

THE KAHO'OLAWE ISLAND RESERVE

Decimated of its natural environment through years of over foraging by ungulates and military bombing, an estimated 1.9 million tons of soil is lost annually on Kaho'olawe to erosion. Severely eroded landscapes cover one-third of the island, with runoff choking the Reserve's pristine reefs and significantly impacting the ocean ecosystem. The Reserve's inventory of 3,000 historic sites and features - all part of the National Register of Historic Places - are in constant need of protection from these damaging circumstances. Despite an extensive, 10 year cleanup by the Navy, unexploded ordnance litter roughly one quarter of the island plus all surrounding waters, leaving areas life-threatening and off-limits.

THE KIRC

The Kaho'olawe Island Reserve Commission (KIRC) was established by the Hawai'i State Legislature in 1993 to manage the Kaho'olawe Island Reserve while held in trust for a future Native Hawaiian sovereign entity. The KIRC has pledged to provide for the meaningful and safe use of Kaho'olawe for the purpose of the traditional and cultural practices of the native Hawaiian people and to undertake the restoration of the island and its waters. Its mission is to implement the vision for Kaho'olawe Island in which the *kino* (body) of Kaho'olawe is restored and *nā poe o Hawai'i* (the people of Hawai'i) care for the land. The organization is managed by a seven-member Commission and a committed staff of eighteen.

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MAHALO

More than 1,000 volunteers have devoted their time and energy to this critical project on Kaho'olawe. Mahalo to those individuals, to the KIRC staff and to the following for their support:

USGS Pacific Coastal and Marine Science Center (Santa Cruz CA), Ho'olawa Farms, Maui Nui Botanical Gardens, KUPU Hawai'i, Keala Pono Archaeological Consulting, LLC

To support this work as a volunteer, visit kahoolawe.hawaii.gov/volunteer. To make a donation visit kahoolawe.hawaii.gov/donations.

REDUCING Excessive Sedimentation in the Hakioawa Watershed of Kaho'olawe by RESTORING Native Ecosystems



PROJECT BACKGROUND

SNAPSHOT

- The island of Kaho'olawe, a single shield volcano, is approximately 1.03 million years old and is located 7 miles southwest of the island of Maui.
- The Kaho'olawe Island Reserve includes the entire island and its surrounding ocean waters in a 2 mile radius from shore. The island is approximately 11 miles long, 7 miles wide, and comprised of 28,800 acres.
- The entire island of Kaho'olawe is on the National Register of Historic Places and is considered a cultural treasure, possessing unique cultural sites.
- In recent history, the island was used as a penal colony, a ranch, and for military training, including live fire training.
- The presence of ungulates and repeated bombing and burning resulted in extensive environmental degradation, and much of the topsoil has been lost, eroding down to hardpan. Today approximately 30% of the island is barren due to severe erosion.
- This process has greatly affected the marine habitat, with restoration dependant upon the effectiveness of terrestrial re-vegetation efforts.

AIM

The Hawai'i Department of Health, Polluted Runoff Control Program (PRCP), has granted Clean Water Act (CWA) section 319 funding to the KIRC to initiate **erosion control, reestablish native plant communities, and improve water quality** affected by the non-point source pollutant "excessive sedimentation". KIRC project activities will reduce the amount of sediment entering coastal waters, diminishing the ecological impact to near-shore coral reef communities and maintaining and improving their structure, thereby helping to ensure that our global waters are not polluted.

CHALLENGE

The 109-acre project site is located in the Hakioawa Watershed; one of 24 watersheds on Kaho'olawe. Digging is prohibitive, as removal of unexploded ordnance (UXO) was conducted on the terrestrial surface only and still remains subsurface. Irrigating newly planted vegetation is challenged by the island's average annual rainfall of 10 - 25 inches due to its location in the rain shadow of Maui.

This Project has been jointly funded by the U.S. Environmental Protection Agency ("Agency") or ("EPA") under Section 319(h) of the Clean Water Act, and the Hawaii State Department of Health, Clean Water Branch. Although the information in this document has been funded wholly or in part by a Federal grant to the Hawaii State Department of Health, it may not necessarily reflect the views of the Agency and the Hawaii State Department of Health and no official endorsement should be inferred.

PROJECT ACTIVITIES



Planting on a Former Bombing Range

The KIRC developed an innovative *kipuka* (clear place or oasis within a lava bed where there may be vegetation) strategy in response to challenges presented by the presence of unexploded ordnance and poor soil conditions. More than 1,300 *kipuka* rock and soil mounds have been outplanted with native Hawaiian plants, created with native soil, kiawe (*Prosopis pallida*) chips and soil amendments. Irrigation lines operated by a photovoltaic powered water pump feed water to the entire array.



Erosion Control

Designed to capture sediment during rain events, soil erosion control devices (e.g. fiber rolls and check dams) made using geotextiles and burlap bags filled with Pili (*Heteropogon contortus*) hay, kiawe chips, rocks and other organic biodegradable materials have been installed throughout the project site as *Nonpoint Source (NPS) Management Measures*.



Non-Native Plant Species Control

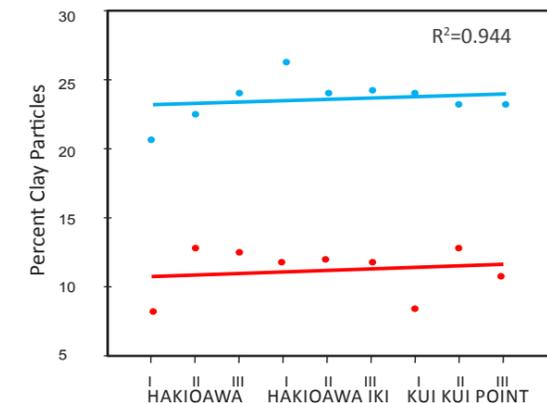
KIRC staff and volunteers remove non-native plants both manually and through the use of limited herbicides. After removing the seeds from these invasive plants, green material is used in gulches and atop the hardpan for the erosion control devices listed above.

PROJECT MONITORING

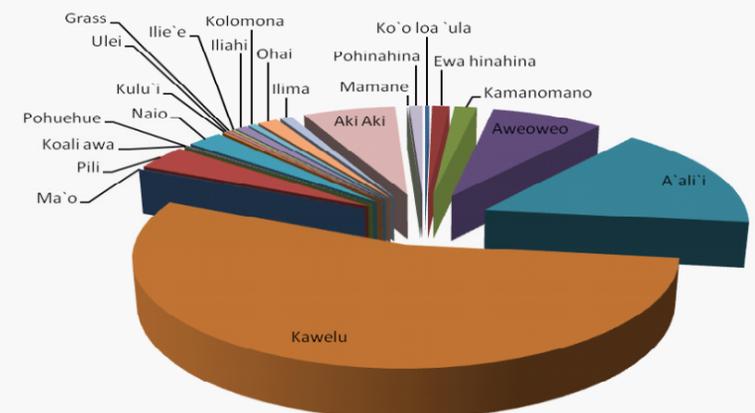
Monitoring project site progress includes measuring changes in native vegetation cover and density, baseline photopoints, soil erosion rates and near shore ocean sediment deposition. Data from a from a 2005-2010 Department of Health project stream gage determined that the annual suspended load for the 766-acre Hakioawa watershed averaged 1,880 tons.



Hakioawa Watershed (project area shaded in green). Initial baseline vegetation surveys in 2013 show 82% was bare soil and only 5.5% was native plant cover



After 2.5 times more rainfall between the first (red) and second (blue) deployments, a significant difference was observed in more clay sized particles from each site.



22 native species used for outplanting