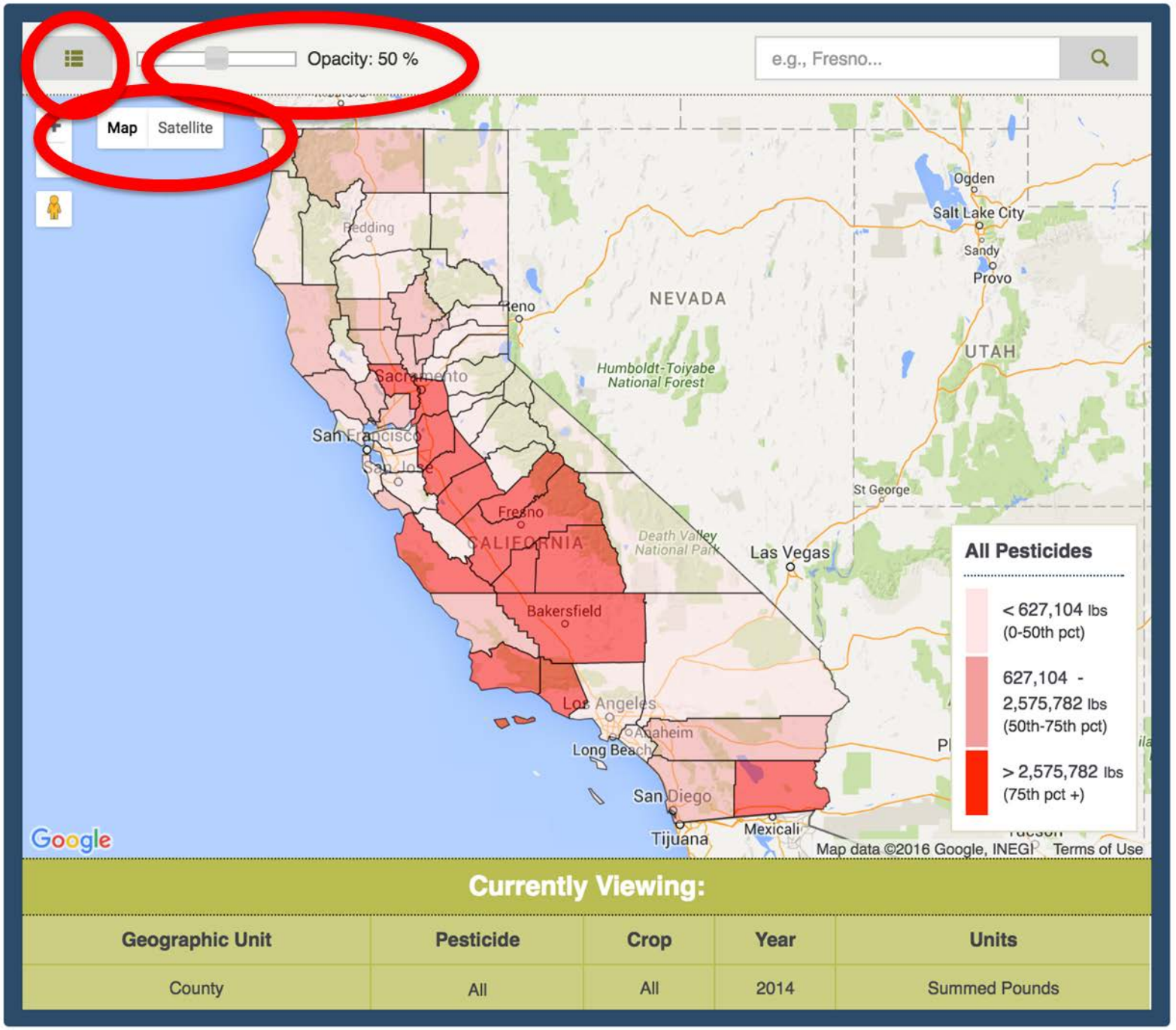
Agricultural Pesticide Mapping Tool



Available at:
http://www.cehtp.org/page/pesticides/agricultural_pesticide_use_in_california

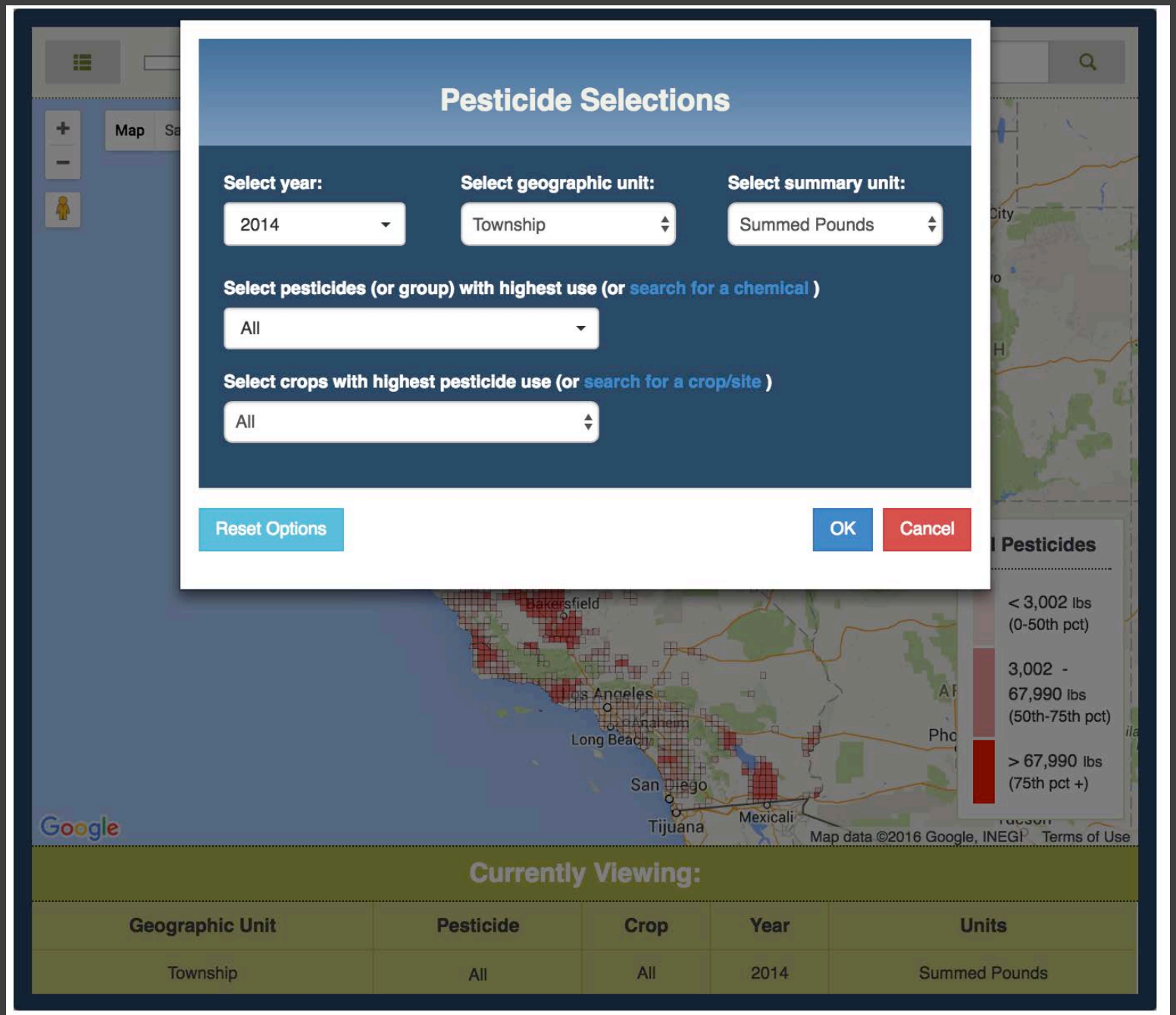
Currently Viewing:

Geographic Unit	Pesticide	Crop	Year	Units
Township	All	All	2014	Summed Pounds



Currently Viewing:

Geographic Unit	Pesticide	Crop	Year	Units
County	All	All	2014	Summed Pounds


Pesticide Selections
Select year:
2014
Select geographic unit:
Township
Select summary unit:
Summed Pounds
Select pesticides (or group) with highest use (or search for a chemical)
All
Select crops with highest pesticide use (or search for a crop/site)
All
Reset Options
OK
Cancel
Map
Pesticides
< 3,002 lbs (0-50th pct)
3,002 - 67,990 lbs (50th-75th pct)
> 67,990 lbs (75th pct +)
Bakersfield
Long Beach
San Diego
Tijuana
Mexicali
Google
Map data ©2016 Google, INEGI
Terms of Use
Currently Viewing:
Geographic Unit
Pesticide
Crop
Year
Units
Township
All
All
2014
Summed Pounds

Possible Approach to Select Populations for Biomonitoring for Pesticide Exposure

- Select random (or stratified random) sample of maternal addresses (proxy for where populations live in CA)

- Geocode addresses and use Tracking Pesticide Linkage Service to determine poundage of pesticides of interest within specified distance of address

- Random sample of addresses of individuals living at least a specified distance *away* from pesticide use could be used as a control series

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Questions/Comments?

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Special Acknowledgement to Craig Wolff, Jeff Fowles, and Lauren Wohl-Sanchez for assistance on Pesticides and School Report