



# **2013-14 STATE WIDE PESTICIDE SAMPLING PILOT PROJECT**



**PRESENTATION OF PRELIMINARY FINDINGS  
TO THE 2014  
2<sup>ND</sup> ANNUAL JOINT GOVERNMENT WATER  
QUALITY CONFERENCE**

**WAILUKU, MAUI  
AUGUST 12, 2014**

**FENIX GRANGE  
HAWAII STATE DEPARTMENT OF HEALTH  
HAZARD EVALUATION AND EMERGENCY RESPONSE OFFICE**

# Background



**Growing citizen concern about off site movement of pesticides from large agricultural operations**

**Limited data available. State does not have a surface water monitoring program for pesticides.**

**DOH and HDOA partnered to develop pilot study**

**CWB and USGS provided expertise and fieldwork**

# Pilot Project Partners and Funding



Special Funds used to support this pilot project

- HDOH provided \$25,000 from the ERRF
- HDOA provided \$25,000 funding from the Pesticide Use Revolving Fund

We contracted with USGS to provide services

- USGS provided matching funds of \$45,000 from their Cooperative Water Program

# Previous Studies in Hawaii



USGS study on Oahu in 2000-2001 showed a clear connection between land use and pesticide detections in streams and ground water

Urban areas and agricultural areas had very different “fingerprints”

Residues of pesticides used on sugar cane, pineapple and golf courses detected in ground water and surface water

Multiple household pesticides detected in urban streams

# Previous Pesticide Studies on Maui



## **Public Drinking water Supplies - Ongoing**

- Required regulatory monitoring for pesticides, other chemical contaminants
- Detections of historic pineapple fumigants (EDB and DBCP). These compounds are no longer used in agriculture.
- Atrazine detected in one regulated drinking water well in central Maui, with a total of two detections in over 30 years of monitoring, with a maximum concentration of 0.07 ppb in 2010. Far below MCL of 3 ppb
- No other currently used pesticides detected

## **Irrigation wells 1993-1994**

- Monitored by sugar industry in 1993-94 for atrazine
- Detections ranged from 0.13 to 0.3 ppb. 10x below MCL No data since then

## **Surface water sampling 2012**

- 2 locations on Maui, 13 different pesticides
- Black Rock Spring, Ka'anapali atrazine 0.040 ppb
- Ukumehame Beach State Park – no detections

# Statewide Study Design



- Mixture of land uses
- Winter sampling, dry period
- Snapshot sampling – not representative of average conditions or other times of year
- Very broad analytical spectrum – 136 different compounds in water, 121 different pesticides in sediments
- Very low detection limits

# Land Uses Selected



- **Large, single crop agriculture**
  - Seed crops, sugar cane, coffee, macadamia nuts
- **Mixed crop, small farms**
  - Wide variety of crops and pest management practices
- **Golf courses and resorts**
  - Turf and landscape maintenance
- **Urban areas**
  - Home and urban use pest control

# Sampling Site selection



- Small water bodies directly adjacent to or downstream of pesticide use
- No appropriate stream sites for sampling on Maui and Molokai and in some active agricultural areas
- Variations between sites - streams, drainage canals, anchialine ponds and wetlands
- Multiple upstream users – sampling cannot definitively identify source
- Some sites had multiple upstream land uses

# Study design – Sample Numbers



- 24 sites statewide for water samples, 2 on Maui
- 7 sites added bed sediment testing
- 7 sites added glyphosate sampling in water and bed sediments

# Laboratory Analyses and Data Quality



- Partnered with USGS for all laboratory analytical services, scientific expertise, local and national knowledge
- Careful QA/QC to ensure reliability of results
- Separate laboratories for surface water, sediments and glyphosate

# Data Evaluation



- **Compare to regulatory standards**
  - - State and Federal Ambient Water Quality Criteria
  - - EPA Level of Concern (LOC)
- **MCLs not directly applicable, but relevant**
- **Use other EPA benchmarks to assist with interpreting concentrations well below standards**
- **EPA OPP Aquatic Life Guidelines – set using the “No Effect” concentration for the most sensitive species tested, including algae, invertebrates and fish**

# Pesticides detected in water statewide



## 41 different pesticide compounds detected

- **20 Herbicides**
  - 4 herbicide breakdown products
- **11 Insecticides**
  - 4 insecticide breakdown products
- **6 Fungicides**
  - no fungicide breakdown products

# Key Findings Statewide – Urban Sites



- Land use significantly impacted the number and type of pesticides detected. Urban areas on Oahu showed the highest number of different pesticides.
- Urban streams showed many general, home use pesticides, and some restricted use pesticides. Three Oahu streams exceeded an aquatic life benchmark for insecticides, either fipronil or cyfluthrin.

# Key Findings Statewide – Agricultural Sites



- **Atrazine, a restricted use pesticide, was the most commonly found pesticide statewide at 20 of 24 locations. Two sites, one on Kauai, and one on Maui, reflected elevated concentrations suggestive of current use of atrazine. All of the remaining detections were trace level concentrations far below state and federal benchmarks.**
- **Atrazine and metolachlor, two restricted use herbicides, were detected at one location on Kauai at levels that exceeded aquatic life guidelines, but remain below regulatory standards.**

# Key Findings



- The pilot study tested stream bed sediment at seven sites and found glyphosate, in all samples. Glyphosate (trade marked as Roundup) is widely used for residential, commercial, agricultural and roadside weed management.

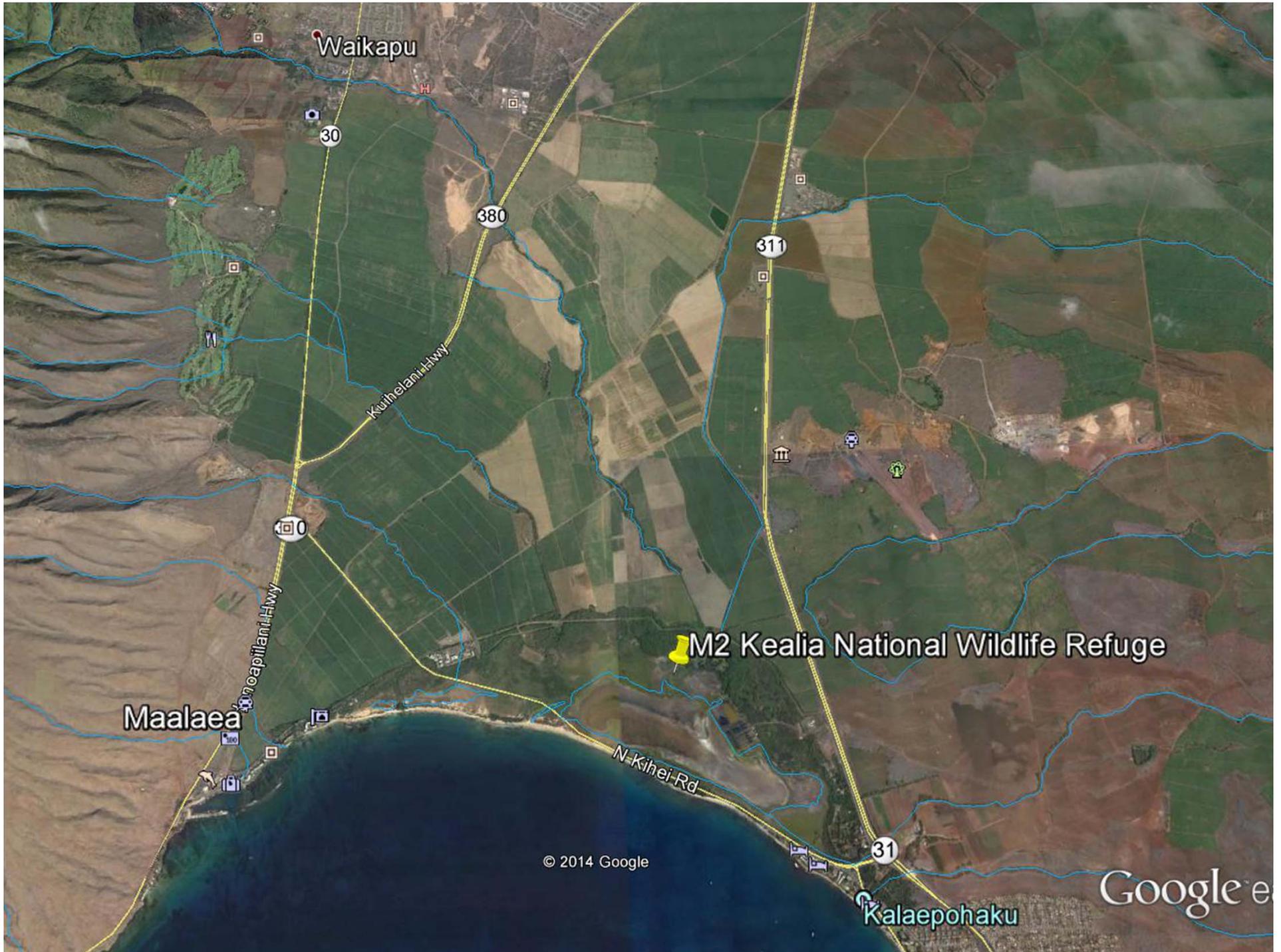
# 2014 Pesticide Sampling Locations on Maui



No stream sites were sampled on Maui due to the lack of suitable perennial streams in close proximity to up gradient pesticide uses.

The two surface water locations sampled are both groundwater fed, and likely receive little direct run off from upstream pesticide applications.

- Black Rock Spring at Kaanapali - inputs from golf, urban, historic pineapple and sugar cane
- Wetland within Kealia NWR – current upgradient inputs primarily from sugar cane and seed corn



Waikapu

30

380

311

0

Maalaea

M2 Kealia National Wildlife Refuge

N-Kihei Rd

31

Kalaepohaku

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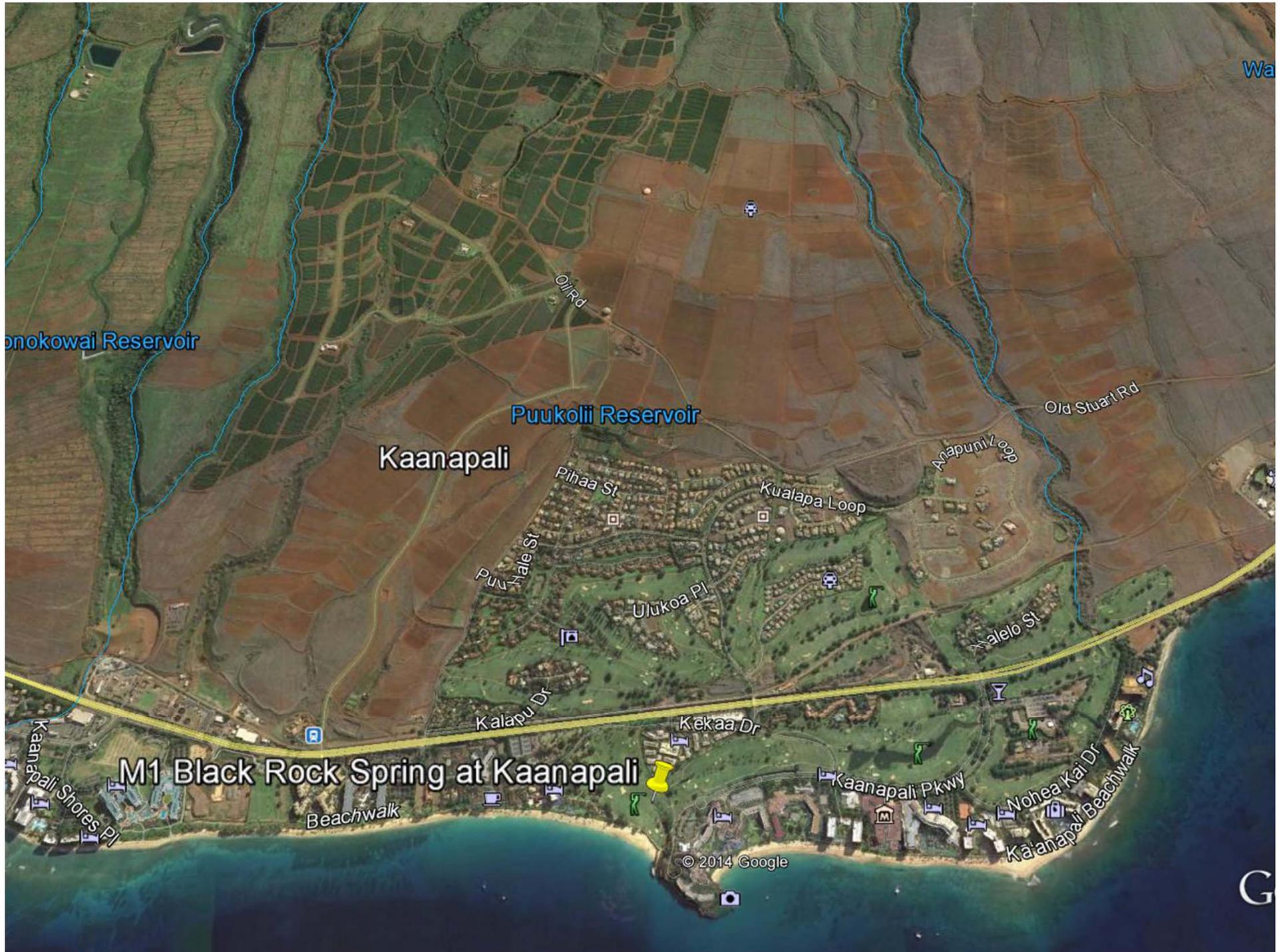
# 2014 Pesticide Sampling Results on Maui



## **Wetland within Kealia NWR**

3 herbicides detected

- Atrazine and breakdown products, concentrations reflect current use in sugar cane and seed corn up gradient
  - Atrazine detected at **0.182 ug/l**
    - < **Aquatic Life Benchmark** for protection of algae **1 ug/l**
    - < **MCL** for drinking water **3 ug/l**
    - < **Regulatory standard** Level of Concern **10 ug/l**
- Prometryn – was registered for cucumbers in Hawaii, source unknown and may be historic
  - Prometryn detected at **0.008 ppb**, > **100x below strictest benchmark**
  - < **Aquatic Life Benchmark** for protection of algae **4 ug/l**
- Fluometuron has not been registered for use in Hawaii, source unknown
  - Fluometuron detected at **0.060 ppb**, 15x below strictest benchmark
  - < **USGS Human Health Based Screening Level 4 ug/l**



Onokowai Reservoir

Puukoolii Reservoir

Wa

Kaanapali

Oli Rd

Old Stuart Rd

Pihaa St

Kualapa Loop

Mānāpuni Loop

PUN Hale St

Ulukoa Pl

Malelo St

Kalapu Dr

Kekaa Dr

M1 Black Rock Spring at Kaanapali

Beachwalk

Kaanapali Pkwy

Nohea Kai Dr

Kāanapali Beachwalk

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# 2014 Pesticide Sampling Results on Maui



## **Black Rock Spring, Ka'anapali**

4 herbicides and 1 fungicide detected

All concentrations >100x lower than strictest benchmark

- Atrazine and breakdown products. Restricted Use. Concentrations reflect historic use
  - Atrazine detected at **0.038 ug/l**
    - <**Aquatic Life Benchmark** for protection of algae 1 ug/l
    - <**MCL** for drinking water 3 ug/l
    - < **Regulatory standard** Level of Concern 10 ug/l
- Hexazinone, restricted use Likely reflects historic sugar cane use
  - Hexazinone detected at **0.034 ug/l**
- Simazine, restricted use herbicide
  - Simazine detected at **0.012 ug/l**
- Diuron, general use herbicide
  - Diuron detected at **0.020 ug/l**
- Iprodione, general use fungicide
  - Iprodione detected at **0.0016 ug/l**

# Maui Data Gaps



- Groundwater sites sampled don't capture runoff
- No urban sites selected, residential uses not captured
- No appropriate sites for mixed use/small ag
- No glyphosate or sediment sampling
- Many areas cannot be evaluated with surface water
- Irrigation well sampling could provide additional info
- Nearshore or seep sampling may also be useful

**What are your priorities?**

# Get the Report



- Summary tables, raw data, maps, and other resources to assist stakeholders with interpreting the data are available online at the HEER website.

<http://eha-web.doh.hawaii.gov/eha-cma/Leaders/HEER/statewide-pesticide-survey>

**Just google HEER Hawaii Pesticides**

## For further information



**Hawaii Department of Health  
Hazard Evaluation and Emergency Response Office  
808-586-4249**

**Clean Water Branch  
808-586-4309**

**Hawaii Department of Agriculture  
Pesticides Branch  
808-973-9401**