



EMP

Ecosystem Management Program Bulletin

Volume 48

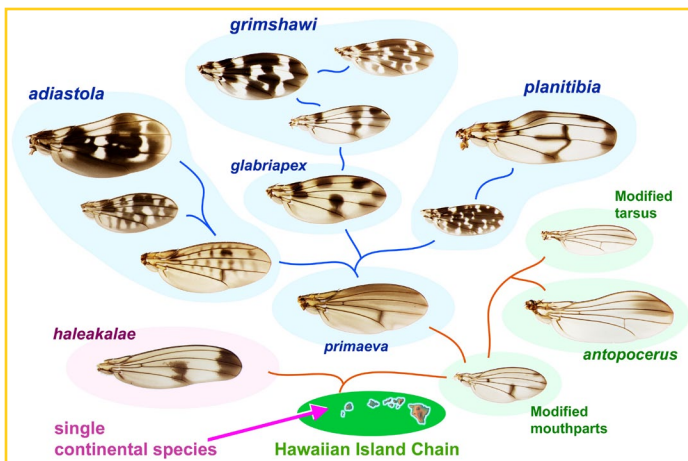
Winter 2009-2010

New Tiny Taxa

By Kapua Kawelo

IN 2007, THE U.S. Fish and Wildlife Service listed seven O’ahu picture wing flies, or Hawaiian *Drosophila*, as endangered species. Each different type, or “taxa,” has an intricate wing pattern all its own, giving them the name “picture-wings.”

Ranging in size from a sunflower seed to a mere sesame seed in length, the 1,000 of these tiny species currently described are thought to have evolved from a single ancestor. *Drosophila* are found worldwide, but the Hawaiian species are the largest and most ornate in the genus. Interestingly, Hawaiian *Drosophila* are also known to perform the most elaborate mating dances.



Hawaiian *Drosophila* display a diversity of wing patterns, giving them the name “picture wings.” (Illustration courtesy of Edwards et al., 2007)

Hawaiian *Drosophila* are related to *Drosophila melanogaster*, the infamous fruit fly with the reputation of being a major agricultural pest. Unlike *D. melanogaster*, which lay their eggs in fruit and are not native to Hawai’i, the Hawaiian *Drosophila* use many different parts of native plants for egg-laying. In fact, the listed endangered picture wings lay their eggs on only a specific and narrow range of native host plants that include Halapepe (*Pleomele* spp.), ‘Ōhāwai (*Clermontia* spp.), Hāhā (*Cyanea* spp.) and

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Ōpuhe (*Urera* spp.).

When the picture wing flies were listed as endangered, the Army initiated surveys on O’ahu Army Training Ranges. This year, two endangered ‘tiny taxa’ were identified at Schofield Barracks: *Drosophila substenoptera* and *Drosophila montgomeryi*. This discovery is fitting, as Dr. Steve Montgomery led these surveys and *D. montgomeryi* was named in his honor.



Drosophila substenoptera. (Photo by Karl Magnacca)



Drosophila montgomeryi. (Photo by Karl Magnacca)

Both taxa are located within the “Lihue Fence Unit,” an area proposed for fencing by the O’ahu Army Natural Resources Program (OANRP). In an attempt

to better understand the current range of these two taxa, OANRP has initiated additional surveys off of Army Lands. Surveys at Pu'u Palikea revealed *D. montgomeryi* and *D. substenoptera*, as well as *Drosophila hemipeza* (another of the seven O'ahu picture wings listed as endangered).

Management for these tiny taxa by the OANRP will include habitat protection via feral pig and goat control, weed control and host plant propagation and outplanting. The specific host for *D. substenoptera* is 'Ōlapa (*Cheirodendron* spp.), which is fortunately fairly abundant in Schofield Barracks West Range. The tree known to host the eggs of *D. montgomeryi* is Ōpuhe (*Urera glabra*), yet this tree is not as abundant on Army land as 'Ōlapa; therefore the OANRP may need to conduct active *U. glabra* restoration.

The OANRP look forward to working with our first listed insect! Tiny taxa here we come. •

REFERENCES:

Edwards, K.A., L.T. Doescher, K.Y. Kaneshiro, and D. Yamamoto. 2007. A database of wing diversity in the Hawaiian *Drosophila*. PLoS ONE 2(5): e487, 1-12.

~Kapua Kawelo is a biologist with the U.S. Army Garrison, Hawai'i, working for the O'ahu Army Natural Resources Program.

The View from Above: Aerial Surveys in Schofield Barracks West Range Reveal the Extent of Weed Spread

By Jane Reppun Beachy

HOW DO YOU quickly look for invasive alien weeds across an entire valley? From the air! O'ahu Army Natural Resource Program (OANRP) staff conducted aerial surveys across Hale'au'au in September 2009. Hale'au'au, the largest valley in Schofield Barracks West Range (SBW), is located in and above the impact area behind the SBW live fire

training range, and stretches all the way up to the back wall of Ka'ala. Unexploded ordnance is a hazard for staff as they hike through Hale'au'au, making it challenging to conduct vegetation surveys.

When staff needed to get a closer look at weeds threatening the area, they took to the air. OANRP staff Phil Taylor, Jane Beachy and Kaleo Wong flew over the area with pilot Howard Estebrook of Pacific Helicopters. The crew specifically searched for *Hedychium gardnerianum* (kāhili ginger) and *Sphaeropteris cooperi* (Australian tree fern), although other invasive trees were noted as well.

Detecting species from a helicopter requires practice and expertise. The helicopter must fly slow, and low to the ground; a seasoned pilot and good weather are crucial. Observers must be familiar with target plants and handy with a GPS marking device. Motion sickness makes it difficult to concentrate on surveying.

Kāhili ginger, although gorgeous and fragrant, is highly invasive. The bright orange fruit of kāhili ginger are thought to be bird-dispersed, and its rapid spread poses a serious threat to the rare plants that thrive in the unique bog habitat of Ka'ala. Kāhili ginger was planted as an ornamental at Ka'ala many years ago, and has since spread across the bog, colonizing the cliffs and most remote reaches of Hale'au'au. Control work is ongoing by OANRP staff on the summit of Ka'ala.

Directing this control work, the crew on the aerial survey discovered that while kāhili ginger had indeed spread into Hale'au'au, its distribution was focused in just a couple of drainages. Two other valleys backing Ka'ala (Mākaha and Wai'anae Kai) were kāhili ginger-free. While control will be challenging, staff are optimistic that novel weed control techniques will help to keep kāhili ginger from spreading further.

"After seeing the devastating impact kāhili ginger has in other wet forest areas, such as the back of Waikāne Valley, we have become inspired and renewed our dedication to eradicate this invasive weed from the Wai'anae Range," said Wong, commenting on their findings with respect to kāhili ginger.

Another popular ornamental plant, Australian tree fern can grow up to 20+ feet tall, and wind dispersed spores mean that it can easily spread over large areas. Although similar in appearance to the native Hawaiian tree fern hāpu'u, Australian tree

fern can be distinguished from hāpu‘u by its height, by white, hairy scales on its fronds, and by its distinct, circular frond arrangement.

The crew was unpleasantly surprised by the numbers of Australian tree fern detected by aerial survey in Hale‘au‘au; hundreds of ferns were found scattered across the middle and upper reaches of the valley.

In the next year, the OANRP hopes to use the data from these aerial surveys to direct additional weed control in Hale‘au‘au, and to test new methods of weed control, such as remote high-accuracy spot treatment. •

~Jane Reppun Beachy is an ecosystem restoration program manager with RCUH / PCSU, working for the O‘ahu Army Natural Resources Program.



Can you spot the Australian Tree Ferns in this aerial view?

The photo below was taken from a helicopter during an aerial survey for weeds. See how many Australian Tree Ferns you can find in the image.

(Answers on following page.)

COMPARISON

Australian Tree Fern:	Native Hāpu‘u:
 <p>Photo by OANRP staff</p> <p>Leaves radiate symmetrically</p>	 <p>Photo by Forest & Kim Starr</p> <p>Leaves branch randomly</p>
 <p>Photo by OANRP staff</p> <p>White scales cover the fuzzy branches and trunk.</p>	 <p>Photo by Forest & Kim Starr</p> <p>Branches can be fuzzy with NO white scales, or they may be smooth.</p>



Photo by OANRP staff

Answer: **16** Australian Tree Fern weeds!

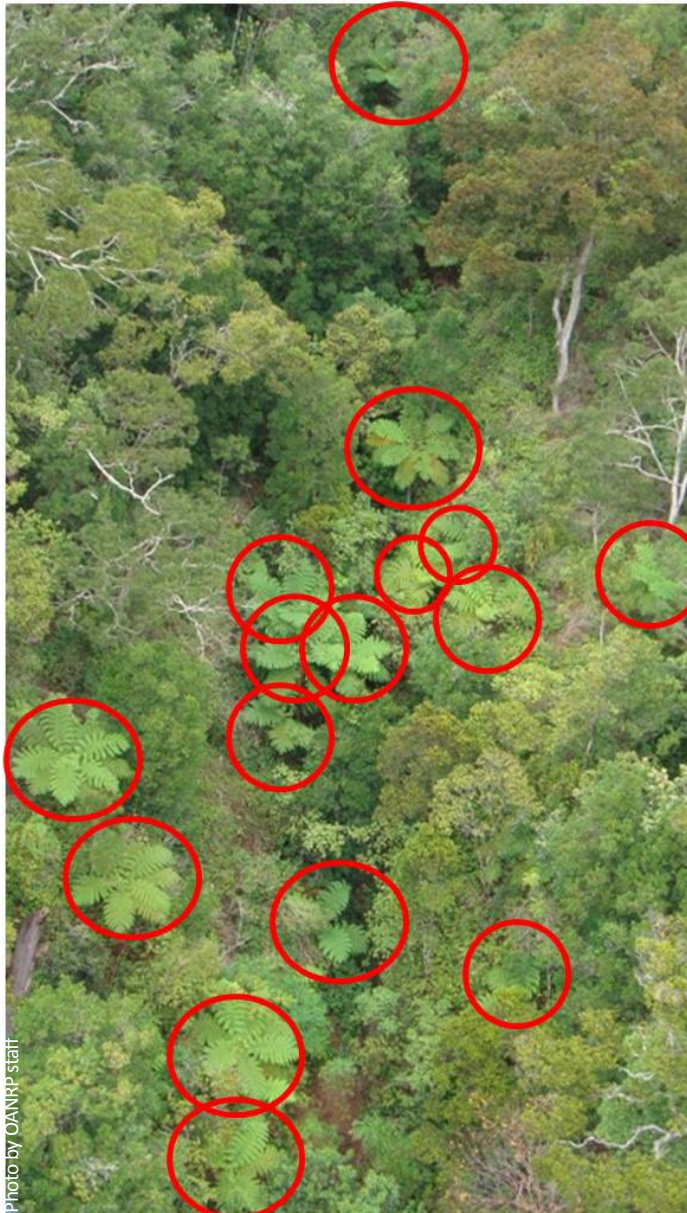


Photo by OANRP staff

Now imagine finding and counting those while flying!

Targeting Pōhakuloa’s “Most Un-Wanted”: The Incipient Weed Program at PTA

By Julia Parish

IN HAWAI‘I, the introduction of invasive species is a significant threat to our native plant species. A non-native plant is considered invasive if it is likely to or known to cause harm, either economically or environmentally. Invasive species increase the risk of wildland fires, displace native species, and alter native habitat. They also hinder the military’s ability to train and increase operations cost.

According to Westbrook and Ramos (2005), invasive species negatively impact installations in four major ways: they limit training activities by reducing land availability; they alter the type of training that can occur in an area because of increased fire risks or the reduction in “realistic conditions”; they increase operations cost; and they pose a security risk or create safety hazards such as reducing the line of sight on runways. At Pōhakuloa Training Area (PTA), non-native invasive species are extremely detrimental to military operations and to the viability of biological resources.

An example of an established invasive species at PTA is fountain grass (*Pennisetum setaceum*), which was introduced to the Hawaiian Islands in the early 1900’s.

This North African grass now covers a vast portion of the PTA dryland forest. It appears to out-compete native plants for limited soil and water resources, thus hindering the ability of native species to regenerate, which ultimately increases wildland fire risk.

Invasive weed: A plant that was introduced to an area (either intentionally or accidentally) that has out-competed native plants for resources that include sunlight, water, and soil. Because of this competition, invasive weeds eventually dominate areas, as native plants can no longer survive.

Incipient weed: A plant newly discovered in an area that has not yet become invasive, but is known to be an invasive weed in a similar type of habitat. Because of this high potential to become invasive, incipient weeds are especially important to control.

At PTA, the introduction of invasive plants and

the management of incipient weeds are important program concerns because of the movement of military air and land vehicles between the islands of Hawai'i and O'ahu, and the extensive movement of vehicles and personnel throughout the PTA ranges during training activities.

Locating and eradicating invasive plants immediately upon arrival and before a population can become established in an un-infested area is a critical first step towards effectively managing invasive plants at PTA. Besides the ecological advantages and the benefits for training capacity, managing incipient weeds reduces the overall cost of managing weed populations.

To identify new and potentially invasive plant populations, and to prevent the spread of high risk weed species, the Incipient Weed Program (IWP) was developed by the PTA Natural Resource Office (NRO) in 2009. This program is an important step in fulfilling related directives outlined in the 2003 Biological Opinion issued by the U.S. Fish and Wildlife Service. IWP objectives are to detect and eradicate new introductions of invasive plants before they become established, and to prevent the spread of currently established invasive plant populations.

These objectives are met by implementing roadside and high-use area surveys, and using written and electronic documentation regarding incipient plant locations. Chemical or manual control methods for eradication are employed once target areas are identified and prioritized.

In addition to management of incipient weed species, an important programmatic goal is to educate staff, military personnel, and recreational users of PTA, regarding the threats invasive non-native species pose to the installation operations, as well as to natural and cultural resources.

Field surveys indicate there are over 140 naturalized non-native plant species documented on PTA lands. Of these, almost 30 species are designated by the PTA NRO as potential incipient weed targets. Drawing on previous research and early detection efforts in place on Maui and O'ahu, the PTA IWP implements a "target-based" early detection approach using roadside surveys and monitoring in locations of rare and endangered plant management (Areas of Species Recovery or ASRs).

Two target species lists were developed from the

potential incipient weed target species to aid staff during incipient weed surveys. The first is a "Five Most Un-Wanted" list of potentially invasive plant species that occur on the island but are not currently known to exist on PTA. This list includes species like Pampas grass (*Cortaderia selloana*) and gorse (*Ulex europaeus*).

The second list is comprised of plant species that are currently known to occur on PTA and the Ke'āmuku Maneuver Area (KMA), and includes banana poka (*Passiflora tarminiana*), fennel (*Foeniculum vulgare*), and bull thistle (*Cirsium vulgare*). These potential target species currently have small population distributions, or are high-risk for dispersion, and must be



Pampas grass, *Cortaderia selloana*. (Photo by Forest & Kim Starr)

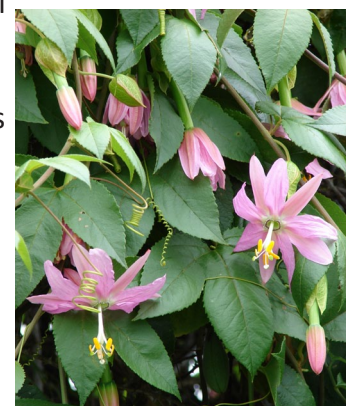


Gorse, *Ulex europaeus*. (Photo by Forest & Kim Starr)

prevented from spreading to ASRs. To prioritize incipient weed management, a list of high-use areas and areas of significant infrastructure development were compiled in order to rank priority regions for roadside surveys at PTA. These regions include areas mandated by the Biological Opinion (US FWS, 2003) to be surveyed for incipient weed species. Survey areas were prioritized according to frequency of use for military training and other installation activities, the number of public access points, and the potential for new plant introductions. Priority survey areas are ranked 1-5 by order of significance, with Priority

prevented from spreading to ASRs.

To prioritize incipient weed management, a list of high-use areas and areas of significant infrastructure development were compiled in order to rank priority regions for



Banana poka, *Passiflora tarminiana*. (Photo by Forest & Kim Starr)

Area 1 being an area of greatest concern.

Roadside surveys began in May 2009 and are conducted on a quarterly basis throughout the year. Surveys document species introductions and common weed distributions, and provide NRO managers with a practical and accountable basis for incipient weed control.

Incipient weed control at PTA also benefits other Department of Army Installations on Hawai'i Island and neighboring islands by reducing the risk of inadvertent transportation of problem PTA species to regions not yet impacted by these non-native plants. •

~Julia Parish is a natural resource specialist with the Center for Environmental Management of Military Lands working for the PTA Army Natural Resources Program.

O'ahu Army Natural Resources Volunteers Appreciated with Holiday Party

THE O'AHU ARMY Natural Resources Program's (OANRP) "East Baseyard" in Wahiawa is always a flurry of activity. However, on November 21, the activity was focused on creating festive table arrangements at a Holiday Party in appreciation of all the time, energy and dedication given by OANRP volunteers.

Nearly thirty volun-



Dedicated volunteer Jeanne Furukawa assembles her beautiful centerpiece. (Photo by OANRP staff)

teers joined OANRP staff in creating Thanksgiving centerpieces out of cuttings from non-native pine trees such as Loblolly, Norfolk, and Juniper,



Non-native greens and cones were collected with a permit for the OANRP Volunteer Appreciation Holiday Party. (Photo by OANRP staff)

among others. Occasionally, folks managed to tear themselves away from their creations to venture over to the food tables, filled with steaming hot apple cider, savory sausages, and a variety of baked goods prepared by staff.

Hundreds of volunteers have helped the OANRP protect and preserve O'ahu's endangered forest plants and animals over the past year. The holiday party was a welcome opportunity for staff to say "mahalo and we are all looking forward to working together in the forests in 2010!" •

► **Please see p. 8 if you are interested in volunteering with the O'ahu Army Natural Resources Program!**

Rat Attack

A Series



By Candace Russo

UNDERSTANDING THAT THE rapid proliferation of rats on the Hawaiian Islands is a major threat to native Hawaiian plants and animals and the traditional Hawaiian culture linked to those species, the Partnership to Protect Hawai'i's Native Species (PPHNS) was created. A collaborative effort in the true sense of the word, multiple federal, state, and non-profit agencies are included in the PPHNS, with a mission to conduct educational outreach and raise public awareness about rat impacts on our native species and conservation tools available to provide possible solutions.

As a second installment of this series, "Rat Attack," we will explore how the PPHNS is accomplishing their mission and take a closer look at the Loulu, Hawaii's only native palm tree, one of many species under attack by the rat.

Rats are commonly thought to live in areas with a high density of people, such as cities, or even in rural areas or agricultural fields, posing a risk to human health by transmitting diseases. Yet rats are not limited to these areas. On the Hawaiian Islands, rats can even be found at high-elevations, far from cities or farm land, thriving in our native forests, feasting on our native and often rare species.

Why are they able to survive in so many places? One reason is that rats are anything but finicky when it comes to their diet - they appear content consuming an array of food from gourmet cheese to garbage, and from forest snails to forest seeds.

The PPHNS is about to launch a web site (www.removeatsrestorehawaii.org) to "facilitate community involvement during conservation efforts and planning" for a project specific to removing rats in an effort to restore Hawai'i. Information on the website will include: how rats affect people and the natural and cultural resources upon which we rely; what new methods can be used to safely remove rats from our Islands; case studies; and will include a feedback form for public comments.

One of the many natural resources affected by rat predation is the Loulu. A type of fan-palm, Loulu stand alone as the only palms native to the

Hawaiian Islands.

On the island of O'ahu, a particularly interesting story emerged from a recent study of the 'Ewa Plain (Athens, 2009). Based on historical pollen records it is known that Loulu palms were once the dominant tree covering the 'Ewa Plain - a large area spanning the lowlands from Kapolei to Wahiawa. Yet today few Loulu are found on O'ahu, and then only high in the Wai'anae and Ko'olau mountain ranges. One theory is that human settlement in the lowlands contributed to the rapid decline of Loulu, and others hypothesize that fire quickly wiped out these palms. Athens' study reveals evidence that may contradict these theories entirely.

In his paper titled "*Rattus exulans* and the catastrophic disappearance of Hawai'i's native lowland forest," Athens suggests it was rats, not human settlement or fire, that decimated Loulu palms in the 'Ewa Plain. He offers much evidence in the form of archaeological and biological investigations, rat ecology, and more, painting a groundbreaking picture of how quickly and thoroughly rats can alter a landscape. This theory has even been applied to the collapse of civilization on *Rapa Nui*, or Easter Island.

Coupled with this interesting historical evidence and the fact that current Loulu populations are in decline due to rats feeding upon the seeds, the need for better conservation tools to address flourishing rat populations is evident.

The public is encouraged to visit the PPHNS project website in the near future (currently under construction) to learn more about this issue and what can be done to remove rats in an effort to restore Hawai'i. •

WEBSITE COMING SOON!

www.removeatsrestorehawaii.org

REFERENCES:

Athens, S.J., 2009. *Rattus exulans* and the catastrophic disappearance of Hawai'i's native lowland forest. *Biological Invasions* 11:1489-1501.



Loulu, *Pritchardia kaalae*. (Photo by OANRP staff)

Partnership to Protect Hawai'i's Native Species



**Remove Rats,
Restore Hawai'i**

'Tis the Season...

W
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...to enjoy the brilliant yellow blooms of the Ma'ō Hau Hele, *Hibiscus brackenridgei*. Most commonly known as the Hawai'i state flower, the variety found on O'ahu is also an endangered species.

To protect this rare plant, Hawai'i's only native yellow hibiscus, the Army Natural Resources Program controls threats that include invasive weeds and fire, and also outplants new Ma'ō Hau Hele grown from cuttings back into the dry forests where they live. Currently, only four locations remain where wild Ma'ō Hau Hele can be found on O'ahu: Keālia, Mākua Valley, Kea'au, and the Waialua area. Ma'ō Hau Hele display variation in form based on different environmental conditions found in these locations, from rambling shrubs in Mākua Valley to impressive 23-foot tall trees in the Waialua area.

No matter the form, Ma'ō Hau Hele are a flagship species for winter flowers on O'ahu. If you are hiking in one of these dry forest areas, look for bright yellow flowers, reminiscent of sunshine during the winter months!



VOLUNTEER OPPORTUNITIES

FEBRUARY

EVENT: Plant monitoring at Kahanahāiki

DATE: Thursday, Feb. 18

PURPOSE: To measure common native plants

TERRAIN: Some steep terrain; moderately difficult hike

EVENT: Ginger weed sweep at Ka'ala

DATE: Monday, Feb. 22

PURPOSE: To search for invasive ginger off-trail

TERRAIN: Steep terrain; dense vegetation including blackberry; hike includes crawling through dense vegetation, off-trail

MARCH

EVENT: Weeding at Kahanahāiki

DATE: Monday, Mar. 1

PURPOSE: To remove invasive weeds surrounding rare plant populations

TERRAIN: Some steep terrain; moderately difficult hike

EVENT: Weeding at Kahuku

DATE: Thursday, Mar. 18

PURPOSE: To remove invasive weeds surrounding rare plant populations

TERRAIN: Some steep terrain; moderately difficult hike

For more information about O'ahu Army Natural Resource Program volunteer opportunities, or to be added to our monthly e-mail posting of all public events, please contact

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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 EMP Bulletin, please feel free to contact us! The deadline to submit articles for the next issue is **February 23, 2010**.*




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