

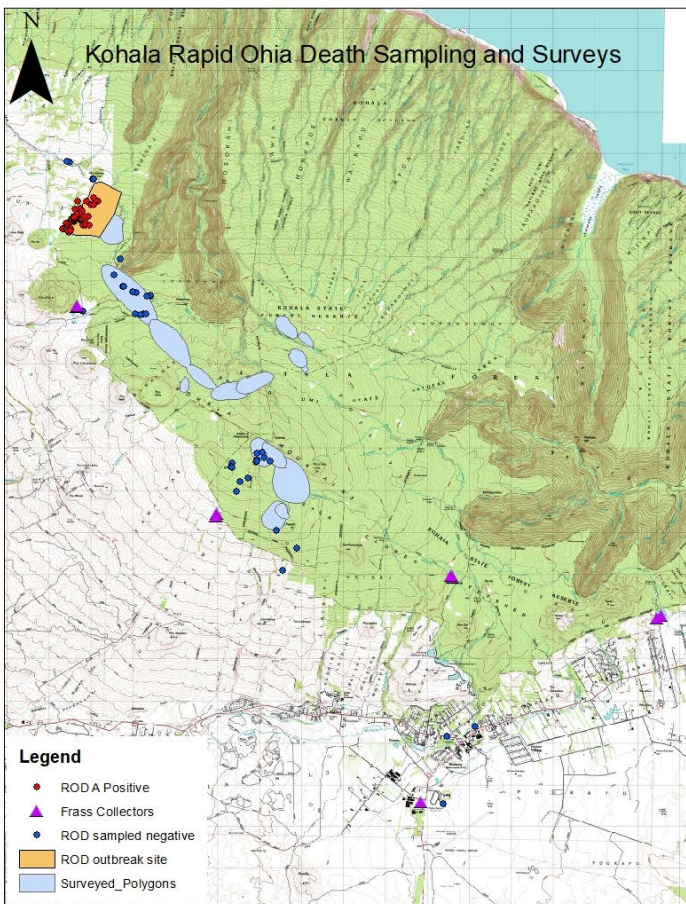
The Kohala Center - Kohala Watershed Partnership  
Hawaii Invasive Species Council  
Final Report 2018

Proposed work:

Division of Forestry and Wildlife (DOFAW) will conduct one aerial survey of Kohala mountain every six months to monitor the spread of Rapid 'Ōhi'a Death (ROD). These surveys will provide photos and GPS points of new outbreaks of the disease. Once this data has been collected it will be shared with Kohala Watershed Partnership (KWP) to be ground truthed. KWP will visit these sites to collect samples and send them to U.S. Department of Agriculture Pacific Basin Agricultural Research Center (PBARC) for analysis. Once the status of the tree is confirmed, DOFAW will determine the best management practice. A potential follow-up visit may be required to fell the tree and cover with the appropriate material following the ROD protocol set by Department of Land and Natural Resources (DLNR). Working with the appropriate researchers, KWP will purchase and install frass collectors in strategic points across Kohala mountain. These collectors will be monitored for frass; once collected, samples will be submitted for testing.

Accomplished work:

Following DOFAW's January 11, 2017 ROD flight over Kohala mountain a series of points and polygons were created identifying individual suspect trees and stands. These shapefiles were shared with Big Island Invasive Species Committee (BIISC). BIISC's Forest Response Program Coordinator, Bill Buckley worked closely with KWP to determine how to access these sites and coordinate KWP and BIISC work weeks. Sampling began on January 6, 2017. All of the samples from this original flight came back "undetected" for ROD.



KWP worked with PBARC microbiologist Carter Atkinson to obtain and deploy nine frass collectors at five different sites on Kohala mountain. Preferred sites were accessible (i.e., in an open pasture-like area bordering the forest edge).



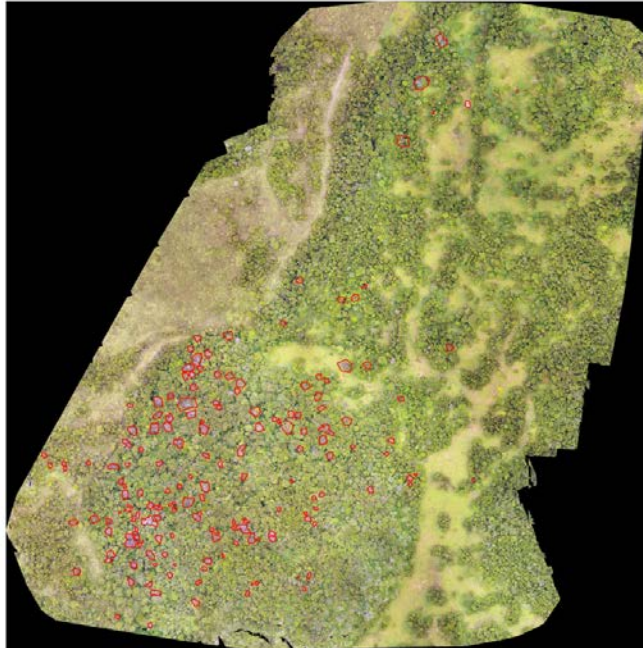
A) Passive frass collectors. B) Glass slides.

Frass collectors were revisited every two weeks in order to collect and replace the glass slides and repair any damages to the instruments. These instruments ended up requiring a lot of maintenance and repair because they were not built to handle the strong winds of Kohala. KWP rebuilt and redeployed the instruments three times because of the damage they received from wind events. Collected slides were sent into PBARC for analysis. None of the slides that were collected and sent in for testing came back positive for ROD.

During DOFAW's September 1, 2017, ROD survey flight, the crew spotted a large suspect stand of trees in Kohala. Due to the size of this stand and the canopy's strong resemblance to ROD, BIISC contacted KWP immediately after the flight to setup a day to conduct follow-up sampling to determine if the trees were positive for ROD. KWP and BIISC were on site sampling trees September 14, 2017. The samples were prioritized for testing and the results were available September 15, 2017. Eight of the ten trees sampled came back positive for *Ceratocystis lukuohia*, or ROD species A.

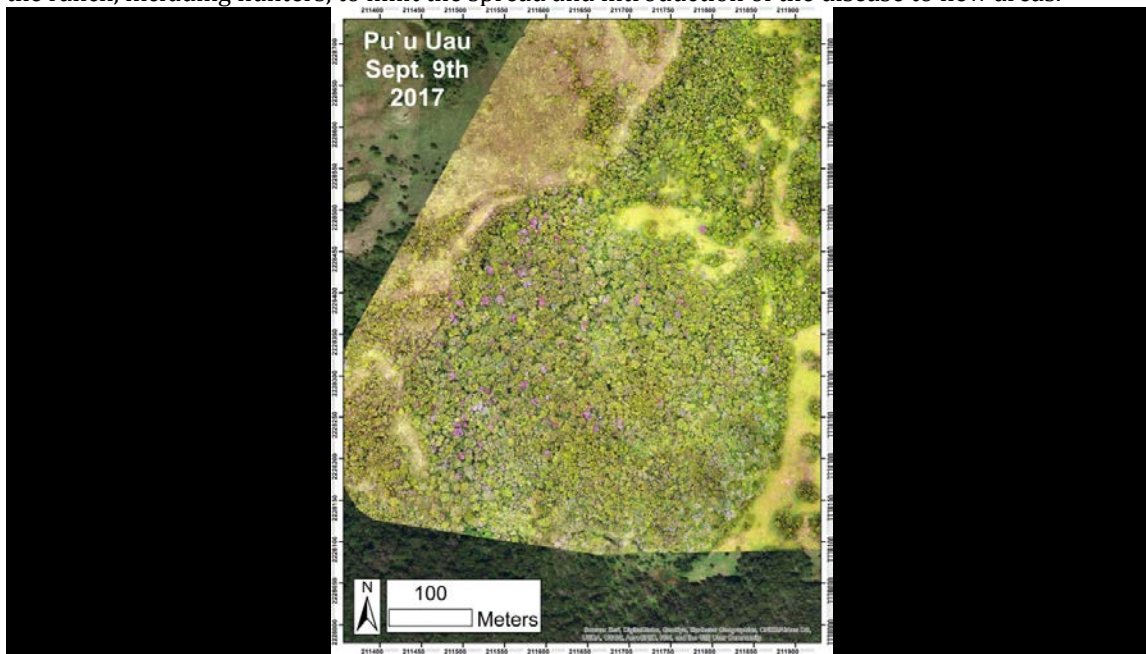
After the outbreak was confirmed, Kohala became a focal point for ROD research. KWP's landowning partner where the outbreak was found preferred that KWP be the point of contact for all access going to the site. KWP facilitated and escorted all crews and research groups in response to this request. BIISC continued to sample and map with drones; U.S. Forest Service (USFS) established long-term monitoring plots; Curtis Ewing and Carter Atkinson set up insect and frass monitoring collection instruments in addition to those previously installed on Kohala mountain; and Ryan Perroy and his team at University of Hawai'i Spatial Data Analysis and Visualization Labs (SDAV) mapped the extent of the outbreak with drones. These groups visited the Kohala outbreak site multiple times during September-December 2017, which consumed large portion of KWP personnel time. However, KWP made this ROD research and monitoring a priority due to urgent threat this pathogen poses to Kohala watershed and ecosystem function.



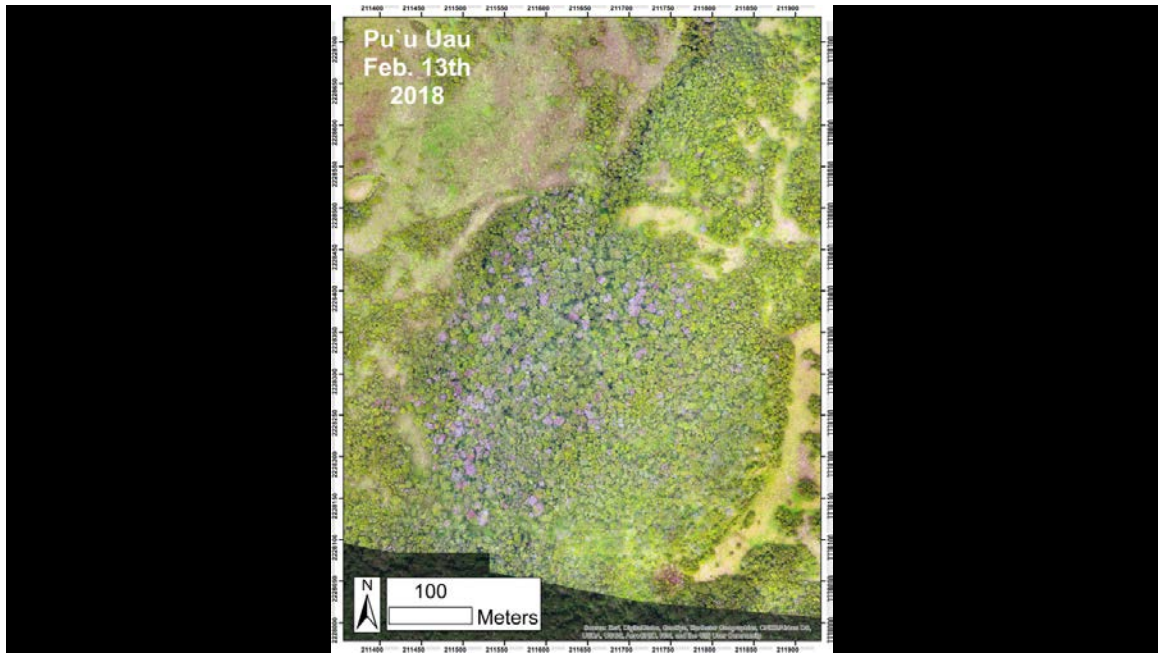


Drone imagery from September 9, 2017. Red polygons depicting ROD positive trees. Imagery courtesy of Timo Sullivan, UH Hilo, SDAV lab.

DOFAW, BIISC, and KWP discussed the next management steps with the landowner and it was agreed upon to fell any positive trees within the pasture area. The intent with this management action was to limit the spread of the disease via animal rubbings or damage. The landowner also decided to shutdown all visitor access to the ranch, including hunters, to limit the spread and introduction of the disease to new areas.



Drone imagery from September 9, 2017. Dead or dying trees from ROD red/purple canopy. Image courtesy of Timo Sullivan, UH Hilo, SDAV lab.



Drone imagery from February 13, 2018. Image courtesy of Timo Sullivan, UH Hilo, SDAV lab.

KWP continues to work with the landowner, adjoining landowners (where the disease has spread to), DOFAW, BIISC, and ROD research groups to continue to monitor and limit the spread of the disease.



April 2018. New detected ROD trees. Yellow: dying, Red: Dead, Green outline original outbreak site.