



Dept. of Hawaiian Home Lands
Dept. of Land & Natural Resources
Haleakalā National Park
Haleakalā Ranch
Ka`ono`ulu Ranch
Kaupō Ranch
Nu`u Mauka Ranch
Thompson Ranch
'Ulupalakua Ranch

The Leeward Haleakalā Watershed Restoration Partnership
P.O. Box 652, Makawao, HI 96768
Ph. (808) 573-8989
Fax (808) 573-1932
www.lhwrp.org

E ho'omau i nā moku koa o Maui



LHWRP Annual Update to Council Members
Submitted by the Leeward Haleakalā Watershed Restoration Partnership

February 3, 2020

RECEIVED AT W11 MEETING ON 2/3/20

Andrea Buckman

LHWRP was formed in 2003 and encompasses over 45,000 acres of watershed forest from Makawao through 'Uluplakuā to Kaupō. Maui County has invested in LHWRP's efforts to expand our precious sources of freshwater through native habitat protection and restoration since 2006. This investment has enabled LHWRP to increase acres in active management from less than 500 to over 19,000. DWS funding in FY19 was \$190,000 and in FY20 is \$200,000. LHWRP has requested \$300,000 in FY21 since we will have a new enclosure with 3,000 acres to plant at Kamehameui Forest Reserve. DWS funding in FY20 supports efforts at sites in proximity to County water systems – Haleakalā Ranch, Kaupō Ranch, and Pu'u-o-kali as well as supports regional seed farms and seed collection to facilitate restoration. In addition, DWS staff funding supports LHWRP participation in hydrologic research to better document and understand the impacts of restoration on hydrology, fresh water supply, and climate change.

Kaupō Ranch Summary

- ▲ Completed Draft Management Plan for Kaupō Ranch project and presented to Forest Stewardship Program Committee. Once revisions are complete, this will enable 10 years of dedicated funding as cost share for restoration over 215 acres.
- ▲ Initiated planting of koa and halapepe - 100 seedlings planted
- ▲ Controlled invasive trees and shrubs (primarily silk oak, lantana, strawberry guava, guava, and senna) across 6 acres
- ▲ Animals (feral deer and pigs, and domestic cattle) breached fence twice delaying restoration. 400 more plants will be planted by April 2020 once fence retrofits are completed
- ▲ Fence inspections completed and material and funding secured to retrofit fence and replace gates with stepovers for hikers to reduce opportunity for animal ingress.

Haleakalā Ranch Summary

- ▲ Kahaleaimakani seed farm – fences checked and enclosure maintained quarterly in collaboration with HARC
- ▲ Restoration initiated in the 100-acre Ukulele enclosure adjacent to Waikamoi Preserve.
- ▲ A series of fires delayed surveys for *Bocconia*, which are scheduled for February. Instead, LHWRP crews conducted invasive tree control of *Eucalyptus* and *faya* trees inside the Pu'u Pahu enclosure.
- ▲ Fences at Pu'u Pahu are inspected quarterly, and 2 deer were found inside the fence.



Fusarium-resistant koa seed farm at Haleakalā Ranch managed with HARC. Dark green is koa planting, and rest of the unit are to be planted with additional native seedlings. The light square is the State's nene breeding facility.

Seed farms – continuing to develop regional seed sources and propagation capacity

- ▲ Nu'u koai'a seed farm is now producing seed – Acaranthes, 'aweoweo, and pili grass
- ▲ Greenhouse completed at Kahikinui
- ▲ Seed farm and small nursery are underway at new base yard
- ▲ Kahaleaimakani koa seed farm was thinned to allow healthiest trees to grow



Progression of Nu'u seed far from planting in 2016 to maturing plants and increased species diversity.

- ▲ Seed farm at 'Ulupalakua Ranch was maintained
- ▲ Nursery at 'Ulupalakua Ranch provided 1000 halapepe seedlings



At left, 'Ulupalakua Ranch seed farm managed in collaboration with HARC. At right, halapepe seedlings sprouting and then ready for outplanting.

Department of Hawaiian Home Lands Summary

- ▲ Inspected fence protecting 236 acres quarterly and added apron as a preventative measure in areas suffering from erosion. Installed 660ft. of additional apron and stacked rocks to accommodate ranch operations outside the fence to keep cattle safe
- ▲ Collected thousands of native seeds of naio, 'a'ali'i, koai'a, 'aweoweo, kolomona, and 'awikiwiki, and ko'oloa'ula
- ▲ Planted 16 'awikiwiki (PEPP species)
- ▲ Controlled invasive grasses along fence firebreak, internal road, and in sensitive areas within the enclosure to reduce fire threat over five acres.
- ▲ Controlled invasive koa haole, kiawe, and other non-native shrubs along 0.5mi of fenceline to prevent damage to fence and reduce fire risk.
- ▲ Worked with Dr. Jim Juvik to develop plans for fog drip capture system at Kahikinui to quantify the potential for this passive water collection system to supplement County water users in drought-prone areas and remote communities. This could be a powerful tool to supplement our fresh water supply and provide sources of freshwater for fire response. This system is expected to supply a 20,000gal tank with consistent fresh water from passing clouds that will be available for the residents of Kahikinui for domestic use. Overflow will also be used to supply a reservoir for fire response and community grazing/agriculture.



Images of fence work done at Pu'u-o-kali at left, with rocks covering apron to prevent cattle from being stuck. At right, example of fog drip capture system Dr. Juvik installed at another site.

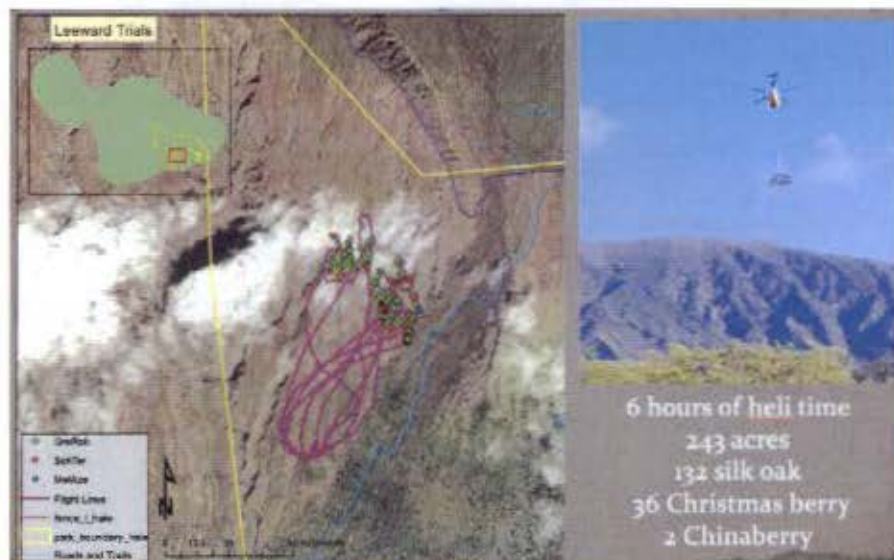
Minimizing herbicide exposure to field staff and the environment

- ▲ Although not DWS-funded, we are experimenting at Kahikinui with planting without spraying the pasture grasses to prepare the site. This method has been successful at Pu'u Wa'a Wa'a and is likely to reduce establishment of weeds. This would significantly reduce herbicide use, but may slow planting rates. So far, over 10,000 seedlings were planted this season and are showing excellent success rates.
- ▲ At Haleakalā Ranch and Kaupō Ranch, partners are using domestic goat herds to graze areas prior to planting to suppress weeds. This tremendously reduces staff time and herbicide use for weed control.

- ▲ Strategic aerial spray trials in collaboration with Heialakalā National Park staff in the moku of Kaupō. NPS staff reported recent monitoring indicates high success rate.
- ▲ Another creative method is planting into areas damaged by pigs to facilitate planting in the loosened soil and replace invasive grasses and mosquito pools with native seedlings



Extensive pig damage at left created opportunity for quick establishment of native seedlings at right once animals have been removed.

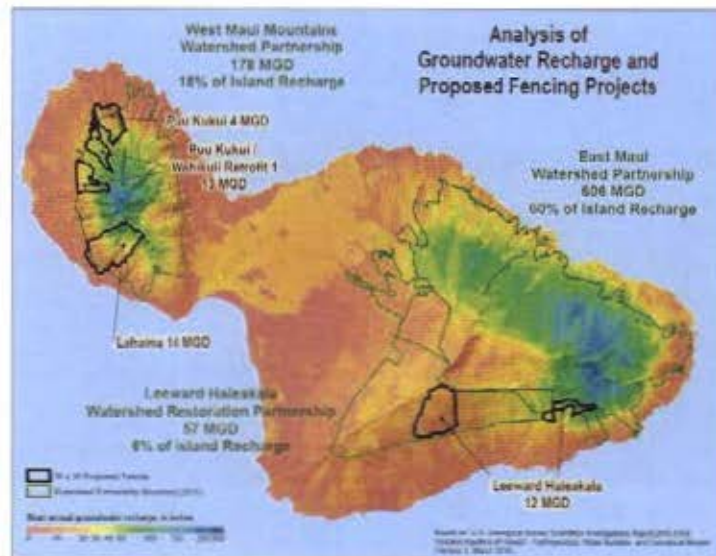


Map of aerial tree control trials demonstrating efficacy of strategic aerial spray. This would have been too dangerous and inefficient for LHWRP crew to conduct by foot.

Contributing to hydrology research and freshwater security

- ▲ Completed Study at Waikahi, 'Ulupalakua Ranch with USGS to gather data regarding differences in hydrology between koa and tropical ash forest
- ▲ Continuing to develop fog drip capture project at Kahikinui in partnership with DHHL and Ka 'Ohana O Kahikinui
- ▲ Presenting at 'Ike Wai symposium with UH Water Resources Department in February
- ▲ Conducted site visit with Dr. Tom Giamballuca to discuss research opportunities regarding hydrologic impacts of koa forestry project at Haleakala Ranch

- ▲ Developing series of weather stations in LHWRP to contributing to Hawai'i climate knowledge in partnership with UH



Map resulting from recent USGS research showing additional groundwater recharge projected with recent fencing.

Staff and diversified funding

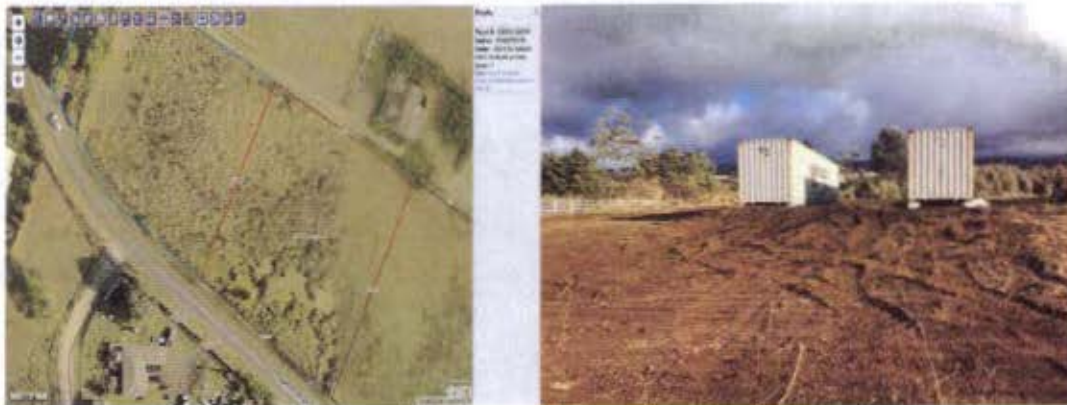
- ▲ A Field Crew Leader was hired and two full-time and one part-time Restoration Assistants were hired for a total of 5 full-time staff and 2 part-time crew. New grants just came online at UH so we can fill part-time Outreach Coordinator and Data Management positions. We would like to triple our field staff to accommodate the expansion of our management areas.
- ▲ We will again work with UHMC's Kekaulike program to host two summer interns
- ▲ Application for 501c3 was submitted
- ▲ Funding was secured from three new sources to further diversity funding (Arbor Day Foundation, Hilton Effect Foundation, NRCS-RCPP Program and 3 new private donors).



LHWRP staff Andrea Buckman, Chawn Villalon, Kamuela Kaeo, volunteer Yeshua Goodman of Four Seasons, and Iban Garvin after a day of planting. Not pictured: Shelby Rivera, Audrey Tamashiro-Kamii, Ainoa Kaiakamalie

New base yard construction

- ▲ Working with Hawai'i Off-Grid to create site plan for 5-year off-grid demonstration project
- ▲ Funding from OED enabled establishment of 2 containers, and two 2,000gal water catchment tanks
- ▲ Next steps are to install fencing, office containers and seed farm and transition out of Makawao location



Map of new base yard location and image of two installed containers

Outreach Program Development – focus on regional partners, schools and visitor industry locations within LHWRP

- ▲ Working with Maui Fire Dept. Haleakalā National Park, DOFAW, DHHL, Kaupō Ranch, 'Ulupalakua Ranch, Goodfellow Bros., Nu'u Mauka Ranch, HILT, and others in the Leeward Haleakalā Fire Task Force. This model is used in West Maui and Moloka'i also
- ▲ Planted native garden and made seed balls with Hilton Global staff at Grand Wailea. Developing long-term educational programs with Grand Wailea staff.
- ▲ Completed retrofit of enclosure at Kahikinui where volunteers can participate
- ▲ Partners sharing LHWRP efforts at Las Vegas hunting trade show
- ▲ Plans to develop programs with Four Seasons and Marriott to further
- ▲ Continuing outreach programs with Kamehameha Schools, Montessori School, and the Ag in the Classroom program at Haleakalā Ranch which reaches Maui 3rd graders
- ▲ UH halted helicopter access for volunteers, limiting programs to driveable sites
- ▲ Seed balls containing over 100,000 native seeds to be distributed in February



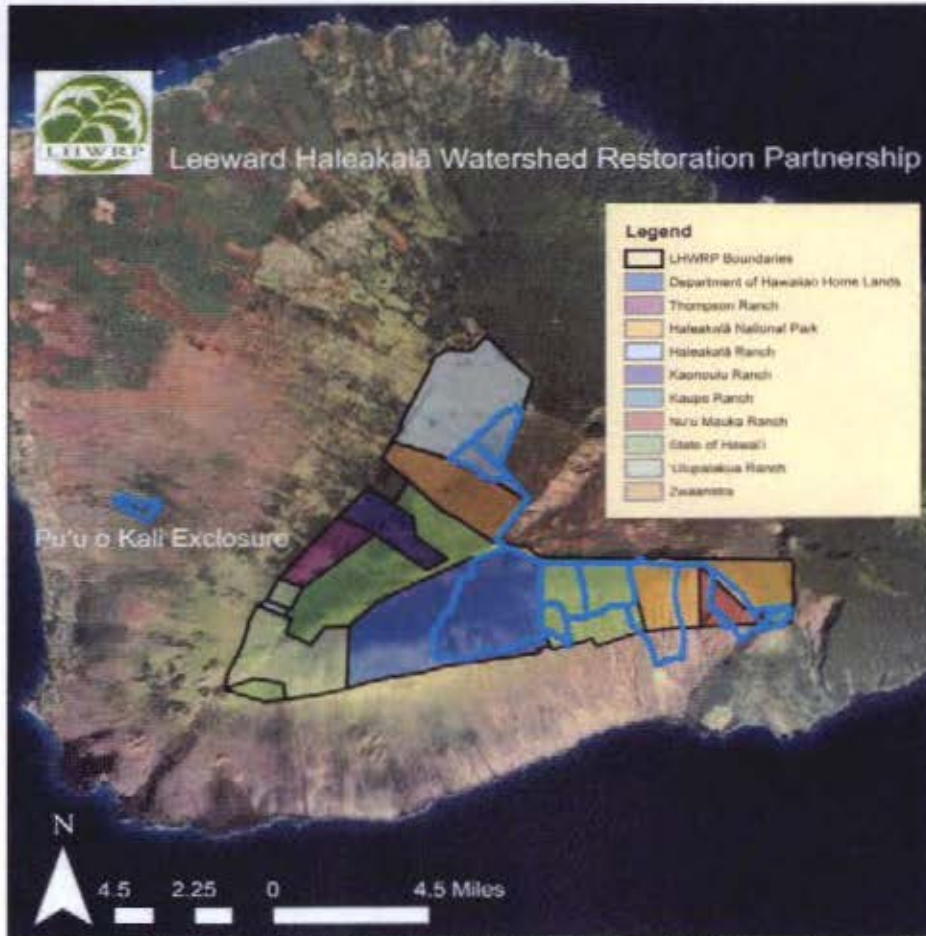
Haleakalā Ranch and other conservation organizations to educate over 3,000 Maui 3rd graders regarding watershed conservation and to make seed balls.



LHWRP staff worked with Hilton Global staff to create a native garden and to make seed balls at the Grand Wailea. The picture at bottom right is 3 months after planting.

Cultural knowledge expansion

- ▲ LHWRP worked with Imi Loa Astronomy Center, Hui O Wa'a Kaulua, and Ka 'Ohana O Kahikinui to study an archaeological site at Kahikinui associated with voyaging
- ▲ LHWRP Program Manager is participating in Halau 'Ōhi'a to expand cultural knowledge and incorporate practices into LHWRP's efforts
- ▲ We are working with Bob Hobdy to research traditional place names within LHWRP and plan to develop educational curriculum with Hawaiian language option in 2020.



Map of LHWRP showing fenced areas in bright blue. LHWRP abuts Haleakalā National Park and the East Maui Watershed Partnership to completely protect the upper elevation portions of Haleakalā's watersheds.

**LHWRP Funding Breakdown
FY2003 - FY2019**

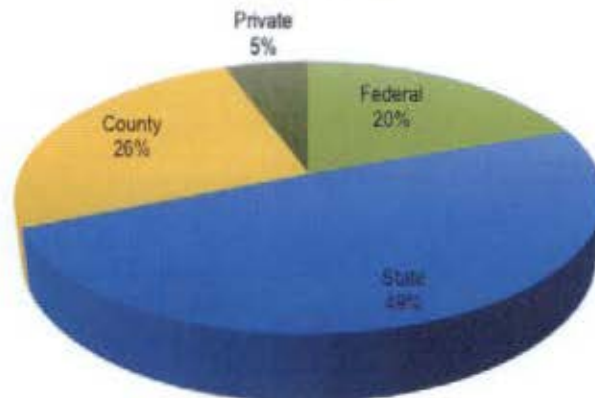


Diagram showing approximate proportion of LHWRP funding. The State's portion is significantly higher due to CIP funding for fencing at Kahikinui. LHWRP is working to expand private funding sources by working with private foundations and individual donors through UH Foundation.

Mahalo piha for your past and continued support!







DEGRADATION & RENEWAL

Increasing forest cover and native biodiversity will enhance resource availability for Maui's people, for agricultural production, and for cultural practitioners. Healthy native ecosystems provide key services that single species cannot, such as slowing water and sediment transfer into coastal waters and providing resilience against wildfire, disease, and climate change. We know that native species are specially adapted to efficiently collect, store, and filter water—in fact, research shows native Hawaiian plants absorb 30% more water than non-native ones.

Onipu'u ku ulu - remain steadfast on the path

On Haleakalā's leeward slopes, decades of damage from fire, feral ungulates, and invasive species have diminished native forests to 5-10% of former extents, resulting in this region being termed the "epicenter of extinction in the Pacific." Sadly, much of what we know of these ecosystems comes from fossil discoveries, field notes from early botanists, or observations passed down through Hawaiian oral history.



 @leewardhaleakala
  @LHWRP
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VOLUNTEER

Your monetary or in-kind donation will not only help us purchase supplies and equipment, but it provides critical matching funds for Federal, State and local grant programs. Please contact us directly to make a donation at this time.

CONTRIBUTE

Miles of forest protection fences completed	Maui students
95.5	19,080
Native seedlings planted	Acres of watershed lands in partnership
500,000+	45,473

Recognizing an opportunity to reverse the loss of native forests, our coalition of landowners and agencies partnered with volunteers to protect and restore Maui's leeward watersheds for future generations.

The land is the chief, man is its servant

ʻAe aliʻi ka ʻāina, ʻae kuuwā ke kuuwā



E Ho'omanai Nā Moku Koa O Maui

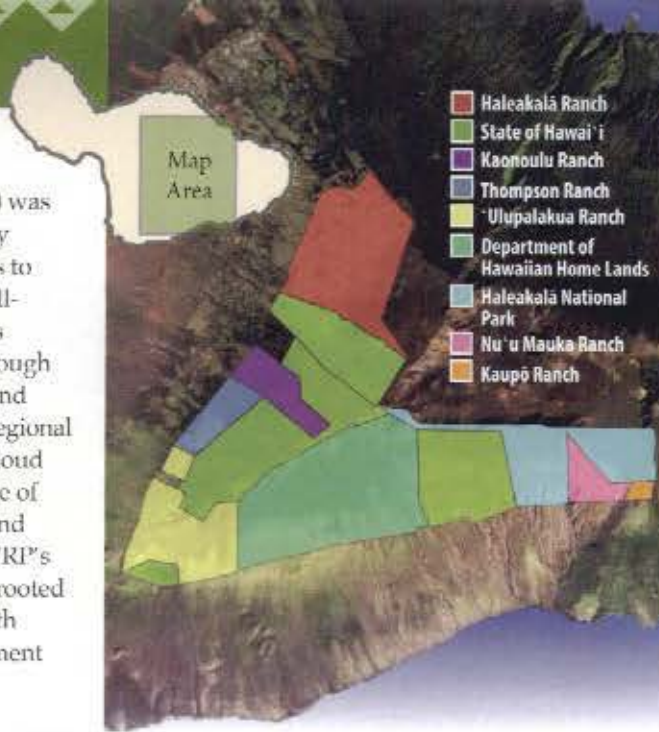
Make forever the koa forests of Maui



LEEWARD HALEAKALĀ WATERSHED
RESTORATION PARTNERSHIP
www.LHWRP.org

PARTNERSHIP

The Leeward Haleakalā Watershed Restoration Partnership (LHWRP) was formed in 2003 by a group of visionary landowners, scientists, and supporters to protect over 45,000 acres on the rainfall-limited slopes of Haleakalā. LHWRP's footprint stretches from Makawao through 'Ulupalakua to Kaupō between 3,500 and 6,500 ft. elevation - the headwaters of regional watersheds where the famous *nānulu* cloud rests almost daily. This unique alliance of ranchers, State and Federal agencies and community groups is guided by LHWRP's dedicated staff. Together, our work is rooted in ecological priorities and aligned with traditional and modern land management practices unbound by property lines.



VISION

LHWRP's vision is to engage partners and the community in restoring leeward Haleakalā's ecosystems to benefit the freshwater, biological, cultural, and economic resources they provide. Our current management priorities are to:

- Protect existing remaining native habitat
- Proactively address fire risks
- Reduce erosion and sedimentation of nearshore ecosystems
- Control habitat-modifying invasive species
- Collect ecoregion-specific native seeds so they can be planted with respect for ancestral, and site-specific adaptations



OUR WORK: FROM THE PEAK OF HALEAKALĀ TO THE COMMUNITIES BELOW

Watersheds



Wai, or fresh water, is essential. Its value was well understood by *ka po'e kahiko* (the people of old) in that the term for wealth is *waiwai*. Hawaiians established ways in which water was efficiently managed and preserved to benefit all people. Replanting Haleakalā's cloud forest enables the precipitation cycle to once again feed regional streams and aquifers. Watershed restoration also speeds the recovery of native habitats and expands the availability of fresh water to local communities.

Biodiversity



Hawai'i is recognized globally for its impressive ratio of unique species. The isolation, antiquity, and dramatic topography of the islands enabled diverse assemblages of striking, fascinating organisms to adapt specifically to the numerous microclimates. Prior to human contact, 90% of terrestrial and 75% of marine species in Hawai'i were endemic. Many of these species are now extinct, endangered, or increasingly rare.

Cultural Resources



From the moment Polynesian voyagers arrived, native forests - once spanning from mountain to sea - provided for the people of Hawai'i. 90% of Maui's dry forest trees have traditional uses from shelters, canoes, weapons, and tools, to dyes, adornments, perfumes, and poisons. With a diversity of species discovered, Hawaiians developed a material culture with unparalleled artistry and craftsmanship, and responsibly manage finite resources.

Economic Diversity



Our efforts cultivate abundance in a variety of ways. The *ahupua'a* system was unique to Hawai'i and sustained its people for countless generations by acknowledging the reciprocal relationship between *'āina* and *kanaka* (man). Silviculture, ranching, woodworking, agriculture and even eco-tourism can all put food on the table while maintaining and respecting connection to the land.

Community Engagement



We all have a *kuleana* (responsibility) to protect the cultural and natural resources we share. LHWRP has formed lasting relationships with local and international researchers who study our unique watershed lands and species. We can offer our knowledge accrued from generations of families, practitioners, and workers on this mountain. And we can learn from others who have specialized knowledge and tools to make our management strategy even more successful.

OUR APPROACH



Plant Native Seedlings

Maui's leeward native forests are imperiled. Planting locally sourced seedlings restores biodiversity and jump-starts ecosystem function.

Minimize Erosion

Decades of deforestation and ungulate pressure left only barren, hard-packed soil and rock in some areas. A variety of site-specific approaches are employed to retain topsoil and minimize transfer of sediment downslope into precious wetland and marine ecosystems.

Reduce Invasive Species

Invasive species present an imminent threat to Hawaiian forests. Non-native hooved animals decimate vegetation, inhibit native

seedling recruitment, trample roots, and expose soil creating weed and mosquito habitat. Invasive plants out-compete and displace most natives. Rodents and introduced invertebrates eat and damage seeds and seedlings, reducing restoration potential.

Educate and Engage

Fostering stewardship, and encouraging professional development through experiential learning are essential components of LHWRP's mission. With a hands-on approach, we bring the watershed to the classroom with virtual topography models, seed ball making workshops, offering informative presentations and by promoting native gardens at schools.

Monitor & Manage

Observation is a key part of ensuring our efforts are effective. We carefully monitor sites to track recovery and correct course where needed.

