

STATEWIDE PESTICIDE SAMPLING PILOT PROJECT

JANUARY, 2014



In partnership with the Department of Agriculture and the United States Geological Survey (USGS), the Hawaii Department of Health (DOH) is measuring pesticides in surface water and sediment at multiple locations in Hawaii. Pesticide sampling will occur in December 2013 - January 2014. This pilot project takes a snapshot sampling approach to assess 24 surface water locations statewide that represent four different land uses, each with differing pesticide use practices. The locations have been chosen in areas across the state where currently used pesticides have the potential to enter local surface waters and/or the nearshore marine environment. The results of this preliminary study will be used to work with a wide variety of stakeholders to better understand occurrence and concentration of currently used pesticides in non-target environments, and how they may relate to different land use types.



OBJECTIVE OF PESTICIDE SAMPLING

The short-term goal of this joint sampling effort is to gather initial data on the types and concentrations of currently used pesticides in surface water and sediment associated with a variety of differing land uses. The State of Hawaii has no ongoing stream monitoring program for pesticides and consequently there is very little information available to evaluate whether current pesticide use practices are resulting in off-site movement of pesticides into state waters. The data from this pilot study will provide preliminary information on the presence or absence of pesticide residue levels in surface waters. The results will be compared to water quality standards, environmental action levels and other state and federal guidelines, to provide a mechanism to rate risks of differing compounds detected. Working with our partners, this information may also prove helpful to better understand how these residues may relate to pesticide use practices that result in offsite movement of pesticides in the environment.

SAMPLING APPROACH

Surface water and sediment samples will be collected by DOH personnel between December, 2013 and January, 2014 and sent to the USGS laboratories on the mainland. Approximately 24 stream locations statewide representing four different land uses will be sampled. Sediment samples will be collected from up to 7 sites to evaluate the potential for sediment to serve as a “sink” and secondary source for pesticide residues. Separate testing for the pesticide glyphosate (e.g., “Roundup”) is included in this study due to community concern about use and fate of this herbicide. Analyses for glyphosate in both water and sediment will be carried out on samples from up to six sites, representing different land uses associated with glyphosate applications.

The focus of the sampling effort is on small water bodies directly adjacent to or downstream from targeted usage activities described below. At sites that do not have perennial streams, alternate locations that represent local groundwater conditions were selected including anchialine pools, wetlands, lagoons that have storm overflow to the ocean and agricultural drainage systems.

Note that this surface water sampling design cannot gather data from areas that do not have perennial surface water sources adjacent to or downstream of pesticide uses. For this reason, areas such as Molokai, Kunia, Waianae, and much of Maui's agricultural areas are not included in the study. Potential pesticide impacts to shallow groundwater in these areas could be studied in the future should resources become available to assess irrigation wells.

PESTICIDE SAMPLING LOCATIONS

Surface water and sediment monitoring will be conducted downstream of four different land use types:

- monoculture agriculture (relatively large tracts of land with single crops, users of restricted use pesticides)
 - 6 sites with extensive monoculture crops (seed corn, sugar, macadamia and coffee)
- mixed use agriculture (small farms close together growing a variety of crops)
 - 9 sites with mixed use ag (wide variety of crops: vegetables, papaya, banana, sweet corn, potatoes, vegetables, herbs, taro, ornamentals) Some sites include some upstream inputs from other categories.
- turf uses (golf courses and resorts that use pesticides to maintain landscaping)
 - 5 sites
- urban areas (these include residential pesticide uses and a wide variety of urban pesticide users, often including inputs from turf and small farms)
 - 4 sites that represent a mixture of residential and urban sites and integrator sites that have combined inputs from residential/urban uses and one or more of the above

Water and sediment samples will be collected from locations that are most likely to reflect pesticide usage and impacts. As part of the sampling plan development, DOH worked closely with Department of Agriculture, reviewed restricted use pesticide sales records for 2011-13, consulted with University of Hawaii, USGS, USDA and other experts and solicited input from a wide variety of stakeholders. Sites ultimately selected for sampling are located downstream of significant agricultural activities, turf uses or urban activities. Eight sites were selected on Kauai and Oahu, six sites on the Big Island, and two sites on Maui.

TARGET PESTICIDES

The pesticides will include a full analytical suite of currently used restricted and general use pesticides and their breakdown products, for which there are USGS methods available. Over 100 different pesticides will be sampled in surface water and sediment. The methods for surface water include the National Water Quality Laboratory Schedules 2033 and 2060. They may be accessed on line at: <http://nwql.usgs.gov/Public/PublicQAQC/nav/S2033-PBLNK-2012.html> and <http://wwwnwql.cr.usgs.gov/USGS/catalog/index.cfm?a=bs&sa=s&sap=2060&uid=>

The analytical method for sediments is from the USGS Pesticides Fate Research Group (2012) <http://ca.water.usgs.gov/projects/PFRG/AnalyticalMethods.html>. Gyphosate will be measured by the USGS Kansas Water Quality Science Center using method 0-2141-09 for water samples and USGS method LCGS in sediment <http://ks.water.usgs.gov/lcgy>.

Laboratory analysis is expected to take 2-3 months. Data will then be reviewed and evaluated by DOH and Department of Agriculture prior to public release.

DATA EVALUATION

Associations between the four different land use categories and detections of individual pesticides will be evaluated. The concentrations of individual pesticides will be compared to existing water quality standards or other health based levels. Sediment data will be evaluated using available state and federal sediment quality guidelines. It is important to understand, however, that the reported concentrations of pesticides in the samples only represent a snapshot in time from a small area within a watershed and may not be representative of worst-case or even typical conditions. All sites selected have multiple upstream inputs. Therefore, data collected will not conclusively identify specific source areas. The goal of this stage of the investigation is instead to help identify pesticides that have widespread or elevated detections, and how they may relate to pesticide use activities occurring upstream. This preliminary information will assist other agencies to identify pesticide use practices that may contribute to off-target movement into the environment, and will locate areas that may benefit from future monitoring. In addition, DOH will conduct a qualitative assessment of groundwater interaction with surface water sites sampled in this study. In areas where groundwater inputs provide significant flow to the water body sampled, available data on pesticides in groundwater will be considered to help understand whether historic pesticide residues in groundwater could be contributing to detections in surface waters in this study. Conversely, we will assess whether data from this study identifies areas where surface water data suggest potential pesticide concerns in surrounding shallow groundwater from current pesticide usage.

LIMITATIONS

The pilot study of pesticide occurrence in surface water and sediments is limited in scope and is not adequate to represent exposure and harm to human health and the environment. Data collected will not be a representative sample of pesticide occurrence throughout the year, and may not capture pesticides applied outside the sampling period. The pilot study will not be able to evaluate variability in pesticide residues found in surface water and sediments. Samples will not be collected during high flow storm events, therefore, insecticides and other pesticides which are primarily transported to surface waters through storm runoff may not be detected. Additionally, there may not be health based standards or guidelines for the pesticides detected.

For more information on the study design, please contact Fenix Grange or Dr. Barbara Brooks, DOH HEER Office, 808-586-4249 or by email at Fenix.grange@doh.hawaii.gov
Barbara.brooks@doh.hawaii.gov

For information on the pesticide sample collection and field work, contact the DOH Clean Water Branch at 808-586-4309

For information on pesticide regulation in Hawaii and the Department of Agriculture Pesticides Branch, please call 808-973-9560 or go to the website at <http://hdoa.hawaii.gov/pi/pest/>