

## Mangrove Eradication within Reach on Hawai‘i Island

By Ann Kobsa, Malama O Puna

Is a community organization dedicated to safeguarding Puna’s natural treasures

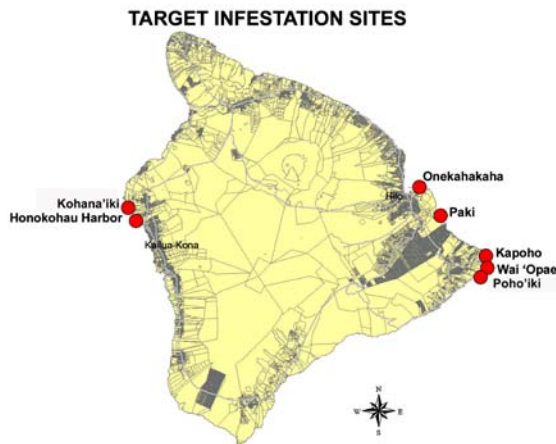


top photo by Mitzi Messick & bottom by Heather Rauch

The red mangrove, *Rhizophora mangle*, falls into that category of alien species that are imperiled in their native range but are monster weeds in Hawai‘i. Mangroves provide valuable ecosystem benefits worldwide, but in Hawai‘i they grow to higher densities and shed more biomass than in their native range. This negatively impacts native fish communities and destroys native habitat needed by endangered Hawaiian waterbirds. Anyone who has ventured into a Hawaiian mangrove swamp knows how dominant they become, replacing entire terrestrial plant communities and aquatic coastal ecosystems. They are able to spread along coastlines to places that other colonizers can’t reach.

The red mangrove was first introduced to Moloka‘i in 1902 and has since spread to all the major islands, with O‘ahu and Moloka‘i having vast infestations. Hawai‘i Island has had a total of nearly 75 acres, with 20 acres currently remaining. Mechanical removal of mangroves in Hawai‘i has been reported to cost between \$37 K and \$175 K per acre. Using shoreline-approved herbicide to kill the mangroves, the estimated cost for mangrove eradication completed so far is \$2 K per acre.

Malama O Puna’s eradication project at Wai ‘Opae Marine Life Conservation District (MLCD), near the easternmost point of Hawai‘i Island, is about 85% complete. The area had about 20 acres of mangroves covering an extensive network of tidal pools and ranging from dense mangrove swamp with trees up to 80 ft tall, to mangrove thicket from 3 to 20 ft. tall, to sparse mangrove keiki colonizing bare pahoehoe. The mangroves were progressively replacing the coral pool ecosystem, and in the past several years had largely displaced the endangered Hilo beach grass, *Ischaemum byrone*. This is an area of high subsidence, which is one of the biggest contributors to mangrove spread. Sea level rise will likely have a similar effect in enlarging areas of mangrove infestation.



map by Mitzi Messick

Mangroves are destroyed according to the size of the plant: larger trees are drilled and injected, while smaller plants receive foliar spray of a shoreline-approved systemic herbicide. Habitat (imazapyr) is used at 0.3% for spraying and both Habitat and Aquamaster (glyphosate) are used for injection. Habitat (imazapyr) is preferred as it is effective at lower concentration, it kills the propagules on the tree, and is effective in foliar application, whereas Aquamaster is not. Work is carried out at low tide during dry weather.

An education/outreach component involves students and community volunteers in hand-pulling, cutting, and hauling out the more sparse makai mangrove keiki, which are those within the MLCD. Volunteers play another important role of always being the lookouts for rogue mangrove plants and propagules that may float in from other islands.

In the interior of Wai 'Opae dead mangroves are being replaced by natural growth of interspersed milo trees and new milo seedlings. Replanting of hala, milo and naupaka will begin shortly, to reduce the likelihood that the area will be taken over by other invasives. The more exposed areas will likely remain free of vegetation, except for the low-growing akulekule, *Sesuvium portulacastrum*, that has survived the spraying.

Herbicide-based mangrove eradication appears to be lower-impact than manual removal in that it involves no ground disturbance, allows interspersed native plants to slowly fill in the gaps left by dying mangroves, and appears to retain more of the integrity of the ecosystem than the manual methods that are being used nearby. It is definitely lower-impact on the budget. Ongoing fish monitoring at Wai 'Opae should reveal any changes in community structure that may play out over a longer time frame.

In the next project phase, Malama O Puna will partner with the Big Island Invasive Species Committee on the goal of freeing Hawai'i Island of mangroves by 2011. Field methods developed at Wai 'Opae will be applied to five remaining infestations as follows: Paka Bay (4 acres), Poho'iki (7 acres) and Kapoho Bay (<0.5 acre) in Puna District; Onakahakaha (4 acres) in Hilo Bay; and Honokohau (0.7 acres) in Kona. Two additional infestations, one in Kapoho Bay (4 acres) and one at Kohana'iki, Kona (~0.5 acre) will be eliminated independently by private property owners using manual methods. The final step will be to survey the coastline for detection of any last mangrove removal.

This work is supported by the US Fish and Wildlife Service Coastal Program and Hawaii Tourism Authority Natural Resources Conservation Program. Email [ann.kobsa@gmail.com](mailto:ann.kobsa@gmail.com) to receive detailed methods for mangrove eradication, or to report any additional infestations on Hawai'i Island.