HISC project for FY 2018
Cost Effectiveness of HBT Intervention Strategies Protecting Critical Habitat Assets against Invasive Species

1.   Initiate scaled tactics in critical habitat asset protection through the deployment of aerial HBT operations targeting incipient Miconia

In 2018, operations were substantially reduced to record low 29 hours of operational flight time. This very limited effort focused on priority asset areas with a mean elevation of 1900' a.s.l. We eliminated 784 miconia targets.

2.   Develop spatially explicit bioeconomic map layers depicting optimal management strategies with a custom data base application

The East Maui Watershed (EMW) is a steep, forested landscape with wide temperature and precipitation gradients that is currently being invaded by the non-native, canopy tree miconia (Miconia calvescens DC.). Current miconia management efforts focus on protecting important watershed and critical habitat areas from invasion. Here, we report on a species distribution model to predict vulnerability of unoccupied areas. This suitable habitat model was developed from an ensemble of five algorithms associating four physical features of the EMW with miconia occurrence data from a 26-yr management history (1991-2016). All of the algorithms performed well based on model evaluation statistics (e.g., AUC ≥ 0.83; TSS ≥ 0.29). Elevation and rainfall were consistently important predictors, while slope and aspect were variable and low contributors, respectively. The binary ensemble model predicted ~77% of the total area of interest being vulnerable to miconia invasion, with at least one of the algorithms correctly classifying all occupied area as suitable. Independent miconia occurrences recorded in 2017-2018 validated the EHSM with 93% correctly predicted to occupy suitable habitat. However, the remaining, outlier occurrences occupying "unsuitable" habitat, including mature, indicate the invasion has not yet reached equilibrium. A weighted mean probability surface model from the same algorithms displayed a higher resolution gradient of values across the suitable and unsuitable regions of the EMW. In a post-hoc analysis, It showed mature occurrences occupying significantly higher suitability values than immature (p < 0.004), suggesting there are ecotones suitable for miconia to colonize, but less suitable to naturalize. This model presents an initial framework for future projections to eventually delineate priority areas that are most vulnerable to miconia naturalization.

3.   *Assess the efficacy of HBT treatments on Mule's Foot Fern (Angiopteris evecta)*

A single observational flight was conducted to visit the treatment points at > 12 months after treatment. There was no observable lethality or injury observed in these locations from treatment. It is possible that the treated plants were effectively eliminated and decomposed, making them not apparent or the observed plants in the location were in fact recovered from treatment. Thus, we can not conclude that HBT applications were effective and should not be considered further for testing with out a different approach that eliminates practitioner participation.