

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

August 28, 2015

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

Land Board Members:

**SUBJECT:** REQUEST FOR APPROVAL OF A FOREST RESERVE MANAGEMENT PLAN FOR NOUNOU AND KĀLEPA FOREST RESERVE, TAX MAP KEYS (4) 4-2-004: PORTION OF 001, (4) 4-1-012:011 THROUGH 013, AND (4) 3-9-002: PORTION OF 014, WAIPOULI, OLOHENA, AND WAILUA, PUNA, KAUA'I.

**SUMMARY:**

This submittal requests Board approval for the Division of Forestry and Wildlife (DOFAW) Nounou and Kālepa Forest Reserve Management Plan (Exhibit A). The Nounou and Kālepa Forest Reserves together comprise approximately 1,393 acres of public land, and are located on the eastern side of Kaua'i. Nounou Forest Reserve (722.29 acres) lies to the north of Kālepa Forest Reserve (670.35 acres), separated by the Wailua River State Park. This plan is one in a series of site-specific plans to be prepared by DOFAW for individual forest reserves in the State of Hawai'i. These plans present a brief history of the specific forest reserves, a description of cultural and natural resources, and proposed management actions for the area in the future.

**BACKGROUND:**

The Hawai'i Forest Reserve System was created by the Territorial Government of Hawai'i on April 25, 1903. Forest reserves were intended to protect mauka forests and watersheds in order to guarantee an ample supply of water to developing agricultural interests, which in turn would ensure the prosperity and welfare of the Territory. The Forest Reserve System is one of the oldest structures for land conservation in Hawai'i. Today, DOFAW manages 54 forest reserves across the State, encompassing over 650,000 acres of public land. The Forest Reserve System provides essential benefits to the residents of Hawai'i, including fresh water supply and many other conservation, cultural and recreational values.

Intermittently throughout the twentieth century, forestry staff developed management plans for a variety of forest reserves; however this practice was discontinued during the 1970s for undocumented reasons. The Division of Forestry and Wildlife (DOFAW) is conducting on-going planning efforts to develop and update management plans for all of the forest reserves in Hawai'i. These plans vary in detail depending on a number of factors, but all represent an important

foundation for reforestation, conservation and forest product development in the future. These efforts are intended to be consistent across the State and serve to organize field management, assist in budgeting and funding concerns, and to provide the public and partner organizations a process for providing input to and viewing the resulting management plans.

These plans will also contribute towards fulfillment of recommendations made in the Hawai'i Tropical Forest Recovery Action Plan - a result of the 1992 Federal Hawai'i Tropical Forest Recovery Act. Specific recommendations addressed by these management plans include:

- Recommendation 1: Using a partnership-based, ecosystem management approach, develop a comprehensive management, protection, and utilization strategy for the forest resources of Hawai'i;
- Recommendation 6: Protect and restore native forest ecosystems through adequate support of existing state, federal, and private organizations' natural resource programs in an effort to contribute to healthy forest ecosystems and the recovery of plant and animal species listed as threatened and endangered;
- Recommendation 7: Expand research and support for comprehensive game management efforts to enhance hunting opportunities;
- Recommendation 8: Establish koa and other hardwood reforestation projects on formerly forested lands to restore a full range of values and purposes, from commercial forests to natural ecosystems;
- Recommendation 10: Utilize existing fire management expertise in a coordinated effort to share knowledge and resources for prevention, presuppression and suppression, and vegetation management activities. Enhance existing fire suppression capabilities, including private sector resources; and
- Recommendation 19: Update or complete and implement management plans for all publicly owned and managed forests.

## DISCUSSION:

The Nounou and Kālepa Forest Reserve management plans were developed using a variety of methods. Initial development consisted of reviewing and analyzing DOFAW historic and current files (both at the Administrative and Kaua'i Branch office), and documents obtained from other State agencies including the Department of Land and Natural Resources Land Division and Bureau of Conveyances, the Department of Accounting and General Services Survey Division, as well as the State Archives. State of Hawai'i Geographic Information Systems (GIS) map layers relating to biological, historical, and environmental resources were referenced extensively to develop this plan. Additional resources utilized for the development of this plan (including other plans that identified the Forest Reserves or the general area), were the Hawaiian Forester and Agriculturalist, the Hawai'i Biodiversity and Mapping Program, Hawai'i Comprehensive Wildlife Conservation Strategy, U.S. Fish and Wildlife Service Recovery Plans and others.

The plan then evolved into its final iteration through discussions with Division staff from all program areas, both at the Branch and Administrative offices, other Divisions and State agencies, DOFAW partners, and the public.

**Development Process & Timeline for the Nounou and Kālepa Forest Reserve, Kaua‘i**

Stage of Development	Date Achieved	Comments
Branch review	October 2013	Incorporated
DOFAW review	January 2015	Incorporated
Partner agency consultation	March 2015	Three responses received from partners and government agencies
Public consultation	May 2015	<ul style="list-style-type: none"> <li>• Posted on DOFAW website May 1, 2015 – May 31, 2015</li> <li>• Press release May 1, 2015</li> <li>• Eight comments received</li> </ul>

**SUMMARY OF COMMENTS AND RESPONSES:**

The Division received three responses on the Keālia and Moloa‘a Forest Reserve Management Plan during the partner agency consultation period. The Division received eight written comments on the plan during the public consultation period (two of the comment letters were supportive of DOFAW’s management planning effort). Below is a summary of the major comments received and the responses that were provided.

**Theme:** To avoid and minimize potential impacts to the seabirds from artificial lighting, it was recommended that commercial activities only occur during daylight hours. To minimize impacts to the endangered Hawaiian hoary bat, it was recommended that woody plants greater than 15 feet tall should not be disturbed, removed, or trimmed during the bat birthing and pup rearing season (June 1 through September 15).

**Response:** The Division is aware of the light attraction issues for seabirds, and the tree felling concerns during Hawaiian hoary bat birth and pup rearing season. There are established procedures already in place for both, and they will be followed by our Division during any management activities.

**Theme:** Open a public off-road biking (Off Highway Vehicle Park), mountain biking and hiking park for the citizens of Kaua‘i and other islands on Kālepa. The State currently does not provide any public use area for off-road motorcycling. Please consider these points as there are over 500 off-road riders that live on Kaua‘i and many more on other islands.

**Response:** Kālepa Forest Reserve is currently landlocked with no legal public access, or public trails. Until DOFAW can formalize legal public access to the reserve, there will be no recreational opportunities provided in Kālepa Forest Reserve. Negotiating legal public access is an identified management objective in the draft management plan. The DOFAW Nā Ala Hele program currently manages 33 recreational features on the island of Kaua‘i. Of those features three are approved for motorcycle use, and they are the Contour Road Trail, Powerline Trail, and the Wailua Forestry Management Road. Any use of a motorized ground vehicle on a Nā Ala Hele trail requires a street legal muffler, and a valid license plate, registration and safety check.

**Theme:** Would DOFAW consider allowing harvesting of small amounts of Eucalyptus to run trials of low land Koa in Nounou Forest Reserve?

**Response:** It is not likely that DOFAW would put either Nounou or Kālepa Forest Reserve under timber production for a number of reasons. Included in this plan is the DOFAW Management Guidelines, which identify both reserves as a 4 (lowest priority) for forest products.

**Theme:** Nounou or Kālepa Forest Reserve should not be used for commercial purposes such as tours, and may be trodden with much heavier traffic for the sake of generating income. With more people traffic, come 'ōpala, and deteriorated 'āina that should be respected and left to be preserved.

**Response:** DLNR's statutory mandate is for the protection and proper stewardship of the natural and cultural resources of Hawai'i. Public access to these resources is provided for in a manner to promote public safety and to ensure that public activity does not damage the resource. Commercial activity on public resources will only be considered if the activity does not adversely affect the natural and cultural resources, the community, or the general public's recreational activity.

In order for legal commercial hiking tours to take place, the trail must be managed and approved for commercial activity by the Nā Ala Hele program. The trails in Nounou FR are already approved for, and is currently being used for commercial tours. DOFAW regulates commercial activity by limiting the number of groups per day (3 for Nounou trails), and also the number of people (12 including the guide) in each group. Additionally, parking for commercial tours are limited to specific areas. Commercial use in Nounou FR is currently very low, and they are not the primary users of these trails. There are no plans to increase the limits set for commercial use.

Kālepa Forest Reserve on the other hand is landlocked, with no legal public access or public trails. Until DOFAW can formalize public access to Kālepa FR, there will be no recreational opportunities allowed in the reserve.

**Theme:** Wherever more details [primarily of the surrounding areas] can be added to the plan, it would be helpful.

**Response:** DOFAW will review all requests for additional information and will incorporate them as appropriate. Please understand that the content of the management plan is limited to the resources that are physically located within the forest reserve boundary.

**Theme:** The State should develop and implement a “good neighbor policy” with adjacent neighbors to prevent property damage, personal injury, and litigation. Develop suitable no tree buffer zones (75-100') between the State Forest Reserve and adjacent neighbors. This would also act as a fire break.

**Response:** DOFAW takes your hazard tree and fire concerns very seriously. With the current state of funding we are unable to establish and maintain 100' fire buffers, but we have responded to landowner hazard tree removal requests in the past whenever possible.

**Theme:** Hikers constantly trespass. Numerous hikers climb in the dark and there is evidence of fireworks and bonfires within the reserve. Fence along hiking trails and between State Forest land and neighbor's property.

**Response:** The Nā Ala Hele Nounou West Trail is fenced along the corridor that is directly adjacent to private property. If trail users continue to trespass please call the Kaua'i County Police Department for assistance. The use of fires and fireworks are also prohibited in the forest reserve. If you observe such use please call the DOCARE hotline for assistance.



Board approval of the subject forest reserve management plans is intended to trigger some or all of the following actions:

1. Preparation of regulatory compliance documents as required for implementation of management actions as outlined in the plan.
2. DOFAW efforts to secure operational and planning funding for plan objectives.
3. Prioritized implementation of plan objectives by DOFAW.
4. Periodic solicitation of requests for proposals or bids for implementation of plan objectives, including issuance of permits, licenses, or contracts, as necessary.

The Division has completed and approved the following management plan and submits it for your review:

1. Nounou and Kālepa Forest Reserve, Kaua'i (Exhibit A)

#### CHAPTER 343 – ENVIRONMENTAL ASSESSMENT:

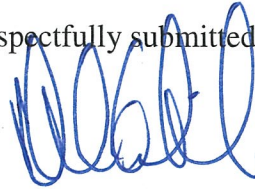
The Division will periodically bring the most recently developed management plans forward for Board review. This plan is for planning purposes only. Any actions that are expected to take place that are outlined in the Forest Reserve Management Plan will follow all Chapter 343, Hawai'i Revised Statutes, compliance regulations prior to implementation.

RECOMMENDATIONS:

That the Board of Land and Natural Resources:

1. Approve the Nounou and Kālepa Forest Reserve Management Plan as a guiding document for the management of the subject reserves.

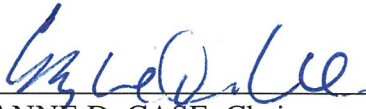
Respectfully submitted,



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DAVID G. SMITH, Acting Administrator  
Division of Forestry and Wildlife

APPROVED FOR SUBMITTAL:



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SUZANNE D. CASE, Chairperson  
Board of Land and Natural Resources

Nounou and Kālepa Forest Reserves

Management Plan

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June 2015

Prepared by:

State of Hawai'i  
Department of Land and Natural Resources  
Division of Forestry and Wildlife  
Forests Resources Management Section

## EXECUTIVE SUMMARY

This management plan for Nounou and Kālepa Forest Reserves on Kauaʻi is one in a series of site-specific natural resource management plans to be prepared by the Department of Land and Natural Resources, Division of Forestry and Wildlife (DOFAW) for individual forest reserves in the State of Hawaiʻi. These plans present a brief history of the specific forest reserve, a complete record of land transactions and boundary changes over time, a description of cultural and natural resources, as well as an account of infrastructure and intended use(s) of the area. These plans serve to: (1) assist in preparation of regulatory compliance documents required to implement management actions outlined in the plan; (2) support DOFAW efforts to secure funding for plan objectives; (3) prioritize implementation of management objectives; (4) solicit requests for proposals or bids to implement plan objectives; and (5) inform the public of short and long-term goals.

Nounou Forest Reserve was established by Governor's Proclamation in 1918 for the purpose of protecting the spring and to reforest the ridge. Kālepa Forest Reserve was established by Governor's Proclamation in 1944, also for the purpose of reforestation. There was very severe erosion occurring on the windward side of the ridge. Currently, both reserves are generally characterized by steep, lower-mesic forested slopes. Vegetation is primarily non-native species, although there is some native vegetation in the upper areas.

DOFAW's current management activities within Nounou and Kālepa Forest Reserve are rare plant protection and maintenance of Nā Ala Hele trails.

Management priorities were divided into eight categories and ranked on a qualitative basis (see Table 7 on page 27). Summaries of management priorities and goals for the Nounou and Kālepa Forest Reserves are as follows:

1. Watershed Values – Erosion reduction and prevention; Monitoring forest composition.
2. Resource Protection – Reduce impact of fire, insects and disease on forest resources.
3. Other Public Activity – Acquire and secure additional management and/or public access.
4. Threatened and Endangered (T&E) Species Management – Protection and recovery of rare and endangered plants and animals.
5. Invasive Species Control – Manage incipient and established invasive plants and animals.
6. Native Ecosystems – Determine landscape level needs; Native ecosystem restoration.
7. Game Animal Management – Promote public hunting through Chapter 122 & 123, Hawaiʻi Administrative Rules (HAR).
8. Commercial Activity – Generate income from commercial activities in the reserves.

Details of specific tactical goals and action items can be found in Table 8 on page 27 of this plan. This plan is intended to describe short-term resource management planning and implementation strategies, as well to serve as a basis for future updates and modifications to accommodate evolving or additional objectives such as additional fencing projects and/or improving access and facilities for Nounou and Kālepa Forest Reserves.

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NOUNOU AND KĀLEPA FOREST RESERVES  
MANAGEMENT PLAN SIGNATURE PAGE

Kaua'i District certification: This plan was prepared by a team of Division of Forestry and Wildlife (DOFAW) staff to provide a management framework for Nounou and Kālepa Forest Reserves.

\_\_\_\_\_  
Galen K. Kawakami – DOFAW Kaua'i Branch Manager

\_\_\_\_\_  
Date

DOFAW Administrator's approval: I have reviewed the enclosed Forest Reserve Management Plan and concur with the recommendations herein. I agree that resource management implementation will follow those specified in the Management Plan for Nounou and Kālepa Forest Reserves.

\_\_\_\_\_  
Galen K. Kawakami – Acting DOFAW Administrator

\_\_\_\_\_  
Date

Department of Land and Natural Resources Board approval: This plan is in accordance with the mandates of the State Forest Reserve System which includes Chapter 183, Hawai'i Revised Statutes, and Chapter 13-104, Hawai'i Administrative Rules.

\_\_\_\_\_  
Suzanne D. Case – BLNR Chairperson

Approved by the Board  
of Land and Natural  
Resources at its meeting  
held \_\_\_\_\_, 2015

## DEVELOPMENT PROCESS TIMELINE

Nounou and Kālepa Forest Reserves, Kaua'i

<b>Stage of Development</b>	<b>Date Achieved</b>	<b>Comments</b>
Branch review	October 2013	Incorporated
DOFAW review	January 2015	Incorporated
Partner agency consultation	March 2015	Incorporated
Public consultation	May 2015	Incorporated
DOFAW approval		
BLNR approval		

## I. INTRODUCTION

The Division of Forestry and Wildlife conducts on-going planning efforts to develop and update management plans for all forest reserves across the State. These efforts, to be generally consistent across the State, serve to organize field management, assist in budgeting and funding concerns, and make the process transparent for partner organizations and the public. These plans also help to fulfill certain recommendations made in the Hawai'i Tropical Forest Recovery Action Plan, which came about as a result of the 1992 Federal Hawai'i Tropical Forest Recovery Act.

Each Branch office of DOFAW will have a comprehensive management plan that addresses overall Forest Reserve System issues, goals and objectives for that Branch. In addition, management plans will be developed for each individual forest reserve, which will in part reflect the Division's management guidelines specific to that area. This document represents the management plan for the Nounou and Kālepa Forest Reserves, which fits under the comprehensive forest reserve management plan for Kaua'i Branch. It addresses concerns and strategies only on the public lands within Nounou and Kālepa Forest Reserves.

This management plan for the Nounou and Kālepa Forest Reserves was developed using a variety of methods. Initial development consisted of reviewing and analyzing DOFAW historic and current files (both at the Administrative and Kaua'i Branch office), and documents obtained from other State agencies including the Department of Land and Natural Resources Land Division and Bureau of Conveyances, the Department of Accounting and General Services Survey Division, as well as the State Archives. State of Hawai'i Geographic Information Systems (GIS) map layers relating to biological, historical, and environmental resources were referenced extensively to develop this plan. Additional resources utilized for the development of this plan (including other plans that identified the Forest Reserves or the general area), were the Hawaiian Forester and Agriculturalist, the Hawai'i Biodiversity and Mapping Program, Hawai'i Comprehensive Wildlife Conservation Strategy, U.S. Fish and Wildlife Service Recovery Plans and others. The plan then evolved into its final iteration through discussions with Division staff from all program areas, both at the Branch and Administrative offices, other Divisions and State agencies, DOFAW partners, and the public.

Once finalized by DOFAW, this Nounou and Kālepa Forest Reserves Management Plan will be submitted for review and approval by the Board of Land and Natural Resources (Board). If approved by the Board, the following actions may be triggered:

1. Preparation of regulatory compliance documents as required for implementation of management actions as outlined in the plan.
2. DOFAW efforts to secure operational and planning funding for plan objectives.
3. Prioritized implementation of plan objectives by DOFAW.
4. Periodic solicitation of requests for proposals or bids for implementation of plan objectives, including issuance of permits, licenses, or contracts, as necessary.



## II. NOUNOU AND KĀLEPA FOREST RESERVES DESCRIPTION

**A. Location and Description:** Nounou and Kālepa Forest Reserves (FR) together comprise approximately 1,393 acres of public land (Tables 1 and 2), and are located on the eastern side of Kauaʻi (Figure 1). Nounou FR lies to the north of Kālepa FR, separated by the Wailua River which is part of the Wailua River State Park. Nounou FR is bordered by privately owned land on its western and northeastern boundaries, and bordered by other State land on its southern and southeastern boundaries. Kālepa FR is primarily surrounded by other State lands except for the south and southeastern corner. The Department of Hawaiian Home Lands (DHHL) owns much of the land that abuts the makai side of Kālepa FR, and it may eventually be developed. The County’s proposed site for a new landfill is adjacent to the western boundary of Kalepa FR.

These forest reserves are on the windward side of Kauaʻi and are generally characterized by steep, lower- mesic forested slopes. Vegetation is primarily composed of non-native species, although some native vegetation still exists in the upper portion of the reserves. The communities served by these forest reserves include Kapaʻa, Wailua Houselots, Wailua Homesteads, Waipouli, Kapaia, and Hanamāʻulu.

**Table 1.** Government Tax Map Key (TMK) parcels currently comprising public lands of Nounou Forest Reserve. Some TMKs have areas both inside and outside the FR boundary.

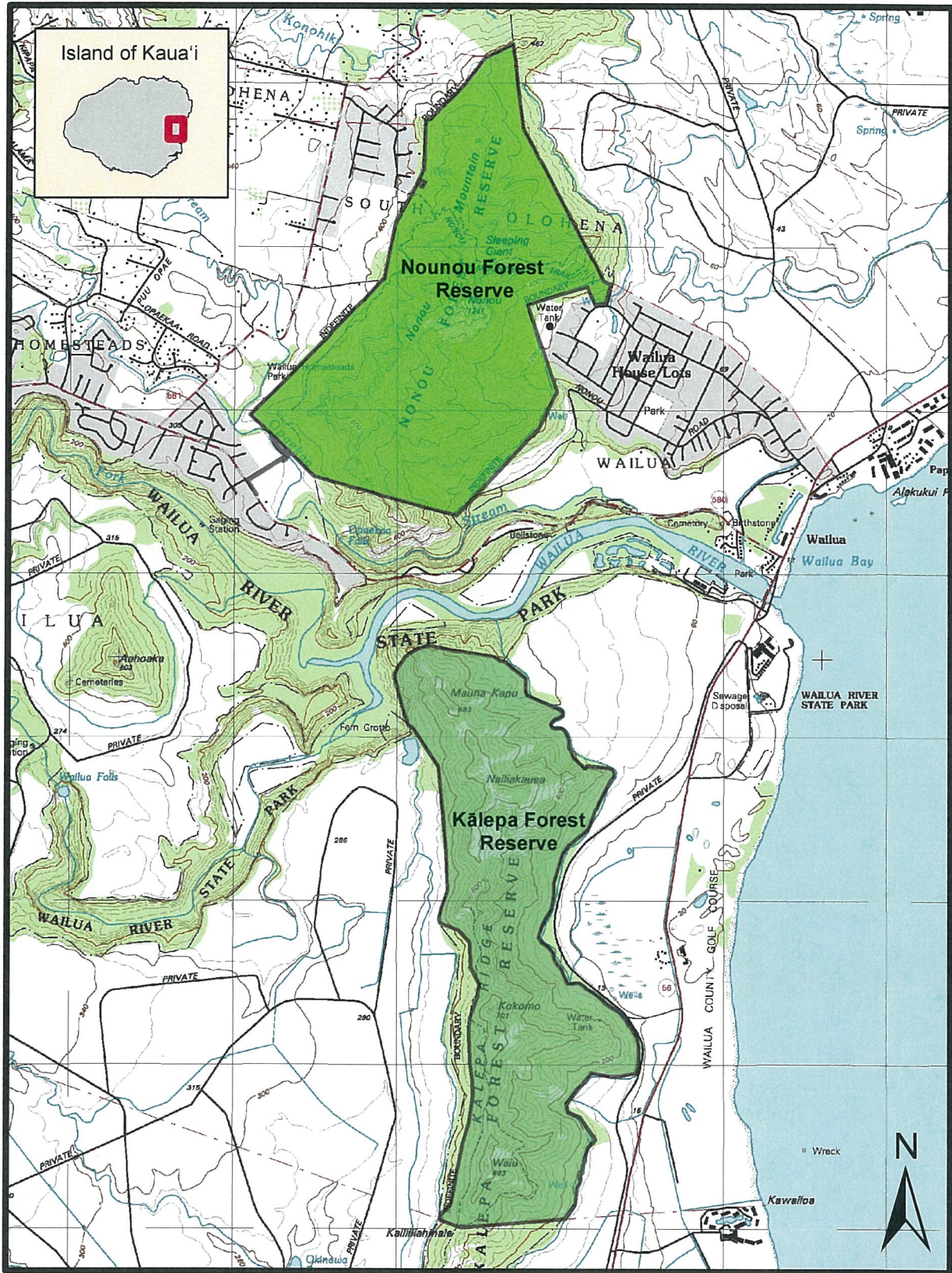
TMK Number	Owner	Tax Acres (entire TMK)	GIS Acres (entire TMK)	GIS Forest Reserve Acres
442004001	State of Hawaiʻi	722.33	719.17	718.90
441012011	State of Hawaiʻi	1.05	1.05	1.05
441012012	State of Hawaiʻi	1.16	1.17	1.17
441012013	State of Hawaiʻi	1.17	1.17	1.17
TOTAL				722.29

**Table 2.** Government Tax Map Key (TMK) parcels currently comprising public lands of Kālepa Forest Reserve. Some TMKs have areas both inside and outside the FR boundary.

TMK Number	Owner	Tax Acres (entire TMK)	GIS Acres (entire TMK)	GIS Forest Reserve Acres
439002014	State of Hawaiʻi	678.59	708.63	670.35
TOTAL				670.35

**B. Geographic Site Data:** Kauaʻi is the oldest of the main Hawaiian Islands and was formed approximately five million years ago by at least one extinct volcano (Juvik and Juvik 1998). A second, smaller volcano may have formed the southeast part of the island, but erosion, weathering, landslides, and rejuvenated flows have made it difficult to ascertain the island’s history. An enormous caldera complex and the lack of rift zones make the geology of Kauaʻi unique among the Hawaiian Islands. Kauaʻi is known for its deeply weathered mountains and associated landscapes (e.g. Waimea Canyon and the Nāpali coast) and its wet climate. Kawaikini peak is the highest point on Mount Waiʻaleʻale. With an annual rainfall of over 390 inches, was once one of the wettest places on Earth.

Figure 1: Current extent of public lands of Nounou and Kālepa Forest Reserves



0 0.25 0.5 1 Miles

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 Division of Forestry and Wildlife  
 808-587-0166  
 September 2013



The Līhu‘e basin on the east side of Kaua‘i is a large semicircular depression bounded by steep cliffs. The Lihue Depression is believed to have been formed by a collapse of the Napali Formation and was subsequently filled by late-rejuvenated-stage volcanic material. The Nounou and Kālepa ridges are remnants of the original Napali Formation on the eastern side of the collapse (Reiners et. al., 1999).

**C. Physical Site Data:** Nounou and Kālepa Forest Reserves currently occupy lands in the ahupua‘a of Waipouli, North and South Olohena and Wailua. Elevation and rainfall vary through the reserves. The highest elevation reaches up to approximately 1,200 feet, and lower regions slope down to below 100 feet. Average precipitation is approximately 50-60 inches annually (Figure 2). Rainfall received in the Nounou and Kālepa FRs charges two aquifers: Wailua and Hanamā‘ulu. Soils in both reserves are predominantly classified as Highly Erodible Land as defined by the United States Department of Agriculture’s Natural Resource Conservation Service. This agency provides online soil maps and data at <http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm>.

The dominant feature of Nounou FR is Nounou Mountain (Sleeping Giant). Kālepa FR contains all or part of the following features: Maunakapu summit, Nā‘ilia Ka‘aua lookout, Kālepa ridge, Kokomo summit, and Waiū summit.

**D. Pre-Reserve and Early Use History:** Both forest reserves were created by Governor’s Proclamation; Nounou in 1918 and Kālepa in 1944. Over the years, the boundaries of both reserves have undergone changes (Tables 3 and 4, Figure 3).

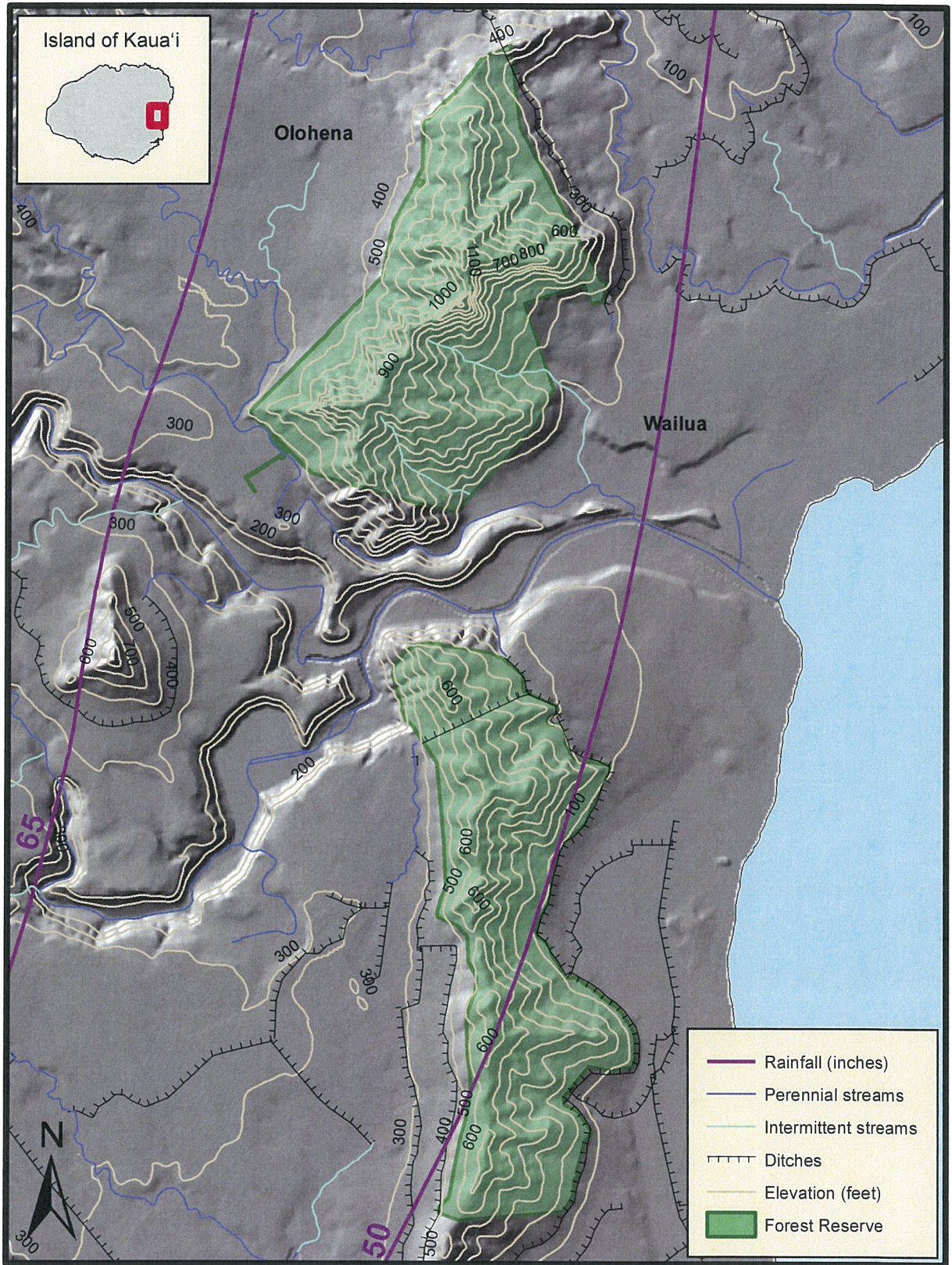
#### Nounou

According to a report that preceded the 1918 Governor’s Proclamation, Nounou FR was created to protect the remaining forests, a small stream, and several springs on the leeward side of the ridge. Boundaries were drawn with the intent to “include only the steeper slopes and in such a manner that a minimum of fencing for its protection will be required.” The report also states that, “In the early days the whole ridge was undoubtedly covered with a heavy forest of koa, sandalwood, kukui, hala, and other indigenous trees which occupy similar situations, but the inroads made by cattle and fire have driven the forest back to the inaccessible parts of the ridge,” (Judd 1918, p. 485). At the time of its designation as a forest reserve, the intent was to reforest the entire ridge, to capture water from the “moisture laden wind coming off of the ocean,” (Judd 1918, p. 485). Mylar maps of tree plantations made from aerial photography document that by 1966, approximately 303 acres had been reforested in Nounou FR (Klingensmith 1967).

In 1975, the Division of Forestry identified the need for acquisition of land to provide public access to Nounou FR from Kuamo‘o Road. On April 27, 1979, the Board of Land and Natural Resources authorized the acquisition of a perpetual non-exclusive easement by negotiation or by condemnation if necessary and the assignment of the easement to the Division of Forestry upon completion of the acquisition. The Final Order of Condemnation was issued on January 6, 1986, for portions of land located within TMK (4) 4-2-003:012 and (4) 4-2-003:065, marking the first successful effort by the State to condemn land needed to complete a trail and open access



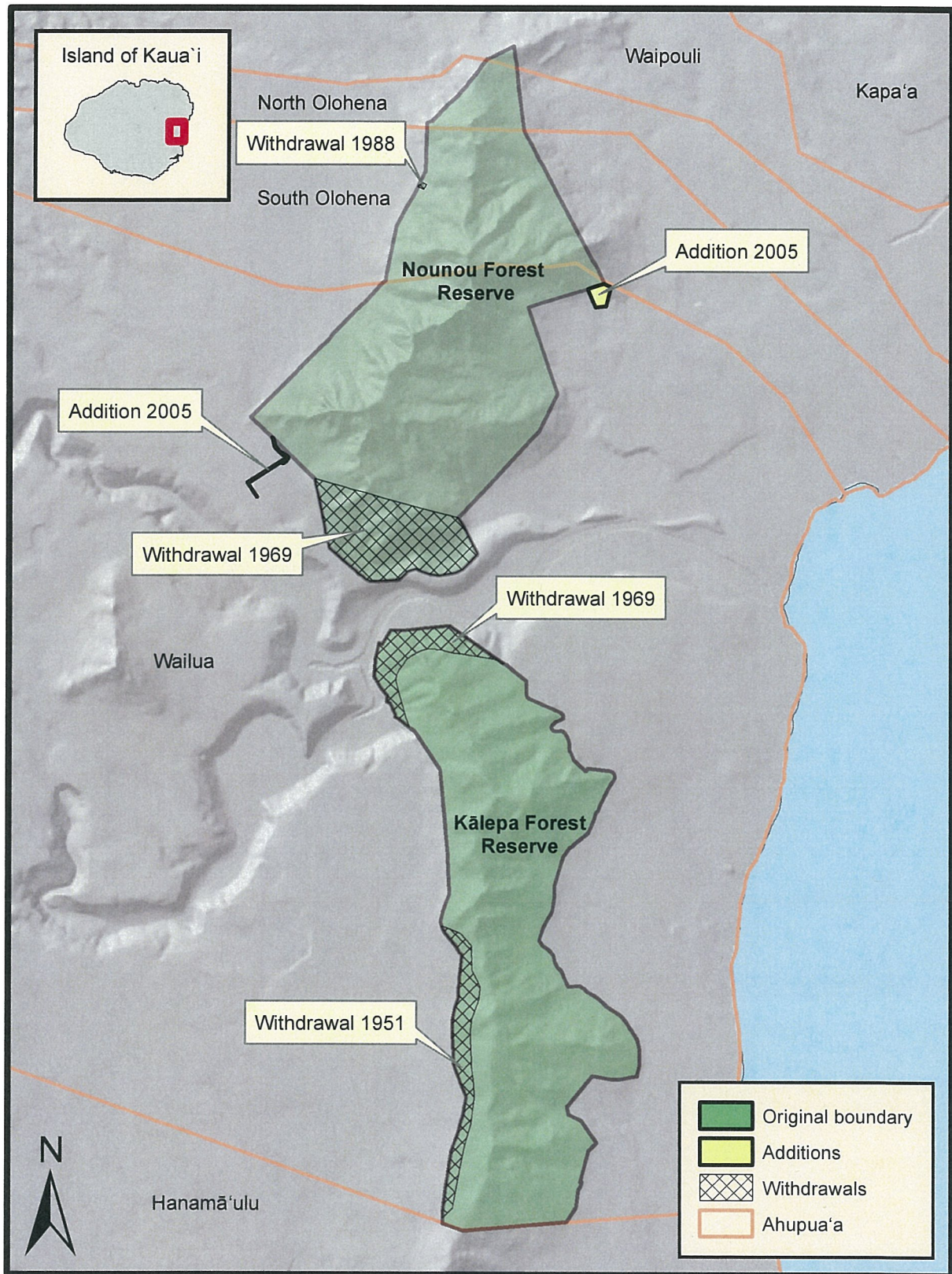
Figure 2: Hydrological features of Nounou and Kālepa Forest Reserves



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 June 2015



Figure 3: Historical changes to public lands in Nounou and Kālepa Forest Reserves. Year of addition/withdrawal and ahupua`a indicated.



0 0.25 0.5 1 Miles

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 Department of Land and Natural Resources  
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 September 2013

through a forest reserve. The easement was purchased from Hale Kauai, Ltd., for \$32,000. On May 5, 1989, DOFAW officially opened the new State forest reserve trail and bridge.

## Kālepa

Prior to it becoming a forest reserve, the northern half of Kālepa ridge was government land and the southern half was owned by Lihue Plantation Company, Ltd. In 1925, the Territorial Government of Hawai‘i leased the northern half to Lihue Plantation Company, Ltd., giving the company access to the entire ridge. The area was primarily used for the grazing of animals and was surrounded on the east and west by the sugarcane fields of Lihue Plantation.

In 1940, the general lease for north Kālepa expired, and in 1944, the Lihue Plantation Company, Ltd., surrendered the care, custody and control of south Kālepa ridge (193.5 acres) to the Territory for forest reservation purposes. The Agreement of Surrender lasted for a period of 20 years, and in return, the company was exempt from paying property taxes for the surrendered land.

At the time of its designation as a forest reserve, Kālepa ridge was described by Territorial Forester C. S. Judd, as being covered primarily with short grass and was severely eroded on the windward side. The intent was to reforest the ridge to mitigate for the erosion. By 1966, the Division of Forestry planted almost 171 acres of private and government lands in Kālepa FR with non-native tree plantations (Klingensmith 1967). Efforts were concentrated around the perimeter of existing scars and eroded areas that still had sufficient soil to support vegetative growth.

In 1977, the State botanist conducted a vegetation survey of northern Kālepa ridge. On page one of her report Carolyn Corn states that, “The vegetation is composed mostly of introduced exotics and a few remnant native species.” She also documented that soon after Kālepa ridge was converted into forest reserve, Indian sandalwood (*Santalum album*), ironwood (*Casuarina sp.*), and brush box (*Lophostemon confertus*) were planted (Corn 1977).

**Table 3:** Summary of public land additions and withdrawals (A/W) for Nounou FR. See Figure 3 for map descriptions. Portions of TMKs are denoted with (por.). Data relating to these items are filed at the DOFAW Administrative Office and the State Survey Office.

Action	Date	A/W	Description	Acres	Copy of Survey Furnished (CSF)	TMK
Governor’s Proclamation	31-Dec-1918	A	Land set aside for establishment of Nounou FR	818	2870	442004001 442004002
Executive Order 2421	10-Jan-1969	W	Withdrawal of Government lands at Wailua for addition to Wailua River State Park	95.67	15438	442004002

Action	Date	A/W	Description	Acres	Copy of Survey Furnished (CSF)	TMK
Executive Order 3376	08-Jan-1988	W	Withdrawal of Government lands at South Olohena for the County of Kaua'i for a well site	0.27	20597	442004001 (por.)
Executive Order 4098	12-Jan-2005	A	Addition of land at Wailua House Lots for public trail access	3.385	23910	441012011 441012012 441012013
Executive Order 4107	18-May-2005	A	Addition of a perpetual non-exclusive easement for public access foot trail	0.780	24006	442003012 (por.) 442003065 (por.)

**Table 4:** Summary of public land additions and withdrawals (A/W) for Kālepa FR. See Figure 3 for map descriptions. Portions of TMKs are denoted with (por.). Data relating to these items are filed at the DOFAW Administrative Office and the State Survey Office.

Action	Date	A/W	Description	Acres	Copy of Survey Furnished (CSF)	TMK
Governor's Proclamation	19-Jun-1944	A	Land set aside for establishment of Kālepa FR	744.00	9401	439002014 439002030 (por.)
Executive Order 1480	27-Nov-1951	W	Withdrawal of Government lands at Wailua for pineapple cultivation	33.59	11283	439002014 (por.)
Executive Order 2420	10-Jan-1969	W	Withdrawal of Government lands at Wailua for addition to Wailua River State Park	31.82	15439	439002030 (por.)

**Kuleana Parcels:** None.

**Documented Activities/Leases/Deeds/Permits:** Documentation has been found for three land use agreements involving lands of the Kālepa FR (Table 5). None were found for Nounou FR.

**Table 5:** Historical land use agreements in Kālepa FR.

Type of Action	Action Number	Duration	Description	Acres	Copy of Survey Furnished (CSF)	TMK
Lease	GL-1495	1-July-1925 to 1-July-1940	Lease to Lihue Plantation Company, Ltd.	7055	4039	439002014

Type of Action	Action Number	Duration	Description	Acres	Copy of Survey Furnished (CSF)	TMK
Lease	GL-1495	1-July-1925 to 1-July-1940	Lease to Lihue Plantation Company, Ltd.	7055	4039	439002014
Lease	S-5193	26-Jul-1990 to 13-Jul-2001	Lease for hydroelectric plan operations that was never executed and eventually cancelled	?	?	439002014
Agreement of Surrender	n/a	5-Sept-1944 To 5-Sept-1964	Lihue Plantation Company, Ltd.	193.5	n/a	438002004 438002005 438002018

**E. Vegetation:** Nounou and Kālepa FRs are dominated by non-native forest: albizia (*Falcataria moluccana*), strawberry guava (*Psidium cattleianum*), Java plum (*Syzygium cumini*), octopus tree (*Schefflera actinophylla*), Christmas berry (*Schinus terebinthifolius*), and silk oak (*Grevillea robusta*); shrubland: lantana (*Lantana camara*) and koa haole (*Leucaena leucocephala*); and grassland: guinea grass (*Urochloa maxima*) and bush beard grass (*Schizachyrium condensatum*) (Figure 4). There are some native species still present in both reserves. For a more detailed list of plant species see Appendix A. DOFAW's Draft Management Guidelines consist of four vegetation classifications: V-1 Highest Quality Native Ecosystems, V-2 Predominantly Native Areas, V-3 Considerably Disturbed Areas, and V-4 Badly Degraded Areas. The vegetation in Nounou and Kālepa FRs are classified as V-4 (Figure 5). Management objectives for V-4 areas are to prevent activities or intensities of use that result in degradation of watershed cover or soils. These areas are where the most disruptive activities would be allowed, such as large-scale commercial forestry, game habitat manipulation, etc. Native plant conservation is mainly focused at the species level. There are approximately 1,393 acres of V-4 in Nounou and Kālepa FRs. DOFAW is in the process of updating its Management Guidelines.

**Rare Plants:** Kaua'i has a high level of biological endemism (Mitchell et al., 2005) and has many rare plants, some of which may be found within Nounou FR (Table 6 and Figure 6). There are no known wild populations of rare plant species in the Kālepa FR, but the Division maintains rare plant exclosures in both reserves and have in the past outplanted rare and common native plants into the exclosures and also in the surrounding area. Rare species in Hawai'i may be listed with the Federal Endangered Species Act (US-ESA) and/or with the local Plant Extinction Prevention (PEP) Program, whose mission is to protect Hawai'i's rarest native plants from extinction. The PEP Program works to reverse the trend toward extinction by managing wild plants, collecting seeds, and establishing new populations with a focus on species that have fewer than 50 plants remaining. Funding for the PEP Program is provided by DOFAW, U.S. Fish and Wildlife Service (USFWS), and other federal, state, and private partners. Members of the Hawai'i Rare Plant Restoration Group, of which DOFAW is a founding member, provides oversight to the PEP Program and provides botanical expertise when necessary. The PEP Program regularly collaborates with over 60 conservation partners and landowners to protect PEP species under their jurisdiction.



Figure 4: Vegetation cover at Nounou and Kālepa Forest Reserves (Hawai'i GAP Analysis Program 2005)

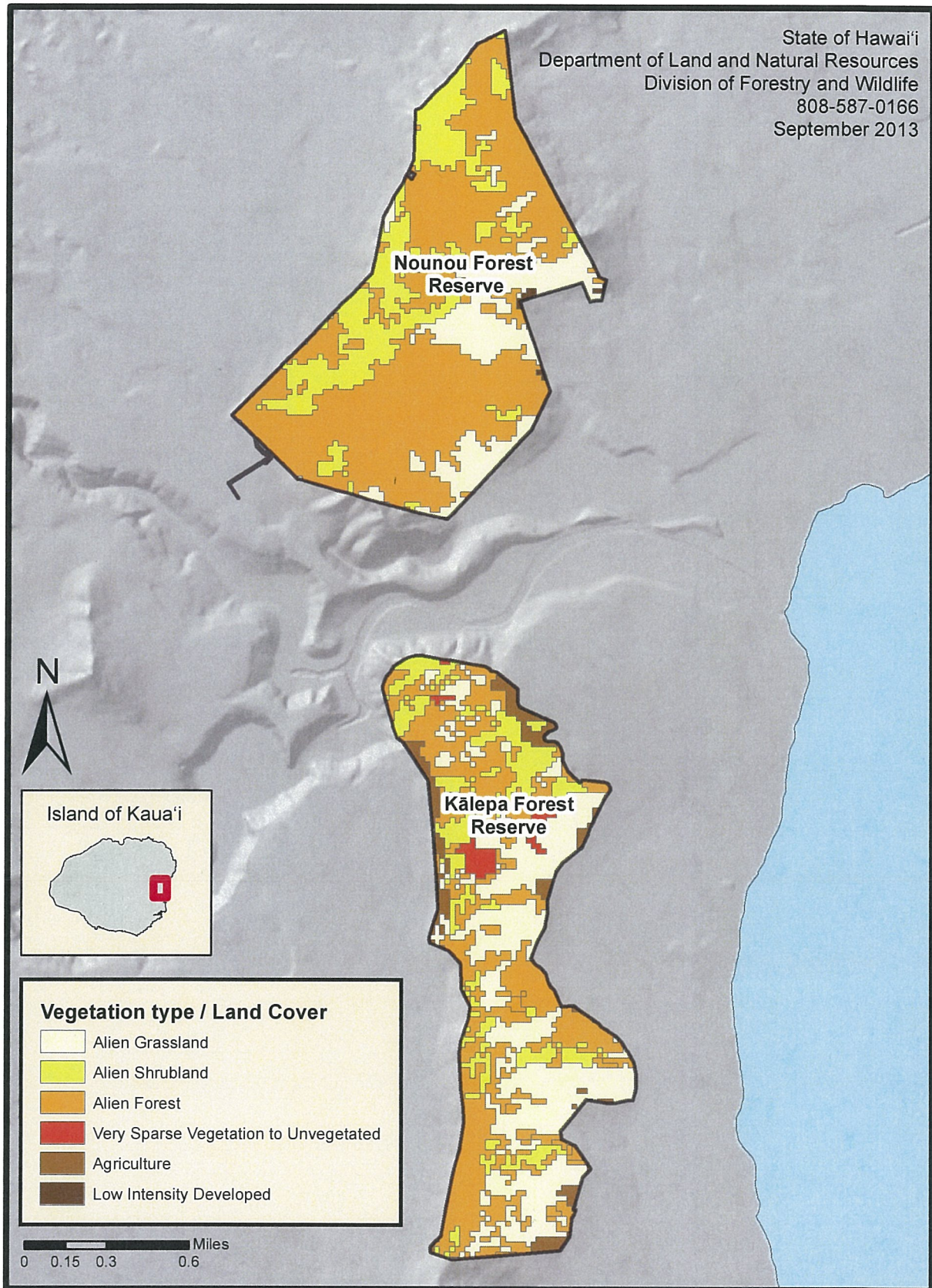
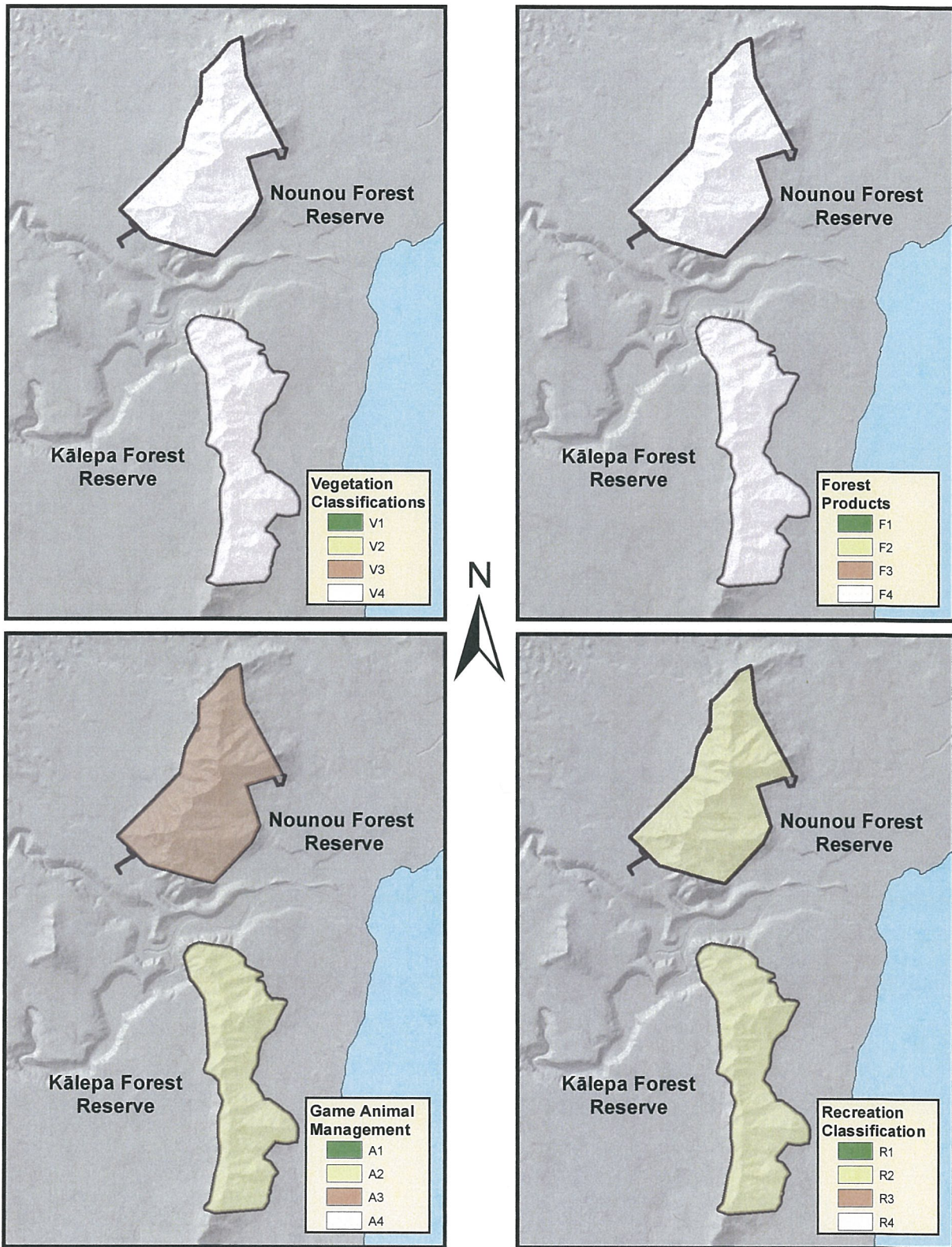




Figure 5: DOFAW's Draft Management Guidelines for Nounou and Kālepa Forest Reserves



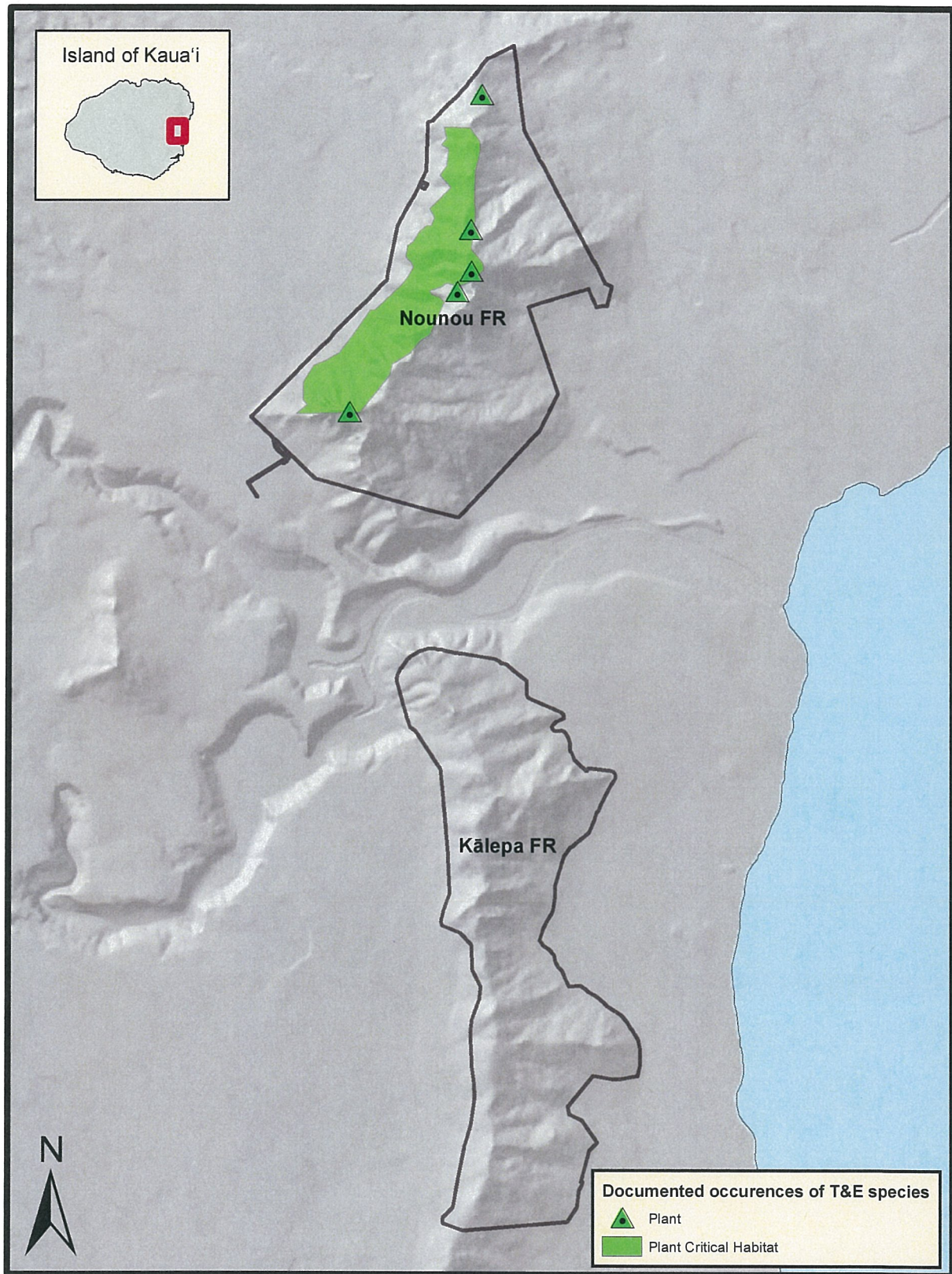
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 Department of Land and Natural Resources  
 Division of Forestry and Wildlife  
 808-587-0166  
 January 2015

0 0.3 0.6 1.2 Miles





Figure 6: Threatened and Endangered (T&E) Species and Critical Habitat in Nounou and Kālepa Forest Reserve (FR) Also see Table 6. (Hawai'i Biodiversity and Mapping Program 2008)



0 0.25 0.5 1 Miles

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Division of Forestry and Wildlife  
808-587-0166  
September 2013

**Table 6:** Rare and endangered plants observed within Nounou FR (Hawai‘i Biodiversity and Mapping Program 2008). Species listed may have more than one observation. An observation is considered historical if it occurred more than 30 years ago. Also see Figure 6.

	Species	Current/ Historical	US-ESA Listing Status	PEP Species
<b>Plants</b>	<i>Hibiscus clayi</i>	Current	Endangered	Yes
	<i>Lobelia niihauensis</i>	Historical	Endangered	No
	<i>Polyscias racemosa</i>	Current	Endangered	No
<b>Animals</b>	<i>Lasirus cinereus semotus</i>	Current	Endangered	N/A
	<i>Puffinus auricularis newelli</i>	Current	Endangered	N/A

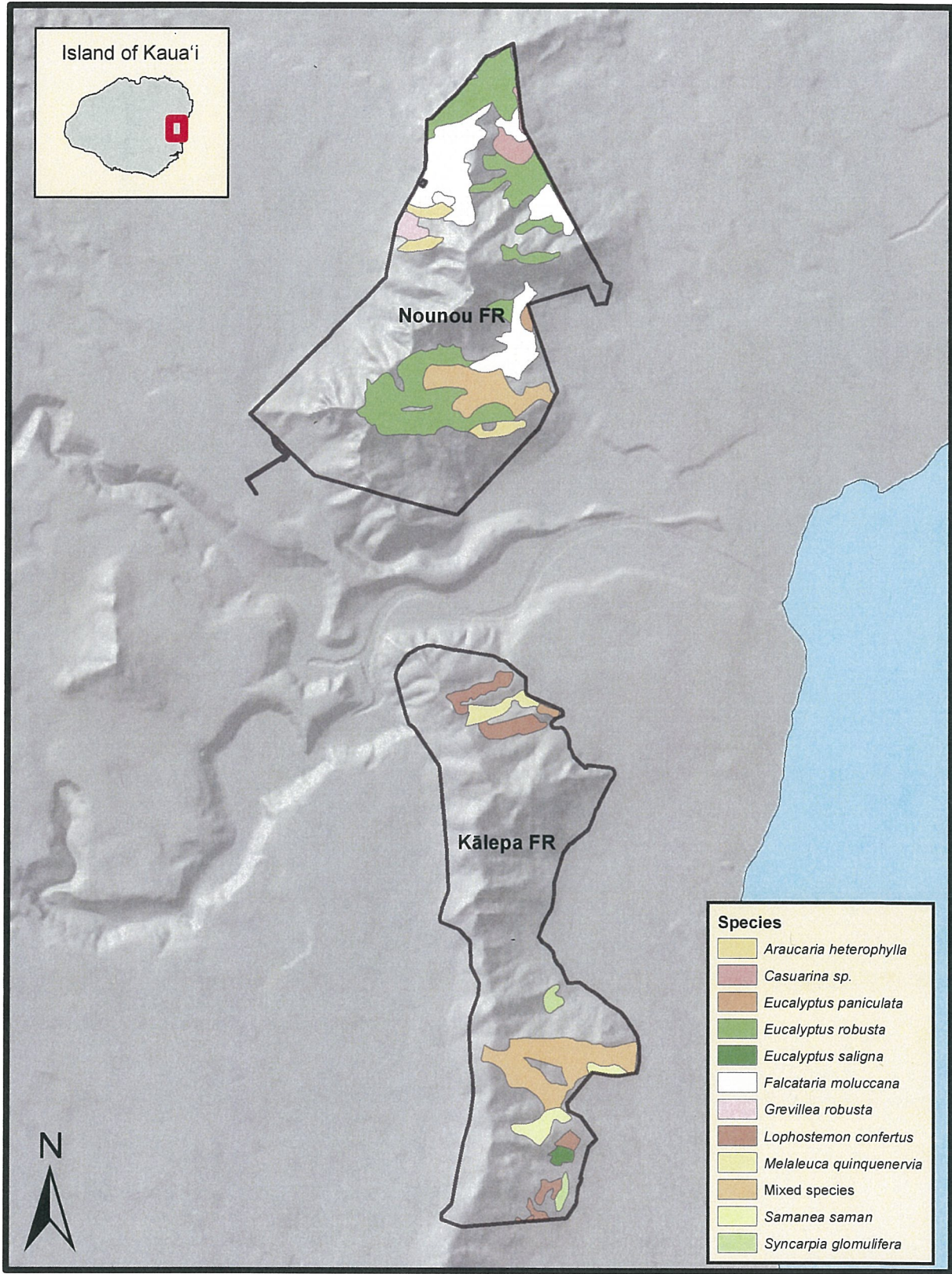
**Plant Critical Habitat:** As defined by the US-ESA, Critical Habitat is defined as “specific geographic areas, whether occupied by a listed species or not, that are determined to be essential for the conservation and management of listed species, and that have been formally described in the Federal Register,” (U.S. Fish and Wildlife Service 2014). Nounou Forest Reserve contains Critical Habitat for two plant species (*Hibiscus clayi* and *Polyscias racemosa*) encompassing 147 acres (Figure 6). Kālepa Forest Reserve does not contain Critical Habitat for any endangered plant species.

**Timber Species:** Large scale harvesting of the Hawaiian forests began in 1791, with the sandalwood trade. This ultimately led to the severe depletion of native sandalwood by the 1830’s (Merlin et al. 1990). Forest loss continued due to fire, cattle grazing, and harvesting of wood for fence posts and fuel wood for whaling ships and sugar mills. In the late 1800’s, ranchers and sugar plantations began replanting efforts to replace the forests that provided a steady source of water. The Territorial Government also took an interest in exotic and native tree planting throughout the Hawaiian Islands, both for reforestation purposes and to conduct trials with commercially valuable timber species (Nelson 1967). Nounou and Kālepa Forest Reserves together have 33 plantation plots encompassing approximately 382 acres (Figure 7) (Klingensmith 1967). Most of these were planted prior to 1957 (Honda et al., 1967). Species that were planted and are still present in these FRs include:

- *Araucaria heterophylla* (Norfolk island pine)
- *Casuarina* sp. (ironwood)
- *Eucalyptus paniculata* (grey ironbark)
- *Eucalyptus robusta* (swamp mahogany)
- *Eucalyptus saligna* (Sydney blue gum)
- *Falcataria moluccana* (albizia)
- *Grevillea robusta* (silk oak)
- *Lophostemon confertus* (Brisbane box)
- *Melaleuca quinquenervia* (paperbark)
- *Samanea saman* (monkeypod)
- *Syncarpia glomulifera* (turpentine tree)



Figure 7: Plantation timber stands in Nounou and Kālepa Forest Reserves.



0 0.25 0.5 1 Miles

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DOFAW's Draft Management Guidelines designate Nounou and Kālepa FRs as containing only one of four levels of forest products classification (Figure 5): Restricted (F-4, forest products are not normally an objective. Harvesting would be considered only for compelling public benefit, 1393 acres). All classification levels have restrictions regulated by DOFAW and require appropriate permits and/or licenses. DOFAW is in the process of updating its Management Guidelines.

**Non-Native Plant Species:** Large areas of both Nounou and Kālepa FRs are comprised of non-native vegetation, much of which is considered invasive. Species in the FRs that fall under this category include:

- *Ardisia elliptica* (inkberry)
- *Caesalpinia decapetala* (catsclaw)
- *Chrysophyllum oliviforme* (satin leaf)
- *Clidemia hirta* (clidemia)
- *Clusia rosea* (autograph tree)
- *Leucaena leucocephala* (koa haole)
- *Lantana camara* (lantana)
- *Macaranga tanarius* (parasol leaf tree)
- *Melinis minutiflora* (molasses grass)
- *Mesosphaerum pectinatum* (comb bushmint)
- *Psidium cattleianum* (strawberry guava, waiawi)
- *Rhodomyrtus tomentosa* (downy rose myrtle)
- *Schinus terebinthifolius* (Christmas berry)
- *Schizachyrium condensatum* (bush beard grass)
- *Spathodea campanulata* (African tulip)
- *Sphaeropteris cooperi* (Australian tree fern)
- *Syzygium cumini* (Java plum)
- *Schefflera actinophylla* (octopus tree)
- *Urochloa maxima* (guinea grass)

**F. Wildlife:** A few species of native wildlife, including two endangered species can be found in the Nounou and Kālepa FRs (Table 6). Auditory surveys conducted by the Kaua'i Endangered Seabird Recovery Project has detected the endangered Hawaiian hoary bat (*Lasirus cinereus semotus*) in the vicinity of both forest reserves (Nick Holmes, personal communication, unreferenced), and more recently the 'a'o or Newell's shearwater (*Puffinus auricularis newelli*) has been detected in the vicinity of Nounou FR. There is no other information on any other federally listed species in these areas. Other species of Hawaiian birds that have been observed in the vicinity of both forest reserves are the pueo (*Asio flammeus sandwicensis*) and the white-tailed tropicbird (*Phaethon lepturus dorotheae*).

**Animal Critical Habitat:** There is no animal critical habitat located in the Nounou or Kālepa Forest Reserves.

**Non-Native Wildlife:** A wide variety of introduced songbirds exist across the island of Kaua'i. Some of these provide competition for resources and serve as reservoirs for diseases that affect



native bird populations. Mosquitoes, especially *Culex quinquefasciatus*, are a concern due to their status as disease vectors. Rats (*Rattus* spp.) eat fruits of native plants and can be vectors for Leptospirosis, a zoonotic disease. Feral cats (*Felis catus*) may prey on nesting native birds. Mongoose (*Herpestes javanicus*) are also a threat to native birds and were captured on Kaua'i for the first time in 2012. Credible mongoose sightings continue to be reported to the Kauai Invasive Species Committee. Introduced game animals, such as pigs (*Sus scrofa scrofa*) also have negative impacts on native ecosystems. Other non-native wildlife that may commonly be found in the area include the neotropical toad (*Bufo marinus*), tree gecko (*Hemiphyllodactylus typus*), metallic skink (*Leiopisma metallicum*), mouse (*Mus musculus*), house sparrow (*Passer domesticus*), Java finch (*Padda oryzivora*), chicken (*Gallus gallus*), and ring-necked pheasant (*Phasianus colchicus*).

**G: Access:** The western and central portions of the Nounou FR have public access (Figure 8). There are no official public access points for the Kālepa FR.

**Vehicular Access:** There are no roads within Nounou and Kālepa FRs, but trail access to Nounou FR can be reached by three public roads: Haleilio Road, Kuamo'o Road and Kamalu Road. There are no public roads that contour the Kālepa FR boundary.

**Trails:** Nā Ala Hele, the State of Hawai'i trail and access system (<http://hawaiitrails.ehawaii.gov>) has three interconnecting trails that provide public access to the Nounou FR; Nounou Trail East, Nounou Trail West and the Kuamo'o-Nounou Trail (Figure 8). The Nounou Trail East starts in Wailua Houselots at a parking area and ends at a picnic shelter. The Nounou Trail West begins along Kamalu Road in the Wailua Homesteads. It heads up the west side of the mountain and ends where it joins the Nounou Trail East near the 1.5 mile post. The Kuamo'o-Nounou trail starts on the southwestern side of Nounou FR on Kuamo'o Road and contours north along the mountain for 2 miles and ends when it connects with the Nounou Trail West. The three trails range from easy to difficult and all are approved for pedestrian activity. Only Kuamo'o-Nounou trail allows bicycle and equestrian activity. There are no public trails in Kālepa FR.

**Designated Helicopter Landing Zones:** None.

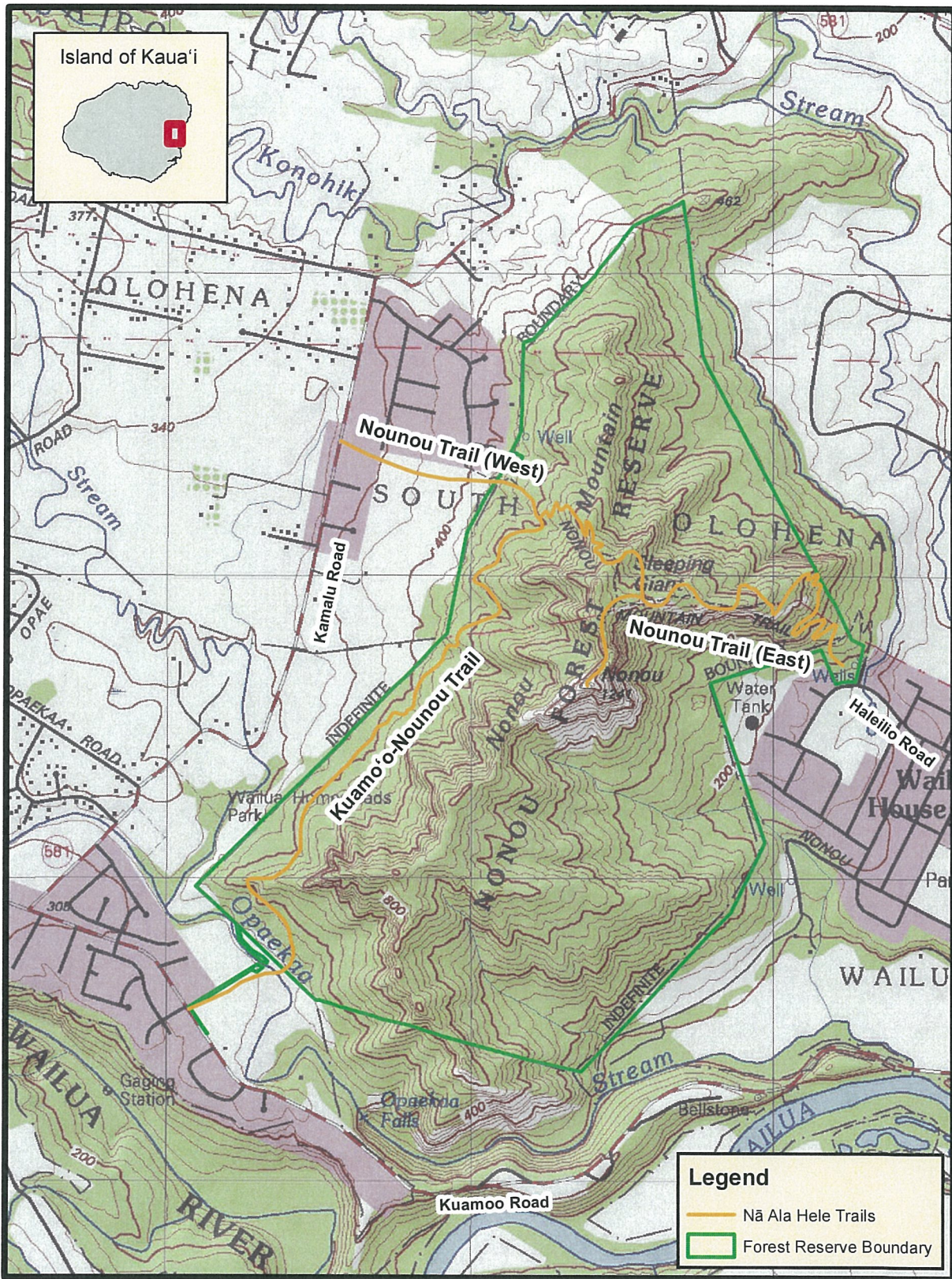
**Restricted Watershed:** No restricted watershed areas exist on the island of Kaua'i.

**H: Infrastructure:** Infrastructure in Nounou FR is minimal and mostly for public access. There is a parking area at the trail head of Nounou Trail East and a bridge at the beginning section of the Kuamo'o-Nounou Trail. There is a trail shelter on Kuamo'o-Nounou Trail and at the end of the Nounou Trail East. A fence line also exists between private landowners on the west and south boundary of Nounou FR. There are small fence exclosures in both reserves for rare plant protection and outplanting.

**I: Archaeological and Historical Sites:** Nounou and Kālepa are prominent geological features on the eastern side of Kaua'i. They are mentioned in oli and are also the setting for well known mo'olelo such as *Mo'olelo o Kawelo*, which had been published multiple times in Hawaiian newspapers and then again published in translated collections of Hawaiian legends. These two



Figure 8: Public access routes to Nounou Forest Reserve. There are currently no public access points to Kālepa Forest Reserve.





forest reserves are a part of a rich history associated with the ahupua'a of Waipouli, North and South Olohena, and Wailua.

Between Nounou and Kālepa Forest Reserves lies the Wailua River State Park. Wailua was one of the two major ruling centers on Kaua'i. The lower river valley region of Wailua was also known as Wailuanuiaho'āno (the Great Sacred Wailua of Ho'āno). Wailuanuiaho'āno was the region makai of the southern part of Nounou Mountain and Maunakapu on Kālepa Ridge (Dickey 1916). It contains many culturally significant sites, including heiau, birthing stones, a bell stone, petroglyphs, burials, canoe landings, and fishponds (Ho'omanawanui 2012). There are more heiau within Wailua ahupua'a than in any other on Kaua'i (Bennett, 1931).

Until recently, the only record of an archaeological or historical site within the boundaries of either Nounou FR or Kālepa FR was included in Bennett's 1931 publication. He reported that rocks for making stone implements were quarried from Nounou ridge, but this quarry site has not been relocated in recent times. In 2007, during wildfire suppression efforts by DOFAW, staff identified previously undocumented archeological sites within Kalepa FR. In 2014, the State Historic Preservation Division (SHPD) visited and cataloged two significant archeological sites within the Kālepa FR, sites 50-30-08-2265 and 50-30-08-2266. According to the SHPD report, "Both sites assimilate into the cultural and historical landscape of the Wailua area and are consistent with land use for agriculture and habitation," (SHPD 2014, p. 4).

Site 50-30-08-2265 is a well preserved kauhale, or house site complex, which includes a fairly large enclosure with numerous additional terraces. "The style and construction denote pre-Contact use and may have also been used historically," (SHPD 2014, p. 4). At site 50-30-08-2266, northwest of site 50-30-08-2265, at least five terraces were identified with more terraces likely to be revealed following a complete survey. According to SHPD, the terraces at this site are distinct but slightly eroded and less defined than those at site 2265. In addition, a significant concentration of large boulders was observed on the northeastern bend of Kālepa Ridge between site 2265 and 2266 that may be determined as a ceremonial site upon further investigation. It is recommended by SHPD that the sites be managed for preservation by the state and that a full site assessment is conducted in order to reveal important data that was not included in their report.

#### **J. Other Public Activity:**

**Hunting:** DOFAW manages public hunting on all forest reserve lands on Kaua'i by the regulation of hunting seasons, bag limits, and hunting methods. These two forest reserves are not part of any hunting unit, and hunting is not allowed in these two areas. General hunting regulations can be found in Chapter 121, HAR. Rule regulating game bird hunting can be found in Chapter 122, HAR, and rule regulating game mammal hunting can be found in Chapter 123, HAR. The Division of Conservation and Resources Enforcement (DOCARE) enforces hunting regulations.

Nounou and Kālepa Forest Reserves contain two of the four possible Game Animal management classes (Figure 5) according to DOFAW's Draft Management Guidelines: A-2 Mixed Game and Other Uses, and A-3 Game Control (public). Approximately 724 acres of A-3 managed area exists in Nounou FR, and 670 acres of A-2 managed area exists in Kālepa FR. A-2 areas are

designated where game management is an objective integrated with other uses. Habitat may be manipulated for game enhancement (game bird). Game populations are managed to acceptable levels using public hunting. A-3 areas are designated where resource protection is the primary objective, with emphasis on native plant communities and watersheds. DOFAW is currently in the process of updating its Management Guidelines.

**Camping:** Camping is not allowed in either Nounou or Kālepa Forest Reserve.

**Fishing:** No fishing opportunities are available in these two forest reserves.

**Hiking:** There are three Nā Ala Hele hiking trails in Nounou FR but none in the Kālepa FR. See section G: Access for more details.

**Horseback Riding:** Horseback riding is allowed on the Nā Ala Hele Kuamo‘o-Nounou trail in the Nounou FR. See section G: Access for more details.

**Dirt Bikes, All Terrain Vehicles (ATVs) and Mountain Bikes:** Dirt bikes and ATVs are not allowed in either Nounou or Kālepa FRs. Non-motorized mountain bikes may be used on Kuamo‘o-Nounou Trail.

**Non-Timber Forest Product Collection:** Non-timber forest products may be collected within the forest reserves. Examples include, but are not limited to:

- a. Ferns
- b. Flowers
- c. Fruits
- d. *Psidium* spp. (guava) poles

Gathering of material from plant species that are not on Federal or State threatened and endangered species lists is permitted and regulated by DOFAW through standard Forest Reserve System permit procedures as described in Chapter 104, HAR. Gathering of non-listed species or common materials, in quantities which are determined by DLNR as representing personal use, is regulated through issuance of a Collection Permit and may be issued at a fee. Consult the Forest Products Fee Schedule for information on personal versus commercial use quantities, as well as current commercial use pricing. The Forest Product Fee Schedule can be found at, <http://dlnr.hawaii.gov/forestry/files/2013/09/Forest-Product-Fee-Schedule.pdf>.

Collection of:

1. Listed threatened, endangered, or other rare species;
2. Common invertebrate species; or
3. Any migratory bird species,

may be allowed if individuals have obtained an appropriate permit by applying to the “Administrator,” at the DOFAW Honolulu office. In these cases, a separate Access Permit may be required which is obtained through the Branch Manager at the DOFAW Kaua‘i office. Both addresses follow:

Administrator  
Division of Forestry and Wildlife  
1151 Punchbowl Street, Room 325  
Honolulu, HI 96813  
Phone (808) 587-0166

Kaua'i Branch Manager  
Division of Forestry and Wildlife  
3060 Eiwa Street, Room 306  
Līhu'e, HI 96766  
Phone (808) 274-3433

The collection of any federally listed species or migratory bird is also subject to Federal Permits. Contact the USFWS for additional information.

**General Recreation:** Nounou and Kālepa Forest Reserves contain one of four possible Recreation Management classes according to DOFAW's Draft Management Guidelines (Figure 5): R-2 (Medium Use Areas, 1,394 acres). R-2 areas are where outdoor recreation is limited or controlled, or where it may be integrated with other uses. Facilities are not highly developed and include trails and trail shelters. These Draft Management Guidelines are currently being updated.

#### **K. Threats:**

**Plants:** Invasive, weedy plants that have some of the greatest potential to disrupt the ecosystem in Nounou and Kālepa FRs include:

- *Clidemia hirta* (clidemia)
- *Falcataria moluccana* (albizia)
- *Lantana camara* (lantana)
- *Leucaena leucocephala* (koa haole)
- *Psidium cattleianum* (strawberry guava, waiawi)
- *Schizachyrium condensatum* (bush beard grass)
- *Urochloa maxima* (guinea grass)

**Animals:** Animals that may pose threats to the resources in Nounou and Kālepa FRs include:

- Cats (prey on seabirds)
- Feral ungulates (pigs damage vegetation and cause erosion)
- Barn owls (prey on seabirds)
- Rodents (feed on native plant seeds and native birds)
- Mongoose (prey on native birds)

**Fire:** As much of the vegetation in Nounou and Kālepa FRs consists of non-native forest with a grassy understory, fire is a risk in the area. There have been fires in Nounou and Kālepa FRs in the past. DOFAW is the primary response to wildland fires that occur in forest reserves, and through a "Mutual Aid Agreement," works cooperatively with the Kaua'i Fire Department.

**Flooding:** There are public safety concerns due to occasional flooding of ‘Ōpaeka‘a Stream particularly at the bridge crossing. There has been significant damage to the bridge in the past after high rainfall events.

**Other:** There are potential hazard tree concerns that affect private landowners along the boundary of Nounou FR, and potential rockfall hazards along the east side of Nounou Mountain. There is also illegal off-road vehicle activity in Kālepa FR damaging the natural resources in this area.

**L. Revenue:**

According to Section 183-1.5, HRS, the Department shall:

“Devise and carry into operation, ways and means by which forests and forest reserves can, with due regard to the main objectives of title 12, be made self-supporting on whole or in part.”

The trails in Nounou FR are managed by and approved for commercial tour activities by the Nā Ala Hele program. Commercial activity is regulated by limiting the number of groups per day (3 for Nounou trails), and also the number of people (12 including the guide) in each group. Parking for commercial tours in Nounou FR is limited to specific areas.

There are currently no other revenue sources within Nounou and Kālepa FRs. A potential source of future revenue may be from commercial tour or film industry permits.

### **III. MANAGEMENT**

**A. Past Planning:** There are no official management plans that have been written for these two forest reserves.

**B. Summary of Existing Management Activities:** Current management activities within Nounou FR include Nā Ala Hele trail maintenance and rare plant protection. DOFAW maintains rare plant exclosures in both reserves and have in the past outplanted rare and common native plants into the exclosures and also in the surrounding area.

**C. Management Objectives and Goals:** In the Draft Umbrella Management Plan for each Branch of the Division, broad management priorities for each forest reserve were derived from the mandates that regulate DOFAW activities, including the Draft Management Guidelines and Administrative Rules, as well as input from Branch staff. These management priorities were divided into eight categories:

- Watershed Values (aquifer recharge and erosion control)
- Native Ecosystems (landscape level protection)
- Resource Protection (fire, insects, and disease)
- Invasive Species Control (incipient and established plants and animals)
- Threatened and Endangered (T&E) Species Management (Federally listed, State listed, and rare plants and animals)

- Other Public Activity (non-income generating uses, such as recreation, cultural activities, personal gathering, educational or research activities, and events among others)
- Game Animal Management (areas managed for public hunting and/or habitat enhancement for game animals)
- Commercial Activity (income generating activities such as timber, tours, etc.)

Each category has been ranked on a qualitative scale of 1 to 8 with 1 as higher priority and 8 as lower priority. Table 7 is an excerpt from the Kaua‘i Forest Reserves Draft Umbrella Management Plan and lists qualitative rankings of the management priority categories for Nounou and Kālepa Forest Reserves.

**Table 7:** Nounou and Kālepa Forest Reserves and associated management priority categories.

Forest Reserve Section Name	Resource Protection	Watershed Values	Invasive Species Control	T&E Species Mgmt.	Native Ecosystems	Game Animal Mgmt.	Commercial Activity	Other Public Activity
Nounou	2	1	6	4	5	8	7	3
Kālepa	2	1	5	7	6	4	8	3

Table 8 expands on these management priority categories, listing general management actions to address the objectives, along with tactical goals, action items, and estimated cost associated with these actions. As the two Forest Reserves are in close proximity to each other and they have similar management priorities, they are treated as one in the following table.

**Table 8:** Management objectives and associated plans for Nounou and Kālepa Forest Reserves. Estimated cost refers to State funds.

Management Priority	General Management Action	Tactical Goals	Action Items	Estimated Cost
<b>Watershed Values</b>	Reduce the threat and impact of erosion on reserve resources	Maintain forest cover on watershed lands to provide high quality water for residents	Re-establishment of appropriate vegetative cover	\$10K/year + staff costs
			Work with DOCARE to address illegal dirt bike activity in Kalepa FR, in conjunction with a community outreach and education effort.	Staff & mgmt costs only
	Monitor forest composition over time to determine landscape level needs	Determine permanent systematic monitoring protocol	Establish survey plots and transects	\$30K/year
<b>Resource Protection</b>	Reduce impact of fire, ungulate, insects, and disease on forest resources	Support biological control research	Implement science-based biological control when approved for use	TBD

<b>Management Priority</b>	<b>General Management Action</b>	<b>Tactical Goals</b>	<b>Action Items</b>	<b>Estimated Cost</b>
		Fire presuppression and prevention	Educate public on defensible spaces, esp. near residential areas: Kapa'a, Wailua Houselots, Wailua Homesteads, Waipouli, Kapaia, and Hanamā'ulu	Staff & mgmt costs only
		Insects and disease monitoring and control	Compose and submit annual report of forest pests surveys to Forest Health Coordinator	Staff & mgmt costs only
		Ungulate control	Issuance of wildlife control permits and promote public hunting	Staff & mgmt costs only
<b>T&amp;E Species Management</b>	Protection and recovery of listed rare plants and animals	Determine specific areas and species of interest	Build fence and maintain exclosures around wild populations of rare plants. Outplant T&E species into exclosures	\$25K each
			Kaua'i district Botanist to conduct botanical surveys	Staff & mgmt costs only
		Predator control	Rats – predator control Cats – trapping	\$70K/year
		Conduct surveys for presence, location, and population estimates of rare animals	Seabirds and Hawaiian hoary bat Newell's shearwater	\$30K/year
<b>Invasive Species Control</b>	Manage incipient and established invasive plants and animals	Collaborate with partners to support ongoing research for invasive species control	Support invasive species control research done by partner agencies	\$20K/year
		Invasive species monitoring and control	Chemical and mechanical control	\$50K/yr + staff costs
<b>Other Public Activity</b>	Acquire and secure management and/or public access to Kālepa FR	Purchase needed lands through land acquisition programs	Initiate discussions with adjacent landowners	Based on land assessment value + staff costs
		Obtain access easements	Work with landowners in areas where needed (DHHL, Grove Farms, Agribusiness Development Corporation)	Staff & mgmt costs only
	Public information	Update informational signage	Sign installation and replacement as needed	\$10K/year + staff costs

Management Priority	General Management Action	Tactical Goals	Action Items	Estimated Cost
	Trail infrastructure maintenance	Maintain and repair aging infrastructure	Maintain and repair bridge, trail shelters and parking lots	\$2500/year + staff cost
<b>Native Ecosystems</b>	Determine landscape level needs	Native ecosystem restoration	Common native outplanting (low priority action)	\$50K/acre
<b>Game Animal Management</b>	Promote public hunting through Chapters 122 & 123, HAR	Amendments to Chapters 122 & 123, HAR	Add to Chapters 122 & 123, HAR	Staff & mgmt costs only
		Improve hunter access	Acquire land and/or easements see above	Based on land assessment value + staff costs
		Update Draft Management Guidelines	Amend Animal Management Guidelines	Staff & mgmt costs only
		Conduct animal (goat) surveys	Determine population sizes	Staff and mgmt costs only
		Public education	Continue hunter education program, other public outreach as required	Staff & mgmt costs only
<b>Commercial Activity</b>	Generate income from commercial activities in the FR	Determine future income possibilities – commercial tour permits, collection permits, and film industry	Determine protocol to manage fee collection	Staff & mgmt costs only

#### **D. Overall Measures of Success:**

Measures of success for individual forest reserve management plans can be derived from the State of Hawai‘i annual variance reports. Initial measures of success that may be applicable to Nounou and Kālepa FRs include:

- Number of volunteer service projects
- Acres of noxious plants controlled
- Acres of fire protection area
- Miles of trail maintained
- Miles of fence constructed
- Miles of fence maintained
- Acres of exclosure developed
- Acres of exclosure maintained
- Acres of native forest restored
- Number of rare, threatened, or endangered plant/animal species protected
- Number of cultural resources protected

- Number of commercial leases/licenses/permits issued
- Number of signs replaced
- Number of appurtenant features maintained

#### **IV. FUTURE RECOMMENDATIONS**

**A. Desired Outcome for the Forest Reserves:** Protection and enhancement of watershed quality and quantity provided by the lands of Nounou and Kālepa FRs is essential. Protection of known locations of threatened and endangered species and cultural resources is also an important goal. Maintain and enhance public access and activity in these two Forest Reserves.

**B. Future Recommendations:** Pursuing public access agreements, whether through land acquisition or securing easements, should be considered a priority for Kālepa FR. Also of considerable value is the investigation of deriving revenue for the management of the reserves.



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## **VI. APPENDIX**

# Appendix A: Nounou Forest Reserve Botanical Survey

Conducted by A.M. Williams, Kawai Botanist

Super Family	Family	Taxon Name	Common Name	Status	FedStat
Dicot	Fabaceae	<i>Acacia confusa</i> Merr.	Formosa Acacia	Naturalized	
Dicot	Fabaceae	<i>Acacia koa</i> Hillebr.	<i>Koa</i> , <i>Koa</i> 'e	Endemic	SOC
Pteridophyte	Pteridaceae	<i>Adiantum raddianum</i> C.Presl	Maidenhair Fern	Naturalized	
Monocot	Asparagaceae	<i>Agave</i> sp.	Agave	Naturalized	
Dicot	Asteraceae	<i>Ageratum conyzoides</i> L.	Billygoat Weed	Naturalized	
Dicot	Euphorbiaceae	<i>Aleurites moluccana</i> (L.) Willd.	<i>Kukui</i>	Polynesian	
Dicot	Apocynaceae	<i>Alyxia stellata</i> (J.R.Forst. & G.Forst.) Roem. & Schult.	<i>Mai</i> 'e	Indigenous	
Gymnosperm	Araucariaceae	<i>Araucaria columnaris</i> (G.Forst.) Hook.	Cook Pine	Naturalized	
Dicot	Primulaceae	<i>Ardisia elliptica</i> Thunb.	Inkberry	Naturalized	
Monocot	Asparagaceae	<i>Asparagus plumosus</i> Baker	Asparagus Fern	Naturalized	
Monocot	Poaceae	<i>Axonopus compressus</i> (Sw.) P.Beauv.	Wide-leaved Carpet Grass	Naturalized	
Monocot	Poaceae	<i>Bambusa vulgaris</i> Schrad	Common Bamboo	Cultivated	
Dicot	Asteraceae	<i>Bidens sandwicensis</i> subsp. <i>sandwicensis</i>	<i>Ko'oko'olau</i>	Endemic	
Pteridophyte	Blechnaceae	<i>Blechnum appendiculatum</i> Willd.	Hammock Fern, Blechnum	Naturalized	
Dicot	Scrophulariaceae	<i>Buddleja asiatica</i> Lour.	Bai Bei Feng	Naturalized	
Dicot	Fabaceae	<i>Caesalpinia bonduc</i> (L.) Roxb.	<i>Kakalaia</i> , <i>Hihikolo</i>	Indigenous	
Dicot	Fabaceae	<i>Canavalia cathartica</i> Thouars	<i>Moundloa</i>	Naturalized	
Monocot	Cyperaceae	<i>Carex meyeri</i> Nees	Carex Sedge	Indigenous	
Monocot	Cyperaceae	<i>Carex wahuensis</i> subsp. <i>wahuensis</i>	' <i>Uki</i>	Endemic	
Dicot	Boraginaceae	<i>Carmona retusa</i> (Vahl) Masam.	Fukien Tea, Philippine Tea	Naturalized	
Dicot	Casuarinaceae	<i>Casuarina equisetifolia</i> L.	Ironwood	Naturalized	
Monocot	Poaceae	<i>Cenchrus purpureus</i> (Schumacher) Morrone	Elephant Grass, Napier Grass	Naturalized	
Dicot	Apiaceae	<i>Centella asiatica</i> (L.) Urb.	Asiatic Pennywort	Naturalized	
Dicot	Fabaceae	<i>Chamaecrista nictitans</i> subsp. <i>patellaria</i> var. <i>glabrata</i> (Vogel) H.S.Irwin & Barneby	Partridge Pea, <i>Lauki</i>	Naturalized	
Dicot	Sapotaceae	<i>Chrysophyllum oliviforme</i> L.	Satin-Leaf Tree	Naturalized	
Monocot	Poaceae	<i>Chrysopogon aciculatus</i> (Retz.) Trin.	<i>Manienie</i> , Golden Beardgrass	Indigenous?	
Dicot	Verbenaceae	<i>Citharexylum caudatum</i> L.	Fiddlewood	Naturalized	
Dicot	Melastomataceae	<i>Clidemia hirta</i> var. <i>hirta</i>	<i>Clidemia</i>	Naturalized	

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# Appendix A: Nounou Forest Reserve Botanical Survey

Conducted by A. M. Williams, Kawai' Botanist

Super Family	Family	Taxon Name	Common Name	Status	FedStat
Dicot	Clusiaceae	<i>Clusia rosea</i> Jacq.	Autograph Tree	Naturalized	
Monocot	Arecaceae	<i>Cocos nucifera</i> L.	Niu, Coconut Palm	Polynesian	
Monocot	Araceae	<i>Colocasia esculenta</i> (L.) Schott	Kalo, Taro	Polynesian	
Dicot	Asteraceae	<i>Conyza</i> sp.	Horse Tail, Fleabane, Lani Wela	Naturalized	
Monocot	Asparagaceae	<i>Cordyline fruticosa</i> (L.) A.Chev.	Ki, Ti Leaf	Polynesian	
Monocot	Costaceae	<i>Costus scaber</i> Ruiz & Pav.	Indiahed Ginger	Naturalized	
Dicot	Asteraceae	<i>Cyanthillium cinereum</i> (L.) H. Rob.	Little Ironweed	Naturalized	
Pteridophyte	Thelypteridaceae	<i>Cyclosorus dentatus</i> (Forssk.) Ching	Downy Wood Fern	Naturalized	
Monocot	Cyperaceae	<i>Cyperus hillebrandii</i> var. <i>decipiens</i> (Hillebr.) Kük.	No Common Name	Endemic	
Monocot	Cyperaceae	<i>Cyperus papyrus</i> L.	Papyrus	Naturalized	
Dicot	Fabaceae	<i>Desmodium incanum</i> DC.	Creeping Beggarweed, Spanish Clover	Naturalized	
Dicot	Fabaceae	<i>Desmodium triflorum</i> (L.) DC.	Three-Flower Beggarweed	Naturalized	
Pteridophyte	Gleicheniaceae	<i>Dicranopteris linearis</i> f. <i>linearis</i>	'Uluhe	Indigenous	
Dicot	Ebenaceae	<i>Diospyros sandwicensis</i> (A.D.C.) Fosberg	Lama	Endemic	
Dicot	Sapindaceae	<i>Dodonaea viscosa</i> Jacq.	'A'alii'	Indigenous	
Pteridophyte	Pteridaceae	<i>Doryopteris decipiens</i> (Hook.) J.Sm.	'Iwa 'Iwa	Endemic	
Dicot	Elaeocarpaceae	<i>Elaeocarpus angustifolius</i> Blume	Blue Marble Tree	Naturalized	
Dicot	Asteraceae	<i>Elephantopus mollis</i> Kunth	Tobacco Weed	Naturalized	
Monocot	Poaceae	<i>Eleusine indica</i> (L.) Gaertn.	Manienie Aii', Wire Grass	Naturalized	
Dicot	Myrtaceae	<i>Eucalyptus robusta</i> Sm.	Swamp Mahogany	Naturalized	
Dicot	Euphorbiaceae	<i>Euphorbia celastroides</i> var. <i>celastroides</i>	'Akoko	Endemic	
Dicot	Fabaceae	<i>Falcataria moluccana</i> (Miq.) Barneby & J.W. Grimes	Albizia	Naturalized	
Dicot	Moraceae	<i>Ficus microcarpa</i> L.f.	Chinese Banyan	Naturalized	
Monocot	Asparagaceae	<i>Furcraea foetida</i> (L.) Haw.	Mauritius Hemp	Naturalized	
Monocot	Cyperaceae	<i>Gahnia aspera</i> subsp. <i>globosa</i> (H.Mann) J.Kern	'Uki	Endemic	
Monocot	Cyperaceae	<i>Gahnia beecheyi</i> H.Mann	'Uki	Endemic	
Pteridophyte	Hymenophyllaceae	<i>Gonocormus minutus</i> (Blume) Bosch	Tiny Brittle Fern	Indigenous	
Dicot	Proteaceae	<i>Grevillea robusta</i> A.Cunn. ex R.Br.	Silk Oak	Naturalized	

# Appendix A: Nounou Forest Reserve Botanical Survey

Conducted by A.M. Williams, Kaua'i Botanist

Super Family	Family	Taxon Name	Common Name	Status	FedStat
Monocot	Poaceae	<i>Heteropogon contortus</i> (L.) P.Beauv. ex Roem. & Schult.	<i>Pili</i>	Indigenous?	
Dicot	Malvaceae	<i>Hibiscus clayi</i> O.Deg. & I.Deg.	<i>Koko'i'ula</i>	Endemic	E
Dicot	Malvaceae	<i>Hibiscus tiliaceus</i> L.	Hau	Indigenous?	
Dicot	Lamiaceae	<i>Hyptis pectinata</i> (L.) Poit.	Comb Bushmint	Naturalized	
Dicot	Acanthaceae	<i>Justicia betonica</i> L.	White Shrimp Plant, Squirrel's Tail	Naturalized	
Dicot	Verbenaceae	<i>Lantana camara</i> L.	Lantana	Naturalized	
Pteridophyte	Polypodiaceae	<i>Lepisorus thunbergianus</i> (Kaulf.) Ching	' <i>Ekaha</i>	Indigenous	
Dicot	Ericaceae	<i>Leptocophylla tameiameiae</i> (Cham. & Schitdl.)	<i>Puka'awe</i>	Indigenous	
Dicot	Fabaceae	<i>Leucaena leucocephala</i> (Lam.) de Wit	<i>Koa Haole</i>	Naturalized	
Dicot	Onagraceae	<i>Ludwigia octovalvis</i> (Jacq.) P.H.Raven	Primrose Willow	Polynesian?	
Dicot	Euphorbiaceae	<i>Macaranga tanarius</i> (L.) Müll.Arg.	Parasol-Leaf Tree, Heart Leaf	Naturalized	
Dicot	Anacardiaceae	<i>Mangifera indica</i> L.	Common Mango	Naturalized	
Dicot	Meliaceae	<i>Melia azedarach</i> L.	Chinaberry	Naturalized	
Monocot	Poaceae	<i>Melinis minutiflora</i> P.Beauv.	Mollasses Grass	Naturalized	
Monocot	Poaceae	<i>Melinis repens</i> (Willd.) Zizka	Natal Red-Top	Naturalized	
Dicot	Myrtaceae	<i>Metrosideros polymorpha</i> var. <i>glaberrima</i> (H.Lév.) H.St.John	' <i>Oh'i'a Lehua</i>	Endemic	
Pteridophyte	Dennstaedtiaceae	<i>Microlepia strigosa</i> var. <i>strigosa</i>	<i>Palapalai</i>	Indigenous	
Dicot	Fabaceae	<i>Mimosa pudica</i> var. <i>unjiuga</i> (Duchass. & Walp.) Griseb.	Sensitive Plant	Naturalized	
Dicot	Rubiaceae	<i>Morinda citrifolia</i> L.	<i>Noni</i>	Polynesian	
Dicot	Rubiaceae	<i>Murraya paniculata</i> (L.) Jack	Mock Orange	Naturalized	
Pteridophyte	Lomariopsidaceae	<i>Nephrolepis brownii</i> (Desv.) Hovenkamp & Miyam.	Asian Sword Fern	Naturalized	
Pteridophyte	Lomariopsidaceae	<i>Nephrolepis exaltata</i> (L.) Schott	<i>Kupukupu</i> , Sword Fern	Indigenous	
Dicot	Ochnaceae	<i>Ochona thomasiana</i> Engl. & Gilg	Mickey Mouse Plant	Naturalized	
Monocot	Poaceae	<i>Opismenus hirtellus</i>	Wavy-Leaf Basketgrass	Naturalized	
Dicot	Rosaceae	<i>Osteomeles anthyllidifolia</i> (Sm.) Lindl.	' <i>Ulei</i>	Indigenous	
Dicot	Oxalidaceae	<i>Oxalis corniculata</i> L.	' <i>hi 'ai</i> , Yellow Wood Sorrel	Indigenous?	
Monocot	Pandanaceae	<i>Pandanus tectorius</i> Parkinson ex Z	<i>Hala</i> , Scaw Pine	Indigenous?	

# Appendix A: Nounou Forest Reserve Botanical Survey

Conducted by A.M. Williams, Kaula'i Botanist

Super Family	Family	Taxon Name	Common Name	Status	FedStat
Monocot	Poaceae	<i>Paspalum conjugatum</i> P.J.Bergius	Hilo Grass	Naturalized	
Monocot	Poaceae	<i>Paspalum scrobiculatum</i> L.	Rice Grass	Indigenous?	
Dicot	Passifloraceae	<i>Passiflora edulis</i> Sims	Passion Fruit/Flower	Naturalized	
Dicot	Passifloraceae	<i>Passiflora laurifolia</i> L.	Water Lemon, Yellow Granadilla	Naturalized	
Dicot	Piperaceae	<i>Peperomia blanda</i> var. <i>floribunda</i> (Miq.) H.Huber	'Ala 'alawainui	Indigenous	
Dicot	Lauraceae	<i>Persea americana</i> Mill.	Avocado	Naturalized	
Pteridophyte	Polypodiaceae	<i>Phlebodium aureum</i> (L.) J.Sm.	Rabbit's-Foot Fern, Golden Polypody	Naturalized	
Dicot	Phyllanthaceae	<i>Phyllanthus debilis</i> Klein ex Willd.	Niruri	Naturalized	
Dicot	Phyllanthaceae	<i>Phyllanthus tenellus</i> Roxb.	Longstalked Phyllanthus	Naturalized	
Pteridophyte	Polypodiaceae	<i>Phymatosorus grossus</i> (Langsd. & Fisch.) Brownlie	<i>Lau'e</i> , Maile-Scented Fern	Naturalized	
Dicot	Plantaginaceae	<i>Plantago major</i> L.	Broadleaf Plantain	Naturalized	
Dicot	Lamiaceae	<i>Plectranthus parviflorus</i> Willd.	<i>Ala Ala Wai Nui</i>	Indigenous	
Dicot	Asteraceae	<i>Pluchea carolinensis</i> (Jacq.) G.Don	Sourbush	Naturalized	
Dicot	Polygalaceae	<i>Polygala paniculata</i> L.	Root Beer Plant	Naturalized	
Dicot	Araliaceae	<i>Polyscias racemosa</i> (C.N.Forbes) Lowry & G.M.Plunkett	Munroidendron	Endemic	E
Dicot	Portulacaceae	<i>Portulaca oleracea</i> L.	Purslane	Naturalized	
Monocot	Arecaceae	<i>Pritchardia hardyi</i> Rock	<i>Loulu</i>	Endemic	E
Dicot	Myrtaceae	<i>Psidium cattleianum</i> Sabine	Strawberry Guava	Naturalized	
Dicot	Myrtaceae	<i>Psidium guajava</i> L.	Common Guava	Naturalized	
Pteridophyte	Psilotaceae	<i>Psilotum nudum</i> (L.) P.Beauv.	<i>Moa</i> , Whiskfern	Indigenous	
Pteridophyte	Dennstaedtiaceae	<i>Pteridium aquilinum</i> subsp. <i>decompositum</i> (Gaudich.) Lamoureux ex J.A.Thomson	<i>Kila'u</i> , Bracken Fern	Endemic	
Pteridophyte	Lindsaeaceae	<i>Lindsaea ensifolia</i> Sw.	Graceful Necklace Fern	Naturalized	
Monocot	Arecaceae	<i>Ptychosperma macarthurii</i> (Veitch) H.Wendl. ex Hook.f.	Macarthur Palm	Naturalized	
Dicot	Apocynaceae	<i>Rauvolfia sandwicensis</i> A.DC.	<i>Hao</i>	Endemic	
Dicot	Myrtaceae	<i>Rhodomyrtus tomentosa</i> (Aiton) Hassk.	Downy Rose Myrtle	Naturalized	
Monocot	Arecaceae	<i>Roystonea regia</i> (Kunth) O.F.Cook	Cuban Royal Palm	Naturalized	
Dicot	Rosaceae	<i>Rubus rosifolius</i> Sm.	Thimbleberry	Naturalized	

# Appendix A: Kālepa Forest Reserve Botanical Survey

Conducted by A.M. Williams (DOFAW), and Tim Flynn (NTBG)

Super Family	Family	Taxon Name	Common Name	Status	FedStat
Dicot	Malvaceae	<i>Abutilon grandifolium</i> (Willd.) Sweet	Hairy Indian Mallow	Naturalized	
Dicot	Fabaceae	<i>Accacia confusa</i> Merr.	Formosan Koa	Naturalized	
Dicot	Fabaceae	<i>Acacia koa</i> Hillebr.	<i>Koia, Koa'i</i>	Endemic	SOC
Dicot	Asteraceae	<i>Ageratum conyzoides</i> L.	Billygoat Weed	Naturalized	
Gymnosperm	Araucariaceae	<i>Araucaria columnaris</i> (G.Forst.) Hook.	Cook Pine	Naturalized	
Monocot	Orchidaceae	<i>Arundina graminifolia</i> (D.Don) Hochr.	Bamboo Orchid	Naturalized	
Dicot	Asteraceae	<i>Bidens sandwicensis</i> subsp. <i>sandwicensis</i>	<i>Ko'oko'olau</i>	Endemic	
Dicot	Fabaceae	<i>Canavalia cathartica</i> Thouars	<i>Maunaloa</i>	Naturalized	
Monocot	Cyperaceae	<i>Carex wahuensis</i> subsp. <i>wahuensis</i>	'Uki	Endemic	
Dicot	Casuarinaceae	<i>Casuarina equisetifolia</i> L.	Ironwood	Naturalized	
Dicot	Apiaceae	<i>Centella asiatica</i> (L.) Urb.	Asiatic Pennywort	Naturalized	
Dicot	Fabaceae	<i>Chamaecrista nictitans</i> subsp. <i>patellaria</i> var. <i>glabrata</i> (Vogel) H.S.Irwin & Barneby	Partridge Pea, <i>Louki</i>	Naturalized	
Dicot	Sapotaceae	<i>Chrysophyllum oliviforme</i> L.	Satin-leaf Tree	Naturalized	
Monocot	Poaceae	<i>Chrysopogon aciculatus</i> (Retz.) Trin.	<i>Mani'e</i> , Golden Beardgrass	Indigenous?	
Dicot	Lauraceae	<i>Cinnamomum camphora</i> (L.) J.Presl	Camphor	Naturalized	
Dicot	Clusiaceae	<i>Clusia rosea</i> Jacq.	Autograph Tree	Naturalized	
Monocot	Arecaceae	<i>Cocos nucifera</i> L.	Niu, Coconut Palm	Polynesian	
Dicot	Asteraceae	<i>Coryza</i> sp.	Horse Tail, Fleabane, <i>Lani Wela</i>	Naturalized	
Monocot	Asparagaceae	<i>Cordyline fruticosa</i> (L.) A.Chev.	Ki, TI Leaf	Polynesian	
Dicot	Fabaceae	<i>Crotalaria spectabilis</i> Roth	Showy Rattlebox	Naturalized	
Dicot	Fabaceae	<i>Desmodium incanum</i> DC.	Creeping Beggarweed, Spanish Clover	Naturalized	
Pteridophyte	Gleicheniaceae	<i>Dicranopteris linearis</i> f. <i>linearis</i>	'Uluhe	Indigenous	
Dicot	Sapindaceae	<i>Dodonaea viscosa</i> Jacq.	'A'ali'i	Indigenous	
Pteridophyte	Pteridaceae	<i>Doryopteris decipiens</i> (Hook.) J.Sm.	'Iwa 'Iwa	Endemic	
Dicot	Asteraceae	<i>Emilia coccinea</i> (Sims) G.Don	Flora's Paintbrush, Tassel Flower	Naturalized	



# Appendix A: Kālepa Forest Reserve Botanical Survey

Conducted by A.M. Williams (DOFAW), and Tim Flynn (NTBG)

Super Family	Family	Taxon Name	Common Name	Status	FedStat
Dicot	Asteraceae	<i>Emilia fosbergii</i> Nicolson	Florida Tassel Flower	Naturalized	
Dicot	Myrtaceae	<i>Eucalyptus</i> sp.	Eucalyptus	Naturalized	
Dicot	Fabaceae	<i>Falcataria moliuccana</i> (Miq.) Barneby & J.W.Grimes	Albizia	Naturalized	
Dicot	Moraceae	<i>Ficus microcarpa</i> L.f.	Chinese Banyan	Naturalized	
Dicot	Proteaceae	<i>Grevillea robusta</i> A.Cunn. ex R.Br.	Silk Oak	Naturalized	
Monocot	Poaceae	<i>Heteropogon contortus</i> (L.) P.Beauv. ex Roem. & Schult.	<i>Pili</i>	Indigenous?	
Dicot	Malvaceae	<i>Hibiscus tiliaceus</i> L.	<i>Hau</i>	Indigenous?	
Dicot	Fabaceae	<i>Indigofera suffruticosa</i> Mill.	Anil, Wild Indigo, 'Iniko, 'Inikoa,	Naturalized	
Dicot	Crassulaceae	<i>Kalanchoe pinnata</i> (Lam.) Pers.	Air Plant	Naturalized	
Dicot	Verbenaceae	<i>Lantana camara</i> L.	Lantana	Naturalized	
Dicot	Fabaceae	<i>Leucaena leucocephala</i> (Lam.) de Wit	<i>Koa Haole</i>	Naturalized	
Pteridophyte	Lindsaeaceae	<i>Lindsaea ensifolia</i> Sw.	Graceful Necklace Fern	Naturalized	
Dicot	Myrtaceae	<i>Lophostemon confertus</i> (R.Br.) Peter G.Wilson & J.T.Waterh.	Brisbane Box	Naturalized	
Dicot	Euphorbiaceae	<i>Macaranga tanarius</i> (L.) Müll.Arg.	Parasol-Leaf Tree, Heart Leaf	Naturalized	
Dicot	Fabaceae	<i>Macroptilium atropurpureum</i> (DC.) Urb.	Purple Bush-Bean, Siratro	Naturalized	
Dicot	Anacardiaceae	<i>Mangifera indica</i> L.	Common Mango	Naturalized	
Dicot	Myrtaceae	<i>Melaleuca quinquenervia</i> (Cav.) S.T.Blake	Paper Bark Melaleuca	Naturalized	
Monocot	Poaceae	<i>Melinis minutiflora</i> P.Beauv.	Mollasses Grass	Naturalized	
Monocot	Poaceae	<i>Melinis repens</i> (Willd.) Zizka	Natal Red-Top	Naturalized	
Dicot	Fabaceae	<i>Mimosa pudica</i> var. <i>unijuga</i> (Duchass. & Walp.) Griseb.	Sensitive Plant	Naturalized	
Dicot	Rubiaceae	<i>Morinda citrifolia</i> L.	<i>Noni</i>	Polynesian	
Pteridophyte	Lomariopsidaceae	<i>Nephrolepis brownii</i> (Desv.) Hovenkamp & Miyam.	Asian Sword Fern	Naturalized	
Pteridophyte	Lomariopsidaceae	<i>Nephrolepis brownii</i> (Desv.) Hovenkamp & Miyam.	Asian Sword Fern	Naturalized	
Monocot	Poaceae	<i>Opismenus hirtellus</i>	Wavy-Leaf Basketgrass	Naturalized	
Dicot	Rosaceae	<i>Osteomeles anthyllifolia</i> (Sm.) Lindl.	<i>Ulei</i>	Indigenous	

# Appendix A: Kālepa Forest Reserve Botanical Survey

Conducted by A.M. Williams (DOFAW), and Tim Flynn (NTBG)

Super Family	Family	Taxon Name	Common Name	Status	FedStat
Dicot	Passifloraceae	<i>Passiflora laurifolia</i> L.	Water Lemon, Yellow Granadilla	Naturalized	
Dicot	Passifloraceae	<i>Passiflora suberosa</i> L.	Corkstem Passionflower	Naturalized	
Dicot	Piperaceae	<i>Peperomia blanda</i> var. <i>floribunda</i> (Miq.) H. Huber	'Aia 'alawainui	Indigenous	
Pteridophyte	Polypodiaceae	<i>Phlebodium aureum</i> (L.) J.Sm.	Rabbit's-Foot Fern, Golden	Naturalized	
Monocot	Arecaceae	<i>Phoenix</i> sp.	Date Palm	Naturalized	
Dicot	Phyllanthaceae	<i>Phyllanthus debilis</i> Klein ex Willd.	Niruri	Naturalized	
Pteridophyte	Polypodiaceae	<i>Phymatosorus grossus</i> (Langsd. & Fisch.) Brownlie	<i>Laue</i> , Maile-Scented Fern	Naturalized	
Gymnosperm	Pinaceae	<i>Pinus</i> spp.	Pine Tree	Naturalized	
Dicot	Pitosporaceae	<i>Pitosporum pentandrum</i> (Blanco) Merr.	Mammalis	Naturalized	
Pteridophyte	Pteridaceae	<i>Pityrogramma calomelanos</i> (L.) Link	Silver Fern	Naturalized	
Dicot	Lamiaceae	<i>Plectranthus parviflorus</i> Willd.	<i>Aia Aia Wai Nui</i>	Indigenous	
Dicot	Asteraceae	<i>Pluchea carolinensis</i> (Jacq.) G. Don	Sourbush	Naturalized	
Dicot	Polygalaceae	<i>Polygala paniculata</i> L.	Root Beer Plant	Naturalized	
Dicot	Araliaceae	<i>Polyscias racemosa</i> (C.N. Forbes) Lowry & G.M. Plunkett	Munroidendron	Endemic	E
Dicot	Portulacaceae	<i>Portulaca oleracea</i> L.	Purslane	Naturalized	
Dicot	Portulacaceae	<i>Portulaca pilosa</i> L.	Rose-Flowered Purslane	Naturalized	
Dicot	Myrtaceae	<i>Psidium cattleianum</i> Sabine	Strawberry Guava	Naturalized	
Dicot	Myrtaceae	<i>Psidium guajava</i> L.	Common Guava	Naturalized	
Pteridophyte	Psilotaceae	<i>Psilotum nudum</i> (L.) P. Beauv.	<i>Moq</i> , Whiskfern	Indigenous	
Monocot	Arecaceae	<i>Psychosperma macarthurii</i> (Veitch) H. Wendl. ex Hook. f.	Macarthur Palm	Naturalized	
Dicot	Fagaceae	<i>Quercus suber</i> L.	Cork Oak	Cultivated	
Dicot	Myrtaceae	<i>Rhodomyrtus tomentosa</i> (Aiton) Hassk.	Downy Rose Myrtle	Naturalized	
Dicot	Santalaceae	<i>Santalum album</i> L.	Indian Sandalwood	Cultivated	
Dicot	Santalaceae	<i>Santalum ellipticum</i> Gaudich.	Ilihaloe	Endemic	
Dicot	Goodeniaceae	<i>Scaevola gaudichaudii</i> Hook. & Arn.	<i>Naupaka kuahwi</i>	Naturalized	

# Appendix A: Kālepa Forest Reserve Botanical Survey

Conducted by A.M. Williams (DOFAW), and Tim Flynn (NTBG)

Super Family	Family	Taxon Name	Common Name	Status	FedStat
Dicot	Goodeniaceae	<i>Scaevola taccada</i> (Gaertn.) Roxb.	Naupaka Kahakai	Indigenous	
Dicot	Araliaceae	<i>Schefflera actinophylla</i> (Endl.) Harms	Octopus Tree	Naturalized	
Dicot	Anacardiaceae	<i>Schinus terebinthifolius</i> Raddi	Brazilian Pepper Tree	Naturalized	
Dicot	Fabaceae	<i>Senna surattensis</i> (Burm.f.) H.S.Irwin & Barneby	Scrambled Egg Tree	Naturalized	
Monocot	Poaceae	<i>Setaria parviflora</i> (Poir.) Kerguelén	Yellow Foxtail	Naturalized	
Dicot	Malvaceae	<i>Sida fallax</i> Walp.	'Ilima	Indigenous	
Monocot	Orchidaceae	<i>Spathoglottis plicata</i> Blume	Ground Orchid, Spathoglottis	Naturalized	
Dicot	Rubiaceae	<i>Spermacoce assurgens</i> Ruiz & Pav.	Buttonweed	Naturalized	
Pteridophyte	Lindsaeaceae	<i>Sphenomeris chinensis</i> (L.) Maxon	Pala'a	Indigenous	
Dicot	Verbenaceae	<i>Stachytarpheta corymbensis</i> (Rich.) Vahl	Vervain	Naturalized	
Dicot	Myrtaceae	<i>Syncarpia glomulifera</i> (Sm.) Nied.	Turpentine Tree	Naturalized	
Dicot	Myrtaceae	<i>Syzygium cumini</i> (L.) Skeels	Java Plum	Naturalized	
Dicot	Fabaceae	<i>Tamarindus indica</i> L.	Tamarind	Cultivated	
Dicot	Fabaceae	<i>Tephrosia purpurea</i> var. <i>purpurea</i>	<i>Auhuhu, Auhuhu, 'Auhola, Hoha</i>	Polynesian	
Dicot	Acanthaceae	<i>Thunbergia fragrans</i> Roxb.	Sweet Clockvine	Naturalized	
Monocot	Poaceae	<i>Urochloa maxima</i> (Jacq.) R.D.Webster	Guinea Grass, Panic Grass	Naturalized	
Dicot	Malvaceae	<i>Waltheria indica</i> L.	'Uhaloa	Indigenous?	
Dicot	Thymelaeaceae	<i>Wikstroemia uva-ursi</i> var. <i>kauaiensis</i> Skottsb.	<i>Akia</i>	Endemic	

# Appendix A: Nounou Forest Reserve Botanical Survey

Conducted by A.M. Williams, Kawai'i Botanist

Super Family	Family	Taxon Name	Common Name	Status	FedStat
Dicot	Santalaceae	<i>Santalum pyrularium</i> A.Gray	'Iliahi, Sandalwood	Endemic	
Dicot	Araliaceae	<i>Schefflera actinophylla</i> (Endl.) Harms	Octopus Tree	Naturalized	
Dicot	Anacardiaceae	<i>Schinus terebinthifolius</i> Raddi	Brazilian Pepper Tree	Naturalized	
Monocot	Poaceae	<i>Schizachyrium condensatum</i> (Kunth) Nees	Bush Beard Grass	Naturalized	
Dicot	Fabaceae	<i>Senna pendula</i> var. <i>advena</i> (Vogel) H.S.Irwin & Barneby	Easter Cassia	Naturalized	
Monocot	Poaceae	<i>Setaria parviflora</i> (Poir.) Kerguelen	Yellow Foxtail	Naturalized	
Dicot	Malvaceae	<i>Sida acuta</i> subsp. <i>carpinifolia</i> (L.f.) Borss.Waalk.	Broom Weed, Southern Sida	Naturalized	
Dicot	Malvaceae	<i>Sida fallax</i> Walp.	'Ilima	Indigenous	
Dicot	Solanaceae	<i>Solanum americanum</i> Mill.	American Nightshade	Indigenous?	
Dicot	Bignoniaceae	<i>Spathodea campanulata</i> P.Beauv.	African Tulip	Naturalized	
Monocot	Orchidaceae	<i>Spathoglottis plicata</i> Blume	Ground Orchid, Spathoglottis	Naturalized	
Dicot	Rubiaceae	<i>Spermacoce assurgens</i> Ruiz & Pav.	Buttonweed	Naturalized	
Dicot	Asteraceae	<i>Sphagneticola trilobata</i> (L.) Pruski	Wedelia	Naturalized	
Pteridophyte	Lindsaeaceae	<i>Sphenomeris chinensis</i> (L.) Maxon	Pala'a	Indigenous	
Monocot	Poaceae	<i>Sporobolus indicus</i> (L.) R.Br.	Smut Grass	Naturalized	
Dicot	Verbenaceae	<i>Stachytarpheta cayennensis</i> (Rich.) Vahl	Vervain	Naturalized	
Monocot	Poaceae	<i>Stenotaphrum secundatum</i> (Walter) Kuntze	St. Augustine Grass	Naturalized	
Dicot	Asteraceae	<i>Synedrella nodiflora</i> (L.) Gaertn.	Node Weed	Naturalized	
Dicot	Myrtaceae	<i>Syzygium cumini</i> (L.) Skeels	Java Plum	Naturalized	
Dicot	Myrtaceae	<i>Syzygium malaccense</i> (L.) Merr. & L.M.Perry	'Ohi'a Ai, Mountain Apple, Malay Apple	Polynesian	
Dicot	Acanthaceae	<i>Thunbergia fragrans</i> Roxb.	Sweet Clockvine	Naturalized	
Dicot	Malvaceae	<i>Triumfetta semitriloba</i> Jacq.	Sacramento Bur	Naturalized	
Monocot	Poaceae	<i>Urochloa maxima</i> (Jacq.) R.D.Webster	Guinea Grass, Panic Grass	Naturalized	
Dicot	Malvaceae	<i>Waltheria indica</i> L.	'Uhaloa	Indigenous?	
Monocot	Araceae	<i>Xanthosoma robustum</i> Schott	Elephant Ear	Naturalized	
Monocot	Zingiberaceae	<i>Zingiber zerumbet</i> (L.) Sm.	'Awapuhi, Shampoo Ginger	Polynesian	