

Hawaii Statewide Agricultural Land Use Baseline 2015

Metadata and Crop Mapping Protocols

The 2015 Hawaii Statewide Agricultural Land Use Baseline layer was created to provide a snapshot of contemporary commercial agricultural land use activity in Hawaii. It is based upon an assemblage of geospatial datasets, primarily high-resolution WorldView-2 satellite imagery (2011 – 2013) used as a base layer for digitization. Additional datasets used in this work include GIS layers ('Agriculture and Farming', 'Inland Water Resources', and 'Cadastral and Land Descriptions') provided by the state of Hawaii, Office of Planning Statewide GIS Program and other data provided by major land owners and managers. County Real Property Tax and Agricultural Water Use data were also used to identify commercial farm operations. Data for both real property tax assessment and agricultural water use were collected from each county that provided their most recent records, generally from 2014-2015. Not all properties that receive County agricultural tax assessment rates or reduced water cost for agricultural uses were mapped due to the small scale of some of their operations. These data sources were used to verify mapped commercial farms and identify operations that might have been missed using the imagery alone.

Digitized crop locations and boundaries were verified through a combination of on-the-ground site visits, meetings and presentations of draft layers with agricultural stakeholders and landowners, solicitations through a publicly accessible online web mapping portal, and spot-checking using Google Earth™ and other high resolution imagery sources.

The 2015 Hawaii Statewide Agricultural Land Use Baseline layer represents our best efforts to capture the scale and diversity of commercial agricultural activity in Hawaii in 2015 and should be used for informational purposes only.

Sponsor of the 2015 Hawai'i Crop Layer. Funding for the 2015 Hawaii Statewide Agricultural Land Use Baseline was provided by the Hawai'i State Department of Agriculture.

Authors of the 2015 Hawai'i Crop Layer. The University of Hawai'i at Hilo Spatial Data Analysis and Visualization (SDAV) Laboratory carried out the work under the direction of Dr. R.L. Perroy, Project Manager Jeffrey Melrose, and Cartographer and Geospatial Analyst Sylvana Cares. UH Hilo Undergraduate student interns Leilani Yamasaki and Ian Seely also contributed many hours to this work.

No Warranty. We have made every effort to make all images, maps, graphs, data, and other information provided as a result of this project as accurate and error-free as possible. However, we do not guarantee the accuracy of any images, maps, graphs, data, or other information. All content is provided without warranty of any kind and is not intended for any regulatory use whatsoever.

The following protocols were used to generate the 2015 Hawaii Statewide Agricultural Land Use Baseline data layers.

- ❖ This project focused on commercial agricultural operations with a three acre minimum crop mapping area. Understanding the importance of smaller scale producers to Hawai'i's agricultural community, commercial operations less than three acres were included where they could be reasonably identified.
- ❖ Mapped units follow actual cropped areas as identified in satellite imagery, not TMK parcel boundaries.
- ❖ Agricultural lands which did not display actual vegetation growth but appeared to be part of an active agricultural rotation (freshly tilled fields, etc.) were included in acreage summaries.
- ❖ For papaya and other crops that rotate every 3-4 years, mapping efforts were focused on active production areas and did not include fallowed fields.
- ❖ Packing or processing facilities and in-field access roads were generally included in acreage summaries.
- ❖ Homes, reservoirs, un-farmable gulches and major roadways separating field areas were not mapped.
- ❖ "Agri-scaping" of private residences was not mapped.
- ❖ Small backyard orchards and what appear to be home use vegetable gardens were not mapped
- ❖ Equestrian uses, including arenas, boarding and riding facilities, were not mapped.
- ❖ Rooster cultivation was not mapped.
- ❖ Piggeries were not mapped. Available data on pork production is summarized in the text and figures of the accompanying report.
- ❖ Poultry farms were not mapped. Available data on egg and poultry production is summarized in the text of the accompanying report.

Crops categories and considerations

- **Aquaculture** includes active shrimp farms, working fishponds, algae raceways, and research/production facilities.
- **Banana** includes fields in contiguous plantings >2-3 acres. Throughout the state, bananas are also cultivated in gulches, along farm boundaries and in small patches within smaller, diversified farm operations. These smaller mixed plantings are generally incorporated into the surrounding farm and labeled as Diversified Crop.
- **Coffee** includes both larger plantation-type scale operations on Moloka'i, Maui and Kaua'i; and smaller farm planting >2.0 acres in coffee growing regions like Kona, Ka'u and elsewhere. The North and South Kona region on Hawai'i Island were difficult to map accurately based on a practice some farmers have adopted to plant both macadamia nuts and coffee on the same ground. The mature nature of these orchard-dominated agricultural practices in Kona made it challenging to confidently discern these coffee-macadamia crop boundaries from satellite imagery.
- **Commercial Forestry** plantings include both short and long rotation tree crops. Plantings include eucalyptus and other species intended for timber, fiber or energy production and higher value hardwoods like koa and mahogany that are planted for eventual commercial harvest and not part of native forest restoration efforts

- **Dairy** includes core milking and on-farm processing facilities and the surrounding pastures and crop lands under active dairy use.
- **Diversified Crops** includes a wide range of products that are grown either outdoors or in greenhouses. The category includes many of Hawai'i's small farms and much of its local, fresh vegetables including tomato, cucumbers leaf crops, beans, asparagus, etc. This category also includes smaller plantings of crops such as banana, tropical fruit, papaya, coffee etc. that were too small to map out individually. Also included in the category are export crops such as Okinawan sweet potato, basil and Asian spices that make up an estimated 500-1,000 acres of farm land on 'Oahu and South Hilo.
- **Flowers, Foliage and Landscaping** includes a wide variety of products including hot house/shade cloth grown orchids, antheriums, tropical flowers, potted nursery plants, field stock, sod farms, and landscape trees.
- **Macadamia Nut** includes orchards that appear to be actively maintained and harvested. Orchards range from hundreds of acres in South Kona, Ka'ū and Puna to small and mid-size plantings throughout Hawai'i Island. Portions of abandoned planting near Wailuku, Maui, were not counted.
- **Papaya** is a 3-4 year crop and was mapped in areas where significant commercial papaya production occurs. Mapping efforts focused on just those lands that appeared to be planted and in active production. Fallow lands that might be available for future papaya planting were not mapped but are an important part of what the papaya industry needs to produce in a sustainable fashion. Smaller plantings of papaya on mixed-crop farms are mapped as Diversified Crop.
- **Pasture** includes areas in active commercial cattle operation where fencing is apparent and water troughs and/or cattle trails can be identified. Small pasture plots in diverse rural homestead areas were not the focus of this mapping effort but were included where larger parcels and contiguous pasture areas were present. Lands that were formerly in pasture use but have now been purchased by the military (Ke'āmūku, S. Kohala), the National Park Service (Kahuku Ranch, Kau) or withdrawn from pasture in favor of native forest restoration (for example; Keauhou Ranch, Kau or Hakalau, Preserve, Hāmākua) were not included in the pasture layer. Range lands that are fenced and grazed only seasonally are mapped as pasture lands.
- **Pineapples** includes areas planted in large to mid-size operations (primarily on 'Oahu and Maui). Smaller pineapple plantings that are mixed within smaller diversified farm operations are mapped and labeled as Diversified Crop.
- **Seed Production** includes all arable lands in use by the seed companies at the time of this survey. Net acres actually planted in corn, or other seed crops, will be substantially less than the gross acres depicted. The industry estimates that they use approximately 25% of their farmable land at any time for growing crops. Areas depicted include in-field roads, pollen drift buffers and areas managed for future crop rotation.
- **Sugar** includes areas planted in sugarcane. The majority of this crop is grown by Hawai'i Commercial and Sugar Company (HC&S) in the central plain of Maui. HC&S provided the GIS data they use to manage their agricultural field operations. Several smaller sugar plantings were identified on other islands where the crop is used to produce rum or cane is carved into swizzle sticks for the visitor market.
- **Taro** includes crop grown only in wetland settings. Dry land taro is included in the Diversified Crop category.



- **Tropical Fruit** includes a range of products such as rambutan, avocado, longan, lychee, citrus, cacao and other orchard fruit trees, that are planted for commercial harvest. Small backyard orchards were not mapped and are not counted in summary tropical fruit acreage.

1980 ALUM Layer -> 2015 Crop Category Conversion

The previous statewide agricultural footprint layer prepared for the state of Hawaii, the ALUM (Agricultural Land Use Maps) layer, was released in 1980. ALUM crop categories were used as the basis for the 2015 Agricultural Land Use Baseline, with minor modifications shown below.

1980 ALUM Category	2015 Crop Category
Aquaculture	Aquaculture
Avocado	Tropical Fruits
Banana	Banana
Banana/Guava	Diversified Crop
Banana/Other	Diversified Crop
Banana/Papaya	Diversified Crop
Banana/Wetlands	Diversified Crop
Coffee	Coffee
Dairy	Dairy
FIELD CROPS	Diversified Crop
Flowers	Flowers / Foliage / Landscape
Foliage and Nursery	Flowers / Foliage / Landscape
Foliage and Nursery/Forage and Grain	Flowers / Foliage / Landscape
Guava	Tropical Fruits
Macadamia Nuts	Macadamia Nuts
Macadamia Nuts/Other	Macadamia Nuts
ORCHARDS	Tropical Fruits
Other	Tropical Fruits
Papaya	Papaya
Papaya/Guava	Papaya
Pineapple	Pineapple
Sugarcane	Sugar
Vegetables / Melons	Diversified Crop
Vegetables / Melons - Flowers	Diversified Crop
Vegetables / Melons - Foliage and Nursery	Diversified Crop
Vegetables / Melons - Papaya/Macadamia Nuts	Diversified Crop
Wetlands	Taro