

# SECRETARY OF THE ARMY ENVIRONMENTAL AWARDS 2024

## HAWAII ARMY NATIONAL GUARD NATURAL RESOURCES CONSERVATION, SMALL INSTALLATION

Stretching across several island sites, the Hawaii Army National Guard's (HIARNG) statewide installation is small, but the challenges of natural resources conservation (NRC) management in this tropical environment should not be underestimated. The HIARNG installation comprises seven readiness centers, two Army Aviation Support Facilities (AASF), Regional Training Institute (RTI), Regional Training Site Maintenance (RTSM), six shops, three training sites, and headquarters. All together, these sites encompass under 1300 acres. The primary training sites where NRC activities are conducted are Keaukaha Military Reservation (504 acres), Kekaha Firing Range (68 acres), Ukumehame Firing Range (39 acres), and the RTI on Oahu (48 acres). These training sites are home to a number of unique biological resources. Keaukaha Military Reservation (KMR) contains 229 acres of lowland wet forest, an increasingly rare ecosystem in Hawaii, as well as endangered Hawaiian hawks and Hawaiian hoary bats. At Kekaha Firing Range (KFR), the NRC program manages for endangered Niihau panicgrass and threatened sand dune habitat. The seasonal wetlands on Ukumehame Firing Range (UFR) attract endangered bird species, several of which are also present at the RTI. Throughout all the training sites, however, the most consistent challenge has been eradicating invasive and non-native species that continually threaten precarious ecosystems and impede training access while reestablishing thriving forest systems. To that end, the NRC program has implemented a multi-faceted approach that has focused on hybrid habitat creation over the past two years. As a result, among training lands where every acre is precious, the HIARNG is achieving holistic benefits at the ecosystem level that enhance training capabilities.



Through building strong partnerships, the NRC program has accomplished a number of milestones over FY22-23, including the planting of over 1,200 trees in cooperation with the One Trillion Trees project. These plantings are part of the broader implementation of a project to establish climate resilient hybrid forests on the islands, with a blend of native, endemic, and Polynesian species that will achieve carbon sequestration goals. This approach was pioneered through University of Hawaii research on KMR, and the NRC program has continued to expand its use across training sites, particularly as forests have been impacted by the statewide loss of native 'ōhi'a trees to disease. In the process, the NRC program has been able to bring many more activities in-house, saving significant funds over previous contracting. The NRC program has also fenced off 475 acres of forest restoration parcels, protecting these recovering areas from feral pigs. They have also established in-house propagation of seedlings to support ongoing recovery of the hybrid forests, saving around \$20,000 each year in avoided purchase costs.

The NRC program has amplified its capabilities through cooperation with a number of agencies, non-profits, universities, and working groups committed to ecological restoration. The One Trillion Trees project is a worldwide initiative that was endorsed by the Governor of Hawaii, and the HIARNG has been partnering with this group for several years. Together, the non-profit and the NRC program have developed a plan for tree planting through 2030 that will combat climate change effects and stabilize the existing ecosystem. The NRC program also participates in the state's Lowland Wet Forests Working Group, composed of 15 partner





agencies that collectively work to protect this habitat and respond to ‘ōhi‘a loss. University of Hawaii at Hilo has been another critical partner. University research several years ago validated the hybrid ecosystem recovery strategy at KMR, and the NRC program has implemented this plan across training sites. With the KMR research, the university established a larger program known as Liko Na Pilina (the budding of new relationships), with which the NRC program continues to partner; university researchers and students assist with the propagation and planting of seedlings for the installation and with the maintenance of restored forest stands. The US Forest Service and US Geological Service have assisted in monitoring for ‘ōhi‘a disease and in addressing the invasive species impacts that occur when ‘ōhi‘a canopy is lost; these close working relationships help to maintain the HIARNG’s regulatory compliance as well. USDA Animal Plant Health Inspection Service (APHIS) is another important partner, and their management of permit processes helps the HIARNG to remain fully compliant with Section 7 of the Endangered Species Act, the Migratory Bird Act, and Bird Aircraft Strike Hazard (BASH) prevention. APHIS Plant Pathology has provided assistance in responding to ‘ōhi‘a fungal disease and explorations of inoculation treatments.

The NRC program consults with the US Fish and Wildlife Service (USFWS) on several threatened and endangered (T&E) species; notably, as a result of invasive longhorn kiawe eradication, the NRC program documented its first sighting of endangered Hawaiian ducks and threatened nene goose at KFR over the past year. The Big Island Invasive Species Committee (BIISC) and Kauai Invasive Species Committee (KISC) have been critical partners in targeting invasives like miconia, albizia, and kiawe, providing the labor and expertise needed to contain these plants without resorting to enormous quantities of herbicide that could also threaten native plants. The Hawaii Department of Land and Natural Resources (DLNR) assists the NRC program with containing another ecological threat—feral pigs. DLNR staff have coordinated to allow the NRC program to begin trapping and relocating feral pigs, thereby saving the HIARNG around \$60,000 a year in foregone contracting costs.

The NRC program is managed by six dedicated staff members in the Environmental Directorate (HIARNG ENV), including a Conservation Manager, NRC Supervisor, and NRC specialist working across multiple locations. Responding to the enmeshed priorities of NRC and



Restoration plots within the lowland forest at Keaukaha Military Reservation provide the opportunity to reduce invasive plant species, outplant native and Polynesian introduced plants using a hybrid ecosystem approach, create positive ecosystem services, provide opportunities for public out planting events, and increase training lands.



training, the HIARNG has fully integrated the HIARNG ENV into all planning and operations. NRC, compliance, and pollution prevention staffs work cross-functionally to support the broader sustainability goals of the entire statewide installation. The HIARNG ENV's active participation on the Environmental Quality Control Committee (EQCC) teams allows for fuller integration of NRC measures throughout the HIARNG organization with the support of commanders and directorate heads. In total, 20 senior leaders and commanders and 11 HIARNG ENV staff members participate in these meetings and the decision-making process; a second tier of EQCC teams integrates unit EOs into NRC activities.

The NRC program will begin the five-year update of its Integrated Natural Resources Management Plan (INRMP) next year; the update will reflect the focus on reforestation and expansion of in-house capabilities that the staff continues to develop. After years of aggressive action, the NRC program has had incredible success in controlling and reversing the spread of invasive plants. Indeed, control of such plants is largely conducted internally now, saving \$120,000 in contract fieldwork that is no longer required.



Endemic plant species kolea (*Myrsine lessertiana*), kopiko (*Psychotria hawaiiensis*), and ohia lehua (*Metrosideros polymorpha*) trees grown from seed collected and propagated onsite at Keaukaha Military Reservation. The ohia lehua tree is the official Hawaii State Endemic Tree.

**Reforestation:** The NRC program manages some of the most endangered lowland wet forest ecosystems at KMR. The 'ōhi'a/lama forest community is a closed canopy forest that is currently only found on the eastern side of the island of Hawaii. It is dominated by 'ōhi'a (*Metrosideros polymorpha*) and lama (*Diospyros sandwicensis*) in the overstory, and various shrubs, small trees, and ferns in the midstory and understory. These forests are also home to three endangered species—the Hawaiian hawk, Hawaiian hoary bat, and Haiwale shrub. The KMR forest is also home to a variety of endemic species that are found nowhere else in the world. With the decimation of 'ōhi'a due to a fungal disease, however, the stability of these forests is under threat, and the loss of canopy cover from these trees creates opportunity for invasive species to regain their hold on the landscape.

Based on research from the University of Hawaii, the NRC program has focused on designing climate-resilient forests with plantings that are not limited only to native species, but rather to a hybrid blend of native, endemic, and Polynesian varieties that can achieve ecosystem sustainability, carbon sequestration, and wildlife habitat support. This is a landscape level approach that integrates modeling on future climate regimes and the functional traits of

different species that may not have been originally present. This allows the NRC program to





achieve, for instance, the blend of canopy and understory essential to the forest type in the absence of keystone species like ‘ōhi‘a, which can take hundreds of years to reach maturity. Utilizing the recommendations of University researchers involved in Liko Na Pilina and the support of One Trillion Trees, the NRC program has planted over 1,200 trees over the past two years at KMR and throughout the rest of the HIARNG installation, reforesting with a blend of 27 compatible species. The results of the Liko Na Pilina program are outstanding; greater than 90% survival rates have been documented one year after planting along with increased seedling recruitment by native species.



With university support, the NRC program has implemented its own propagation program, growing trees for outplanting on-site; at KMR in particular, all trees planted over the past several years were grown in-house. This allows the program to devote resources for purchasing trees to support the RTI and KFR. As part of the One Trillion Trees project, the NRC program fenced off 475 acres at KMR to protect the lowland forest from feral hogs. This measure protects both the original trees and the new plantings. Until 2020, a contract with USDA provided the HIARNG with feral pig control, but the NRC program is bringing this effort in-house as of this year; under agreements with DLNR, staff will trap pigs, which have cultural meaning as a food source, and relocate them to areas where hunting is legal.

The fencing has been successful in keeping pigs out of the most critical forest areas. In fact, this is helping to protect ‘ōhi‘a trees that are still present; when pigs scratch at the trunk of the tree, it provides the entry point for fungal spread via beetles. Once infected, the trees die within a matter of days. The NRC program has been working with the US Forest Service to explore possibilities for treating or preventing the spread. Beetle trapping and preventive injections may be possibilities for future protection, but they are also looking at genetic immunity and characteristics of resistant trees. Some of the ‘ōhi‘a that the NRC program propagated at KMR seem to be resistant, and in September, a plot of these propagated seedlings will be outplanted over an acre parcel. If the immunity holds, this seed line and cuttings from the planted trees may be used to begin regenerating the ‘ōhi‘a more broadly.



**Invasive Species:** A side effect of the loss of ‘ōhi‘a is the spread of invasive plants; with more light reaching the understory, problem species could be able to regain a foothold. The NRC program is responding proactively with ongoing monitoring and treatment. After many years of concerted effort, however, the NRC program has been able to wind down the intensity of invasive plant eradication. A goat grazing program has been phased out in favor of



The highly invasive and a Hawaii listed noxious weed long-thorn kiawe (*Prosopis juliflora*) once dominated the coastal sand dune area of the Kekaha Firing Range (KFR) on the island of Kauai. To date, over 10,400 long-thorn kiawe plants have been removed from KFR. Surveys in 2022 and 2023 noted only 5 long-thorn kiawe plants. For the first time, two federally listed threatened nene geese were seen foraging atop the sand berm at KFR in 2022 and were also seen again in 2023.

mechanical clearing along trails. The NRC staff continue to monitor and record vegetation locations and density as the efforts shift more to maintenance to prevent a seedbank from retaking root.



**T&E Species:** Reforestation and invasive vegetation control directly benefit the rare and unique wildlife that depend upon HIARNG installation habitats. The fact that endangered Hawaiian ducks and threatened nene geese were seen on KFR for the first time ever this year is an indication that the NRC program's approach is working. The Hawaiian hawk was delisted as an endangered species in 2021 (though still a state-listed species), but the NRC program continues to protect habitat for the bird and is assisting USGS in a five-year monitoring program. Four hawks were caught and tagged with georeferencing monitors, though at least seven birds are known to use HIARNG training sites for foraging and nesting. The Hawaiian hoary bat is also present, and NRC staff have conducted restoration work in habitat corridors to clear vegetation. Native plants were seeded in these areas, with a 50% regrowth of native plants without any further maintenance.



The restoration work, in terms of reforestation, native plant propagation, and clearance of invasive species, has direct benefits to the HIARNG training mission. All of these activities, conducted in concert, create open forest understories that can be used for land navigation and other dismounted training; without the NRC program's efforts, much of these training sites would be so overgrown as to be impassable. Planting a hybrid ecosystem also helps the HIARNG to meet its goals for ecological stability, climate change resiliency, biodiversity, and carbon sequestration. As university researchers confirmed, the hybrid ecosystem approach



Once invaded by invasive plant species and unusable by the HIARNG, this 15-acre site is now utilized for training and maintained in-house by the HIARNG Environmental Conservation.

adopted by the NRC program are ideal for allowing training while still protecting endangered species and their habitats. These goals are important to other state agencies as well, positioning the HIARNG as a leader for its environmental stewardship and an active partner with state and military agencies.



In an effort to control the spread of 'ōhi'a fungal disease, the NRC program has established new training for HIARNG troops, with a protocol for decontaminating and cleaning equipment before it is moved to another site. Similar training has been provided so that soldiers do

not inadvertently spread invasive plant seeds. The HIARNG prides itself on its environmental ethics.

The successes of the NRC program can be transferred to virtually any installation challenged by reforestation or invasive species management, but they are particularly important for other land-owning agencies in Hawaii. Throughout all the islands, the collapse of key forest species threatens ecological stability. As a pioneer in the hybrid reforestation effort, HIARNG installations are proving the effectiveness of this strategy. A similar approach, however, could work for mainland installations where disease or insects have seriously harmed the diversity or density of particular tree types. The NRC program has encouraged other agencies to engage with the University of Hawaii's Restoring Ecosystem Services Tool (REST), an interactive modeling program that recommends species mixes that will create resilient assemblages of trees, even if these are not historic native varieties. Hybrid restoration is likely the solution for many degraded forests throughout the DoD.

The NRC program's internal continuity is grounded in coordinated management across directorates with environmental accountability and awareness instilled throughout all installation facilities through customized training. An environmental component in the HIARNG's SharePoint system has allowed for easier access and updating of electronic copies of all environmental plans, policy memoranda, and EO supplemental training. The NRC program's participation in working groups and interagency coordination help to further embed the goals and initiatives implemented within the HIARNG organization.

Partnerships also form the cornerstone of the NRC program's outreach and education efforts. As a member of the Lowland Wet Forests Working Group, the NRC staff are able to share their expertise and learn from others; there are 15 agencies involved in the group, including the Office of Hawaiian Affairs, the Institute of Pacific Islands Forestry, Hawaii Environmental Restoration, Kamehameha School, University of Hawaii at Hilo, Pohaku Pelemaka, and the Department of Land & Natural Resources, Division of Forestry & Wildlife (DLNR DOFAW). As a cross-section of public, educational, and non-profit environmental stewards, the group has been able to develop powerful guidance that can be shared with other agencies, landowners, and the public to combat the loss of 'ōhi'a and promote hybrid forestry. With the working group, the NRC program continues to explore the resources that are collectively available to fund forest preservation and to vet possible actions for their efficacy. Through partnership with One Trillion Trees, the NRC program and HIARNG have also been positioned to provide knowledge and literacy around forest stewardship for the broader community.

Cooperation with University of Hawaii researchers has also paid dividends for the NRC program. Research on hybrid ecology conducted at KMR has been published, contributing to the knowledge within the conservation field, and subject matter experts from all over the world have visited HIARNG posts through the University to conduct research and collect data that can then be used to inform program strategy. Under a Memorandum of Agreement (MOA) with the university, students also assist with planting activities and other fieldwork. Now the NRC staff are beginning to develop educational opportunities for younger students, as they are coordinating with the Youth Challenge Academy and local Parent Teacher Association groups to establish natural resources lessons and conservation camps for schoolchildren.



Students are invited to visit the KMR training site and adopt a plot of land to maintain. The program teaches them not only about biological conservation, but also cultural conservation, since the link between native history and culture and plant life is deeply entwined in Hawaii.