



EMP

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Mauka Matchmakers

By Dan Adamski

DEEP IN THE O'ahu wet forest, along gulch bottoms and steep slopes, hides the endangered Kāmakahala, scientifically known as *Labordia cyrtandrae*. These shrubs are endemic to O'ahu and were once known throughout the Ko'olau Mountains and at Ka'ala in the Wai'anae Mountains. Today across the entire world, only one plant in the Ko'olau and a mere 72 others on the slopes of Ka'ala survive in the wild.

There are many threats to the survival of these few remaining wild plants including: habitat degradation from weed encroachment, wild pig and goat predation, and the loss of pollinators.

The O'ahu Army Natural Resources Program (OANRP) works to neutralize these threats in a number of ways. Staff and volunteer groups spend much of their time killing invasive weeds such as strawberry guava, kahili ginger, Christmas berry and blackberry. Additionally, OANRP staff constructs fences to exclude wild pigs and goats, allowing regeneration of native habitat.



Male flowers ready for pollen collection, *above*; and a female flower, just pollinated, *below*. (Photos by OANRP staff)

For Kāmakahala, male and female flowers are found on separate plants. Because very few individual plants remain, it is rare to find both a male and female plant in close proximity to one another.

Additionally, its natural pollinator is unknown. Uncertainty surrounds whether Kāmakahala is pollinated by a bird or an insect, if the pollinator is even still present in the wild, and if enough blooming flowers

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are available to attract it.

These factors make natural pollination difficult. In order to protect this endangered species, OANRP staff steps in as "matchmakers," helping the Kāmakahala produce fruit and seeds that may one day return to the slopes of Ka'ala.

The Kāmakahala flowers from May through June, during which time the plants are closely monitored by OANRP staff. As the male flowers open, the staff collects pollen. This gathered pollen is then stored in a thermos to ensure freshness and carried to female plants, where the matchmaking begins. Using a small paintbrush, the pollen from the male plants is transferred to the flowers on the female plants in a process known as "hand-pollination."



Kāmakahala growing on steep slopes in the wet forest of Ka'ala. (Photo by OANRP staff)



Immature fruits of Kāmakahala, some of the largest in the *Labordia* genus, shown top and bottom right; mature fruits yielding seeds, bottom left. (Photos by OANRP staff)

Each branch with pollinated flowers is then tagged to record which male plant's pollen is used for each female flower.

After hand-pollination, much work remains before seeds can be collected. The process from pollination to fruit and seed development takes a long time, sometimes up to a year after initial pollination.

Once Kāmakahala fruits are mature, they are collected, and the seeds inside are propagated in greenhouses or stored as a genetic "safety-net." After the seeds grow into young plants, they are outplanted into the field to establish new populations or supplement existing populations.

The collaboration of OANRP fence builders, volunteers, staff technicians, and specialists all contribute to the survival of the endangered Kāmakahala. It is hoped that these collective efforts will lead to stable populations of these plants, and that one day they will thrive without cupid's "paintbrush." •

~Dan Adamski is a natural resource management technician with RCUH / PCSU, working for the O'ahu Army Natural Resources Program.

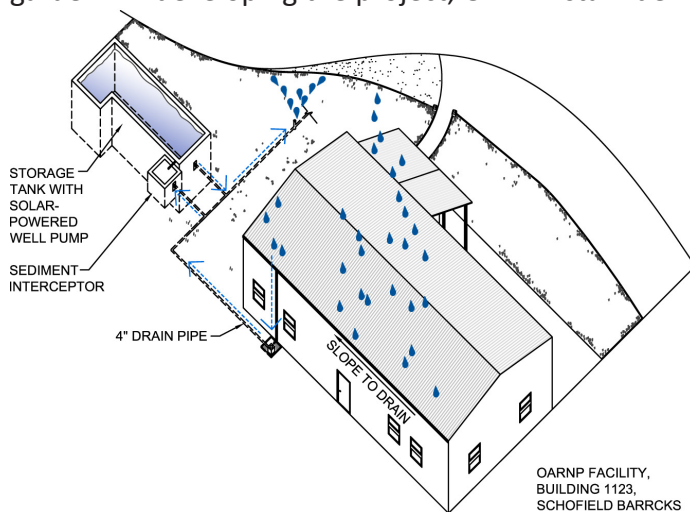
Schofield Barracks Rainwater Harvesting Project to Demonstrate Garrison Water and Energy Savings

By Hayley Diamond

IN AN EFFORT to demonstrate sustainable water management practices, the U.S. Army Garrison-Hawai'i's (USAG-HI) Environmental Division of the Directorate of Public Works (DPW) has collaborated to develop a rainwater harvesting project for the O'ahu Army Natural Resources Program (OANRP) facility on Schofield Barracks.

Rainwater harvesting, which dates to 1500 BC, is the sustainable practice of collecting rainwater from hard surfaces, such as roofs, to be used for gardening, washing and toilet flushing. Today, an estimated 60,000 people in Hawai'i rely on rainwater harvesting for their water needs.

The OANRP facility rainwater harvesting project will celebrate rainwater as a resource by collecting, storing and using rainwater to irrigate a section of lawn bordering the OANRP rare plant interpretative garden. In developing the project, OANRP staff iden-



Schematic of the OANRP facility's rainwater harvesting plan. (Illustration by Hayley Diamond)

tified the potential to utilize an abandoned underground sediment tank adjacent to the office building for storing collected rainwater from the building's roof.

Construction for the project will occur in two phases, the first of which is scheduled for July.

During the first phase, a local Boy Scout seeking his Eagle badge, with help from the OANRP Outreach Program, will coordinate a group of volunteers to install the irrigation system. This irrigation system will temporarily connect to the potable water supply until completion of the second phase.

Components of the second phase include refurbishing the sediment tank for rainwater storage, modifying the roof gutters, and installing the plumbing to convey rainwater to the sediment tank.

DPW Compliance Branch, with the support of the Engineering Division and Branch, Utilities Branch, and Facility Management Section, assisted with project development and procurement of much of the irrigation materials. By incorporating sustainable technology such as a solar-powered well pump and irrigation controllers, and a weather station to adjust the application of irrigation water based on precipitation and wind speed, this project will achieve water and energy savings—two key components of the garrison's environmental policy.

Rainwater harvesting is also currently utilized at the Army's Kilauea Military Camp, on the island of Hawai'i. Benefits of this practice include conserving the potable, or drinkable, water supply; saving energy involved in treating and transporting potable water; and preventing pollution associated with storm water runoff. •

~Hayley Diamond is a clean water program specialist with CSU-CEMML, working for USAG-HI DPW Environmental Division.

A Chipper Outlook on Weeds

By Candace Russo

MANY HAWAIIAN FORESTS suffer from rapid loss of native plant species, displaced by weedy non-native species. With no natural predators here on the Islands to control their rapid growth, these invasive weeds threaten endangered plants and animals, putting the control of these invasive plants at the top of many natural resource managers' to-do list.

This battle against invasive weeds has been waged for decades. Natural resource managers from many agencies and organizations tirelessly expend as much effort as possible removing weeds from native habitats, focusing strategies to maximize efficiency in what can feel like an overwhelming challenge.

When invasive weeds like strawberry guava, Christmas berry or octopus tree grow to completely dominate the forest, natural resource managers must use more aggressive control strategies.

"Strawberry guava forms dense clonal thickets, crowds out native species, and alters soil hydrology," said Jane Beachy, ecosystem restoration program manager with the O'ahu Army Natural Resources Program (OANRP).

"Trials in which [OANRP] clearcut strawberry guava were successful in uncovering hidden native forest remnants," she said, "but the cut slash almost filled the entire cleared area."

One solution to this problem can be heard almost a mile away: a wood chipper. In early June, OANRP flew a 1½-ton chipper, via helicopter, into the heart



Army natural resources staff secure a wood chipper to a helicopter long-line. The chipper is being flown into Kahanahāiki forest to help destroy invasive plants. (Photos by Chad Koide, OANRP)



Photo by Candace Russo



A section of Kahanahāiki forest dominated by strawberry guava. (Photo by Jane Beachy, OANRP)

of one of the thickest strawberry guava-dominated areas of Kahanahāiki forest in Mākua Valley.

Since the start of this concentrated summer-long weeding and chipping effort, a dozen long field days have been spent removing strawberry guava's choke on large remnant koa trees and other native plants in the area.

Timing is everything for this project. Seeds contained within the strawberry guava's red fruits have



"Chipping away" at the strawberry guava yields large remnant koa trees visible in the photo background. (Photo by Jane Beachy, OANRP)

been found to remain viable (able to sprout into new seedling plants) for about three months following fruit-drop. The most effective time to remove strawberry guava, therefore, is just prior to the

tree's aggressive fruiting season, estimated to occur toward the end of the summer.

Once cut, strawberry guava trees are easily pulled through the jaws of the chipper, powerfully reducing them to small chips.

"We can clear an eighth of an acre of dense guava in one or two days, and the follow-up weed control will be immensely easier and more effective without the slash piles," said Dan Sailer, senior

natural resource management coordinator for the OANRP.

"For subtractive restoration work, the chipper is a great tool," he added.

Further, the small chips can decompose more rapidly than whole tree trunks, speeding the return of nutrients back to the forest soil.

Alongside the liberated large koa canopy remnants, small struggling alahe'e and thick maile vines have been revealed.

"Koa 30-feet tall now form a complete canopy over a strawberry guava control plot installed in 2002," Beachy said. "We went from an area that was 100-percent strawberry guava to a much more diverse, native-dominated forest stand in only eight years."

Since the 2002 effort, OANRP staff has seen a very encouraging response from the native forest.



The OANRP will be monitoring the effect of these wood chip piles on seedling recruitment. (Photo by Candace Russo, OANRP)

"Koa and naupaka kuahiwi colonized the newly cleared areas; 'uki 'uki thrived in light gaps; and previously spindly alahe'e flushed with the increased sunlight," Beachy said. "We're hoping to replicate this result on a much larger scale [for this current project], using the chipper to break down the massive slash piles."

The next step for OANRP will be to observe the chip piles to better understand how they affect native plant germination.



Tall koa trees become obvious as strawberry guava is removed. Similar treatments have resulted in a high yield of koa seedlings from these parent trees. (Photo by Candace Russo, OANRP)

Kahanahāiki includes about 60 fenced acres of forest, free of wild pigs and goats, and managed by the OANRP to protect endangered species and their habitat. The section of forest chosen for this project abuts a large population of tree snails and hangs above a gulch rich with endangered plants.

With this project and continued follow-up efforts from staff, local volunteers and the Hawai'i Youth Conservation Corps, a significant section of strawberry guava will be removed, returning the forest to the native plants. •

~Candace Russo is an environmental outreach specialist with RCUH / PCSU, working for the O'ahu Army Natural Resources Program.

Feathers, Flowers and Flak: Protecting Endangered Species in Schofield Barracks' West Range

By Sara Stuart

BEHIND SCHOFIELD BARRACKS firing range, you will inevitably notice a wide firebreak road framing the Southeast Wai'anae mountain slopes like a magnificent picture.

Below the firebreak road, the grass is controlled to decrease the chance of fire ignition. Above the firebreak road, a forest canopy of native and non-native trees stretches up to O'ahu's highest peak, Mt. Ka'ala.

This firebreak road is a preventative buffer to stop potential low-elevation fires from spreading to the forested slopes of Ka'ala. In so doing, the road provides a safe zone for nearly forty different endangered plant and animal species found in this area known as Schofield Barracks' West Range (SBW).

Within SBW, the O'ahu Army Natural Resource Program (OANRP) manages endangered species in five distinct management units (MUs), which hold names both old and new: Mohiākea, Banana Gulch,

Baby Water, South Hale'au'au and North Hale'au'au.

Each of these five MUs encompass unique characteristics dependent upon elevation, topography, slope, aspect, associated plant and bird species, substrate, and threats. These attributes help OANRP staff determine how best to manage the species within each MU.

The endangered species found in these MUs include: 'Elepaio (*Chasiempis sandwichensis ibidis*), a fly-catcher bird; two species of picture-wing flies (*Drosophila* spp.); a species of native tree snail (*Achatinella mustelina*); and 12 species of plants, including the extremely rare *Hesperomannia arbuscula*.

Initially, management of these and other endangered species begins with surveys to locate single or, in some cases, small populations of these rare plants and animals. OANRP staff prints topographic maps of the terrain, dons hiking equipment and protective flak gear (due to the unexploded ordnance (UXO) that still remains in the forest behind the firing range), and explores the rugged terrain in search of these elusive species.

Today, with so many competing non-native plants and animals, Hawai'i's rare plants, birds and insects



Clockwise from upper left: OANRP natural resource management technicians Ryan Smith, Sara Stuart, Lalsia Bialic-Murphy, Jessica Hawkins, Dan Adamski and Phil Taylor pose, suited up in their flak, before heading into SBW to manage some of O'ahu's most endangered plants, bird and snails. (Photo by OANRP staff)

are found only in remote locations and may require an entire day of hiking to reach.

If an endangered species is found, its location is mapped and important information such as health, size and maturity is collected and recorded for each individual plant or animal. For example, in 2007 a single representative of the *H. arbuscula* plant was found in SBW in the gulch known as Hale‘au‘au.

H. arbuscula is a member of the sunflower family and has a striking flower that resembles a paintbrush soaked in the colors of a sunset. The base of the flower is crimson red and fades up and into a vibrant yellow.

After this individual plant was discovered, OANRP staff built a fence around the plant to protect it from



Hesperomannia arbuscula with spectacular flowers.
(Photo by Will Weaver, OANRP)

pigs and removed nearby invasive weeds competing for survival. In 2010, this *H. arbuscula* flowered for the first time, and OANRP staff collected pollen, with the hope of playing successful matchmaker to a fellow *H. arbuscula* found in another Wai‘anae Mountain gulch some distance away.

The OANRP staff spends most of its time in SBW surveying, monitoring and managing the endangered O‘ahu ‘Elepaio. This curious flycatcher spends its life foraging for food, looking for a mate, building nests and caring for its new baby fledglings—all while under continuous threat from rats feeding on ‘Elepaio eggs, young birds, and mother birds tending nest.

The OANRP dedicates approximately 1,200 hours a year to protecting these birds. The majority of this time is spent placing and maintaining rat traps and rat bait stations around ‘Elepaio nesting trees. The hard work is paying off. With 28 recorded ‘Elepaio



Endangered O‘ahu ‘Elepaio and its nestlings. (Photo courtesy of Eric VanderWerf)

fledglings, 2010 marks one of the most successful years on record for the birds’ survival.

Despite hot days and heavy flak, OANRP staff are proud to help ensure the survival of SBW’s fragile plants and animals, as noted by Jessica Hawkins, a natural resource management technician with the OANRP, “Once you see your first baby ‘Elepaio jumping around from branch to branch, all the sweat and physical exertion is worth it.”•

~Sara Stuart is a natural resource management technician with RCUH / PCSU, working for the O‘ahu Army Natural Resources Program.



'Tis the Season...

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...for Hawai'i Conservation Week! Each year in Hawai'i, the last week of July is designated as "Conservation Week," a time to celebrate and learn more about conservation in Hawai'i.

Coordinated by the Hawai'i Conservation Alliance (a cooperative partnership of 18 agencies and organizations from across the state), Hawai'i Conservation Week highlights the need to conserve Hawai'i's natural environment by providing learning opportunities for the general public.

On the calendar for this year:

Natural Treasures of Hawai'i Lecture Series

July 28, 6 p.m.
ING DIRECT Cafe, 1958 Kalakaua Ave.
Dr. Samuel M. 'Ohukani'ōhia Gon III will return to the series for a lecture on the symbolism of the hula and how it relates to the land and sea.

Hawai'i Conservation Fair

July 31, 1-5 p.m.
ING DIRECT Cafe, 1958 Kalakaua Ave.
Exciting exhibits, screening of the film Huliau, student authors from the My Hawai'i Story Project, and prize giveaways!

Huliau Roadshow

July 25-31, Across O'ahu, various times
http://huliau.com/ABOUT_the_FILM.html
Check out the Conservation Week calendar to find a screening near you!

New events will be added to this line-up for Conservation Week. Please check the Conservation Week calendar to find out more! <http://hawaiiconservation.org/2010hwc.asp>

VOLUNTEER Opportunities

AUGUST

EVENT: Kahanahāiki volunteer service trip
DATE: Monday, August 30
PURPOSE: Common native plant monitoring
TERRAIN: Some steep slopes, moderate difficulty

SEPTEMBER


EVENT: Kahanahāiki volunteer service trip
DATE: Friday, September 10
PURPOSE: Common native plant monitoring
TERRAIN: Some steep slopes, moderate difficulty


EVENT: Kahuku - Pahipahi'ālua volunteer service trip
DATE: Monday, September 27
PURPOSE: Invasive weed control
TERRAIN: Some steep slopes, moderate difficulty

Join us at the 2010 Hawai'i Conservation Conference!

(Following Conservation Week)

Hawai'i Conservation Conference EVENTS OPEN TO THE PUBLIC:

 Event: **Conservation Conference Public Open House - Visit the OANRP display booth!**
Thursday, August 5, 4:30 - 6:30 p.m.
Hawai'i Convention Center

 Event: **Public Lecture - Jack Jeffrey, Wildlife Photographer & Biologist**
Thursday, August 5, 6:30 p.m.
Hawai'i Convention Center, Theater

For more information:
www.hawaiiconservation.org

For more information about
O'ahu Army Natural Resources Program
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EMP *Bulletin*

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The success of this newsletter depends on article contributions from the staff of the O'ahu Army Natural Resources Program, O'ahu Army Cultural Resources Program, PTA Army Natural Resources Program, and PTA Army Cultural Resources Program. Mahalo to all staff who have contributed to this issue.

*If you wish to contribute an article or have an idea for an article you'd like featured in the next Ecosystem Management Program Bulletin, please feel free to contact us! The deadline to submit articles for the next issue is **August 24, 2010**.*



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