

**FINAL REPORT
FOREST STEWARDSHIP PROGRAM
COMPETITIVE GRANT # 13-DG-11052021-201
November 30, 2016**

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GRANTEE: State of Hawaii Department of Land and Natural Resources,
Division of Forestry and Wildlife (DOFAW)
ISLAND(S): Hawaii Island
GRANT YEAR: 2013
FEDERAL GRANT NUMBER: 13-DG-11052021-201
EXPIRATION DATE: **June 30, 2016**
GRANT PROGRAM: Forest Stewardship

DATES COVERED BY THIS REPORT (Beginning): July 1, 2012
(Ending): June 30, 2016

For each project in the original or reprogrammed grant narrative, please report on the following:

1. STATUS (Completed, ongoing, or not yet begun):

This project is complete.

2. WHAT HAS BEEN ACCOMPLISHED:

Goal 1) Reduce the threat of invasive species and diseases in the Kapāpala Koa Canoe Forest.
Obj. 1) Complete an invasive species survey, sustain management of existing disease resistance trials and improve infrastructure.

Goal 1 Status: Complete

Accomplishments: Sustain management of existing disease resistance trials

- The Hawai'i Agricultural Research Center (HARC) initiated a koa wilt seedling trial in the Canoe Forest. HARC staff planted 1,000 koa seedlings in a fenced enclosure (Figure 1). Since seedlings were planted in 2012, HARC has been monitoring and fertilizing seedlings as well as controlling exotic grass in the fenced enclosure. Additionally, HARC collected data including two-year annual measurements and number of forks, fork heights, branch angles, canopy area, as well as tree height and dbh, leaf type, form, and vigor. The tallest tree was about 24 feet. Some trees were very tall and straight, but had forking due to twig borers; psyllids also caused some branchiness. The koa was not badly impacted by the koa looper moth that defoliated wide swaths of koa forest on other parts of the island in 2014. In 2015, the trial area did experience wind damage due to storms resulting in

numerous koa being damaged and subsequently removed. In May 2015, 3 - year growth measurements of the remaining koa trees were collected. This included heights, diameters at breast height, vigor evaluations, and records of whether psyllid or koa caterpillar were present. This might give indication of seed sources that might be more attractive to insect pests. The tallest tree height measured was 9.6 meters (31.5 ft). In 2016, HARC activities included ongoing maintenance in addition to seed scouting, collection, and analysis as well as culling of inferior trees and fourth year measurements.

- In 2014 HARC staff also led students with Imi Pono No Ka Aina (Imi Pono) in forestry activities (see Goal 6) including how to measure trees and take diameters using tapes and calipers, height poles and range finders. HARC also led and/or assisted with two additional site visits in June and July 2014 composed of researchers and foresters.

Accomplishments: Improve infrastructure

- The existing fence around the site was evaluated in 2013 and sections were identified for replacement. Fence materials were ordered and TMA and DOFAW staff sprayed grass and cut fallen trees along the fence line to facilitate inspection and repair (Figure 2). Breaches in the existing fence were identified and repaired to prevent further ingress by cattle. DOFAW staff removed cattle from area in 2014; however ingress by just a few animals remains an ongoing problem.
- By June 2014 TMA and DOFAW staff replaced three miles of the existing fence. TMA staff supervised furloughed inmates from the Hawaii Community Correctional Center who helped transport and stockpile old fencing.
- Throughout the grant period, TMA and DOFAW staff continued to inspect the fence and look for any signs that cattle might remain/ingress in the unit. DOFAW staff cut fallen trees off the fence to prevent further ingress by cattle. Since cattle ingress appears to be an ongoing problem, in 2016 DOFAW staff initiated discussions with the ranch manager regarding ways to remove the cattle from the unit.
- In addition to fence repair and replacement, TMA staff, in 2015, made improvements to the access road which was degraded by heavy rain. Gravel was hauled in to repair large sections of road that were washed out.

Accomplishments: Complete an invasive species survey

- In early 2014 TMA staff conducted an initial weed assessment at the site to determine weed species composition and distribution. Later in the year, TMA staff conducted a site visit and weed assessment at the site with a staff member of the Hawai'i Community College (HCC) Forest T.E.A.M. program. In summer of 2015, TMA staff and Forest T.E.A.M. students conducted the weed assessment along several transects running the length of the unit.
- Results of the assessment show that aside from non-native grasses, few weeds are present in the area. The most common weeds detected, at low densities, were banana poka

(*Passiflora tarminiana*), Himalayan raspberry (*Rubus ellipticus*), and blackberry (*Rubus argutus*).



Figure 1. Koa trees within the HARC enclosure.

Figure 2. The perimeter fence that was sprayed by DOFAW to remove invasive plants.

Goal 2) Build momentum and local support to create and sustainable harvest and management plan. Obj. 2): Complete koa log surveys and produce a sustainable harvest and management plan.

Goal 2 Status: Complete

Accomplishments: Complete koa log survey

- In November of 2015, TMA staff assisted FSI with koa log surveys. All koa trees with a diameter greater than four inches were recorded; data remain with FSI.

Accomplishments: Produce a sustainable harvest and management plan

- TMA and DOFAW invited a diverse group of stakeholders to participate in the Kapāpala Koa Canoe Forest working group (“Canoe Forest working group”). Members of the working group were tasked with assisting with the harvest plan and the management of the area.
- In September 2015, the first meeting of the working group was conducted. The two-day meeting included a visit to the site and then a second day of facilitated discussion identifying priority concerns stakeholders wanted addressed in the Forest Management Plan.
- DOFAW staff selected and contracted Forest Solutions Inc. (FSI) to prepare the management plan for the unit.
- FSI completed two drafts of the Kapāpala Koa Canoe Forest Management Plan and circulated to Canoe Forest working group members for feedback during the January and April 2016 working group meetings. FSI, DOFAW, and TMA will continue to revise the

document as needed; a final document will be submitted to the Board of Land and Natural Resources for approval.

- The Canoe Forest working group also began drafting an application and allocation protocol to address the concerns of who would be eligible to obtain a canoe log when harvesting occurred.

Goal 3) Provide long-term sustainable management. Obj. 3) Complete a stewardship plan to be implemented by volunteers including invasive species control and outplanting.

Goal 3 Status: Complete

Accomplishments

- In 2012, a temporary TMA outreach and education assistant (Lauren Kurpita) drafted the Kapapala Youth Education Plan, assisted with student environmental education and community outreach programs in Ka'u, and assisted in identifying and planning outreach activities for Canoe Forest. In June 2013, TMA hired Lauren as a part-time outreach specialist for the project. In mid-2014 she finalized the Youth Education Plan which serves as a stewardship plan for the area to be implemented by volunteers.
- TMA staff sprayed a one-acre area with *Round-Up* in September 2014 to inhibit the invasive grass in preparation for future plantings. The first reforestation event at the area occurred in December 2014 with University of Hawai'i (UH) at Hilo ecology students. Students planted 50 koa seedlings along with 50 seedlings of understory species.
- In April 2015, TMA staff and volunteers collected koa seeds from the unit. These seeds were cleaned and given to the TMA greenhouse specialist to be propagated for future plantings.
- In May 2015, TMA staff constructed a temporary fence around the planting area using plastic construction fencing. The purpose of this temporary fence was to create a barrier to prevent cattle from eating the planted koa seedlings (Figures 3 & 4).
- In June 2015, student volunteers planted 75 koa seedlings and 50 seedlings of understory species.
- In July 2015, TMA staff and volunteers searched to collect koa seeds from the unit. These volunteers also cleaned 'a'ali'i seeds that will be propagated by the TMA greenhouse specialist for future understory plantings.
- Since late 2015, Outplantings at the Koa Canoe Forest site have been suspended since the construction fencing installed around the planting area did not keep the cattle from invading the area. The cattle consumed all the koa seedlings previously planted in the small enclosure. Although out-planting is suspended at Kapapala; outreach and environmental education activities utilize the Canoe Forest as an example site for koa restoration.
- In February and March 2016, TMA staff and volunteers collected koa seeds from the Canoe Forest. These volunteers also cleaned the seeds that will be propagated by the TMA

greenhouse technician for future plantings possibly at the TMA Keauhou koa forest restoration project.



Figure 3. TMA staff constructing the temporary fence at the planting area.



Figure 4. The completed temporary construction fence to deter cattle from eating the koa seedlings.

Goal 4) Respect Hawaiian traditions and include cultural practitioners in planning and management. **Obj. 4)** Establish a stakeholder working group and operational guidelines to provide long-term oversight of forest stewardship and harvest activities.

Goal 4 Status: Complete

Accomplishments

- In late 2013 and early 2014, TMA and DOFAW staff drafted a list of names of potential members for a Koa Canoe Forest Working Group from stakeholder groups. Biographies of these individuals were drafted then given to the office of the Chair of Department of Land and Natural Resources (DLNR) who would then appoint members to the group.
- Later in 2014 TMA and DOFAW staff members contacted potential working group members including canoe builders, outrigger canoe paddlers, woodworkers, and members

from organizations including the Polynesian Voyaging Society, the Friends of Hokule‘a, and Hawai‘iloa.

- In the spring of 2015, potential working group members were formally invited by the Chair Aila of the Hawai‘i DLNR to be members of the working group.
- In September 2015, the stakeholders gathered for the first meeting of the Kapāpala Koa Canoe Forest Working Group. The meeting was held over two days and included a site visit to the forest (figures 5 & 6) and an all-day meeting at meeting at Kilauea Military Camp (KMC) in Hawai‘i Volcanoes National Park. Information gathered from discussions guided Forest Solutions Inc. with the development of the Forest Management Plan. Working group members that attended the meeting included members of canoe racing associations, cultural practitioners, a member from the Friends of Hokule‘a and Hawai‘iloa, conservationists, kupuna from the Ka‘ū community, TMA and DOFAW staff. A concern of the working group was that none of the canoe carvers invited was able to attend the meeting. Additional carvers were invited to the second meeting to ensure their stakeholder group would be represented. The first draft of the Forest Management Plan was distributed to the members of the working group in December 2015.
- On January 9, 2016, the stakeholders gathered again at KMC for the second meeting of the Kapāpala Koa Canoe Forest Working Group. The carvers that attended this meeting addressed the concern from the previous meeting about the lack of carvers in attendance. During this meeting the first draft of the Forest Management Plan was distributed and feedback was provided to FSI.
- The third Kapāpala Koa Canoe Forest Working Group meeting was held on April 9, 2016 at the DOFAW Hilo Branch Office. The members were provided with a second draft of the Forest Management Plan and provided feedback to FSI. The group also began drafting an application and allocation protocol to address the concerns of who would be eligible to obtain a canoe log when harvesting occurred.
- TMA and DOFAW staff planned and facilitated all working group meetings.
- The working group agreed to keep meeting to continue to work on the application and allocation protocol and to possibly serve as an advisory body for management practices.



Figure 5 & 6. The site visit to the Kapāpala Koa Canoe Forest during the working group meeting.

Goal 5) Engage a wide-spectrum of the community in forest management and invasive species control. Obj. 5) Create an environmental education site adjacent to the forest to facilitate stewardship activities.

Goal 5 Status: Complete

Accomplishments

- By the end of 2013, TMA staff identified an environmental education site (Figure 7) to use for camping and program implementation activities. The educational site serves as the central location for educational events and teacher workshops. Additionally, a draft information brochure was developed for distribution to community members and particularly for current users of the forest including hunters and pickers.
- On July 12, 2014 TMA staff assisted with leading a site visit at the Canoe Forest for a group from the Tropical Hardwood Tree Improvement & Regeneration Center
- By the end of 2014, TMA staff had constructed a tent platform (24' x 24') at the environmental education site to use for camping and program implementation activities (Figures 8&9).
- In the fall of 2014, TMA staff brought volunteers to the site as part of the annual Hawai'i Nei native species art exhibition art hike program. Volunteers had the opportunity to learn about native forest birds and plants, discuss forestry management strategies, and were led

on a hike through the forest. Additionally, the Koa Canoe Forest Environmental Education Specialist conducted a site visit with faculty and staff from the University of Hawai‘i - Pacific Cooperative Studies Unit. The Environmental Education Specialist led additional site visits for staff from UH Hilo and HCC in order to plan for future events and projects involving their students.

- In spring and summer of 2015, TMA staff brought student volunteers to the site as part of the ‘Imi Pono environmental education program. Students participated in service projects of seed collection of koa and seed cleaning. They also had the opportunity to learn and experience native forest birds and plants (fig. 3). In June, nine students from this program planted 75 koa seedlings along with 25 a‘ali‘i seedlings. Also, students from the Hawai‘i Community College (HCC) Forest T.E.A.M. program conducted weed surveys with the TMA staff at the site.
- In July 2015, the ‘Imi Pono Summer session went to the Canoe Forest for a day. The students participated ‘a‘ali‘i seed cleaning, learned about the importance of koa to native forests and cultural practitioners, went on an interpretive hike and engaged in palapalai lei making (fig. 10 & 11).
- In July 2015, the University of Miami-Ohio Earth Expeditions Program used the education site as their outdoor classroom. The students, educators from across the country including Hawaii, were taking a graduate field course focused on conservation issues in Hawai‘i. They participated in seed cleaning for future propagation efforts, learned about the importance of koa to native forests and cultural practitioners, learned about the history and role of the Kapāpala Koa Canoe Forest, and participated in forest management techniques.
- In August 2015, TMA staff brought student volunteers to the site as part of the ‘Imi Pono environmental education program. Thirteen students camped overnight at the education site. The trip was scheduled for two nights, but the group left after one night due to severe weather and pending storm conditions. The students were still able to participate in forestry management activities, birding, and plant identification activities.



Figure 7 & 8. Imi Pono no ka Aina program utilizing the education site and tent platform.



Figure 9. Earth Expedition students utilizing the tent platform to have a group discussion.



Figures 10 & 11. Students learning to make palpalai lei.

Goal 6) Engage teachers and schools in forestry issues and education. Obj. 6) Utilize the site for HEEA teacher trainings and educational workshops.

Goal 6 Status: Complete

Accomplishments

- In late 2013, the education coordinator led two trips with volunteers to the site to discuss potential collaboration on educational programs. Additionally, the education coordinator conducted planning meetings with local elementary and high school teachers to discuss the potential involvement of schools and classes. Educational handouts were created about the purpose and goals of the site to distribute to schools and teachers.
- In February 2014, the TMA environmental education team camped at the education site to plan and prepare for future education programs.
- In March 2014, the 'Imi Pono Spring Enrichment Program was held at the site. Ten middle and high school students and four staff camped for two nights. The theme of the program was Hawaiian Plants and Their Uses. Students participated in plant identification activities, bird watching, navigating using GPS, lei making, storytelling, and journal writing. The students also meet with a staff member from HARC to learn about the koa seed trials and the enclosure. They were able to collect data on the measurements of the trees and they removed the invasive grass surrounding the planted trees.
- In January and February 2014, the outreach specialist conducted trips to other sites (Kaiholena and Pu'u Ki) for the second and third grade classes at Volcano School of Arts and Sciences. These classes were not able to obtain approval from their school officials to visit the Canoe Forest due to concerns over hunting regulations. The activities for these students focused on native species, koa in particular. Students participated in hikes, created sound maps of their observations from the forest, used graphic organizers to take notes about plants and their function within the forest, and created leaf rubbings.
- In April 2014, the outreach specialist taught lessons for the Biology classes at Ka'u High School. One lesson focused on evolution and native forest birds. The students performed a lab testing the effectiveness of various bird beaks with different food sources. Another lesson focused on invasive species and their impact on native ecosystems. The students were able to play the "Ungulate Invasion" game, which introduced the students to real life scenarios and implications of invasive species.
- In July 2014, the student of the 'Imi Pono Summer program traveled to the education site. The students learned about koa scientifically and culturally. The students learned about the purpose of the Canoe Forest and the role the koa trees have in perpetuating the cultural traditions of voyaging. The students also removed invasive grass around the planted trees within the HARC enclosure.
- Throughout the second half of 2014, the Education Specialist conducted planning meetings with local middle and high school teachers to discuss the potential involvement of schools and classes in Canoe Forest activities. Local schools are resistant to allowing students to participate in field trips at the site because it is a hunting area, so the Environmental Education Specialist brought the forest into the classroom. She visited the Ka'u Middle School Science classes four times in December to implement lessons about

the Canoe Forest involving topics of forestry management, watershed science, and native and invasive species.

- In late 2014 the Environmental Education Specialist also led a service trip for the UH-Hilo Ecology class at Kamehameha Schools' Keauhou Ranch because the class had limited time and could not make the trip all the way to the Canoe Forest. The students planted 50 koa seedlings along with 150 seedlings of understory species and learned about the Canoe Forest at Kapapala.
- In the first half of 2015 Students from the third grade at Volcano School of Arts and Sciences, Ka'ū High School's AVID class, UH Hilo's Ecology and Conservation Biology classes, and HCC Ethnobotany class participated in educational events held at Kamehameha Schools' Keauhou Ranch and The Nature Conservancy's Kaiholena Preserve that were led by the Koa Canoe Forest Environmental Education Specialist. These sites were utilized since these classes had limited time and could not make the trip all the way to the Canoe Forest. Students learned about forestry management techniques at the Canoe Forest, watersheds, and native species. Students participated in reforestation with koa, mamane, and a'ali'i. The Environmental Education Specialist led classroom presentations for these students to prepare for their service trips into the field.
- In October 2015, UH-Hilo's Ecology students participated in a reforestation event and planted 150 koa seedlings. Additional reforestation events were cancelled due to severe weather on the days of the events.
- In December 2015, the Education Specialist engaged Ka'ū Middle School science students in classroom lessons about native birds, adaptations, and evolution. In-class lessons were conducted since it was not feasible for the class to go the forest (Figures 12 & 13).
- In December 2015, a Ka'ū High School student and teacher along with the Education Specialist traveled to the Kapāpala Koa Canoe Forest to collect data about koa and rhizobia (Figures 14 & 15). The Education Specialist served as a mentor for the student's Science Fair Project.
- In February and April 2016, the TMA environmental education team held teacher workshops highlighting the Kapapala Canoe Forest at Keauhou Bird Conservation Center. Teachers learned about the educational opportunities provided by TMA education staff and ways to incorporate place-based learning into their classrooms. One of the teachers that participated in the workshop in February brought her class to Keauhou for a restoration event in March.
- In January 2016, the Canoe Forest Education Specialist led a field trip for the Volcano School of Arts and Sciences third grade at the Nature Conservancy's Kaiholena preserve. The students, teachers, and family members hiked in the forest and engaged in plant identification activities. The students also participated in activities about the Canoe Forest, watersheds and Hawaiian culture.

- The Canoe Forest Education Specialist conducted koa restoration activities for community members and students groups from EB DeSilva Elementary School (Hilo) and Ka‘ū High School.
- In March 2016, the Canoe Forest Education Specialist joined the TMA ‘Imi Pono Spring session during a week of activities at Hawai‘i Volcanoes National Park focused on the Kapapala Canoe Forest, watersheds and forestry management. Students even conducted a habitat assessment to determine the quality and potential of the area for the endangered ‘Alalā or Hawaiian Crow.



Figure 12 &13: Students from Ka‘ū Middle School students engaged in activities about native bird adaptations.



Figures 14 &15: A Ka‘ū High School student collecting data on koa for her science fair project.

Goal 7) Civil Rights Compliance Obj. 7) DOFAW will establish and implement a comprehensive and going program of civil rights training for all staff, contractors and sub-awardees.

**Goal 7 Status: Complete
Accomplishments**

- TMA is located in a federal facility, “And Justice For All” posters are displayed in staff offices. Also, TMA staff will include non-discrimination statements and Forest Service affiliation on all finalized printed materials.

Goal 8) Civil Rights Compliance Obj. 8) DOFAW will conduct a comprehensive program review of civil rights compliance within the Department and with all contractors and sub-awardees.

Goal 8 Status: Ongoing

Accomplishments

- This activity is ongoing.

3. PROBLEMS ENCOUNTERED (Explain delays, adverse conditions or changed costs that significantly impair the ability to meet grant objectives. If necessary, prepare a separate formal request for an extension of the grant period):

- Feral cattle remain in the unit and continue to create challenges with planting koa seedlings. The poor condition of the 4WD roads created challenges in accessing the unit – without ongoing road maintenance, many section of the forest are inaccessible. Alternate locations with easier access were used for some outreach activities, but all environmental education activities related to koa ecology, native ecosystem, and watershed functions highlight or included the Kapapala Canoe Forest.

4. CHANGES PLANNED (If the scope of the objectives would change, or if more than 10% of the total budget would change object class categories, or if more funding is desired for computers, or if funding is to be shifted from “personnel” to “contractual”, or if the lead person has or will change, communicate with the program manager about a separate formal request to amend the grant):

- N/A

5. OTHER COMMENTS

- TMA staff planned to build an informational kiosk at the entrance to the Canoe Forest during this reporting period but work had to be rescheduled and it will be completed in FY17, outside the timeframe of this grant.

BREAKDOWN OF Federal GRANT EXPENDITURES:

Major Categories	Federal \$	Federal \$ Spent
Travel	\$10,000.00	\$4,709.60
Supplies	\$29,000	\$34,370.60
Contractual	\$173,000	\$172,919.80
Other: DOFAW Admin	\$23,500	\$23,500
Total	\$235,500.00	\$235,500

BREAKDOWN OF Match GRANT EXPENDITURES:

Major Categories	Match \$	Match \$ Spent*
DOFAW Personnel	\$30,160	\$26,488.08
DOFAW Fringe Benefits	\$17,440	\$15,171.39
Travel	\$9,300	\$0.00
DOFAW Supplies	\$7,500	\$1,495.50
DOFAW Other	\$27,000	\$16,775.91
Other Match:		<i>\$175,569.12</i>
- Volunteers		- \$42,298.47
- TMA personnel/fringe		- \$92,033.38
- TMA supplies		- \$11,076.37
- HARC personnel/fringe		- \$28,453.00
- HARC travel		- \$808.00
- HARC supplies		- \$900.00
	\$171,100	
Total	\$235,500.00	\$235,500.00