



HAWAII STATE
DEPARTMENT
OF HEALTH



**2018 JOINT GOVERNMENT
WATER QUALITY CONFERENCE
HONOLULU, HAWAII
JULY 26, 2018**



**INTERAGENCY
COLLABORATIONS:
ASSESSING PESTICIDE
OCCURRENCE AND DISTRIBUTION
IN HAWAII**

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

A Little History



Public debate, lawsuits, conflicts and widely differing perceptions about impacts of large agribusiness seed operations on health of local communities and ecosystems.

Are currently used pesticides moving off site at levels of concern?

DOH surface water monitoring program does not include currently used pesticides

USGS Studies on Oahu



Ground-Water Quality and its Relation to Land Use on Oahu, Hawaii, 2000–01

U.S. Department of the Interior
U.S. Geological Survey
Water-Resources Investigations Report 03-4305



Distribution of volatile organic compound mixtures in ground water.

NATIONAL WATER-QUALITY ASSESSMENT PROGRAM



Water Quality on the Island of Oahu Hawaii, 1999–2001



U.S. Department of the Interior
U.S. Geological Survey

Circular 1239

USGS Studies on Oahu



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

Initial Collaboration 2013



Sharing expertise and digging up resources

- DOH HEER Office and Clean Water Branch \$25K
 - Department of Agriculture \$25K
 - USGS Training, Technical Support and Laboratory Analyses \$45K in kind
- 
- 2013-14 Statewide WQ Snapshot Pilot Study

2013-14 Pilot Study Design



- 4 islands, 24 sampling locations
- Compared land uses with differing pesticide uses
- Small perennial streams or water bodies
- Winter sampling, dry period
- One time “snapshot” sampling– not representative of average conditions or other times of year
- Looked for broad range of currently used pesticides– 136 different compounds in water, 121 in sediments
- Very low detection limits

Key Findings Statewide



- Atrazine in 23 of 24 locations tested
- 42 pesticides detected
- Dieldrin exceeded WQS in Manoa Stream
- Atrazine, metolachor, chlorpyrifos, fipronil exceeded aquatic life benchmarks
- No currently used pesticide exceeded water quality standards
- No currently used pesticide exceeded drinking water standards
- Manoa Stream had most detections Ag lands - most herbicides

Pilot Study Data Gaps and Findings



- **Snapshot approach affected comparability and lack assessment of impacts over time**
- **Flow conditions not considered**
- Sampling did not consider application periods
- **Lack of perennial streams/suitable sites for key ag areas on Oahu and Maui**
- Limited glyphosate sampling detected widespread, low concentrations - ubiquitous, but not a risk
- Sediment data less helpful than water samples

Evolution 2015 -18



- DOH & DOA chose ongoing collaboration
- Kauai Joint Fact Finding Group expanded focus
- 2016 & 2017 Legislatures funded work through 2019
- Expanded WQ partnership
 - USGS experts: primary study design, mgmt and field ops
 - DOA Pesticides provides focus areas, pesticides of concern
 - HEER provides toxicology and study design assistance
- Trends by site, land use, flow conditions, pesticide regs
- Follow up sampling where exceedances occur
 - ✓ **Lack of comparability and assessments over time**



Pesticide-Monitoring Program of Surface Waters in the State of Hawai'i

Steve Anthony, Director
USGS Pacific Islands Water Science Center

Briefing to the Hawai'i State Legislature
December 11, 2017

U.S. Department of the Interior
U.S. Geological Survey



This information is preliminary or provisional and is subject to revision. It is being provided to meet the need for timely best science. The information has not received final approval by the U.S. Geological Survey (USGS) and is provided on the condition that neither the USGS nor the U.S. Government shall be held liable for any damages resulting from the authorized or unauthorized use of the information.

USGS Water Mission

- Provide information to manage, protect, and enhance water resources
- Address water-related hazards
- Non-regulatory role
- Provide publicly accessible information that is actionable, reliable, impartial, and timely

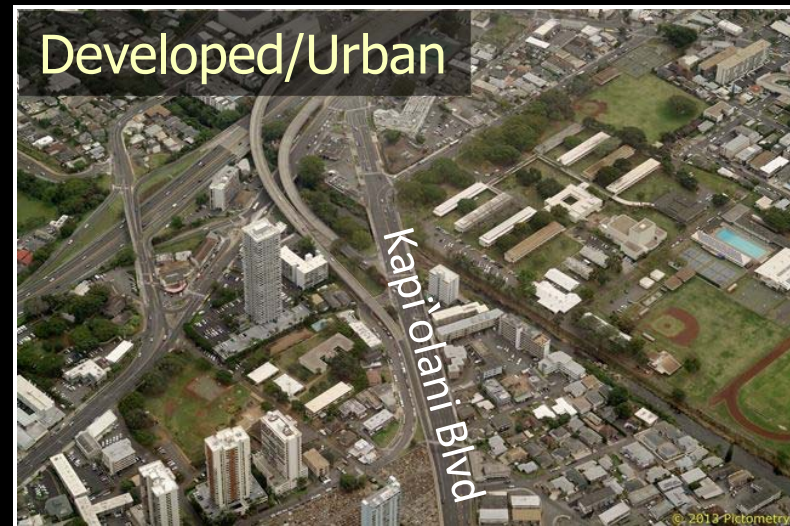
Program Objectives and Initial Scope

- Collaborative effort with HDOA and HDOH
- Assess the occurrence and distribution of current-use pesticides in surface water in Hawai`i
- Collect water samples at targeted sites on Kaua`i and O`ahu, and eventually other islands, using nationally consistent protocols
- Provide quality-assured sample results to HDOA and public through USGS online data repository
- Compare results to established Federal and State human-health and aquatic-life benchmarks

Program Objectives and Initial Scope—cont.



Collect samples at targeted sites that receive runoff from different types of land uses



Program Objectives and Initial Scope—cont.

Collect samples during different flow conditions



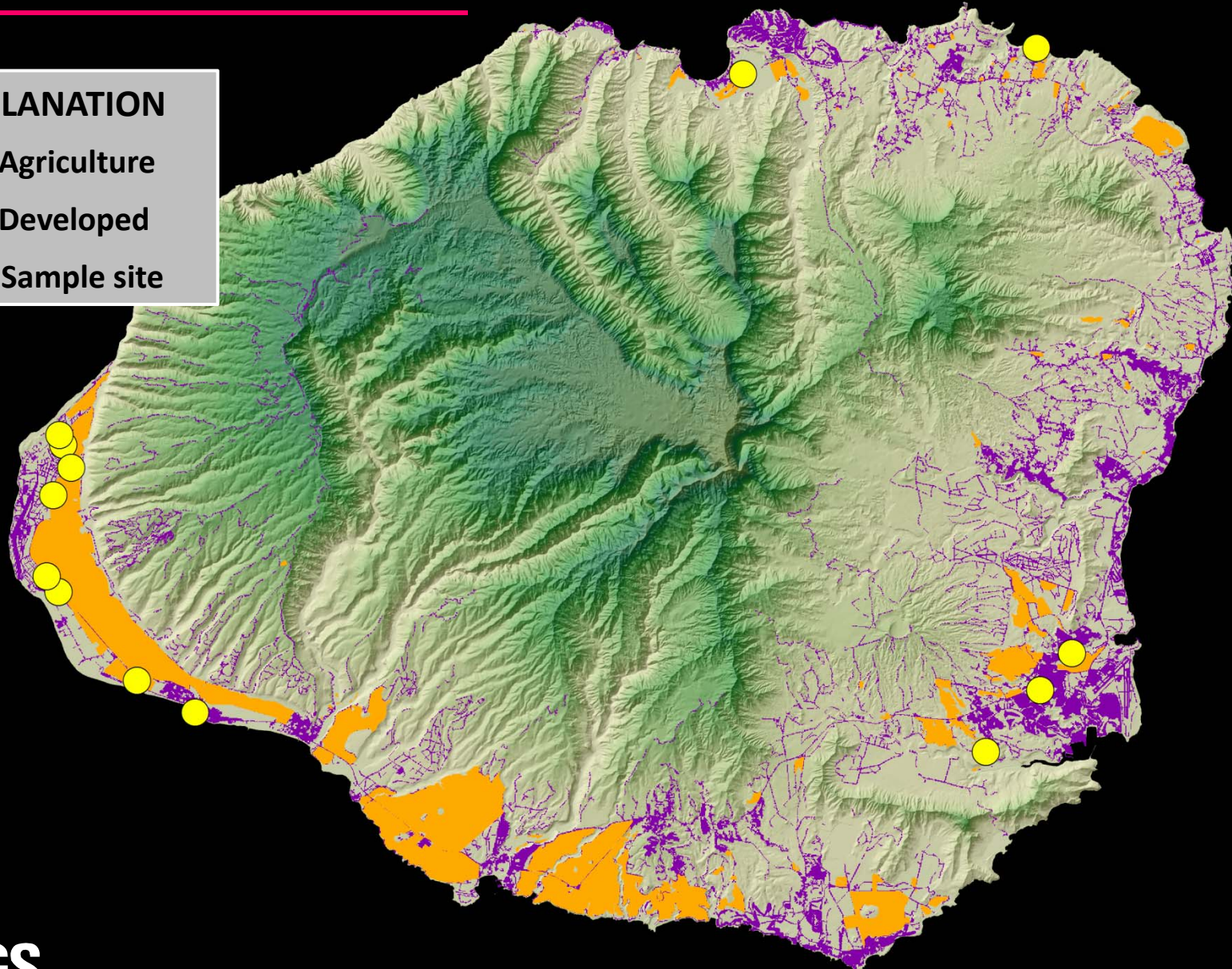
2017 Samples Collected at 35 Sites

- 13 sites on Kaua'i and 22 sites on O'ahu
- Streams, ditches, a wetland, and coastal ocean
- Downstream or nearby areas with:
 - Agriculture (16 sites)
 - Developed/Urban land use (6 sites)
 - Mixture of agriculture and developed (13 sites)

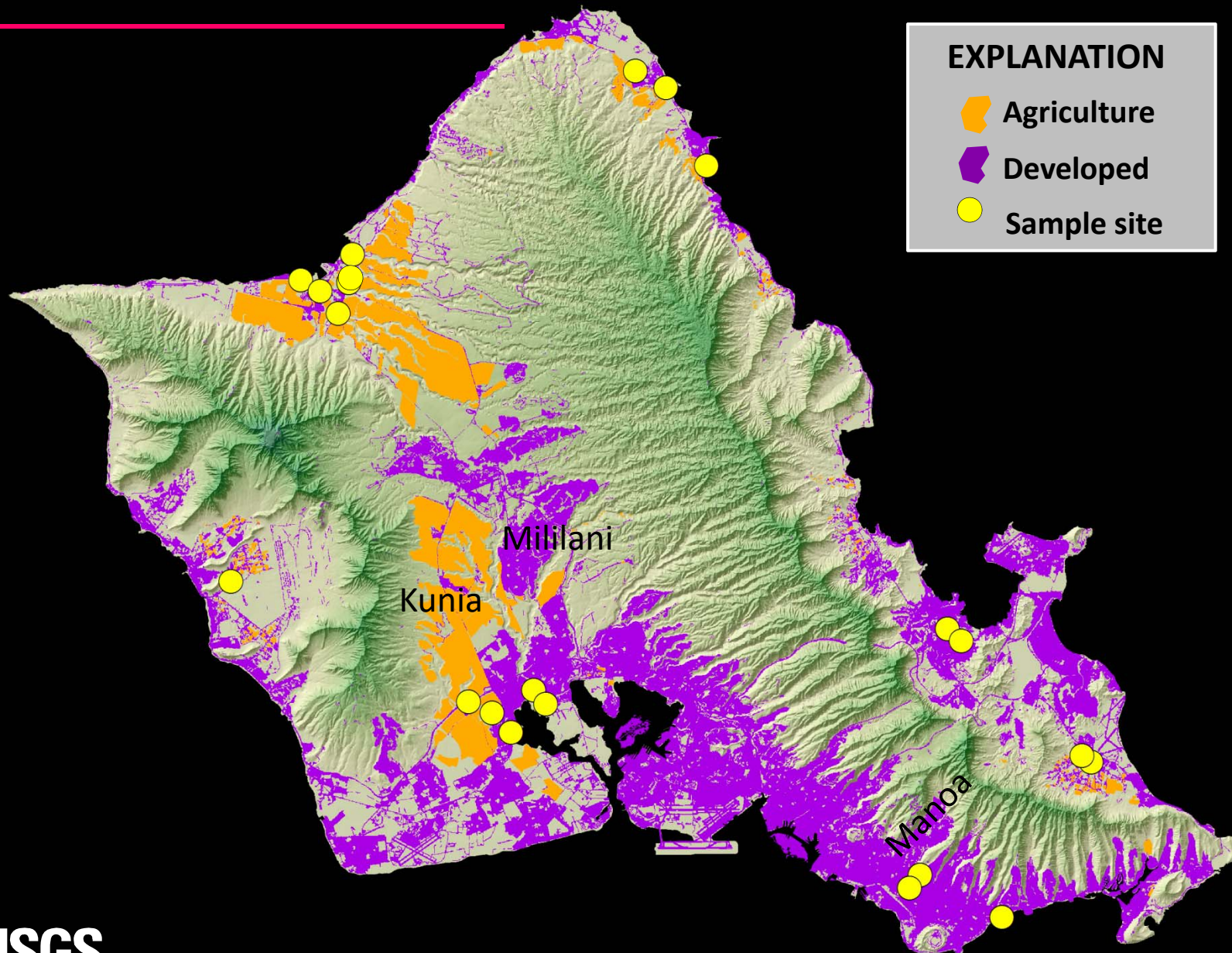
13 Sites on Kaua'i

EXPLANATION

-  Agriculture
-  Developed
-  Sample site



22 Sites on O'ahu



51 Samples Collected

32 discrete samples

- 14 high flow
- 18 low flow

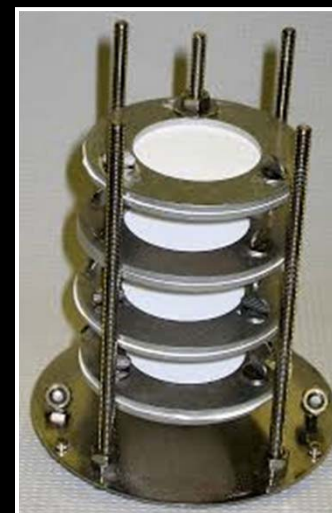


12 accumulation samplers (passive samplers)



7 quality-control samples

- blanks
- replicates
- spikes



Laboratory Analyses for Pesticides

- Samples analyzed at USGS National Water-Quality Laboratory
- 225 current-use pesticides
 - 123 herbicides
 - 87 insecticides
 - 15 fungicides
- Pesticides can be detected at trace levels (parts per trillion), commonly 10 to 10,000 times lower than human-health and aquatic-life benchmarks

1 part per trillion =
~1 water drop in 12 of these:



2017 Findings

Number of pesticide detections by use group and flow condition

245 detections total, out of 7,200 pesticide-compound results from laboratory

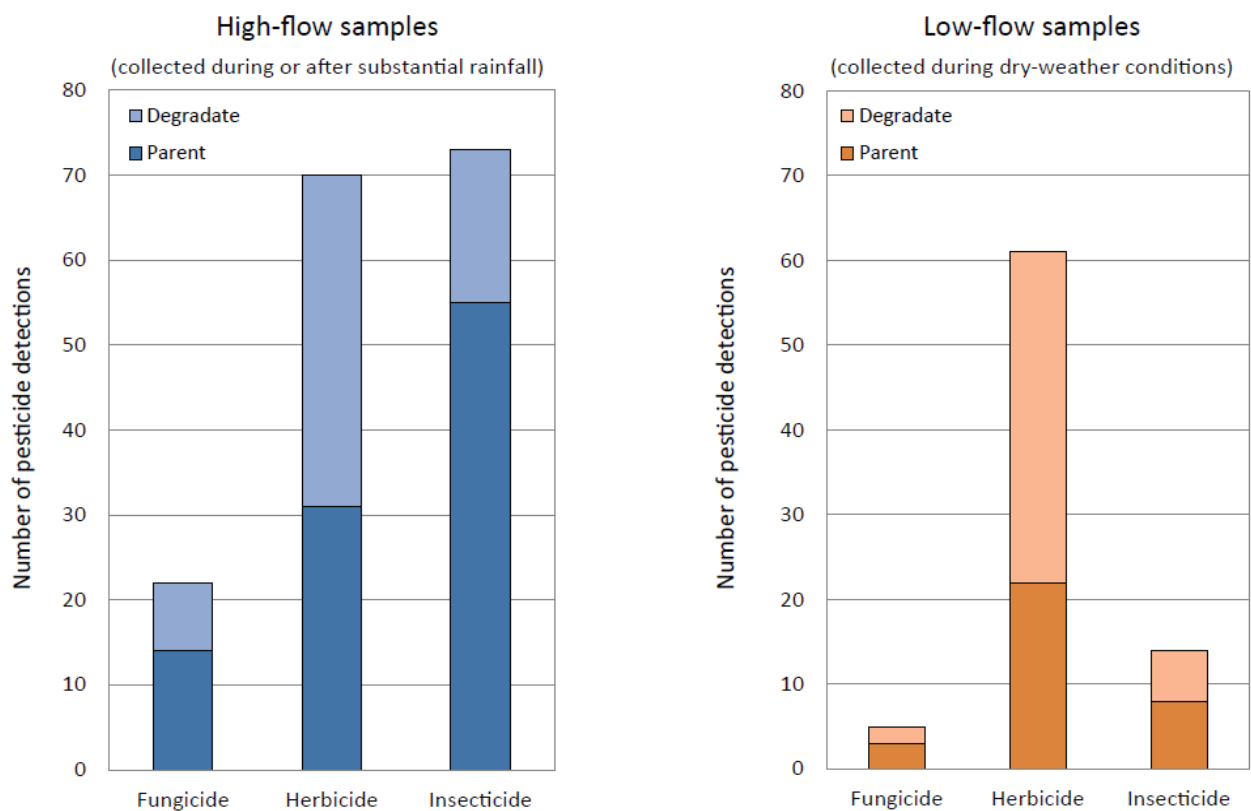


Figure 4. Number of pesticides detected by use group and flow condition in all 32 discrete water samples collected on Kaua'i and O'ahu, Hawai'i, between November 2016 and April 2017.

2017 Findings

- Most samples contained a mixture of multiple pesticides
 - 0 to 33 pesticides detected per discrete sample
 - 2 to 51 pesticides detected per accumulation sampler
- Concentrations of detected pesticides were low:
 - All were below current human-health benchmarks
 - Nearly all were below current aquatic-life benchmarks
 - Fipronil detected in 100% of developed land use category sites -- use as a termiticide and pet treatment
- Note: Some detected pesticides have no human-health or aquatic-life benchmarks

Johnson, A.G. and Kennedy, J.J., 2018, Summary of dissolved pesticide concentrations in discrete surface-water samples collected on the islands of Kaua'i and O'ahu, Hawai'i, November 2016–April 2017: U.S. Geological Survey data release, <https://doi.org/10.5066/F7BG2N79>.



Pesticide-Monitoring Program of Surface Water in Hawai'i: January- February 2018 Update for the Islands of Kaua'i, O'ahu and Maui



Kaua'i



O'ahu



Maui

DRAFT

Joseph Kennedy
Rachel Heinz
USGS Pacific Islands Water Science Center

Pesticide-Monitoring Program Update Meeting
July 19, 2018

U.S. Department of the Interior
U.S. Geological Survey

This information is preliminary and is subject to revision. It is being provided to meet the need for timely best science. The information is provided on the condition that neither the U.S. Geological Survey nor the U.S. Government shall be held liable for any damages resulting from the authorized or unauthorized use of the information.

Summary of Early 2018 Sampling

Kaua'i

✓ Flow conditions not considered

- 8 storm samples and 1 dry-weather sample
- 26 pesticides detected plus 18 breakdown products
- No exceedances of benchmarks, AWQC, WQS or MCLs

O'ahu

- 2 storm samples
- 16 pesticides detected plus 10 breakdown products

Maui

- 11 storm samples
 - 21 pesticides detected plus 21 breakdown products
- ✓ Lack of perennial streams

One location exceeded USEPA AWQCs for Acetochlor, Atrazine, Carbaryl, and Imidacloprid exceedances



North Shore of Maui as we flew in to Kahului, Feb 15, 2018

Wailuku River near
Wailuku, Maui, Feb 15, 2018
Storm sample: 1 detection

Collection site

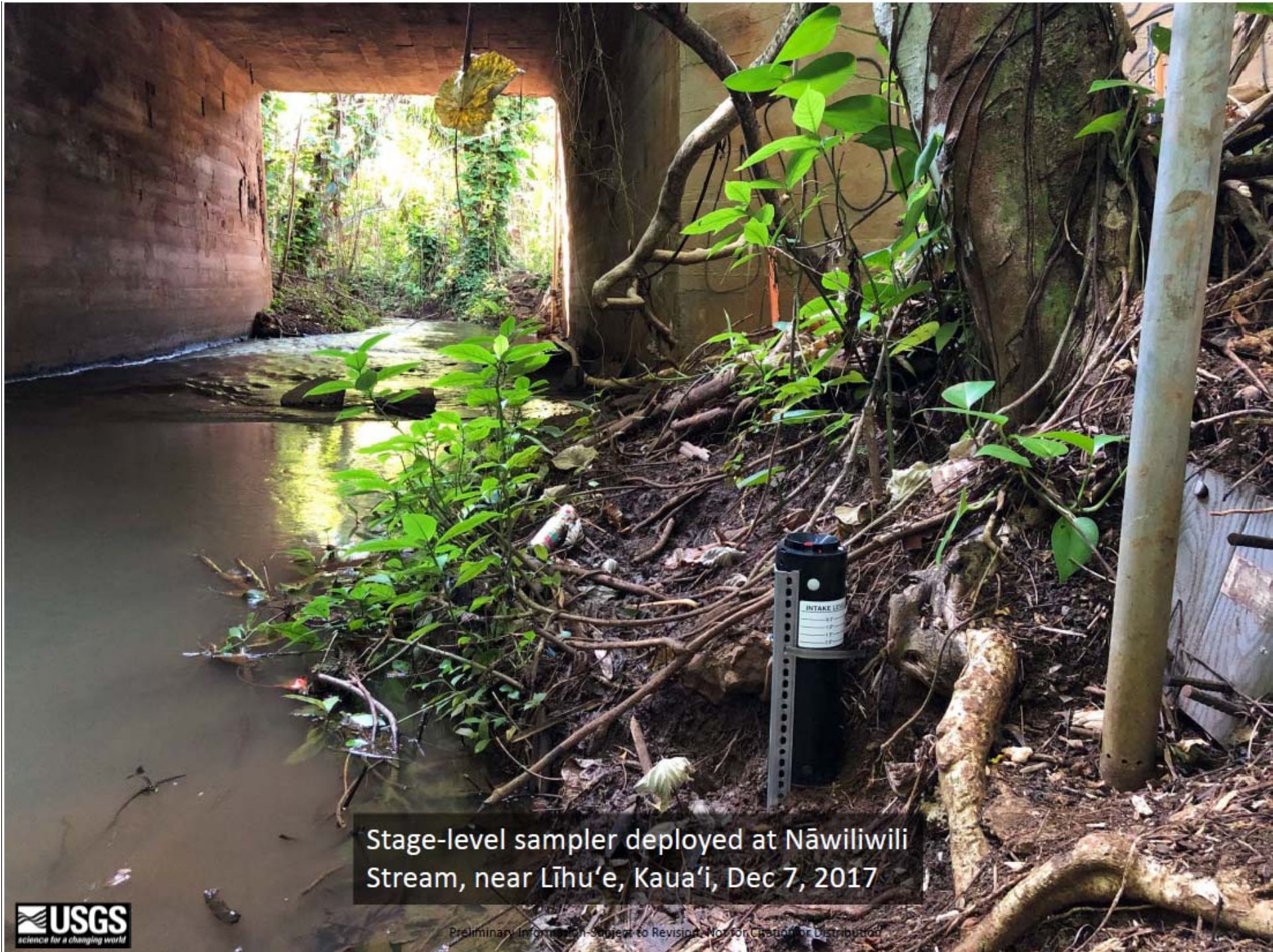


Retrieving water from stage-level sampler in Kukamahu Gulch near Hanapēpē, Kauaʻi, Feb 2, 2018
Storm sample: 19 detections

Joe Kennedy and Adam Johnson at work



Collecting sample at Kālepa Gulch near Wailuku, Maui, Feb 15, 2018
Storm sample: 2 detections



Stage-level sampler deployed at Nāwiliwili Stream, near Līhu'e, Kaua'i, Dec 7, 2017

Mā'ili'ilii Drainage Canal near
Wai'anae, O'ahu Feb 14, 2018
Storm sample: 17 detections

Collection site

Next steps

Analyze pending results for dry-weather samples collected at

- 15 sites on Big Island in June 2018
- 5 sites on Maui in May 2018
- 15 sites on O'ahu in May and July 2018

Complete initial (phase 1) sampling at each targeted site

- Get a dry-weather sample if water is present and is mostly fresh
- Get a storm sample if possible
- Deploy passive sampler if feasible and logical

Continue follow-up (phase 2) sampling at sites where

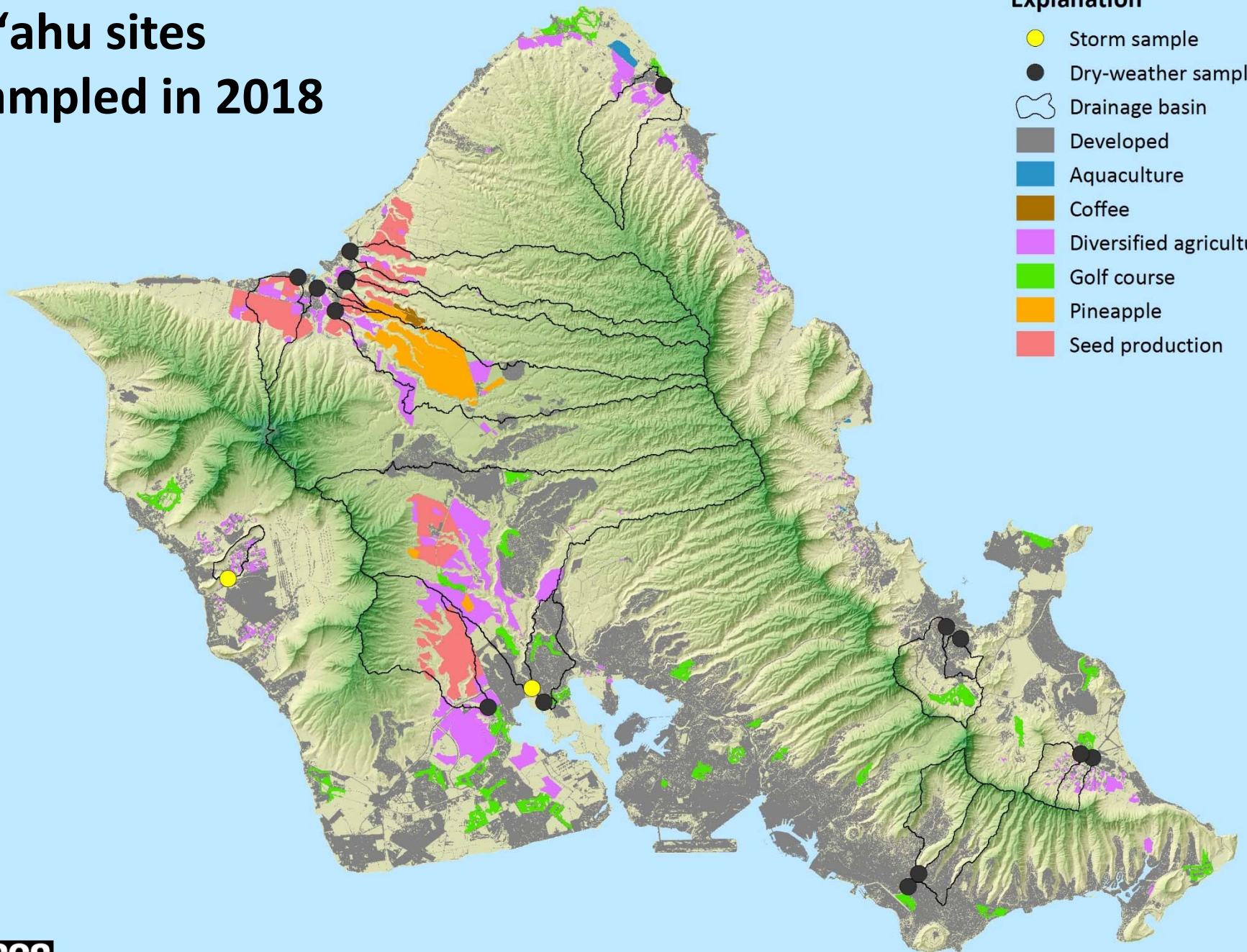
- Chlorpyrifos was detected
- Other pesticides of concern to DOA and DOH are detected?
- Pesticide concentrations exceeded or were within 10 percent of Hawaii or Federal water-quality standards

Release results for passive samplers deployed 2015 - 2017

O'ahu sites sampled in 2018

Explanation

- Storm sample
- Dry-weather sample
- ⬭ Drainage basin
- Developed
- Aquaculture
- Coffee
- Diversified agriculture
- Golf course
- Pineapple
- Seed production

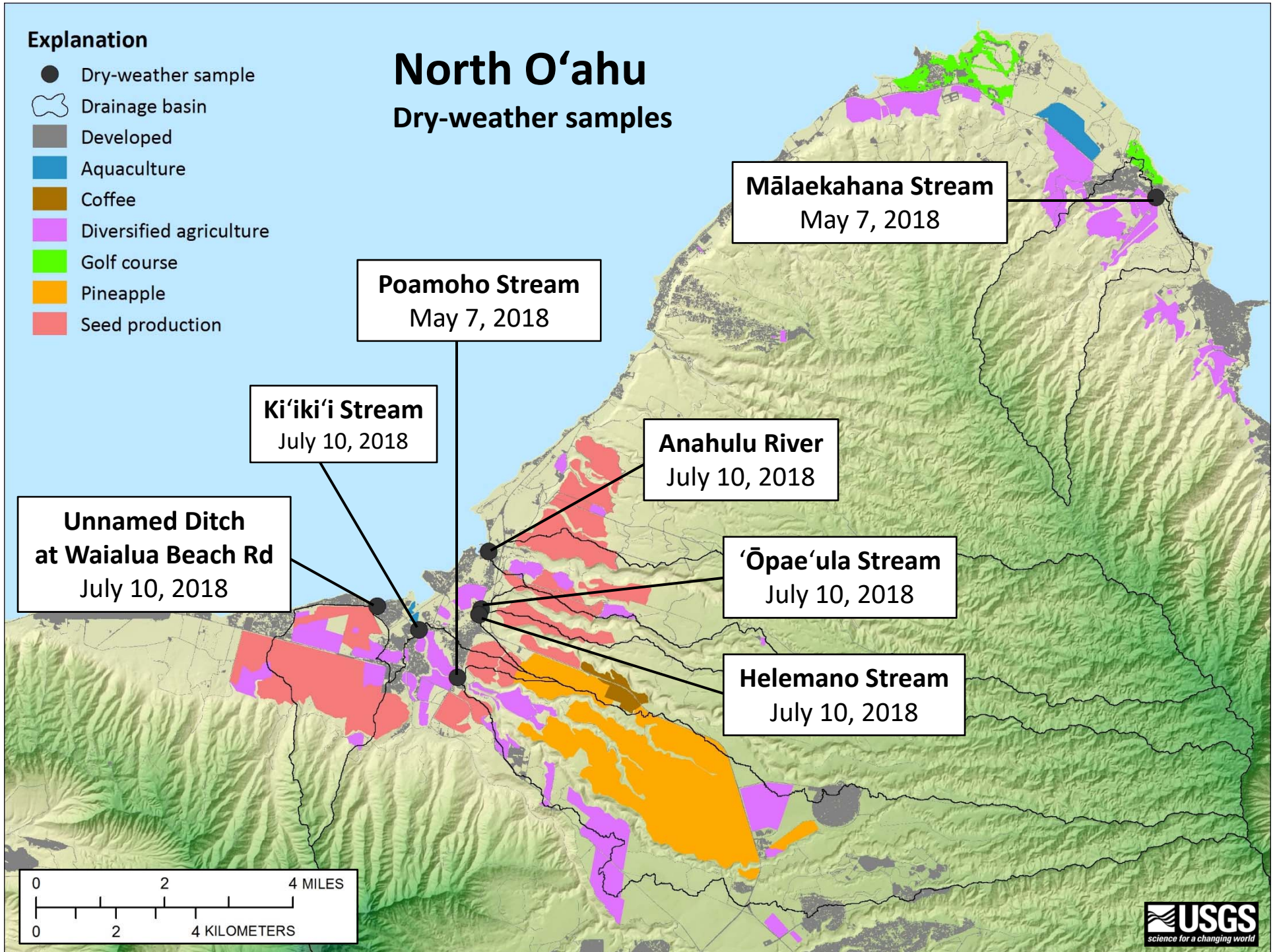


Explanation

- Dry-weather sample
- ☞ Drainage basin
- Developed
- Aquaculture
- Coffee
- Diversified agriculture
- Golf course
- Pineapple
- Seed production

North O'ahu

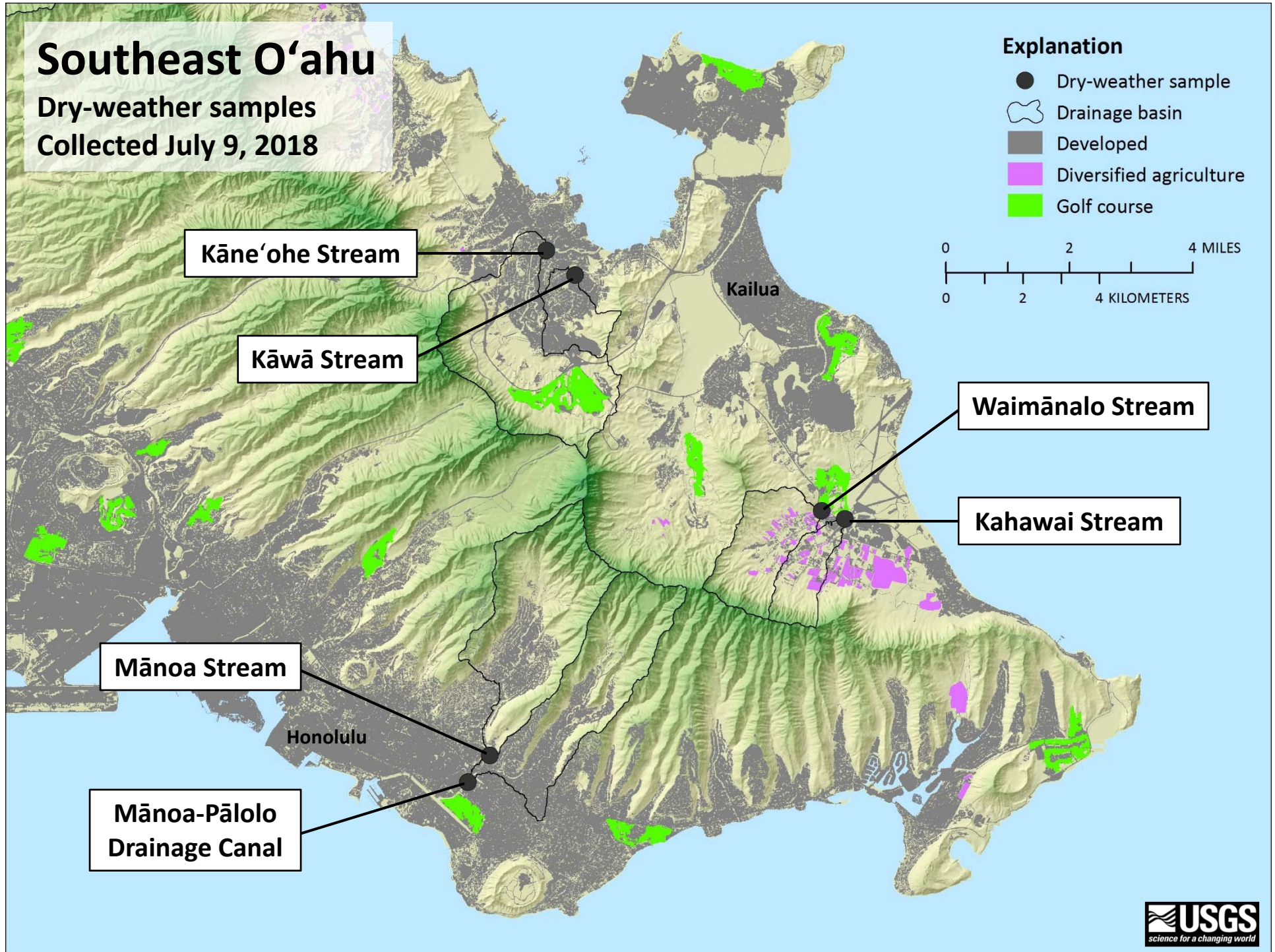
Dry-weather samples



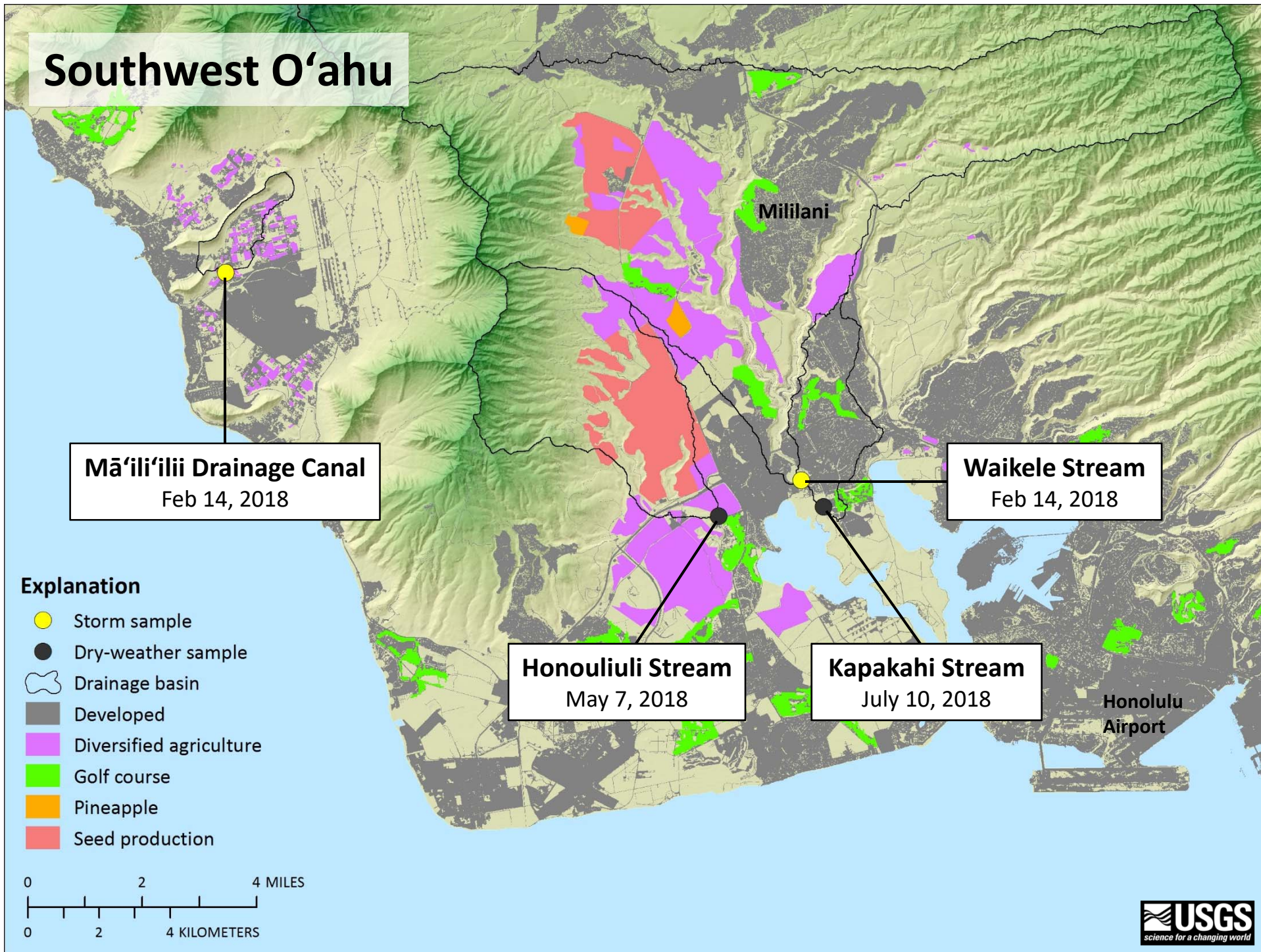
Southeast O'ahu

Dry-weather samples

Collected July 9, 2018



Southwest O'ahu



Mā'ili'ilii Drainage Canal
Feb 14, 2018

Waikele Stream
Feb 14, 2018

Honouliuli Stream
May 7, 2018

Kapakahi Stream
July 10, 2018

Explanation

- Storm sample
- Dry-weather sample
- ⬭ Drainage basin
- Developed
- Diversified agriculture
- Golf course
- Pineapple
- Seed production



Mahalo to our Collaborators



USGS Pacific Water Science Center

Steve Anthony

Adam Johnson

Joe Kennedy

Rachel Heinz

Department of Agriculture

Scott Enright

John McHugh

Tory Matsumura