

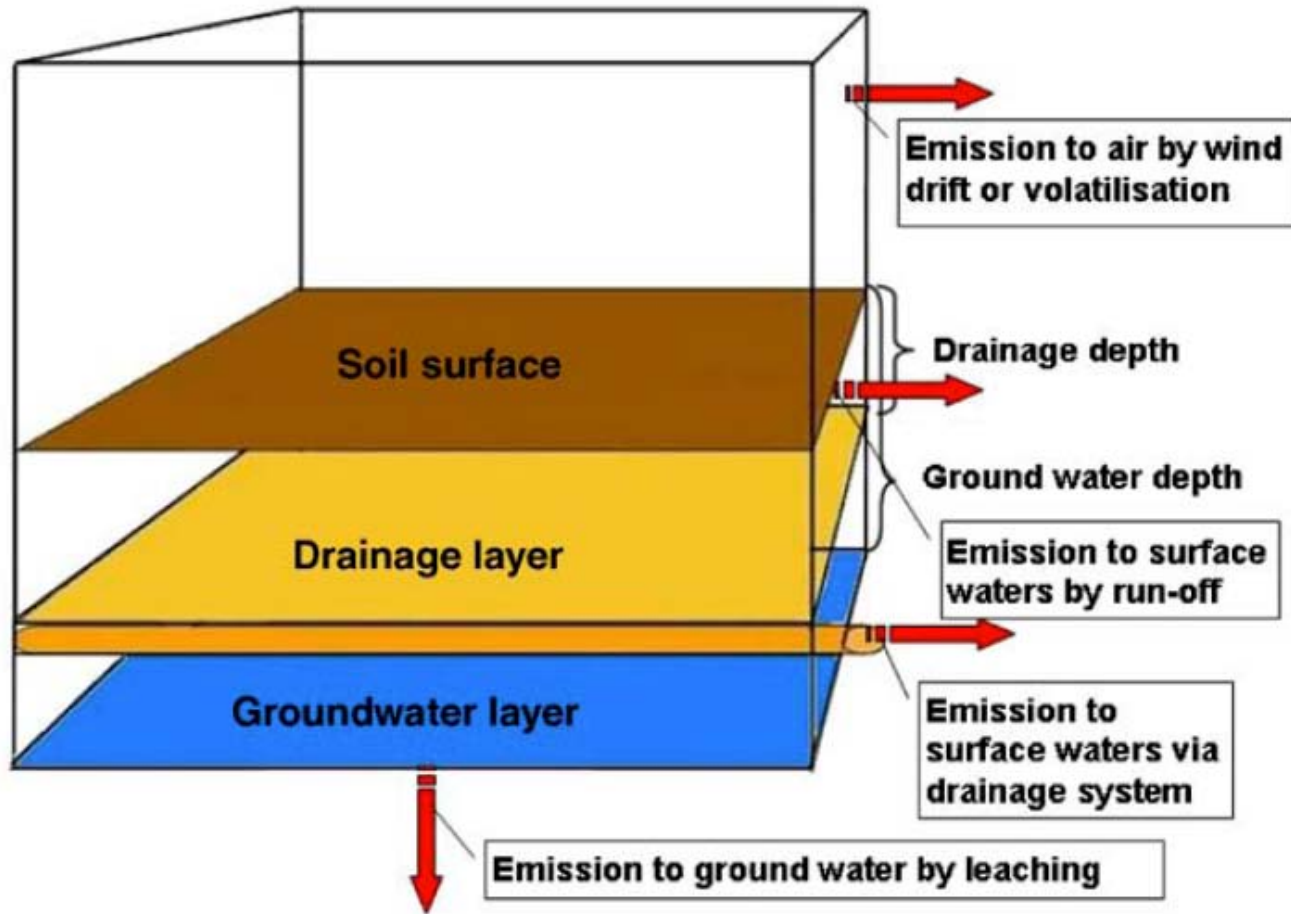
Pesticide Use Risk Evaluation (PURE) Decision Support System (DSS) -- A Self-Evaluation Website

Yu Zhan, Minghua Zhang

06/05/2012

Zhan, Y., Zhang, M., 2012. PURE: A web-based decision support system to evaluate pesticide environmental risk for sustainable pest management practices in California. *Ecotoxicology and Environmental Safety*. (Accepted)

Pesticide Emissions



Pesticides Risks

- **Human**



- **Terrestrial**



- **Aquatic**



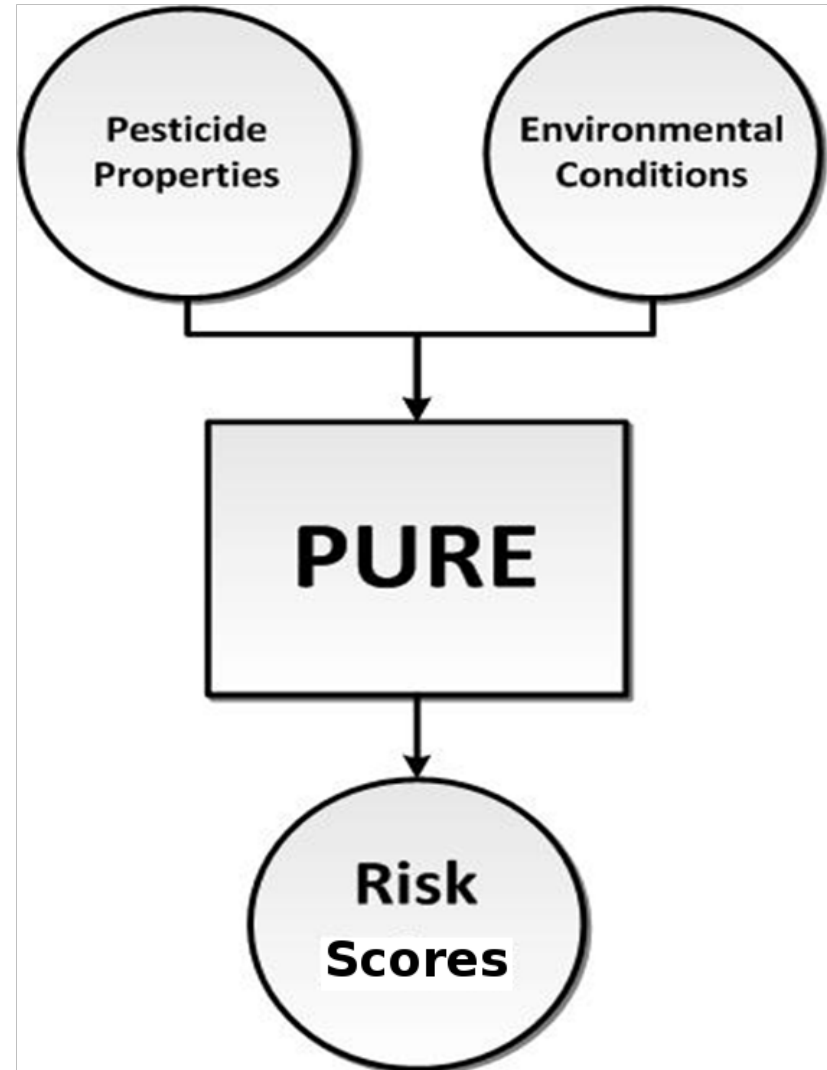
- **Air**



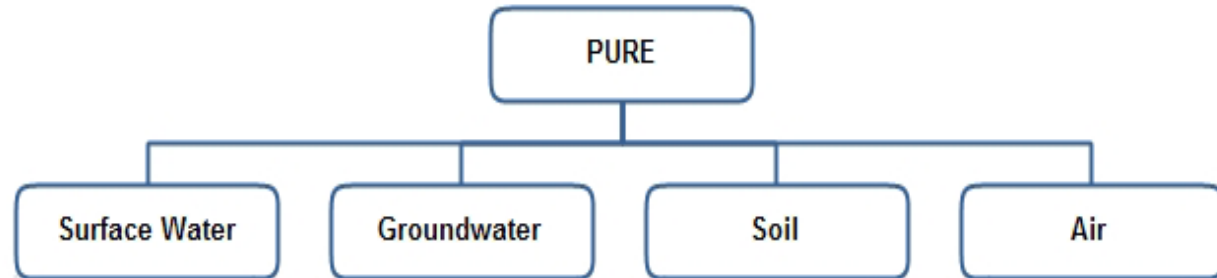
- ...

Pesticide Environmental Impact

- Risk = Exposure + Effect
- PURE (Pesticide Use Risk Evaluation) DSS
 - California based
 - Modularized
 - Transparent
 - Freely accessible

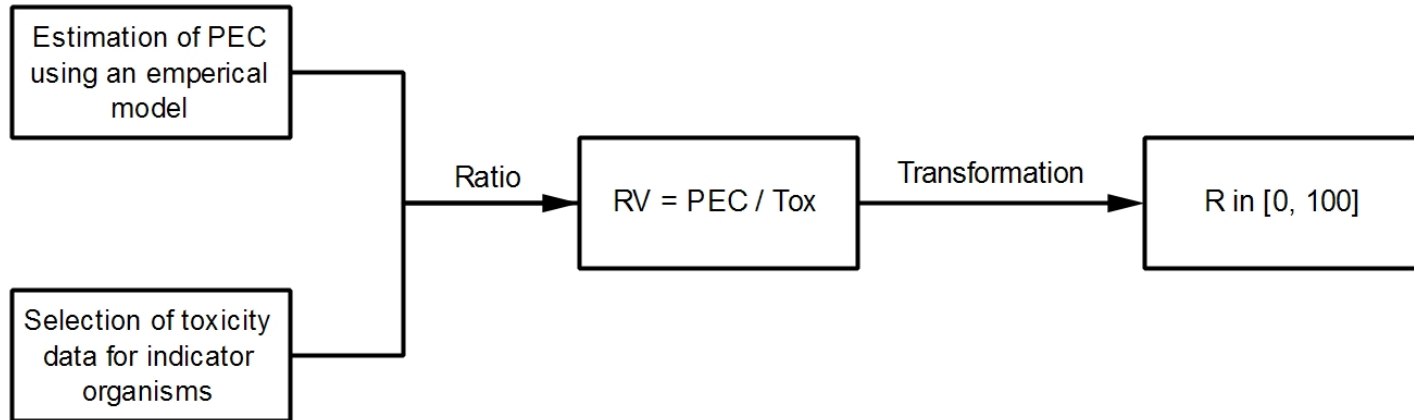


Parameters for each compartment



| | | Surface Water | Groundwater | Soil | Air |
|-------------------|-------------------------------|---------------|-------------|------|-----|
| Physical-chemical | Sorption Coefficient | * | * | | |
| | Henry's Law Constant | | * | | |
| | Half Life in Soil | * | * | * | |
| | Half Life in Water | * | | | |
| | Emission Potential | | | | * |
| Toxicity | Toxicity to Aquatic Organisms | * | | | |
| | Toxicity to Earthworm | | | * | |
| | Acceptable Daily Intake | | * | | |
| Soil Property | Bulk Density | * | * | * | |
| | Organic Carbon Content | * | * | | |
| | Sand Content | * | | | |
| | Hydrology Group | * | | | |
| | Field Capacity | | * | | |
| Topography | Ground Slope | * | | | |
| | Distance to Surface Water | * | | | |
| | Groundwater Table | | * | | |
| Meteorology | Annual Rainfall | * | * | | |
| | Maximum Daily Rainfall | * | | | |
| | Temperature | * | * | * | |
| Miscellaneous | Crop Type | * | * | * | |
| | Application Time | * | * | * | |
| | Application Intensity | * | * | * | * |

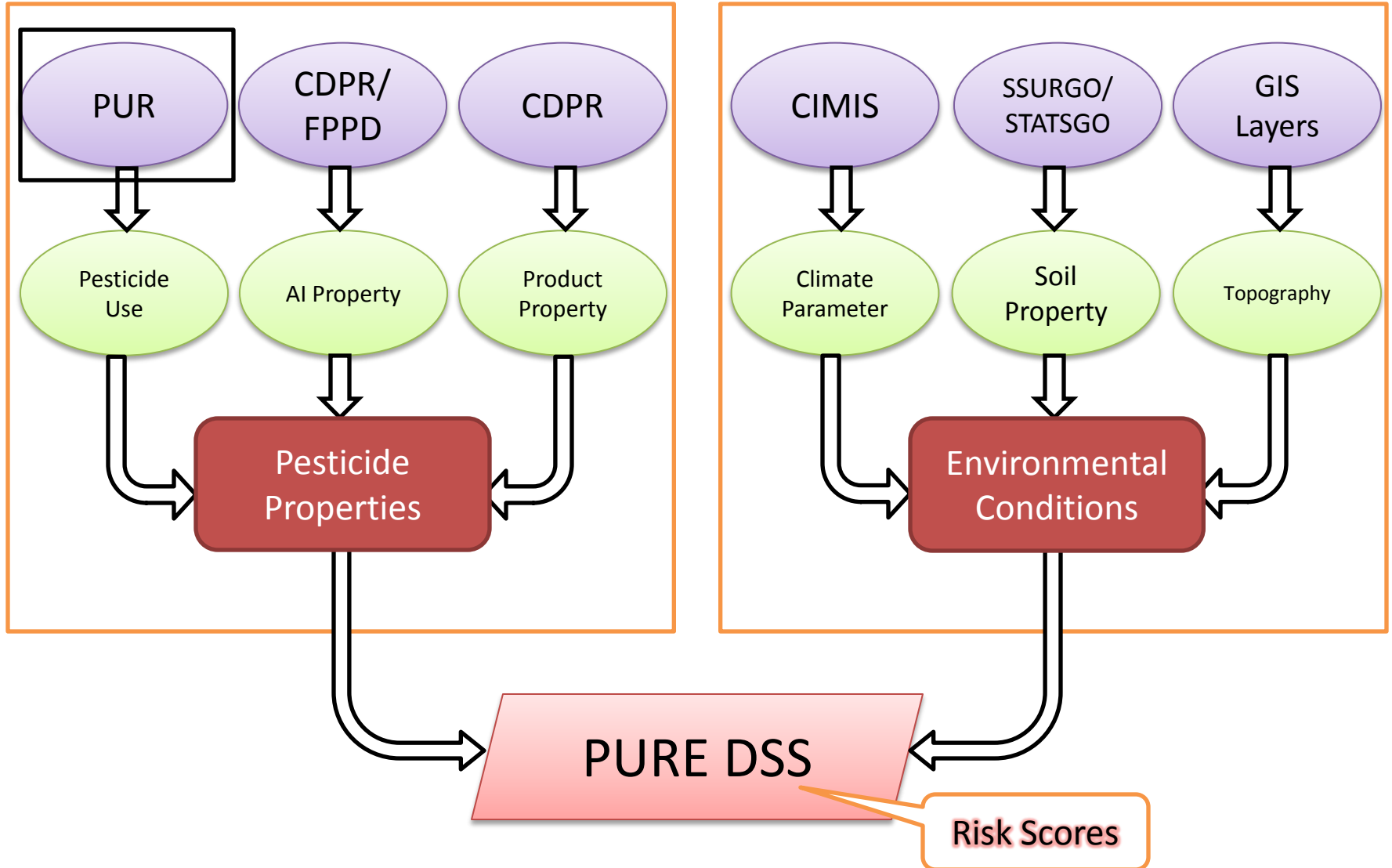
Risk Score Calculation and Classification



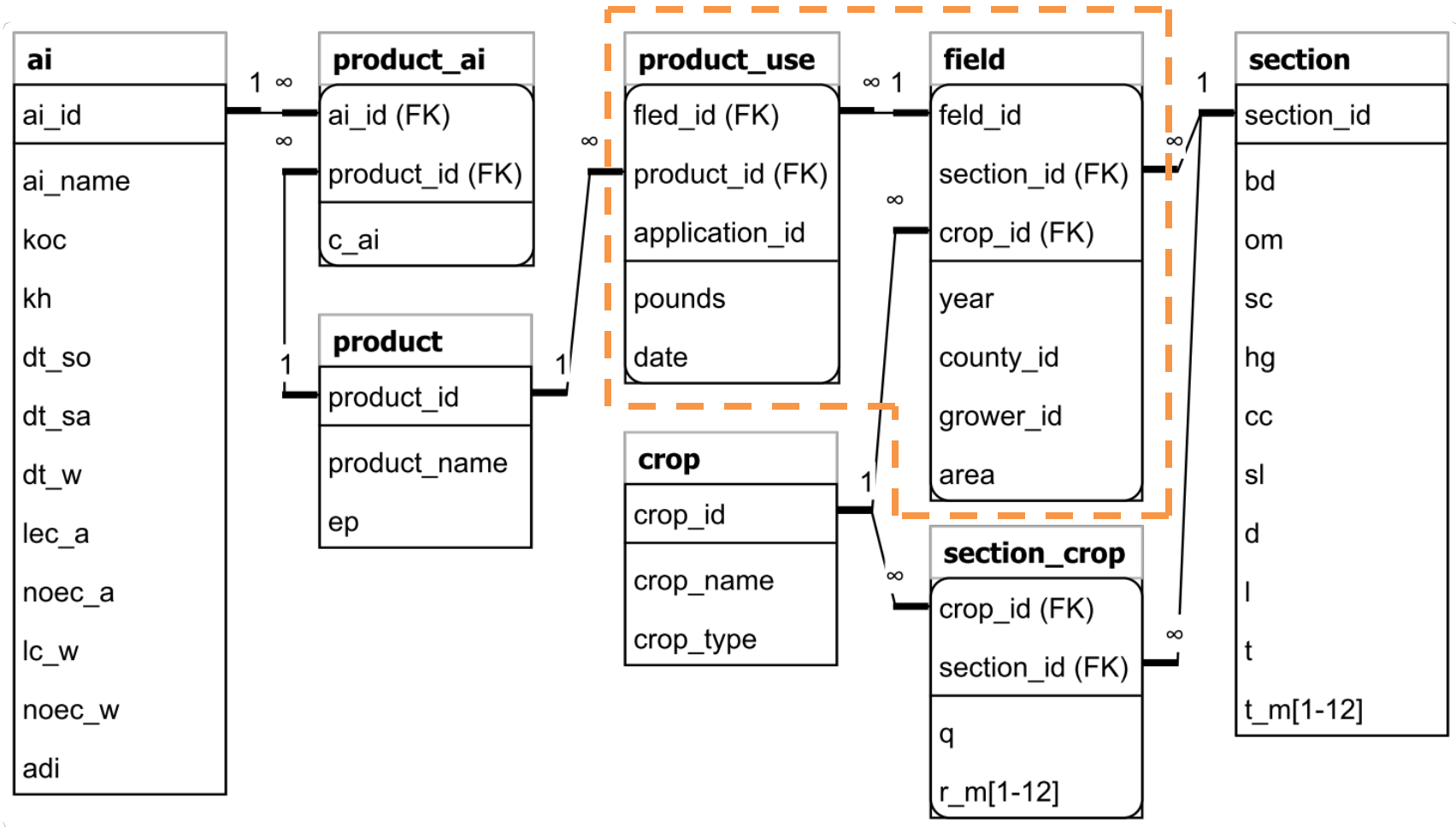
PEC: Predicted Environmental Concentration
Tox: Toxicity Value
RV: Risk Value
R: Risk Score

| Risk Score | Risk Class |
|--------------------|---------------|
| $0 \leq R \leq 25$ | Low |
| $25 < R \leq 50$ | Moderate Low |
| $50 < R \leq 75$ | Moderate High |
| $75 < R$ | High |

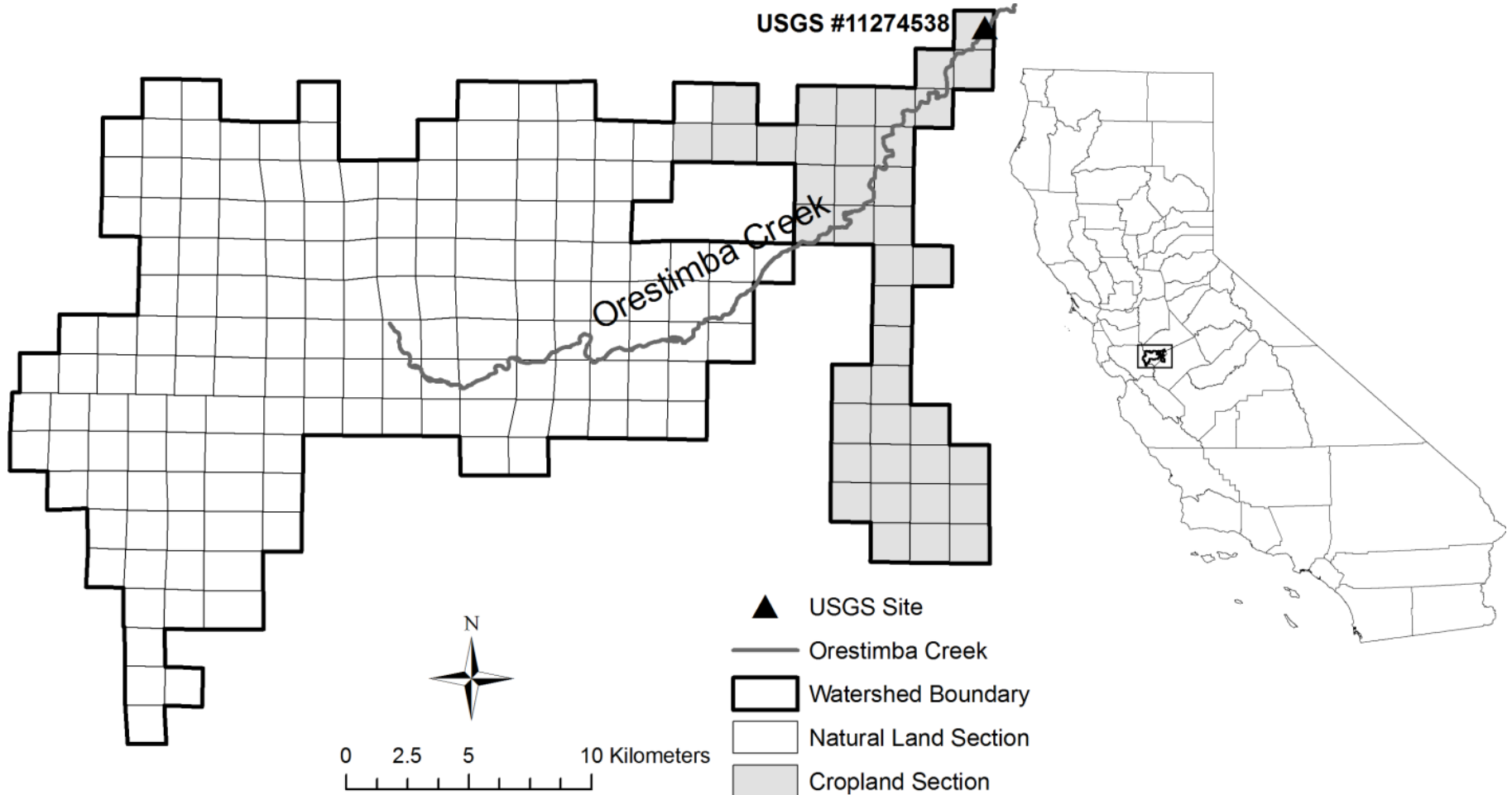
Main Data Sources



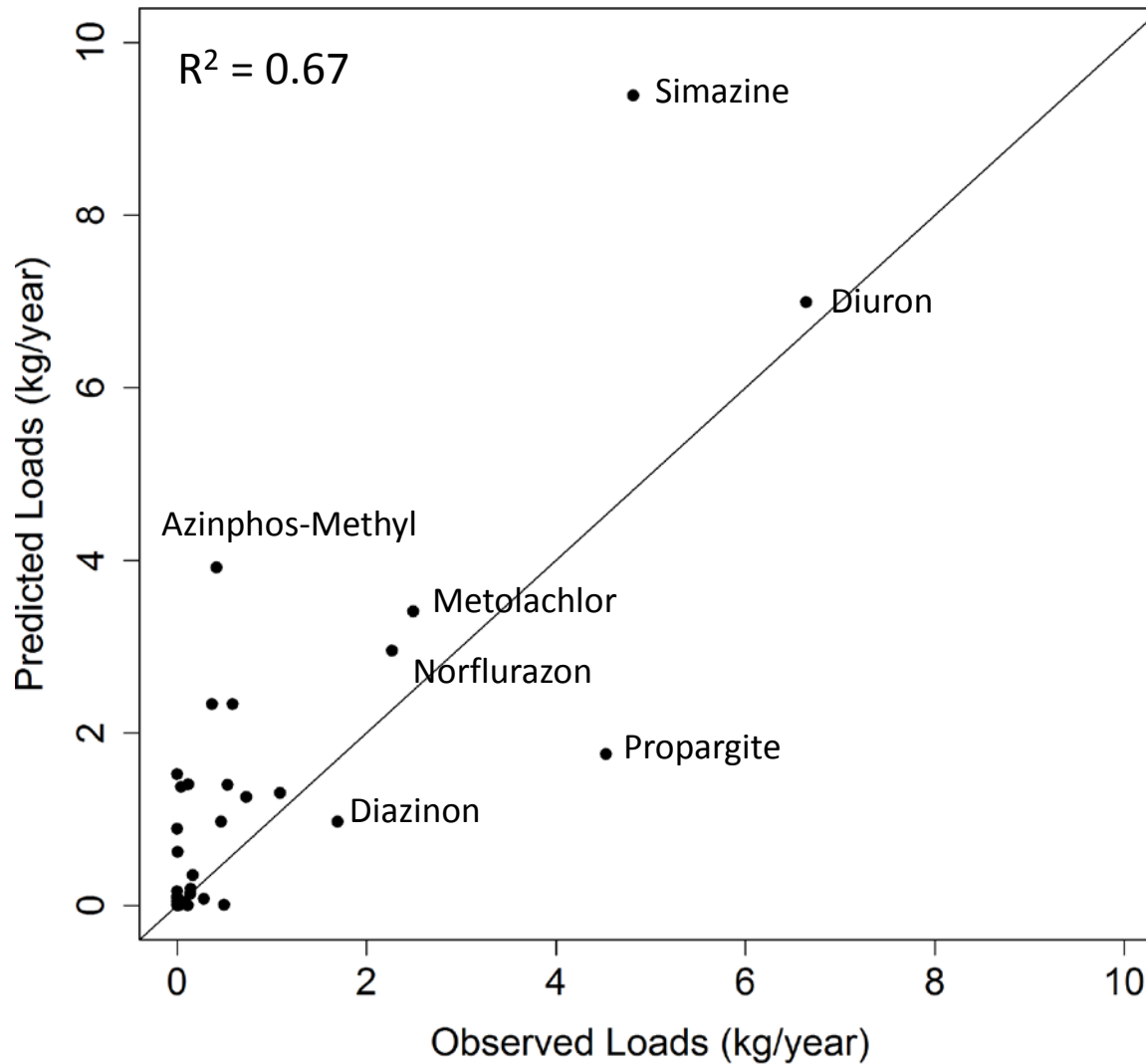
PURE Database Schema



PURE Evaluation - Study Area




PURE Evaluation - Results



Website Demonstration


<http://pure.ucdavis.edu>



PURE
CALIFORNIA PESTICIDE USE RISK EVALUATION

Search Pesticide Risk Assessment Home

Risk Assessment System for California Growers



County
Kern

Crop Type
Almond

Analysis Type
 Past Performance in
2009
 Future Decision Making

Operator ID (last 7 digits)
0000000

Field ID
▼

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Thank SureHarvest for their valuable advice on the user interface design.

Past Performance Report - Field



County: Kern

Crop: Almond

Year: 2009

Operator ID: 0000000

[Show all fields for this operator](#)

Multiyear trends

[Aggregate](#)

[Surface Water](#)

[Groundwater](#)

[Soil](#)

[Air](#)

[Back](#)

Field ID: 1 (320 acre) | Environmental Conditions | [Show Chart](#)

| Date | Pesticide Product | Application Rate (lbs/acre) | Integrate | Surface Water | Ground Water | Soil | Air |
|-------------------------|--|-----------------------------|-----------|---------------|--------------|------|-----|
| 2-5 | Activate Plus | 0.15 | 0 | 0 | - | - | - |
| 2-5 | Gramoxone Inteon | 1.80 | 55 | 0 | 0 | 55 | 52 |
| 3-7 | Touchdown Total | 0.84 | 43 | 34 | 0 | 39 | 43 |
| 4-13 | Esteem Ant Bait | 1.37 | 44 | 32 | 0 | 0 | 44 |
| 4-23 | Goal 2XI | 0.08 | 44 | 40 | 36 | 6 | 44 |
| 4-23 | Touchdown Total | 0.61 | 40 | 31 | 0 | 36 | 40 |
| 5-7 | Goal 2XI | 0.18 | 53 | 46 | 41 | 15 | 53 |
| 5-7 | Roundup Powermax Herbicide | 0.87 | - | - | - | - | - |
| 5-19 | Pounce 1.5G Insecticide | 0.0031 | 36 | 36 | 0 | 0 | 0 |
| 5-25 | Roundup Powermax Herbicide | 0.88 | - | - | - | - | - |
| 5-31 | Whirlwind | 3.27 | 100 | 100 | 0 | 68 | 82 |
| 6-13 | Clinch Ant Bait | 0.91 | 39 | 32 | 0 | 0 | 39 |
| 6-15 | Mso Concentrate With Leci-Tech | 0.55 | - | - | - | - | - |
| 6-15 | Poast | 0.76 | 70 | 44 | 30 | 14 | 70 |
| 7-9 | Activate Plus | 0.17 | 0 | 0 | - | - | - |
| 7-9 | Gramoxone Inteon | 2.06 | 53 | 43 | 0 | 46 | 53 |
| 7-21 | Agrisolutions Cornerstone Plus Herbicide | 2.29 | 47 | 33 | 0 | 47 | 0 |
| 10-2 | Agrisolutions Cornerstone Plus Herbicide | 3.33 | 52 | 36 | 0 | 52 | 0 |
| 10-2 | Choice Weather Master | 0.22 | - | - | - | - | - |
| 10-2 | Goal 2XI | 0.42 | 62 | 51 | 47 | 24 | 62 |
| 2009 Field | | - | 82 | 82 | 2 | 50 | 63 |
| 2009 Operator | | - | 59 | 48 | 29 | 47 | 59 |
| 2009 Kern County Almond | | - | 58 | 43 | 26 | 58 | 57 |
| 2009 Statewide Almond | | - | 50 | 33 | 49 | 27 | 50 |

-: Not available due to missing pesticide properties

Thank You

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