

State of Hawai'i
DEPARTMENT OF LAND AND NATURAL RESOURCES
Division of Forestry and Wildlife
Honolulu, Hawai'i 96813

November 8, 2019

Chairperson and Members
Board of Land and Natural Resources
State of Hawai'i
Honolulu, Hawai'i

Land Board Members:

SUBJECT: PROGRESS BRIEFING FOR RESEARCH AND EDUCATIONAL
ACTIVITIES OF THE HAWAI'I EXPERIMENTAL TROPICAL FOREST

Background

On January 25, 2007 the Board of Land and Natural Resources granted the U.S. Department of Agriculture, Forest Service (USFS), Pacific Southwest Research Station a non-exclusive 35 year permit to use State lands (Appendix A) situated at Laupāhoehoe and Pu'uwa'awa'a, Hawai'i for use as the Hawai'i Experimental Tropical Forest (HETF).

The HETF includes two Units: the Laupāhoehoe Wet Forest, totaling 12,343 acres, and the Pu'uwa'awa'a Dry Forest, totaling 38,885 acres. Unit maps are provided in Appendix A. The HETF overlays existing State of Hawai'i, Department of Land and Natural Resources (DLNR) managed lands and include the following land designations: Forest Reserve and Natural Area Reserve (NAR) in Laupāhoehoe, and Wildlife Sanctuary (*Forest Bird Sanctuary*), Forest Reserve and State Parks in Pu'uwa'awa'a.

The USFS works with the DLNR – Division of Forestry and Wildlife (DOFAW) and State Parks to manage research and education activities within the HETF. Further information regarding HETF management is outlined in the December 6, 2006 Cooperative Agreement (Appendix B) between the USFS and the State of Hawai'i Board of Land and Natural Resources (referenced throughout this document as "HETF Cooperative Agreement").

In granting the Permit to Use State Lands (Appendix A), the USFS agreed to "consult regularly with the State including:

- a) Providing an annual report on the status of approved new and ongoing research (including the primary investigator, the research topic, the location for the research, dates of field research, date of anticipated results, and contact information for the primary investigator);
- b) Providing an annual report on the number of educational tours and total number of participants, and

- c) Annually reporting on the challenges faced in the administration of the Experimental Forest.”

This submittal provides an overview of HETF administration, a summary of the research and education activities that have occurred within the HETF in 2018, current plans for facilities and the challenges associated with HETF administration. More detailed information can be found within the annual reports available online (<http://www.hetf.us/page/home/>) or hardcopy by request.

Administration

Per the HETF Cooperative Agreement, "owing to the many values and benefits that arise from research, education and demonstration on the HETF and elsewhere, the Parties (the USFS and the State of Hawai'i) further agree they will consult and reach agreements with each other to coordinate research, management, and education activities." The HETF Planning Group was established to fulfill this objective and includes the USFS-HETF Line Officer, the USFS-HETF Science Lead, the USFS-HETF Facilities Manager, the Hawai'i Island DOFAW Branch Manager, the Hawai'i Island Natural Area Reserves Program Manager, the Hawai'i Island Forestry Program Manager, East and West Hawai'i Island Wildlife Biologists, the Pu'uwa'awa'a coordinator, and two to three external partners.

Permitting

Permit applications for research and education activities are reviewed by a subset of the HETF Planning Group, the Research Technical Committee (RTC), which includes the USFS-HETF Line Officer, the Hawai'i Island DOFAW Branch Manager, the USFS-HETF Science Lead, the Natural Area Reserve Hawai'i Island Manager, the Forest Reserve Hawai'i Island Manager, East and West Hawai'i Island Wildlife Biologists, and the Pu'uwa'awa'a coordinator. Permit processing and tracking is coordinated and administered by HETF staff. Signing authority for all permits within DOFAW managed lands lies with the Hawai'i Island DOFAW Branch Manager. All research permits are valid for one year and require an annual report. The Pu'uwa'awa'a Unit of the HETF is limited to land activities. Research activities that take place in water including up to the tide line are under the jurisdiction of the DLNR-Division of Aquatic Resources and the Office of Conservation and Coastal lands (OCCL). Permits within State Parks are issued by State Parks Hawai'i Island District Superintendent.

Community Advisory Councils

Per the HETF Cooperative Agreement, "the Parties will consult with scientists, managers, general citizens, and local community members concerning ongoing research activities. Existing State sanctioned advisory councils may be utilized for this purpose." The Pu'uwa'awa'a Advisory Council (PAC) has been in existence since 2002. The Laupāhoehoe Advisory Council (LAC) was formed in December 2010. Both councils advise on and facilitate HETF related activities, as well as participate in research permit application review and their comments and/or recommendations are provided to the RTC during the review process.

Support

USFS Staff

USFS-HETF Line Officer & Science Lead - Dr. Susan Cordell

USFS-HETF Education Lead - Dr. Christian Giardina

USFS-HETF Facilities Manager - Jon Mitsuda

HETF Resource Associate - Tabettha Block

DOFAW Staff

Hawai'i Island DOFAW Branch Manager - Steve Bergfeld

Hawai'i Island Natural Area Reserves Program Manager - Nick Agorastos

Hawai'i Island Forestry Program Manager - Jay Hatayama

East Hawai'i Island Wildlife Biologist - Joey Mello

West Hawai'i Island Wildlife Biologist - Kanalu Sproat

Pu'uwa'awa'a Coordinator - Dr. Elliott Parsons

State Parks Hawai'i Island District Superintendent - Dean Takebayashi

State Managed Research Activities

As mentioned previously, HETF lands are managed cooperatively by IPIF, DOFAW and State Parks. State management activities and research and monitoring activities performed by State staff do not require HETF permits and are not tracked within this annual report. Management activity reports for each State land designation (Forest Reserves, NARS, Wildlife Sanctuary and State Parks) are prepared by DOFAW administration and are available via annual reports to the Legislature.

Facilities

Laupāhoehoe

HETF support facilities for the Laupāhoehoe Unit are present within the town of Laupāhoehoe but outside the forest boundary. The Kahikina Learning Center (Center) is located on 55 acres of old sugar cane lands within the Laupāhoehoe community, approximately four miles from the HETF boundary. Facilities include a bunkhouse, complete with a full kitchen and classroom/meeting space, a restroom and shower building, and a workshop. The facility site offers opportunities for research, education, and demonstration. A weather station, installed in 2009, is located onsite.

Pu'uwa'awa'a

In 2018 the facilities planning process has taken a significant directional shift, in that the focus of the efforts will now be to rehabilitate the existing infrastructure (Meeting and Lake houses), owned and operated by the Hawai'i State Division of Forestry and Wildlife (DOFAW). Rehabilitation of these existing facilities will greatly benefit all members of the HETF community, providing upgraded, safe, and more useable bunkhouse and meeting facilities.

Conceptual rehabilitation design was completed in September 2018, with a multi-disciplinary group of USFS and DOFAW staff providing input to a USFS -contracted architectural and engineering (A&E) firm. Completion of the final design improvements package is anticipated to

be completed in July 2019. Subsequently, award of the construction contract is planned for September 2019. Construction activities should be complete by mid-2020.

Research

The HETF is utilized for research by universities, government agencies including the USFS, and private organizations, as well as others including non-profits, non-government organizations, and societies (Figure 1).

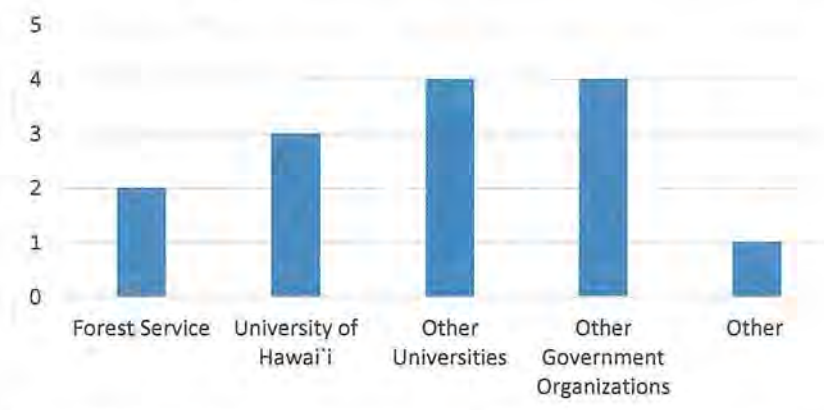


Figure 1: Affiliation for research projects initiated within the HETF from 2014 to 2018.

The HETF supported a total of 12 research projects in 2018. Table 1 provides a breakdown of project locations within the HETF Units and yearly project totals from 2014-2018. Research project locations may be specific to an HETF Unit or take place within both Units.

Table 1: Total number of research projects initiated in the HETF and grouped by Unit in 2018.

Year	Laupāhoehoe Unit Only	Pu'uwa'awa'a Unit Only	Both HETF Units	Total # of Projects Initiated
2018	3 (25%)	6 (50%)	3 (25%)	12

Selected research projects from this period are highlighted below.

- Diversity, distribution, and biology of the native Hawaiian bark beetles (Coleoptera: Scolytinae)*** - Dr. Conrad Gillett of the University of Hawaii at Mānoa has found that a total of 6 species of native Hawaiian bark beetles have so far been recorded, including the rediscovery of *Xyleborus pele*, a species which had not been recorded since its description in 1981 (and the last known specimen was collected 89 years ago). Bark beetle surveying through trapping was undertaken in the Laupāhoehoe Unit of the HETF between January 4 and February 15, 2018, and at the Pu'u Wa'awa'a Unit of the HETF between February 5 and April 19, 2018. Four species of native bark beetles in the genus *Xyleborus* were collected at Laupāhoehoe, and 2 species were collected at Pu'u Wa'awa'a. Despite this positive outcome, native *Xyleborus* are far outnumbered by exotic bark beetles. The specimens have been preserved for molecular phylogenetic analyses which will be undertaken during the course of the next year. A manuscript describing the rediscovery of *Xyleborus pele* has been accepted for publication. A manuscript is currently in preparation

detailing the survey for native bark beetles on Big Island, including additional sites at Hawaii Volcanoes National Park, with special comparison of the diversity and abundance of native species to those of exotic species.

- ***The genomic and transcriptomic analysis of adults and embryos of Hawaiian *Drosophila* and *Scaptomyza* flies*** - This study conducted by Joel Atallah of the University of New Orleans, analyzes both genomic DNA and RNA transcripts from the embryos and adults of a range of Hawaiian *Drosophila* and *Scaptomyza* flies from diverse species groups. These species will be collected from within the Laupāhoehoe Unit of the HETF. Researchers will study the transcriptomes of both a very early embryonic stage when RNA is expected to be mostly maternal (embryonic stage 2) and a later stage which will allow us to determine the identities of the first genes to be activated by the zygote. The early stages of *Drosophila* embryogenesis have been shown to be comparable across diverse species, allowing us to select equivalent stages and compare messenger RNA profiles. Comparisons will be made between the Hawaiian *Drosophila* transcriptomes from different species with each other and with *Scaptomyza*, to determine how these lineages have evolved at the genetic level, and to analyze whether the genetic changes we identify are correlated with the diverse morphological adaptations that these flies are famous for. In preliminary work, we have generated transcriptomes for two Hawaiian fly species, *Drosophila grimshawi* from the iconic picture-wing clade, and two Hawaiian *Scaptomyza* species, *Scaptomyza anomala* and *Scaptomyza elmoi*. Our early results suggest that some Hawaiian species may have highly diverged transcriptomes, possibly associated with their exceptional embryonic development.

Education

Both HETF Units are utilized for education and outreach activities. Table 2 contains annual data for the number of educational trips and participants within the HETF Units in 2018. Activities are categorized as education, service, education/service (this is when an education trip also includes a service portion) and other (which includes trainings, surveys (engineer, archaeological, plot, or private) as well as site visits, tours, media visits and Hawaiian cultural practices such as Ho‘olaule‘a).

Table 2: Total number of education trips in the HETF and grouped by Unit in 2018.

Year	Laupāhoehoe Unit		Pu‘uwa‘awa‘a Unit	
	# of participants	# of trips	# of participants	# of trips
2018	95	6	540	25

Some examples of educational activities from 2018 are highlighted below. More detailed information on all education activities can be found within the HETF annual reports available online at <http://www.hetf.us/page/resources/>.

- ***University of Hawaii at Mānoa*** students and faculty visited the Laupāhoehoe climate tower. Discussion focused on cloud water interception and how such equipment operates.

Participants also performed maintenance on the cloud water interception equipment and collected.

- **USFS and Ulu Lehulehu** staff hosted Laupāhoehoe Community Public Charter School (LCPCS) 9th grade students at the Laupāhoehoe Unit. Students focused invasive plant removal, such as *Rubus ellipticus* (yellow Himalayan raspberry), *Clidemia hirta* (Koster's curse), and *Hedychium gardnerianum* (kahili ginger) from along both sides of Blair Road (approximately 500 meters total), beginning near the climate station and working their way down the road. Aside from the service portion of this trip, staff shared mo'olelo and history of the area and discussed the ongoing research USFS does to help support the protection and conservation of our natural landscapes and resources.
- **2018 Biocultural Blitz** explores Hawaiian dry forest ecology as well as traditional Hawaiian cultural practices. The Institute of Pacific Islands Forestry and Hawaii Experimental Tropical Forest in partnership with the Hawaii Division of Forestry and Wildlife, the University of Hawaii at Mānoa and the Forest Service's National Partnership Office, hosted 250 fourth-graders for a "Bio-Cultural Blitz" at the HETF's Pu'u Wa'awa'a Dry Forest Unit. Students were traditionally welcomed by Native Hawaiian descendants of Pu'u Wa'awa'a and spent the day visiting stations highlighting the biocultural significance of Hawaii's endangered dry forests, from botany and soils to wildlife and insects to cultural geography and indigenous resource management, while engaging in hands-on activities.
- **Johns Hopkins University** graduate students participating in a special trip to Hawaii, visited the Pu'uwa'awa'a Unit to discuss restoration of dryland forests, its challenges and successes, restoration experimentation methods, and ahupua'a resource management.
- **University of Hawaii at Hilo, Geology Department** advanced Volcanology students measured stratigraphic sections of tephra fall in the shallow quarry at the west end of Pu'uwa'awa'a trachyte quarry. Students also measured shapes and sizes of pyroclasts, plus the thickness and extent of the layers for the purpose of reconstructing the sequence of volcanic events leading to deposition of beds in this area.

HETF Related Citations

Submitted with 2018 annual reports:

In 2018, three HETF-related journal articles were submitted through either project annual reports or direct submission.

Ibanez, Thomas; Keppel, Gunnar; Baider, Cláudia; Birkinshaw, Chris; Culmsee, Heike; Cordell, Susan; Florens, Vincent; Franklin, Janet; Giardina, Christian; Gillespie, Thomas; Laidlaw, Melinda; Litton, Creighton; Martin, Tara; Ostertag, Rebecca; Parthasarathy, Narayanaswamy; Randrianaivo, Richard; Randrianjanahary, Miramasoandro; Rajkumar, Muthu; Rasingam, Ladan; Ratovoson, Fidy; Reza, Ludovic; Sack, Lawren ; Aiba, Shin-ichiro; Webb, Edward; Whitfeld, Timothy; Zang, Runguo; Birnbaum, Philippe. Regional forcing explains local species diversity and turnover on tropical islands. In press. *Global Ecology and Biogeography*.

LaManna, JA, Scott A. Mangan, Alfonso Alonso, Norman A. Bourg, Warren Y. Brockelman, Sarayudh Bunyavejchewin, Li-Wan Chang, Jyh-Min Chiang, George B. Chuyong, Keith Clay,

Richard Condit, Susan Cordell, Stuart J. Davies, Tucker J. Furniss, Christian P. Giardina, I. A. U. Nimal Gunatilleke, C. V. Savitri Gunatilleke, Fangliang He, Robert W. Howe, Stephen P. Hubbell, Chang-Fu Hsieh, Faith M. Inman-Narahari, David Janík, Daniel J. Johnson, David Kenfack, Lisa Korte, Kamil Král, Andrew J. Larson, James A. Lutz, Sean M. McMahon, William J. McShea, Hervé R. Memiaghe, Anuttara Nathalang, Vojtech Novotny, Perry S. Ong, David A. Orwig, Rebecca Ostertag, Geoffrey G. Parker, Richard P. Phillips, Lawren Sack, I-Fang Sun, J. Sebastián Tello, Duncan W. Thomas, Benjamin L. Turner, Dilys M. Vela Díaz, Tomáš Vrška, George D. Weiblen, Amy Wolf, Sandra Yap, and Jonathan A. Myers. 2017. Negative Density Dependence Contributes to Global Patterns of Plant Biodiversity. *Science* 356:1389-1392.

Gillett, C.P.D.T., I. Pulakkatu-thodi, and D. Rubinoff. Rediscovery of an enigmatic bark beetle endemic to the Hawaiian Islands (Coleoptera: Curculionidae: Scolytinae). *Coleopterists Bulletin*

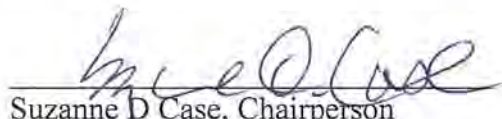
In closing, the Hawaii Experimental Tropical Forest (HETF), with its objective to provide information and tools to land managers through research, demonstration and education, is among the most remarkable and unique of experimental forests on earth. Further, the establishment of the HETF represents one of the most important and significant events in the history of the long and close relationship between the Hawaii Department of Land and Natural Resources', Division of Forestry and Wildlife (DOFAW) and the USDA Forest Service (USFS) - Institute of Pacific Islands Forestry. The HETF has completed its first decade of service, and the USDA Forest Service has accomplished much in developing this research, demonstration and education resource for Hawaii. Critical investments have been made by US Congress via the USDA Forest Service, but also by partners such as the University of Hawaii, which has directed substantial NSF-based EPSCoR infrastructure resources to developing the HETF. Additional funding from the DOD, other NSF program areas, and the State of Hawaii, among others have provided critical resources to support research, demonstration and education within the HETF. As a result of these investments, the USFS and DOFAW are able to enhance leadership roles in the science of tropical resource management.

Respectfully submitted,



for DAVID G. SMITH
Administrator

APPROVED FOR SUBMITTAL:



Suzanne D. Case, Chairperson
Board of Land and Natural Resources

Attachments

LINDA LINGLEE
GOVERNOR OF HAWAII



**STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES**

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

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BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

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DEAN NAKANO
ACTING DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAAIOLA LAGOON AND RESERVE COMMISSION
LAND
STATE PARKS

PERMIT TO USE STATE LANDS

Pursuant to the authority granted by the Board of Land and Natural Resources at its meeting of January 25, 2007, (Item C-2), the U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station, ("USDA Forest Service" or "Permittee"), is hereby granted a non-exclusive permit to use State lands situated at Laupāhoehoe and Pu'u Wa'awa'a, Hawai'i, identified by tax map key parcel numbers: (3) 3-7-001:002; (3) 3-7-001:012; (3) 7-1-001:001; (3) 7-1-001:004; (3) 7-1-001:004; (3) 7-1-001:006; (3) 7-1-001:007; (3) 7-1-002:001; (3) 7-1-002:013; (3) 7-1-002:002; (3) 7-1-002:008, and as shown on the attached maps, for use as the Hawai'i Experimental Tropical Forest (Laupāhoehoe and Pu'u Wa'awa'a units), in compliance with the herein referenced Cooperative Agreement. The USDA Forest Service is acting through the Institute of Pacific Islands Forestry located in Hilo, Hawaii.

Definitions:

"Assigns" means the employees, contractors, agents, and consultants.

"Cooperative Agreement" means the Cooperative Agreement between the State of Hawaii, Board of Land and Natural Resources and the U.S. Department of Agriculture, Forest Service, dated December 12, 2006.

"Hazardous Material" means any pollutant, toxic substance, hazardous waste, hazardous substance, or oil as defined in pursuant to applicable federal law, including, but not limited to, the Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA"), 42 U.S.C. §§ 9601, et seq., the Resource Conservation and Recovery Act, 42 U.S.C. §§ 6901, et seq., the Clean Water Act, 33 U.S.C. §§ 1251, et seq., Clean Air Act, 42 U.S.C. §§ 7401, et seq., the Safe Drinking Water Act, 42 U.S.C. §§ 300f, et seq., the Oil Pollution Act, 33 U.S.C. §§ 2701, et seq., the Toxic Substances Control Act, 15 U.S.C. §§ 2602, et seq., and the Federal Insecticide, Fungicide, and Rodenticide Act, 7 U.S.C. §§ 136, et seq., or any state law or regulation promulgated pursuant to such federal law.

This Permit is subject to the following conditions:

1. This permit to use State lands shall be effective from the last date shown below and extend for thirty-five years from December 12, 2006, the date the parties entered the Cooperative Agreement.
2. This permit to use State lands is a non-exclusive authorization for the USDA Forest Service and its assigns to occupy and use the Hawaii Experimental Tropical Forests for

the purpose of research, education, demonstration, and related purposes. This permit shall be effective for the following general purposes:

- a. To conduct long-term ecological, forestry, hydrological, and other natural resources-related research;
- b. To conduct long-term studies at scales from the plot to the watershed on forestry, conservation biology, endangered species, and invasive species;
- c. To conduct baseline studies and monitor results and benefits of forest management practices on important issues facing Hawaii including but not limited to: weed control, invasive pest control, forest restoration, aquatic ecology, hydrology, ungulate management, forest recreation, recreational hunting, fire control, cultural subsistence gathering, and protection and reintroduction of native plants and animals;
- d. To conduct studies on forest silviculture and sustainable management and to develop new commercial forest products;
- e. To conduct global climate change research;
- f. To attract and conduct multidisciplinary research studies by scientists from federal and state agencies, non-governmental organizations, and universities;
- g. To provide for environmental education and demonstration for groups ranging from school children to continuing education for land managers, natural resource professionals, and the general public;
- h. To form a management/research partnership where information needs and new findings are freely exchanged between the USDA Forest Service and the State; and
- i. To construct, maintain, and improve needed infrastructures, including: a new field station facilities at Laupāhoehoe and renovation of existing structures for use as a field station at Pu'u Wa'awa'a consisting of dormitories, work areas, demonstration/education buildings, and storage facilities, gaging stations in streams, weather stations, eddy covariance towers, and similar devices, maintenance of the existing trail system and development of new trails for access, and maintenance and improvement of existing roads.
- j. To engage in the specific activities listed on Exhibit A to this permit.

Research or activities requiring additional Federal, State, or county permits or approvals, including but not limited to environmental assessments or conservation district use permits, will be subject to the procedures in effect for obtaining such permits or authorizations.

The USDA Forest Service must obtain the prior written consent of the Board before construction of infrastructure or making any major improvements, as outlined in section IV.I of the Cooperative Agreement. Any major improvements, including but not limited to buildings and fences, erected on or moved onto the Premises by the USDA Forest Service shall remain the property of the USDA Forest Service and the USDA Forest Service shall have the right, prior to the termination or revocation of this Permit, or within an additional period the Board in its discretion may allow, to remove the improvements from the Premises.

3. This permit to use State lands constitutes an authorization for the USDA Forest Service and its assigns to conduct activities described herein as authorized under the Cooperative Agreement. For activities conducted by entities other than the USDA Forest Service and its assigns permits to conduct those activities shall be secured as outlined in Sections III and VI through IX of the Cooperative Agreement. The permit or any rights hereunder shall not be sold, conveyed, leased, mortgaged, or otherwise transferred or disposed of. Persons acting under this permit shall carry a copy of the permit or a signed authorization from the USDA Forest Service indicating their name, purpose, and dates of authorization with them at all times while in the permit area and

shall, upon request, show the permit or signed authorization to any law enforcement officer, or the authorized representative of the Board of Land and Natural Resources.

4. USDA Forest Service shall insure that in the exercise of this permit to use State lands, it shall comply with all laws, statutes, ordinances, rules and regulations of the Federal, State, and county governments affecting the permit area. In addition, prior to activities in Laupāhoehoe Natural Area Reserve, USDA Forest Service shall ensure that proposed activities are to be performed in a manner which is consistent with NARS management objectives, HRS § 195-1 and in consultation with the Hawaii Island Natural Area Reserves System Area Manager to ensure that proposed activities remain consistent with NARS objectives and management actions. Prior to activities in Pu'u Wa'awa'a, USDA Forest Service shall ensure that proposed activities are to be performed in a manner consistent with the Pu'u Wa'awa'a Management Plan and in consultation with the Pu'u Wa'awa'a Coordinator.
5. In the event any unanticipated sites or remains such as bone or charcoal deposits, human burials, rock or coral alignments, pavings or walls are encountered USDA Forest Service, its contractors, and consultants shall immediately stop work and contact the State Historic Preservation Division in Kapolei at (808) 692-8015.
6. USDA Forest Service agrees to consult regularly with the State, including the appropriate DLNR land manager, on proposed and ongoing activities within the permit area, to ensure open and full communication and to minimize conflicts and maximize benefits between planned and ongoing research projects and between research projects and land management.
7. USDA Forest Service, through the Hawaii Experimental Tropical Forest Research Committee established under the Cooperative Agreement, agrees to consult regularly with the State, including:
 - a. Providing a copy of the annual report submitted to Congress as required by section 607 of the International Forestry Cooperative Act of 1990, as amended by the Hawaii Tropical Forest Recovery Act;
 - b. Providing an annual report on the status of approved new and ongoing research (including the primary investigator, the research topic, the location for the research, dates of field research, date of anticipated results, and contact information for the primary investigator);
 - c. Providing an annual report on the number of educational tours and total number of participants; and
 - d. Annually reporting on the challenges faced in the administration of the Experimental Forest.
8. The USDA Forest Service will maintain the improvements on the land that are being used by the Forest Service or its assigns. The USDA Forest Service will keep the permit area and improvements in a clean, sanitary, and orderly condition. Disturbance of native vegetation and native wildlife shall be avoided as much as possible. The USDA Forest Service will not make, permit, or suffer, any waste, strip, spoil, nuisance or unlawful, improper, or offensive use of the permit area. Precautions shall be taken to prevent introductions of plants and animals not naturally present in the permit area, including inspection and cleaning of clothing, equipment, and vehicles. At all times with respect to the permit area, USDA Forest Service will use due care for public safety and will use appropriate precautions and measures to minimize inconveniences to surrounding residents, landowners, lessees, and the public in general.

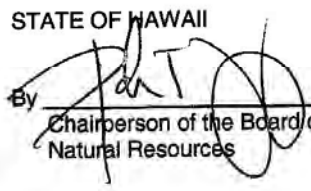
9. The State will remain primarily responsible for normal land management functions, including but not limited to control of public access, fire suppression, law enforcement, regulation of hunting and grazing activities, invasive species management, and forest disease, insect, and ungulate control. The Board will be responsible for maintenance of all improvements not used, built or placed on the land by the USDA Forest Service. The Board reserves the right for its employees, agents or representatives to enter or cross any portion of the permit area at any time.
10. Liability for any loss, damage, claim, demand, or action, caused by, arising out of or connected with the operations authorized by the Cooperative Agreement shall be governed by applicable State and Federal law. To the extent that the USDA Forest Service requires third parties, including but not limited to its contractors or consultants, to procure liability insurance or to indemnify the Forest Service, the USDA Forest Service shall also require such third parties to insure and indemnify the State.
11. This permit may be modified at any time by mutual agreement of the Director, Institute of Pacific Islands Forestry, USDA Forest Service, and the Board of Land and Natural Resources.
12. Permittee and its assigns shall not cause or permit the escape, disposal or release of any hazardous materials except as permitted by applicable federal and state law. Proposed use of hazardous materials in research activities will be disclosed to the State through the research review and approval procedures of the Hawaii Experimental Tropical Forest Research Committee and the processes for activities authorizations prescribed by the Cooperative Agreement. Permittee and its assigns shall store and use hazardous materials only as prescribed by federal law. Liability for release of a hazardous material shall be in accord with applicable Federal and state law.

To the extent that the Permittee requires its contractors or consultants to indemnify, defend, and hold the Permittee harmless from any damages and claims resulting from the release of hazardous materials on the permit area occurring while Permittee or its contractors are in possession of the permit area, or elsewhere if caused by Permittee's contractors acting for or on Permittee's behalf, Permittee shall also require such contractors or consultants to indemnify the State. These covenants shall survive the expiration or earlier termination of this permit.
13. In the event of an alleged violation of this permit, the State will contact the Director of the Institute of Pacific Islands Forestry (or other designated official of the USDA Forest Service) with notice of such violation and a reasonable time permitted to cure the violation.
14. Disputes shall be resolved by the Station Director, Pacific Southwest Research Station, USDA Forest Service, and the Board of Land and Natural Resources. Disputes involving Laupāhoehoe Natural Area Reserve shall be taken to the Natural Area Reserve System Commission first for their recommendation to the Board of Land and Natural Resources.

IN WITNESS WHEREOF, the STATE OF HAWAII, by its Board of Land and Natural Resources, has caused the seal of the Department of Land and Natural Resources to be hereunto affixed and the parties hereto have caused these presents to be executed the day, month and year first above written.

Approved by the Board of
Land and Natural Resources
at its meeting held on JAN 26 2007


STATE OF HAWAII

By 
Chairperson of the Board of Land and
Natural Resources

USDA FOREST SERVICE


James Sedell, Station Director
Pacific Southwest Research Station

APPROVED AS TO FORM:


Deputy Attorney General
State of Hawaii

Dated: 1/26/07

Exhibit A to Permit

The following activities, when undertaken by the Forest Service or its assigns pursuant to actions authorized in accordance with the provisions of the Cooperative Agreement for research between the State of Hawaii and the Forest Service, are authorized by this Permit. For purposes of this Exhibit A, "nondestructive" means an activity that does not destroy or harm the object of analysis.

1. Operations and maintenance of buildings, dormitories, work areas, demonstration/education buildings, storage facilities, and management structures on experimental forest lands or other state lands encumbered under lease, license or permit.
2. Minor modification of existing buildings, work areas, demonstration/education facilities, and storage facilities to improve their usefulness as per the cooperative agreement, or to provide for public and worker safety.
3. Maintenance or modification of landscaping and other minor land and vegetation improvements around buildings, work areas, storage facilities on experimental forest lands to improve site use or public safety, including cutting and/or removal of vegetation, and use of pesticides and herbicides to maintain landscaping.
4. Cutting and/or removal of exotic/nonnative vegetation and animals or use of pesticides and herbicides to control or prevent the establishment or spread of invasive species.
5. Maintenance and operation of all facilities and improvements that are used by the U.S. Forest Service or its assigns, or those installed under research permits as per agreement of the Forest Service.
6. Maintenance of existing roads to facilitate access and diminish ecological damage from roads in poor condition, including the cutting or removal of roadside vegetation, and use of herbicides and pesticides in road right-of-way.
7. Maintenance of the existing trail system facilitate access, minimize trampling damage and insure safety of users, including the cutting or removal of roadside vegetation, and use of herbicides and pesticides in the trail corridor.
8. To participate in or conduct hikes, nature study, or other passive recreational activities.
9. Non-destructive inventory and monitoring of basic resources of experimental forest lands.
10. To lead site tours or provide access to school children, land managers, natural resource professionals, and the general public for forest education purposes and demonstration projects.

11. Installation and maintenance of directional and informational signs for worker, visitor, and public use and safety.
12. Monitoring of public use and environmental conditions in and around public use facilities, including placement of temporary electronic devices for environmental monitoring or sampling (for periods ≤ 36 months), and the sampling of air and gasses (plant and soil respiration) within the experimental forest.
13. Use of motorized or unmotorized vehicles and equipment off established roads and trails or other designated vehicle-areas for approved management and research plan activities or to respond to emergency situations.

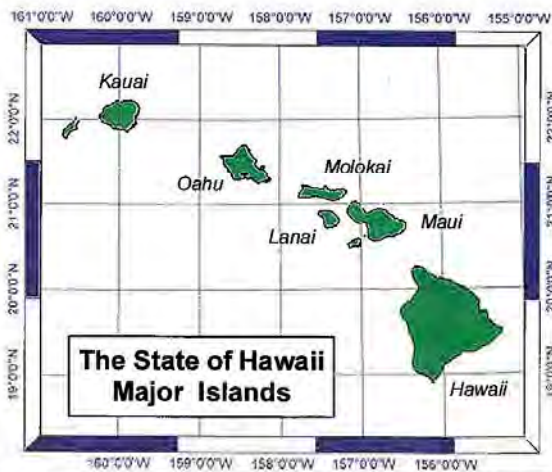
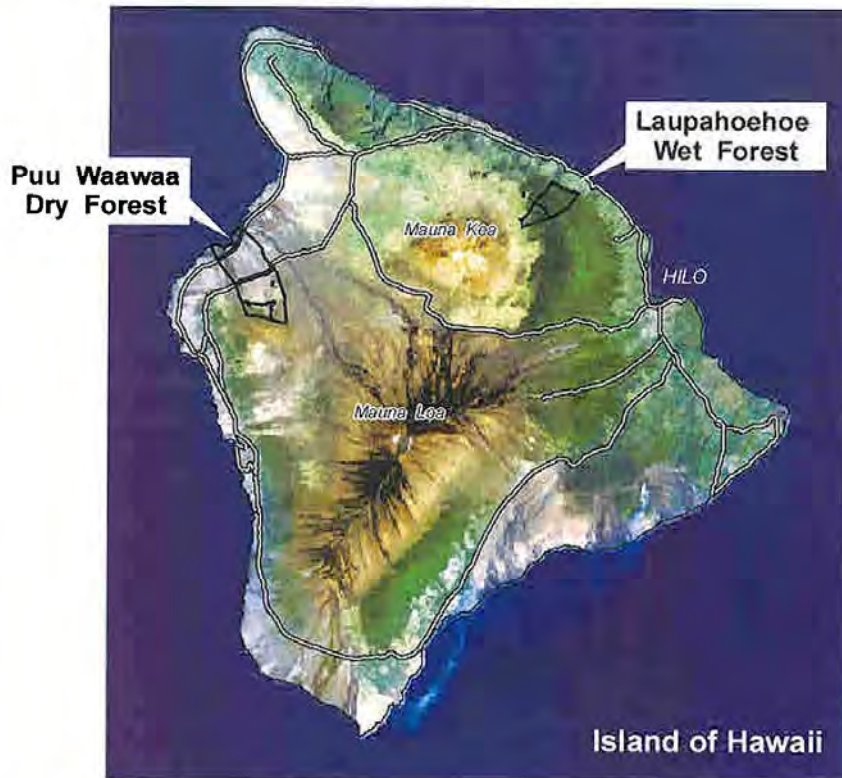
The following eleven activities are also authorized by this permit when undertaken by the Forest Service or its assigns pursuant to research actions authorized by the Hawaii Experimental Tropical Forests Research Committee in accordance with the provisions of the Cooperative Agreement for research between the State of Hawaii and the Forest Service.

14. Non-destructive inventory, measurements, censuses, and monitoring of trees, ferns, understory plants, birds, mammals, insects, and aquatic organisms where there is no harm to the organisms (includes both ground-based and remotely sensed measures).
15. Non-destructive inventory, measurements, and monitoring of the forest floor, dead and downed wood, and soils.
16. Non-destructive inventory, measurements, and monitoring of streams, ponds, and other aquatic ecosystems.
17. Nondestructive hydrological and geomorphic studies which do not involve the erection of structures or long term placement of equipment.
18. Erection of small protective fences and barriers ≤ 10 acre in area (and the removal of exotic species within such plots).
19. Construction of temporary blinds and field observation structures.
20. Soil and plant nutrient cycling research.
21. Biocontrol research to control invasive plants and animals - manipulate densities of state and federally permitted biocontrol agents through redistribution and experimental methods, including caging plants or parts of plants.
22. Introduction and use of carbon, oxygen, nitrogen and other isotopes for research.

23. Non-destructive collection of plant material (excluding all listed T&E plants), soils, and water samples for laboratory analysis.

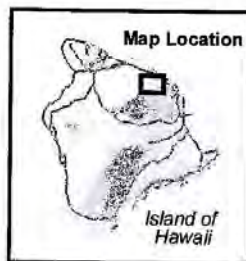
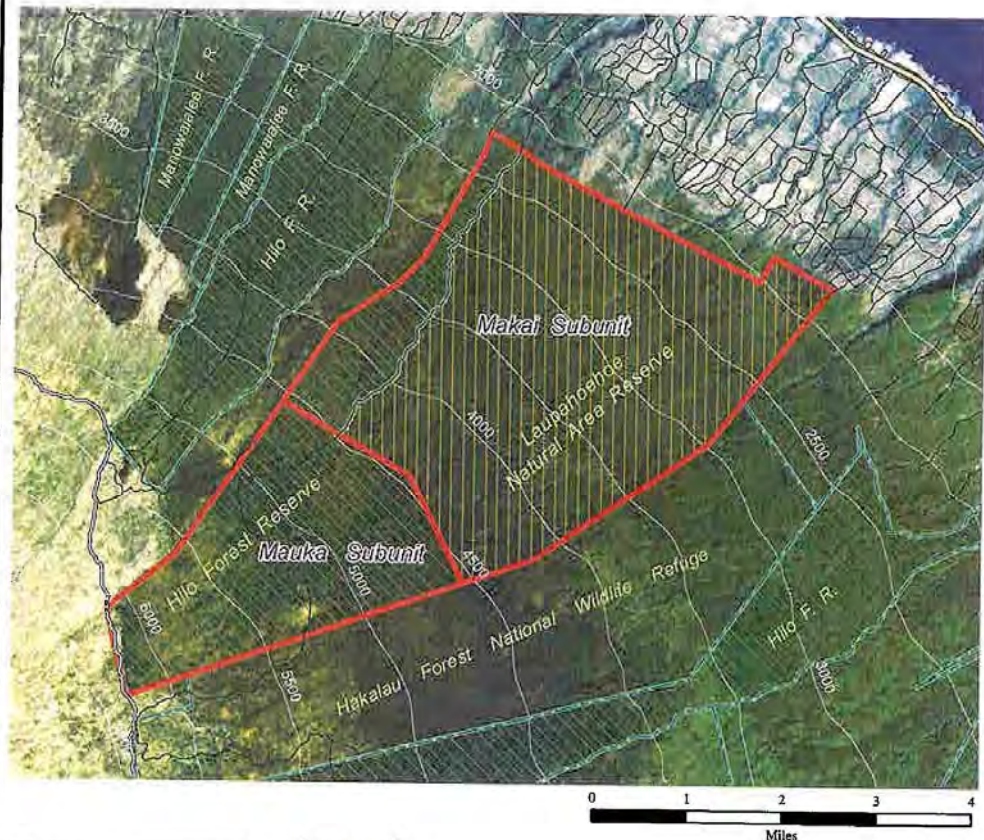
24. Collection of plant and insect samples that are from common, exotic, and abundant taxa for laboratory, greenhouse, or herbarium sampling (excluding all listed T&E species).

MAP 1. Location



State of Hawaii
 Department of Land and Natural Resources
 Division of Forestry and Wildlife
 Map No. FW - 0669 (08/2006)
 Contact: Ronald Cannarella
 Telephone: (808) 383-3077
 Email: Ronald.J.Cannarella@hawaii.gov

MAP 2. Laupahoehoe Wet Forest : Subunits and Geography



Legend

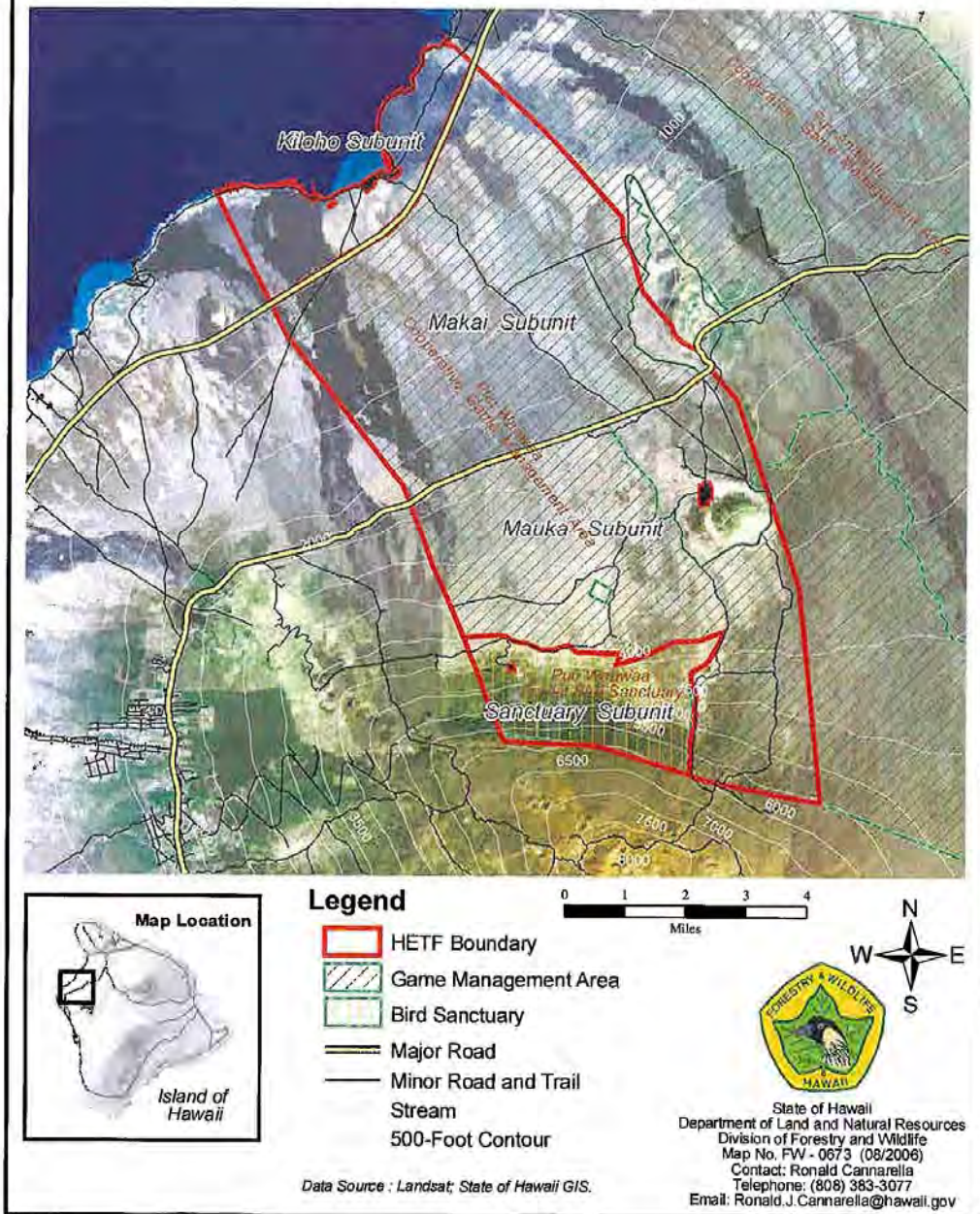
- HETF Boundary
- Forest Reserve
- Natural Area Reserve
- Major Road
- Secondary Road
- Minor Road and Trail
- Stream
- 500-Foot Contour

Data Source : Landsat; State of Hawaii GIS.



State of Hawaii
Department of Land and Natural Resources
Division of Forestry and Wildlife
Map No. FW - 0670 (06/2006)
Contact: Ronald Cannarella
Telephone: (808) 383-3077
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**MAP 3. Puu Waawaa Dry Forest :
Subunits and Geography**



COOPERATIVE AGREEMENT

between the

UNITED STATES DEPARTMENT OF AGRICULTURE FOREST SERVICE

and the

STATE OF HAWAII BOARD OF LAND AND NATURAL RESOURCES

THIS COOPERATIVE AGREEMENT is between the **United States Department of Agriculture, Forest Service**, hereinafter referred to as the "Forest Service", and the **State of Hawaii**, by its Board of Land and Natural Resources, hereinafter referred to as the "Board". The Forest Service and the Board are jointly referred to as the "Parties".

RECITALS:

Whereas, the Hawaii Tropical Forest Recovery Act of 1992 (Public Law 102-574) authorizes the establishment of the Hawaii Experimental Forest as a center for long-term research and a focal point for developing and transferring knowledge and expertise for the management of tropical forests.

Whereas, the unique biological diversity, resources, and threats to Hawaii's tropical forests pose a critical need to establish experimental forests in Hawaii, where currently none exist.

Whereas, there are areas of State land which are uniquely suited to the conduct of tropical research and, therefore, for designation as the first two units of the Hawaii Experimental Tropical Forests.

Whereas, the Forest Service, through its Pacific Southwest Research Station and its affiliated Institute of Pacific Islands Forestry in Hilo, Hawaii, is authorized to implement the Hawaii Tropical Forest Recovery Act of 1992 on behalf of the United States Department of Agriculture.

Whereas, the Parties deem a cooperative Federal and State research program to be the best way to effect the purposes of the Hawaii Tropical Forest Recovery Act of 1992 and, to that end, to execute and implement this Cooperative Agreement.

NOW, THEREFORE, in consideration of the mutual benefits of cooperative research and the other terms and conditions of this agreement, the Parties agree as follows:

I. AUTHORITIES.

A. *For the Forest Service:* This Cooperative Agreement is authorized by section 606(d)(1)(B) of the International Forestry Cooperation Act of 1990, as amended by the Hawaii Tropical Forest Recovery Act of 1992 (Public Law 102-574).

B. *For the State:* This Cooperative Agreement is authorized by Hawaii Revised Statutes (HRS) §§ 171-6, 183-1.5, 195-4, and 195-7.

II. HAWAII EXPERIMENTAL TROPICAL FORESTS.

A. Within 90 days of execution of this Cooperative Agreement, the Secretary of Agriculture will designate pursuant to the Hawaii Tropical Forest Recovery Act (Public Law 102-574), two units of the Hawaii Experimental Tropical Forests located on the island of Hawaii, generally depicted on the map appended hereto as Map 1, as follows:

1. Laupāhoehoe Experimental Forest comprising approximately 12,343 acres on the Island of Hawaii and generally depicted on the map appended hereto as Map 2.
2. Pu'u Wa'awa'a Experimental Forest comprising approximately 38,885 acres on the Island of Hawaii and generally depicted on the map appended hereto as Map 3.

B. The Laupāhoehoe and Pu'u Wa'awa'a Experimental Forests are collectively referred to herein as the "Hawaii Experimental Tropical Forests".

C. The purposes of the Hawaii Experimental Tropical Forests are:

1. To learn how to better restore, preserve, and sustainably manage native tropical forests, streams and entire watersheds of the Pacific, and to provide information to land managers challenged with management of these important landscapes;
2. To be a center for demonstration, education, training, and outreach on tropical forestry, conservation biology, and natural resources research and management;
3. To provide sites dedicated to long term research on tropical forestry, ecology, hydrology, conservation biology, and natural resource management; and

4. To promote research cooperation and collaboration between State, Federal agencies, educational, and other institutions in tropical forestry research in Hawaii.

D. Additional lands may be incorporated into the Experimental Forests with the written concurrence of the Parties in accordance with section 606 of the International Forestry Cooperation Act of 1990, as amended by the Hawaii Tropical Forest Recovery Act of 1992.

III. LAND USE AUTHORIZATION.

On or about the date hereof, the Board of Land and Natural Resources ("Board") will issue to the Department of Agriculture, Forest Service, a permit to use the Hawaii Experimental Tropical Forests in accordance with this Cooperative Agreement.

A. The permit is a non-exclusive authorization for the Forest Service and its assigns to use the Hawaii Experimental Tropical Forests for the purpose of research, education, demonstration, and related purposes.

B. Entities conducting research activities requiring additional federal, state, or county permits or approvals, including but not limited to environmental assessments or conservation district use permits, will be required to acquire those permits through the procedures in effect for obtaining such permits.

C. In the event that the Forest Service needs to build valuable improvements and support facilities in furtherance of activities contemplated under this Cooperative Agreement, then the State shall issue a lease for such purposes on terms and conditions necessary to meet the requirements of 7 U.S.C. § 2250a and HRS §§ 171-95 and 183-11.

D. All research activities to be conducted on the Hawaii Experimental Tropical Forests shall be administered by the Hawaii Experimental Tropical Forests Research Committee as provided in Part VI of this Cooperative Agreement.

IV. COOPERATIVE RESEARCH AND MANAGEMENT.

In furtherance of a long-term philosophy for cooperation at the Hawaii Experimental Tropical Forest and to implement the purposes of the Hawaii Experimental Tropical Forests and Section 606 of the International Forestry Cooperation Act of 1990, as amended by the Hawaii Tropical Forest Recovery Act, the Parties agree:

A. To conduct long term ecological, forestry, hydrological and other natural resources-related, research;

B. To conduct long term studies at scales from the plot to the watershed on forestry, conservation biology, endangered species, and invasive species;

C. To conduct baseline studies and monitor results and benefits of forest management practices on important issues facing Hawaii including but not limited to: weed control, invasive pest control, ungulate management, forest recreation, recreational hunting, fire control, cultural subsistence gathering, protection and reintroduction of native plants and animals, hydrology, and water quality;

D. To conduct studies on forest silviculture, restoration, and sustainable management;

E. To conduct global climate change research;

F. To attract and conduct multidisciplinary research studies by scientists from federal and state agencies, non-governmental organizations, and universities;

G. To provide for forest education and demonstration for groups ranging from school children to continuing education for land managers, natural resource professionals, and the general public;

H. To form a management/research partnership where information needs and new findings are freely exchanged between the Parties; and

I. To construct, maintain and improve needed infrastructure, including:

1. New field station facilities at Laupāhoehoe and renovation of existing structures for use as a field station at Pu'u Wa'awa'a consisting of dormitories, work areas, demonstration/education buildings, and storage facilities on experimental forest lands or other state lands encumbered under lease, license or permit.
2. Gaging stations in streams, weather stations, eddy covariance towers, and similar research structures. Gaging stations can be placed at the lower reaches of Ka'awali'i Stream, Laupāhoehoe Stream, Kilau Stream, Kiwilahiahi stream, Ha'ako'a Stream, and Pahale Stream within the Laupāhoehoe Natural Area Reserve.
3. Development and maintenance of the existing trail system and the development of a limited network of new trails to achieve access, minimize trampling damage and insure safety of users
4. Maintenance and improvement of existing roads to facilitate access and diminish ecological damage from roads in poor condition.

V. CONSULTATION.

A. *In General.* Owing to the many values and benefits that arise from research, education, and demonstration on the Hawaii Tropical Forests and elsewhere, the Parties further agree they will consult and reach agreements with each other to coordinate research, management, and educational activities and to:

1. Jointly develop research and management plans for the Hawaii Experimental Tropical Forests and to update these plans at least every five years;
2. Consult and reach agreement prior to implementing any written policy or plan that may affect the management of or research within the Hawaii Experimental Tropical Forests;
3. Consult and reach agreement during planning for the development of facilities or any major ground disturbing activities;
4. Consult and reach agreement before any major ground disturbing activities that may affect the conduct of research or the biological integrity of the area such as logging, scarification, chemical applications, fencing, etc.

B. *External Consultation.* The Parties will consult with scientists, managers, general citizens, and local community members concerning ongoing research activities. Existing State sanctioned advisory councils may be utilized for this purpose.

VI. HAWAII EXPERIMENTAL TROPICAL FORESTS RESEARCH COMMITTEE.

A. There is hereby established a Hawaii Experimental Tropical Forests Research Committee ("Committee") which will be chaired by the Forest Service. The Committee will consist of one Federal representative and one State representative who will review and recommend for approval research, education, and demonstration activities on lands designated as the Hawaii Experimental Tropical Forests, and recommend such terms and conditions for the conduct of such research as the Committee deems in the public interest consistent with this Cooperative Agreement.

B. The Committee will establish its own procedures and guidelines consistent with this Cooperative Agreement, including the establishment of subcommittees which may be composed of staff or consultants to deal with specific proposals for the Pu'u Wa'awa'a and Laupāhoehoe Experimental Forest Units.

C. The Committee shall be comprised of persons familiar with the on-going management, research, and education activities on the Experimental Tropical Forests:

1. The Director of the Institute of Pacific Islands Forestry in Hilo, Hawaii, or such alternative Federal official as may be named by the Station Director of the Pacific Southwest Research Station, and
2. The Hawaii Island Branch Manager of the Division of Forestry and Wildlife, or such alternative as may be named by the Board of Land and Natural Resources.

D. Additional members of the Committee may be added by mutual agreement by way of an amendment to this Cooperative Agreement.

E. The Committee will act by unanimous agreement to recommend research activities, including any recommended terms and conditions set forth in writing in an agreement with each research proponent. Research and other activities will follow State guidelines and management plans specific for the land area designation and experimental forest where the research will be conducted.

F. The Committee will provide mechanisms for public information and oversight of research activities, and will provide such information to the Secretary of Agriculture for inclusion in the annual reports to Congress as required by section 607 of the International Forestry Cooperation Act of 1990, as amended by the Hawaii Tropical Forest Recovery Act of 1992. A copy of this annual report will also be sent to the Board of Land and Natural Resources and Natural Area Reserves Commission.

G. Committee members shall serve such renewable terms as determined at the pleasure of the Station Director of the Pacific Southwest Research Station and the Board, as the case may be.

VII. AUTHORIZATION OF RESEARCH ACTIVITIES.

A. The Parties agree that the procedures of the Committee in administering, reviewing, and approving research activities, and the State procedures for issuance of permits for State lands should be streamlined and, to the extent possible, consolidated.

B. For areas of the Hawaii Experimental Tropical Forests outside the Natural Area Reserves System (NARS), within 90 days of this agreement, the Board will delegate to its representative on the Committee the authority to approve and issue permits for the use of state lands for research activities approved by the Committee. It is recognized that this delegation will be subject to terms and conditions as the Board may prescribe, and is subject to modification or revocation at the sole discretion of the Board.

C. For areas of the Hawaii Experimental Tropical Forests inside the Natural Area Reserves System, the Parties agree to encourage the NARS Commission to adopt policies and procedures to meet the objectives of paragraph A. It is recognized that any delegation would be subject to terms and conditions as the Commission may prescribe, and is subject to modification or revocation at the sole discretion of the Commission. It is recognized that, as of the date of this Cooperative Agreement, the NARS Commission lacks legal authority to delegate permit approval authority.

D. Forest Service research activities which the State determines to be within the scope of the permit issued pursuant to Part III of this Cooperative Agreement may not require additional authorizations.

VIII. RESEARCH ON THE LAUPĀHOEHOE NATURAL AREA RESERVE.

A. The Laupāhoehoe Experimental Forest will be a site where long term research at the landscape or ahupua'a scale will be made possible. Within this ahupua'a will be a field station on State-leased agriculture lands, a Natural Area Reserve (NAR), and a Forest Reserve (FR).

B. In addition to the other requirements of this Cooperative Agreement, any research conducted on the Laupāhoehoe Natural Area Reserve shall be performed in a manner which is consistent with NARS management objectives, HRS § 195-1.

C. Prior to issuing a recommendation for approval of any proposed research on the Laupāhoehoe NAR, the Committee will consult with the Hawaii Island NARS Area Manager. The Area Manager will be consulted regularly on ongoing research activities to insure research activities remain consistent with NARS objectives and management actions.

IX. RESEARCH ON THE PU'U WA'AWA'A EXPERIMENTAL FOREST UNIT .

A. The Pu'u Wa'awa'a Experimental Forest Unit will be a site where long term research at the landscape or ahupua'a scale will be made possible.

B. In addition to the other requirements of this Cooperative Agreement, any research conducted on the Pu'u Wa'awa'a Experimental Forest Unit shall be performed in a manner which is consistent with or provides information that would improve the Pu'u Wa'awa'a management plan.

X. RESEARCH RESULTS.

- A. Unless the Parties agree otherwise on any given project, the rights to publication, patent, or otherwise to any research results shall accrue to the respective party(s) conducting the research.
- B. Each agency shall be acknowledged in publications and audiovisuals as a result of this Cooperative Agreement.
- C. Within a reasonable period after completion of research or management activities, the Committee shall require that all information be included in an Experimental Forest data base.
- D. Metadata including weather and streamflow data will be made available to the Parties as soon as is practically possible.

XI. MANAGEMENT ACTIVITIES ON HAWAII EXPERIMENTAL TROPICAL FORESTS.

- A. *Occupancy and Use.* By this Cooperative Agreement and the permit referenced in Section III.A, persons employed by the Forest Service, are authorized general entry upon the Hawaii Experimental Tropical Forests for research, education, demonstration, and related purposes as set forth herein.
- B. *Assignees, contractors and cooperators.* Either Party may authorize entry to the Hawaii Experimental Tropical Forests to assignees and contractors to carry out activities authorized under any permit or authorization, insofar as such entry and activities undertaken do not interfere with any ongoing or planned research or management activities. This Cooperative Agreement does not restrict the Forest Service or the Board from participating in similar research activities with other public or private agencies, organizations, and individuals.
- C. *Public Access.*
 - 1. If so authorized, public access will be regulated by the Board to accommodate, in a manner compatible with, ongoing research or management activities. The Board will appropriately manage public access so that threats to public safety are minimized.
 - 2. The Board shall be primarily responsible to utilize its authorities under state law to enforce regulations and permit requirements.
- D. *State Management.* The Board will be primarily responsible for normal land management functions including, but not limited to, control of public access, fire suppression, law enforcement, regulation of hunting and grazing activities, invasive species management, and

forest disease, insect, and ungulate control. The Parties will consult with each other and reach an agreement prior to implementing any activity which may impede ongoing management or research activities.

E. *Emergencies.* Nothing in this Cooperative Agreement shall be interpreted to impede the State's prerogatives in dealing with immediate emergencies such as fire or other immediate threats to human safety, which may be undertaken without prior consultation with the Forest Service or the Committee.

F. *Environmental Compliance.* The Committee shall assure that all research activities fully comply with the requirements of all applicable state and federal environmental laws and regulations.

G. *Maintenance of Improvements.* Unless the Parties agree otherwise on a case-by-case basis, the Forest Service will maintain the improvements on the land that are being used by the Forest Service or its assigns for research purposes. The Board will be responsible for maintenance of all other improvements.

XII. FUNDING.

A. *No Obligations of Funds.* This Cooperative Agreement is neither a fiscal nor a funds obligation document. Any endeavor involving reimbursement or contribution of funds, transfer of property, services or anything of value between the parties will be handled in accordance with applicable regulations, and procedures including those for Governmental procurement or printing. Such endeavors will be outlined in separate agreements that shall be made in writing by representatives of the parties and shall be independently authorized by appropriate statutory authority. Any contract or agreement for training or other services must fully comply with all applicable procurement procedures.

B. *Anti-deficiency.* All activities and operations of the Forest Service and the Board are subject to the availability of appropriated funds. Nothing in this Cooperative Agreement shall be interpreted as obligating unappropriated funds by either entity.

XIII. LIABILITIES.

The Parties agree that liability for any loss, damage, claim, demand, or action, caused by, arising out of or connected with the operations authorized by this Cooperative Agreement shall be governed by applicable state and federal law. For the Forest Service, tort claims will be governed by the provisions of the Federal Tort Claims Act (28 U.S.C. §§ 2671, *et seq.*).

XIV. TERM, EVALUATION AND MODIFICATION.

A. *Term.* This instrument is executed as of the last date shown below which shall be the commencement date. This instrument will remain in effect for Thirty Five (35) years after which it is renewable at the option of the Parties.

B. *Evaluation.* This Cooperative Agreement may be reviewed, evaluated, and updated at any time, but no later than ten (10) years from the commencement date.

C. *Modification.* This Cooperative Agreement may be modified at any time by mutual agreement of the Parties. Modifications shall be in writing executed by the authorized officer representing the Forest Service and the Board respectively. For purposes of this modification provision, such authorized officers are the Station Director of the Pacific Southwest Research Station, and the Board of Land and Natural Resources for all substantive changes and the Chairperson of the Board for nonsubstantive changes to facilitate processing such changes.

XV. DISPUTES.

A. *Laupāhoehoe Natural Area Reserve.* Disputes that cannot be resolved within the Committee concerning research permission on the NAR will be taken to the Natural Area Reserves System Commission for their recommendation to the Board of Land and Natural Resources.

B. *Other Disputes.* Any other dispute among the parties in implementation of the Permit or this Cooperative Agreement shall be elevated to the Station Director, Pacific Southwest Research Station, and the Board of Land and Natural Resources, State of Hawaii.

XVI. TERMINATION.

Either party, in writing, may terminate the instrument in whole, or in part, at any time before the date of expiration. Unless otherwise by mutual agreement, two years advance notice shall be provided prior to termination.

XVII. PRINCIPAL CONTACTS.

The principal contacts for administering this Cooperative Agreement are:

- A. *U.S. Department of Agriculture:*
Director, Institute of Pacific Islands Forestry
Pacific Southwest Research Station
Department of Agriculture, Forest Service

Delegation of Selected Permitting Approval Authority for Research Activities
Undertaken on the Hawaii Experimental Tropical Forest

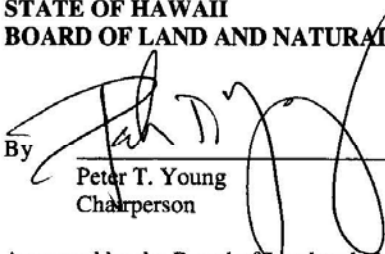
The authority to approve permits and permit terms and conditions for the following research activities conducted on the Hawaii Experimental Tropical Forest is hereby delegated to the Hawaii Island Branch Manager of the Division of Forestry and Wildlife when performing duties as authorized by the Cooperative Agreement for research between the State of Hawaii and the U.S. Forest Service. For purposes of this Exhibit A, "non-destructive" means an activity that does not destroy or harm the object of analysis.

1. Non-destructive inventory, measurements, censuses, and monitoring of trees, ferns, understory plants, birds, mammals, insects, and aquatic organisms where there is no harm to the organisms (includes both ground-based and remotely sensed measures).
2. Non-destructive inventory, measurements, and monitoring of the forest floor, dead and downed wood, and soils.
3. Non-destructive inventory, measurements, and monitoring of streams, ponds, and other aquatic ecosystems.
4. Nondestructive hydrological and geomorphic studies which do not involve the erection of structures or long term placement of equipment.
5. Research involving cutting and/or removal of exotic/nonnative vegetation that does not directly disrupt native forest species, forest composition, or forest structure (limited to test plots ≤ 10 acres in area).
6. Research on the use of pesticides/herbicides/prescribed fire/grazing animals to control invasive species (does not directly disrupt native forest species, composition, or structure, and limited to test plots ≤ 10 acres in area).
7. Erection of small protective fences and barriers ≤ 10 acre in area (and the removal of exotic species within such plots).
8. Construction of temporary blinds and field observation structures.
9. Soil and plant nutrient cycling research.
10. Biocontrol research to control invasive plants and animals - manipulate densities of state and federally permitted biocontrol agents through redistribution and experimental methods, including caging plants or parts of plants.

11. Sampling air and gasses (plant and soil respiration) within the experimental forest.
12. Placement of temporary electronic devices for environmental monitoring or sampling (for periods ≤ 36 months).
13. Introduction and use of Carbon, Oxygen, Nitrogen and other isotopes for research.
14. Non-destructive collection of plant material (excluding all listed T&E plants), soils, and water samples for laboratory analysis.
15. Collection of plant and insect samples that are from common, exotic, and abundant taxa for laboratory, greenhouse, or herbarium sampling (excluding all listed T&E species).
16. Maintenance of a trail system for access.

**STATE OF HAWAII
BOARD OF LAND AND NATURAL RESOURCES**

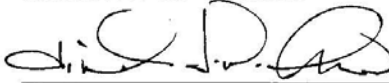
By


Peter T. Young
Chairperson

Date

Approved by the Board of Land and Natural Resources
at its meeting held on DEC 08 2006.

APPROVED AS TO FORM



Deputy Attorney General

Date:

12/8/06