EMP
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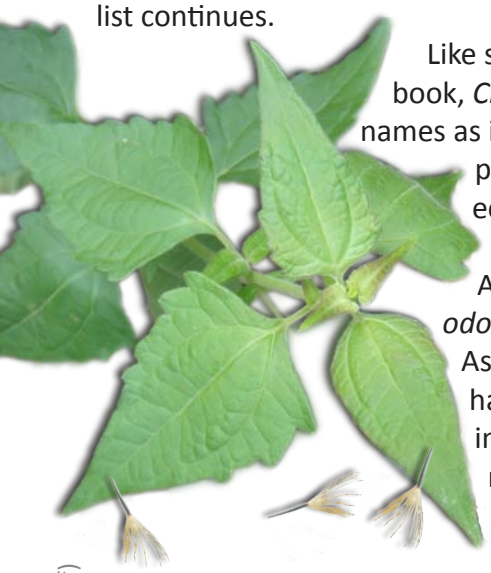
O‘ahu Endures First Contact with New Invasive Weed, *Chromolaena*

By Jane Beachy

IN AUSTRALIA AND the U.S., it is called bitter bush, devil weed and Siam weed.

In Guam, it's called *masigsig*, in Chuuk *otuot*, in Kosrae *mahsrihsrihk*, in Palau *kesengesil*, in the Philippines *agonoi*, in Honduras *rey del todo* … and the list continues.



Chromolaena odorata leaves and seeds; *please note: photos not to scale.* (Photos by OANRP staff)

Like stamps in a passport book, *Chromolaena* collects names as it moves from place to place, invading new ecosystems.

Native to Central America, *Chromolaena odorata*, a member of the Aster (sunflower) family, has become a highly invasive pest across much of the world. Management agencies struggle to control its spread in Africa, and conservationists in Australia strategize on effective control measures.

Chromolaena spans Southeast Asia, from Indonesia to Japan. It has even skipped across the Pacific, infesting every island it comes into contact with.

This year, *Chromolaena* reached Hawai‘i.

Staff at the O‘ahu Army Natural Resources Program, or OANRP, based on Schofield Barracks, discovered an infestation of *Chromolaena* during routine road surveys in January 2011. Crew members Kahale Pali, Scott Heintzman and Jamie Tanino were surveying in the Kahuku Training Area (KTA), on the north shore of O‘ahu, when Pali spotted the distinctive triangular leaves. The crew stopped and collected a specimen of the plant.

A quick check in a reference book suggested the plant was *Chromolaena* and tipped off the group that the plant was not known in Hawai‘i.

The specimen was submitted to the Bishop Museum and the O‘ahu Early Detection program. Botanists at the museum verified that the specimen was indeed *Chromolaena odorata*, a candidate for the 100 worst weeds in the world.

Inside this issue:

How did it get here?

How did *Chromolaena* reach Kahuku, when Hawai‘i is separated by hundreds of miles of ocean from anywhere? How does any new pest reach Hawai‘i?

Most of them are carried here unintentionally by people. Human activity has dramatically increased the rate of species introduction to Hawai‘i, and Hawaiian ecosystems are critically endangered by these invasive threats.

While it is hard to discern the exact path *Chromolaena* took to get here, a few plausible scenarios are available. Perhaps contaminated seed was planted in the agricultural area below KTA, or perhaps the seed rode in on a dirt bike, since part of KTA is used as a public motocross track on weekends. However, the infestation lies in a part of KTA that is heavily used for military training, the most likely cause for *Chromolaena*’s introduction.

Occasionally, units from Guam train in Hawai‘i, so perhaps, tiny *Chromolaena* seeds, hidden in packs or boots, hitched a ride with one of these units.

Why should we be worried about *Chromolaena*?

Chromolaena is toxic to humans, livestock and even other plants. It forms dense, monotypic tangles. Each shrubby *Chromolaena* plant grows up to 12-feet tall and can produce 800,000 seeds in a year.

The small, narrow seeds, topped with a tuft of fibers, are easily dispersed via the wind. The small seeds also burrow into clothing, gear, tires and fur, and thus move quickly along trails and roads. As if all this isn't enough, cut branches can root and grow into new, healthy plants.

While *Chromolaena* doesn't thrive in deep shade, it thrives just about everywhere else. In parts of Asia, fields have been abandoned to *Chromolaena*, as crops and farmers couldn't compete with the super weed.

OANRP staff, with help from the Oʻahu Invasive Species Committee, Bishop Museum, Oʻahu Early Detection and the Hawaiʻi Department of Agriculture, are working to develop a detailed map of the *Chromolaena* infestation in Kahuku. This map will be the first step in creating a comprehensive plan for addressing this highly invasive species.

Just one day of surveys revealed the infestation was much larger than expected. Further surveys are needed to define its boundaries. In all, the infestation may encompass as much as 100 to 150 acres.

What are the next steps?

Is *Chromolaena* already too widespread to eradicate in Hawaiʻi? Can Hawaiʻi's imperiled ecosystems handle yet another threat? Can Hawaiʻi's natural resource managers afford not to control *Chromolaena*?

As surveys are concluded, OANRP and its partner agencies will think critically about these questions and others, and work to develop a realistic management strategy for *Chromolaena*.

While the odds are stacked in *Chromolaena*'s favor, managers aren't giving up yet. Effective control methods exist, and new labor-saving techniques are being developed. The infestation is easy to reach, and the terrain, while challenging, is not extreme.

Chromolaena seeds persist a year in soil, but perhaps not much more than that. With careful planning, innovative strategy and hard work, managers may be able to contain the infestation, manage it, and perhaps even eradicate it entirely.

In weed control, optimism and commitment are some of the strongest weapons available. However, the best defense against invasive species is simply to stop them from entering Hawaiʻi in the first place.

The cost of preventing a pest from entering Hawaiʻi is many times smaller than the cost of controlling an established pest. Therefore, Hawaiʻi Dept. of Agriculture inspectors monitor shipments coming into Hawaiʻi, as well as those moving between islands. Each Christmas, they inspect containers of Christmas trees and turn back any harboring non-native insects, slugs or bats.

Chromolaena is on the state noxious weed list, which makes it illegal to transport over state borders.

The OANRP surveys roads and landing zones on Oʻahu's Army training ranges once a year. These surveys are critical in detecting new pests early on and enable staff to respond rapidly to new threats. On some roads, these monitoring efforts began over 10 years ago. The road where *Chromolaena* was first spotted had only been surveyed once before.

The discovery of *Chromolaena* in Kahuku highlights the importance of maintaining strict sanitation on Army training ranges. The Army has a commitment to mitigate any negative impacts of training, including invasive weed spread.

OANRP will be investing a significant amount of Department of Defense money into managing *Chromolaena*. In the meantime, everyone – whether hiking on the weekend or working on the range – is being asked to help prevent species like *Chromolaena* from arriving in Hawaiʻi.

Hikers, bikers and Soldiers are asked to inspect their boots, clothes, packs and other field gear before entering natural areas. They are also asked to clean mud and debris off their gear at the end of every field day, and to wash and vacuum their vehicles at least once a week.

Many training ranges operate wash racks; troops and contractors are required to clean wheel wells and undercarriages on tactical and other vehicles before traveling between training ranges.

Together, everyone can prevent new invasive species from invading Hawaiʻi.•

~Jane Beachy is the ecosystem restoration program manager with RCUH / PCSU, working for the Oʻahu Army Natural Resources Program.

ALERT! **A highly invasive weed (listed as a state noxious pest) has been discovered in the Kahuku and Pūpūkea regions of the Koʻolau Mountains:**

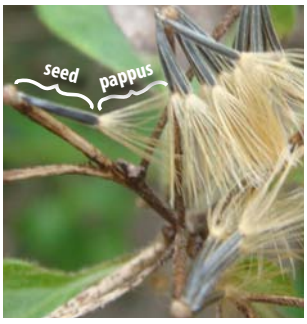
Your kōkua is needed to prevent its spread and protect people and our native plants and animals!

Chromolaena odorata

(Common names include: Siam Weed,Bitter Bush, Devil Weed, Rey del Todo and others)

Facts about *C. odorata*:

- A candidate for one of the top 100 worst weeds in the world;
- This is the **first record** of this weed in the Hawaiian Islands;
- Tolerates a wide range of soil conditions and severe drought;
- Prefers full sun to partial shade;
- Rapidly forms dense thickets in disturbed/cleared areas;
- Creates a fire hazard;
- Alleleopathic (prevents other plants from growing nearby);
- **Allergen/toxic to humans** (causes skin problems and asthma in allergy-prone people);
- Can be toxic to animals, causing diarrhea and death in extreme cases;
- Host for recognized pests and diseases;
- Can grow and spread from cut stems;
- Can mature/make seeds in one year;
- Produces many seeds (up to 800,000 per plant) that can last more than a year in soil;
- **Seeds are easily spread unintentionally by hikers, vehicles, equipment and mammals.**



C. odorata characteristics:

- Shrub; can form dense tangled bushes 1.5-2 m in height (some branches can grow up trees to 20 m);
- Leaves extend from stem in opposite pairs, light green with ***velvety hairs, triangular shape***, leaf edges can have large serrations (teeth) or they can be smooth (without teeth);
- Leaves have a distinctive 3-vein "pitchfork" pattern;
- Leaves have distinct odor when crushed;
- ***Stems have short, soft hairs*** (older stems woody);
- Flowers in small round clusters, white to mauve color, 4-5 mm long; individual flower shape is a slender trumpet; ***long, whispy structure*** *(called the "style")* ***extends beyond flower petals,*** see photos, below;
- Seeds are dark, 3-4 mm long, with a 5 mm long fluffy structure (called the "pappus") – see photo, left.

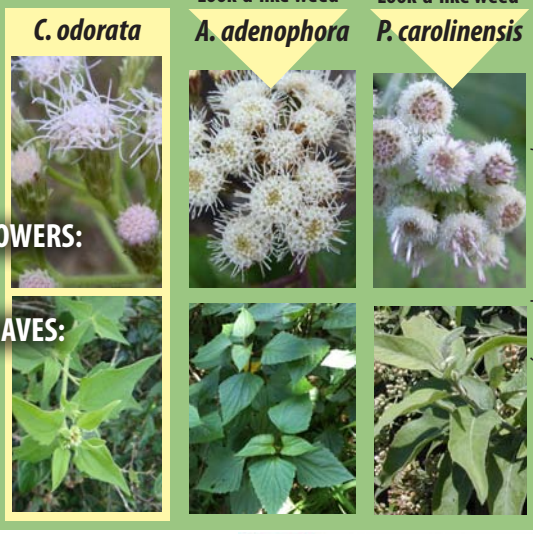
Can be easily confused with:

Ageratina adenophora
(Maui Pamakani, Pamakani Haole; *not native*)

- Plant not hairy
- Stems dark red/purple
- Leaves dark green
- Seeds smaller (1.5 mm long), pappus 4 mm long

Pluchea carolinensis
(Sourbush; *not native*)

- Does not form tangled shrub
- Leaves dull gray-green, oblong to elliptic shape
- Seeds smaller (1 mm long), pappus 2-3 mm long



What you can do:

- Wash your bikes, vehicles, boots and gear BEFORE and AFTER hiking, riding motocross, or 4-wheeling on Oʻahu –this will help prevent the spread of tiny weed seeds and protect our Islands' forests.
- Please stay on marked trails!
- If you think you've spotted *C. odorata*...
  - Report all sightings to the Oʻahu Invasive Species Committee (OISC) so it can be identified and removed – note where you found it, and take photos, if possible.
  - DO NOT try to pull it out–it grows from any pieces that are left behind.

For more information, or to report a sighting of C. odorata, please contact **OISC** at: **oisc@hawaii.edu**, 266-7994

OISC O'AHU INVASIVE SPECIES COMMITTEE

BISHOP MUSEUM

HAWAII DEPARTMENT OF AGRICULTURE

Oʻahu Army Natural Resources Program

Flier detailing *Chromolaena odorata* facts and identification tips. By Candace Russo & Jane Beachy, OANRP staff.

Homeland Defense for Kāhuli

By Dan Forman

AT HĀPAPA, THE north facing slope above Kalua'ā in the Wai'anae mountains, a one-hectare area is home to endangered Hawaiian tree snails, known as kāhuli (*Achatinella mustelina*). The area is just below the crestline dividing Kalua'ā and Lualaulei, and since the 1950s, was known to harbor a large population of kāhuli on the flat bench area.

Endangered Kāhuli (*Achatinella mustelina*) tree snails have endured intense predation by rosy wolf snails (*Euglandina rosea*) and rats (*Rattus* spp.) at the Hāpapa field site.

The main predatory threats to kāhuli at Hāpapa are the rosy wolf snail (*Euglandina rosea*) and rats (*Rattus* spp.). These threats have sharply reduced kāhuli numbers. In 2004, 481 kāhuli were counted in a single day at Hāpapa. In 2009, almost 50% less kāhuli were found, with the addition of 169 wolf snails. During this same time, 308 freshly killed kāhuli shells (likely eaten by the rosy wolf snails) were found on the ground. These alarming figures led the O'ahu Army Natural Resources Program's (OANRP) rare snail specialist, Vince Costello, to write a plan detailing special protection measures for the kāhuli at Hāpapa.

The rosy wolf snail (*Euglandina rosea*) is a non-native cannibalistic snail that decimates Hawai'i's native snails. (Photo by Ron Heu, Hawai'i Department of Agriculture).

According to Costello's 2010 report:

> "This area is exceptional in its *Achatinella mustelina* richness and also exceptional in its astronomical numbers of *Euglandina rosea*. It deserves an exceptional response to preserve what snails remain. I recommend doing a thorough survey of the remaining snails and if the numbers are low, as anticipated, bring the remaining snails into the lab for temporary safe-keeping with the intention of constructing a snail exclosure at the site. When the exclosure is complete the snails could be returned from the lab to the wild. The last two counts show that *A. mustelina* have declined by 150 snails in 8 months. This works out to approximately 18 snails/month or 0.6 snails/day. At this rate the total population of 236 snails could be gone in approximately 13 more months. We're very fortunate to be able to intervene at this time and hopefully prevent the snails from disappearing."

Soon after Costello's report, a meeting was held with the top malacologists (snail experts) on the island. Shortly thereafter, 200 snails were collected – many from Papala kepau trees (*Pisonia sandwicensis*) – for safekeeping in the snail lab at the University of Hawai'i.

In 2010, OANRP staff began clearing a 180 meter line of vegetation for the construction of a predator-proof fence at Hāpapa, which will protect hundreds of kāhuli. The area is a mix of native and introduced vegetation and is already protected from ungulates by other fencing. An area of intensive management, ongoing efforts at Hāpapa include weed control, outplanting and monitoring of rare plant species, and protection of *Drosophila montgomeryi*, an endangered picture-wing fly also found in this area.

The Hāpapa fence, nearly complete, will protect rare Hawaiian land snails from the threat of rosy wolf snails, rats, mice, mongooses and Jackson chamaeleons. (Photo by OANRP staff)

Hāpapa is a high priority for construction of a predator-proof fence due to its favorable climate and habitat, and its once large

A close-up of part of the predator-proof fence being built at Hāpapa. (Photo by OANRP staff)

population of kāhuli. "Predator-proof" fences go a step beyond traditional fencing, in that smaller predators can be excluded. In this case, the predator-proof fence at Hāpapa will keep out multiple snail predators, including rosy wolf snails, rats, mice, mongooses and jackson chamaeleons, and will be based on a tested rat- and mouse-proof fence design, with added barriers for rosy wolf snails. The design includes a buried portion, a hood, solid wall construction, and special flashing with wire bristles to prevent wolf snails from crossing.

As of July 2011, construction of the predator-proof fence is nearly complete. In the next six months, similar predator-proof fences will be constructed to protect kāhuli and other rare snail species at two additional locations: one in the Koʻolau Mountains at the Poamoho summit, and the other at Palikea, at the southern end of the Waiʻanae Mountains. Construction for all three of these fences will be completed by "Excluder," an experienced company from New Zealand, with funding from the U.S. Fish and Wildlife Service.

Once complete, each of these fences will serve as a sanctuary for the endangered kāhuli and other rare Hawaiian land snails. At Hāpapa, the snails collected from Papala kepau will be returned to their home, where they can once again thrive in an environment free from predators.•

~Dan Forman is a natural resource management specialist with RCUH / PCSU, working for the Oʻahu Army Natural Resources Program.

Up-and-coming Conservationists:

Q & A with the OANRP's New Staff and Summer Interns!

Parker Peredes

OANRP Natural Resource Management Technician

Q *What is your educational background?*

A I have a Bachelor of Arts in Geography from the University of Hawaiʻi at Mānoa.

Q *Why did you want to join the OANRP?*

A I wanted to join the OANRP because I'm passionate about Hawaiʻi's threatened natural ecosystems, and I love the outdoors.

Q *How does conservation fit in your plans for the future?*

A As a young and new conservation technician I hope to gain the knowledge that will one day allow me to become a Resource Manager in Hawaiʻi.

Q *What hobbies do you enjoy outside of work?*

A I enjoy hunting, fishing and chainsaws!

Jon Sprague

OANRP Natural Resource Management Technician

Q *What is your educational background?*

A I have a B.A. in History from Bowdoin College in Maine (2000), and I am a few months from a Master's degree in Biology from the University of Montana. My work experience includes an internship at Kīlauea Point National Wild-

life Refuge on Kaua‘i and seven seasons in the Papahānaumokuākea Marine National Monument with USFWS, NOAA Fisheries, and the Universities of Texas and Montana.

Q *Why did you want to join the OANRP?*

A What really excites me about working with OANRP is: first, getting back into the field and not sitting in a classroom all day; and second, the breadth of species, projects, and conservation techniques involved in the program.

Q *How does conservation fit in your plans for the future?*

A My goal over the next few years is to become more familiar with Hawaiian ecosystems, conservation issues, and community needs, and to use my education and experience to help conserve one of the most threatened and remarkable ecosystems in the world.

Q *What hobbies do you enjoy outside of work?*

A SCUBA, playing the banjo (poorly), and Ultimate Frisbee (darn hippies).

Zoe Eisenpress

OANRP Field Crew Summer Intern (Blue Team)

Q *What is your educational background?*

A I graduated with a Bachelor’s Degree in Interdisciplinary Studies, Major Equivalent in Environmental Studies, from the University of Hawai‘i at Mānoa in May 2010.

Q *Why did you want to become an OANRP intern?*

A I wanted to become an OANRP intern because of my passion for the environment and the aspiration to be a part of the restoration efforts of native habitats and the perpetuation for the survival of rare native species.

Q *How does conservation fit in your plans for the future?*

A Through this internship I hope to become a better steward in teaching others of our unique island ecosystem and to promote more citizen awareness. I hope to be involved in conservation and making Hawai‘i a more self-sustaining state.

Q *What hobbies do you enjoy outside of work?*

A When I am not working, I enjoy discovering new trails to hike, gardening, cooking, photography, surfing, and swimming.

Rebecca Fonoimoana

OANRP Field Crew Summer Intern (Green Team)

Q *What is your educational background?*

A I am attending the University of Hawai‘i at Mānoa, with one more semester left of a B.S. in Natural Resources and Environmental Management.

Q *Why did you want to become an OANRP intern?*

A I wanted to become an OANRP intern because I’ve always heard great things about the program, and I knew it would teach me vital career preparation skills and knowledge, and provide me with the opportunity to network with respected individuals in the conservation field.

Q *How does conservation fit in your plans for the future?*

A In the future, I plan on working in the conservation field – possibly doing field-work at first,

and maybe later moving towards environmental education and outreach or natural resource policy.

Q *What hobbies do you enjoy outside of work?*

A My hobbies outside of work include singing in a reggae-jazz band called "The Virtue," surfing, and jiu jitsu.

Kanoa O'Connor

OANRP Fence Crew
Summer Intern

Q *What is your educational background?*

A Currently working towards a B.S. in Environmental Engineering at Stanford University.

Q *Why did you want to join the OANRP?*

A What first excited me about OANRP was that it gave me an opportunity to work hands-on in some of Oʻahu's most pristine ecosystems. Being an intern is an awesome learning opportunity for me on a daily basis. Interning lets me absorb as much manaʻo as I can to conserve and sustain our ʻaina.

Q *How does conservation fit in your plans for the future?*

A Our kupuna understood that our connection to the land is more than assorted conservation efforts - we are connected ancestrally. It is our duty to mālama the ʻāina so it may malama us in return. Because of this, conservation is and always will be very important in my life.

Q *What hobbies do you enjoy outside of work?*

A Learning!

Tia Perez

OANRP Horticulture Crew
Summer Intern

Q *What is your educational background?*

A I attended the University of Hawaiʻi at Mānoa, where I earned a degree in Botany.

Q *Why did you want to become an OANRP intern?*

A I wanted to become an OANRP intern because it is a program that is heavily funded and focused on endangered flora, and would offer me the chance to spend time in the field and greenhouses around plants that are extremely rare. The other reason I wanted to become an OANRP intern is because of the incredible team of specialists, biologists and technicians. The amount of knowledge that everyone holds and shares is exponential and for an intern I've been given the opportunity to learn form the best.

Q *How does conservation fit in your plans for the future?*

A In the future I plan to always work in the conservation field specifically with endangered Hawaiian flora.

Q *What hobbies do you enjoy outside of work?*

A In my free time I spend my time basically farming. I have a few raised organic beds, chickens, and a native garden. Working the land is my passion and being an OANRP intern has been an incredible experience so far.

Mina Viritua

OANRP Field Crew
Summer Intern

Q *What is your educational background?*

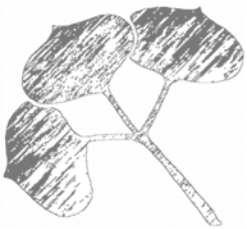
A I graduated from Ke Kula o Nāwahīokalani'ōpu'u Hawaiian immersion school in 2005 and graduated Hawai'i Community College in May of 2010 with two Associates in Applied Science in Mahi'ai (traditional Hawaiian taro farming) and Hula. I also graduated Hawai'i Community College this past May of 2011 with a liberal arts degree, and am currently enrolled at the University of Hawai'i in Geography.

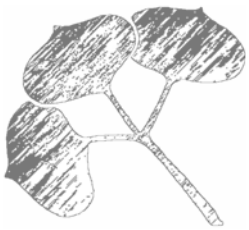
Q *Why did you want to become an OANRP intern?*

A I wanted to become an OANRP intern because I was inspired early on in my life to become a conservationist, which reflects my Hawaiian cultural foundation. I also wanted to become an OANRP intern because it is a great avenue to becoming part of the conservationist community; I was also inspired by Kahale Pali (OANRP Natural Resources Management Coordinator for the orange team), who I met at the Hawai'i Conservation Conference.

Q *How does conservation fit in your plans for the future?*

A The term conservation to me as a Hawaiian is something that my po'e kupuna lived day to day which is mālama 'āina: "to live in balance with each other and the land that we feed from." Conservation is in my heritage and I plan to perpetuate and pass to the future generations.





Chris Wong

OANRP Horticulture Crew
Summer Intern

Q *What is your educational background?*

A During the year, I am taking classes at the University of Hawai'i at Hilo in order to obtain a degree in Tropical Horticulture.

Q *Why did you want to become an OANRP intern?*

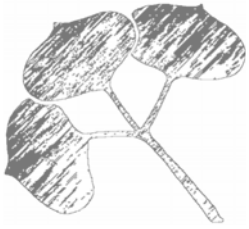
A Seeing a former Youth Conservation Corps teammate of mine do the OANRP internship program in the past, and talking to the OANRP outreach specialists at the Conservation conference, I knew this was something I had to try.

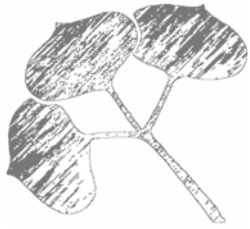
Q *How does conservation fit in your plans for the future?*

A For the future, I really hope to be doing what I am doing now: propagating native plants in hopes of reforesting the land with natives – whether common or endangered – or even providing a genetic storage for the future. So much of conservation depends on the plants, and horticulturalists know only plants, so it only makes sense that the two should go together.

Q *What hobbies do you enjoy outside of work?*

A Outside of work, I am always hiking the ridges and peaks of O'ahu. Seeing O'ahu at its finest is always a thrill.





'Tis the Season...

SUMMER

VOLUNTEER *Opportunities*

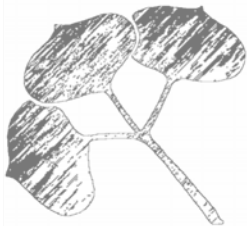
August

EVENT: Palikea volunteer service trip
DATE: Tuesday, August 16
PURPOSE: Invasive weed control
TERRAIN: Some steep slopes, moderate difficulty

EVENT: Kaʻala volunteer service trip
DATE: Friday, August 26
PURPOSE: Invasive weed control
TERRAIN: Some uneven terrain, easy hiking

Join us at the 2011 Hawai'i Conservation Conference!

The OANRP will have a booth at the Hawaii Conservation Conference, and several activities are scheduled for the general public – please see the flyer on p. 9 for details!



For more information about O'ahu Army Natural Resources Program volunteer opportunities, or to be added to our monthly e-mail posting of all public events, please contact:
Kim Welch, kmwelch@hawaii.edu

ALOHA

I wish to bid farewell and aloha to all of our readers, as I will be relocating to Oregon in a few weeks. Thanks to everyone for your support of this publication, for your contributing articles, and for the many notes of appreciation that I've received over the years for making this information available.

I have thoroughly enjoyed writing for, editing and compiling the EMP Bulletin; it will be one of many projects I will miss. However, I will be turning this over to the trusting and capable hands of my co-worker, Kim Welch, as well as my up-coming replacement. I know they will keep the EMP alive and well!

Hawai'i will always be a special place for me – I am proud to have been part of this conservation community. You have all shown such dedication and passion for protecting the Island's natural resources...your spirit for working together in partnerships to make a difference has been an inspriation!

With Aloha,
~Candace Russo

Photo courtesey of William Weaver Photography (www.williamweaverphotography.com)

EMP Bulletin

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The success of this newsletter depends on article contributions from the staff of the Oʻahu Army Natural Resources Program, Oʻahu 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 ***September 8, 2011.***

Robert Eastwood
Director of Public Works
U.S. Army Garrison - Hawaiʻi