



Friends of Hakalau Forest National Wildlife Refuge

June 2018 Newsletter

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From the President's Perch – May 31, 2018

One of the ways the Friends seek to bring the Refuge to our local community here in Hilo is by sponsoring a series of talks on conservation topics. Last month we were treated to a talk by Dr. Jolene Sutton of UH Hilo on "Options for controlling mosquito-transmitted diseases in Hawai'i."

Before the early 1800s there were no mosquitoes in Hawai'i. Since then, the mosquito-transmitted diseases of avian malaria and avian pox have decimated populations of Hawaii's native forest birds, helping drive many to extinction and leaving most others on the brink. With a warming climate, once-secure refuges such as Hakalau will also become infested with mosquitoes, threatening the remaining native birds with extinction. Mosquitoes also transmit human diseases including the Zika virus, dengue, and malaria, and are also responsible for transmitting canine heartworm.

Several technologies exist which could be implemented to suppress or eliminate mosquitoes in Hawai'i. Many center around creating a large population of sterile males, which, when released back into the breeding population, swamp our fertile individuals and cause the population to crash. Since male mosquitoes do not bite, there would be no side effects on native species nor direct effects on human health. One method of sterilizing males, which has been used on different insect pests for 50 years, is by irradiation. A second method would be to release male mosquitoes carrying specifically-developed strains of *Wolbachia*. *Wolbachia* are bacteria that occur naturally in insects, including mosquitoes. If male mosquitoes are inoculated with a different strain of *Wolbachia* than the local female mosquitoes, the offspring will not develop. A third method is to use genetic technology to create "self-limiting" male mosquitoes that will not produce viable offspring when they mate. This self-limiting technology has been used around the world to greatly reduce populations of disease-carrying mosquitoes.

A summary of the potential technologies is available in the report of a 2016 workshop [found here](#). None of these technologies are currently being implemented in Hawai'i currently, but they could be. Some of them will require public input during a permitting process, and it will be important for people who value Hawaii's native birds

to speak up. There will be nay-sayers who don't think we should "mess with nature," but we've already messed with nature in bringing mosquitoes to these islands. It is up to us to fix the problems we have created.

Thank you for all that you do for our native birds and the Refuge.

Aloha,



J. B. Friday

President, Friends of Hakalau Forest National Wildlife Refuge

Manager's Update

Aloha, Friends of Hakalau Forest. My name is Tom Cady, and I am filling in as the acting Project Leader for the Big Island National Wildlife Refuge Complex (BINWRC) from May 13-July 20, 2018. I am



Tom Cady with his wife.

thrilled to be here, as I have great interest in Hawaii and the conservation issues that face this beautiful place. My current permanent position is Deputy Manager at the Alaska Peninsula and Becharof National Wildlife Refuges (AKPB) in Southwest Alaska. Home is King Salmon, AK, on Bristol Bay, which is home to the world's largest sockeye salmon run and fishery. Though a sharp contrast to my previous and current experience, this detail will be a great opportunity for me to 'test the waters' as a Project Leader for the National Wildlife Refuge System and the BINWRC.

My primary background is in aquatic ecology and fisheries management. I held several 'aquatic' biologist positions with different entities for about fifteen years before eventually becoming a program supervisor with the Forest Service in 2010. Our program focused on watershed restoration on Prince

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of Wales Island on the Tongass National Forest. I had the pleasure of overseeing numerous watershed



improvement projects during my years in that role. My wife and I moved to King Salmon in 2015 and assumed our current roles with the Refuge and the USFWS. My wife is the Avian Biologist for AKPB. Most of our Refuge's focus is on monitoring the local (e.g., bears, moose) and migratory (e.g., birds) species and preserving/protecting a vast landscape (4.2 million acres) into the future. It is always great pleasure to see the birds return in the spring, especially the *kolea*!

I will be assisting with many of the ongoing tasks Cashell mentioned in the last newsletter like moving the staffing process forward into recruitment, helping with day to day coordination and operations, and getting the budget in order. I did have one brief visit to the Refuge to see facilities, other infrastructure, and the forest restoration that is taking place. It is simply amazing to see where the ecosystem is now compared to where I understand it was at the time of initial property acquisition. It is especially impressive to see and learn how partnerships and volunteers have significantly contributed to this dramatic success.

In closing, I want to thank the Refuge and Pacific Region staff for inviting me to come work here for a brief two months. My main goals are to help them out where I can and learn a lot more about this wonderful place. If you have a chance, please stop by and

say 'aloha'. I may even get a chance to work with some of you on the refuge before I leave in July.

The *Teaching Change* Program – Inspiring Positive Environmental Change in Local Youth



The towering slopes of Mauna Kea were gleaming in the backdrop last March when the *Teaching Change* staff met with the lucky group of students and two accompanying teachers at Waimea Middle School for an overnight field-trip to Hakalau Forest National Wildlife Refuge. These fortunate students



The March 15-16, 2018 Teaching Change group from Waimea Middle School.

were about to join one of a dozen monthly trips each year offered by *Teaching Change* to local middle and high school students on the Island of Hawaii. The teachers, Jade Bowman and Jamilynn Mareko, decided to put students through an interview process to select their group. These teachers wanted to have students understand that this opportunity was a privilege to be part of and wanted to entice interest and appreciation for the environmental adventure ahead. Students were grilled about why attending this course was important to them, and it worked. When Catherine Spina, the *Teaching Change* program coordinator, arrived to greet the

students, they were packed and ready to start the day, like explorers ready to for an expedition into uncharted territory. They were all ears with some visible mild trepidation about what lay ahead, but excited to begin their adventure.

As Spina fielded questions, one concerned student asked if they would be sharing the cabin with spiders because she was deeply afraid of them. Several other students echoed this sentiment, visible from their raised eyebrows and nodding heads. They had not considered this hazard until then. Spina responded with reassurance. *“Housing accommodations are safe comfortable and clean”,* adding that *“there are no guarantees that a rich safari of species diversity will be seen on the trip, however the more the merrier – we are going to a wildlife refuge!”* Spina further encouraged students to keep a list of the different species they encountered over the next two days. As Spina wrapped up her introduction and safety briefing, Bowman pulls her aside and points to one of the students attending, explaining that he had not slept well in the nights leading up to this trip because of the anxiety involved with being away from home for the first time in his life. Spina had heard this story many times before on prior trips. For many students, this will be an experience of personal growth, of leaving the nest and getting the big picture perspective of their island home. After packing a 4WD van and large field truck with all the gear, food and materials needed for the trip, the group was off for Hakalau.

As the group drove away from Waimea, students played a species-seeker game and completed their first assignment on identifying differences in their surrounding environment. Hawaii Island is home to four of the five major global climate zones and the 2-hour drive to the refuge is a journey through these varied environments. The sunny morning in Waimea overlooking the lush green hills was left behind as the group drove through a dry landscape dominated by the non-native fountain grass, kiawe and cactus before ascending the slopes of Mauna Kea. There are so many opportunities for learning on these trips, and pointing out ecosystem connections and transitions makes the drive fly by for the students. Once on Saddle Road, the environment changes again from nonnative grasslands to dry upland shrublands and then to forests surrounded by fields of black lava. As the landscape changes, student observations lead to a stream of questions that Spina enthusiastically addresses.

In 2011, Dr. Creighton Litton (Department of Natural Resources and Environmental Management, University of Hawaii at Manoa) and Dr. Christian Giardina (Institute of Pacific Islands Forestry, U.S. Forest Service), both forest ecologists studying the state of Hawaii’s ecosystems, including those at Hakalau Forest National Wildlife Refuge, saw a need and had a vision. They saw native forest habitats decreasing rapidly in quality and function, largely due to human impacts. What was needed was a way to help mitigate this degradation of native ecosystems, and the place to start was with Hawaii’s youth, the future scientists and land managers for and from the State of Hawaii. With the help of many collaborators, the Teaching Change Program was born. Teaching Change, has been managed and overseen by the Friends of Hakalau Forest and is a broad partnership that includes participation by Hakalau Forest NWR (staff and logistical support), University of Hawai’i at Manoa (financial and programmatic support), USDA Forest Service (staff support), Dr. Ming Wei Koh with PREL (curriculum and programmatic support), USGS - PIERC (native bird research opportunities), Imi Pono no Ka aina (environmental education), and more recently, with the Division of Forestry and Wildlife – Puuwaawaa Forest Reserve (programmatic support). Now in its 8th year and reaching more than 8,500 local students through a variety of programs, including overnight trips to the refuge, Teaching Change has impacted the minds of tomorrow’s leaders and continues to grow in scope and reach.



Turning onto the bumpy and windy Mana Road, the students' excitement was building with giggles and waves like sounds heard on a roller coaster as the van went over each hill and down to each stream. Spina geared up for a somber introduction. "Oh my gorse" she exclaimed after turning a corner and seeing the expansive view of gorse shrubs (*Ulex europaeus*). She continued by adding that "the spread of gorse can even be seen from space", and the students are all ears with eyes wide in awe at the sight. Impenetrable thickets of yellow-flowered gorse shrubs were introduced to the island over a hundred years ago as living fences, and this highly invasive species has rapidly spread, swallowing hilltops one after the other. After about 30 min of driving through dense thickets of this plant, it is clear that left unchecked, gorse is a real threat to the entire mountain ecosystem. The plant is so thorny that hand pulling is not feasible. Students were put in the hot seat and asked how they would manage this site? One student suggested burning, another herbicide, and one even offered to use her dad's bulldozer. In fact, all these approaches have been used, yet none has been very effective. Over the next couple of days these students were tasked with mulling over the gorse issue and coming up with feasible solutions. Spina knows this is a difficult question, but explains that forest managers tackle challenging, big picture questions daily. This was their opportunity to understand the role of conservation leaders in their community, a role that these students will one day fill as citizens and at least some of them directly as conservation professionals.

In large part, the design of the Teaching Change program is to inspire local youth to pursue careers in natural resource management in Hawaii. By directly exposing local youth to the unique ecological and cultural heritage of native forest ecosystems, Teaching Change inspires Hawaii's students to think about the threats these ecosystems face and what can and is being done to manage those threats. Additionally, the program fosters and empowers local students with the knowledge of what careers exist in the state in natural resource management, and how to prepare themselves for these careers via postsecondary educations in Hawaii.

As we approached the refuge, the landscape began to change again and students started to notice their first koa trees in the distance. Fences began to appear and within the enclosures lay a native forest oasis. "These are Hakalau Forest National Wildlife refuge forest units, managed sites. What do you notice?" asked Spina. "Where is the gorse?" one student replied. Spina explained that it was an unwelcome visitor to these parts because of its potential to take over areas, a phenomenon already etched into their minds from the drive to the refuge. To promote native species at the refuge, decades of work have been conducted to fence and remove unwanted, invasive plants and animals such as gorse, providing the students with their first look at what natural resource management means on the ground. As the refuge sign became visible and the group drove down to the entrance gate, the students fell silent. You can almost feel their minds taking it all in, seeing the immediate transition into a native forest dominated landscape as they cross the threshold into the refuge.

Hakalau is home to many of the State's most vulnerable, threatened and endangered native species, many of which the students have never seen or heard, and may never encounter elsewhere. This environment facilitates Teaching Change to deliver core STEM concepts in the context of a transformative and highly personal learning experience over 2 days.

It is lunchtime when the group arrives at the University of Hawaii housing and laboratory facilities at the refuge. The expansive field station boasts a large kitchen joined with a spacious dining room that doubles as a classroom. A separate wing houses a dormitory with 16 beds. Fortunately, all expenses (food, transportation, lodging, substitute teacher support, raingear, etc.) are provided by *Teaching Change* through the grants that support the program. The program is designed in this way so that schools do not have to sacrifice expenses and resources in order to have this opportunity available to their students.

After lunch, Steve Kendall, the refuge biologist clad in US Fish and Wildlife Service (USFWS) uniform, arrived to greet the students and provide them with an hour-long overview of the unique habitat that is Hakalau. Kendall was once a schoolteacher and it was obvious by his glee and enthusiasm as he talked about nature. Kendall transitioned from the classroom some 28 years ago to work with the USFWS in environments ranging from the Arctic wilderness, where he learned to outsmart polar bears, to the remote landscape of Mauna Kea managed by the refuge. As part of Kendall's introduction, he explained that Hakalau is home to native bird species that are rapidly declining in areas beyond the refuge fences. He also described that this is the home to a wide

array of native plant species that inhabit these cool wet forest habitats. With that knowledge in hand, students set out for a greenhouse tour to learn native plant identification. The group then moved on to participate in forest restoration, where each student picked a single native species to outplant at the



A student poses with her selected outplanted ohia tree adorned with koa leaves and her custom label reading "I will protect you".



Students reaching for the sign that hangs over the greenhouse entrance.

refuge with a personal message etched into an aluminum tag. "You are loved" read one, "May you grow to have many nests" read another. The outdoor portion of the two-day trip had only just begun, but it was obvious that students had already developed a personal and lasting relationship with Hakalau and the native species that reside there.

One of the keys to the refuge's effort to restore native ecosystems on degraded pastureland is the greenhouse nursery manager Baron Haraguchi, aptly dubbed "The Magician" for his ability to successfully propagate rare and

endangered Hawaiian plants. A volunteer-crafted sign above the greenhouse door reads “*Laulima*”, a Hawaiian word translating into many hands working together. It is with the help of many volunteer groups over the years, like students from *Teaching Change*, that Haraguchi’s babies are outplanted into the surrounding landscape to become habitat to provide homes and food for the many Hawaiian endemic species in the area. Incorporating a hands-on restoration effort into the immersive *Teaching Change* curriculum plays an important role in the students’ feelings of community accomplishment and resource management. By planting their own personal plant, these native species and their student planters serve as a beacon of hope for a future thriving native ecosystem.

The evening provided the opportunity for more learning, as Spina gave a presentation on climate change and its role in ecology and biodiversity. Students were surprised to learn that mosquitoes were the deadliest animal alive today, and that Hawaii was no stranger to their wrath. Mosquitoes, accidentally brought to the islands when Europeans began arriving, quickly established in Hawaii. Much like gorse, mosquitoes found a habitat that allowed them to flourish, with devastating impacts on their new environment.

Hawaii’s native forest birds evolved without viruses such as avian malaria and pox that are spread by mosquitos. With just one bite from an infected mosquito, Hawaii’s native forest birds often die. Fortunately, mosquitoes are limited by temperature (i.e., elevation) and most of the refuge is located in areas that are too cold for mosquito larvae to



Steve Kendall, the US Fish and Wildlife Service biologist at Hakalau leading a native bird hike.

develop. However, climate change is bringing warmer temperatures and allowing mosquitos to move up into high elevation wet-forests such as those at Hakalau. Though climate change is a primary focus of the *Teaching Change* curriculum, it is often an intractable topic for many educators. To help students understand climate change and to train them to observe their environment, *Teaching Change* embraces and uses the concept of ‘phenology’. Phenology is the study of lifecycles observed as both subtle and obvious changes within a species. After some brief training on the topic of phenology for koa (*Acacia koa*) and ohia (*Metrosideros polymorpha*) trees, the students are told that the following day will be filled with a hands-on citizen science activity to better understand the effects of climate change while also contributing to science. Students went to sleep that night with thoughts of the delicate ecosystems that surrounded them, and the important role that they would play the following day in documenting how it is changing.

No trip to the refuge would be complete without the opportunity to observe native Hawaiian forest birds in their natural habitat, and Kendall is just the person for that, starting the day by leading a 2-hour morning bird hike. Equipped with binoculars, customized bird guides, and a loaded backpack, in an atmosphere of excitement, the Waimea students eagerly began Day 2. The teachers had prepared their students for this special day with a Hawaiian chant that they beautifully sang before presenting a ti leaf lei at the beginning of the hike to show their heartfelt gratitude. Once the last note of their chant drifted away, the silence was broken only by the songs of native birds, the cue to begin. From the knowledge gained the day prior, students were well aware that the sights and sounds that they heard were a result of decades of management by the refuge. Watching scarlet colored iiwi foraging on the nectar of the akala (Hawaiian raspberry, *Rubus hawaiiensis*), listening to the call of the omao, and catching a glimpse of the orange plumage of the endangered akepa, was accompanied by the breathless whisper of the students flawlessly reciting each bird's name.



Students collecting phenology data on a koa tree with their teacher, Jade Bowman.

The afternoon is all about phenology, with students identifying and quantifying the phenological phases (phenophases) of koa and ohia trees at the refuge. These same trees have been visited by *Teaching Change* students since the program's inception, providing a large dataset that resides within the [USA National Phenology Network](https://www.usanationalphenology.org/) for anyone to see and use. In fact, koa and ohia are part of the national phenology network as a result of these students taking repeated measurements at Hakalau over the past 8 years, and the phenology data that they collect is already exhibiting patterns and, more importantly, is being used by scientists studying climate change in Hawaii.

After their phenology monitoring activities, a volunteer *Teaching Change* staff, Dr. Ken Puliafico, a research entomologist with the U.S. Forest Service, held an insect finding activity. *Teaching Change* benefits tremendously from volunteers who help the staff run trips, and it was remarkable to observe how students progressed from openly expressing disinterest, or even fear, in insects, to becoming highly engaged and awe-struck at the little critters once Dr. Puliafico found and presented them for close-ups. When the elusive and highly sought after happy-face spider, (*Theridion grallator*) was found, all students wanted a closer look! And the girl who at the beginning of the trip was so concerned about spiders? Turns out she wanted very badly to hold it and have her picture taken with it. When her classmates reminded her that she was afraid of spiders, she responded "*But this one is cute*".



A student poses with a Happy Face spider.



Students with an ohia tree aged to be approximately 650 years old.

Later that day Spina asked students if they noticed a tree that appears to stand out amongst the rest. It was a towering ohia reaching straight up into the sky. Spina explained that this tree was aged by Dr. Pat Hart's lab at the University of Hawaii at Hilo to be ~650 years old. Students were given the time to ponder what changes a tree of that age had witnessed, and that it likely meant that this single tree harbored the nests of many, many native bird species, some of which are now extinct. This also presented the opportunity to speak with the students more about *Ceratocystis*, a fungus more commonly known as Rapid Ohia Death (ROD) that is currently threatening ohia forests throughout Hawaii Island, and was recently discovered on the Island of Kauai as well. All the students were quick to encircle the tree and lay their hand on its bark, as though to provide a formal greeting.

As their two-day experience with *Teaching Change* and Hakalau Forest National Wildlife Refuge was coming to a close, the students took the time to reflect on their vast and rich experiences over the prior days by composing a haiku or short poem to be shared amongst the group. One read "*The sounds of nature, Harmonizing perfectly, Nature's melody*". One after another, each poem echoed the sentiment of nature's bountiful beauty and importance, yet also its vulnerability and need for care and management. While driving away from the refuge, down Mana road and through the jungle of gorse, one student

triumphantly suggested, "*Why don't we use a native vine to cover and smother the gorse since it cannot tolerate shade?*" Spina smiles, mission accomplished. The students were now thinking about ways to manage and conserve the native ecosystems of their island home, a home that they share with the many vulnerable native species they met over the last two days.

In addition to field trips at the refuge, Teaching Change also offers: (i) overnight field trips to the Puuwaawaa unit of the Hawaii Experimental Tropical Forest for middle and high school students; (ii) day trips to visit local kipuka forests for 4th grade students; (iii) teacher training workshops for local middle and high school teachers to incorporate place-based, outdoor, immersive education opportunities in their classes; and (iv) in collaboration with the Division of Forestry and Wildlife, an annual Bio-cultural Blitz event. For more information on the Teaching Change program, please visit www.teaching-change.org

By Catherine Spina

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Upcoming Events

The Refuge's Outreach Intern, Loreto Villegas-Villeza has a Friends of Hakalau trip planned for August.

August 15-16, 2018

This Trip will include outplanting on one day then a bird tour the next morning. This trip may also include help with seed collection or greenhouse maintenance/cleaning.

You must be a member to participate, but can join at the same time you sign up.

***To reserve your place, please e-mail
friendsofhakalauforest@gmail.com***



Loreto leads Friends on an invasive plant removal project

September 14-17 3rd Annual Festival of Birds

2018 Festival Theme

Back from the Brink
Hawaii's Battle Against Extinction

Sheraton Kona Resort at Keauhou Bay

To register go to <https://birdfesthawaii.org/>



Become a Member

Friends of Hakalau Forest, National Wildlife Refuge is a 501 (C) (3) organization and is recognized as a tax exempt non-profit organization by the Federal government and the State of Hawaii. We appreciate and thank you for your membership and or your donation.



*Friends of Hakalau Forest members enjoy a brief hike in
Pua Akala led by Lance Tanino*

Please download a [Membership/Donation Form](#), fill out, make checks payable to Friends of Hakalau Forest NWR and mail to:

***Friends of Hakalau Forest, NWR
P.O. Box 6065
Hilo, HI 96720***

Board Meetings will be held monthly; members wishing to attend should contact the Secretary, President or Vice President to confirm the meeting time and date.

The Annual Membership Meeting occurs in late January. Please check Events for exact date, location and time.

