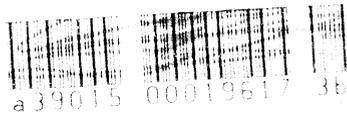


**HAWAII (Ter)**  
**BOARD OF**  
**AGRICULTURE**  
**AND**  
**FORESTRY**  

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**REPORT**  
**(reprint from)**  
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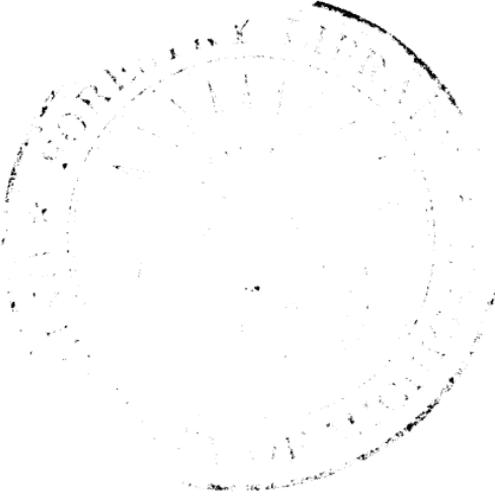
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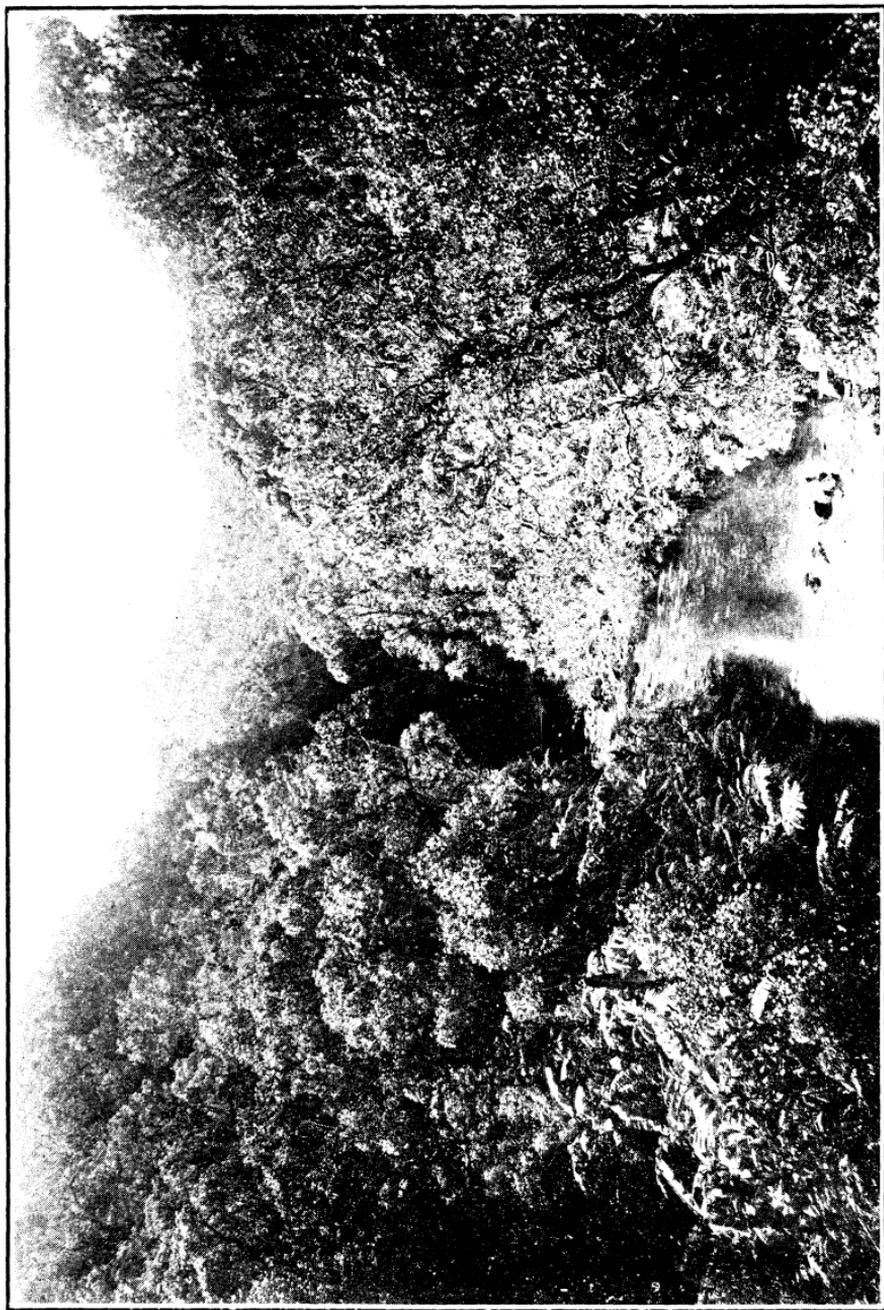


Plate 1. A Hawaiian Protection Forest.

TERRITORY OF HAWAII  
BOARD OF AGRICULTURE AND FORESTRY

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DIVISION OF FORESTRY  
RALPH S. HOSMER, Superintendent

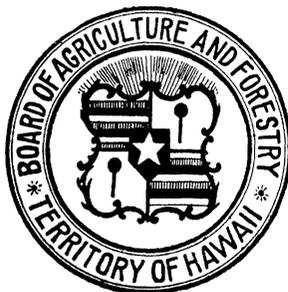
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REPORT  
OF THE  
DIVISION OF FORESTRY

FOR THE  
BIENNIAL PERIOD ENDING DECEMBER 31st, 1912

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REPRINT FROM THE REPORT OF THE BOARD OF COMMISSIONERS  
OF AGRICULTURE AND FORESTRY



HONOLULU, T. H.  
HONOLULU STAR-BULLETIN, LTD.  
1913



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# Division of Forestry.

## Report of the Superintendent of Forestry.

Honolulu, Hawaii, December 31, 1912.

The Board of Commissioners of  
Agriculture and Forestry,  
Honolulu, Hawaii.

GENTLEMEN:—I have the honor to submit as follows the report of the Division of Forestry for the calendar years 1911 and 1912.

### THE REASON FOR PRACTICING FORESTRY IN HAWAII.

“Save the forests—Store the floods.” To the people of Hawaii this motto of the National Irrigation Congress voices an imperative demand. Vitally important in the Western States, the conservation of water is also, and perhaps even in greater measure, required for this Territory. Water is a fundamental need everywhere. In Hawaii the foundations of the whole economic structure of the Territory rest on its wise and right use. Everything that tends to perpetuate or increase the local supply of water is of interest and moment.

One of the chief factors in maintaining an assured water supply is the forest. It needs no argument to prove this. The truth of the statement is self evident. But because this is so, the practice of forestry in Hawaii becomes an economic necessity. The object of this report is to sum up the reasons why the forest area of Hawaii must be protected and increased, and briefly to outline what has been accomplished during the past two years in this and the kindred lines of forest work now being carried on under the direction of the Territorial Government.

The way in which the native Hawaiian forest exerts its influence on water supply has so often been pointed out that it ought now pretty well to be understood. But with the added demands that each year's development makes on the sources of supply, the need becomes more apparent of husbanding this most important of our natural resources.

In Hawaii with its short, steep watersheds, the limited area of its catchment basins and the great and sudden fluctuations in rainfall, even in the supposedly wet districts, it is of paramount importance that a cover of vegetation be permanently maintained

on the slopes of the mountains whence come the streams that feed the irrigation ditches. On the continuance in good condition of large tracts of forest depend the prosperity and well being of many people, for a body of forest reacts favorably on the region adjacent to it in many ways.

In our present state of knowledge we may not know just how this influence is exerted, nor how far reaching are its effects, as for example on local climate and on health. But it is the experience of mankind that a body of forest is a valuable asset, a heritage which ought not to be jeopardized through neglect or mismanagement.

The droughts of the past season bring home the vital connection that exists between water and the yield of the sugar plantations. How much more would serious deterioration of the forest spell a general diminution of prosperity. And yet that is just what is happening all over the Territory, in all the windward districts where the native wet forest is not being protected from trespass and kept free from injury by man, wild stock and the rank-growing introduced grasses and other weeds.

With the outlook for the future what it is in this Territory today, the time has unquestionably arrived when greater care must be given the forests. Fencing, the extermination of wild cattle and goats, the extension of the native forest cover, are all things that urgently call for prompt and energetic attention.

There has been enough and to spare of talk. What is demanded now is the means to carry into effect the plans which the Board of Agriculture has worked out for meeting the present needs. These plans have been developed in conjunction with the Hawaiian Sugar Planters' Association and will receive the support of that organization, but it is not enough for the corporations only to take a hand in this matter. The protection and right use of the native Hawaiian forest is an issue that concerns all the people of the Territory, large interests and small landholders alike, for everybody uses water. The need for water is a common need. A well kept forest cover on the watersheds is essential to an assured supply.

The means for doing what is required can be had by devoting to forest purposes, especially to forest protection, a portion of the revenues now derived from the water right leases and licenses in the existing forest reserves. Upwards of \$67,000 per annum is now received by the Territory from this source. A part of this money ought to be reinvested in the forest as a revolving fund, which in the end would pay back the amount so invested, with good interest. I earnestly recommend that this matter be given serious consideration by the Commissioners.

During the past two years a large share of attention has been paid by the Division of Forestry to interesting corporations and

individuals in tree planting, both through the giving of advice and by the supplying of actual plant material. This work is of much practical importance and should be continued, but for 1913 the forest needs of the Territory are first and essentially the better protection of the native forest. While there is yet time let us here in Hawaii "conserve the foundations of our prosperity."

#### SUMMARY.

During the past two years the activities of the Division of Forestry have followed in general the program laid down when forest work was systematically begun in this Territory ten years ago. Four new forest reserves have been added to the chain extending through the islands and three of the older reserves have been increased in area. Most of the necessary field work preliminary to the technical reservation of the remaining forest areas that it is proposed to add to the forest reserve system has been completed. Measures looking to the maintenance in good condition of the native forests, particularly those set apart as forest reserves, have been forwarded. Tree planting on government land and by private owners has received a decided impetus through the activities of this Division. The giving of advice on various forest matters has been continued and has met a hearty response from those benefitted. Additional information has been secured concerning the value locally of trees of economic importance new to the Territory. And through the forest fire service, protection has been afforded against that danger. Altogether the years 1911 and 1912 have seen a marked advance both in the status of forestry in Hawaii and in results actually accomplished.

The important thing now is to treat what has already been done merely as an incentive for better efforts in the future and to press on toward the goal of all forest work—the wise use of the forest for the continuing good of all the people.

#### STAFF.

During the past biennial period the staff of the Division of Forestry has consisted of the Superintendent of Forestry (Ralph S. Hosmer) and the Forest Nurseryman (David Haughs). Until September, 1911, Mr. Joseph F. Rock was also a member of the staff, under the title of Botanical Assistant. He was then transferred to the faculty of the College of Hawaii, but as an honorary officer of the Board his name is still carried on the rolls as Consulting Botanist.

Certain changes among the District Fire Wardens are indicated in a revised list of these volunteer officials of the Board that appears elsewhere in this volume.

## APPROPRIATIONS.

For the past two years the expenses of the Board of Agriculture and Forestry have been met from the Conservation Fund. Of this the expenditures of the Division of Forestry were as follows:

Year.	Salaries and Pay Rolls.	Current Expenses.	Total.
1911 .....	\$9,765.05	\$ 807.63	\$10,572.68
1912 .....	8,813.43	1,246.97	10,060.40

From special allotments there was also expended during these years for forest work:

Forest Planting, Pupukeya, Oahu .....	\$ 831.30
“ “ Kohala Mountain, Hawaii..	3,421.60
	\$4,252.90

From the sale of Ohia timber, under a territorial license, in the Puna Forest Reserve, Hawaii, the sum of \$2,955 was realized in June, 1911. This amount was set apart, under the law, as a special fund for forest work. In 1912 this money was transferred to the account of forest planting on Kohala Mountain.

At the close of 1912 there still remains available \$4,402.25 for additional planting in this account.

As general realizations from the sale of seeds, plants, etc., and of dead wood from the Tantalus forest, there have been turned into the Territorial Treasury by the Division of Forestry the following amounts:

For the year 1911 .....	\$612.75
“ “ “ 1912 .....	295.40

## FOREST RESERVES.

To those who have followed the earlier reports of this office, the reasons underlying the creation of forest reserves in Hawaii are an old story. But the need for forest protection and forest work remains and will always continue in Hawaii to be a vital one.

Many of the great functions of the Government now go on so smoothly that we have ceased to think much about them, but nevertheless it is well for us that our fundamental rights are safeguarded.

In a somewhat similar way it must not be forgotten that agriculture cannot exist in these islands in a large way, without irri-

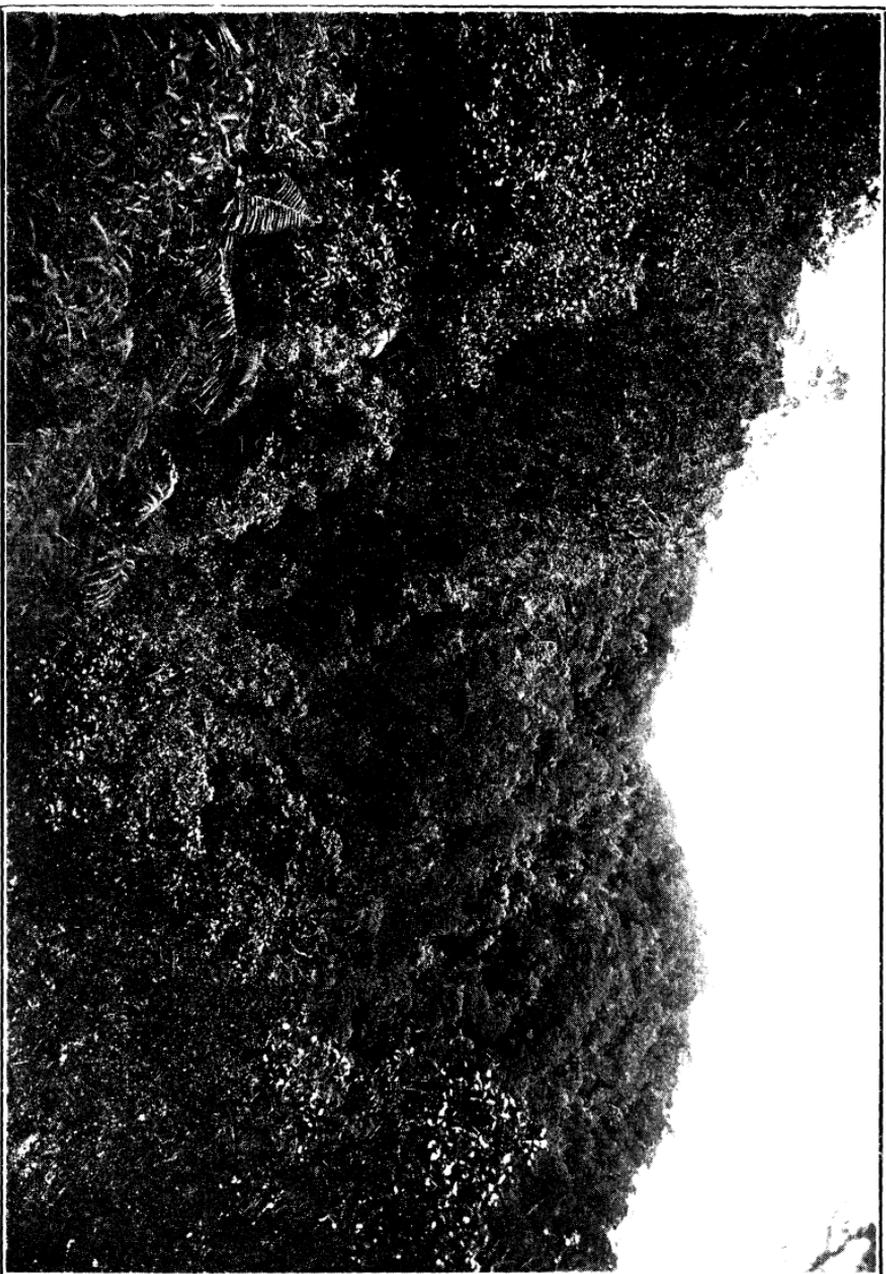


Plate 7. Dense Forest on a Ridge in a Watershed.



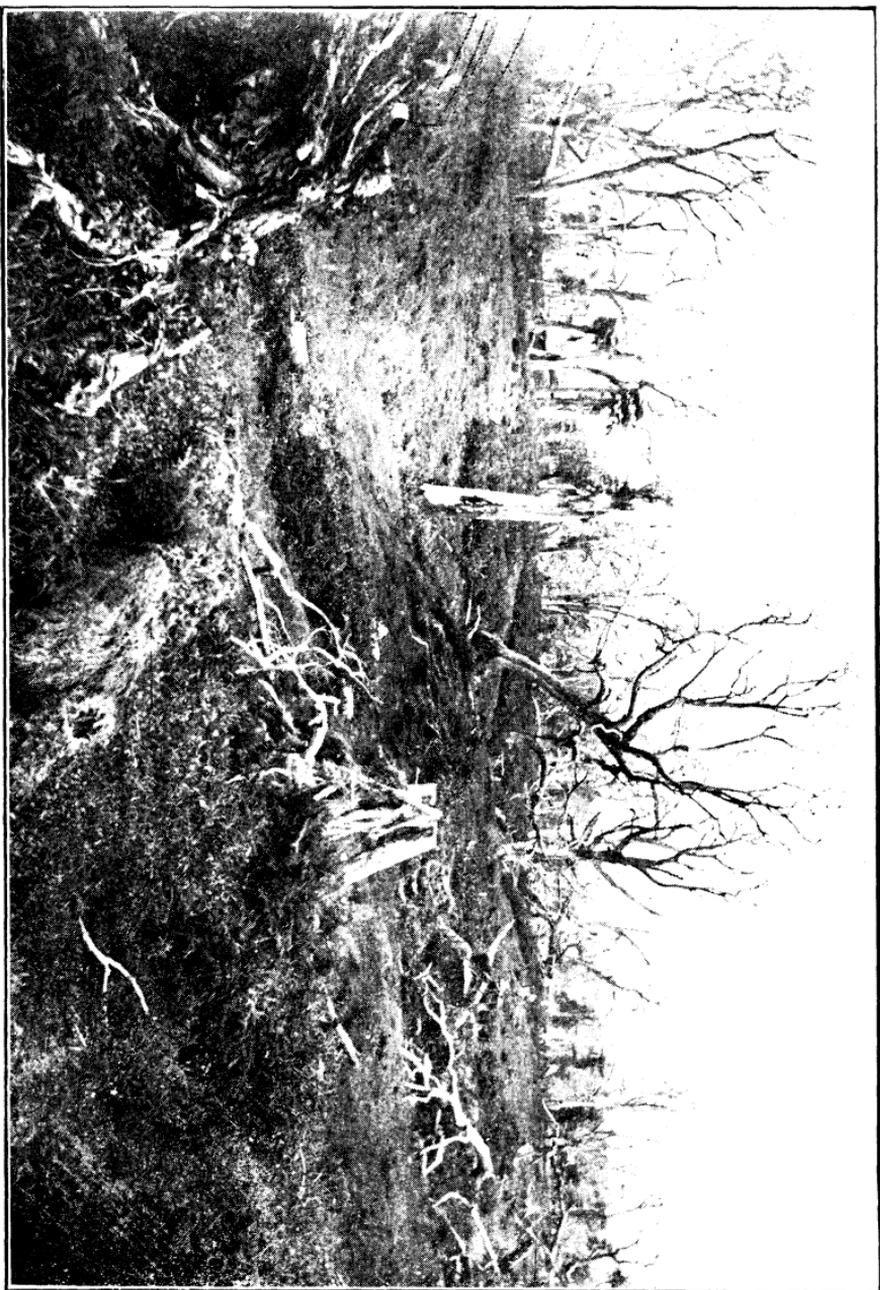


Plate 8. A Hawaiian Forest After Fire and Grazing.





Plate 9. Remnants of the Past.  
This palm normally is found only in the dense wet forests.



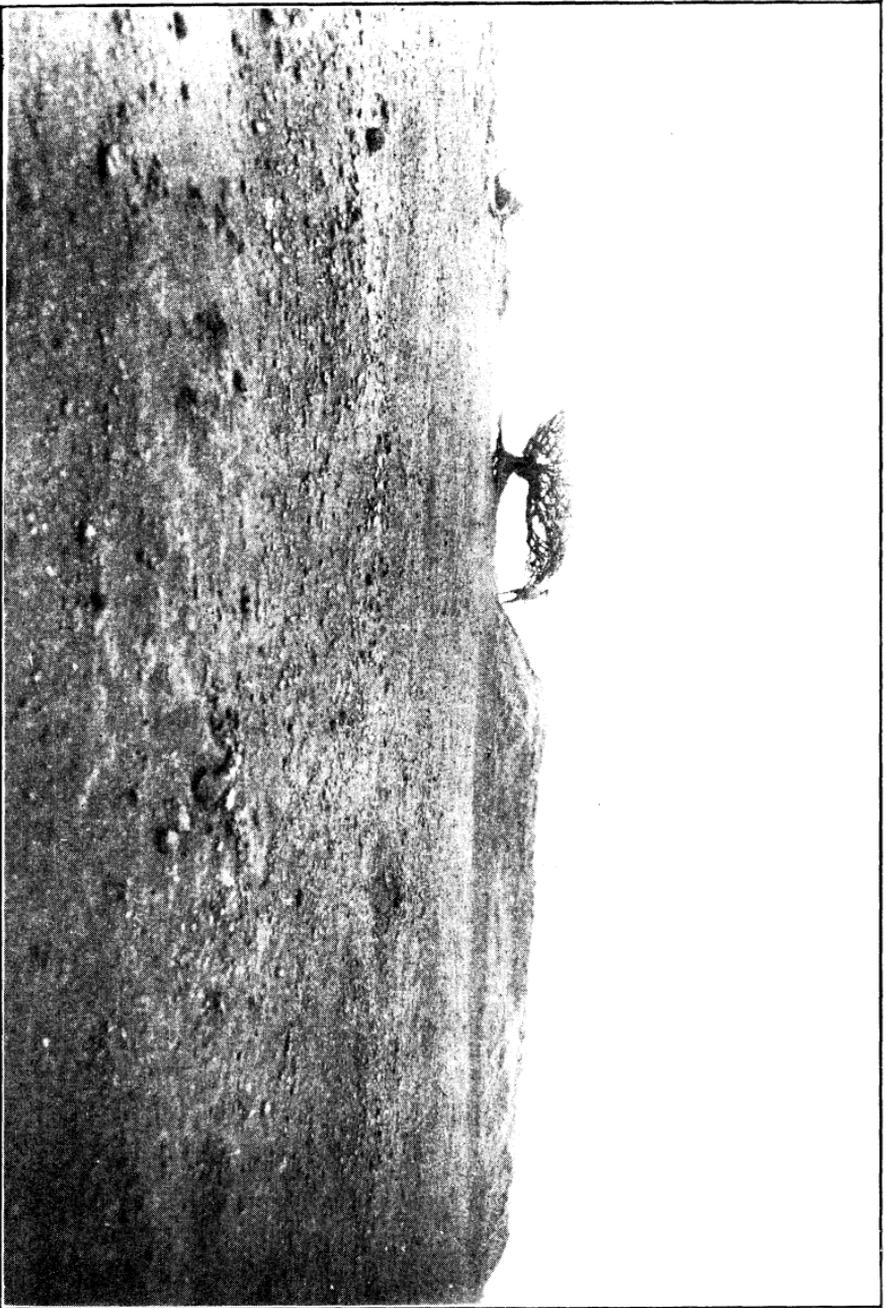


Plate 10. The Ultimate Result of Forest Destruction.  
Two-thirds of the Island of Kahoolawe is like this.



gation. Under the natural conditions that obtain here—climatic, geologic, topographic—an assured supply of water cannot be relied on unless the catchment areas are kept clothed with vegetation. The native Hawaiian rain-forest is the ideal of the type of protection forest needed. It is a plant community that precisely fills man's needs for keeping conditions at the head waters of the streams as he desires them.

But owing to the extreme susceptibility of the Hawaiian forest to injury and to the rapidity with which it deteriorates when trouble gains a foothold, it is absolutely essential, in order to retain and perpetuate the conditions most favorable for water conservation, that the native forest receive adequate protection and care. This is the reason why forest reserves are created. The areas necessary to protect given streams are set apart that they may be managed to help secure for all time the largest possible flow in the streams or springs whose sources they surround. So too, with the artesian supply. Unless the catchment basins are protected, the flow in the wells below will fluctuate and eventually decrease.

By far the greater part of the native Hawaiian forests, especially in the districts on the windward sides of the several islands, are of value primarily on account of the water which can be got from them. As has often been said of these forests, *water*, not wood, is their important product. Their management must therefore be with reference to water. This means in practice that the water bearing forests should be treated strictly as "protection forests," from which men and animals alike are to be excluded. The continuation of primitive conditions is the ideal—the elimination of all sorts of trespass.

That we are yet very far, in Hawaii, from the realization of this ideal is unfortunately true. Technically, to be sure, forest reserves have been set apart on each of the larger islands. Practically, only a few of those created are receiving the care necessary to keep them in the condition in which they should be maintained for the good of all concerned. Through the co-operation of corporations and individuals much, of course, has been and is being done, in fencing, in protection, and in some cases in forest planting. But the need remains for more fences, for the complete eradication of wild cattle and goats and in some cases pigs from the reserves, for continuing protection from fire, and in many places for improving the forest cover and extending it, particularly in those forest reserves that are created essentially for water protection.

These are the needs of the present. They are needs that must be met. For unless the required protection is given, and that speedily, the native Hawaiian forest will recede and disappear

just as surely as it has already gone in Hamakua, Hawaii, or as it is now going in North Kona.

The mere formal creation of forest reserves, the delimiting of boundaries and the coloring in of given areas on a map are of course only steps in the process of getting the forests under proper control. These are necessary steps and have to be gone through with, but the essential thing is protection—and the appointed time for securing protection is now.

The Board of Agriculture has detailed plans showing what ought to be done in the way of fencing and protection on each reserve. The practical requirement is for funds with which to get this work under way. As has already been pointed out, the reasonable solution of this problem is through the assignment to forest work of a portion of the revenues now received by the Territory from the leases and licenses of water rights in a number of the forest reserves. A percentage of this money ought to be devoted to the protection and improvement of the native forest on Government land. Every effort should be made to secure its use for this purpose.

#### NEW RESERVES.

During the past two years four new forest reserves were added to the list, making a total at the close of 1912 of 27 forest reserves that have formally been set apart. The new reserves are as follows:

South Kona—Kona and Kau, Hawaii. May 17, 1911. Total area, 36,952 acres; area of Government land 29,260 acres.

Puna—Puna, Hawaii. June 29, 1911. Area 19,850 acres, all Government land.

Molokai—Molokai. September 11, 1912. Total area, 44,674 acres; area of Government land, 13,268 acres.

Kula—Kula, Maui. September 11, 1912. Total area, 6,075 acres; area of Government land, 5,069 acres.

In February, 1911, the boundaries of two of the older reserves, West Maui and Kau, Hawaii, were modified and the areas somewhat increased. Similar action was taken in September, 1912, with regard to the Waianae kai Forest Reserve on Oahu, and through a land exchange on Kauai, 420 acres of forest in the Lihue-Koloa Forest Reserve were transferred from private to Government ownership.

At the close of 1912 there are twenty-seven forest reserves in the Territory of Hawaii with a total area of 683,101 acres, of which 454,810 acres, 67 per cent., is Government land. On following pages are tables giving in detailed form the statistics of each reserve.

Of the four new forest reserves, *Molokai* is essentially protection forest. *Puna* and *South Kona*, being in districts where there are no running streams, were set apart primarily because of the prospective value of the forest on them from a commercial standpoint.

Soon after the establishment of the Puna Forest Reserve a payment of \$2955, made on behalf of the Hawaii Lumber Company for the right to cut Ohia timber, under an existing license, was received by the Division of Forestry. This money was set aside under the forest law (Chapter 28, Section 385, Revised Laws of Hawaii) as a special fund for conducting forest work. In that this payment was the first one to be made under this section of the law, it may be of interest to note it here. The money has been allotted for forest planting on the Island of Hawaii

*Kula* consists mainly of a portion of the upper slopes of Mt. Haleakala, above the area of especial value for grazing. Like the Mauna Kea Forest Reserve on Hawaii, the object here is to keep under control of the Board of Agriculture and Forestry land now of but little value for any form of agriculture, with the expectation that in time considerable portions of it may be made to grow useful trees. Experimental work is constantly going on to find out what species of economic trees can be made to grow in various parts of the Territory. It is confidently expected that in the end one or more species will be found that will do well on the upper slopes of our higher mountains.

FOREST RESERVES, TERRITORY OF HAWAII. Arranged in Chronological Order.

No.	Name.	District.	Island.	Total Area		Date of Proclamation	Proclamation Signed by
				Recom- mended to be Reserved.	Area Private Land.		
				Acres.	Acres.		
1	Kaipapau.....		Oahu	913	.....	Nov. 10, 1904	G. R. Carter
2	Hamakua Pali..		Hawaii	18,940	16,333	Dec. 23, 1904	"
	Total for the year ending December 31, 1904. ....			19,853	17,246	2,607	
3	Hilo.....		Hawaii	110,000	60,223	July 24, 1905	A. L. C. Atkinson
4	Koolau, Maui..		Maui	42,969	30,230	Aug. 24, 1905	"
5	Halelea.....		Kauai	37,500	10,990	Aug. 24, 1905	"
	Total for the year ending December 31, 1905. ....			190,469	101,443	89,026	
6	Kealia.....		Kauai	9,935	7,385	Mar. 9, 1906	"
7	Ewa.....		Oahu	28,550	5,151	Mar. 9, 1906	"
8	Honuula.....		Hawaii	665	665	April 4, 1906	"
9	Kau.....		Hawaii	†66,066	59,811	Aug. 2, 1906	G. R. Carter
10	Waianae-kai....		Oahu	‡ 3,653	3,546	Sept. 7, 1906	"
11	Lualualei.....		Oahu	3,743	3,743	Nov. 30, 1906	"
12	Hana.....		Maui	14,825	13,767	Nov. 30, 1906	"
	Total for the year ending December 31, 1906. ....			127,437	94,068	33,369	
13	Na Pali-Kona..		Kauai	60,540	40,650	June 12, 1907	A. L. C. Atkinson
	Total for the year ending December 31, 1907. ....			60,540	40,650	19,890	
14	West Maui.....		Maui	\$44,482	19,147	April 21, 1908	W. F. Frear
	.....Lahaina, Kaanapali and Wai- luku .....				25,335	19,890	



FOREST RESERVES, TERRITORY OF HAWAII. Arranged by Islands and Counties.

No.	Name.	District	Island.	Total Area Re-com-mended to be Reserved.	Area Gov-ernment Land.	Area Private Land.	Date of Proclamation	Proclamation Signed by
COUNTY OF KAUAI.								
				Acres.	Acres.	Acres.		
5	Halelea.....		Kauai	37,500	10,990	26,510	Aug. 24, 1905	A. L. C. Atkinson
6	Kealia.....		Kauai	9,935	7,385	2,550	Mar. 9, 1906	"
13	Na Pali-Kona...Na Pali and Kona.....		Kauai	60,540	40,650	19,890	June 12, 1907	"
19	Lihue-Koloa....		Kauai	29,260	13,365	15,895	June 5, 1909	W. F. Frear
20	Moloaa.....		Kauai	5,670	3,615	2,055	June 5, 1909	"
Total for Kauai.....				142,905	76,005	66,900		

CITY AND COUNTY OF HONOLULU (OAHU).

1	Kaipapau.....		Oahu	913	913	.....	Nov. 10, 1904	G. R. Carter
7	Ewa.....		Ewa, Waianae and Waialua..	28,550	5,151	23,399	Mar. 9, 1906	A. L. C. Atkinson
10	Waianae-kai....		Waianae	3,653	3,546	107	Sept. 7, 1906	G. R. Carter
11	Lualualei.....		Waianae	3,743	3,743	.....	Nov. 30, 1906	"
21	Pupukea.....		Koolauloa	865	865	.....	May 10, 1910	W. F. Frear
Total for Oahu.....				37,724	14,218	23,506		
COUNTY OF MAUI.								
4	Koolau, Maui...Koolau and Hamakualoa....		Maui	42,969	30,230	12,739	Aug. 24, 1905	A. L. C. Atkinson
12	Hana.....		Hana	14,825	13,767	1,058	Nov. 30, 1906	G. R. Carter
14	West Maui....		Lahaina, Kaanapali and Wai-luku	\$44,482	19,147	25,335	April 21, 1908	W. F. Frear
15	Makawao.....		Hamakuaopoko	* 1,830	1,830	.....	April 21, 1908	"



## PROPOSED FOREST RESERVES.

Reports recommending the creation of additional forest reserves on the Waianae Hills, Island of Oahu, are now in the hands of the Committee on Forestry. Other forest reserve projects on Oahu and Hawaii only wait the completion of the technical description by the Survey Department to be brought to the stage of final action.

Condemnation proceedings instituted by the Territorial Government for the acquisition of a portion of the land of Kehena 2 on the Kohala Mountain, Hawaii, which it is proposed be included in the Kohala Mountain Forest Reserve, were still pending at the end of the year.

Under the heading "Forest Planting" mention will be made of work in forest replacement carried on in two of the forest reserves.

## FENCING FOREST RESERVE BOUNDARIES.

It is the policy of the Territory so far as possible to provide for the construction and maintenance of fences on forest reserve boundaries through clauses in the leases of adjoining government lands that are devoted to agriculture or grazing. Under such a requirement a fence was built in 1911 by the Princeville Plantation Company along a section of the boundary of the Halelea Forest Reserve above Hanalei, Kauai. The fence runs between the Kalihiwai and the Hanalei streams. While only a little over a mile long it shuts off and protects a very large area of the forest above. The fence itself is very substantially built and should stand for a considerable time with only such minor repairs as must always be given to any fence line in the woods. Special mention is made of it here because this fence was practically built voluntarily, the requirement that such a fence be built having been inserted in this lease at the suggestion of the officers of the Princeville Plantation Company. As will be recalled, similar co-operation has been shown in past years by a number of other corporations throughout the Territory.

Other localities where fence building is required on government land, along forest reserve boundaries, by government leases now in force are Kula, Maui, on lands leased to the Cornwell Ranch; Kapaa and Kamalomalo, Kauai, on lands above the Kealia Plantation; Waioli, Kauai, under a lease to C. B. Makee; East Ohia and Kahananui, Molokai, under leases respectively to A. Rodriguez and C. Kaanoi; and Humuula, Hawaii, under a lease to the Humuula Sheep Station.

Other leases call for the building of fences on forest reserve lines as soon as certain proposed forest reserves on Oahu shall have been officially set apart. While again, still other leases call for the up-keep of fences built, voluntarily or under lease requirements, in former years, on forest reserve boundaries on each of the larger islands of the group. In addition many miles of forest fence are voluntarily maintained by sugar plantation companies and ranches on forest reserve boundaries across Government lands, not to speak of forest fences wholly on privately owned lands.

An estimate recently made of forest fencing now in existence, required to be constructed under leases in force, and needing to be built for the better protection of the native forest, shows the following data, which while only pretending to be approximate, give a fairly good idea of the length of fencing required:—

	Government Lands. Miles.	Private Lands. Miles.
Existing forest fences . . . . .	110.0	111.0
Fences required to be built under leases now in force . . . . .	21.5	.....
Needed fencing . . . . .	85.0	91.0
	<hr/> 216.5	<hr/> 202.0

When this needed additional fencing is all done and the fences so built and those now in existence are being properly cared for, the forests of Hawaii will be in vastly better condition than they are today. The particular forest need of the present year is to get this work started and under way.

#### KAHOOLAWE.

Perhaps at this point reference should be made to the reclamation of the Island of Kahoolawe.

This small island (28,260 acres) was, upon the expiration of a fifty-year lease, set apart in August, 1910, as a forest reserve. This action was taken at the suggestion of the Governor and was in accordance with a concurrent resolution passed by the Legislature at the session of 1909. The purpose of the action was to bring Kahoolawe under the control of the Department of the Territorial Government best fitted to handle the task of restoring to a condition where it would be of real value, an island that through continued over-stocking by cattle and sheep followed by the action of the elements, has been reduced in large part to an absolutely barren waste.

As it is now, somewhat over half of the entire area of Kahoolawe is absolutely destitute of all vegetation, the result of erosion by wind that since the cover of grass and other herbage was broken, has gone on with increasing destructiveness for many years. The process has now gone so far as to make efforts at reclamation extremely difficult. The problem presented, if it is possible to do anything at all, is to put back a cover of some sort of vegetation. Then to improve its condition. And so, eventually, to restore the island to a condition of productivity. The question is much more one of establishing soil binding plants than of tree planting, though of course windbreaks will have their place.

For some time now there have been no cattle on Kahoolawe. A few sheep yet remain and there is also a band of wild goats. The first move is, of course, to get rid of these animals. In terminating the old lease an arrangement was made to drive and kill a part of the goats.

Over perhaps a third of Kahoolawe is good pili grass and a scattering growth of Algaroba trees. This forest is spreading slowly but the process ought to be helped along.

Owing to the fact that no funds were provided by the Legislature for such work, no further attempt than the above mentioned action has as yet been made to undertake active work in the reclamation of Kahoolawe. Conditions have for a long time now been so bad over a large part of the island that it makes the outlay of any considerable amount of money on the barren portion partake of the character of a somewhat doubtful speculation. But it can be said that on the section of the lower lands where Algaroba is already growing, the stand should be extended. The trees are spreading naturally but if the process could be hastened it would be that much better. Were it found possible to devise some practicable but very inexpensive way in which assistance of this kind could be given, the matter would at least be worth considering.

#### FOREST PLANTING.

During the past two years especial efforts have been made by the Division of Forestry to push work in forest planting, both on Government land and by corporations on their own, fee simple property. The reasons for this are plain. In Hawaii the native trees do not yield wood suitable for structural purposes. Furthermore, in many of the districts where wood is most needed, the native forest has already been pushed back as far as or farther than is safe from a water protection standpoint. Consequently there, even the cutting of fire wood is, or should be, tabu.

On the other hand the demand for wood for all sorts of uses is constantly on the increase. Large quantities of lumber are

annually imported from the American mainland and in the nature of things this must continue for many years. But there seems no good reason why wood and timber for minor uses, such as posts, ties, rough bridge and flume sticks and the like, should not be supplied from local grown trees. Then, too, fuel wood is an item of very considerable importance on plantations on the windward side of the islands, in localities where the Algaroba will not grow. Windbreak, roadside and ornamental planting also require annually a goodly number of trees of various species.

To provide a local source of wood supply is so evidently a good business proposition that it does not need any argument at all to prove it so. The main drawbacks to forest planting in Hawaii are the initial cost and the length of time that must necessarily elapse before returns can be got. But on both counts Hawaii is more fortunate than many places, for even if only fuel is cut, the yields from planted groves are sufficient to make the rate of interest on the investment a satisfactory one. With a longer term investment, yielding a higher grade of wood product, returns in Hawaii can, because of the fact that quick growing trees like the Eucalyptus are for the most part the ones used, be got very much sooner than in most places elsewhere in the United States.

The function of the Division of Forestry in this matter is, first, to make available information as to what, where and how to plant to get the results desired, and second, further to assist the planter of trees by supplying at cost price seed and seedlings of the species of trees locally most in demand.

A considerable part of the time of the Forest Nurseryman is devoted to the former work. Information is given out verbally, by correspondence, and through publications. In June, 1912, a new and revised edition was issued of the circular entitled "Instructions for Propagating Forest, Shade and Ornamental Trees." For a detailed account of this phase of the Division's work, the report of the Forest Nurseryman should be consulted.

#### EUCALYPTUS BULLETIN.

Perhaps it is not out of place here to make mention of a bulletin entitled "Eucalyptus Culture in Hawaii" that was issued in July, 1911, as Bulletin No. 1 of the Division of Forestry. This report, written by Mr. Louis Margolin of the U. S. Forest Service, gives the results of the investigation carried on in 1910 with the co-operation of the Forest Service, when all the planted groves of Eucalypts in Hawaii were visited and all the information locally available in regard to this genus got together. An edition of 3,000 copies was printed, so that the bulletin could be

given wide distribution. For those who are minded to establish Eucalyptus plantations this bulletin contains much material that is of interest and value. Copies may be had upon application, without charge. A further account of the investigation itself may be found in the biennial report of the Division of Forestry for 1909-1910, page 41.

#### PLANT DISTRIBUTION.

The distribution of plant material during the past biennium has exceeded in number of plants given out any previous record. For the most part the tree seedlings are sold at cost, but also many plants are given away, free. Especially is this true of Arbor Day, when an effort is made to get trees into the hands of as many individuals as possible, each person who applies being given not to exceed 24 seedling trees, chosen by him out of one or more of about a dozen species. In 1911 the total number of trees given away at the Government Nursery on Arbor Day was 11,508. In 1912 it was 13,645. A phase of considerable importance in the plant distribution work is the supplying material for planting the grounds of schools and other public institutions, for street planting by local improvement associations and other similar clubs, and for use at the Army and Navy posts and stations. Up to the present practically all material of this class has been furnished free, save that the Department of Public Instruction has paid the freight on shipments made to schools.

Regularly the Government Nursery does not deal in ornamental vines and shrubs, but in the case of certain schools and of the Army an exception has been made and more or less plant material of this sort has been got ready for planting out. The justification of such co-operation rests on the desire of the Territory to assist the Federal Government in every way possible.

In addition to its plant distribution to individuals, the Division of Forestry has in the past two years furnished large numbers of small seedlings to sugar plantation companies throughout the islands at cost. Many of the plantation managers are willing to set out a few thousand trees every year, but do not care to be bothered with the trouble of raising them. Under a plan that has been carefully worked out by the Division of Forestry, seedlings for this use can be got cheaply from the Government Nursery in seed boxes. The seedlings are not sent out until they have passed the "damping off" stage and are ready for the first transplanting. This any laborer can do, and then after a time set out the little trees in their permanent place without more than ordinary supervision.



Plate II. A Shipment of Seedlings for a Sugar Plantation Company.  
Packing frame at the right. Plant boxes and box shooks at left.



In 1911, 349,000 seedling trees were grown and sent out for this class of planting. In 1912 the orders (to be filled during the winter of 1912-13) amounted to 666,730 trees. One plantation company alone wanted 500,000. Considering that a few years ago the total number of trees planted in the Territory was officially estimated at 498,677 (1908), this is certainly a gain worthy to be noted, for of course only a part of the trees now annually planted throughout the Territory come from the Government Nursery.

Seed as well as seedlings of the trees most in demand for local planting is kept on hand at the Government Nursery at Honolulu, for sale at cost price. As far as possible the tree seed is collected locally so as to secure the advantage of acclimatization. With species that do not seed readily here, seed is purchased from commercial seedsmen elsewhere and imported. Upon request the Division of Forestry will endeavor to procure seed of any kind of tree desired by any citizen of the Territory, the only charge being the actual cost of the seed itself.

#### SUB-NURSERIES.

Besides the Government Nursery at Honolulu, as a part of and in connection with which is maintained the substation and experimental garden in Makiki Valley, there are at present two sub-nurseries of the Division of Forestry on the other islands. These are respectively at Hilo, Hawaii, under the charge of Brother Matthias Newell, and at Homestead, Kauai, under the direction of Mr. Walter D. McBryde. To both these gentlemen it is appropriate that a renewed expression of thanks should here be made, for without their generous contribution of much time and thought it would be impracticable under present conditions for the Division of Forestry to maintain these stations.

Following is a table which shows the totals of seedling trees distributed from Division of Forestry nurseries in 1911 and 1912:

#### TOTALS OF DISTRIBUTION OF SEEDLING TREES.

##### Sold and Given Gratis from Division of Forestry.

Nursery	1911	1912
Government Nursery, including Makiki Station, Honolulu .....	597,396	787,704
Hilo Nursery, Hawaii .....	12,104	12,490
Homestead Nursery, Kauai .....	11,239	6,343
Total.....	620,739	806,537

A detailed tabulation of these figures, showing the numbers of trees supplied for various classes of planting is given in the report of the Forest Nurseryman.

The need for other sub-nurseries in various districts on the several islands, pointed out in previous reports, continues to increase. In a few places on Maui and on Hawaii, temporary arrangements have been made with plantation companies and others to supply trees to individuals for local planting, especially at Arbor Day time. But there ought to be better provision made for this phase of the work. People on Maui, for instance, have just as good a right to a local Nursery as persons in Hilo. Provision should be made for the establishment of more sub-stations.

As it is now, apart from the seedlings distributed from depots established by temporary arrangement, a good many plants are of course shipped from Honolulu, so that those who really want them have no need to go without. But, obviously, a local nursery has its advantages, to say nothing of the saving of time, cost and liability of damage over inter-island shipments.

#### TREE PLANTING BY CORPORATIONS.

Without reference to where the plant material came from, it can truly be said that interest in tree planting by corporations has increased markedly during the period of this report. Most of those sugar plantations which were before doing a good deal have increased their activities. Others that had not before engaged in tree planting have taken up the work. And best of all, almost all the planting by corporations is being done in a careful and systematic manner, which should insure the ultimate success of the trees set out.

Tree planting by sugar plantation companies can naturally be divided into three classes: wind breaks, roadside planting and camp adornment, and planting for direct economic return through wood production. Within the past two years noticeable additions have been made to the shelter belt of Ironwoods (*Casuarina*) along the windward shore of Hawaii in the Hamakua and Kohala Districts. Similar planting is also in progress on Maui, Oahu and Kauai. On good authority it is stated that in the lower fields on windward plantations which are protected by an Ironwood windbreak, the yield of sugar has been increased very appreciably, as much in some cases as one half ton or more per acre. Also it has been possible in some cases to bring some new fields under cane since windbreaks were established.

Of the planting of roadside trees and ornamentals near the camps no special mention is necessary except that it might well be noted that practically all the leading sugar companies are pay-

ing much more attention to the appearance of their mill grounds and camps than was the case even a few years ago—a movement that certainly is to be encouraged.

Tree planting for commercial return by sugar plantation companies is usually confined to areas unavailable for agricultural crops, such as gulch sides, rocky corners and the like, that would otherwise be classed as waste land. Almost every plantation has such land. Much of it is in close proximity to camps where live the people who would be the chief users of fuel wood. But whether trees are planted with the object of producing fuel or some other form of wood, it is good business so to utilize areas that would otherwise lie unproductive. The plantation companies that are vigorously carrying on such work now will benefit from it largely in the future.

The accompanying table, compiled from answers to a general request for tree planting data sent to sugar plantations, stock ranches and other large tree planters, shows approximately the total number of trees set out throughout the Territory during the past two years. The figures in each case are those given by the companies themselves. While of course the grand total cannot be claimed to include all trees planted, it is thought to be a pretty close approximation to the true figure. Naturally this table includes all classes of tree planting, as have similar estimates in former years. For comparison the totals for the last five years may be given, as follows:

**Total Number of Trees Reported Planted, 1908-1912.**

1908	1909	1910	1911	1912
498,677	597,381	725,022	1,134,940	1,303,698

As in past years the Division of Forestry stands ready, upon request, to draw up planting plans for any locality in the islands, having in mind the desire of the owner for one or another type of forest, and based on a study of the local conditions. The cost of this service consists merely in the traveling expenses of the agent sent. As has already been said, plant material can be obtained from the Division of Forestry at cost price.

Table Showing Number Of Trees Planted In The Territory Of Hawaii,  
Mainly By Corporations, in 1911 and 1912.

Name of Corporation.	Number of Trees Planted.*	
	1911.	1912.
<i>Kauai.</i>		
Princeville Plantation Co. ....		10,000
Kilauea Sugar Plantation Co. ....	2,000	2,000
Makee Sugar Co. ....	14,908	17,195
Lihue Plantation Co. ....	20,000	20,000
Grove Farm ....	25,000	45,000
Koloa Sugar Co. ....		17,770
Hawaiian Sugar Co. ....	10,000	40,000
W. D. McBryde (Kukuiolono Park) ....	42,000	3,000
Papaholohola Reserve ....	4,000	9,538
McBryde Sugar Co. ....		17,300
Waiawa Ranch ....		1,000
Lihue Ranch ....	72,000	161,000
A. S. Wilcox (Kilohana) ....	2,500	20,000
Rev. Hans Isenberg (Kukuaa) ....	1,100	1,600
Homesteaders on Kauai ....	15,000	10,000
Totals for Kauai ....	208,508	375,403
<i>Oahu.</i>		
Kahuku Plantation Co. ....	5,000	8,000
Waialua Agricultural Co. ....	50,000	10,000
Waianae Co. ....	5,177	3,336
Honolulu Plantation Co. ....	100,000	125,000
Ii Estate (Waipio) ....	19,042	20,000
Kunia Development Co. ....	21,058	59,797
O. R. & L. Co. Ranch Department. ....	5,000	.....
C. G. Owen (Pupukea) ....	1,000	2,000
Pupukea Forest Reserve ....		1,000
Waimanalo Sugar Co. ....	12,000	16,000
Francis Gay (Kalih) ....		5,000
Totals for Oahu. ....	218,277	250,133

\* A number of sugar plantation companies and others report that owing to the prolonged drought of 1912 seedling trees that would otherwise have been planted out during the year are still held in the nursery.

*Maui, Lanai and Molokai.*

Maui Agricultural Co.		
Kailiili and Opana .....	300,000	417,000
Paia Nursery .....	50,000	29,511
Hawaiian Commercial & Sugar Co.....	6,594	7,780
Wailuku Sugar Co. ....	11,405	17,009
Haleakala Ranch .....	1,450	8,250
Honolua Ranch .....		500
Polipoli Forest Reserve (Wailuku) .....		2,686
Koolau District (H. C. & S. Co.).....	18,015	66,812
Homesteaders on Maui .....	5,000	5,000

*Molokai and Lanai.*

Molokai Ranch .....	15,000	18,000
Kalawao (Bro. Joseph Dutton) .....	3,760	500
Lanai Ranch (Koele) .....	500	8,000
	<hr/>	<hr/>
Totals for County of Maui.....	411,724	581,048

*Hawaii.*

Niuli Mill & Plantation .....	1,730	6,020
Kohala Sugar Co. ....	20,000	12,000
Puakea Co. ....	710	575
Pacific Sugar Mill .....	5,000	10,000
Hamakua Mill Co. ....	25,000	.....
Honokaa Sugar Co. ....	10,000	10,000
Kaiwiki Sugar Co. ....	400	500
Kukaiiau Ranch .....	45,003	29,070
Hawaiian Agricultural Co. ....	9,000	.....
Homesteaders in Kau .....	25,000	5,000
W. R. Castle (So. Kona) .....		2,000
Parker Ranch		
Kohala Mt. ....	128,437	5,888
Waiki & Makahalau .....	10,500	.....
Paauhau .....	14,151	14,561
Other localities .....	1,500	1,500
	<hr/>	<hr/>
Totals for Hawaii.....	296,431	97,114

*Summary.*

Kauai .....	208,508	375,403
Oahu .....	218,277	250,133
County of Maui .....	411,724	581,048
Hawaii .....	296,431	97,114
	<hr/>	<hr/>
Grand Total .....	1,134,940	1,303,698

## SPREADING THE ALGAROBA.

One other forest suggestion that is pertinent here is that more systematic effort should be made by those owning or controlling considerable areas of low lying land along the lee coasts of the several islands, to extend the Algaroba forest. Of course, through natural reproduction this tree is spreading now in almost every district, but there are many localities where the process should be assisted. When land of poor character, dry and rocky, can so easily be increased in value as by establishing on it an Algaroba forest it would seem to require little argument to induce land owners to take the simple steps necessary to bring such afforestation about. As a bee pasture, as a source of stock feed and as a producer of fuel-wood, Algaroba is of increasing value in Hawaii. Provision ought to be made by the Territory to increase the Algaroba forest on Government lands. Private owners should put into force a similar program on their holdings.

## TREE PLANTING ON GOVERNMENT LAND.

Within the past two years the Territorial Government has resumed forest planting on its own lands, both directly under contracts for planting given areas, and also through requirements in public land leases whereby the lessee is obligated to establish a given number of trees within a certain period on specified tracts.

*Pupukea, Oahu.*

Two areas have been planted directly by the Government under contract. One is a portion of the Pupukea Forest Reserve, Waialua District, Oahu. Here on what was formerly known as "Water Reserve C" are now between 30 and 35 acres of forest, mainly Swamp Mahogany (*Eucalyptus robusta*). This work was begun in 1910, as was noted in the report of this Division for that year, and completed in the early part of 1911. Final payment under the contract was made in October of that year. The result of this planting is a vigorous stand of thrifty, well developed trees.

In February, 1912, a special agreement was entered into with Mr. C. G. Owen, whereby in return for the privilege of growing two crops of pineapples on some remnants of open land on the bluff adjoining the Pupukea forest plantation, he is then to plant trees on the area so cultivated. The satisfactory performance of this tree planting is insured by a bond fully covering the cost of the work. This particular planting will join and extend the stand already established.

*Waimea, Hawaii.*

The other locality planted directly by the Government is on Kohala Mountain, above Waimea Village, Hawaii. In May, 1911, a contract was signed with Mr. A. W. Carter, Manager of the Parker Ranch, under which, in accordance with a planting plan drawn up by the Division of Forestry, 50 acres were planted during the winter of 1911-12. Here again *Eucalyptus robusta* was the principal tree used. The planting having been satisfactorily completed, payment of the contract was made in the summer of 1912 in two installments.

A continuation of this planting has been made by the Parker Ranch on adjoining fee simple lands, so that altogether a considerable block of forest will soon be in evidence. The areas planted were open slopes on the hills above Waimea, adjoining the native forest out of which come streams now tapped for use on the Waimea plains. The object of the planting is to utilize otherwise unproductive land and in part to form a buffer belt, or transition zone between the native forest and the open grazing land. Under the peculiar conditions that obtain in the Hawaiian islands the outer edge of the native forest is often in poor health and reduced vigor. Unavoidable encroachments from the outside where the forest touches agricultural land, the spread into the forest of rank growing grasses, incursions by men and animals, and in places the danger of damage by fire, all tend to work injury to the close cover that is the characteristic and valuable feature of the indigenous forest.

By keeping the outer boundary of the forest somewhat farther out than in itself is actually required for watershed protection, the welfare of the forest as a whole is the better maintained.

In the "wet" or water-bearing forest on the catchment basins of streams especially needed for irrigation, the retention of this "buffer belt" is a matter of much importance. For the most part the buffer belt should consist of an extension of the native forest cover. Where the cover is broken it should ordinarily be renewed through encouraging a return of the native vegetation, but in some few places a planted stand of introduced trees can be used to advantage to bridge the outer zone. In such places the planted stand can serve also as a source of local wood supply. The planting above Waimea Village falls into this latter class. Both purposes will there be served by the stand planted.

*Planting Under Government Lease Requirements.*

Under the requirements of Government leases issued by the Territorial Land office, forest planting is in progress on several

tracts on Hawaii now under the control of the Parker Ranch and of the Kukaiaiu Ranch. Visits of inspection were made to these localities in the summer and autumn of 1911, when the tree planting work was found to be going on satisfactorily in accordance with the requirements of the leases.

In December, 1911, a planting plan was drawn up for certain Government lands in the Kula District, Maui, now under a lease to the Cornwell Ranch, carrying similar requirements. Planting on these lands, delayed during the past summer by unfavorable weather conditions, is now in progress.

Through the voluntary co-operation of two sugar plantation companies—the Waianae Company on Oahu, and the Wailuku Sugar Company on Maui—forest planting is now going on on Government land in forest reserves above those plantations. In both cases grass-covered slopes on the foot hills are being reforested, mainly with Eucalypts. At Waianae 5177 trees were planted in 1911; 3336 in 1912. Above Wailuku, the planting of the land of Polipoli did not begin till 1912, when 2686 trees were set out.

#### FUNGUS DISEASE ON EUCALYPTUS.

During the autumn of 1912 the plant pathologists of the Hawaiian Sugar Planters' Experiment Station called attention to a fungus which is killing Eucalyptus trees in various parts of the Territory. Perhaps the place where the trouble has been most noticeable is the Tantalus Forest, back of Honolulu, where many large trees have been killed. Up to now the Eucalypts in Hawaii, except for injury from a leaf-eating beetle on one or two species, have been remarkably free from insect pests, blights and similar troubles so that the appearance of this fungus is an unpleasant surprise.

As yet not as much has been found out about the fungus as will be known when investigations now in progress are completed, but the indications seem strongly to be that it is most likely to attack individual trees rather than groves as a whole, so that if somewhat greater care is given the stand than has been thought necessary in the past, there need be no great cause for worry over a diminution of returns. Instead of periodical thinnings it may become necessary to remove individual trees should they die, whereby the spread of the fungus may be that much checked. This has been done on Tantalus the past autumn, the wood being sold for fuel, as it might be from any other stand.

Basing the statement on information now in hand, it may be said that the danger of the disease becoming epidemic and attacking all the trees of a given grove at once seems remote. Exceptional climatic conditions favorable to its spread might of

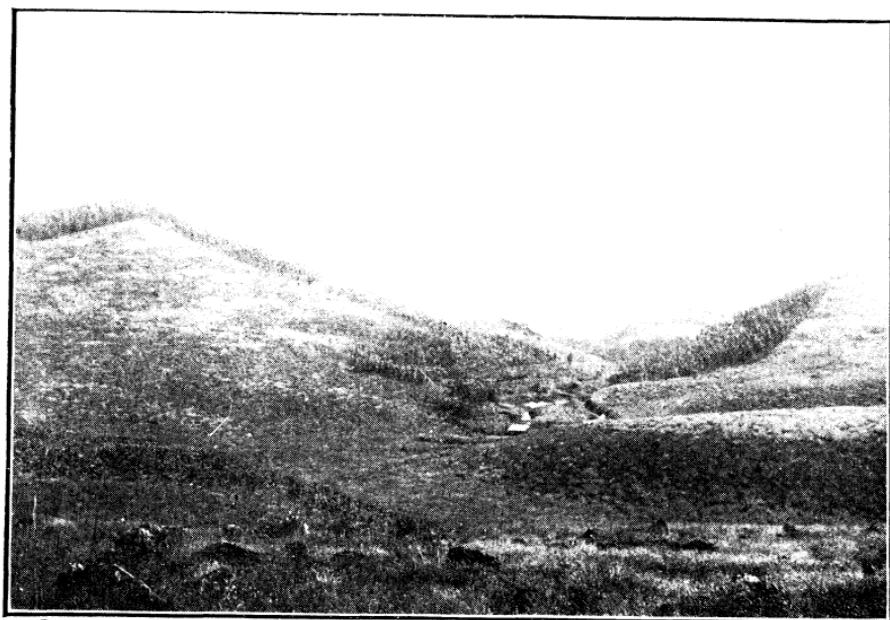


Plate 12. Papapaholahola Sub-Nursery and Experimental Planting Ground, Homestead, Kauai.



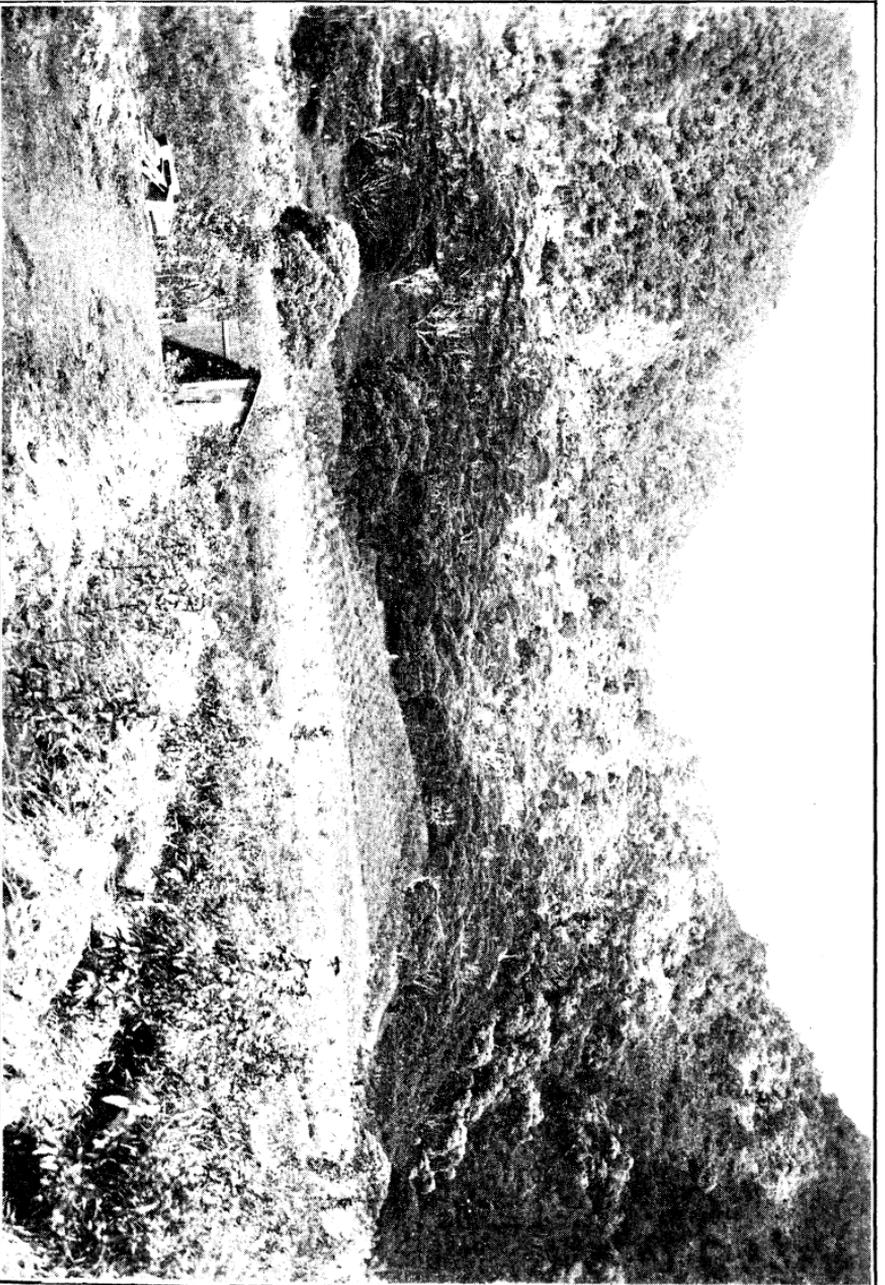


Plate 13. Experimental Eucalyptus Plantation, Nuuanu Valley near Honolulu.





Plate 14. *Eucalyptus Robusta* Windbreak, Nuuanu Valley Plantation.  
Two years and ten months from seed. Rows of *Eucalyptus corynocalyx* at left.



course occur but taken by and large it seems probable that only a small percentage of the trees in any one stand would be attacked. As Eucalyptus plantations need to be thinned vigorously anyway and as the margin of profit in this form of investment in Hawaii is considerable, there seems no good reason for discontinuing the planting of Eucalypts for commercial returns, especially on waste lands adjoining sugar plantations, provided the work is gone about in the right way to start with, and a reasonable amount of subsequent care can be assured.

## PLANT INTRODUCTION WORK

### EXPERIMENTAL PLANTING.

An important phase of forest work in Hawaii is the introduction into the Territory of exotic trees of economic importance. This is a line of investigation that should receive much greater attention than has been given it in recent years. Much of the attractiveness of Honolulu and of our other towns today is due to the introductions made years ago by Dr. Hillebrand and the men in charge of the Government Nursery in its early days. Many of the trees brought in by them were ornamentals. What is needed now is to try out species primarily of economic and commercial value. There is also a real need for supplementing our native flora by the introduction of trees and shrubs of generally similar botanic character that could be used for replanting areas in the water-bearing, protection forests, where for one or another reason, native Hawaiian plants cannot well be used.

Such experimental work is necessarily slow, and to be effective requires careful and painstaking devotion to details by well trained men. It is slow also because many of the plants tried will unavoidably be found to be unsuited to local conditions. But those that do succeed more than offset the failures.

With the machinery now at hand at the Makiki Experimental Garden, a slight additional outlay would enable many new trees to be started there for use at the lower levels. If then, provision could be made for planting out and caring for these new species from Makiki, and as well from other experimental nurseries located at suitable places throughout the Territory, at various elevations and under varying climatic conditions, a work of great value to the people of the islands would be accomplished. Especially should propagating stations be established at the higher elevations on the larger islands adjacent both to the native wet forest on the one hand and the high slopes of the great mountains on the other. It is urgently recommended that provision be made for such investigations.

## A NEW INTRODUCTION.

Through the courtesy of Hon. A. de Souza Canavarro, Consul for Portugal at Honolulu, this office received, early in 1911, a consignment of basket willow cuttings, brought direct from the Azores by Dr. L. R. Gaspar. These were planted in the Makiki Station grounds, where they did remarkably well. In January, 1912, when the holts were first cut, a number of baskets were made up, as is shown in the accompanying illustration. In the Azores furniture and a variety of articles in addition to baskets, are made from willow. There seems no reason why the same should not in time be the case here.

During the present winter cuttings will be distributed to persons desiring to establish stands of basket willow. In this way the initial steps are being taken to create a new industry in Hawaii, one that in time may give employment to many persons.

## PAPAPAHOLAHOA STATION, KAUAI.

In connection with the sub-nursery maintained by the Division of Forestry at Homestead, Kauai for the distribution of seedling trees to persons in that vicinity, a forest trial ground has also been started, where will be planted out many trees new to Hawaii. Of this experimental plantation, known locally as the "Papapahohola Reserve," the agent in charge, Mr. Walter D. McBryde, has the following to say:

"The Reserve covers 39½ acres, the whole of it being fenced in. I have had some ten acres of this plowed, a part of which has been well harrowed preparatory to its being planted to trees. I have found that this initial expense is well repaid in the quick growth of the trees, thus also making a great saving in the care and cultivation of the trees owing to their shading the ground and thus keeping down the grass and weeds.

"According to figures kept by the head worker at the Reserve, we have planted out during the year 1912 a total of 9,538 trees of the following varieties: Eucalyptus robusta, Blue Gum, E. diversicolor, Sugi or Japanese Cedar, Ironwood and Mexican Algaroba. In 1911 there were planted something over 4000 trees.

"The Papapahohola Spring Reserve is becoming quite a show place, owing to the good work being done by the two men allowed by your Department and if the work is continued along the same lines as at present undertaken, the Government will have a Forest Reserve of which they can well feel proud."

From a personal inspection of this tract made in the summer of 1912, I am inclined to speak with enthusiasm of the good progress made. Were there other experimental tracts like this one,

distributed throughout the Territory, much more rapid advance than at present would result in securing definite, practical data as to the value for one and another purpose of newly introduced trees.

#### FOREST PLANTING IN KOOLAU, MAUI.

In co-operation with and at the expense of the Alexander & Baldwin Interests, experimental planting of certain introduced trees was undertaken in the summer of 1911 in a section of the forest bordering the irrigation ditches in the Koolau District on the Island of Maui. This work is being done in the locality where portions of the native forest died out a few years since from a cause that has never been satisfactorily explained. Shelter belts have been started in several places to provide protection from the wind to limited areas where it is proposed to try out special things. Experimental lots of a number of species of trees new to Hawaii are being planted to ascertain if among them are not kinds adapted for use under the conditions obtaining in this particular section, while other experiments are in progress to determine the best methods of propagating on an extensive scale, certain of the native Hawaiian forest plants that are valuable as members of the plant community that makes up the water-bearing forest.

In April and May, 1911, an arrangement was made whereby Mr. H. M. Curran of the Philippine Bureau of Forestry visited Maui to confer with those locally interested, in their efforts to devise ways and means of handling this forest to the best advantage. A brief report containing Mr. Curran's recommendations was published in the *Hawaiian Forester and Agriculturist*, June, 1911; Vol. VIII, No. 6.

#### FEDERAL EXPERIMENTAL TREE PLANTING.

##### *Nuuanu Valley.*

In the interest of forest extension, the Forest Service of the United States Department of Agriculture has for several years now made an allotment for experimental forest planting in Hawaii. In the beginning all the money was used for the trial of temperate zone trees in fenced enclosures on the upper slopes of Mauna Kea and Mt. Haleakala. In 1911 an experimental plantation of Eucalypts was established on land controlled by the Honolulu Water Works above Luakaha, in Nuuanu Valley. Sample plots of eighteen different species of Eucalyptus were planted, kinds as yet little known in Hawaii but reputed to be of economic importance. Some additional planting and filling up of the blocks

to their full quota of trees was done in 1912. On the windward side of the plants a double line of Swamp Mahogany (*Eucalyptus robusta*) was set out, as a windbreak. This experimental plantation should yield valuable data in years to come. The species so far planted are as follows:

<i>E. corynocalyx</i>	<i>E. melanophloia</i>	<i>E. redunca</i>
<i>E. crebra</i>	<i>E. microcorys</i>	<i>E. rostrata</i>
<i>E. gomphocephala</i>	<i>E. microtheca</i>	<i>E. rubida</i>
<i>E. goniocalyx</i>	<i>E. muelleriana</i>	<i>E. siberiana</i>
<i>E. leucoxyton</i>	<i>E. obliqua</i>	<i>E. smithii</i>
<i>E. loxophleba</i>	<i>E. pilularis</i>	<i>E. tereticornis</i>

#### *Experimental Plots on the High Mountains.*

Results from the sowing of tree seed in fenced enclosures on Mt. Haleakala and Mauna Kea have as yet been but meager, but enough has been accomplished to indicate pretty clearly that were it possible to give more care and attention to this line of investigation much better returns could be looked for. Counts of seedlings in the seed spot beds in the several plots on both mountains made in the summer and autumn of 1911 showed that with a number of species of conifers the percentage of seedlings that had germinated and lived through the first season was sufficiently large to be really encouraging.

The purpose of sowing tree seed direct was to find out if the seed spot method was at all practicable under the conditions obtaining in Hawaii and to get an additional line on the behavior of the species tried. No very large returns were expected but as the cost of sowing the seed was very little, it was felt that the effort was justifiable. Experiments of this sort should be continued, for if one or two species of conifers can be found that will grow on the upper slopes of these mountains it will mean much to the Territory.

Seedlings of the following species were found, among others, to have germinated and apparently to have started to grow in a number of the plots, both on Maui and on Hawaii; *Pinus coulteri*, *P. contorta*, *P. ponderosa*, *P. murrayana*, *P. insularis*, *P. sylvestris*, *P. radiata*, *Cupressus arizonica*, *Libocedrus decurrens*, *Picea engelmanni*, *P. parryana*, and *Pseudotsuga taxifolia*.

The amount allotted by the U. S. Forest Service for experimental planting in Hawaii was \$750 for the fiscal period ending June 30, 1912. For the present year it is \$500. The greater part of the money for this year and last has been expended for the wages of laborers used in planting out and caring for the *Eucalyptus* in the Nuuanu Valley Plantation.

## MISCELLANEOUS FOREST WORK.

In addition to the lines of work which comprise the main activities of the Division of Forestry, no inconsiderable amount of energy is expended in efforts, not always easy to classify, which are designed in one way or another to benefit the people of the Territory.

## REPORTS AND PUBLICATIONS.

Under the heading publicity might be mentioned the written reports which are made to the Commissioners on all important matters.

Whenever a forest reserve is to be set apart a report is made summing up the reasons that underlie the action recommended. It is on the basis of this report that the Board requests the Governor to take the action required by law. From time to time, too, special reports are prepared on the condition of given forests or on particular problems that arise in connection with their administration. These reports are, of course, all based on field work, usually done by the Superintendent of Forestry. Monthly routine reports are also prepared to keep the Commissioners informed of the current work of the Division.

All of these reports are made public through the pages of the Hawaiian Forester and Agriculturist, the monthly journal issued under the auspices of the Board of Agriculture and Forestry. It is a part of the policy of the Board so to issue them, for the desire with forest work, as with all other activities of the Board, is to give the work being carried on such publicity that everyone who is interested in, or concerned by it can be fully informed as to what is going on. While necessarily some of these reports are technical in character the effort is always made to couch them in terms that anyone can understand.

Mention has already been made of Bulletin No. 1, "Eucalyptus Culture in Hawaii," by Mr. Louis Margolin of the U. S. Forest Service, and of Circular No. 2, "Instructions for Propagating Forest, Shade and Ornamental Trees," by David Haughs, Forest Nurseryman, issued respectively in 1911 and 1912. The only other publication of the Division of Forestry, issued during the past two years, outside of contributions to the Forester and Agriculturist, was the Biennial report for 1909-1910, which appeared on March 11, 1911.

In further effort to bring a knowledge of the reasons for forest work home to the people of the islands, public addresses are made occasionally by the Superintendent of Forestry before various organizations. In December 1911 a paper of this sort was read

at the annual meeting of the Hawaiian Sugar Planters' Association and a talk was given to the pupils of the Normal School on Arbor Day of that year. A paper on Street Tree Planting read before the Kilohana Art League was later published in more extended form in Thrum's Annual for 1913. This paper contains a list of trees suitable for use locally for this purpose, with brief notes in regard to each species.

There are increasing calls for a popular bulletin descriptive of the common introduced trees planted in Honolulu. It is hoped that such a publication can be prepared and issued by the Division of Forestry. It would meet a real demand.

#### BOTANICAL SURVEY.

Until September, 1911, Mr. Joseph F. Rock was a regular member of the staff of the Division of Forestry. He was then transferred to the faculty of the College of Hawaii. Mr. Rock continues, however, as an honorary officer of the Board with the title "Consulting Botanist."

Under a carefully worded agreement, the herbarium of the Board of Agriculture and Forestry, with the cases in which it is housed, has been loaned to the College of Hawaii. The collection was transferred to the College building in Manoa Valley in the summer of 1912. It may there be consulted by those interested.

In the spring, of 1911, Mr. Rock made collecting trips to Hawaii and Maui and that summer again visited the Kau District on Hawaii. On each of these expeditions he collected much new herbarium material which was added to the collection. Pending the completion of the new building of the College of Hawaii, Mr. Rock continued to occupy quarters at the Board's office on King street, until July, 1912.

In September 1911 there was issued as Botanical Bulletin No. 1 of the Division of Forestry, an illustrated 15 page pamphlet entitled "New and Noteworthy Hawaiian Plants." In December 1911 another similar bulletin was issued by the College of Hawaii describing some additional new species, under the title "Notes upon Hawaiian Plants with Descriptions of New Species and Varieties." By means of a fund raised through private subscription, Mr. Rock expects in the near future to publish an illustrated book on the native trees of Hawaii, based upon data collected by him during his active connection with the Board. A brief report by Mr. Rock outlining certain interesting finds made by him on the Island of Hawaii, including one rubber producing tree, a *Euphorbia*, appears elsewhere in this volume as a special contribution.

## FOREST FIRES.

With the exception of a few small brush and grass fires on Oahu and Kauai, all of which were extinguished before serious damage had resulted, the forest fire record for the years 1911-1912 is fortunately small. One of the fires on Oahu occurred in Manoa Valley in April 1911. The others, and there have been a number of them, were in the Ewa District in the vicinity of Leilehua and Wahiawa. The fires on Kauai were in the woods back of Kilauea. Both occurred in June, 1911.

But while fortunate in escaping much damage from forest fire during this period, the Territory is by no means immune from forest fire danger. The liability of fire is always present unless there is a watchful and efficient forest fire service ready and able to take prompt action when ever necessary. And further, back of any system of fire fighting there must be public sentiment.

Thanks to the efforts of the local district fire wardens a much better appreciation of the dangers of forest fires prevails now than formerly but there is still room for improvement. Particularly is it true that new comers to Hawaii should take more than ordinary precautions in the use of fire in or near the forest. Much of the native vegetation, even that growing in the truly wet forests, is extraordinarily inflammable. The common Staghorn fern and the Ie-ie vine are both examples. Both will burn readily even when in full leaf. Then, too, the Staghorn always has a lot of dry leaves and twigs underneath, that add to the flames.

The number of grass and brush fires, especially on Oahu in 1911 and 1912, indicate clearly enough a lack of care in throwing down burning matches and cigarettes. So far, thanks to prompt attention, serious damage has been averted, but one can never tell when the time will come when a fire may get beyond control and spread over half the Koolau range. Besides, each time a grass or brush fire has to be fought, it means just so much expense and loss of time for those who turn out.

Everyone who has to do with the forests of Hawaii in any way should have it on his mind to be careful about fire. All those in charge of others would do well to issue strict instructions in regard thereto. Only through the cooperation of all concerned can we expect to be wholly free from this danger.

In this connection the recommendation is again made, and that most urgently, that a special fund be provided from some source for fighting forest fires on Government land. At present this Department is powerless to take effective steps, except through the voluntary cooperation of corporations or individuals, in combatting fires in the forest reserves that consist of unleased government land. There should be an emergency fund of at

least \$5,000 per annum maintained for this purpose. This is one of the forest matters that decidedly demands attention.

As in earlier years one ranger was employed throughout the period to patrol the Tantalus forest and to oversee the burning of brush, under permit, on Tantalus Heights.

Several changes in the staff of volunteer fire wardens have lately been made by which the efficiency of the service as a skeleton organization is maintained. A revised list of the District Fire Wardens appears elsewhere in this volume.

#### SUMMARY OF RECOMMENDATIONS,

From the statements in the foregoing pages it should be evident that at the present stage of the game in Hawaii the essential need in forestry is for the better protection of the native forests. And this is required not because of the worthiness of the forest in itself to be cared for, but because on the forest depends the continuance of an assured water supply. There are other needs, too, for there is much forest work in Hawaii that requires urgently to be done, to say nothing of tree planting on waste lands that will unquestionably be of profit to those who undertake it. But first and foremost at this time comes the call for better care of the existing forests on the watersheds. The necessary steps to be taken are fencing and the eradication of wild stock in the forest reserves—cattle, goats and pigs—which should be followed by the extension of the forest, through planting, where the cover has been broken from any cause.

To carry out as it should be done, these extensions of forest work will necessarily require larger expenditures than have been made in the past. To meet this demand a portion of the revenues now derived by the Territorial Government from water licenses on streams in the forests should be devoted to forest work. In a word, some of the money derived in these islands from water, a product of the forest, should be reinvested in the forest, to the end that for the future the supply of water may be assured, if indeed it cannot be increased. A revolving fund so established will in the end pay itself back many fold. It is the experience of all countries where forestry is practiced that the reinvestment, up to a certain point, in forest administration of the revenue derived from the forest, leads to an increase in subsequent returns. Hawaii would be no exception to this general law. Provision should be made for getting the adequate protection of the forest started without more delay. This is a matter that should be brought in the most forcible way possible to the attention of the Legislature.

Along with the adequate protection of the native forest, the activities of the Division of Forestry should be carried on in accordance with the general program that has been in force for the past several years. The growing and distributing of seedling trees, free or at cost price, from the Government Nursery at Honolulu and from sub-stations on the other islands; the extension of this work through the establishment of additional sub-nurseries in other districts; the continuation of the policy of furnishing advice and suggestions as to tree planting and other forest work; and the prosecution, for a while longer, of the campaign of education as to the necessity and desirability of forest work, until a larger proportion of the owners of fee simple land that should be under forest cover take effective steps to make it so; these are all lines of activity that should be continued; that could to the advantage of the people of the Territory, very well be expanded.

In addition tree planting by private corporations should be further encouraged, both as to the planting of stands of commercially valuable trees for fuel, posts, etc., on waste areas near plantation camps, and also as to spreading the Algaroba forests along the sea coasts of the several islands.

The forest fire danger in Hawaii is fortunately not great in most districts, but for this very reason all the more care should be taken to keep fire out of the forest altogether. New comers to Hawaii have difficulty in appreciating how inflammable much of the native vegetation is, even in the true wet forests. With the increasing necessity for keeping our water sheds in the best possible condition it is essential that no chances be taken with fire. The recommendations made in earlier reports that an emergency fund be provided for fighting forest fires on government forest land is here repeated with added emphasis. The need is more urgent now than ever before. From some source money must be provided for this purpose.

The practice of forestry in Hawaii is not a panacea for all the difficulties that beset the Territory, but it is one of the essential factors in the maintenance of our present economic prosperity. If the people of Hawaii will but stop to think, the connection between forest protection and assured stream flow is so obvious that it cannot escape even casual attention. Water is something that everyone must have. The only way in Hawaii of being sure of getting it in abundance is to keep the water sheds covered with dense vegetation. While there is yet time, let us then Save the Forests.

Very respectfully,

RALPH S. HOSMER,  
Superintendent of Forestry  
and Chief Fire Warden.

## Report of the Forest Nurseryman.

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Honolulu, Hawaii, December 31, 1912.

R. S. Hosmer, Esq.,  
 Superintendent of Forestry,  
 Honolulu, Hawaii.

Dear Sir:—I herewith submit a report of the work done at the Government Nursery and Makiki Station, etc., for the years 1911 and 1912.

### NURSERY.

#### *Collection and Exchange of Seeds.*

The collection is done principally by two boys who have to be proficient in the climbing of trees. This work can be done more economically and safer with two working together than one. One boy climbs the tree and the other directs where the best seeds are. He also gathers up the seed that is thrown down. We have found that it is necessary to have two together when climbing in case of accidents. We are glad to say that so far we have not had any serious accidents although the boys have had several bad falls.

The most of the seed is collected in and around Honolulu. A great deal of our Eucalyptus, also Koa, is collected on Tantalus. Mr. J. F. Rock, Botanist, collected and handed to us large quantities of indigenous seed of rare plants. This has been distributed to people who were particularly anxious to get seed of the native plants of the Islands. The cleaning and drying of the seed is done at the nursery and this work takes a great deal of time, some of the seed being quite difficult to separate from the pods or seed vessels. Some varieties, however, are easily handled. The seed boys also prepare packages for mailing and for distributing to people who may call at the Nursery.

#### *Exchange of Seed.*

During the period covered by this report we have had letters from a number of Botanic Gardens and Experiment Stations in addition to our regular list asking that they be put upon our seed exchange list. We have also received numerous printed lists giving the names of hundreds of species which would be mailed to us free upon application. We have not taken advantage of these offers of seed for the reason that we are not equipped sufficiently

at present to give them a fair trial. We have supplied seed free to those who have made application for the same, including homesteaders and others all over the islands. Many of the tourists visiting the islands and those passing on steamers from and to the Orient and to the Australian Colonies call at the Nursery and ask for seed. Hardly a day passes without some callers of this sort. Not a little seed is given out in this way, a considerable part of it gratis.

*Seed Received Through Exchange.*

1911.	No.	Pkgs.	
Feb.	28	9	Government Gardens, Koshun, Formosa.
Mar.	24	57	Jewish Agricultural Experiment Station, Haifa, Palestine.
Mar.	27	61	Gerrit P. Wilder, Honolulu.
April	4	4	Arnold Arboretum, Jamaica Plain, Massachusetts.
April	15	1	Marsden Manson, City Engineer, San Francisco.
April	25	2	Gerrit P. Wilder, Honolulu.
April	26	1	Botanical Gardens, Buitenzorg, Java.
May	6	1	Bro. Matthias Newell, Hilo, Hawaii.
May	11	10	U. S. Experiment Station, Honolulu.
May	17	12	Director, Public Gardens, Jamaica.
June	5	2	Gerrit P. Wilder, Honolulu.
June	7	5	Gerrit P. Wilder, Honolulu.
June	21	2	Gerrit P. Wilder, Honolulu.
July	5	11	Gerrit P. Wilder, Honolulu.
July	14	1	Botanic Gardens, Buitenzorg, Java.
July	14	2	Q. Q. Bradford, Formosa.
July	19	27	Gerrit P. Wilder, Honolulu.
July	21	8	Arnold Arboretum, Jamaica Plain, Mass.
July	23	1	Edward M. Ehrhorn, Honolulu.
Sept.	7	7	Botanic Gardens, Dominica.
Sept.	18	1	Mrs. Dora Isenberg, Lihue, Kauai.
Sept.	28	1	Director Public Gardens, Jamaica.
Sept.	30	4	Capt. E. E. Ropes, Die Lanel, Florida.
Oct.	4	10	Edward M. Ehrhorn, Honolulu.
Oct.	19	4	Hon. S. B. Dole, through Gerrit P. Wilder, Honolulu.
Nov.	18	1	Bro. Matthias Newell, Hilo, Hawaii.
Nov.	21	5	Tokyo Plant and Seed Co., Tokyo, Japan.
Dec.	6	1	T. Inomura, Koshun, Formosa, Japan.
Dec.	19	1	Edward M. Ehrhorn, Honolulu (seed from Peru).
Dec.	20	1	Mrs. Gilbert, Honolulu.
Dec.	27	8	Government Botanic Gardens, Koshun, Formosa.
Dec.	27	1	Government Botanic Gardens, Buitenzorg, Java.

1912.	No.	Pkgs.	
Jan.	4	50	Botanic Gardens, Buitenzorg, Java, through Mrs. F. J. Green, Honolulu.
Jan.	15	6	Gerrit P. Wilder, Honolulu.
Jan.	26	5	Arnold Arboretum, Jamaica Plain, Mass.
Jan.	27	26	Assint College, Assint, Egypt.
Mar.	5	8	Jardin Botanique de Saizon, Java.
Mar.	7	9	Government Botanic Gardens, Koshun, Formosa.
Mar.	15	16	Dr. H. L. Lyon, H. S. P. A., Honolulu.
Mar.	24	5	Dr. H. L. Lyon, H. S. P. A., Honolulu.
June	14	15	Bureau of Forestry, Manila.
July	7	5	H. S. P. A., Honolulu.
Aug.	6	1	Gerrit P. Wilder, Honolulu.
Aug.	6	1	Mrs. Foster, Honolulu.
Aug.	8	1	H. S. P. A., Honolulu.
Oct.	10	2	L. Lewton-Brain, Director of Agriculture, Federated Malay States.
Oct.	12	1	Dr. H. L. Lyon, H. S. P. A., Honolulu.
Oct.	19	2	Dr. H. L. Lyon, H. S. P. A., Honolulu.
Oct.	28	4	W. E. Shaw, Cuba.

## PLANT DISTRIBUTION.

DISTRIBUTION OF PLANTS FROM GOVERNMENT NURSERY AND  
MAKIKI STATION.

1911		In seed boxes	In boxes trans- planted	Pot grown	Totals
Sold:	Regular Distribution .....	35,900	9,823	10,184	55,907
Gratis:	Arbor Day .....		500	11,008	11,508
	“ Homesteaders and others. 95,350		6,823	2,300	104,473
	“ Military Posts .....		2,000	4,000	6,000
	“ Public and Private Schools and churches .....		2,200	500	2,700
	“ Molokai Settlement and				
	“ Cable Station Midway.. 64,000		1,000	541	65,541
	“ Improvement Clubs and Street Planting .....		1,267	1,000	2,267
		<u>195,250</u>	<u>23,613</u>	<u>29,533</u>	<u>248,396</u>
Special Plantation Orders .....	338,000		11,000	.....	349,000
Grand Total .....	533,250		34,613	29,533	597,396

1912		In seed boxes	In boxes transplanted	Pot grown	Totals
Sold:	Regular Distribution .....	10,600	4,570	17,474	32,644
Gratis:	Arbor Day .....		500	13,145	13,645
"	Homesteaders and others. 29,000		5,000	3,600	37,600
"	Military Posts .....		5,500	3,640	9,140
"	Public and Private Schools and Churches .....		2,492	2,760	5,252
"	Molokai Settlement and Cable Station, Midway.. 9,250		2,400	6,000	17,650
"	Improvement Clubs and Street Planting .....		2,000	3,143	5,143
		48,750	22,462	49,762	120,974
Special Plantation Orders .....	624,000		35,400	7,330	666,730
Grand Total .....	672,750		57,862	57,092	787,704

It will be seen by the foregoing tables that the distribution of trees to the general public and also to plantation companies and other corporations has been larger this year than any previous year in the history of the Nursery. In general we are led to believe that a great deal better use is being made of the trees that are distributed from the Nursery than in previous years. The examples which have come under the writer's personal observation are the homesteaders, the military posts and the house-lot planting. In most instances the trees have been well planted and cared for.

Special mention ought to be made in regard to the planting that has been done at Fort Ruger through the efforts of Major and Mrs. Timberlake. From a heap of dry rocks destitute of any vegetation save a few scrub bushes of lantana, Fort Ruger is fast becoming one of the beauty spots of Honolulu. Those in charge certainly deserve great credit for their work.

The homesteaders are beginning to realize the value of trees on their homesteads and many inquiries are continually coming in regarding the best trees to plant for firewood, windbreaks and other purposes.

The demand for ornamental trees for gardens, and for street and road planting has been large. For such purposes pot-grown seedlings should be used, which insures a good root system and also reduces to a minimum the danger of losing any trees in the transplanting. Terra Cotta pots are generally used for this purpose, although lately we have been experimenting with the damaged tin cans thrown away by the people at the Pineapple Cannery and find that the cans make excellent pots for trees.

A machine was designed and made at the Nursery for cutting out the ends of the cans and we find that this machine is a great saving in labor as compared with the small hand cutter.

The shipping of plants in crate form has been found to work well. An upright frame for placing the boxes in while the laths are being nailed on the corners is another labor-saving device which we planned and built at the Nursery. One man with the frame can do the work of two without it.

*Propagating Trees for Plantation Companies and Other Corporations.*

The propagating of trees in large quantities for plantation companies and other corporations was started about two years ago. Previous to that time we managed to supply the trees wanted, with the regular men employed by the Board. Owing to the great increase in orders coming from companies and corporations we found it impossible to keep up the work and continue the regular distribution, which was also increasing, without the help of more men. The matter was brought to the attention of the then President and Executive Officer of the Board, Mr. Marston Campbell, who after consulting with the members of the Board, decided to continue the growing of trees in large quantities for plantation companies and other corporations with the understanding that the companies and corporations shall pay the cost of labor and material in supplying the required seedlings. The above plan has worked well and there is no doubt but that it has been the means of adding many thousands of trees to the barren districts of the Islands.

The majority of the trees so ordered are shipped in the seed boxes, ready to transplant into other boxes or pots. The boxes are nailed together with laths in crate form with three or four together. A number of orders of from 1000 to 12,000 have been received for trees in transplant boxes ready to set out. These are crated in the same manner as the seedlings.

REALIZATIONS.

During the years 1911 and 1912 there has been collected and deposited with the Treasurer of the Territory as a government realization the sum of \$1126.90. In addition to this there is also the sum of \$2955 on special deposit for the use of the Board.

The amount is itemized as follows:

1911	Sale of plants Government Nursery, Honolulu .....	\$ 405.60
	Sale of Seed, Government Nursery, Honolulu .....	9.15
	Sale of plants, Homestead Nursery, Kauai, by W. D. McBryde .....	150.00
	Sale of Wood from Tantalus .....	48.00

*Division of Animal Industry.*

Sale of one yellow mare .....	125.00
Payment for use of Quarantine Station .....	35.50
	\$ 773.25

Payment by the Hawaiian Development Co. for timber cut in Puna Hawaii, Under logging license. Deposited with the Treasurer as a special fund for the use of the Board .....

\$2955.00

1912	Sale of plants, Government Nursery and Makiki .....	\$ 189.40
	Sale of tree labels .....	1.00
	Sale of Wood from Tantalus .....	105.00

*Division of Animal Industry.*

Use of Quarantine Station .....	35.25
Sale of Manure .....	23.00
	\$ 353.65

OTHER WORK.

*Nursery Grounds.*

One regular man with the aid of two prisoners has been labor enough to keep the grounds in fairly good condition and also at times to assist in other work. We are again indebted to Sheriff Henry for the use of the two prisoners and hope that this help will be continued. Many people take advantage of the open park portion of the grounds for rest and recreation.

The sidewalk running along the King Street side of the grounds is sadly in need of a new curb. Stone curbing is laid on both Keeaumoku and Young streets and there was at one time a wooden curbing on the King Street side but it has practically all rotted away.

*Advice and Assistance.*

The work under this heading includes the giving of advice in regard to the propagating, planting, pruning and care of trees. Numerous calls are made at the Nursery for advice on those subjects. Requests to visit places in and around the city for the purpose of giving advice and assistance average from two to five visits a week.

*Congressional Vegetable Seed and Year Books.*

During the month of December, 1911, we received from Washington, D. C., through Hon. J. K. Kalaniana'ole, Delegate to Congress, 10,000 packages of Congressional Vegetable seed and 300 packages of flower seed. The consignment received in December, 1912, contained about the same number of packages. The demand for vegetable and flower seed is increasing and the supply for 1912 was all distributed several months before we received the supply in December, 1912, intended for 1913. This seed is sent out to public and private schools, homesteaders and others all over the islands.

Copies of the Year Book of the U. S. Department of Agriculture, also sent by the Delegate, are distributed annually to a carefully made up list of persons throughout the Islands. Seven hundred and fifty books is the quota received.

*Experimental Garden, Makiki.*

Since our last biennial report we have found it necessary to enlarge the quarters. The old iron roofing taken from the office building at the Nursery on King Street was used for this purpose. An additional shed for storing pots, box shooks, etc., has been added to the buildings. A building 60 feet long by 24 feet wide has taken the place of the old potting shed and tool house. In this building the bins for holding soil, sand, manure, tin cans and pots of different sizes for potting of plants are conveniently arranged. The soil sterilizer is also under the same roof, with sufficient space for mixing and preparing soil. The additions and improvements to buildings have proved to be of great benefit in many ways. It would have been almost impossible to fill a number of the large orders from the plantation companies without this additional room. The work was all done by our regular men. The men at the Nursery assisted as much as possible. All of the soil and sand used at the Garden as well as at the Nursery for propagating trees is mixed and sterilized here. With the addition of a propagating house similar to the two at the Nursery we would have the best of facilities here for propagating plants in large quantities.

*Basket Willow.*

For the past two years the Garden has been used principally for propagating plants, some of which deserve special mention.

The Willow cuttings brought from Portugal about three years ago by Dr. L. R. Gaspar and handed to us by the Honorable A.

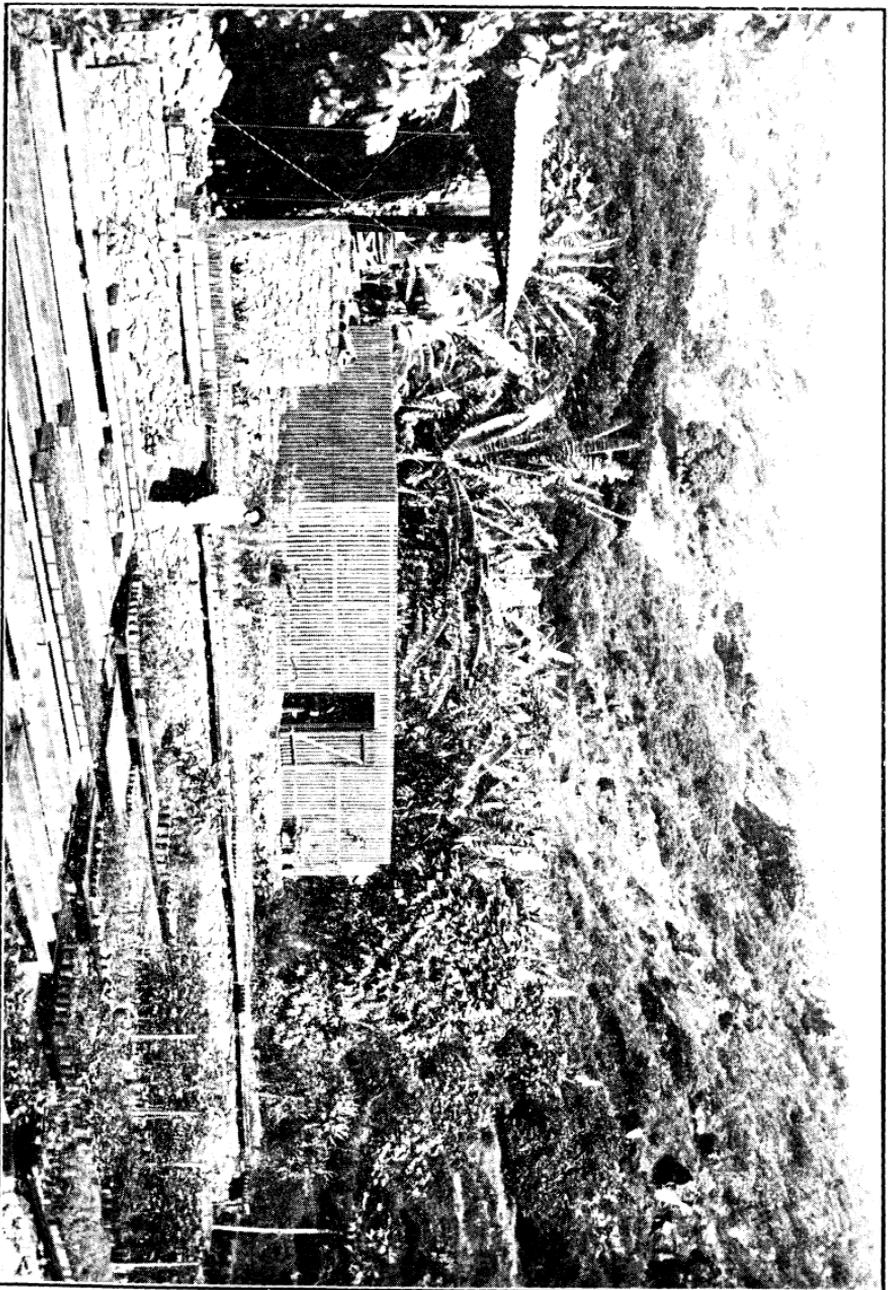


Plate 15. Experiment Garden in Makiki Valley.  
Benches to the right hold new plant introductions.



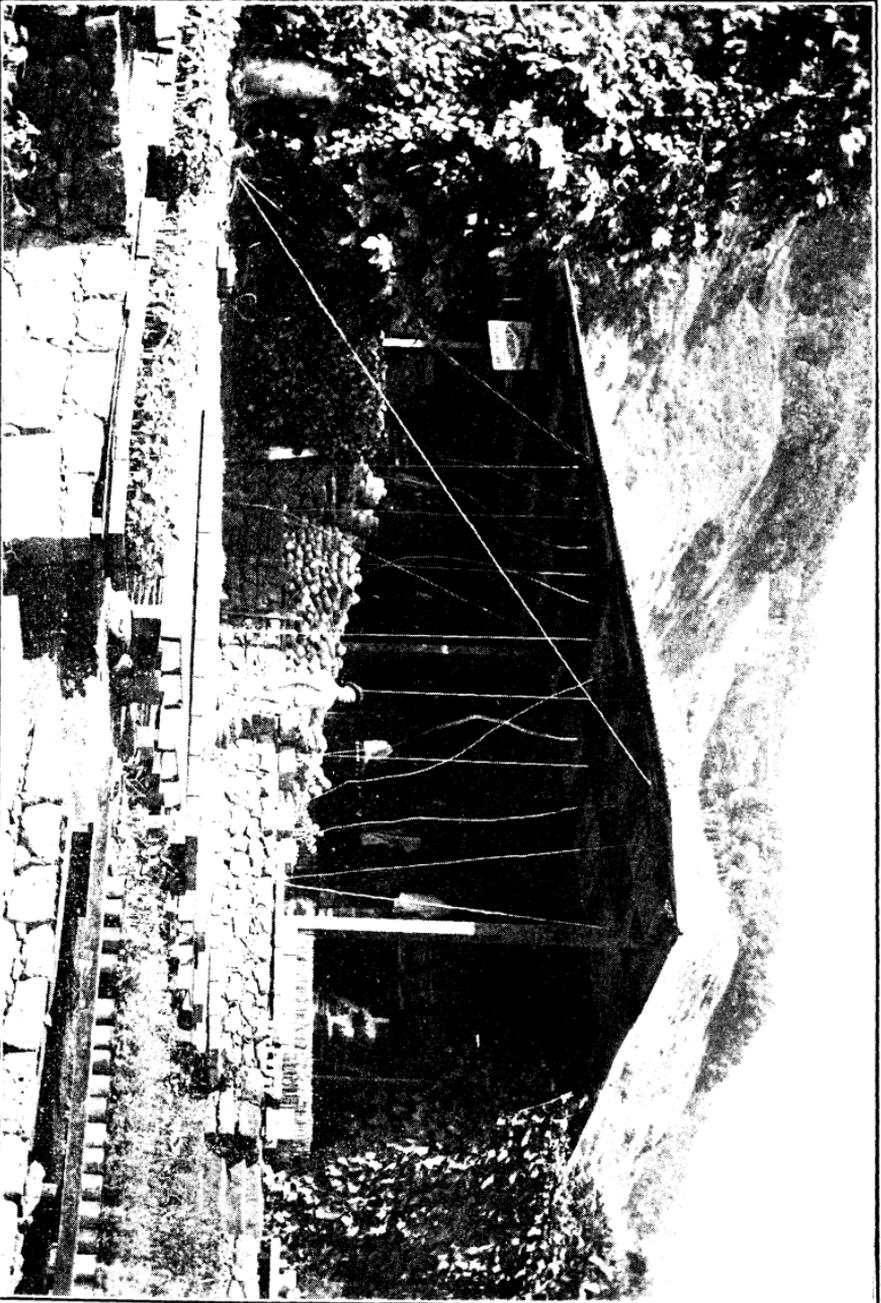
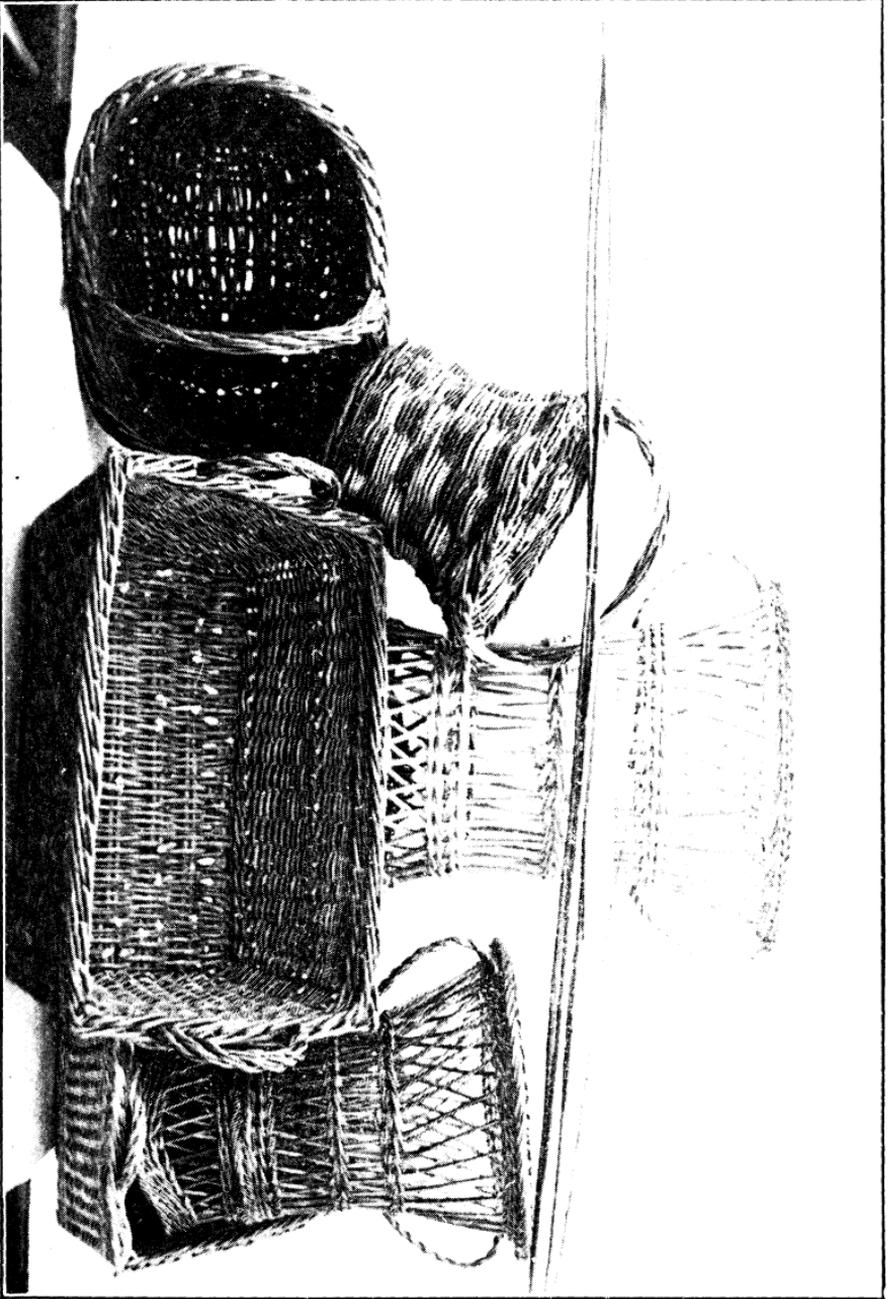


Plate 16. Potting Shed, Soil Sterilizer and Seedling Benches. Makiki Station.



Plate IV. Willow Baskets Made from Plants Grown at the Makiki Experiment Garden.





de Souza Canavarro, Consul General for Portugal, have done exceedingly well. Half a dozen baskets of different shapes and sizes were made from the cuttings taken off during the month of February, 1912. These baskets can be seen at the Government Nursery. There were also a quantity of cuttings taken off for distribution.

We will have about 2000 plants ready for distribution by the end of March, 1913. In sections where there is plenty of moisture and especially along the edges of streams the growing of the basket willow for basket making should prove to be paying industry.

The Giant Bamboo, imported by Mr. Gerrit P. Wilder, is doing very well and without doubt will prove to be a valuable introduction.

Another tree introduced by Mr. Wilder which so far is doing very well is a species of Juniper. The trees are growing well and looking very healthy. A quantity of other trees introduced by Mr. Wilder are doing well, some of which have already been distributed to people on different parts of the Islands.

#### *Tantalus Forest.*

With the exception of a number of trees that have died in the lower part of the forest during 1912, the condition in general is good. The trees that died were cut down and removed as soon as possible, the total cordage being 125. In the upper part of the forest the trees are healthy and growing well. Owing to the thick crop of honohono and air plant that is fast covering the floor of the forest, the danger of fires starting is reduced to a minimum.

The Ranger, David Kapihi, has kept the two trails running through the forest clear, also the one running down to the bottom of Makiki Gulch, which starts opposite the old quarters and nursery. He has also kept watch and patrolled the forest in search of stray animals and people who at times trespass in the forest and cut honohono and sometimes trees.

Respectfully submitted,

DAVID HAUGHS,  
Forest Nurseryman.

## List of District Fire Wardens.

Following is a list of the District Fire Wardens, with their respective Districts:

### CHIEF FIRE WARDEN.

RALPH S. HOSMER.

Superintendent of Forestry, *ex officio*.

### DEPUTY FIRE WARDEN AT LARGE.

DAVID HAUGHS.

In and for the Territory of Hawaii.

### DISTRICT FIRE WARDENS.

#### KAUAI.

A. MENEFOGLIO.

In and for Wainiha Valley, District of Halelea.

W. F. SANBORN.

In and for the District of Halelea, excepting Wainiha Valley.

J. R. MYERS.

GEORGE HUDDY,

#### Assistant District Fire Warden.

In and for the District of Koolau, excepting the land of Anahola.

.....

In and for the portion of the Districts of Koolau and Puna, extending from the land of Anahola to the land of Olohena, inclusive.

F. WEBER.

In and for the portion of the District of Puna, south of and including the land of Wailua.

REV. J. M. LYDGATE.

In and for that portion of the district of Kona, formerly known as the District of Koloa.

FRANCIS GAY.

In and for that portion of the District of Kona, lying between and including the Waimea, Poomau and Kauaikanana Valleys on the west and the Hanapepe Valley on the east.

AUGUSTUS F. KNUDSEN.

In and for the District of Na Pali and that portion of the District of Kona, formerly known as the District of Waimea, lying to the west of the Waimea, Poomau and Kauaikanana Valleys.

OAHU.

ANDREW ADAMS.

In and for the District of Koolauloa.

FRANK PAHIA.

In and for that portion of the District of Koolaupoko, extending from the Koolauloa District line to the land of Heeia.

.....

In and for that portion of the District of Koolaupoko, extending from and including the land of Heeia to the land of Kailua.

JOHN HERD.

In and for that portion of the District of Koolaupoko, extending from and including the land of Kailua to Makapuu Point.

CHARLES H. BAILEY.

In and for that portion of the District of Kona, extending from Makapuu Point to Palolo Valley.

JOSEPH K. KAPONO.

In and for Palolo Valley District of Kona.

C. MONTAGUE COOKE.

In and for Manoa Valley, District of Kona.

W. M. GIFFARD.

In and for that portion of the District of Kona, lying between Pauoa and Manoa Valleys.

G. H. MOORE.

In and for Pauoa and Nuuanu Valleys, District of Kona.

WALTER F. DILLINGHAM.

In and for that portion of the District of Ewa lying to the West of the main government road.

JAMES GIBB.

In and for that portion of the District of Ewa, lying between the lands of Moanalua and Waiawa.

.....

In and for that portion of the District of Ewa, lying to the East of the main government road between the northern boundary of the land of Manana and the Kaukonahua gulch.

W. M. TEMPLETON.

In and for that portion of the District of Waialua, lying between the Kaukonahua and Helemanu gulches.

.....

In and for that portion of the District of Waialua, lying to the north of the Helemanu gulch.

F. MEYER.

In and for that portion of the District of Waianae lying to the West of the Waianae Mountains.

**MOLOKAI.**

JAMES MUNRO.

In and for that portion of the Island of Molokai lying to the West of Wailau Valley and the land of Mapulehu.

C. C. CONRADT.

In and for that portion of the Island of Molokai including and lying to the East of Wailau Valley and the land of Mapulehu.

**LANAI.**

GEORGE C. MUNRO.

In and for the Island of Lanai.

**MAUI.**

L. WEINZHEIMER.

In and for the District of Lahaina.

DAVID T. FLEMING.

In and for the District of Kaanapali.

H. B. PENHALLOW.

In and for the District of Wailuku.

H. A. BALDWIN.

In and for the district of Hamakuapoko and the west half of the District of Hamakualoa.

W. F. POGUE.

In and for the District of Koolau and the east half of the District of Hamakualoa.

JOHN CHALMERS.

In and for the District of Hana.

.....

In and for the District of Kipahulu.

ALIKA DOWSETT.

In and for the Districts of Honouliuli and Kahikinui.

L. VON TEMPSKY.

In and for the Districts of Kula and Kaupo.

**HAWAII.**

G. C. WATT.

In and for that portion of the north half of the District of Kohala, extending from the land of Kaauhuhu to the Hamakua District line.

## SAM P. WOODS.

In and for that portion of North Kohala, extending from the northern boundary of the land of Kawaihae I to and including the land of Kaauhuhu.

## SAM M. SPENCER.

In and for the District of South Kohala.

## AUGUST AHRENS.

In and for the western part of the District of Hamakua, extending to the boundary of the land of Paauhau.

## ALEXANDER SMITH.

In and for that portion of the District of Hamakua, extending from the western boundary of the land of Paauhau to the boundary of the land of Kukaiau.

## ALBERT HORNER.

In and for that portion of the District of Hamakua, extending from and including the land of Kukaiau to the Hilo District line.

## JOHN M. ROSS.

In and for that portion of the District of Hilo, extending from the Hamakua District to the land of Makahanaloa.

## JOHN T. MOIR.

In and for that portion of the District of Hilo, extending from and including the land of the Makahanaloa to the land of Kikala.

## JOHN A. SCOTT.

In and for that portion of the District of Hilo, extending from the Puna District line to and including the land of Kikala.

## JOHN WATT.

In and for the District of Puna.

## WILLIAM G. OGG.

In and for that portion of the District of Kau, extending from the Puna district line to and including the land of Punaluu.

## CARL WOLTERS.

In and for that portion of the District of Kau, extending from the land of Punaluu to the Kona District line.

## R. VON S. DOMKOWICZ.

In and for that portion of the District of Kona, extending from the Kau District line to and including the land of Kaapuna.

T. C. WHITE, *Acting*.

In and for that portion of the District of Kona, extending from the land of Kaapuna to and including the land of Hookena.

## JOHN D. PARIS.

In and for that portion of the District of Kona, extending from the land of Hookena to and including the land of Kaawaloa.

**T. C. WHITE.**

In and for that portion of the District of Kona, extending from the land of Kaawaloa to and including the land of Kahaluu.

**JOHN A. MAGUIRE.**

In and for that portion of the District of Kona, extending from the land of Kahaluu to the Kohala District line.

**Forest Ranger.****DAVID KAPIHE.**

In and for that section of the District of Kona, Island of Oahu, bounded on the east by Manoa Valley, on the north by the Konahuinui Mountain Range, on the west by Nuuanu and Pauoa Valleys, and on the south by the makai edge of the Eucalyptus forest, the Makiki Park and the mauka boundary of the Judd land in Makiki and Manoa.

**DISTRICT FORESTERS.**

The names of the following gentlemen are borne on the rolls of the Board of Agriculture and Forestry as District Foresters. Those marked with a star (\*) have been appointed Special Territorial Police Officers to enforce the terms of the Wild Bird Law, Act 104 of the Session Laws of 1907:

**Kauai.**

\*Albert S. Wilcox, J. R. Myers, \*F. Weber, Edward Broadbent, Rev. J. M. Lydgate, \*Walter D. McBryde, \*Francis Gay, \*Augustus F. Knudsen.

**Oahu.**

\*Andrew Adams, \*L. L. McCandless, \*John Herd, \*Paul R. Isenberg, \*Walter F. Dillingham, W. W. Goodale.

**Molokai.**

\*James Munro, \*C. C. Conratt.

**Lanai.**

Geo. C. Munro.

**Maui.**

.L. Weinzheimer, H. B. Penhallow, \*H. A. Baldwin, \*W. F. Pogue, \*L. von Tempsky, Dr. J. H. Raymond, D. T. Fleming.

**Hawaii.**

\*G. C. Watt, \*A. W. Carter, \*A. Ahrens, \*John M. Ross, \*John A. Scott, \*John Watt, \*Julian Monsarrat, \*Geo. C. Hewitt, R. Von S. Domkowicz, W. R. Castle, \*John D. Paris, \*John A. Maguire.

## Report of the Consulting Botanist.

---

Honolulu, T. H., December 31, 1912.

The Board of Commissioners of  
Agriculture and Forestry,  
Honolulu, Hawaii.

GENTLEMEN:—I beg to present a brief report of the work accomplished during the period from January 1, 1911 to September 1, 1911, after which my connection with the Forestry Division as an active staff-member was severed.

Up to April, 1911, the writer was engaged in identifying plants collected on previous exploring trips, but especial mention must be made of the work in monographing one of our largest and most interesting plant families, namely Campanulaceae, with especial reference to the tribe Lobelioideae. In order to make a thorough and exhaustive study of this tribe which seemed to be in an eclipse, type material was found to be necessary in order to bring this huge task to a successful completion. Letters were written to the Directorates of the Berlin, Paris and Vienna Museums as well as to Harvard (Gray Herbarium) asking for the loan of such type and other material of the tribe Lobelioideae as was in their possession.

All these requests were kindly complied with and the material promptly forwarded. These very valuable collections were of inestimable assistance in determining our plants and enlarging upon their original descriptions and making certain the determination of new species.

All the type material was photographed and is expected to be published together with the numerous plates of new species in a forthcoming monograph by the writer. At about the same time the writer commenced writing the manuscript from the copious notes compiled in the field for his forthcoming book on the Indigenous Trees of the Hawaiian Islands.

### EXPLORATION ON THE WINDWARD SIDE OF HALEAKALA FROM KAHUA, MAUI, TO HANA, MAUI.

During the month of April the writer made a field trip to the Volcano of Kilauea on Hawaii to explore the neighboring districts and slopes of Mauna Loa as far as possible at that time. His attention was called to a certain kipuka, or oasis as it may be termed, by Mr. L. A. Thurston, who had discovered this most interesting parcel of land containing 56 acres with more than 40 species of trees some of which were new and unique.

This kipuka is situated at an elevation of 4000 feet, about three miles from the Volcano House. Nowhere in the Territory, with the exception of few places on Hawaii and Maui, did the writer find such an interesting tree flora as covers these 56 acres, where virgin soil abounds, black, and rich and without a sign of rocks or lava.

The fact that Puaulu remained so long undiscovered may be attributed to the vast aa lava fields which surround this kipuka and hide it completely from view, and more so on account of the huge Koa forest which has taken possession of the ancient lava flows which encircle this virgin parcel of land.

Rich collections were made and several new species discovered; among them a new genus of trees, which the writer called *Hibiscadelphus*, and described with some others in a botanical bulletin issued by your Board, September, 1911.

After spending a few weeks on Hawaii the writer joined a party consisting of Messrs. Hosmer and Curran at Mr. von Temp-sky's, Makawao, Maui, and proceeded across the forest from Olinda to Mr. Pogue's at Kailua, Maui, with the view of looking into the dead forest there.

Taking advantage of the occasion offered, the writer stayed several weeks longer exploring the whole country from Kailua to Hana, especially the valleys of Waikamoi, Puohaokamoa, Hononuanu, Keanae, and the forests back of Nahiku. At Hononuanu, at an elevation of 3000 feet, the writer discovered a new species of palm which is now being described with others by Dr. O. Beccari of Florence, Italy; a translation of whose work on these palms will appear in the writer's tree book. In collecting, special attention was paid to the tribe Lobelioideae, numerous members of which were then in flower.

After a sojourn of several weeks, the writer returned to Honolulu; shortly before his departure from Maui, however, he secured one of the largest Silverswords from Haleakala crater, weighing 96 pounds, for the Promotion Committee, where it is on exhibition, together with some photographs taken by the author and representing scenes from Maui.

After an illness of over six weeks the writer again visited Kilauea, Hawaii, in company with Mr. W. M. Giffard. This time more for recuperating than collecting. However, botanical material was secured, especially of such plants of which complete material had not been collected previously, this having been the summer season when everything was either in flower or fruit.

In September a bulletin was issued by the Board describing new species of trees discovered by the writer, with an original diagnosis of the interesting *Alectryon macrococcus* Radlk. by Dr. Radlkofer of Munich, Bavaria, with additional description of the male flowers, by the writer, which up to that time were unknown.



Plate 18. The Koko or Akoko.  
A Hawaiian Rubber-producing Tree.



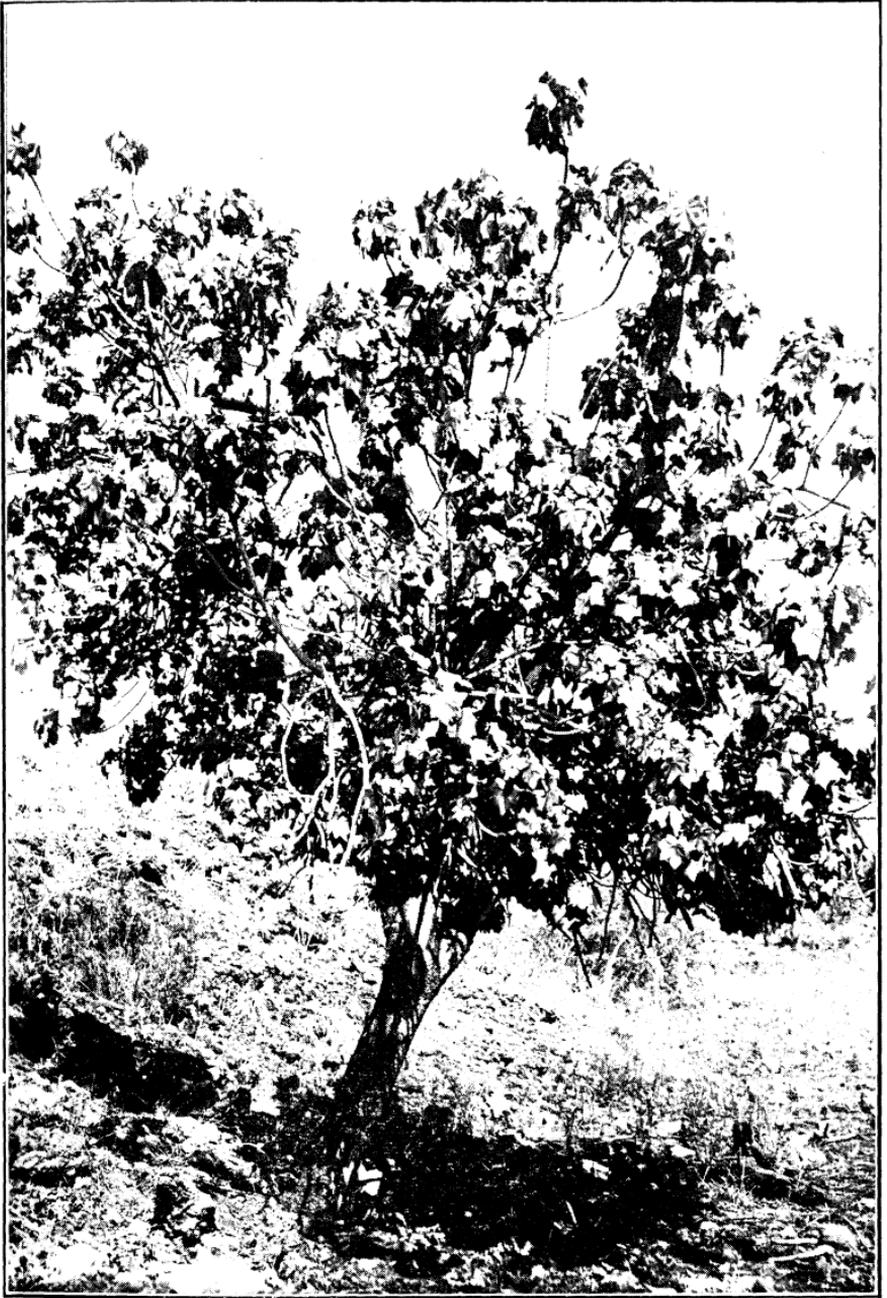


Plate 19. *Kokia Rockii* Lewt. *Kokia*.  
One of the healthy cotton trees.



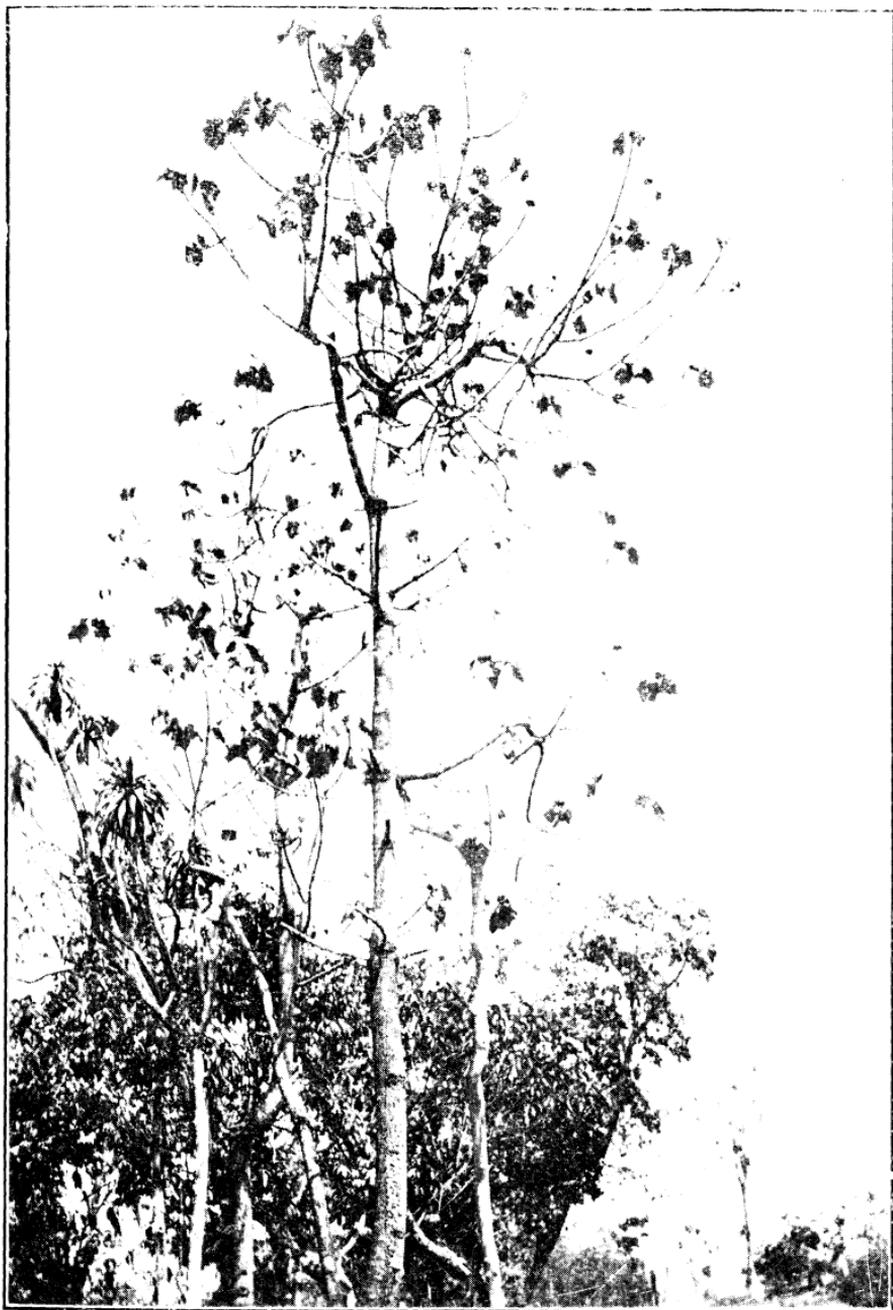


Plate 20. *Kekia Rockii* Lewt.  
The majority of the trees are in a dying condition.



## TRANSFER OF THE HERBARIUM TO THE COLLEGE OF HAWAII

Owing to lack of funds, the Board found it advisable to discontinue the botanical work of the Department of Forestry carried on by the writer, though, in order that the valuable material collected during a period of over three years should not be left undetermined and in such shape as would be practically useless to future workers, it was deemed best to transfer the whole herbarium to the College of Hawaii where the writer could continue his researches and bring the whole work to a satisfactory conclusion.

Under the new auspices the writer has made several field trips and enriched the herbarium by several thousand sheets. The grasses were worked up by Dr. Hackel of Austria, the rushes by the Rev. George Kuenthal of Coburg, the lichenes by Dr. A. Zahlbruckner of Vienna and the palms by Dr. O. Beccari of Florence. The writer takes this opportunity to express the thanks of the Forestry Division as well as his own to the above gentlemen, who are all authorities in their respective fields, for their valuable service.

## PLANT PROTECTION.

Mr. Fairchild, Agricultural Explorer in charge of the Bureau of Plant Industry, Department of Agriculture, Washington, D. C., whose attention had been called to the writer's discovery of a species of *Gossypium* from Mt. Hualalai, Hawaii, through the writer's last report, entered into correspondence with the latter in regard to collecting of seeds of this rare Hawaiian plant, which he thinks to be of economic importance. He also advised to have these few remaining trees protected from cattle in order to assure their perpetuation for, at least, a few years more to come.

The Territorial Government was in a way powerless to act as the trees are found on private estates, except in one place where they are growing on Government land, at present under lease to Mr. Robert Hind.

Fortunately arrangement could be made with the Bishop Estate and Mr. Robert Hind in regard to the fencing of these rare and valuable trees. Nearly all of them are now fenced and protected from cattle which are very fond of the succulent branchlets and large leaves. The Board of Forestry also contributed \$100 toward defraying expenses of fencing. Herbarium samples of these interesting trees were forwarded together with specimens from a related species from Molokai to Mr. Fred Lewton, Curator of Textiles, who described the plants under a new genus "*Kokia*" after its native name *Kokio*.

The type of the genus is *Kokia Rockii* Lewton. His paper, which forms No. 5 of Vol. 60 of Smithsonian Miscellaneous collections, is entitled *Kokia: A New Genus of Hawaiian Trees*, and was issued October 22, 1912; it is illustrated by 5 plates, two of which were furnished by the writer. At the request of Mr. Fairchild, the writer caused seeds of *Kokia Rockii* to be gathered which were forwarded to the Bureau of Plant Industry, Washington, D. C.

#### DISCOVERY OF A NATIVE HAWAIIAN RUBBER PRODUCING TREE.

While on an official exploration trip at Puuwaawaa, North Kona, Hawaii, one of the richest botanical sections in the Territory, the writer found a species of *Euphorbia* (*E. lorifolia*) which produced a tremendous flow of latex when bruised or cut. It is a tree of an average height of 20 feet and a trunk of about 10 inches in diameter. It is very abundant and scattered over an area of more than 5000 acres. In certain localities the plants are so thick that it is impossible to ride through them. The ground is covered densely with the young seedlings and thousands upon thousands of plants cover that area. The writer tapped several trees and sent the secured latex to the Chemist of the Hawaii Agricultural Experiment Station at Honolulu.

Mr. Wm. McGeorge and Mr. W. A. Anderson published a paper or press bulletin\* on the result of their investigation, to which the writer would refer any one particularly interested in this discovery. Samples of the crude dry material, rubber, resin, etc., were taken by Mr. Anderson to the Rubber Exposition in New York; one firm offered 70c per pound for the crude material. The writer has been told by Mr. R. Hind, on whose leased land the trees are found, that he is now shipping one ton of the crude material to a firm in the East, which is, I believe, for experimental purposes.

#### COLLECTING OF SEED FOR EXCHANGE PURPOSES.

While on an exploring trip in Kau and South Kona, Hawaii, during the months of December, 1911, January and February, 1912, the writer collected several hundred pounds of seeds of Hawaiian trees, the most noteworthy of which were the following:

---

\* Hawaii Agricultural Experiment Station, Press Bulletin No. 37, "Euphorbia lorifolia, a Possible Source of Rubber and Chicle," by Wm. McGeorge and W. A. Anderson.

*Olopuā*, *Osmanthus sandwicensis*.  
*Alaa*, *Sideroxylon auahiense*.  
*Hame*, *Antidesma pulvinatum*.  
*Halapepe*, *Dracaena aurea*.  
*Hoawa*, *Pittosporum Hosmeri* var.  
*Lama*, *Maba sandwicensis*.

At Kapua, South Kona, the writer also collected additional wood specimens of 12 native trees, which were not in the collection made previously for the Seattle Fair.

Respectfully submitted,.

J. F. ROCK,  
Consulting Botanist.



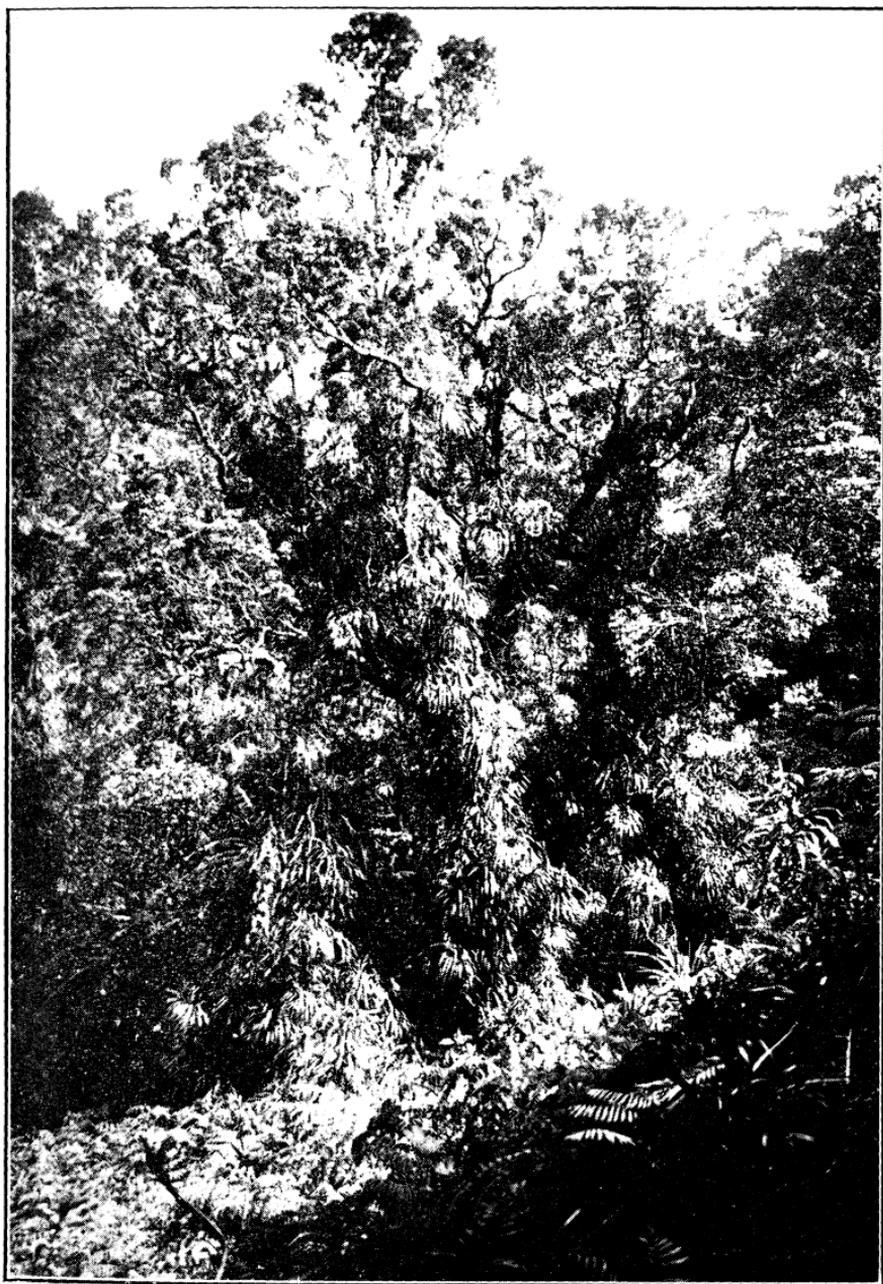


Plate 2. Ie-ie Vine on Ohia Lehua Tree.



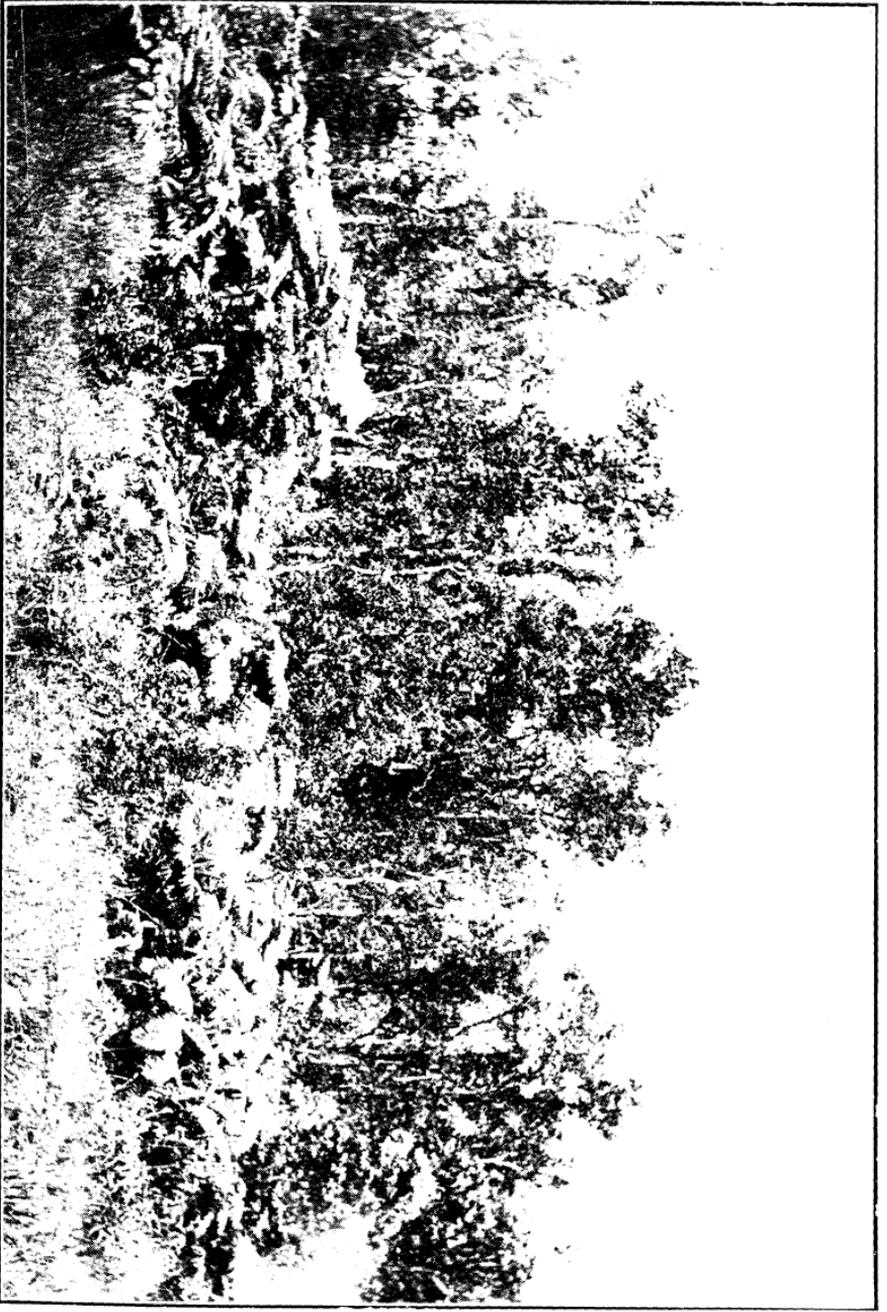


Plate 3. The Upper Transition Zone. A Typical View.





Plate 4. Where the Forest Gives Place to Grazing Land. A Forest Fence.





Plate 5. Fern Undergrowth in the Hawaiian Forest.

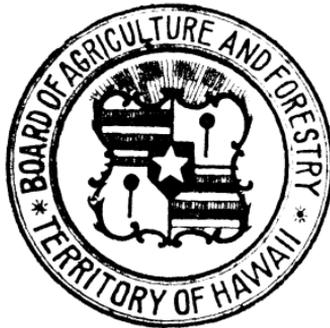


TERRITORY OF HAWAII  
**BOARD OF AGRICULTURE AND FORESTRY**

**DIVISION OF FORESTRY**  
RALPH S. HOSMER, Superintendent

**R E P O R T**  
OF THE  
**DIVISION OF FORESTRY**  
FOR THE  
**BIENNIAL PERIOD ENDING DECEMBER 31st, 1914**

*Reprint From the Report of the Board of Commissioners  
of Agriculture and Forestry*



HONOLULU, T.H.  
THE NEW FREEDOM PRESS  
1915.



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# Division of Forestry

## Report of the Superintendent of Forestry

Honolulu, Hawaii, August 31, 1914.

The Board of Commissioners of  
Agriculture and Forestry,  
Honolulu, Hawaii.

Gentlemen:—I have the honor to submit as follows the report of the Division of Forestry for the period from January 1, 1913, to August 31, 1914. This report is made at this time and to this earlier date instead of as usual to the end of the calendar year because of my resignation as Superintendent of Forestry, which takes effect on September 1, when I leave the Territory to become head of the Department of Forestry at Cornell University.

### SCOPE OF THIS REPORT.

After the custom of past years this report recounts briefly the activities of the Division of Forestry for the current period. Accompanying it is a revised table giving the essential statistics regarding the established forest reserves. Together with this biennial statement it has seemed to me appropriate, as this is my last report as Superintendent of Forestry, to summarize what I conceive to have been the main accomplishments in forestry work in Hawaii during the past decade, the period since the establishment of the Division of Forestry, and to make certain recommendations as to the principles which I believe should guide forest work in Hawaii in the future. The statement concerning the years 1913 and 1914 precedes the general summary.

### RESUME OF THE WORK PERFORMED.

The work of the Division of Forestry during this year and last has followed closely the lines laid down in earlier periods. Protection of the native Hawaiian forests on the important watersheds and encouragement of tree planting to meet divers demands under various conditions, have remained the two dominant ideas that have guided its activities. Further repetition of the reasons for practicing forestry in Hawaii seems unnecessary, but the need itself is a continuing one and will always remain so. The economic life of the Territory rests on the tripod of the three essen-

tial natural resources of the islands—water, forests and lands. To make the most complete use of the land there must be water, and to insure a permanent and adequate supply of water there must be forests. No one of the three can be spared from the foundation. And, scarcely less important, the forests cannot properly be protected and cared for without men trained in the principles and practice of forestry. Forests and forest work form an integral part of the local economic structure, which in turn supports our whole social organization. Forestry is therefore one of the fundamental needs of Hawaii.

#### STAFF.

No changes have been made in the salaried staff of the Division of Forestry in the past twenty months. As in former years the active work of the Division has been divided between the Superintendent of Forestry (Ralph S. Hosmer), who as well as having general charge of all its activities, has devoted particular attention to forest reserve matters, including fence construction, and the Forest Nurseryman (David Haughs), under whose immediate direction comes the propagation and distribution of seedling trees and other plant material and the answering of questions, verbal and by letter, of persons desiring advice and suggestions on various forest problems.

A few changes, mainly additions, have been made in the list of District Fire Wardens. A revised list of these volunteer officials accompanies this report.

The appropriation for the Division of Forestry for the present fiscal period consists of one-half of a special fund created by Act 57 of the Session Laws of 1913 from the revenues derived from water leases and licenses of streams on Government forest lands. On other pages of this report are statements showing how the money has been expended.

The Forest Nurseryman acts as Receiving Officer for the Board of Agriculture and Forestry. In his report will be found a statement of the realizations for 1913 and 1914.

#### FOREST RESERVES.

##### *New Reserves.*

During 1913 and 1914 ten new forest reserves have been added to the Forest Reserve system. The list is as follows:

NEW FOREST RESERVES.

Name	District	Island	Total Area	Area Gov't. Land.	Area Private Land.	Date 1913
Nanakuli	Waianae	Oahu	1,016	1,016		June 4
Makua-Keauu	"	"	4,716	4,376	340	" 4
Kuaokala	Waialua	"	434	434		" 4
Kohala Mountain	N. and S. Kohala	Hawaii	29,627	14,204	15,423	" 4
Upper Waiakea	Hilo	"	51,800	51,800		Oct. 13
Upper Olaa	Puna	"	9,280	9,280		" 13
Honolulu Watershed	Honolulu	Oahu	6,950	5,000	1,950	" 13
Total for the year 1913			103,817	86,104	17,713	
Kuliouou	Honolulu	Oahu	214	214		1914
Kipahulu	Kipahulu and Kaupo	Maui	10,600	4,600	6,000	Feb. 13
Olaa Forest Park	Puna	Hawaii	531	531		Aug. 20
Total for the year 1914			11,345	5,345	6,000	" 20

On October 13, 1913, the boundary of the Moloaa Forest Reserve on Kauai was modified by the elimination of 83 acres and the addition of 34 acres, a net decrease of 49 acres. This action was taken on the basis of a revised survey to straighten the boundary line and exclude from the reserve a section of open land found not to be essential for water protection that was needed for grazing.

On August 31, 1914, there are 37 forest reserves in Hawaii with a total area of 748,214 acres, of which 546,222 acres (68 per cent.) is land belonging to the Territory. On following pages are tables giving the essential statistics of all the forest reserves to date.

Of new reserves the three set apart in June, 1913, are located on the leeward slopes of the Waianae Mountains on Oahu. The object in each case was to protect the scanty sources of water supply at the heads of the high valleys where even an intermittent supply of water has high value.

The Kohala Mountain Forest Reserve embraces the summit and southern slopes of Kohala Mountain. Protection of the watershed is its purpose in that from this mountain comes the water for the Kohala and the Hamakua Ditch systems as well as for the Waimea Plains. This reserve had long been pending. It was indeed one of the first suggested when the forest reserve policy was adopted.

Upper Waiakea and Upper Olaa together embrace a large tract of dense forested country in the region between Hilo and the Volcano. Although without running water it was felt that this section should be under the control of the Board of Agriculture and Forestry, particularly as in time the question may arise of exploiting the timber trees on the tract. These Government lands were accordingly set apart so that they might be handled by this Department.

The Honolulu Watershed Forest Reserve and its neighbor, the Kuliouou Forest Reserve, are both on the slopes of the Koolau Ridge back of the City of Honolulu. The name of the former is sufficiently indicative of its purpose; the latter was created for the protection of the stream in Kuliouou Valley.

The Kipahulu Forest Reserve on Maui, set apart in August, 1914, is likewise designed for watershed protection. It was practically the last large unreserved forest area in Hawaii needed to conserve a catchment basin. With its creation the forest reserve system throughout the Territory as regards watershed protection on Government lands may be regarded practically as technically complete, save for one land on Oahu, Mokuleia on the Waianae Hills.

On August 20, 1914, there were also set apart as the "Olaa

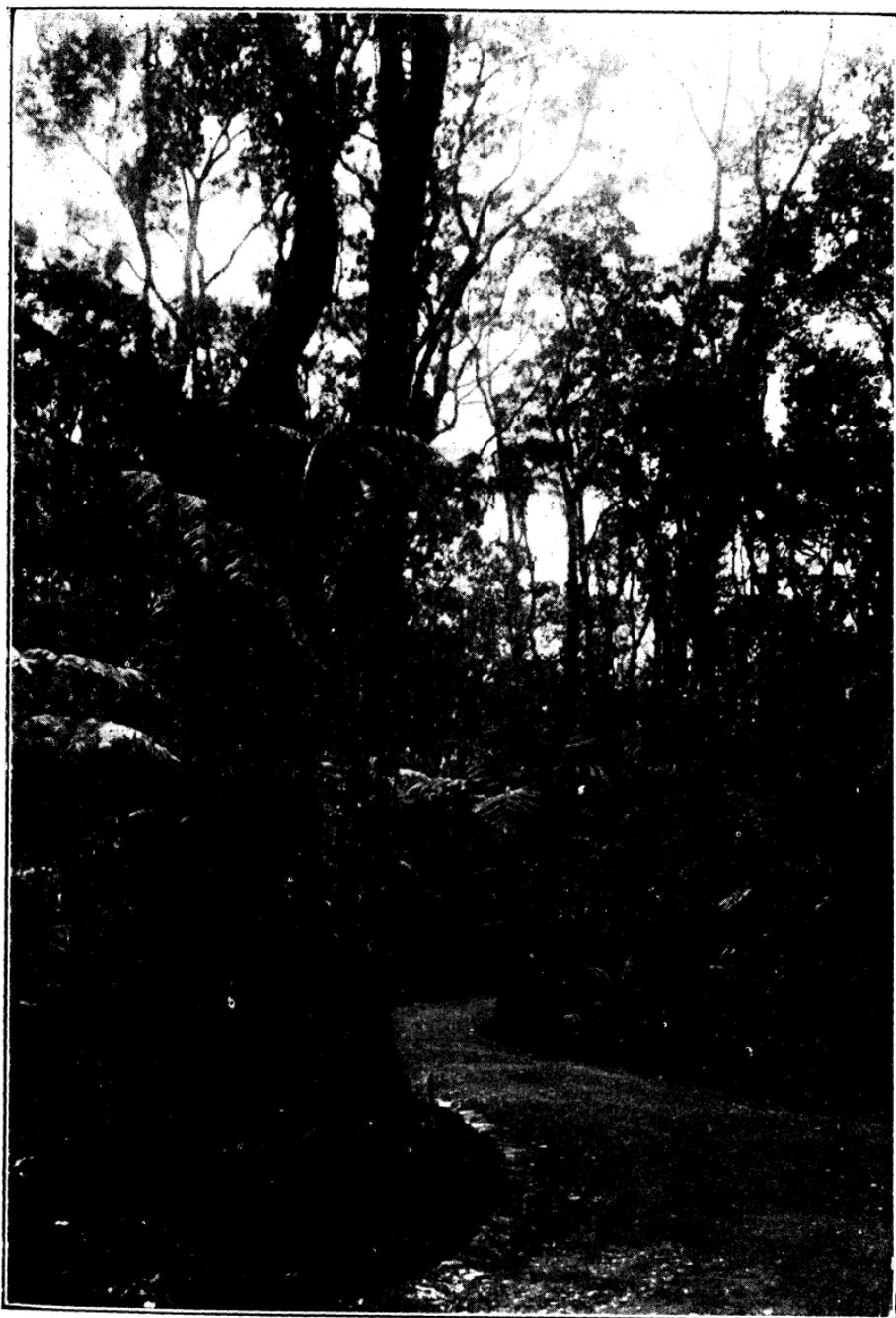


Plate 2. An Ohia Forest on Hawaii.



Forest Park Reserve," three areas of government land along the Volcano Road in the Puna District, Hawaii. The purpose here is to preserve in its primitive condition the most easily accessible remaining block of native Hawaiian forest in the Territory. Section A consists of a block of 374 acres of forest at 24 miles, a little above Glenwood. Section B is the small Koa grove at 29 miles, 7 1-3 acres. Section "C" comprises the so-called "forest strips" along the Volcano Road from 18 to 24 miles, area 150 acres. Both because of its scientific interest and because the forest along the Volcano Road is one of the scenic features of Hawaii, and hence a tourist attraction, it is deemed good business formally to set this land apart. It really constitutes a forest park rather than a forest reserve in the usual sense, but for purposes of administration and that the area may come under the Board of Agriculture and Forestry, this land was set apart as Forest Reserve No. 37.

FOREST RESERVES, TERRITORY OF HAWAII. Arranged in Chronological Order.

No.	Name	District	Island	Total Area Recom- mended to be Reserved.	Area Gov- ernment Land.	Area Private Land.	Date of Proclamation	Proclamation Signed by
				Acres.	Acres.	Acres.		
1	Kaipapau	.....	Oahu	913	913	.....	Nov. 10, 1904	G. R. Carter
2	Hamakua Pali	.....	Hawaii	18,940	16,333	2,607	Dec. 23, 1904	"
Total for the year ending December 31, 1904				19,853	17,246	2,607		
3	Hilo	.....	Hawaii	110,000	60,223	49,777	July 24, 1905	A. L. C. Atkinson
4	Koolau, Maui	.....	Maui	42,969	30,230	12,739	Aug. 24, 1905	"
5	Halelea	.....	Kauai	37,500	10,990	26,510	"	"
Total for the year ending December 31, 1905				190,469	101,443	89,026		
6	Kealia	.....	Kauai	9,935	7,385	2,550	Mar. 9, 1906	"
7	Ewa	.....	Oahu	28,550	5,151	23,399	"	"
8	Honuaula	.....	Hawaii	665	665	.....	Apr. 4, 1906	"
9	Kau	.....	Hawaii	566,966	59,811	6,255	Aug. 2, 1906	G. R. Carter
10	Waianae-kai	.....	Oahu	3,653	3,346	107	Sept. 7, 1906	"
11	Luualalei	.....	"	3,743	3,743	.....	Nov. 30, 1906	"
12	Hana	.....	Maui	14,825	13,767	1,058	"	"
Total for the year ending December 31, 1906				127,437	94,068	33,369		
13	Na Pali-Kona	.....	Kauai	60,540	40,650	19,890	June 12, 1907	A. L. C. Atkinson
Total for the year ending December 31, 1907				60,540	40,650	19,890		

14	West Maui	Lahaina, Kaanapali and Wailuku	\$44,482	19,147	25,335	Apr. 21, 1908	W. F. Frear
15	Makawao	.....Maui	1,830	1,830	.....	" "	"
16	Waiaha Spring	.....Maui .....Hawaii	193	193	.....	" "	"
	Total for the year ending	December 31, 1908	46,505	21,170	25,335		
17	Mauna Kea	.....Hamakua	66,600	66,600	.....	June 5, 1909	"
18	Waihou Spring	.....Hamakua	84	74	10	" "	"
19	Lihue-Koloa	.....Puna and Kona	29,260	13,365	15,895	" "	"
20	Molokai	.....Koolau	5,621	3,578	2,043	" "	"
	Total for the year ending	December 31, 1909	101,565	83,617	17,948		
21	Pupukea	.....Koolauloa	865	865	.....	May 10, 1910	E. A. Mott-Smith
22	Hauola	.....Hamakua	7	7	.....	June 13, 1910	W. F. Frear
23	Kahoolawe	.....County of Maui	28,260	28,260	.....	Aug. 25, 1910	"
	Total for the year ending	December 31, 1910	29,132	29,132	.....		
24	South Kona	.....Kona and Kau	36,952	29,260	7,692	May 17, 1911	"
25	Puna	.....Puna	19,850	19,850	.....	June 29, 1911	"
	Total for the year ending	December 31, 1911	56,802	49,110	7,692		
26	Molokai	.....Kona and Kau	44,674	13,268	31,406	Sept. 11, 1912	"
27	Kula	.....Kula	6,075	5,069	1,006	" "	"
	Total for the year ending	December 31, 1912	50,749	18,337	32,412		
28	Nanakuli	.....Waianae	1,010	1,010	.....	June 4, 1913	"
29	Makua-Keau	.....Waianae	4,716	4,376	340	" "	"
30	Kuokala	.....Waialua	434	434	.....	" "	"
31	Kohala Mt.	.....N. and S. Kohala	29,627	14,204	15,423	" "	"

FOREST RESERVES, TERRITORY OF HAWAII. Arranged in Chronological Order.

No.	Name	District	Island	Total Area		Area Gov- ernment Land,	Area Private Land,	Date of Proclamation	Proclamation Signed by
				Recon- me ded to be Reserved,	Acres,				
32	Upper Waiakea.Puna		Hawaii	51,800	51,800				
33	Upper Olaa		Hawaii	9,280	9,280				
34	Honolulu								
	Watershed ..Honolulu		Oahu	6,950	5,000		1,950	Oct. 13, 1913	E. A. Mott-Smith
	Total for the year ending December 31, 1913			103,817	86,104		17,713	" "	" "
35	Kulionou		Oahu	214	214			Feb. 13, 1914	L. E. Pinkham
36	Kipahulu		Maui	10,600	4,600		6,000	Aug. 20, 1914	" "
37	Olaa For. Park.Puna		Hawaii	531	531			" "	" "
	Total for the year ending December 31, 1904			11,345	5,345		6,000	" "	" "
	Grand Total, December 31, 1914			798,214	546,222		251,992		
					68 p.c.		32 p.c.		

‡ Boundary modified and area enlarged from 3,257 to 3,653 acres by proclamation of Gov. Frear, September 11, 1912

§ " " " " 44,440 to 44,482 " " " " February 4, 1911.

\* " " " " 1,796 to 1,830 " " " " June 5, 1909.

† " " " " 65,850 to 66,066 " " " " February 4, 1911.

‡ " " " " reduced " " " " Act.-Gov. Mott-Smith, Oct. 13, 1913.

¶ By land exchange 420 acres transferred from private to government ownership.

FOREST RESERVES, TERRITORY OF HA WAIL. Arranged by Islands and Counties.

COUNTY OF KAUI.

5	Halelea .....	Kauai	37,500	10,990	25,510	Aug. 24, 1914	A. L. C. Atkinson
6	Kealia .....	Puna	9,935	7,385	2,550	Mar. 9, 1906	"
13	Na Pali-Kona ..	Na Pali and Kona	60,540	40,650	19,890	June 12, 1907	"
19	Lihue-Koloa ..	Puna and Kona	29,260	13,365	15,895	June 5, 1909	W. F. Frear
20	Molooa .....	Koolau	5,621	3,578	2,043	"	"

Total for Kauai ..... 142,856 75,968 66,888  
 CITY AND COUNTY OF HONOLULU (OAHU).

1	Kaipapau .....	Koolauloa	913	913	.....	Nov. 10, 1904	G. R. Carter
7	Ewa .....	Ewa, Waianae and Waialua	28,550	5,151	23,399	Mar. 9, 1906	A. L. C. Atkinson
10	Waianae-kai ..	Waianae	3,653	3,546	107	Sept. 7, 1906	G. R. Carter
11	Lualualei .....	Waianae	3,743	3,743	.....	Nov. 30, 1906	"
21	Pupukea .....	Koolauloa	865	865	.....	May 10, 1910	W. F. Frear
28	Nanakuli .....	Waianae	1,010	1,010	.....	June 4, 1913	"
29	Makua-Keauu ..	"	4,716	4,376	340	"	"
30	Kuaokala .....	Waialua	434	434	.....	Oct. 13, 1913	E. A. Mott-Smith
34	Hon. Watershed	Honolulu	6,950	5,000	1,950	Feb. 13, 1914	L. E. Pinkham
35	Kulionou .....	Honolulu	214	214	.....	"	"

Total for Oahu ..... 51,048 25,252 25,796

COUNTY OF MAUI.

4	Koolau, Maui ..	Koolau and Hamakualoa	42,969	30,230	12,739	Aug. 24, 1905	A. L. C. Atkinson
12	Hana .....	Hana	14,825	13,767	1,058	Nov. 30, 1906	G. R. Carter
14	West Maui .....	Lahaina, Kaanapali and Wailuku	\$44,482	19,147	25,335	Apr. 21, 1908	W. F. Frear
15	Makawao .....	Hamakuaopoko	* 1,830	1,830	.....	"	"
18	Waihou Spring	Hamakuaopoko	84	74	10	June 5, 1909	"
23	Kahoolawe .....	County of Maui	28,260	28,260	.....	Aug. 25, 1910	"
26	Molokai .....	County of Maui	44,674	13,268	31,406	Sept. 11, 1912	"
27	Kula .....	Kula	6,075	5,069	1,006	"	"
36	Kipahulu .....	Kipahulu and Kaupo	10,600	4,600	6,000	Aug. 20, 1914	L. E. Pinkham

Total for Maui ..... 193,799 116,245 77,554



## FENCING FOREST RESERVE BOUNDARIES.

But technical delimitation on a map and the formal phraseology of a proclamation do not alone constitute true reservation of a forest, nor do they protect it from the inroads of stock and other trespass. They are necessary preliminary steps which have to be taken, but they must be followed up, if the desired results are to be attained, by fences, forest rangers, and suitable administrative control of the reserves.

Getting the forest reserves throughout the Territory technically established has been a principal part of the forest reserve work in the past decade. The job for succeeding years is to make the reserves do their full duty in the best way.

The years 1913 and 1914 have, however, seen a marked advance in the better care of the Hawaiian forests. The action of the Legislature of 1913 in setting apart the water revenues from streams on government lands as a special fund to be used for forest and hydrographic work made a red letter day in the history of forestry in Hawaii. It was one result of the long campaign that has been carried on by the Board of Agriculture and Forestry to secure better protection of the native forests.

Under the terms of the new law (Act 57 of 1913), one-half of the revenues derived from the lease of water rights is devoted to forest work. The annual income from water rights is a little over \$66,000. The share of forestry for 1913 and 14 was therefore \$33,000 per annum, an increase of about \$22,000 per annum over the amount which the Division of Forestry had had in recent years. Continuing the staff of the Division of Forestry unchanged and making the same provision as in the past for its routine work, the bulk of the water money was allotted in July, 1913, for the construction of forest fences on the boundaries of certain forest reserves across government land or on party lines where the government was one owner, in places where there were no natural barriers, or where there yet remained gaps in existing lines of fence.

During the 20 months covered by this report fencing projects have been undertaken and in most cases have already been completed, in the following districts:

Name of Project.	District	Island
Moloaa	Hanalei	Kauai
Wailua	Lihue	Kauai
Lualualei (two)	Waianae	Oahu
Waihou Spring	Makawao	Maui
Nahiku	Hana	Maui
Kawaihae	N. Kohala	Hawaii
Waiaha Spring	N. Kona	Hawaii
Ninole	Kau	Hawaii

Other fencing projects were contemplated, and had been provisionally arranged for, when in the spring months of 1914 came the call from the Territorial Administration to retrench in every possible manner. This has led to the postponement of several important fencing projects and the elimination of several more that were regarded as highly desirable. The projects already under way will all be completed by the end of this calendar year.

#### FENCING UNDER LEASE REQUIREMENTS.

In addition to the fences built with the water revenues, considerable other forest fencing was done during 1913-14 by ranch and plantation companies under the requirements of government leases covering agriculture or grazing land adjoining forest reserves. In particular attention may be called to fences built in this way in the Districts of Hanalei on Kauai, Kula and Wailuku on Maui (two in each case), and North Kohala on Hawaii.

Two of the fencing projects on Maui coming under this head are of particular interest. The fence on the boundary of the Kula Forest Reserve, from Waiakoa to Keokea, built by the Cornwell Ranch, and the repair and rebuilding of the fence around the Polipoli Spring section of the same reserve, by Dr. J. H. Raymond. With the completion of a short stretch of stone wall on the Kahikinui slope, now being built by Dr. Raymond, and the contemplated removal from Haleakala of a band of semi-wild cattle, now at large at the south end of the mountain, these fences, provided they are properly looked after, will satisfactorily protect the area included in the Kula Forest reserve. In that one of the chief reasons for setting apart this area was to provide for its ultimate afforestation with temperate zone trees, this step is an important one. Practically all of the Government land included in the Kula Forest Reserve is too poor in character to be of value for grazing, but it can be made to grow such trees as pines, firs and cedars. It is the intention of the Board of Agriculture and Forestry to start such planting as soon as there are any funds available for the purpose. Consequently the completion of these fences now is particularly timely. Mention should be

made of the fact that the Cornwell Ranch carried the forest reserve fence across its fee simple land of Kaonoula, thus throwing the mauka portion of that land into the reserve.

On Kohala Mountain, Hawaii, under the requirements of leases obtained from the Government in July, 1913, the Parker Ranch has repaired and put in shape the forest fences on the entire south face of that mountain on the boundary of the forest reserve. In this case, too, several blocks of fee simple land have been fenced off and included in the reserve.

An inspection of other forest fences on Hawaii, in the Hamakua and Hilo Districts, was made by me during the early autumn of 1913. It showed the forest reserve fences around Mauna Kea and, with one exception, those on the mauka side of the Hilo Forest Reserve, to be in good condition. On the mountain the fences are maintained under lease requirements by the Parker Ranch, the Kukaiau Ranch and the Humuula Sheep Station. Across the several private lands in the Hilo District, from Honohina to and across the government tract of Piihonua, Mr. W. H. Shipman was then just completing the relocation and rebuilding of the Puu Oo Ranch forest fence, approximately on the mauka boundary of the Hilo Forest Reserve. This fence is a substantial one, put up in a thoroughly satisfactory way.

On the boundary between Humuula and the Hilo forest the fencing is of recent date, and in good condition. On the government land of Piha there has been trespass and a generally unsatisfactory state of things, but arrangements are now well advanced that will soon put an end to that condition. Steps are also now being taken by the Government to prevent trespass by cattle along the lower edge of the Hilo Forest Reserve, above Hakalau, a matter which has been under consideration by the Division of Forestry for some time.

On the Kona side of Hawaii the Trustees of the Bishop Estate have within the past year had several miles of forest fence built and repaired on the boundaries of their private forest reserve above Kealakekua.

In Kau the forest fence along the mauka side and at the East and West ends of the Kau Forest Reserve have recently been, or are at this date, in process of being reconstructed. The upkeep of these fences is required under government leases held respectively by the Hawaiian Agricultural Company and the Hutchinson Sugar Plantation Company. By mutual agreement between these companies and the Kahuku Ranch, portions of the mauka line are to be fenced by the latter. This work is now in progress. The sections built by the two plantations have already been completed. Both were inspected by me during a special trip made to Kau for that purpose in July, 1914.

The Hutchinson Plantation fence consists of four strands of No. 4 German galvanized wire, with substantial posts set 10 feet apart. It runs from the northwest corner of the reserve eastward along the mauka boundary of the forest for approximately 7 1-2 miles. It is a thoroughly good piece of fence work and should give good service.

The Hawaiian Agricultural Company's fence follows the line of the forest fence first erected by that company in 1896. The old fence was entirely rebuilt both as to posts and wire in 1913. It now consists of five strands of No. 7 wire, English make, with posts of Ohia or Split Koa set 8 feet apart. This fence encloses the entire east end of the Reserve. The length is approximately 15 miles. It was built under the personal supervision of Mr. Julian Monsarrat, who for 18 years now has had charge of the mountain fences of the Hawaiian Agricultural Company. Properly maintained, as the past record of the company gives assurance that it will be, this fence will be an efficient barrier for many years. Special mention is made of these fences here because the proper fencing of the Kau Forest Reserve is a matter that has received not a little attention from the Board. Because of them, and the other fences enclosing it, the Kau Forest Reserve is now among the best protected of any of the forest reserves in the Islands.

#### FOREST EXTENSION.

The encouragement of tree planting has always been a very important part of the work of the Division of Forestry. It is carried on by the division in three ways: First, by the actual planting of government land with stands of forest trees: second, by the maintaining of nurseries for the propagation and distribution of tree seedlings; and third, by the giving of advice on the best methods of growing and caring for trees planted for profit, for shade or for pleasure.

During the past two years, under the water revenues fund, the Division of Forestry has itself carried on several planting projects. Perhaps the most important of these is the reforestation of a portion of the Honolulu Watershed on Oahu. Here, on the slopes of Sugar Loaf, at the head of one of the branches of Makiki Valley, a stand of Hawaiian Koa (*Acacia Koa*) has been set out, extended lower down on the sides of the gulch by another native tree, Kukui (*Aleurites moluccana*). As a part of the city water supply for Honolulu comes from springs in the branches of Makiki Valley the planting of these slopes has economic significance. Incidentally the reclothing of the grass-covered hills above the city will add much to the attractiveness of the view toward the mountains.

Beginning in July, 1913, with the preparations for planting, some 23 acres have now been set out. The Koa trees are spaced 15 x 15 feet, with the intention of securing a complete cover on the slopes. It is expected that this planting will be continued over all the open ridges between Sugar Loaf and the Tantalus forest.

Another planting project carried forward by the Division of Forestry has been the continuation of the tree planting undertaken by the Alexander & Baldwin interests on Government land along the Koolau Ditch system on windward Maui. Begun in 1911 under a planting plan drawn up by the Division of Forestry, the purpose of this planting is to assist in restoring the dense cover of vegetation on portions of this important watershed which had been opened up through the dying off of the forest during the years 1906 to 1908. The work of the past year has been primarily in caring for the seedlings previously planted until they became established, and in extending somewhat the areas set in trees. In part this planting is experimental. Various species of Eucalyptus are being tried out, while attention has also been paid to increasing the spread of Koa and of the native Bamboo.

Further, in the way of experimental tree planting, the Division of Forestry has made progress during the past two years. Under its auspices such planting is now in progress in five localities: two on Maui, two on Oahu and one on Kauai. Those on Maui are at Kailili, above Makawao, and on the Government remnant called Polipoli, above Wailuku in the West Maui Forest Reserve. At Kailili, through an arrangement with the Maui Agricultural Co., a number of species of Eucalypts are being planted in definite plots on a section of open land in the Makawao Forest Reserve, in return for the privilege granted that Company of removing dead wood from the land.

Among the trees being tried at Kailili are the following species of Eucalypts: *E. gomphocephala*, *E. goniocalyx*, *E. hemiphloia*, *E. longifolia*, *E. leucoxydon*, *E. macrorhyncha*, *E. maculata*, *E. marginata*, *E. paniculata*, *E. polyanthemos*, *E. punctata*, *E. saligna*, *E. siderophloia*, *E. sideroxydon*, and *E. tereticornis*.

Other trees in the plantation are: *Pinus massoniana*, *P. canariensis*, *P. radiata*, and *P. tuberculata*.

On the windward of the block is a belt of *Eucalyptus robusta*.

Each species is in a plot by itself, plainly marked by a stake with a metal tag bearing the tree name and the date of planting. The object is to try out valuable species at present imperfectly known in Hawaii. Those that are found to do well at Kailili can later be recommended for other localities where the conditions are similar as to elevation, rainfall and wind exposure.

This project has been carried on for the Division of Forestry

by Mr. W. Hannestad, forester for the Maui Agricultural Co., in connection with the extensive tree planting that he has been doing on the privately owned lands of that company lying just to windward of the Government tract. This private forest at Kailili constitutes the largest area of artificially established forest in the Territory. Eucalypts of several different species have been the trees used, and since in almost all the stands the trees are close spaced, the result is true forest planting. The Kailili forest should be of great value in years to come to the Maui Agricultural Company, not only for fuel but as well and more particularly for posts, railroad ties and other timber.

The experimental planting above Wailuku has been carried on for the Division of Forestry by the Wailuku Sugar Company in connection with other planting which that company has been doing on the foothills back of the plantation. Plots of the following species of Eucalypts have been planted: *E. corynocalya*, *E. diversicolor*, *E. saligna*, and *E. tereticornis*.

The purpose here is the same as at Kailili, to try out trees new to Hawaii, under a variety of conditions. The project has had the personal supervision of Mr. H. B. Penhallow, manager of the Wailuku Sugar Co., who has taken the greatest interest in getting trees started on all the waste, upper lands of the plantation from Waihee to Maalaea Bay.

On Oahu the experimental plantation of Eucalypts in Nuuanu Valley, started in 1911 with funds supplied by the U. S. Forest Service, may now be regarded as established. During the past two years all the blanks in the original planting have been filled and the little trees kept free from grass until they grew large enough to take care of themselves. There have been no serious setbacks in this plantation through the trees dying or from other reasons. From it valuable data should be secured in later years as the trees develop.

The other locality on Oahu where experimental tree planting has been done is Makiki Valley, where in the vicinity of and in connection with the experimental garden maintained by the Division of Forestry, many species of trees new to Hawaii have been started and planted out.

On Kauai, above the sub-nursery maintained by the Division of Forestry at Homestead, in the Papapaholahola Spring Reserve, blocks of a number of forest trees have been planted and are thriving. Especially to be noted here are the stands of Sugi or Japanese Cedar (*Cryptomeria Japonica*), a tree that when planted in the right localities is bound to be of great value in the Islands. The local nursery at Homestead, as well as the experimental planting, is being looked out for by Mr. Walter D.

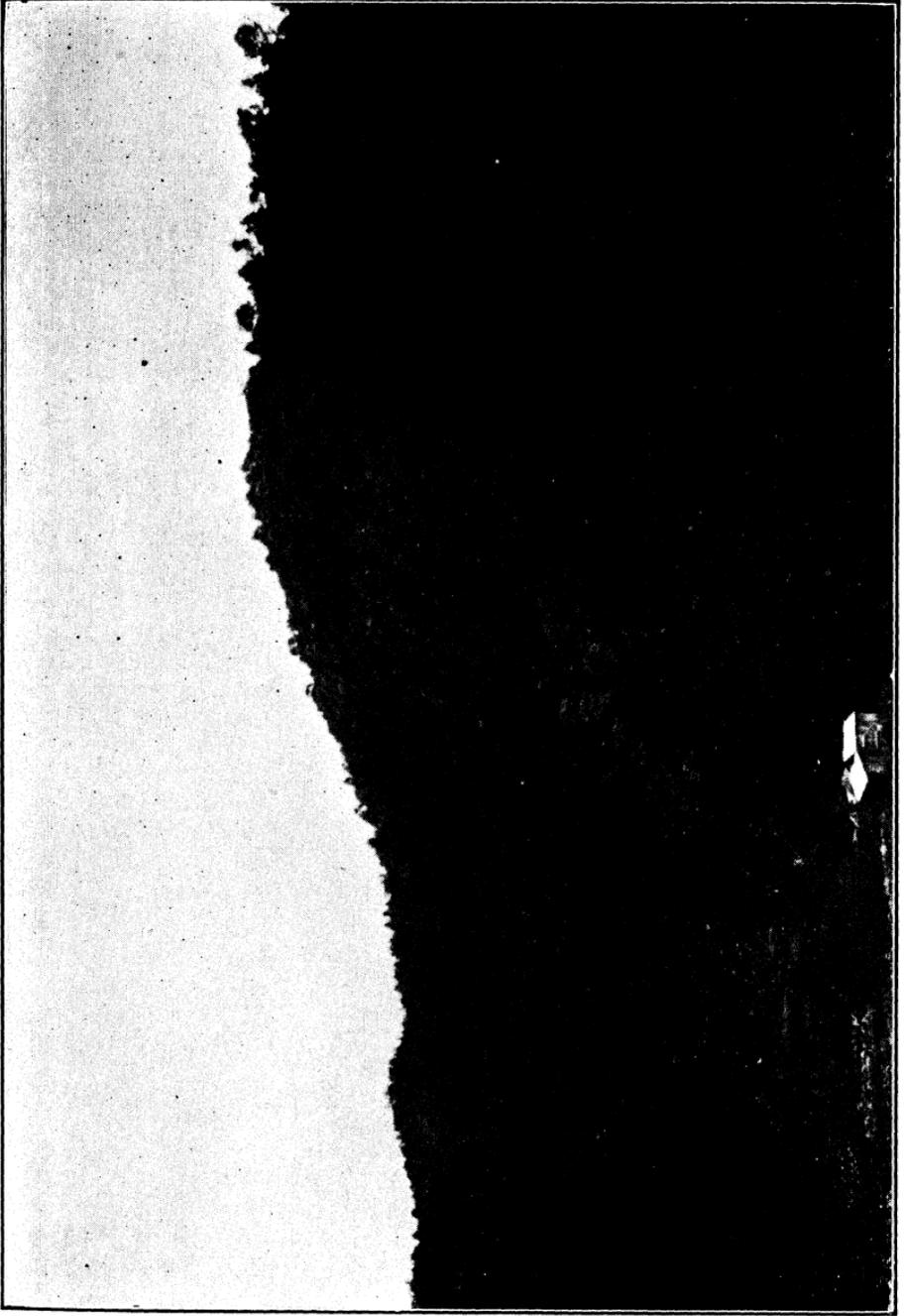


Plate 3. Planted Forest on Tantalus near Honolulu



McBryde, who for many years has been a most enthusiastic tree planter.

*Federal Assistance in Tree Planting.*

With the close of the fiscal year, June 30, 1914, came the discontinuation of the allotments that had been made for six years by the U. S. Forest Service for experimental tree planting in Hawaii. Having before gradually diminished the amount, the service was obliged this year entirely to discontinue this project because of pressing demands in other directions requiring all its appropriations, particularly for combatting forest fires. But the attitude of the Forest Service in regard to this project is shown by the following paragraph from a letter from Mr. Henry S. Graves, Chief Forester of the United States, under the date of May 7, 1913:

“Your report on the experimental planting indicates conclusively that you have obtained good results from this intensive study of the possibilities of reforestation in portions of the Hawaiian Islands. I feel that there is no question as to the wisdom of your undertaking these experiments or of the Forest Service’s participating in them on the small scale which has been possible for us. I wish very much that it might be possible for us to continue this cooperation on the same small scale as during the present fiscal year.”

The amount allotted for 1912-13 was \$500; for 1913-14, \$188. The greater part of this money was expended for labor in the Experimental Plantation of Eucalyptus in Nuuanu Valley, Oahu, already referred to, in caring for the small trees until they became established.

The earlier work with the Federal funds was on the high mountains on Hawaii and Maui, in the trial of temperate zone trees, especially conifers. Arrangements are now pending whereby such work can be resumed under Territorial auspices on the upper slopes of Mt. Haleakala. But in view of the fact that the first chapter of this investigation is now closed, it may not be out of place to insert here a summary of the results obtained with Federal funds which I drew up for the Forest Service in February, 1914, as follows:

“Returns from the planting on the high mountains have not been as great as it was hoped would be the case. Through unavoidable changes of program due to the death in one case and the unexpected departure in another of employees of neighboring ranches who were cooperating in the work, the original planting was handicapped, both through loss of material and through inability to secure proper care in the raising of seedlings in local nurseries. Further, climatic conditions at the higher plots on

both mountains were found to be more unfavorable than had been anticipated. But of the original seedlings and transplants set out, enough individuals have become established to show that such work is feasible. So, too, with the seed spots. Enough seedlings have come up and lived through to give information that is decidedly worth while as to species to be granted further trial and as to methods to be used in subsequent work. Also, of course, the fenced enclosures on both Mauna Kea and Haleakala remain to be used in later experiments."

"Strictly considered, the experimental plantings on the high mountains in Hawaii, whether of seedlings or of seed, so far carried on, would probably have to be classed as failures, but summing up the situation, I believe this project of the Forest Service to have been justified, first: because it has started a greatly needed study that is much more likely to be carried forward by the Territory now that there has been provided fenced enclosures that can continue to be used for a long time. Second: because while the results in actual numbers of growing plants are meagre, it has been shown what classes and types of trees are needed: namely, conifers accustomed to semi-arid conditions, as some of those from the American Southwest and Northern Mexico, or other related species. And, third, because considerable light has been thrown on methods desirable to follow or to avoid. To have got this information is worth while."

One of the essential needs in forestry in Hawaii has been and is, that trees new to the islands be systematically tried out under the varying local conditions. With the pressing necessity to use Territorial revenues in other ways, it was possible to undertake such experimental planting only with the aid of Federal funds. A good share of the money expended has gone into supplying equipment that can be used for a long time to come. By inaugurating this investigation the Forest Service has rendered a lasting benefit to the Territory of Hawaii."

#### *Plant Distribution.*

Following the usage of past seasons the Division of Forestry has continued to grow and distribute free or at cost price, seedling trees to all those desiring them in any part of the Territory.

It is the intention of the Division to keep constantly on hand a few thousand each of the species most often called for—forest, shade and ornamental trees—to meet current demands. When larger numbers are desired though for forest planting by sugar plantation companies or other corporations, special consignments are started on due notice and shipped when the seedlings are large enough to plant out. Many corporations are finding it easier and cheaper to secure from the Government Nursery seedlings in seed

boxes, just ready for transplanting, rather than to grow them themselves. This is partly because most of the troubles in growing trees, such as the damping off fungus, etc., occur in the very early stages of a tree's life.

Large lots can be got ready for shipment in from six weeks to two months, depending on the species. It is then a simple matter to transplant the seedlings and look out for them locally for a month or two more, when they are of sufficient size to be planted in their permanent place. The cost of the common forest tree seedlings in seed boxes varies from a dollar to a dollar and a half for 800 to 1000 plants. Pot-grown seedlings of shade and ornamental trees usually sell for 2½ cents each, the intention being in each case to have the price just cover the cost. Further details in regard to this phase of the work of the Division of Forestry may be found in the report of the Forest Nurseryman, to whom should be addressed, at Box 207, Honolulu, all inquiries about the purchase, setting out and subsequent care of forest, shade and ornamental trees.

Beside the Government Nursery at Honolulu, the Division of Forestry also maintains sub-nurseries at Hilo, Hawaii (in charge of Brother Matthias Newell), and at Homestead, Kauai (under the care of Mr. Walter D. McBryde).

The report of the Forest Nurseryman covers this subject more in detail. It should be consulted by those interested.

The Government Nursery, as a rule, does not deal in ornamental shrubs, nor in fruit trees. But during the past several years an exception has been made as regards the former class of plants in favor of the United States Army. With the influx of soldiers into Hawaii, and the establishment and expansion of the various posts and forts on Oahu, the Division of Forestry has deemed it justifiable to cooperate as far as it reasonably could in helping to make their new quarters habitable, both for officers and enlisted men. The result has been that the Quartermaster's wagons have been frequent visitors at the Nursery, especially during the last two years, and that many plants have been furnished both to carry out the official programs of post planting and to make more attractive the temporary quarters that precede the permanent streets and houses at the forts. During 1913 there was distributed in this way to the army a total of 4,447 plants from the Government Nursery. One of the most satisfactory things about this army distribution is that almost every plant sent out is taken care of until established—a fate that unfortunately does not always befall the little trees that go from the Nursery on other orders.

Arbor Day continues to be a convenient point of departure for efforts to get more people interested in tree planting. Coming the second Friday in November, trees set out then get, in normal

season the advantage of the winter rains. Arbor Day is essentially the time for the free distribution of trees, but for the past two years a strong effort has been made to direct the distribution more carefully than in years before, so that trees should only be sent to those who really wanted them. The total number distributed is thus reduced, but it is believed that the net results are considerably higher.

Especial efforts have been made, both in 1913 and during this year, to get trees into the hands of the homesteaders at Haiku, Maui, Kapaa, Kauai and Waimea (Kamuela), Hawaii, all newly opened tracts where the settlers are trying to develop real American communities.

#### *Advice on Forest Matters.*

Along with the actual distribution of plant material the Division of Forestry performs the important function of being ready at all times to offer technical advice about every sort of forest work from sowing the seed to securing a second crop of trees after a stand of timber has been harvested.

The preparation of detailed planting and working plans is not often called for, though a few are drawn up each year, but much advice is given verbally and by letter every month. Indeed, judged by the number of requests that come in, this branch of the work is one of the most useful activities of the Division of Forestry. No charge is made for the suggestions given, whether at the Nursery or on the ground, except that in the latter case, if the locality visited is out of Honolulu, the actual traveling expenses of the agent sent are borne by the applicant. This function of the Division of Forestry is already pretty generally known, but it does no harm to say again that the members of the staff are always ready to answer any inquiries that may be made as to the how and why of forest work.

#### *Plant Introduction.*

One other phase of work of the Division of Forestry is entitled at least to mention in this report—the introduction into Hawaii of trees and shrubs new to the Territory. In earlier paragraphs the work in experimental planting has been described. This section deals with the bringing in of new plants. Lack of funds that could be devoted to it and the inherent difficulties of trying out new introductions without a series of experiment gardens under the control of the Division of Forestry, at various elevations and under differing climatic conditions, have kept this work down to very simple terms. But it remains a line of investigation that Hawaii ought to take hold of and push vigorously. Properly carried on there are few places in the world where the

results from the introduction of valuable plants would be of more immediate value to the community.

During the past year and a half a number of new plants have been received by the Division of Forestry, through gift and exchange, which are now being propagated for subsequent distribution. Especially may be noted a consignment of American basket willows, sent by the U. S. Forest Service as the result of our investigations two years ago with a basket willow from the Azores; a Juniper from the West Indies, brought back by Mr. Gerrit P. Wilder, and a variety of plants, largely ornamental, grown from seed collected and sent in by Mr. Joseph F. Rock, Consulting Botanist of the Board, while on an official tour around the world in the interest of the Botanical Department of the College of Hawaii. It is decidedly to be hoped that in later years this branch of the Division of Forestry may receive more attention than it has been thought practicable to give it in the past.

*Tree Planting Under Private Auspices.*

Owing to the general retrenchment that has been necessitated throughout the Territory by the approaching removal of the tariff on sugar, there has unavoidably been a marked falling off in tree planting, especially by sugar plantation companies. But nevertheless enough planting has been done to make it certain that there has been no decrease in interest in the matter. The fact that fewer trees have been set out is purely a question of lack of funds.

No data have as yet been compiled for 1913 and 1914 as to the number of trees planted by corporations, but from notes in hand I believe the total for 1913 will be found to be about one million trees. Of the sugar plantation companies that are actively—though, of course, in varying degrees—keeping up their tree planting, mention may be made of Makaweli, Grove Farm, Lihue and Kealia on Kauai; of Waialua on Oahu; of Wailuku and the Maui Agricultural Company on Maui; and of Honokaa, Paauilo and Pahala on Hawaii.

Several ranch companies are also actively continuing their tree planting, particularly the Parker Ranch on Hawaii and the Haleakala Ranch on Maui. And under the requirements of Government Land Office leases, extensive blocks of trees are being planted by the Kukaiiau Ranch on Hawaii and the Cornwell Ranch on Maui. Inspections of both these projects made during the early summer of 1914 showed the work to be going on in earnest and the trees already planted to be in good condition.

The forest plantation started by the Division of Forestry in 1910 and 1911 at Pupukea, Oahu, and above Waimea, Hawaii, are both in excellent condition—the trees growing well and developing fast.

In March, 1914, another cooperative tree planting agreement, similar to the one made with Mr. C. G. Owen, of Pupukea, in 1912, was entered into with Messrs. Macfarlane and Robinson of Paumalu, Oahu, for the planting of a part of "Water Reserve A," a section of the Pupukea Forest Reserve. Temporarily the land is to be used for growing pineapples. During the year 1917 it will be planted with trees. The area involved is  $3\frac{1}{4}$  acres. The faithful performance of the contract is insured by a bond made out in favor of the Territory.

#### MISCELLANEOUS ACTIVITIES.

##### *Algaroba Licenses.*

In addition to its regular lines of work the Division of Forestry is frequently called on to cooperate with other branches of the Territorial Government in matters more or less directly connected with forestry. By arrangement with the Commissioner of Public Lands all matters relating to public forests, whether within the limits of forest reserves or not, are referred to the Board of Agriculture and Forestry for its special recommendations. Thus during the past year the Division of Forestry has drawn up plans for, and subsequently made inspections in the field of, the thinning of certain Algaroba groves which the Government desired to bring to a condition that would lead to the greatest possible production of flowers and beans, valuable locally for bee pasture and stock feed. The localities for which these algaroba licenses were issued were Nanakuli and Waianae, Oahu and Kihei, Maui.

##### *Hawaii Hardwood Lumber Company.*

On October, 1913, an inspection was made of the operations of the Hawaii Hardwood Company, successors to the Pahoa Lumber Mill of the Hawaiian Development Co., in Puna, Hawaii. This concern is logging Ohia lehua on government and private land in that district, but so far has barely reached the section set apart as the Puna Forest Reserve, although an advance payment was made in 1911 for the timber on 591 acres of it. Since the organization of the present company, following the loss of the Pahoa lumber mill by fire in January, 1913, the operations both in the woods and at the mill have been much more systematic and thorough than at any time in the past. Practically everything except small branches is taken out of the forest, to be worked up at the mill or sold as fuel. And at the mill scarcely any waste goes into the trash fire.

Through persistent activity a place has been made in mainland markets for Ohia, and the mill is kept busy in supplying the increasing demands for Ohia, in one or another form. The



Plate 4. Fig. 1 Cutting Algaroba in the Purely Commercial Forest on the Dry Lowlands



Plate 4. Fig. 2. Makiki Nursery, Honolulu.



use to which Ohia seems best adapted is flooring and wainscoting. Comparatively little Ohia is now sold for railroad ties, notwithstanding it was on this basis that the original company was organized. With its operations conducted as at present, in the forest and at the mill, the Territory can have no complaint against the Hawaii Hardwood Company on the score of non-utilization.

As more of the area of Ohia forest so far cut over has proved to be agricultural land, it is probable that the portion owned by the Government will sooner or later be opened for homesteading. Whether that lying within the boundary of Puna Forest Reserve is of like character remains yet to be seen.

#### *Fence Post Test.*

In August, 1914, a cooperative arrangement was entered into by the Division of Forestry and the College of Hawaii whereby there will be tried out for fence posts on the College Farm in Manoa Valley, Honolulu, timbers from a number of locally grown species of Eucalypts. The posts were cut from trees felled in the Tantalus forest under the direction and at the cost of the Division of Forestry. The hauling and setting of the posts and the treating of them with preservatives was paid for by the College. The following species were used, the posts being cut from the trees averaging about thirty years in age: *E. calophylla*, *E. citriodora*, *E. cornuta*, *E. globulus* and *E. robusta*. The results of this test will be made public from time to time in the Hawaiian Forester and Agriculturist.

#### *Permits in Forest Reserves.*

During the year 1914 a somewhat new departure has been made by the Division of Forestry in the issuance of a number of permits for privileges within certain of the forest reserves for which a cash return was demanded. Therefore most of the permits given have been for free use. Thus on Oahu, in the Honolulu Watershed Forest Reserve, three permits were given authorizing the holders to live on the reserve for a limited period, and make use of small portions of it for gardens. In return the permittees, in addition to the fee paid to the Government, agree to turn out in case of need, to fight forest or brush fires. One grass cutting permit was also issued for the Tantalus Ridge section, and one giving the holder the privilege of hunting wild cattle and pigs in the Upper Olaa Forest Reserve on Hawaii. All these permits are for limited periods only, and are made only on the condition of the compliance with strict requirements.

In August, 1914, one more permit was issued granting the privilege of establishing a mountain outing camp on the upper slopes of Haleakala, Maui, in the Kula Forest Reserve, in return

for assistance to the Government in experimental tree planting in that reserve. In each case the object of these permits is to allow the fullest use to be made of the land, consistent with its proper maintenance as a forest reserve.

#### *Honorary Forest Rangers.*

Another departure in 1914 was the appointment of several Volunteer (or Honorary) Forest Rangers, to assist the Board in giving better protection to certain of the Forest Reserves. To this position for the Honolulu Watershed Forest Reserve, Oahu, were appointed Messrs. Charles L. Beal and E. H. Hipple, of Honolulu; for the districts of Hilo and Puna, Hawaii, Mr. W. H. Shipman, of Hilo. The appointment of Mr. Beal was made primarily on account of the interest he has shown in repairing and extending the trails on the mountains back of Honolulu. It was felt that it would mutually be a good thing if the Board had Mr. Beal's assistance and cooperation.

#### *Surrender of Forest Land.*

In June, 1914, under the terms of Chapter 28 of the Revised Laws of Hawaii, the Honorable George R. Carter formally turned over to the Board for a period of five years the custody and control of a tract of 132 acres of forest land owned by him at the head of Manoa Valley, Oahu, within the Honolulu Watershed Forest Reserve. This is the second time in the history of the Division of Forestry that such a transfer has been made, the other instance being certain lands on the windward side of Maui that were similarly surrendered by the Alexander & Baldwin interests for a period of years, in 1906. Mr. Carter's action is more important in that it confirms a precedent, than in the actual transfer itself. With a better system of protecting and administering its forest reserves the Territory would doubtless be in receipt of many applications from private owners of forest land requesting that the management of their lands be taken over by the Board.

#### *Publications.*

With the exception of the Biennial Report of the Division for 1911 and 1912, issued in March, 1913, the only publication of the Division of Forestry in its regular series has been Botanical Bulletin No. 2: "List of Hawaiian Names of Plants," by Joseph F. Rock, Consulting Botanist of the Board. This pamphlet was issued in June, 1913, and gives the Hawaiian and scientific name for all the indigenous and many introduced trees and shrubs. The data there collected are taken from Mr. Rock's comprehensive contribution to Hawaiian botany entitled "The Indigenous Trees of the Hawaiian Islands," a volume of 518 pages, fully illustrated

by 215 full page plates, that was published under patronage and privately printed in Honolulu, in June, 1913. Most of the field work on which this book is based was done when Mr. Rock was a regular member of the staff of this Board.

It was the intention of the Board to publish as a Bulletin, but in somewhat more amplified form, the general description of the Botanical Regions of Hawaii that constitutes the introduction to Mr. Rock's book. But lack of funds, due to the financial retrenchment of the spring of 1914, made it necessary to postpone the issuance of this publication.

As usual routine reports of the Division of Forestry in manuscript have been made to the Commissioners every month, together with many reports on Forest Reserves and other forest matters. The greater part of these reports have later appeared in the Board's monthly magazine, "The Hawaiian Forester and Agriculturist."

During the past two years a series of special, and in a measure confidential, reports on forest conditions on each island have been prepared for the information of the Commissioners. The preparation of all these reports has taken not a little time, but in making them the policy of the Board has been complied with.

In July of each year, statements for the Governor to use in making up his annual report have also been drawn up, and in January, 1914, a brief report of the Division of Forestry for 1913 was prepared, which was published with the reports of the other divisions of the Board in the "Hawaiian Forester and Agriculturist" for May, 1914.

#### FOREST FIRES.

The forest fire record for this Territory continues to be gratifyingly short. None of the fires reported in 1913 did serious damage although several required not a little hard work to put out before they should reach alarming proportions. The localities and dates of the fires in 1913 and from January to August inclusive, 1914, are as follows:

- 1913
- Feb. 3—Waipio, Oahu.
  - Mar. 9—Kalihi Valley, Honolulu, Oahu.
  - " 13—Pacific Heights, Honolulu, Oahu.
  - " 30—Honouliuli, above Kunia, Oahu.
  - Apr. 20—Ninole, Kau, Hawaii.
  - May 20—Kapaa Homesteads, Kauai.
  - July 23—Pukoo, Molokai.
  - Aug. 8—Waipouli, Kauai.
  - "   Wahiawa, Oahu (two).

1914

Jan. 26—Nuuanu Valley, Honolulu.

Apr. 10—Palolo Valley, Honolulu.

The majority of these fires were in grass or brush. None of them burned over large areas. But had they not been stopped promptly it is possible that serious damage would have resulted, for several were in localities where, had the fire really got away into the forest it would have been exceedingly hard to combat. The fires near Honolulu were fought by the Honolulu Fire Department and the staff and laborers of the Division of Forestry. Those in the country districts under the direction of the local District Fire Wardens.

For setting the fire above Pukoo, Molokai, two men were arrested. They pleaded guilty, and were fined \$25 each.

A number of new names have been added during 1913 and 1914 to the list of Forest Fire Wardens, which list, revised to date, accompanies this report. As in former years the Chief Fire Warden is glad of this opportunity to express the appreciation of the Board on the interest and public spirit shown by the gentlemen named therein in making the Hawaiian Forest Fire Service an efficient skeleton organization, always ready for action.

#### SUMMARY OF FOREST WORK IN HAWAII,

1904—1914.

In that my resignation as Superintendent of Forestry, and the appointment of my successor will necessarily open a new chapter in the history of the Division of Forestry, it is perhaps not inappropriate briefly to summarize what I conceive to be the essential accomplishments in forest work in Hawaii during the past decade.

The Division of Forestry was established under the Board of Agriculture and Forestry by Act 44 of the Legislature of 1903 (Chapter 28, Revised Laws of Hawaii). During the summer of 1903, at the request of the Board, Mr. Wm. L. Hall, of the U. S. Forest Service, was sent to the Islands to investigate the local situation, and to suggest a forest policy. This he did and in December, 1903, upon recommendation of the Chief Forester of the United States, Mr. Gifford Pinchot, I was appointed Superintendent of Forestry, reporting for duty in Honolulu in January, 1904.

During the past ten years the Division of Forestry has stood consistently for two main objects—(1) the protection and proper administration of the native Hawaiian forest on the important watersheds, and (2) the planting of economically valuable trees on non-agricultural and other waste land.

The more important achievements of the Division may be summed up as follows:

The creation of a forest reserve system and the laying of the foundation for a proper administration of the forest reserves.

A decrease of trespass on the forests by the extension of forest boundary fences, the eradication of wild cattle and goats in most of the reserves, and the awakening of public opinion as to the importance of these measures.

The securing of general assent to the doctrine of tree planting on waste land as evidenced by the establishment of many groves of trees and forest plantations throughout the Territory.

An increase in popular knowledge and appreciation of certain valuable trees, and the keeping up of the agitation of the subject of the importance of systematic investigations with new trees and shrubs.

The carrying on of a campaign of education as to the value and necessity of practicing forestry in these islands, and further as to the intimate relation which the right use of the natural resources—popularly known as “Conservation”—bears to the continued economic well-being of this Territory.

The enactment of a forest fire law and the organization of a forest fire service.

And some share in the strengthening of the general public sentiment in favor of forestry and forest work that has found expression in continued and increased support by the Legislature.

The protection of the areas of native Hawaiian forest covering the important watersheds throughout the Territory has been sought through the creation of forest reserves. The essential object is to equalize and maintain the flow in these streams that feed the various ditch systems which make the water available for irrigation, power development, cane fluming and domestic supply. There are now 37 forest reserves in Hawaii. These reserves include both government and privately owned land. The total area is 798,214 acres, of which 546,222 acres (68 per cent) belongs to the Territory. Twenty-eight of the reserves are essentially protection forests, primarily of value for safeguarding the cover of vegetation on watersheds. The other nine, almost all government land, were set apart that the areas included within their limits might eventually be brought under forest, or that the commercially valuable timber on them might be administered under the Board of Agriculture and Forestry.

Technically the Hawaiian forest reserve system has now been pretty nearly completed. Only a few comparatively small lands remain to be set apart to round out the forest area needed for the protection of the important streams. What has so far been accomplished is essential as the first steps in the program, but to

secure the full benefits to be derived from the protection of the forest it must be followed up by systematic administration of the reserves, such as can only be secured by a forest ranger service. The immediate forest problem in Hawaii and the next step in the progress of forestry in this Territory is to get an effective field organization established and in working order.

In large measure the boundaries of the forest reserves either consist of natural barriers or are fenced. Some of the fences are maintained under the requirements of government leases, some have been built and are maintained at government expense, and some are kept up voluntarily by corporations or private owners. The more important corners of a number of the forest reserves have been marked with metal monuments. All the forest reserve boundaries ought to be so defined.

During the past two years the government has constructed a number of new fences. Several other stretches of fence required under leases have also recently been completed, and some other lines of forest fence have been erected at private cost. The general attitude of the public in regard to the protection of the forest has undergone a marked change in the past decade. While there is still more or less trespass going on on each island, the best sentiment is now strongly against it, rather than being hostile or indifferent, as was the case previously.

In a few of the reserves the forest is still being damaged by wild cattle and by goats, but in the last few years a very marked improvement has been effected on each of the larger islands in controlling this form of injury.

The second main line of endeavor pursued by the Division of Forestry since 1904 has been the encouragement of tree planting. This the Department has sought to do by supplying technical advice to all who desired it as to methods and means of nursery and tree planting work, by furnishing free or at cost price tree seedlings of various species, and by a general campaign of education as to the desirability of establishing blocks of planted forest from the standpoints of commercial return, watershed protection or aesthetic consideration.

Tree planting has been practiced in Hawaii both by the government and by private individuals and corporations, for 30 years or more, but in the past few years there has been a marked increase in the number of trees set out and a much better understanding of the necessity for such work than at any time before. The doctrine of using for tree planting non-agricultural land on the sugar plantations that otherwise would be closed as waste area has been persistently preached, until it is now generally acknowledged to be a sound policy to follow wherever it is possible to secure funds to defray the initial cost.

In this campaign much has been written and printed, in regular reports, in the "Hawaiian Forester and Agriculturist," and elsewhere, both as argument and exhortation, and also in the way of concrete examples showing the profit to be derived from tree planting in terms of compound interest. Among this matter the bulletin entitled "Eucalyptus Culture in Hawaii," by Mr. L. Margolin, calls for special mention. This report gives the result of a cooperative study made by the Division of Forestry and the U. S. Forest Service in 1910. That the efforts put forth have really told is evidenced by the increase in the number of trees planted each year. In 1912, the last year for which full records are at hand, the number planted was well over a million and a quarter trees. For the credit of creating this sustained interest the division of Forestry has the right to claim a share.

In this connection it is only fair to make mention of the part played by the Forest Nurseryman of the Division of Forestry, Mr. David Haughs, who has charge of the section of the Division's work in dealing with the growing and distribution of trees. From his long experience in the islands Mr. Haughs' suggestions on all matters relating to tree growing are distinctly worth having. That this part is appreciated is proved by the steady stream of application for advice that come to the Division. Giving assistance of this sort is one of the important functions of this office. It is an essential part of the Territory's forest work.

The introduction and experimental planting of trees new to the islands is a branch of forest work which it has been the aim of the Division of Forestry to foster, ever since its organization. Only by the actual trial of new trees and shrubs can it be known surely whether or not they will succeed here under our local conditions. The Division of Forestry has helped to make better and more widely known several species that had previously been introduced, especially Japanese Cedar, certain of the Eucalypts, and a basket willow from the Azores. It has as well developed the use of Ironwoods as a windbreak for canefields near the ocean, and has started upon the investigation of many new trees about which it is yet too soon to have positive information to give out.

The forest fire law in Hawaii dates from 1905. Under its terms a forest fire service consisting of volunteer district fire wardens has been organized and kept strictly up to date. This skeleton organization has been effective in combatting all fires that have occurred, and furthermore has gone a long way toward firmly fixing in the minds of the people generally that the Board of Agriculture and Forestry meant business in its enforcement of the terms of the forest fire law. A number of convictions have been secured, especially during the past three or four years, where fires had been allowed to escape through preventable carelessness. This

action has had a salutary effect in certain sections of the Territory where the danger from fire was high.

Very fortunately Hawaii has suffered but little from forest fires. But in the leeward districts and in occasional dry years even in those normally subject to heavy rainfall, the danger of fire is always present. The time to make ready for fighting fire is before it starts. Hawaii is prepared.

#### RECOMMENDATIONS.

Just how soon it will be possible to establish a regular service of forest rangers, paid by and responsible solely to the Board of Agriculture and Forestry, is a question of financial policy. But until such a force of efficient men is organized to patrol the reserves, prevent trespass, see that the fences are maintained, exterminate the remaining wild stock in the forests, and prevent forest fires, the Hawaiian forest reserve system will not be properly administered. This is now the first need in forestry in Hawaii.

Next, the Territory is a long way yet from having enough grove and plantations of trees of economically valuable species. This is equally true of government and of privately owned land. Fuel supply in certain districts, fence posts, railroad ties, bridge timbers and other lumber for rough work, to say nothing of construction timber, will always be required in Hawaii. With the diminishing wood supply on the mainland the price of lumber will certainly not recede. It may make considerable advances. It has been demonstrated that there are trees well adapted to local conditions that can supply at least part of the local demand. It needs no argument to show the wisdom of establishing plantations of such species on land that cannot profitably be used for agriculture.

Along with the other forms of forest protection it is essential that the Territory keep up an efficient forest fire service. It will continue the duty of the Division of Forestry to see that the present forest fire organization is maintained, and when necessary expanded.

There are, as well, many lines of forest investigation which it should be the policy of the Board of Agriculture and Forestry to encourage. The introduction of species of trees new to the Islands, the experimental planting of temperate zone trees on the high mountains, and enough publicity and educational work so that the public shall be kept fully informed as to the necessity for forestry in the Islands and its needs, are all matters that should have attention.

The practice of forestry must always continue to be one of the important functions of the Territorial Government. On the

foundation that has been laid in the past decade may the Division of Forestry build strongly and well.

Very respectfully,

RALPH S. HOSMER,

Superintendent of Forestry and Chief Fire Warden.

## LIST OF DISTRICT FIRE WARDENS

Following is a list of the District Fire Wardens, with their respective districts:

### CHIEF FIRE WARDEN.

Superintendent of Forestry, *ex officio*.

### DEPUTY FIRE WARDEN AT LARGE.

DAVID HAUGHS.

In and for the Territory of Hawaii.

### DISTRICT FIRE WARDENS.

#### KAUAI.

A. MENEFOGLIO.

In and for Wainiha Valley, District of Halelea.

W. F. SANBORN.

In and for the District of Halelea, excepting Wainiha Valley.

J. R. MEYERS.  
GEORGE HUDDY.

#### Assistant District Fire Warden.

In and for the District of Koolau, excepting the land of Anahola.

GAYLORD P. WILCOX.

In and for the portion of the Districts of Koolau and Puna, extending from the land of Anahola to the land of Olohena, inclusive.

F. WEBER.

In and for the portion of the District of Puna, south of and including the land of Wailua.

FRANK A. ALEXANDER.

In and for that portion of the District of Kona, extending from the Hanapepe Valley to the Puna District line.

FRANCIS GAY.

In and for that portion of the District of Kona, lying between and

including the Waimea, Poomau and Kauaikanana Valleys on the west and the Hanapepe Valley on the east.

AUGUSTUS F. KNUDSEN.

In and for the District of Na Pali and that portion of the District of Kona, lying to the west of Waimea, Poomau and Kauaikanana Valleys.

OAHU.

C. J. WHEELER.

In and for that portion of the District of Koolauloa from the Waialua District line to and including the land of Kaunala.

ANDREW ADAMS.

In and for that portion of the District of Koolauloa lying to the north and east of the land of Kaunala.

FRANK PAHIA.

In and for that portion of the District of Koolaupoko, extending from the Koolauloa District line to the land of Heeia.

OTTO LUDLOFF.

In and for that portion of the District of Koolaupoko, extending from and including the land of Heeia to the land of Kailua.

JOHN HERD.

In and for that portion of the District of Koolaupoko, extending from and including the land of Kailua to Makapuu Point.

CHARLES H. BAILEY.

In and for that portion of the District of Kona, extending from Makapuu Point to Palolo Valley.

JOSEPH K. KAPONO.

In and for Palolo Valley, District of Kona.

C. MONTAGUE COOKE.

In and for Manoa Valley, District of Kona.

W. M. GIFFARD.

In and for that portion of the District of Kona, lying between Pauoa and Manoa Valleys.

L. A. MOORE.

In and for Nuuanu Valley, District of Honolulu.

WALTER F. DILLINGHAM.

In and for that portion of the District of Ewa lying to the west of the main government road.

JAMES GIBB.

In and for that portion of the District of Ewa, lying between the lands of Moanalua and Waiawa.

**H. BLOMFIELD BROWN.**

In and for that portion of the District of Ewa lying to the east of the main government road between the land of Waipio and the Kaukonahua gulch.

**W. M. TEMPLETON.**

In and for that portion of the District of Waialua, lying between the Kaukonahua and Helemanu gulches.

**GEORGE M. ROBERTSON.**

In and for that portion of the District of Waialua, lying between the Helemanu and Opaeula gulches.

**GEORGE WILSON.**

In and for that portion of the District of Waialua, lying between the Opaelua Gulch and the Koolauloa District line.

**F. MEYER.**

In and for that portion of the District of Waianae lying to the west of the Waianae Mountains.

**MOLOKAI.**

**JAMES MUNRO.**

In and for that portion of the Island of Molokai lying to the west of Wailau Valley and the land of Mapulehu.

**C. C. CONRADT.**

In and for that portion of the Island of Molokai including and lying to the east of Wailua Valley and the land of Mapulehu.

**LANAI.**

**GEORGE C. MUNRO.**

In and for the Island of Lanai.

**MAUI.**

**L. WEINZHEIMER.**

In and for the District of Lahaina.

**DAVID T. FLEMING.**

In and for the District of Kaanapali.

**ANDREW GROSS.**

In and for the District of Wailuku.

**F. F. BALDWIN.**

In and for the District of Hamakuapoko and the west half of the District of Hamakualoa.

**W. F. POGUE.**

In and for the east half of the District of Hamakualoa and that portion of the District of Koolau lying to the west of Makapipi gulch.

**WILBUR A. ANDERSON.**

In and for that portion of the District of Koolau lying to the east of Makapipi gulch.

**JOHN CHALMERS.**

In and for the District of Hana.

.....

In and for the District of Kipahulu.

.....

In and for the District of Honuauia and Kahikinui.

**L. VON TEMPSKY.**

In and for the Districts of Kula and Kaupo.

**HAWAII.**

**G. C. WATT.**

In and for that portion of the north half of the District of Kohala extending from the land of Kaauhuhu to the Hamakua District line.

**SAM P. WOODS.**

In and for that portion of North Kohala, extending from the northern boundary of the land of Kawaihae I to and including the land of Kaauhuhu.

**O. L. SORENSON.**

In and for the District of South Kohala.

**ALEXANDER MORRISON.**

In and for the western part of the District of Hamakua extending to the west from the boundary of the land of Paauhau to the boundary of the land of Kukaiau.

**DONALD S. MACALISTER**

In and for that portion of the District of Hamakua, extending from and including the land of Kukaiau to the Hilo District line.

**JOHN M. ROSS.**

In and for that portion of the District of Hilo, extending from the Hamakua District to the land of Makahanaloa.

**JOHN T. MOIR.**

In and for that portion of the District of Hilo, extending from and including the land of the Makahanaloa to the land of Kikala.

**JOHN A. SCOTT.**

In and for that portion of the District of Hilo, extending from the Puna District line to and including the land of Kikala.

**C. F. ECKART.**

In and for the District of Puna.

**WILLIAM G. OGG.**

In and for that portion of the District of Kau, extending from the Puna District line to and including the land of Punaluu.

**GEORGE GIBB.**

In and for that portion of the District of Kau, extending from the land of Punaluu to the Kona District line.

**R. VON S. DOMKOWICZ.**

In and for that portion of the District of Kona extending from the Kau District line to and including the land of Kaapuna.

**T. C. WHITE, Acting.**

In and for that portion of the District of Kona, extending from the land of Kaapuna to and including the land of Hookena.

**JOHN D. PARIS.**

In and for that portion of the District of Kona, extending from the land of Hookena to and including the land of Kaawaloa.

**T. C. WHITE.**

In and for that portion of the District of Kona, extending from the land of Kaawaloa to and including the land of Kahaluu.

**JOHN A. MAGUIRE.**

In and for that portion of the District of Kona, extending from the land of Kahaluu to the Kohala District line.

**Forest Rangers.****DAVID KAPIHE.**

In and for that section of the Honolulu Watershed Forest Reserve, District of Honolulu, Oahu, bounded on the east by Manoa Valley, on the north by the Konahuanui Mountain Range, and on the west by Nuuanu and Pauoa Valleys.

**Volunteers.****E. H. HIPPLE.**

In and for Manoa Valley, District of Honolulu, Oahu.

**CHARLES L. BEAL.**

In and for the District of Honolulu, Oahu.

**W. H. SHIPMAN.**

In and for the Districts of Puna and Hilo, Hawaii.

**DISTRICT FORESTERS**

The names of the following gentlemen are borne on the rolls of the Board of Agriculture and Forestry as District Foresters. Those marked with a star have been appointed Special Territorial

Police Officers to enforce the terms of the Wild Bird Law, Act 104 of the Session Laws of 1907:

**Kauai.**

\*Albert S. Wilcox, J. R. Myers, \*F. Weber, Edward Broadbent, Rev. J. M. Lydgate, \*Walter D. McBryde, \*Francis Gay, \*Augustus F. Knudsen.

**Oahu.**

\*Andrew Adams, \*L. L. McCandless, \*John Herd, \*Paul R. Isenberg, \*Walter F. Dillingham, W. W. Goodale.

**Molokai.**

\*James Munro, \*C. C. Conradt.

**Lanai.**

Geo. C. Munro.

**Maui.**

L. Weinzheimer, F. F. Baldwin, \*W. F. Pogue, \*L. von Tempsky, Dr. J. H. Raymond, D. T. Fleming.

**Hawaii.**

\*G. C. Watt, \*A. W. Carter, \*A. Ahrens, \*John M. Ross, \*John A. Scott, \*Julian Monsarrat, Geo. Gibb, R. von S. Domkowitz, W. R. Castle, \*John D. Paris, \*John A. Maguire.

## Report of the Acting Superintendent of Forestry

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Honolulu, Hawaii, December 31, 1914.

The Board of Commissioners of  
Agriculture and Forestry,  
Honolulu, Hawaii.

Gentlemen:—I have the honor to submit herewith that part of the biennial report of the Division of Forestry for the period from September 1, 1914, to December 31, 1914, during which time I served at your direction as Acting Superintendent of Forestry after Mr. Ralph S. Hosmer's resignation from the superintendency.

### *Forest Extension.*

The tree planting on that part of the Honolulu Watershed Forest Reserve, lying between Round Top Hill and the planted forest on Tantalus, including Sugar Loaf, has been continued to the end of the period. Up to December 31, 1914, a total area of 39 acres has been planted. Of the total number of 7885 seedlings set out, 6136 are Koa and 1749 are Kukui. Owing to favorable weather throughout the summer of 1914 we were able to continue planting and the seedlings got a good start and are doing well.

In September, 1914, I visited Kauai, and made final arrangements for planting the seed of the Chinese Plum (*Eugenia* *sp.*) on the Moloaa Forest Reserve at Anahola. The tract was examined and instructions given as to how the work should be done, the spacing to be 10 x 10 feet. The work of digging the holes and planting the trees was begun in October, and completed in December. At time of writing (Feb. 3, 1915), a report has been received from Mr. Kaina D. Lovell (who had charge of the planting) stating that he has examined the planted area, and found that out of the 18,900 holes planted, only between 50 and 60 trees failed to grow. This experiment will be watched with interest, and if it is found that certain bare areas within the forest reserves can be successfully covered with this tree at a cost of \$10 per acre, which is approximately what this work has cost, it might be advisable to do more direct planting with this and similar species. The wood of this *Eugenia* makes good firewood, and it is also used to some extent for fence posts.

Final arrangements for the planting of a double line of trees along the boundary fence between the Koolau Forest Reserve and the Nahiku homesteads on Maui were agreed upon, and for this purpose 2,200 seedlings of *Eucalyptus robusta* were sent up from

the Nursery in November. The work was undertaken by the manager of the Nahiku Rubber Company, Mr. W. A. Anderson, and was completed in December. Arrangements were similarly made with Mr. von Tempsky to plant trees on the Waihou Spring Forest Reserve near Olinda, Maui, and during November 2,500 seedlings, consisting half of *Grevillea robusta* in seed boxes and half of *Cryptomeria Japonica* (Japanese cedar) in transplant boxes were shipped from the Nursery for the work. At time of writing the work is reported to be progressing favorably.

For the purpose of doing similar work on Water Reserve B, Pupukea, Oahu, I visited the area in December, and made final arrangements with Mr. Mark Robinson, Jr., who agreed to undertake the work. A first shipment of 500 Ironwood trees has already been made and the work of planting is still in progress.

#### *Forest Reserve Fencing.*

The fencing off of the trail leading over the Kolekole pass in the Lualualei Forest Reserve at Waianae, Oahu, was completed in August. I made an examination of the fence at that time and found it substantially built and according to specifications. An examination of the fence running along the mauka boundary of the Lualualei Homesteads also showed that the repair work was satisfactory.

#### *Dead Timber in Tantalus Forest.*

In December a report was made on an application for the purchase and removal of the dead timber in the planted Tantalus Forest. The applicant offered to pay \$1.50 per cord for the dead trees and limbs. My recommendations that cutting operations be not allowed in the forest during the rainy season on account of the damage that would be done to the roads was approved by the Board.

#### *Arbor Day.*

Arbor Day was celebrated on November 20, and proved to be very successful. The total number of trees distributed amounted to 17,595, which is nearly 6,000 more than for the year 1913. The trees were all pot grown, and with ordinary care ought to make a good growth. Arbor Day is getting more popular every year and more people are taking an interest in the planting and care of trees.

TABLES SHOWING THE NUMBER OF TREES PLANTED IN THE  
TERRITORY OF HAWAII, PRINCIPALLY BY COR-  
PORATIONS, IN 1913 AND 1914.

Name of corporation	1913	1914	Total
<b>KAUAI.</b>			
Koloa Sugar Co. ....	11,199	5,901	17,100
McBryde Sugar Co. ....	17,839	17,839	35,678
Makaweli Sugar Co. ....	.....	.....	.....
Lihue Plantation Co. ....	.....	.....	.....
Papapaholohola Spring Reserve .....	18,544	20,381	38,925
	47,582	44,121	91,703
<b>OAHU.</b>			
Waialua Agricultural Co. ....	125,000	125,000	250,000
Honolulu Plantation Co. ....	.....	30,000	30,000
	125,000	155,000	280,000
<b>HAWAII.</b>			
Kukaiiau Ranch .....	99,450	165,920	265,370
Parker Ranch .....	33,832	96,394	130,226
Kukaiiau Plantation Co. ....	2,000	2,000	4,000
Niulii Mill & Plantation .....	.....	1,700	1,700
Honokaa Sugar Co. ....	10,000	10,000	20,000
Waiohinu Homesteads .....	.....	2,000	2,000
Bro. Matthias Newell (sub-nursery, Hilo) .	1,066	10,868	11,934
	146,348	288,882	435,230
<b>MAUI, LANAI AND MOLOKAI.</b>			
Maui Agricultural Co. ....	.....	255,033	255,033
Wailuku Sugar Co. ....	19,661	29,261	48,922
Government Lands of Polipoli .....	4,653	11,187	15,840
Honolua Ranch .....	2,000	3,500	5,500
Cornwell Ranch .....	.....	32,000	32,000
Lanai Company Ltd. ....	9,000	1,340	10,340
Haiku Homesteads .....	5,000	4,000	9,000
	146,348	288,882	435,230
Total number of trees planted on all islands	359,244	824,324	1,183,568

FORESTRY RULE 1.

On August 22, 1914, the Governor, upon the recommendation of the Board, approved the following rule concerning the protection of the watersheds in Nuuanu and Makiki valleys within the Honolulu Watershed Forest Reserve:

**RULE AND REGULATION OF THE BOARD OF COMMISSIONERS  
OF AGRICULTURE AND FORESTRY.**

**FORESTRY RULE NO. 1.**

Concerning the protection of the Watersheds in Nuuanu and Makiki Valleys, Honolulu, T. H.

The Board of Commissioners of Agriculture and Forestry of the Territory of Hawaii, hereby make the following Rule and Regulation for the purpose of protecting from contamination the watersheds tributary to the Honolulu water supply system, within the boundaries of the Honolulu Watershed Forest Reserve:

Section 1. All persons or corporations are hereby prohibited from cutting or removing grass and other forage plants, except under such permits as may be issued from time to time by the Board of Commissioners of Agriculture and Forestry (1) from the government land in Nuuanu Valley, Honolulu, Oahu, lying within the boundaries of the Honolulu Watershed Forest Reserve, as established by a proclamation signed by Acting Governor E. A. Mott-Smith on October 13, 1913, which area, in part, includes the entire mauka portion of Nuuanu Valley above Luakaha; and (2) from all that portion of Makiki Valley, lying mauka of the Makiki Dam, on the government land of Makiki (also included in the above named forest reserve), as shown by registered map No. 2554, on file in the office of the government survey.

Section 2. Any person violating the above rule shall be guilty of a misdemeanor, and upon conviction thereof shall be punished by a fine not to exceed Five Hundred Dollars (\$500.00), as provided by Section 390 of the Revised Laws as amended by Act 82 of the Session Laws of 1905, and Act 112 of the Session Laws of 1907.

Section 3. This rule shall take effect upon its approval by the Governor.

Approved:

LUCIUS E. PINKHAM,

Governor of Hawaii.

Honolulu, Territory of Hawaii,  
August 22, 1914.

Respectfully submitted,

DAVID HAUGHS,

Acting Superintendent of Forestry.

## Report of the Forest Nurseryman

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Honolulu, Hawaii, December 31, 1914.

Albert Waterhouse, Esq.,  
Acting President and Executive Officer,  
Board of Agriculture and Forestry.

Dear Sir:—I herewith submit a report of the work done during the years 1913 and 1914.

### NURSERY.

#### *Collection and Exchange of Seed.*

The collecting of seed has been continued, and the two men employed have been kept busy at this work and at times assisted in packing up trees as well as collecting fruit and other material for the Entomologists. The seed collected in this manner is used for propagating purposes at the Government Nursery in Honolulu, and sub-Nurseries on the other Islands. The homesteaders and others all over the Territory are supplied with a reasonable amount of the locally collected seed free of charge, while the cost price is charged for imported seed which we buy from salesmen abroad. At the request of the officials of Botanic Gardens and other institutions in different parts of the world, we supply seed on the exchange system. In this way we are sometimes able to secure new and rare species which would be difficult to get otherwise. Tourists and others calling at the Nursery are often anxious to take away with them sample packages of seed. Those we supply with a few sample packages free.

A large quantity of seed collected by Mr. J. F. Rock while on a tour during the early part of 1913 was sown on its arrival and some of the species have already been planted out along the trail leading to Sugar Loaf Hill. Others are in pots at the station. It is too early to make a statement regarding these introductions. Some of them, however, are certainly looking well and are making a good growth.

The most promising introduction in the line of forest trees which we have been able to procure for a number of years is the *Juniperus cedar* of Jamaica, introduced by Mr. Gerrit P. Wilder, who sent us the seed while on a tour about four years ago. These trees have been distributed to people living at different elevations on the Islands, and reports are coming in that they are doing well. We planted a few of these Junipers along the

new trail leading to Round Top Hill, and they are making a splendid growth. We have been able, through our exchange system, to procure more seed of the same, or an allied species of this Juniper (*Juniperus australis*) from Mr. William Harris, Superintendent of Public Gardens, Jamaica. Mr. Harris in his letter describes the *Juniperus cedar* as follows: "I now take pleasure in sending you two bags of seed of *Juniperus cedar* of Jamaica. It yields a beautiful timber, which is used in furniture, cabinet work, interior ornamental house work, etc. It grows in the mountains at from 3,000 to 5,000 feet altitude." The seed sent is germinating nicely, and we will have a large number of trees providing nothing unforeseen happens.

## PLANT DISTRIBUTION.

*Distribution of Plants from Nursery and Makiki Station.*

1913	In seed boxes	In boxes transplanted	Pot Grown	Totals
Sold Regular Distribution .....	7,800	1,880	3,101	12,781
Gratis .....	10,200	2,402	5,018	17,620
Street Planting .....	.....	.....	1,077	1,077
Homesteads .....	5,700	1,416	699	7,806
Military Posts .....	.....	1,723	2,724	4,447
Schools .....	628	283	680	1,591
Parks .....	.....	.....	154	154
Clubs .....	.....	.....	776	776
Arbor Day .....	.....	.....	11,961	11,961
	<hr/> 24,328	<hr/> 7,704	<hr/> 26,181	<hr/> 58,213
Plantation Co.'s and other Corporations, etc.	451,620			451,620
				<hr/> 509,833
1914				
Sold .....	6,250	1,301	3,938	11,489
Gratis .....	10,700	7,041	7,853	25,594
Street Planting .....	6,000	100	196	6,296
Homesteads .....	12,750	3,400	1,422	17,572
Military Posts .....	1,000	550	5,138	6,688
Schools .....	.....	125	1,160	1,285
Clubs .....	.....	850	1,330	2,180
Arbor Day .....	.....	.....	17,575	17,575
Gov't Forest Reserves	1,250	3,450	7,885	12,585
	<hr/> 37,950	<hr/> 16,817	<hr/> 46,597	<hr/> 101,364
Plantation Co.'s and other Corporations, &c.	81,850	13,450	1,573	96,873
	<hr/> 119,800	<hr/> 30,267	<hr/> 48,170	<hr/> 198,237

## TOTAL PLANT DISTRIBUTION.

	1913	1914	Totals
Nurseries on Oahu .....	509,833	198,237	708,070
Sub-Nursery, Homestead, Kauai ..	6,500	7,977	14,477
Sub-Nursery, Hilo, Hawaii .....	1,066	10,868	11,934
	<hr/> 517,399	<hr/> 217,082	<hr/> 734,481

*Propagation of Trees for Plantation Companies and Other Corporations.*

The propagation of trees in large quantities for plantation companies and other corporations has been continued during the period. By this system, which was started about four years ago, companies and other corporations desiring large quantities of trees are required to pay the cost of labor and material in supplying the required seedlings. The majority of the trees ordered are shipped in seed boxes ready to transplant into other boxes or pots. As the seedlings are past the damping off stage before they are sent out there is no trouble in transplanting them, and any careful laborer can do the work. During the past two years we have distributed the following trees to plantation companies, etc.:

	In seed boxes.	In transplant boxes.	Pot Grown.	Total.
1913 .....	451,620	.....	.....	451,620
1914 .....	81,850	13,450	1,573	96,873
Total .....	<hr/> 533,470	<hr/> 13,450	<hr/> 1,573	<hr/> 548,493

There is every indication that large numbers of trees will be set out by plantation companies during the early spring of 1915, as we are already receiving orders for quantities of seedlings to be delivered during February and March.

Although we generally have in stock a reasonable number of the species which are in demand both in seed boxes and transplant boxes, we would again urge on those who require large quantities of trees to notify us in advance so that we will be sure to have the trees ready when required. The time required to get seedlings ready for transplanting is from one month to six weeks and for transplants ready to set out from two and a half to three months.

This system of supplying trees in large quantities to plantations and corporations has worked well and there is no doubt has been the means of adding considerably to the number of trees planted.

## GOVERNMENT REALIZATIONS.

1913.

Sale of Plants .....	\$ 76.30	
Sale of Seeds .....	4.55	
The Board's share of the proceeds of sale by the Waterworks Department of Automobile owned jointly by the Waterworks, Public Works and Board of Agriculture and Forestry, bought by Mr. Marston Campbell, July, 1909, when acting as Superintendent of Public Works, Commissioner of Public Lands and President of the Board of Agriculture and Forestry .....	437.50	
Rent of Building, Nursery Grounds .....	437.50	\$619.75

1914.

Sale of Plants .....	\$ 80.75	
Sale of Seeds .....	8.00	
Rent of Building, Nursery Grounds .....	455.00	
5 Coils Fence Wire .....	11.15	
Freight on Plants .....	.50	\$555.40

## COLLECTIONS ON ACCOUNT OF PRESERVATION AND EXTENSION OF FORESTRY AND FOREST RESERVES.

The following amounts have been deposited with the Treasurer as a Special Fund under the above heading:

Rent of premises at Half Way House, Tantalus, at \$10 per month, April 1 to Dec. 31, 1914 .....	\$ 90.00	
Permit to cut grass, Tantalus Forest, at \$20 per month, July and August, 1914 .....	40.00	
For use of two acres of land (Kalawahine), Pauoa Valley, at the rate of \$10 per year, April to Dec., 1914 .....	15.00	
Fee for use of land and gathering Ti leaf on Kalawahine, Pauoa Valley, at the rate of \$50 per year, June 1st, to Dec. 31st .....	37.50	\$182.50

## OTHER WORK

*Nursery and Grounds*

The work at the Nursery has been carried on with the assistance of one man whose principal work consists of potting and packing up trees. One man, employed by the Board, with the assistance of two prisoners, has attended to the grounds around the offices and also to the Park portion of the nursery grounds.

There is great need of a stone curb along the King Street side of the Nursery grounds. The wooden curb, laid many years ago, is practically all rotted away and without a curb the sidewalk looks disreputable.

We wish to extend our thanks to the High Sheriff for the interest taken and the assistance given us by supplying two

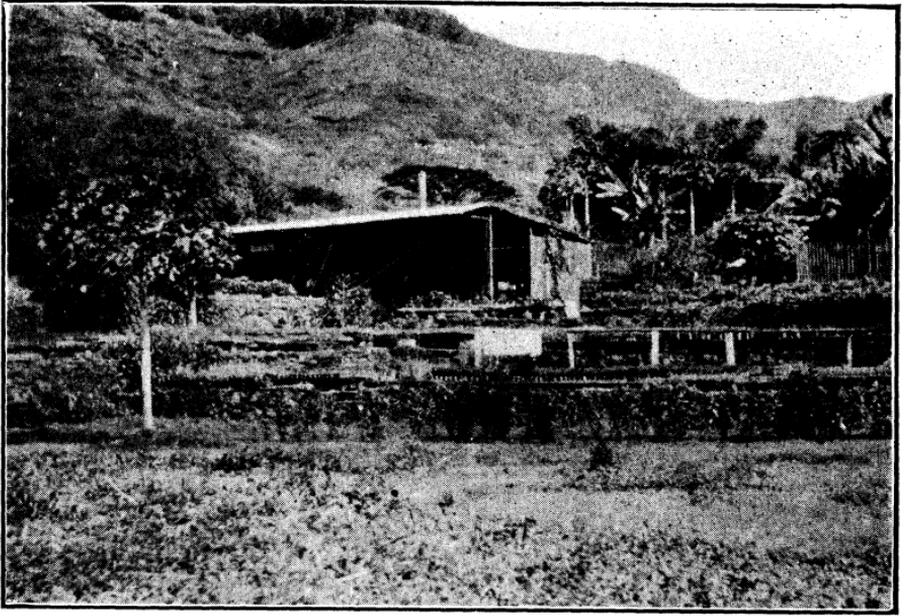


Plate 5. Fig. 1. Plants for Distribution, Makiki Nursery.

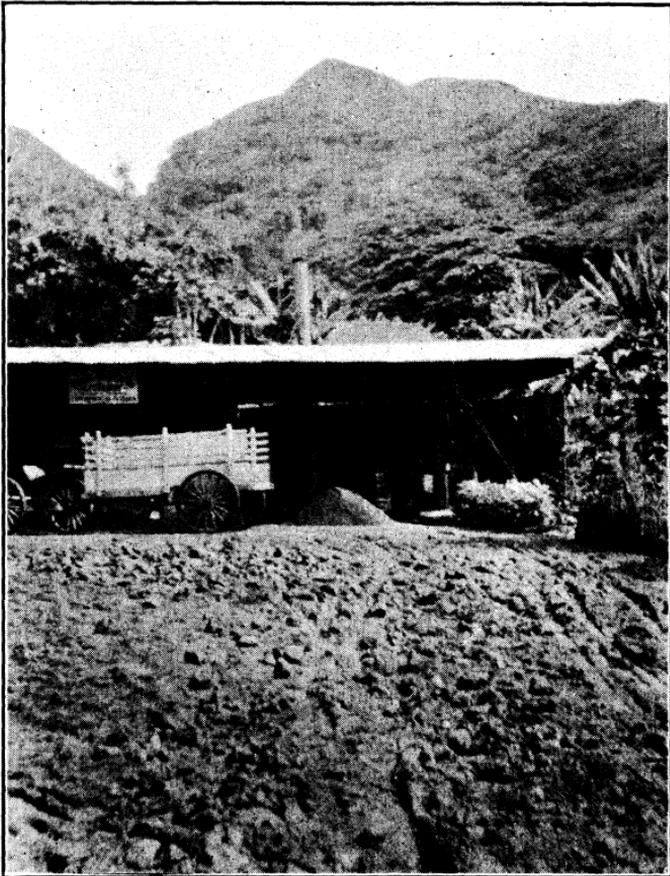


Plate 5. Fig. 2. Soil Sterilizing Shed, Makiki Nursery.



trusties, for with their help it would be impossible for us to keep the grounds in good condition.

### *Congressional Vegetable Seed and Year Books.*

During the month of December 1912 we received from Washington, D. C., through Honorable J. K. Kalaniana'ole, Delegate to Congress, 10,000 packages of vegetable seed and 500 packages of flower seed. The above consignment was all distributed during the year 1913; a similar supply was received in December 1913 for distribution during 1914. This seed was sent out to public schools, homesteaders and others all over the Islands.

Copies of the Year Book of the U. S. Department of Agriculture, also sent by the Delegate, are distributed annually to a list of people interested, throughout the Islands. Seven hundred and fifty books is the quota received.

### *Advice and Assistance*

This branch of the work takes up considerable of the writer's time. Calls are made from time to time at the different Military Posts on Oahu, where a great deal of planting of trees, shrubs and vines is going on. The effect of this planting will, in a few years, show to good advantage, as most of the sites of these posts were without shade or shelter with the exception of a tangle of lantana, glue bush and weeds.

Advice and assistance has been given to the Out Door Circle of the Kilohana Art League Improvement Club, School Officials, and others. Advice by letter is given to people on the other islands and assistance and advice is given to people who make requests by telephone and who call at the nursery personally. The number of these requests has increased considerably during the past two years due principally, there is no doubt, to the increased population, the desire by the officers and men of the different Military Posts to beautify their surroundings, and the general cooperation of individuals with the civic organizations for the beautifying of their respective districts.

### *Makiki Station*

At the station the work of mixing and sterilizing all the soil used there and at the main Nursery is done. The steam sterilizer, installed about three years ago, has done excellent work. A great deal of the transplanting and potting of trees is done at this station. All the new introductions, after being started at the main nursery are sent to this station and grown in pots until they become large enough to be set out in a permanent position.

Along the trail leading up to Sugar Loaf Hill samples of the

new introductions have been planted including the *Juniperus* cedar, introduced by Mr. Gerrit P. Wilder. This station is well situated and owing to the greater moisture, is better adapted for the propagating of some species than the Nursery. We have got a good road now, and the transfer of plants and soil is an easy matter.

There is a large area of land around the station which we are gradually getting planted with trees. A collection of bamboos imported from Japan about four years ago, with few exceptions is doing well.

The Basket willow is also doing very well. About a year ago we received cuttings of five varieties of Basket willow from Washington and with the exception of two they are doing very well. The variety brought here by Dr. L. R. Gaspar from Portugal, and handed to us by the late A. de Souza Canavarro, Consul General for Portugal has done exceedingly well. A great many cuttings of this variety have been sent to selected people on different parts of the Islands. More cuttings are now ready and we will be glad to fill orders providing the applicants are willing and agree to pay the freight or postage.

#### *Tantalus Forest*

During the summer of 1913 the dead wood was all removed from the forest for which the sum of \$55.00 was realized. This amount was deposited with the Treasurer as a realization. During the month of August and September, 1914, 25 trees, 5 each of the following species were cut down: *Eucalyptus cornuta*, *Eucalyptus citriodora*, *Eucalyptus calophylla*, *Eucalyptus robusta* and *Eucalyptus globulus*. These were split up into fence posts and sent to the College of Hawaii to be tested as to their durability. A report of the finding will be furnished the Division of Forestry when complete.

During the months of July and August, 1914, the privilege to cut grass and honohono in the forest was granted to Mr. Farm Corn at a monthly rental of \$20.00. Previous to that time complaints had been coming in about people carting away the grass (and cutting up the road) without permission. An effort was made to stop this unauthorized cutting of grass and honohono but as the grass cutters had permission to cut grass on lands not controlled by us and of course had to pass through the forest to get this grass, they would at times, when the ranger was not around, fill their wagons from the forest. Hence the reason for giving a permit to one man. Mr. Farm Corn discontinued the cutting of grass in the forest at the end of August and there has been no other permit granted.

The forest is in fairly good condition and with the exception

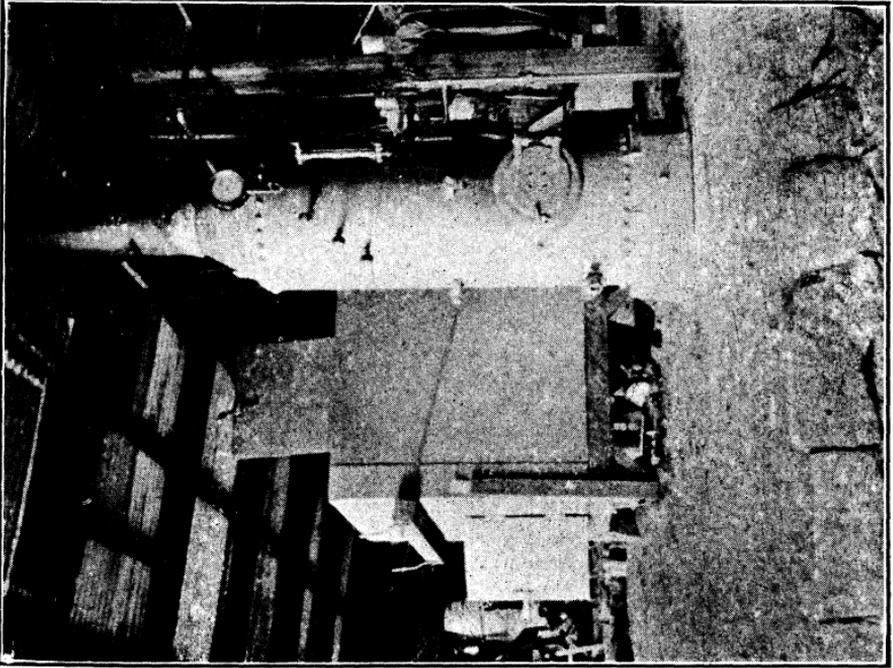


Plate 6. Fig. 1. Soil Sterilizer, Makiki Nursery.

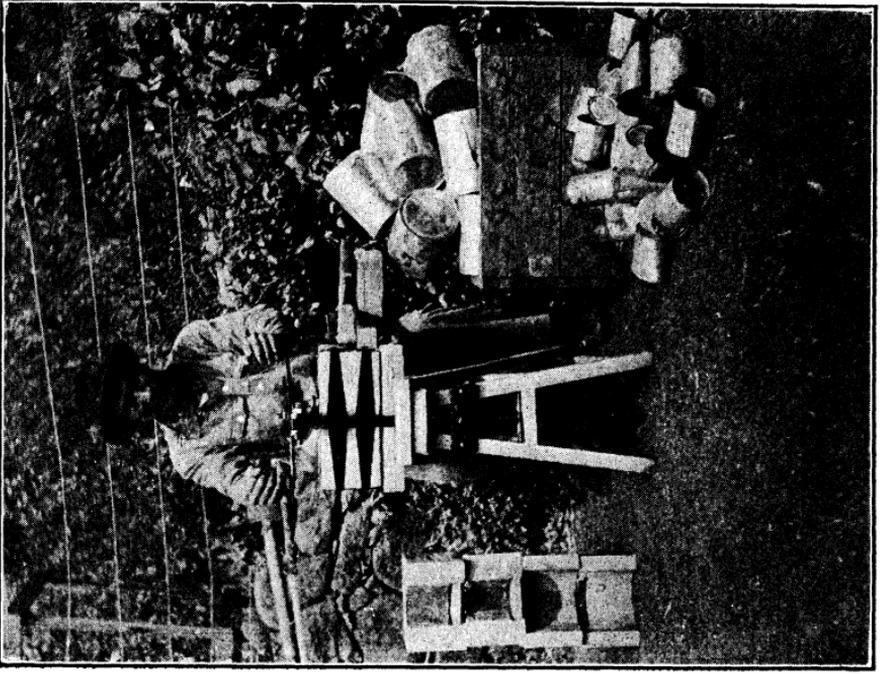


Plate 6. Fig. 2. Tin Can Cutter at Makiki Station.  
Prepares can for tree pots.



of a few dead trees that require to be removed, and the thinning out of parts where the trees are getting crowded, there is little else required at this time.

The ranger, David Kapihi, has done good work in patrolling the forest and keeping the trails clear. There have been no fires in the vicinity of the forest during the period.

### *Honolulu Watershed Planting*

A commencement was made in July 1913 on the arrangements for the planting of Koa and Kukui trees on that portion of the Honolulu Water Shed lying between Round Top Hill and Tantalus Forest including Sugar Loaf Hill. The first work in connection with the planting was the making of trails. A new trail was made from the Makiki Station along the ridge on each side of Herring Valley and leading up to the base of Sugar Loaf Hill where a location for a small nursery was selected. A new trail was started from this point running across the face of Sugar Loaf Hill and connecting with the Round Top trail. Another trail from the small nursery and running across the head of Opu Valley was built so that trees could be packed over to the Round Top side of Opu Valley, also, as a convenience for the men while at work. These trails will all be necessary as a protection in case of grass or brush fires and ought to be kept clear during the dry season at least.

At the small nursery at the base of Sugar Loaf a shed, 12 x 24 feet, with accommodations for tools, water barrels and a space for men to do potting and other work during heavy rains, had to be built. The material for this shed which is constructed of corrugated iron and 2 x 4 scantlings, was, with the exception of a few sheets of roofing iron, taken from the forestry buildings in Nuuanu Valley. The material was carted to the Makiki Station and from there carried by the men along the new trail to the base of Sugar Loaf Hill. Water barrels for storing water for sprinkling the young trees in the nursery had to be packed in the same manner as there is no wagon road near.

The actual planting of trees commenced on the face of Sugar Loaf Hill on October 1, 1913. All of the hill was planted in Koa with the exception of about 200 Kukui trees planted near the bottom. The work of filling up all the waste spaces lying between Round Top and Tantalus is progressing and in a short time this part of the Reserve will have a different appearance and will be of much more value as a watershed. The area now planted is 39 acres. The number of trees planted up to the end of December 1914 is as follows:

Koa .....	6,136
Kukui .....	1,749
	<hr/>
Total .....	7,885

These trees will require to be kept clear of grass and weeds until they get above the long grass and brush. A good many of the trees first planted are at the date of writing from four to six feet high.

Respectfully submitted,

DAVID HAUGHS,

Forest Nurseryman.

## Report of the Consulting Botanist

---

Honolulu, Hawaii, December 31, 1914.

The Board of Commissioners of Agriculture and Forestry,  
Honolulu, Hawaii.

Gentlemen:

I herewith present my report on the work carried on during the biennial period beginning January 1st, 1913 and ending December 31st, 1914, in my capacity as Consulting Botanist.

The writer's connection with the Forestry Division as an active staff member was severed on September 1st, 1911, but he was immediately appointed by your Board to the position of Consulting Botanist, in which capacity he has given advice and has assisted in the introduction of useful plants into this Territory. On the most noteworthy work of this nature he will report in the following lines.

In the earlier part of 1913 the writer was engaged in writing his book on the Indigenous Trees of the Hawaiian Islands, which was based mainly on the material collected by him under the auspices of the Board of Agriculture and Forestry. The volume, containing 530 pages with 215 plates, appeared June 26, 1913. The money necessary for the publication of the book in question was subscribed by some of our very liberal citizens.

About the same time there was issued by the Board of Agriculture and Forestry, Botanical Bulletin No. 2, entitled: "List of Hawaiian Names of Plants," by J. F. Rock. This bulletin comprises a most comprehensive list of all Hawaiian names of plants of all types, including mosses, lichen, sea weeds, herbs, shrubs, and trees which information was secured by the writer while in the employ of your Board.

At the request of the President of your Board the writer compiled an extensive article on the forest covering of all the islands of the Hawaiian group, the manuscript of which now awaits publication. The writer would recommend the same to be published as Bulletin No. 3 of your Board, because he has received many inquiries from various institutions throughout the United States asking if the introduction in the writer's book on the Indigenous Trees of Hawaii has been printed separately. The article furnished by the writer on the forest covering of the islands of the Hawaiian group is in a great measure the same as his introduction in the book on trees, only it has been enlarged and does not discuss the group collectively; but each island, with

its various zones, has been discussed separately and in an appendix a review is given of the plant families which are predominant in the forests of these islands, stating their percentage in each of the various zones.

On July 3, 1913, the writer left Honolulu on an exploration trip to the Island of Palmyra, at the invitation of the Hon. Henry E. Cooper. Much material was collected, especially seed of the two new species of *Pandani* (Screw pines) which are now thriving well in this Territory.

In the month of September, 1913, the writer was especially commissioned by your Board as scientific explorer for the purpose of collecting seeds of useful as well as ornamental plants, and introducing the same into this Territory. On September 13, 1913, the writer started on his trip around the world at his own expense, permission having been given him by the Board of Regents of the College of Hawaii to carry on investigations in the various herbaria of Europe. He was properly commissioned to that effect. He was also commissioned by the United States Department of Agriculture as Collaborator of the Bureau of Plant Industry for the purpose of collecting or causing to have collected seeds of various plants, especially bamboos from the lower forests of Sikkim.

The writer proceeded on the U. S. Army Transport "Thomas" to Manila, Philippine Islands, via. Guam, in which latter place he collected seeds of various trees during his brief stay in that port.

While in the Philippines the writer spent some time with the officers of the Forest School at Los Banos, ascending Mt. Maqueling, where he collected a large quantity of seeds, as well as in the fine natural arboretum around Los Banos Forestry Station. He then proceeded with several members of the Philippine Forestry staff to Batan Province, Luzon, where Mt. Mariveles was partly ascended and seeds collected, which, with instructions in regard to planting, were forwarded to Honolulu.

From the Philippines the writer embarked for Hong Kong and Canton, China. In the former place arrangements were made with the Director of the Botanic Gardens to forward seeds of Chinese conifers and *Araliaceae* to Honolulu.

In Singapore the writer was the guest of the Director of the Botanic Gardens, who helped him greatly in collecting the seeds of many of the wonderful plants found in that renowned garden. The result was the forwarding of a box of seeds of many species of palms and large trees, a good many of which are now growing at the Government Nursery.

From Singapore the writer proceeded to Johore, Penang and Rangoon. Unfortunately the writer was taken ill at Penang, which

prevented him from carrying out his plans in that region. From Burmah he sailed for Calcutta and from there took the train for Darjeeling, the summer residence of the Bengal Government in the lower Himalayas at an elevation of 7,000 feet. In this most wonderful of all regions the writer stayed a month, making various journeys into the hills. He employed several Nepalese and Tibetans, instructing them to collect seeds of as many forest trees as they could find. As the trees found in this region are of a more temperate climate, they were intended for planting on some of our high mountains, such as Mauna Kea and Mt. Haleakala. Seeds of not less than 82 species of trees and shrubs were collected in these magnificent hills and were forwarded to Honolulu. Arrangement was made to have collected a large amount of seeds of a giant bamboo (*Dendrocalamus Hamiltonii*) growing in the Teesta valley and in the lower regions of Sikkim. This bamboo was desired by the U. S. Department of Agriculture for the purpose of experimental planting along the Panama canal. It is one of the bamboos which flowers and fruits abundantly nearly every year. Over a large area this bamboo was in flower during the writer's visit in that district.

At Calcutta the writer secured the help of the Director of the Botanic Garden at Sipbur in regard to the collecting and forwarding of seeds of valuable trees and shrubs and he has since been informed by Mr. Haughs of the Board of Agriculture that seeds have already been received from that garden.

From Calcutta the writer journeyed through the whole of Northern India, visiting the districts of Benares, Agra, Delhi, Lahore in the Punjab and from Rawal pindi, the junction to Kashmere to Peshawar in the northwest frontier province. There he secured a pass from the residing political agent which enabled him to cross the mountains intervening between British India and Afghanistan by way of the famous Khyber pass.

The mountains there are extremely arid and barren; in the Khyber proper he found trees of an Acacia and other leguminous shrubs which reminded him very much of the Algaroba; seeds were secured but unfortunately they never arrived in Honolulu. From the extreme northwest corner of India the writer traveled across to Bombay, Central India, Hyderabad in the Deccan, and via Madura to Tuticorin in the extreme south of India, embarking there for Ceylon. Shortly after arrival at Colombo he proceeded to Kandy, the old Singhalese capital, spending most of his time in the famous botanic gardens at Peradenya, collecting seeds.

At Colombo the writer embarked for Egypt, where he visited the sugar producing districts and the largest sugar mill in the world near Assiut. He collected seeds of many plants below Assuan, along the Nile. The most notable introduction into our

Territory from there is the Dom palm (*Hyphaene thebaica*), one of the very curious fan palms that branches like a Pandanus. It is known as the Ginger bread tree, as its fruit, which is edible, savors of ginger. The seeds brought back by the writer have already germinated and the young plants should be planted in a conspicuous place in some park or at the Nursery grounds, where they can readily be seen.

After journeying through Algeria and collecting in the Atlas mountains, especially near El Kantara, the writer visited the famous oasis Biskra, with its wonderful date palm gardens, journeying south to the great oasis of Tuggurt in the land of the dunes.

From Algeria he went straightway via Italy to Berlin where he spent most of his time at the Royal Botanical Museum working up the Hillebrand collection, making drawings of the types, etc. For the purpose of determining some of the more difficult Hawaiian genera, Herbarium material was forwarded from Honolulu to Berlin, which the writer compared with the Hillebrand, Wawra, and Chamisso collections at the Royal Botanical Museum. The authorities of the latter institution presented the Herbarium with almost a complete collection of Hawaiian plants, containing portions of types and co-types from the Hillebrand collection. This, with the co-types from the Asa Gray collection, generously given by the Gray Herbarium, Cambridge, Massachusetts, makes the Herbarium of your Board, now in the safe keeping of the College of Hawaii, the most complete and valuable collection of Hawaiian plants in the world.

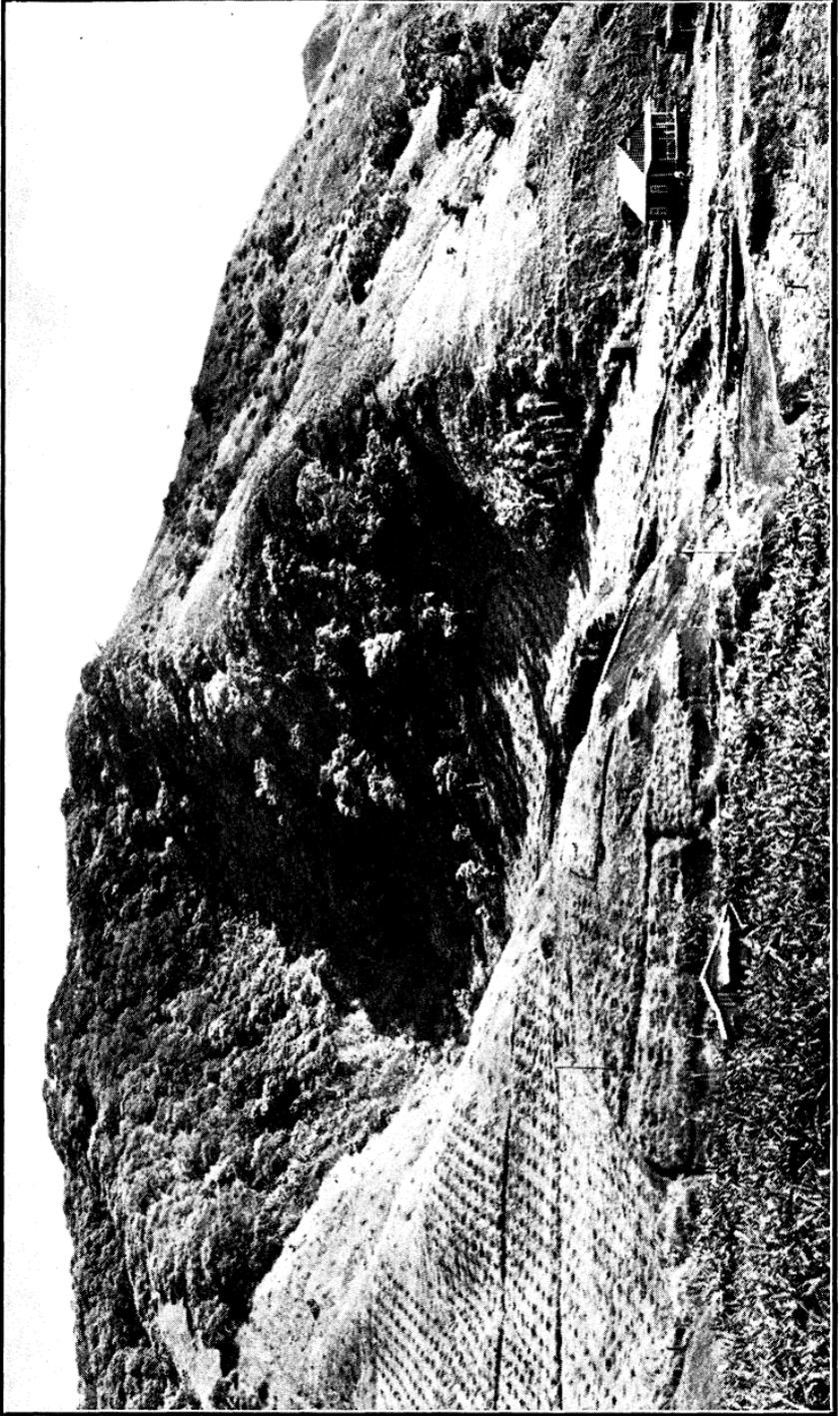
Respectfully submitted,

JOSEPH F. ROCK,

Consulting Botanist.



Plate 1.



MANOA RANGER STATION, NEAR HONOLULU, OAHU.

TERRITORY OF HAWAII  
**BOARD OF AGRICULTURE AND FORESTRY**

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**DIVISION OF FORESTRY**  
C. S. JUDD, Superintendent

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**REPORT**  
OF THE  
**Division of Forestry**  
FOR THE  
**Biennial Period Ending December 31, 1916**

*Reprint from the Report of the Board of Commissioners  
of Agriculture and Forestry*



HONOLULU, T. H.  
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1917



Forestry Library  
S. T. Dana  
19-1930

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# Division of Forestry

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## Report of the Superintendent of Forestry

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Honolulu, Hawaii, December 31, 1916.

The Board of Commissioners of  
Agriculture and Forestry,  
Honolulu, Hawaii.

Gentlemen: I have the honor to submit as follows the report of the Division of Forestry for the calendar years 1915 and 1916.

### INTRODUCTION.

Upon the assumption of my duties as Superintendent of Forestry on January 16, 1915, I cast over the forest situation in the Islands and it at once became very evident that our native forests are more valuable, not for the timber which they produce, but for the beneficial influence which they exert on a far more valuable product—water. To insure a permanent and adequate supply of water there must be forests. This requirement naturally resolved the chief activities of this Division into two main divisions, first, forest protection, which seeks to protect from damage by stock, human beings and fire the present forest reserves, to extend the reserves by adding to their present areas where possible, and to place them under better administration by an enlargement of the forest ranger force, and, second, forest extension, which seeks to reclothe with suitable forest trees bare hillsides and other areas in water producing regions which have been denuded of their forest cover.

The chief activities of this Division during the past two years have therefore, continued along these lines with expansion due to better facilities and have followed the same general trend as those laid down by my worthy predecessor, Prof. Ralph S. Hosmer, to whose capable mind and hand fell the performance of the pioneer forest work in Hawaii.

Other activities have consisted of the encouragement of tree planting to meet divers demands under various conditions by introducing, propagating and distributing seedling trees and other plant material, and of the giving of advice and suggestions

on various forest problems. These latter activities have during the past two years, as previously, been very ably handled by the Forest Nurseryman, Mr. David Haughs.

## FOREST PROTECTION.

### ADMINISTRATIVE FIELD FORCE.

It is a pleasure to report that during the two years just passed it has been possible, as a part of the general forest protection plan, to begin an actual administration of the forest reserves on the ground and to make them more than mere paper reserves. With the appropriation available and as fast as the administrative requirements of forest reserves in the different districts could be ascertained and suitable men could be found to fill the position, the forest ranger force was increased from the one, who had already been employed for several years, to six, so that now every main island has at least one forest ranger to look out for the government's interests in the forest reserves.

The present force of forest rangers with dates of appointment and districts is as follows:

*Kauai*: Kaina D. Lovell, Forest Ranger for the Island of Kauai, with headquarters at Anahola. Appointed May 1, 1915.

*Oahu*: David Kapihe, Forest Ranger for Tantalus, Oahu, with headquarters on Tantalus, Honolulu. Appointed March 1, 1906.

E. H. Hipple, Forest Ranger for Palolo, Manoa, and Nuuanu Valleys in the Honolulu Watershed Forest Reserve, with headquarters at the Manoa Ranger Station, Oahu. Appointed November 15, 1915.

John Pililaa, Forest Ranger for Waianae, Oahu, with headquarters at Waianae. Appointed December 1, 1915.

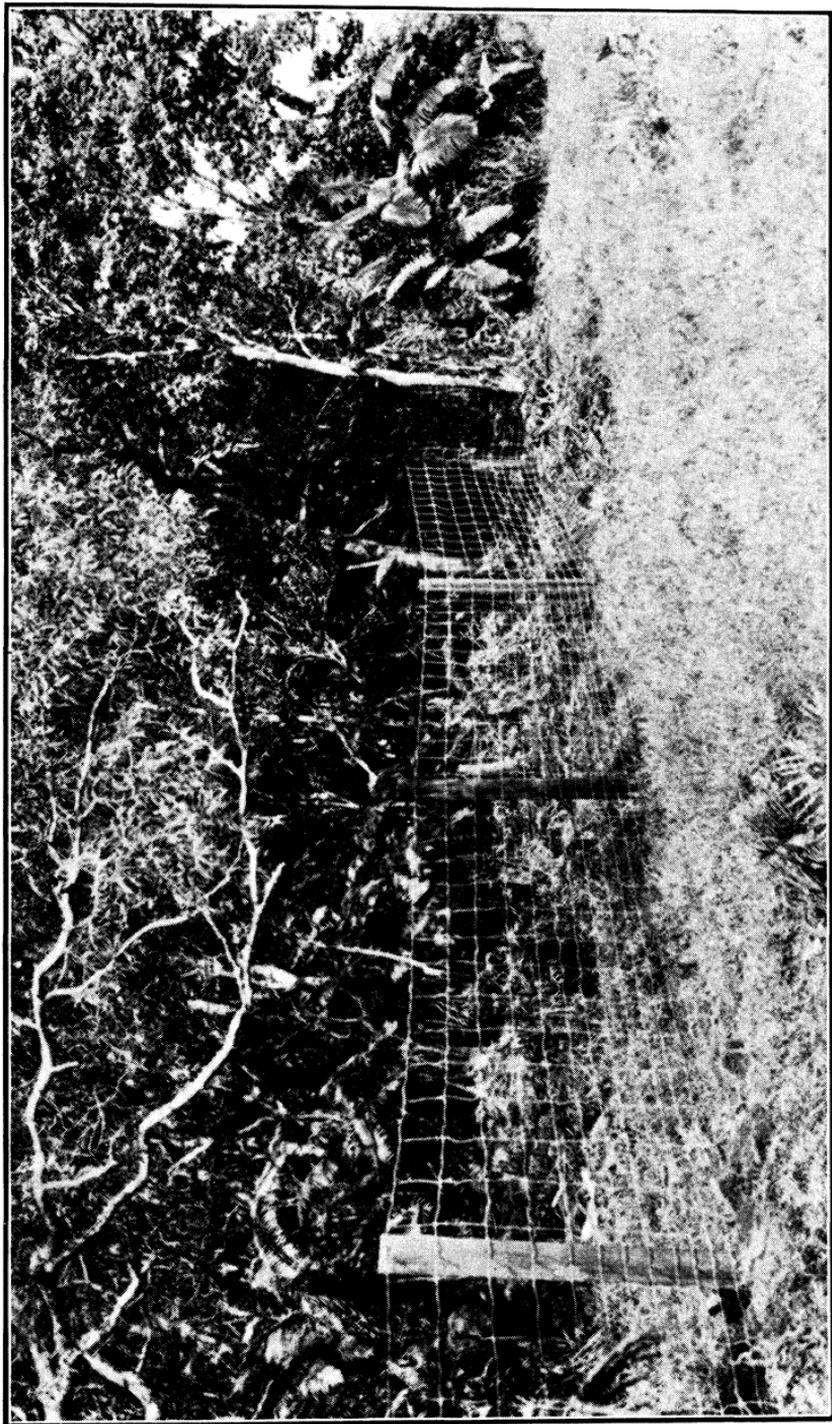
*Maui*: James Lindsay, Forest Ranger for the Island of Maui, with headquarters at Haiku. Appointed December 1, 1916.

*Hawaii*: Francis B. Dodge, Forest Ranger for the Island of Hawaii, with headquarters at the Upper Olaa Ranger Station (P. O., Volcano House). Appointed July 15, 1916.

For the present it is likely that this force of six rangers will be sufficient to handle the field work on the different Islands, but as more forest reserve land reverts to the government by lease expiration, it is probable that one additional ranger will be needed on Kauai, one on Maui, and one on Hawaii.

It is the duty of these forest rangers to protect government lands in the forest reserves from damage by man, unconfined stock, and fire, to repair and build new fences, to enforce the rules and regulations pertaining to forest reserves, to plant trees,

Plate 2.



HOG-PROOF FENCE BUILT BY THE DIVISION OF FORESTRY AROUND THE KOA GROVE RESERVE  
ON THE VOLCANO ROAD, HAWAII.



and to perform any special work which may be assigned to them. A great deal of work along these lines has already been accomplished by the enlarged ranger force.

#### NEW FOREST RESERVES.

During the past biennial period two more forest reserves have been added to the general forest reserve system, bringing the total number up to 39 with a total area of 798,344 acres, of which 546,352 acres or 68.5 per cent is government land.

The two new forest reserves are as follows:

The Manoa Ranger Station, 15 acres in area, which includes a part of the land of Kahoiwai, in Manoa Valley, Oahu, near Honolulu, set aside by proclamation of the Governor on May 9, 1916. It is a narrow strip of land, entirely in government ownership, running from near the Manoa stream to the top of a spur of the Manoa-Palolo ridge and embracing a small valley the upper portion of which is covered with a splendid grove of koa, kukui, and other native forest trees. The land was set aside partly for headquarters for the ranger in this district, but mainly because the location afforded a suitable site for experimental tree planting. What has been accomplished in this respect will be mentioned later on in this report.

The Round Top Forest Reserve, 115 acres in area, which includes a portion of the land of Makiki, Oahu, set aside by proclamation of the Governor on August 10, 1916. This reserve includes only government land on the familiar hill back of Honolulu called Round Top, beginning at the upper turn of the new Round Top Drive and extending as far back as Sugar Loaf. The Makiki valleys of the Honolulu Watershed Forest Reserve bound it on the northwest side and Manoa Valley lies on the other side. The area has great scenic value and is very accessible by a new, well-constructed road.

COUNTY OF KAUAI.

No.	Name	District	Island	Total Area Recom- mended to be Reserved, Acres	Area Gov- ernment Land, Acres	Area Private Land, Acres	Date of Proclamation	Proclamation Signed by
5	Halelea	Halelea	Kauai	37,500	10,990	25,510	Aug. 24, 1914	A. L. C. Atkinson
6	Kealia	Puna	Kauai	9,335	7,385	2,550	Mar. 9, 1906	"
13	Na Pali-Kona	Na Pali and Kona	Kauai	60,540	40,650	19,890	June 12, 1907	"
19	Lihue-Koloa	Puna and Kona	Kauai	29,260	13,365	15,895	June 5, 1909	W. F. Frear
20	Molooa	Koolau	Kauai	5,621	3,578	2,043	June 5, 1909	"
Total for Kauai				142,856	75,968	66,888		

CITY AND COUNTY OF HONOLULU (OAHU).

1	Kaipapau	Koolauloa	Oahu	913	913	.....	Nov. 10, 1904	G. R. Carter
7	Ewa	Ewa, Waianae and Waialua	Oahu	28,550	5,151	23,399	Mar. 9, 1906	A. L. C. Atkinson
10	Waianae-kai	Waianae	Oahu	3,653	3,546	107	Sept. 7, 1906	G. R. Carter
11	Luahalei	Waianae	Oahu	3,743	3,743	.....	Nov. 30, 1906	"
21	Pupukea	Koolauloa	Oahu	865	865	.....	May 10, 1910	W. F. Frear
28	Nanakuli	Waianae	Oahu	1,010	1,010	.....	June 4, 1913	"
29	Makua-Keauu	Waianae	Oahu	4,716	4,376	340	June 4, 1913	"
30	Kuaokala	Waialua	Oahu	434	434	.....	June 4, 1913	"
34	Hon. Watershed	Honolulu	Oahu	6,950	5,000	1,950	Oct. 13, 1913	E. A. Mott-Smith
35	Kuliouou	Honolulu	Oahu	214	214	.....	Feb. 13, 1914	L. E. Pinkham
38	Manoa Ran. Sta.	Honolulu	Oahu	15	15	.....	May 9, 1916	"
39	Round Top	Honolulu	Oahu	115	115	.....	Aug. 10, 1916	"
Total for Oahu				51,178	25,382	25,796		

COUNTY OF MAUI.

4	Koolau, Maui	Koolau and Hamakualoa	Maui	42,969	30,230	12,739	Aug. 24, 1905	A. L. C. Atkinson
12	Hana	Hana	Maui	14,825	13,767	1,058	Nov. 30, 1906	G. R. Carter



## PROPOSED FOREST RESERVES.

The preceding table of forest reserves includes the bulk of government forest land in the Territory which should be protected and maintained as such, but there are a few additional smaller remnants of government forest land either in separate units or adjacent to existing reserves which it is planned to have set apart as soon as the surveys and descriptions are completed. These are at Puukapele and Nonou on Kauai; Mokuleia, Waiahole, and Hauula on Oahu; Makawao on Maui; and Panaewa and Kapapala on Hawaii.

## RULES AND REGULATIONS.

Up to within less than a year ago, this Division had been without a definite set of rules for the administration and protection of government lands within forest reserves, and although the Board had statutory power to adopt such rules, only one rule concerning grass cutting in Nuuanu, of merely local application, had been passed.

## RULE II.

With the placing of a forest ranger force in the field the necessity for a general rule for the administration of forest reserves became apparent, and after a careful study of the essential points to be covered in the administration and protection of government lands in the reserves, Rule II was prepared and passed by the Board, and on April 5, 1916, received the approval of the Governor of Hawaii, thus giving it the full force and effect of law. Several provisions in this rule have been based on the regulations of the U. S. Forest Service, which have proven satisfactory for many years on the 150 million acres of National Forest land all over the United States, and so far this new rule has worked out well for the forest reserves in this Territory.

## TERRITORY OF HAWAII.

## BOARD OF COMMISSIONERS OF AGRICULTURE AND FORESTRY.

## RULE II. DIVISION OF FORESTRY.

The Board of Commissioners of Agriculture and Forestry hereby makes the following rule and regulation for the preservation and administration of forest reserves:

Section 1. The following acts are hereby forbidden on government lands in forest reserves of the Territory of Hawaii and declared to constitute trespass punishable by fine:

(a) The cutting, killing, destroying, girdling, chopping, injuring or otherwise damaging, or the removal, of any timber, young tree

growth, or any other material, except as authorized by permit from the Superintendent of Forestry.

(b) The grazing of any livestock, except as authorized by permit from the Superintendent of Forestry.

(c) The hunting of any wild animals, except as authorized by permit from the Superintendent of Forestry.

(d) Having or leaving in an exposed or insanitary condition camp refuse or debris of any description, or depositing or being or going thereon and depositing in the streams or other waters within or bordering upon government lands in the forest reserves any substance or substances which pollute or are liable to cause pollution of the said streams or waters.

(e) The going on or being upon government lands within a forest reserve with intent to destroy, molest, disturb, or injure property belonging to the Territory of Hawaii, or used by the Territory of Hawaii in the administration of the forest reserves.

(f) The wilful tearing down, defacing, or disturbing of any public notice or survey monument posted within a forest reserve.

(g) Squatting upon government land in a forest reserve, or constructing or maintaining any kind of works, structure, fence, inclosure, road or trail, without a permit, except as otherwise allowed by law.

(h) The tearing down, breaking down or through, or molesting in any manner of a forest reserve boundary fence or gate or a fence or gate on government land within a forest reserve.

Section 2. Any person violating the above rule shall be guilty of a misdemeanor and upon conviction thereof shall be punished by a fine not to exceed five hundred dollars (\$500.00), as provided by Section 529, Revised Laws of Hawaii of 1915.

Section 3. This rule shall take effect upon its approval by the Governor.

Approved:

LUCIUS E. PINKHAM,  
Governor.

Honolulu, Territory of Hawaii,  
April 5, 1916.

### RULE III.

At about this same time it became apparent that another rule, of local application, was necessary to assist in safeguarding the purity of that part of Honolulu's water supply which comes directly from the mountains. Since the land surrounding the upper three reservoirs in Nuuanu Valley, Oahu, is under the control of this Board, it seemed logical for the Board to supplement the work of the Board of Health and the City Water Works in furnishing pure water by passing a rule which would keep the public and stock from wandering over the area draining into the upper three reservoirs and thus remove this danger of water pollution. Rule III, forbidding trespassing on this drainage area by all except certain officials and others in the discharge of their duties, was accordingly passed by the Board and approved on March 31, 1916, by the Governor.

## TERRITORY OF HAWAII.

## BOARD OF COMMISSIONERS OF AGRICULTURE AND FORESTRY.

## RULE III. DIVISION OF FORESTRY.

The Board of Commissioners of Agriculture and Forestry hereby makes the following rule and regulation for the purpose of protecting from contamination the drainage areas tributary to the Honolulu water supply system in Nuuanu Valley, within the Honolulu Watershed Forest Reserve:

Section 1. All persons, except forest rangers and other persons employed by the Territory of Hawaii, by the City and County of Honolulu, by the United States, and by telephone and electric companies, in the discharge of their duties, are hereby prohibited from trespassing, and all persons are hereby prohibited from allowing any stock to graze, upon that portion of the Honolulu Watershed Forest Reserve, herewith described, to wit:

Beginning at the Government Survey Trig. Station "Pali (New)" above the Nuuanu Pali Road, as shown on Government Survey Registered Map No. 2554, and running:

1. In a Southeasterly direction along the summit of the Koolau Range to the junction of Nuuanu and Manoa Valleys to a peak called Konahuanui;
2. Thence Southwesterly down the dividing ridge between Nuuanu and Manoa Valleys to the Government Survey Trig. Station "Kaumuhonu" on the peak of that name;
3. Thence still Southwesterly down the dividing ridge between Nuuanu and Pauoa Valleys, to a prominent peak in said ridge about 3000 feet Southwest of Kaumuhonu;
4. Thence Northwesterly down a well defined lateral ridge to the edge of a deep gulch, across said gulch, over and across grass land, to the Luakaha Falls, the boundary being, however, a direct line from the top of the peak described in Course 3 to the Luakaha Falls;
5. Thence down said falls and the middle of Nuuanu stream to its junction with an angle in the boundary of Grant 4561, Sec. 2 (Luakaha of C. M. Cooke);
6. Thence Northeasterly and Northwesterly along the mauka boundary of Grant 4561 (Luakaha of C. M. Cooke), and across the Nuuanu Pali Road to the Northwest or Ewa side of said road;
7. Thence Southwesterly down along the Northwest or Ewa side of said road to its intersection with the mauka boundary of Grant (P. W.) 7 to J. A. McCandless;
8. Thence along the mauka boundaries of Grant (P. W.) 7 to J. A. McCandless, Grant 5476 to A. Lewis, Jr., Grant (P. W.) 45 to A. Lewis, Jr., and across the old Nuuanu Pali Road to the East corner of Grant 6028 to J. R. Galt;
9. Thence along the mauka and Ewa boundaries of Grant 6028 to J. R. Galt, Grant 5572 to A. F. P. McIntyre, et al., Grant 5552 to Charlotte A. Carter, et al., Grant (P. W.) 42 to

A. L. C. Atkinson, Deed of Kamehameha III to Niniko dated June 15, 1854, and recorded in Liber 26, p. 53, to the Waolani Ridge and along said ridge to the dividing ridge between Nuuanu and Kalihi Valleys;

10. Thence Northeasterly along the dividing ridge between Nuuanu and Kalihi Valleys to the main Koolau Ridge;
11. Thence Easterly along the summit of the Koolau Range to the point of beginning.

Section 2. This prohibition shall not apply, however, to the use of the main government road for the purpose of travel and transportation within the area described in Section 1.

Section 3. Any person violating the above rule shall be guilty of a misdemeanor and upon conviction thereof shall be punished by a fine not to exceed five hundred dollars (\$500.00), as provided by Section 529, Revised Laws of Hawaii of 1915.

Section 4. This rule shall take effect upon its approval by the Governor.

Approved:

LUCIUS E. PINKHAM,  
Governor.

Honolulu, Territory of Hawaii,  
March 31st, 1916.

Both rules have been published in the Japanese, Chinese, Hawaiian and Portuguese, as well as in the English, newspapers of Honolulu and other parts of the Territory, and Rule II has been printed on cloth and posted along the conspicuous boundaries of forest reserves.

#### KAHOOLAWE.

Brief mention may be made here of the present condition of the Island of Kahoolawe, which was created a forest reserve on August 25, 1910. The necessity of ridding the island of all stock in order to let nature work to the best advantage in recuperating the vegetative cover has not been lost sight of and several expeditions with this in view have been made to the island during the last two years. One of these resulted in the killing of 286 goats, and on another occasion 80 sheep were removed from the island. It is planned soon to make several more systematic drives in the effort to get the last animal, so that not a single goat or sheep will remain on the island. During the past ten years, by actual count, over 4,300 goats and all but about 50 sheep have been killed or removed from Kahoolawe, and this reduction in the number of stock has already resulted in a very marked improvement in the vegetative cover of the island. While a large part of the top of the island, where the soil has been blown away, still remains bare hardpan, the larger fringe

on the slopes is covered with a heavy stand of native pili grass, which after freshening rains resembles a huge field of grain. Throughout all of this, especially in the gulches, young algaroba trees are coming up in great profusion from seed dropped by the few work horses which have been on the island. These young trees in time promise to become quite a forest and a source of revenue to the Board. Other native grasses and weeds have come up in great profusion and cannot help but tend to prevent further erosion and to cover bare land which has already been denuded.

#### FOREST FENCING.

In pursuance of the forest protection plan, the greatest attention of this Division has been devoted during the past biennial period to fencing the boundaries of government lands in the forest reserves where the native forest is menaced by wandering stock. Realizing that this phase of work should be gone into on an extensive scale, the Division purchased, in June 1915, enough wire of the most durable quality available to construct a 5-strand fence on 20 miles of boundary. The wire is No. 6 gauge, and is extra heavily galvanized. The wisdom of this purchase has since been proven, because, on account of the increased cost of spelter due to the war, the value of this wire has risen from \$3.52 per coil, its purchase price, to over \$5.00 per coil.

The standard fence of the Division of Forestry consists of five smooth galvanized wires stretched on 7-foot redwood posts set two feet in the ground, 20 feet apart, with three intermediate Douglas fir spreaders. This, of course, has to be varied in places on account of topography and for other reasons.

Previous to my incumbency, 11.52 miles of fences had been constructed by the Division of Forestry during a period of five years on the boundaries of government lands in forest reserves, as will be seen by the following table:

#### FENCES CONSTRUCTED 1910-1914.

Date Completed	Island	Reserve	Location	Length (miles)
July, 1910.....	Oahu.....	Pupukea .....	Pupukea .....	1.70
Nov., 1913.....	Maui.....	Waihou Spgs. ...	Waihou .....	.54
Dec., 1913.....	Kauai.....	Moloaa .....	Moloaa .....	1.61
July, 1914.....	Kauai.....	Lihue-Koloa .....	Wailua .....	1.42
Aug. 1914.....	Hawaii....	Kau .....	Ninole .....	1.25
Aug. 1914.....	Oahu.....	Lualualei .....	Mikilua .....	1.52
Nov., 1914.....	Maui.....	Hana .....	Nahiku .....	1.73
Nov., 1914.....	Hawaii....	Waiaha Spgs.....	Waiaha .....	1.75
Total .....				11.52



STOCK-PROOF FENCE MADE OF ALGAROBA POSTS, LUALUALEI RESERVE, OAHU.



During the past two years the activities of this Division have resulted in the construction of 14.32 miles of new fences on government forest reserve boundaries on three of the largest islands, as shown by the following table:

FENCES CONSTRUCTED, 1915-1916.

Date Completed	Island	Reserve	Location	Length (miles)
Dec., 1915.....	Hawaii....	Olaa For. Park..	Koa Grove....	.44
Dec., 1915.....	Kauai....	Kealia .....	Anahola .....	2.41
Feb., 1916.....	Kauai....	Moloaa .....	Aliomanu .....	.32
Aug., 1916.....	Oahu.....	Lualualei .....	Haleakala ....	1.40
Sept., 1916.....	Oahu.....	Hon. W't'rshed..	Palolo .....	.41
Oct., 1916.....	Hawaii....	Olaa For. Park..	Volcano Rd....	5.52
Oct., 1916.....	Hawaii....	Upper Olaa .....	Ranger St....	.26
Oct., 1916.....	Oahu.....	Hon. W't'rshed..	Luaalaea, Manoa .....	.21
Oct., 1916.....	Oahu.....	Hon. W't'rshed..	Waiakeakua, Manoa .....	.20
Oct., 1916.....	Oahu....	Manoa R. S.....	Kahoiwai, Manoa .....	.75
Nov., 1916.....	Hawaii....	Kohala .....	Kawaihae I....	1.57
Dec., 1916.....	Hawaii....	Upper Olaa .....	Lots 1 to 4....	.83
* Total .....				14.32

Plans have been made for constructing, before the end of the present biennial fiscal period, nine additional miles of forest fences which will exhaust the balance of the available appropriation.

Attention has been given as well during the past two years to the repair of old and broken fences, for the maintenance of existing fences is as important as the construction of new ones, since an old fence with breaks in it is just as ineffective against stock as no fence at all. On the other hand, a broken fence repaired and put in good shape again is as valuable a stock-barrier as a new fence, and is usually made effective at a lesser cost than a new fence. Repairs have been made during the past two years to 13.64 miles of forest reserve boundary fences which have been put into first-class shape as follows:

FENCES REPAIRED, 1915-1916.

Date Completed	Island	Reserve	Location	Length (miles)
July, 1915.....	Kauai....	Moloaa .....	Aliomanu .....	1.48
Aug., 1915.....	Kauai....	Lihue-Koloa ...	Wailua .....	1.42
Sept., 1915.....	Kauai....	Kealia .....	Kapahi .....	.64
Apr., 1916.....	Oahu.....	Pupukea .....	Pupukea .....	1.70
June, 1916.....	Oahu.....	Lualualei .....	Lualualei .....	6.65
Dec., 1916.....	Hawaii....	Hilo .....	Piha .....	1.75
Total .....				13.64

Where circumstances have permitted, the cooperation of the owners of adjacent private lands has been secured to the extent of their paying one-half the cost both of constructing new fences and of repairing existing fences.

It will be seen from the above tables that during the two years covered by this report, 14.32 miles of new forest reserve fences have been constructed, and 13.64 miles of existing fences have been repaired, making a total of approximately 28 miles of forest reserve boundaries effectively guarded from destructive stock. The beneficial results to the native forest from these protective fences can not but be noticeable within a very few years.

#### FOREST FIRES.

There were a few grass and forest fires during the year 1915, only one of which did damage to the native forest in a forest reserve. Owing to a rather rainy season during most of 1916 not a single forest fire occurred and only one or two small grass fires were reported.

The localities and dates of the fires in 1915 were as follows:

*February 6.* Kealia Forest Reserve, Kauai. Started by a homesteader burning brush at Kapahi and burned 125 acres of grass land and 150 acres of native forest. Was extinguished in three days by men working under District Fire Warden G. P. Wilcox.

*March 29.* Piihonua, Hawaii. Started by a native burning brush and burned over 200 acres of pasture and forest land privately owned. Was extinguished in four days by men working under District Fire Warden John A. Scott.

*August 14.* North Kohala, Hawaii. Burned over approximately 200 acres of privately owned grass land, but was extinguished in three days by men working under District Fire Warden S. P. Woods.

*August 29.* Kalena, Waianae-uka, Oahu. A grass fire which started on the military reservation on the Leilehua Plains and was driven by strong winds up to the native forest on the slopes of the Waianae Range. Extinguished in five days by United States troops.

*August 29.* Maili, Oahu. A grass fire on private land which burned over a few acres and was extinguished the same day by laborers from the Waialua plantation.

*September 5, 6 and 8.* Lihue, Oahu. Three grass fires on private lands which were extinguished on the same or following day by pineapple laborers of the Hawaii Preserving Co.

*October 6.* Wailupe-Niu Ridge, Oahu. A grass and brush

Plate 4.



NATIVE KUKUI AND KOA FOREST IN THE HONOLULU WATERSHED RESERVE PROTECTED BY NEW FENCE.



fire which burned over a few acres of private land and was extinguished the same night by men working under Judge A. Perry.

The grass fires which were reported in 1916 consisted of one on April 1 at Maili, Oahu, which burned over a few acres of privately owned land and was at once extinguished by laborers from the Waialua Plantation, and of a similar fire on April 9, near the same place, which covered about 50 acres of grass and brush and was extinguished the same day by the army.

The volunteer fire warden system established throughout the Territory as provided by law has proved its value, and the fire wardens have cheerfully rendered very effective service. In the effort to keep this organization efficient and up to date many changes in the staff have been made during the past two years, largely to replace men who have left their districts. A revised list of the district fire wardens and of the district foresters who look out for the interests of forestry in general, follows this report. The Board is about to appoint new officials to fill the vacancies appearing in this list.

### FOREST EXTENSION.

The native Hawaiian forest, if not depleted too greatly, will come back to its own, more or less satisfactorily, according to circumstances, if afforded adequate protection from stock and other damaging agencies. In the drier parts of the Islands, which are not exposed to the strong trade winds blowing off the sea, the algaroba, an exotic tree having a five-fold value, has been spread by stock which has fed on the pods until now, less than 90 years since its introduction, there are forests of this highly esteemed tree on the different Islands covering an estimated total of about 80,000 acres. But nature must be helped out in the work of reclothing with suitable trees the areas which have been deprived of original forest and particularly in the regions which are water producing.

The Division of Forestry aims to cover this work in four main ways: First, by the introduction from other countries of trees which may be better adapted to these Islands; second, by the maintaining of nurseries for the propagation and distribution of tree seedlings; third, by actual planting on government lands, and fourth, by giving advice on the best methods of raising and caring for trees planted for various purposes.

### TREE INTRODUCTION.

The Division is constantly on the watch for the opportunity of introducing trees from all parts of the tropical and semi-

tropical world which will fill the need which is felt in these Islands for forest cover and timber production. Probably a sufficient variety of trees suitable for fuel production, consisting mainly of the Eucalyptus genus, has now been introduced and successfully established here to meet this requirement, and it now remains to obtain and establish trees which will, if possible, reproduce and spread themselves naturally and quickly and which will be good timber producers in this land of imported lumber, or which afford good watershed protection where water is valued so highly.

In this work our Consulting Botanist has been of very great assistance, for he has not only arranged to have seed of timber producing trees from India sent to the Division, but has also personally collected seed and forest tree seedlings on a trip to Java and the Philippines and has brought them back for planting out by this Division.

The Acting Director of Forestry at Manila, P. I., has also been of the greatest assistance by sending seed of timber trees which promise to do well in these Islands. Among these are the Benguet pine, the narra and the acle, all valuable trees of the Philippine timber forests. Through the kindness of Mr. A. W. Carter, the Benguet pine from the Philippines and the Himalayan cypress, silver fir and the blue pine from India are being raised at a nursery at Keanakolu, Hawaii, for planting out on the slopes of Mauna Kea.

By seed exchanges with botanical gardens and agricultural stations all over the world many new trees have been successfully introduced. From the station near Tamatave, Madagascar, two pods of the African tulip tree, *Spathodea campanulata*, a stately tree with brilliant, orange-red blossoms, previously represented here by only a few specimens, were received, and from these three thousand seedlings were successfully raised and distributed for general ornamental planting.

A new juniper from Jamaica, *Juniperus australis*, introduced in 1914, has been successfully grown here, as has the Bermuda juniper, *Juniper Bermudiana*, the seed of which was sent here by Mr. Gerrit P. Wilder in 1911.

Each September during the last two years, when the crop was ripe, Mr. Eric A. Knudsen has kindly furnished this Division with seed of the New Zealand karaka tree, *Corynocarpus lacrygata*, which was introduced by his parents about 36 years ago and planted at Halemanu, Kauai, where it is spreading rapidly and forms a good watershed cover. This karaka seed has been distributed for planting on parts of the Islands where forest protection for water production is desired and has also been planted on government forest reserves of the same nature.

Through the kindness of Messrs. A. W. van Valkenburg and E. C. Smith several pounds of seed of the Australia red cedar, *Cedrela australis*, personally collected by Mr. Smith in Australia, were turned over to this Division in 1916 and successfully propagated. These have been planted out on government forest reserves, and also distributed to 22 enthusiastic tree planters in various localities on six of the Islands, who have promised to plant them out, care for them systematically and report on their growth. In this manner the best situation for this tree will be determined. The Australian red cedar, allied to the Spanish cedar from which cigar boxes are made, is considered the most valuable timber tree in New South Wales and should be a boon to these Islands.

#### TREE PROPAGATION AND DISTRIBUTION.

In order to encourage tree planting throughout the Territory, this Division, as in the past, has continued to grow and distribute free or at cost price the trees which are in popular demand. Besides the forest, shade and flowering trees, a quantity of flowering shrubs and vines has also been grown and given out mainly to the occupants of the Army posts, who usually desire quick results in the beautification of their quarters.

In addition to the Government Nursery at Honolulu, the Division has grown and distributed trees from its two sub-nurseries; one at Hilo, Hawaii, in charge of Brother Matthias Newell and the other at Homestead, Kauai, in charge of Mr. Walter D. McBryde. Further details concerning tree distribution may be found in the following report of the Forest Nurseryman, who is in direct charge of this work.

#### ARBOR DAY.

To instill interest in tree planting, especially among the school children on Arbor Day, which was first celebrated in Hawaii in 1905, the government nurseries have made it a practice to distribute trees free of charge to all who desire to plant in celebration of the day. In 1915, by proclamation of the Governor of Hawaii, Arbor Day was celebrated on November 19, and on this occasion, besides the trees shipped out, 1,350 school children personally came to the Government Nursery in Honolulu and each took away one tree for planting. In 1916 Arbor Day was similarly celebrated on November 17, this month being a suitable season for planting, so that the trees may have the advantage of the winter rains. An effort has been made through the press and by personal talks to emphasize not only the worth

of tree planting but also the importance of caring for the trees and protecting them after planting.

The numbers of trees distributed from the government nurseries for planting on Arbor Day during the last two years were as follows :

Nursery	1915	1916	Total
Government Nursery, Honolulu .....	20,583	19,297	39,880
Sub-nursery, Homestead, Kauai.....	340	1,298	1,638
Sub-nursery, Hilo, Hawaii .....	325	384	709
<b>Total .....</b>	<b>21,248</b>	<b>20,979</b>	<b>42,227</b>

The distribution of trees by this Division for planting on Arbor Day during the past twelve years is shown in the following statement :

#### ARBOR DAY TREE DISTRIBUTION.

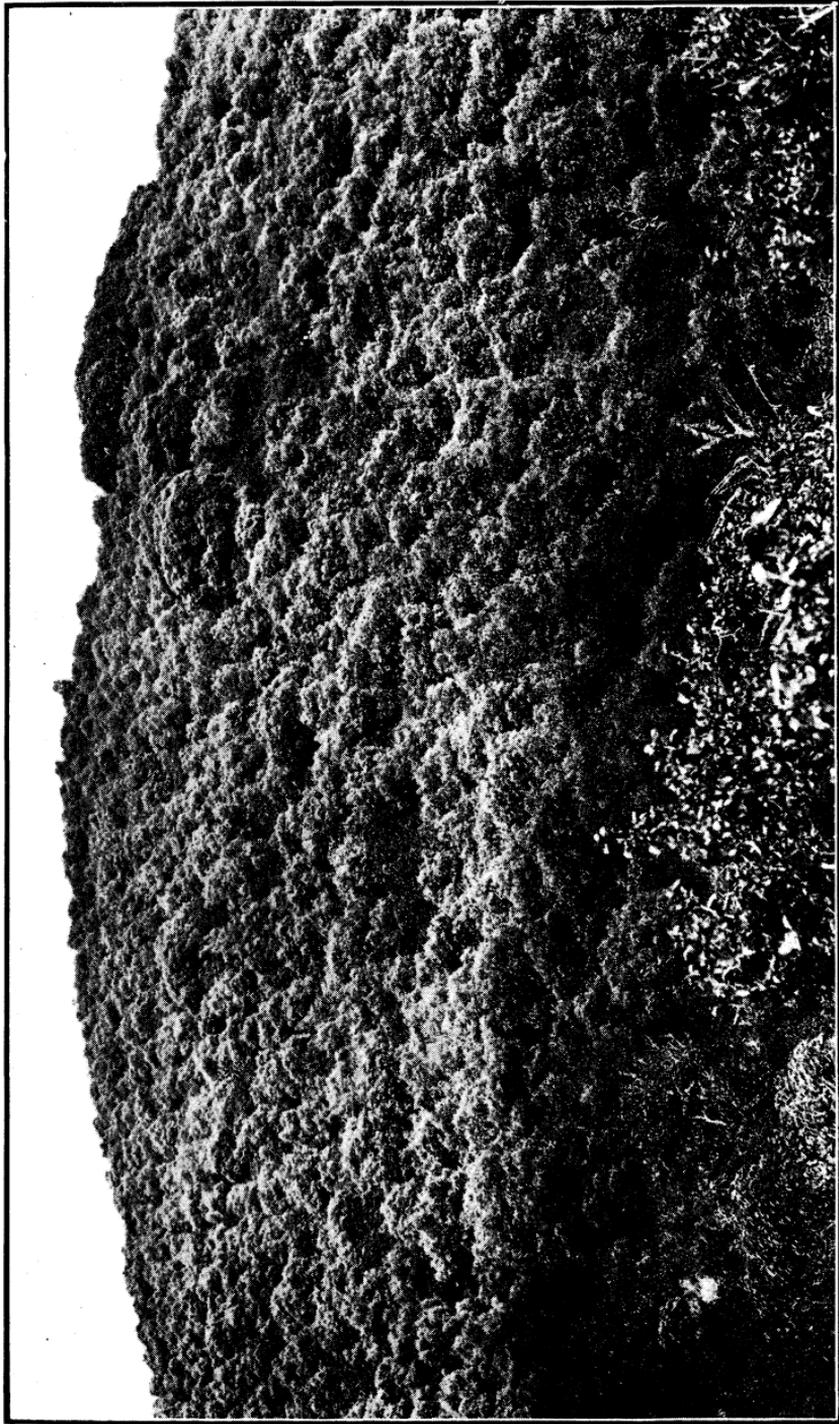
Year	Number of Trees
1905 .....	3,554
1906 .....	2,580
1907 .....	1,524
1908 .....	15,703
1909 .....	63,614
1910 .....	30,482
1911 .....	11,508
1912 .....	13,645
1913 .....	11,961
1914 .....	17,575
1915 .....	21,248
1916 .....	20,979
<b>Total .....</b>	<b>214,373</b>

#### TREE PLANTING ON FOREST RESERVES.

On behalf of the Government, the Division of Forestry has attempted to do its share of forest extension by tree planting so far as the appropriation made this possible, paying the greatest attention to water producing areas.

The reforestation of the Upper Makiki Valleys and Sugar Loaf on the Honolulu Watershed Forest Reserve with native koa and kukui trees, begun in October, 1913, was completed in September, 1915, so far as actual tree planting was concerned. Since then the young trees have been cared for by periodic weeding and blanks have been replanted. The total number of trees planted on this area amounted to 7,128 koa trees and 7,465 kukui trees, or a grand total of 14,593 trees. As they usually occur in nature, the koa were planted on the higher slopes and ridges,

Plate 5.



PLANTED KOA FOREST ON SUGAR LOAF, NEAR HONOLULU, THREE YEARS OLD.



and the kukui on the lower slopes and gulch bottoms. A total area of over 75 acres was thus reforested in two years. The trees were planted 15 feet apart and now, in a little over three years, their crowns are touching, forming a complete canopy. Some of the koa showed remarkable growth, individual trees only two years old attaining a height of 14 feet and a diameter at the ground of 4 inches.

On the Manoa Ranger Station, near Honolulu, which was set aside for administrative and experimental purposes in May, 1916, the native forest on the upper portion has been supplemented by the additional planting of several hundred koa trees. On the lower slopes, eight plots, each one-quarter acre in area, were planted in December, 1916, 8 by 8 feet apart with the following promising timber trees to ascertain their rate of growth and habits under close planting forest conditions:

1. Mahogany	<i>Swietenia mahogani</i>
2. Australian red cedar	<i>Cedrela australis</i>
3. Jamaica juniper	<i>Juniperus australis</i>
4. Japanese cedar	<i>Cryptomeria japonica</i>
5. Yellow poinciana	<i>Peltophorum ferrugineum</i>
6. Lemon gum	<i>Eucalyptus citriodora</i>
7. Swamp mahogany	<i>Eucalyptus robusta</i>
8. Koa	<i>Acacia koa</i>

At about the same time a number of trees suitable for various uses which had come from all over the tropical world and had accumulated at the Makiki nursery were planted out in various numbers at the Manoa Ranger Station to form an arboretum where their growth, habits and adaptability to the region could be closely observed. Each species has been staked with a redwood post, numbered with a zinc tag and permanently recorded to insure no confusion as to its identity. The list of trees so planted is as follows:

Bracelet tree	<i>Melaleuca armillaris</i>
Swamp tea tree	" <i>ericifolia</i>
Broad-leaved tea tree	" <i>leucadendron</i>
Flax-leaved tree	" <i>linariifolia</i>
Styphelia tree	" <i>styphelioides</i>
Thyme-leaved tree	" <i>thymifolia</i>
Jamaica juniper	<i>Juniperus australis</i>
Arizona cypress	<i>Cupressus arizonica</i>
Himalayan cypress	" <i>torulosa</i>
Smooth cypress	" <i>glabra</i>

Pyramid cypress	<i>Cupressus pyramidalis</i>
Himalayan blue pine	<i>Pinus excelsa</i>
Madeira pine	“ <i>arezinado</i>
Cook pine	<i>Araucaria cookii</i>
Japanese cedar	<i>Cryptomeria japonica</i>
Queensland nut	<i>Macadamia ternifolia</i>
Large Queensland nut	“ <i>Hillii</i>
Gray box	<i>Eucalyptus hemiphloia</i>
Lemon gum	“ <i>citriodora</i>
Blackbutt	“ <i>pilularis</i>
White gum	“ <i>saligna</i>
Woolybutt	“ <i>longifolia</i>
Red mahogany	“ <i>resinifera</i>
Spotted gum	“ <i>haemastoma</i>
Red gum	“ <i>rostrata</i>
Gray gum	“ <i>tereticornis</i>
Candle tree	<i>Parmentiera cerifera</i>
Ash	<i>Fraxinus floribunda</i>
Ipil	<i>Intsia bijuga</i>
Ohia lehua	<i>Metrosideros polymorpha</i>
Banyan	<i>Ficus infectoria</i>
Banyan	“ <i>altissima</i>
Peepul tree	“ <i>religiosa</i>
Camphor	<i>Cinnamomum camphora</i>
Mudu-murunga	<i>Sophora tomentosa</i>
Tulip wood	<i>Harpulia Hillii</i>
Narra	<i>Pterocarpus indicus</i>
Karaka	<i>Corynocarpus lacvigata</i>
Wood-oil tree	<i>Alcurites Fordii</i>
Koa	<i>Acacia koa</i>
African tulip tree	<i>Spathodea campanulata</i>

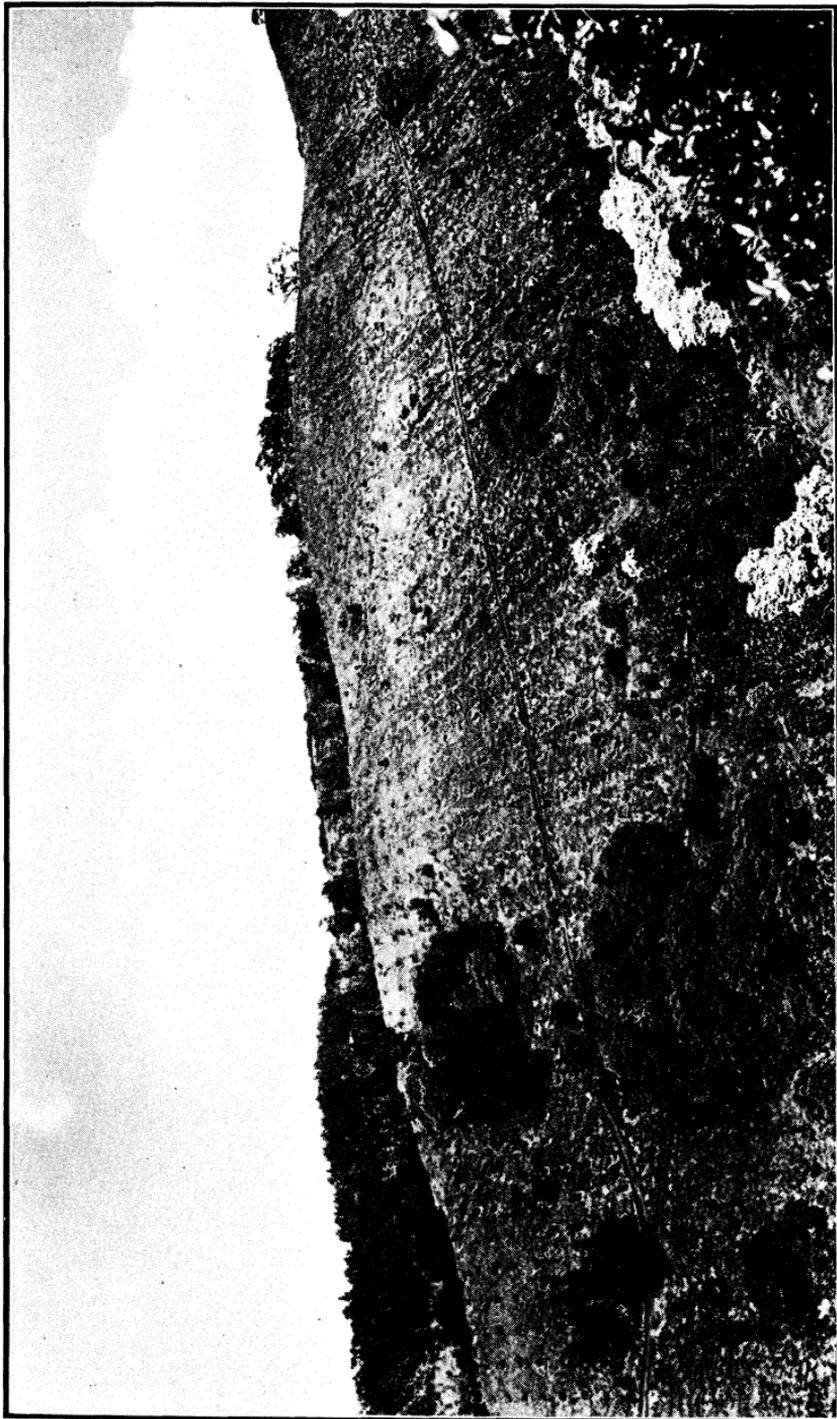
On Kauai, Forest Ranger Kaina D. Lovell, having completed his fence construction, began tree planting on the Kamalomalo flats within the Kealia Forest Reserve, in July, 1916, and up to the end of the year had planted out the following:

Silk oak for watershed cover .....	4,951
Swamp mahogany for windbreak.....	1,720
Japanese cedar for timber .....	1,848
Lemon gum for timber .....	760

Total number of trees planted..... 9,279

During the past two years, Mr. Walter D. McBryde, in charge of the sub-nursery at Homestead, also on Kauai, has continued tree planting on the Papapaholahola Spring Reserve until now it is quite well forested with a variety of trees and is one

Plate 6.



NEW TREE PLANTINGS ON MAKIKI SIDEHILLS BACK OF HONOLULU.



of the show places on that part of the Garden Island. The number of trees planted here partly for watershed cover and partly for timber production during the last two years is as follows:

Name of Trees	1915	1916	Total
Cook pine .....	651	2,639	3,290
Other species .....	2,206	113	2,319
Ironwood .....	2,315	.....	2,315
Swamp mahogany .....	1,800	.....	1,800
Australian blackwood .....	1,584	.....	1,584
Koa .....	545	1,037	1,582
Silk oak .....	1,460	.....	1,460
Japanese cedar .....	1,116	.....	1,116
Eucalyptus spp. ....	384	.....	384
<b>Totals</b> .....	<b>12,061</b>	<b>3,789</b>	<b>15,850</b>

On Hawaii during November, 1916, Forest Ranger F. B. Dodge planted about 50 pounds of seed of the New Zealand karaka tree, described on the preceding pages, on the partly denuded forest of Piha in the Hilo Forest Reserve. Since this is a good watershed cover tree, it is planned to establish a considerable number of seed trees on the area, from which a new forest can spread naturally.

Forest planting, mainly on watershed areas, will be continued on a large scale during the coming two years if there is a sufficient appropriation to make this possible.

#### TREE PLANTING ON PRIVATE LANDS.

During the past two years, tree planting on privately owned lands, mainly by the sugar plantation and other companies, has continued at a greater rate than during the last few previous years. A large number of the trees planted were started at the government nursery for these companies and shipped out as very young seedlings, which have been transplanted before being finally set out.

According to past custom, an attempt has been made to ascertain the total number of trees planted, both by private parties and the government, during the past two years throughout the Territory, and the returns are given in the table which follows. Although these figures do not by any means include all plantings, they probably embrace the bulk of trees planted, and may be considered quite conservative.

NUMBER OF TREES PLANTED IN THE TERRITORY OF HAWAII  
IN 1915 AND 1916.

**Kauai.**

Name	1915	1916	Total
Chas. S. Dole .....	70	21	91
Gay & Robinson .....	3,839	2,734	6,573
Grove Farm Plantation .....	25,000	22,000	47,000
Hawaiian Sugar Co. ....		40,000	40,000
Rev. Hans Isenberg .....	820	.....	820
Kapaa Homesteaders .....	5,000	9,595	14,595
Kekaha Sugar Co. ....	1,000	.....	1,000
Kilauea Sugar Plantation Co. ....	3,000	18,700	21,700
Knudsen Bros. ....		13,000	13,000
Koloa Sugar Co. ....	100	.....	100
Lihue Ranch .....	25,450	35,400	60,850
Makee Sugar Co. ....	25,600	32,200	57,800
W. D. McBryde .....	3,222	.....	3,222
McBryde Sugar Co. ....	12,320	9,887	22,207
Territory of Hawaii .....	12,125	13,068	25,193
A. S. Wilcox .....		300	300
	117,546	196,905	314,451

**Oahu.**

Hawaiian Islands Packing Co. ....	100	25	125
Hawaii Preserving Co. ....		4,000	4,000
Honolulu Plantation Co. ....	350,000	25,000	375,000
Kemoo Farm .....	6,000	.....	6,000
Laie Plantation .....	1,000	2,650	3,650
Libby, McNeill & Libby .....	600	947	1,547
Marconi Wireless Telegraph Co. ....	46	.....	46
Oahu Ry. & Land Co. Ranch Dept. ....	10,000	.....	10,000
Sandwich Islands Honey Co. ....		30,000	30,000
Territory of Hawaii .....	8,866	2,851	11,717
Wahiawa Water Co. ....	1,400	25,000	26,400
Waialua Agricultural Co. ....	9,739	114,577	124,316
	387,751	205,050	592,801

**Molokai.**

American Sugar Co. ....	2,000	.....	2,000
Baldwin Home .....		500	500
	2,000	500	2,500

**Lanai.**

Lanai Company .....	1,570	1,255	2,825
	1,570	1,255	2,825

**Maui.**

Mrs. H. A. Baldwin .....		600	600
Cornwell Ranch .....	8,000	.....	8,000

Name	1915	1916	Total
R. A. Drummond .....	500	.....	500
East Maui Irrigation Co. ....	.....	400	400
Haleakala Ranch Co. ....	380	.....	380
Haw'n Commercial and Sugar Co.....	5,000	400	5,400
Honolua Ranch .....	5,500	12,110	17,610
Kaeleku Sugar Co. ....	1,106	.....	1,106
F. G. Krauss .....	6,000	4,060	10,060
Maui Agricultural Co. ....	243,536	385,800	629,336
Pioneer Mill Co. ....	1,500	8,000	9,500
Wailuku Sugar Co. ....	13,673	20,768	34,441
	<hr/>	<hr/>	<hr/>
	285,195	432,138	717,333

## Hawaii.

Frank R. Greenwell .....	2,000	.....	2,000
Hamakua Mill Co. ....	2,000	.....	2,000
Hawaiian Agricultural Co. ....	6,000	.....	6,000
Hawaiian Irrigation Co. ....	1,000	.....	1,000
Hawi Mill & Plantation Co. ....	1,500	.....	1,500
Hutchinson Sugar Plantation Co. ....	2,000	.....	2,000
Kaiwiki Sugar Co. ....	1,000	1,000	2,000
Kohala Sugar Co. ....	12,000	.....	12,000
Kukaiiau Plantation Co. ....	.....	2,000	2,000
Kukaiiau Ranch Co. ....	20,570	57,430	78,000
Niulii Plantation .....	5,800	.....	5,800
Paauhau Sugar Plantation Co. ....	.....	3,000	3,000
Parker Ranch .....	30,396	25,372	55,768
Puakea Plantation Co. ....	.....	600	600
Waiakea Mill Co. ....	.....	150	150
	<hr/>	<hr/>	<hr/>
	84,266	89,552	173,818
Total number of tree planted on all islands .....	878,328	925,400	1,803,728

Besides the mere enumeration of the total number of trees planted, it has been deemed wise to attempt an analysis of the planting by segregating the species and by apportioning the trees planted for the different purposes. This information has been supplied by the tree planters themselves when sending in their figures.

The following table showing these classifications will doubtless be instructive to many:

## NUMBER OF TREES PLANTED IN THE TERRITORY OF HAWAII BY SPECIES AND PURPOSE OF PLANTING.

1915.

## Purpose of Planting.

Species	Fuel	Cover	Wind-break	Timber	Orna-ment	Totals
Swamp mahogany .....	252,860	154,836	16,286	33,098	500	457,580
Other species .....	2,910	127,454	6,798	.....	8,268	145,430
Ironwood .....	88,034	.....	25,033	8,000	500	121,567

Species	Fuel	Cover	Wind-break	Timber	Orna-ment	Totals
Blue gum .....	50,700	4,000	22,570	.....	.....	77,270
Lemon gum .....	50,000	400	.....	.....	.....	50,400
Algaroba .....	13,081	.....	.....	.....	.....	13,081
Silk oak .....	7,000	1,000	.....	5,000	.....	13,000
<b>Totals</b> .....	<b>464,585</b>	<b>287,690</b>	<b>70,687</b>	<b>46,098</b>	<b>9,268</b>	<b>878,328</b>

## 1916.

Swamp mahogany ....	185,260	200,000	43,420	8,640	.....	437,320
Other species .....	10,096	191,416	1,787	31,759	10,359	245,417
Ironwood .....	69,500	280	42,005	162	1,000	112,947
Blue gum .....	12,500	.....	59,830	.....	.....	72,330
Algaroba .....	33,793	.....	.....	.....	.....	33,793
Silk oak .....	2,000	5,451	4,000	.....	1,182	12,633
Lemon gum .....	10,000	.....	.....	960	.....	10,960
<b>Totals</b> .....	<b>323,149</b>	<b>397,147</b>	<b>151,042</b>	<b>41,521</b>	<b>12,541</b>	<b>925,400</b>

Comparisons may best be made, however, by the use of percentages, and although two years is a rather short period on which to base any deductions, such a brief interval may be sufficient to present at least certain indications:

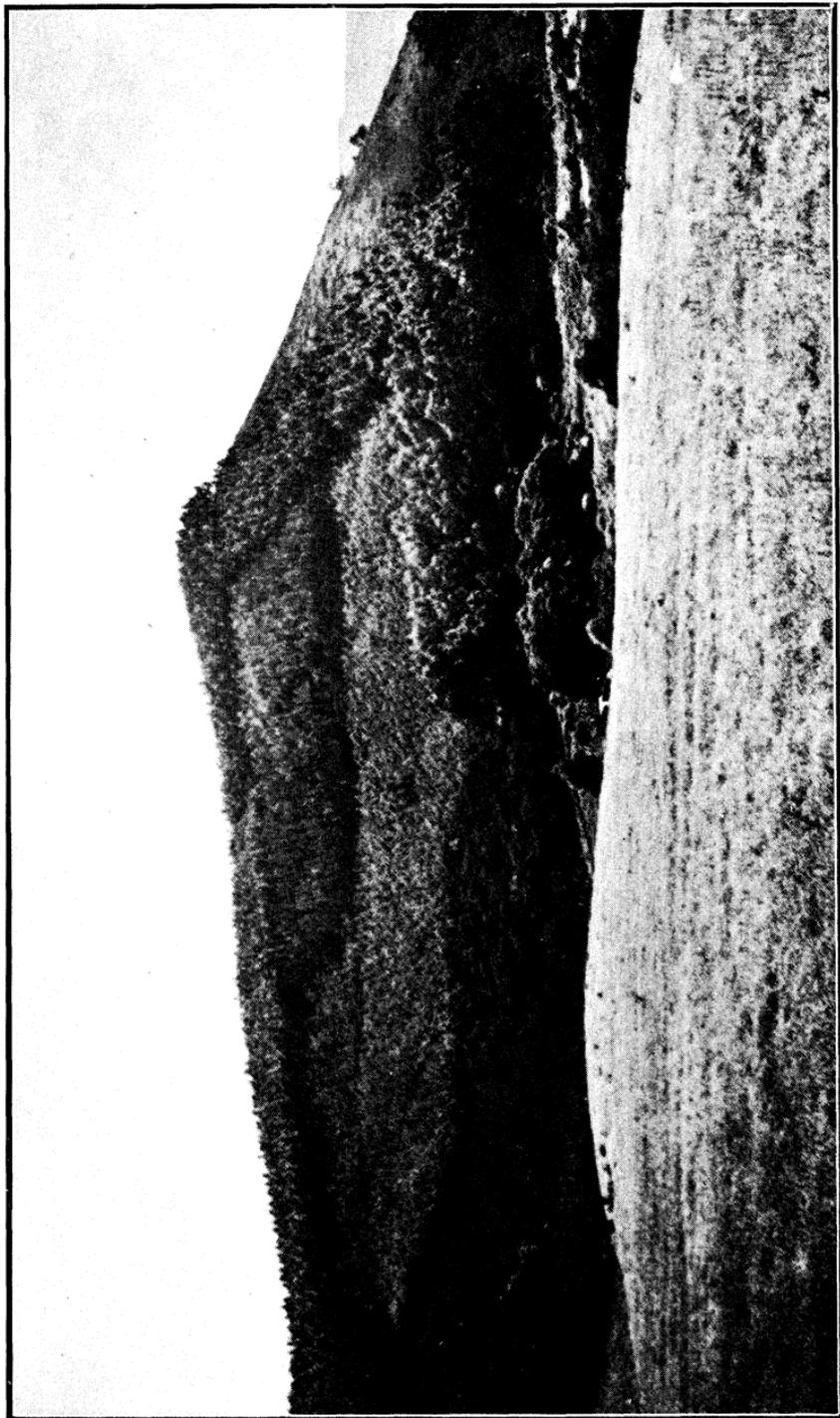
TREES PLANTED IN THE TERRITORY OF HAWAII IN 1915 AND 1916, SHOWING SPECIES BY PER CENTS.

Species	1915	1916	1915 and 1916
Swamp mahogany .....	53	47	50
Other species .....	16	27	22
Ironwood .....	14	12	13
Blue gum .....	9	8	8
Lemon gum .....	6	1	4
Algaroba .....	1	4	2
Silk oak .....	1	1	1
	100%	100%	100%

The above table brings out the surprising fact that, taking the last two years together, one-half the total number of trees planted out consisted of the swamp mahogany, *Eucalyptus robusta*. The ability of this tree to grow in almost any situation, to withstand the wind, to grow fast and produce good fuel and timber and to sprout from the stump, combined with the ease with which it can be propagated from seed, has brought it into the highest rank of popularity.

When we make an analysis of the purposes for which these trees have been planted, we find, as shown in the following table, that the need for fuel wood constitutes the chief reason for tree planting, but that this is closely followed by a realization of the importance of tree planting for water conservation purposes.

Plate 7.



TREE PLANTINGS ON PAPAPAHOLAHO LA SPRING RESERVE, KAUAI.



TREES PLANTED IN THE TERRITORY OF HAWAII IN 1915 AND 1916, SHOWING PURPOSE OF PLANTING BY PER CENTS.

	1915	1916	1915 and 1916
Fuel .....	53	35	44
Watershed cover .....	33	43	38
Windbreak .....	8	16	12
Timber .....	5	5	5
Ornament .....	1	1	1
	100%	100%	100%

In reviewing the total number of trees planted in the Territory during the past nine years, for which records have been kept, we find from the following table that an average of 824,586 trees has been planted each year during this period. If all tree planters in the Territory had been heard from it is likely that this figure would be nearer one million. Taking the actual figures and assuming that the trees were planted on the average 8 by 8 feet apart, the total area planted to trees during the last nine years would amount to over 10,900 acres, or an average planting of 1,211 acres annually.

TREES PLANTED IN THE TERRITORY.

Year	Number of Trees
1908 .....	498,677
1909 .....	597,381
1910 .....	725,022
1911 .....	1,134,940
1912 .....	1,303,698
1913 .....	430,824
1914 .....	927,006
1915 .....	878,328
1916 .....	925,400
Total .....	7,421,276

ADVICE ON TREE PLANTING.

This Division is ready at all times to give advice and information on all questions connected with tree planting and allied subjects, and not a little time of the Forest Nurseryman has been devoted to this phase of the work during the past two years.

MISCELLANEOUS ACTIVITIES

Other activities of this Division during the past two years, while not strictly classified as forest protection or extension work, have been sandwiched in among the more important duties, as time permitted, and are briefly enumerated below.

## FUEL STUDY.

The question of where to obtain a sufficient supply of cheap fuel, mainly for the use of plantation laborers, has prompted this Division to make a study of the situation in the effort to offer practical relief. Early in 1916 a list of questions to be answered was sent out to all of the sugar plantation companies and others in order to secure data on which to sum up the situation and form the basis of the study. Up to date, fifty replies have been received, and when the few remaining ones have been heard from, the material will be compiled, remedial measures recommended, and the whole published for distribution.

## TREE STUDY.

At the suggestion of the Hawaiian Sugar Planters' Association, a study has been begun of the best kinds of trees to plant in given localities for specific purposes. A definite working plan for the study has been prepared and approved not only by this Board but also by the College of Hawaii, which will cooperate by furnishing the advice of its Botanist and by conducting the technical tests of wood specimens. Planting experiments involved in this study have already been started and a small saw-mill is now being installed at the Makiki Station, where rough logs can be sawed up and wood specimens prepared for the tests.

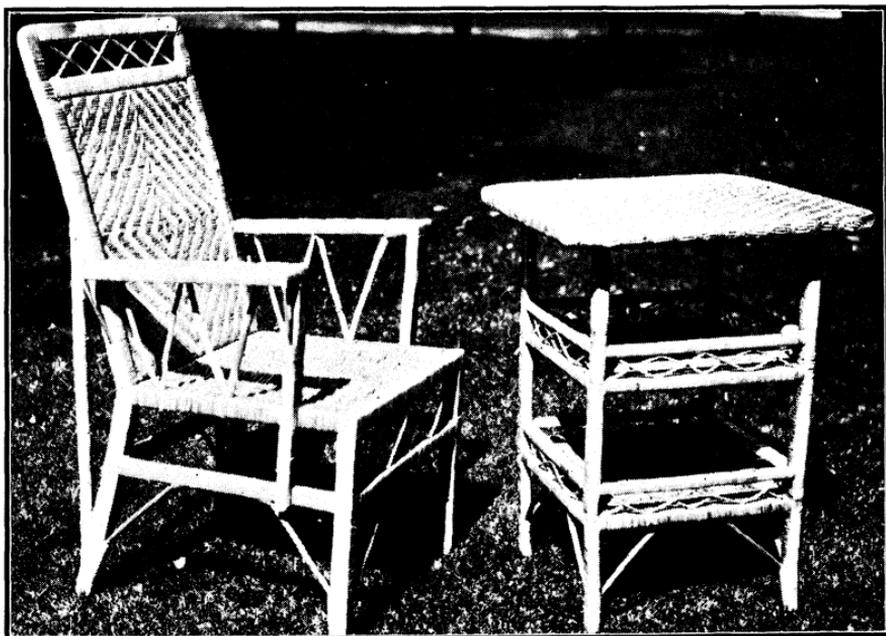
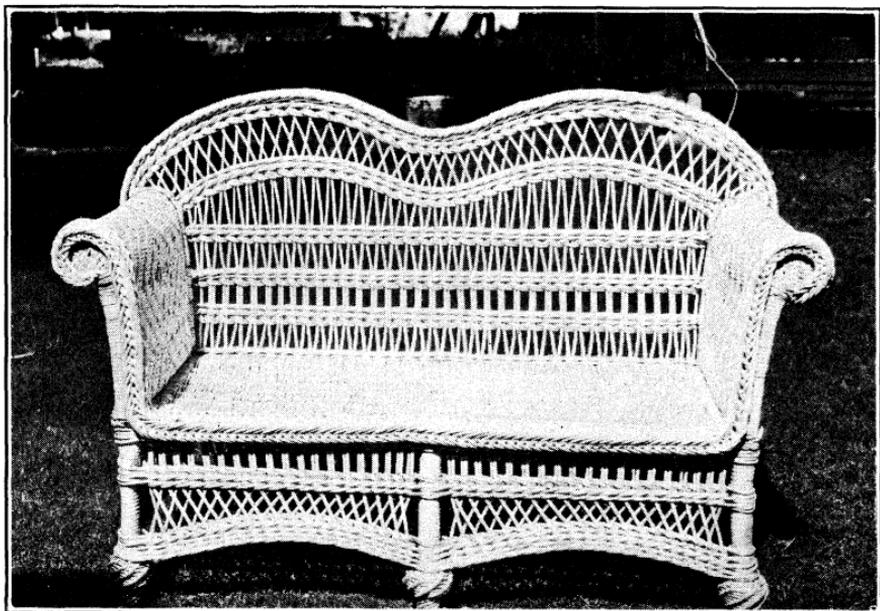
## FEDERAL EUCALYPTUS PLANTATION.

The experimental plantation of 18 different species of promising eucalyptus trees, established in Nuuanu Valley with funds supplied by the U. S. Forest Service in 1911, has been restaked with iron pipes at the corners and reidentified, and the trees have, five years since planting, been measured in order to determine their growth and value. Some of the species have done remarkably well, while others have shown up rather poorly.

## BASKET WILLOW.

The Division has a standing offer to furnish for planting cuttings of the yellow willow, *Salix vitellina*, but as yet very few have availed themselves of it. This willow, which was brought from Madeira to Honolulu in 1909 by Dr. L. R. Gaspar, is most suitable for the manufacture of wicker furniture, as will be seen by the accompanying illustrations of pieces made in Honolulu from the willows grown at the Makiki Station. There is a possibility here for a new domestic industry which it should be worth while for someone to start, considering the price that has to be

Plate 8.



WICKER FURNITURE MADE FROM YELLOW WILLOW GROWN AT THE MAKIKI NURSERY.



paid for the imported articles of wicker furniture which are no more substantial or attractive than those which can be made here.

#### COUNTY FAIRS.

At the second annual Hawaii County Fair held in Hilo on September 22 and 23, 1916, and the first Maui County Fair, held in Wailuku on November 30 to December 2, 1916, the Division was represented, along with the other Divisions of the Board, by exhibits of seedling trees ready for planting, wood specimens and maps of the Islands showing the forest reserves, all of which attracted the attention of the many who attended.

#### PUBLICATIONS.

In addition to the monthly reports, calendar and fiscal year reports, and special articles, which have been published in "The Hawaiian Forester and Agriculturist," the official monthly magazine of the Board, the Division of Forestry has published the following during the past two years:

May 1, 1915. Reprint of Circular No. 2—"Instructions for Propagating Forest, Shade and Ornamental Trees," by David Haughs, Forest Nurseryman.

April 15, 1916. Rule II, Division of Forestry.

April 15, 1916. Rule III, Division of Forestry.

December 28, 1916. Botanical Bulletin No. 3—"The Sandalwoods of Hawaii," by Joseph F. Rock, Consulting Botanist.

Other contemplated publications, for some of which information has been gathered, includes "The Ohia Lehua," "The Fuel Situation in Hawaii," and "The Hawaiian Algaroba."

#### SUMMARY

In conclusion, permit me to state, in appreciation of the appropriation of the last Legislature which has made it possible, that it is with considerable satisfaction that progress has been made in forestry in Hawaii toward the main objects to be sought. The field administrative force for the better protection of the reserves has been increased during the past two years from one to six forest rangers; a suitable rule for them to work under has been put into effect; the forest reserves have been better protected by the construction of more new fences during this period than had been constructed in the previous five years, 28 miles of boundary having thus been effectively guarded from destructive stock; the encouragement of tree planting has been continued with increased results and this work has been extended on gov-

ernment lands; and finally, progress has been made in the attempt to get at, more accurately, the real needs of forestry in Hawaii and squarely to meet them. For the continuation of these lines of work on a sound basis, an adequate appropriation is respectfully requested.

Very respectfully,

C. S. JUDD,

Superintendent of Forestry and Chief Fire Warden.

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## **List of District Fire Wardens**

### **CHIEF FIRE WARDEN**

C. S. JUDD, Superintendent of Forestry, ex-officio.

### **DEPUTY FIRE WARDEN AT LARGE**

DAVID HAUGHS

In and for the Territory of Hawaii.

### **DISTRICT FIRE WARDENS**

#### **KAUAI**

A. MENEFOGLIO

In and for Wainiha Valley, District of Halelea.

W. F. SANBORN

In and for the District of Halelea, excepting Wainiha Valley.

J. R. MEYERS

GEORGE HUDDY, Assistant District Fire Warden

In and for the District of Koolau, excepting the land of Anahola.

GAYLORD P. WILCOX

In and for the portion of the Districts of Koolau and Puna, extending from the land of Anahola to the land of Olohena, inclusive.

F. WEBER

In and for the portion of the District of Puna, south of and including the land of Wailua.

FRANK A. ALEXANDER

In and for that portion of the District of Kona, extending from the Hanapepe Valley to the Puna District line.

.....

In and for that portion of the District of Kona lying between and including the Waimea, Poomau, and Kauaikinana Valleys on the west and the Hanapepe Valley on the east.

ERIC A. KNUDSEN

In and for the District of Na Pali and that portion of the District of Kona lying to the west of Waimea, Poomau, and Kauaikinana Valleys.

OAHU.

F. S. LYMAN, Jr.

In and for that portion of the District of Koolauloa from the Waialua District line to and including the land of Kaunala.

ANDREW ADAMS

In and for that portion of the District of Koolauloa lying to the north and east of the land of Kaunala.

.....

In and for that portion of the District of Koolaupoko, extending from the Koolauloa District line to the land of Heeia.

OTTO LUDLOFF

In and for that portion of the District of Koolaupoko, extending from and including the land of Heeia to the land of Kailua.

JOHN HERD

In and for that portion of the District of Koolaupoko, extending from and including the land of Kailua to Makapuu Point.

CHARLES H. BAILEY

In and for that portion of the District of Kona, extending from Makapuu Point to Palolo Valley.

JOSEPH K. KAPONO

In and for Palolo Valley, District of Kona.

C. MONTAGUE COOKE

In and for Manoa Valley, District of Kona.

W. M. GIFFARD

In and for that portion of the District of Kona lying between Pauoa and Manoa Valleys.

L. A. MOORE

In and for Nuuanu Valley, District of Honolulu.

.....

In and for that portion of the District of Ewa lying to the west of the main government road.

JAMES GIBB

In and for that portion of the District of Ewa lying between the lands of Moanalua and Waiawa.

H. BLOOMFIELD BROWN

In and for that portion of the District of Ewa lying to the east of the main government road between the land of Waipio and the Kaukonahua Gulch.

**A. A. WILSON**

In and for that portion of the District of Waialua, lying between the Kaukonahua and Helemano Gulches.

**GEORGE M. ROBERTSON**

In and for that portion of the District of Waialua lying between the Helemano and Opaaula Gulches.

**GEORGE WILSON**

In and for that portion of the District of Waialua lying between the Opaaula Gulch and the Koolauloa District line.

**F. MEYER**

In and for that portion of the District of Waianae lying to the west of the Waianae Mountains.

**MOLOKAI.****JAMES MUNRO**

In and for that portion of the Island of Molokai lying to the west of Wailau Valley and the land of Mapulehu.

**C. C. CONRADT**

In and for that portion of the Island of Molokai including and lying to the east of Wailau Valley and the land of Mapulehu.

**LANAI.****GEORGE C. MUNRO**

In and for the Island of Lanai.

**MAUI.****L. WEINZHEIMER**

In and for the District of Lahaina.

**DAVID T. FLEMING**

In and for the District of Kaanapali.

**ANDREW GROSS**

In and for the District of Wailuku.

**F. F. BALDWIN**

In and for the District of Hamakuapoko and the west half of the District of Hamakualoa.

**W. F. POGUE**

In and for the east half of the District of Hamakualoa and that portion of the District of Koolau lying to the west of Makapipi Gulch.

**MARION CABRAL**

In and for that portion of the District of Koolau lying to the east of Makapipi Gulch.

**JOHN CHALMERS**

In and for the District of Hana.

JOHN FASSOTH

In and for the District of Kipahulu.

.....

In and for the Districts of Honuaula and Kahikinui.

L. VON TEMPSKY

In and for the Districts of Kula and Kaupo.

HAWAII.

G. C. WATT

In and for that portion of the north half of the District of Kohala extending from the land of Kaauhuhu to the Hamakua District line.

SAM P. WOODS

In and for that portion of North Kohala extending from the northern boundary of the land of Kawaihae I. to and including the land of Kaauhuhu.

O. L. SORENSON

In and for the District of South Kohala.

ALEXANDER MORRISON

In and for the western part of the District of Hamakua extending to the west from the boundary of the land of Paauhau to the boundary of the land of Kukaiau.

DONALD S. MACALISTER

In and for that portion of the District of Hamakua extending from and including the land of Kukaiau to the Hilo District line.

JOHN M. ROSS

In and for that portion of the District of Hilo extending from the Hamakua District to the land of Makahanaloa.

JOHN T. MOIR

In and for that portion of the District of Hilo extending from and including the land of Makahanaloa to the land of Kikala.

JOHN A. SCOTT

In and for that portion of the District of Hilo extending from the Puna District line to and including the land of Kikala.

C. F. ECKART

In and for the District of Puna.

.....

In and for that portion of the District of Kau extending from the Puna District line to and including the land of Punaluu.

GEORGE GIBB

In and for that portion of the District of Kau extending from the land of Punaluu to the Kona District line.

.....

In and for that portion of the District of Kona extending from the Kau District line to and including the land of Kaapuna.

T. C. WHITE

In and for that portion of the District of Kona extending from the land of Kaapuna to and including the land of Hookena.

JOHN D. PARIS

In and for that portion of the District of Kona extending from the land of Hookena to and including the land of Kaawaloa.

T. C. WHITE

In and for that portion of the District of Kona extending from the land of Kaawaloa to and including the land of Kahaluu.

JOHN A. MAGUIRE

In and for that portion of the District of Kona extending from the land of Kahaluu to the Kohala District line.

## Forest Rangers

**Kauai.**

KAINA D. LOVELL

For the Island of Kauai.

**Oahu.**

DAVID KAPIHE

In and for Tantalus, and Makiki and Pauoa Valleys.

E. H. HIPPLE

In and for Palolo, Manoa, and Nuuanu Valleys.

JOHN PILILAAU

In and for the Waianae District.

**Maui.**

JAMES LINDSAY

For the Island of Maui.

**Hawaii.**

FRANCIS B. DODGE

For the Island of Hawaii.

**Volunteer Forest Ranger.**

W. H. SHIPMAN

In and for the Districts of Puna and Hilo, Hawaii.

## District Foresters

**Kauai.**

Albert S. Wilcox, J. R. Myers, F. Weber, Edward Broadbent, Rev. J. M. Lydgate, Walter D. McBryde, Eric A. Knudsen.

**Oahu.**

Andrew Adams, L. L. McCandless, John Herd, Paul R. Isenberg,  
W. W. Goodale.

**Molokai.**

James Munro, C. C. Conratt.

**Lanai.**

George C. Munro.

**Maui.**

L. Weinzheimer, F. F. Baldwin, W. F. Pogue, L. von Tempsky,  
Dr. J. H. Raymond, D. T. Fleming, John Fassoth.

**Hawaii.**

G. C. Watt, A. W. Carter, A. Ahrens, John M. Ross, John A. Scott,  
George Gibb, W. R. Castle, John D. Paris, John A. Maguire.

## Report of the Forest Nurseryman

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Honolulu, Hawaii, December 31, 1916.

Superintendent of Forestry,  
Honolulu, T. H.

Dear Sir: I herewith submit a report of the work done during the years 1915 and 1916.

### COLLECTION AND EXCHANGE OF SEED.

Many requests have come from abroad for seed of our indigenous and exotic plants. The requests come principally from forestry boards and departments, botanic gardens and experiment stations. In many cases along with the requests come packages of seed, and from others assurance that we can have for the asking any seed which they may be able to collect. We have also supplied a number of tourists who have called at the nursery for sample packages of seed. From some of the latter we have received seed in return. Mr. J. F. Rock of the College of Hawaii has also from time to time given us seed of new and rare species, a number of which are growing well and look very promising.

A great deal of the seed collected here is used on the Islands. From Tantalus we are able to collect seed of many species of Eucalyptus, also Casuarina, Koa, etc. The seed of *Eucalyptus robusta*, which is one of favorites for plantation and homestead purposes, is collected on Tantalus. This tree is more generally planted than any of the others. From the groves around Tantalus we were able to collect during the season in 1916 over thirty-five pounds of clean Koa seed. This record is far in excess of any previous one. This supply will be sufficient to keep us going for a number of years to come.

TREES DISTRIBUTED FROM GOVERNMENT NURSERIES  
DURING 1915 AND 1916.

1915.

	Seed- lings	Trans- plants	Pot Plants	Total
<b>Oahu</b>				
Sold .....	4,500	2,376	1,781	8,657
Gratis:				
Arbor Day .....			20,583	20,583
Clubs .....			762	762
Forest Reserves .....			8,927	8,927
Homesteaders .....	7,100	2,780	1,257	11,137
Military Posts .....		509	2,330	2,839
Parks .....			1,272	1,272
Schools .....		221	1,091	1,312
Street Planting .....			396	396
Miscellaneous .....	12,500	7,791	4,451	24,742
	24,100	13,677	42,850	80,627
<b>Kauai</b> .....				2,228
<b>Hawaii</b> .....				10,752
				93,607
Plantation companies, etc. ....				153,825
				247,432

1916.

	Seed- lings	Trans- plants	Pot Plants	Total
<b>Oahu</b>				
Sold .....	2,500	1,365	1,865	5,730
Gratis:				
Arbor Day .....			19,297	19,297
Clubs .....			1,432	1,432
Forest Reserves .....	9,279	1,350	2,690	13,319
Homesteads .....	12,000	11,500	4,500	28,000
Military Posts .....		3,000	2,350	5,350
Parks .....			500	500
Schools .....		1,682	2,000	3,682
Street Planting .....			500	500
Miscellaneous .....	15,000	5,160	3,450	23,610
	38,779	24,057	38,584	101,420
<b>Kauai</b> .....				7,240
<b>Hawaii</b> .....				11,019
				119,679
Plantation companies, etc. ....				540,400
				660,079
1915 Total Distribution .....				247,432
1916 Total Distribution .....				660,079
				907,511
Total (1915 and 1916) .....				907,511

## GOVERNMENT REALIZATIONS.

## 1915.

Sale of Plants .....	\$ 83.80
Rent of Office Building, Nursery Grounds .....	420.00
Refund on payment for rent on land in Kona, Hawaii (Fruit Fly experiments) .....	45.00
	<hr/>
	\$548.80

## 1916.

Sale of Plants .....	\$ 71.00
Sale of Seed .....	28.00
Sale of Mexican Saddle .....	35.00
Rent of Office Building, Nursery Grounds .....	385.00
Balance due on boundary fence according to agreement with Oahu Railroad Company .....	33.46
	<hr/>
	\$552.46

## 1915.

## Preservation of Forest Reserves:

Derived from rent of lands under permit within the forest reserves .....	\$190.00
Sale of two tons of awa .....	100.00
	<hr/>
	\$290.00

## 1916.

Derived from rent of lands under permit within the forest reserves .....	\$216.00
Sale of black sand, Makiki Valley .....	10.00
	<hr/>
	\$226.00

Government realizations are deposited with the Treasurer at the end of each month. Collections on account of Preservation and Extension of Forestry and Forest Reserves are deposited with the Treasurer at the end of each quarter as a special fund.

## PLANTATION COMPANIES AND OTHER CORPORATIONS.

The demand for trees by plantation companies and other corporations is increasing, and the trees are being planted for a number of purposes. The principal purposes are firewood, shelter belts, breakwinds, fence posts, and railroad ties. Lands which are not suitable for agricultural purposes are being used. The following is a list of trees distributed during the past two years, giving the species in demand.

TREES DISTRIBUTED TO PLANTATION COMPANIES AND  
OTHER CORPORATIONS

	1915	1916	Total
<i>Eucalyptus robusta</i> .....	70,650	313,450	384,100
“ <i>citriodora</i> .....	900	40,550	41,450
“ <i>globulus</i> .....	17,450	56,250	73,700
<i>Casuarina equisetifolia</i> .....	56,130	39,700	95,830
“ <i>quadrivalvis</i> .....	3,320	2,800	6,120
<i>Eucalyptus crebra</i> .....	.....	63,000	63,000
“ <i>pilularis</i> .....	.....	4,000	4,000
“ <i>rostrata</i> .....	.....	15,000	15,000
“ <i>leucoxydon</i> .....	.....	5,000	5,000
<i>Grevillea robusta</i> .....	2,000	.....	2,000
Other species .....	3,375	650	4,025
<b>Total</b> .....	<b>153,825</b>	<b>540,400</b>	<b>694,225</b>

NURSERY AND GROUNDS.

The propagation and distribution of plants at the nursery is done with the aid of one man. During the packing and shipping of trees for Arbor Day, however, the assistance of the seed boys and also of the yard man and two trustees had to be added. Most of the trees are propagated here and sent to Makiki when large enough for transplanting.

On the grounds one man is regularly employed who, with the help of two trustees, attends to the grounds around the offices, also the park portion of the nursery grounds.

A new curb and cement sidewalk were laid during the early part of 1915 around the Keeaumoku and King Street sides of the grounds. This work was done at the expense of the City and County Government. We are again indebted to High Sheriff Jarrett for the use of two trustees to assist in keeping the grounds in good condition. We take this opportunity of extending our thanks to Sheriff Jarrett for his kindness in assisting us in this work.

CONGRESSIONAL VEGETABLE SEED.

Early in January, 1915, we received through the Honorable J. K. Kalaniana'ole, Delegate to Congress, 12,000 packages of vegetable seed and 500 packages of flower seed. The public was notified through the newspapers and a large number of requests for seed were received from all over the Islands. Before the end of the year our supply was entirely exhausted. A similar supply arrived at the end of January, 1916, and was distributed to homesteaders and others, who were very grateful and well pleased with the results of seed they had received on former occasions. The Congressional seed filled a much needed want,

and many of those who received it are able to have good vegetables all the year round, while, without the help of Congress many would be entirely without vegetables, not having the means to get them.

As will be seen in our former reports, we received for a number of years, through the Honorable J. K. Kalaniana'ole, copies of the U. S. Agricultural Year Book. For some reason, unknown to us, we have not received any reports since 1913. Our quota previous to this date was 750 copies per year. These were distributed to people specially interested in agriculture and the kindred subjects treated in the Year Book. The discontinuing of this book has been the subject of many comments and the want of it is sorely felt by a number of people.

#### ADVICE AND ASSISTANCE.

Work under the above heading consists of giving advice in the planting and care of trees, pruning trees, making planting plans, laying out grounds, moving large trees, etc. Calls made at the request of people in and around the city range from seven to twelve per month, and advice given by telephone, by letter and to people calling at the nursery range from twenty to twenty-five.

Officers and men of the different military posts are eager to acquire knowledge in regard to the many plants which they find here, and which are entirely new to most of them. Those who have charge of the fixing up of the grounds around their respective posts are constant visitors at the nursery. The writer also makes visits to the different posts for the purpose of giving advice and assistance. All plants for military posts are supplied free of charge. We also endeavor to propagate such plants as may be wanted, even if those plants are not generally carried in our regular stock.

Work such as this does not show up right away or make any immediate change in the surroundings. In years to come, however, the work done by the people at the different army posts will not only be a blessing to those who may come after them, but the whole neighborhood will benefit by it.

#### MAKIKI STATION.

The work done at this station is principally routine, consisting of mixing and sterilizing soil, transplanting trees into pots and boxes, and attending to the new species which we are raising from seed received from different botanic gardens, forestry departments, etc. A large number of new species have been planted at the ranger station in Manoa Valley and others along the trail

which runs from our Makiki Station to Sugar Loaf. A number of the new species are making a good growth and look very promising. The Juniper, *Juniperus Bermudiana*, seed of which was sent by Mr. Gerrit P. Wilder from Bermuda, July, 1911, and another species, *Juniperus australis*, received through our seed exchange system from Mr. William Harris, Superintendent of Public Gardens, Jamaica, in November, 1914, are worthy of special mention. Both species are doing remarkably well, and are the most promising of any introductions which we have received for a number of years.

Part of the land at the Makiki Station is being used for growing cucumbers, corn, and other vegetables for the Division of Entomology, for use in parasitic investigations. We have just received the machinery for a short log saw-mill which is to be erected at this station. We hope to have the mill running soon and we will then be in a position to cut up and test out many different species growing in the Tantalus forest and on other forest reserves.

#### HONOLULU WATERSHED.

During the year 1915 trees planted in the neighborhood of Sugar Loaf Hill and Hering and Makiki Valleys amounted to 992 Koa and 5716 Kukui. Trees previously planted amounted to 6136 Koa and 1749 Kukui. During the year 1916 very little planting was attempted. The encroachment of the pest called *Caesalpinia bonduc* on large patches of land in Makiki and Hering Valleys was beginning to look serious and something had to be done to check it. A commencement was made during the early part of 1916 to root out this pest. This work and taking care of the trees already planted occupied all of our time here during the remainder of the year. The pest is well in hand now and with the exception of a few small patches in the bottom of Opu Valley, all the land lying between Manoa Valley and the planted forest on Tantalus is clear of it. There is still quite a stretch of land in and around Makiki Valley that will soon be planted in trees. The Koa trees in the neighborhood of Sugar Loaf Hill are doing very well; and further plantings of the land in Makiki will increase the value of this section of the reserve as a watershed.

Respectfully submitted,

DAVID HAUGHS,

Forest Nurseryman.

## Report of the Consulting Botanist

Honolulu, Hawaii, December 31, 1916.

The Board of Commissioners of  
Agriculture and Forestry,  
Honolulu, Hawaii.

Gentlemen: I beg leave to present my report on the work carried on during the biennial period ending December 31, 1916, as Consulting Botanist of your Board.

The herbarium of the Board of Agriculture and Forestry, which is still in the safekeeping of the College of Hawaii under the supervision of the Botanist of that institution, has received many additions during the last two years, notably collections of Hawaiian plants made by the writer in the mountains of these Islands. As per agreement at the time of transfer of the herbarium to the College of Hawaii, your Consulting Botanist has prepared one set of specimens for the use of the Division of Forestry, comprising mainly the arborescent forms of our Island flora. The writer thought it wise at present to prepare only such material as has been thoroughly worked up, as for example, the Lobeliaceae, Myrtaceae, Santalaceae and many of the smaller families. The Rubiaceae (Coffee Family) have not been worked up critically as yet but it may be stated that a number of new forms will have to be described. The Rubiaceae is one of the largest plant families, and consequently its members make up a large portion of the rain forests, especially on the older Islands.

At the request of your Superintendent of Forestry the writer worked up the Hawaiian Sandalwoods and arranged for publication a paper treating the history of the sandalwood trade of these Islands in the early days, the distribution of the sandalwoods over the mountainous regions of the Territory and a detailed description of each species, with plates. The paper was published as Botanical Bulletin No. 3 of your Board.

A similar, but much larger paper, on the Hawaiian *Ohia Lehuas* (*Metrosideros*) has been prepared by the writer and has been in the hands of your Superintendent of Forestry awaiting the action of your Board. I sincerely hope that it will be published in the very near future. The paper treats the numerous varieties of *Ohia Lehua* thoroughly for the first time, giving areas of distribution and much ecological data.

The writer hopes in the next few months to complete papers on two of our most important plant families, the Rubiaceae

(Kopiko Family) and Rutaceae (Mokihana Family) which form the bulk of our forest flora. Only when we learn to know our trees thoroughly and study their relationships and their plant associates, with which together they form what is termed a forest, will we be enabled to care for and protect the latter scientifically. Your Consulting Botanist is only too glad to cooperate with your Board as regards the increase of knowledge of our forests by preparing papers on the most important members which constitute their makeup. It is also the writer's idea to prepare a comprehensive work on the plant coverings of the Hawaiian Islands, treating each Island separately, but of course papers which are now being published by your Board must precede such work.

It may be of interest to your Board to learn that the writer's book on the Ornamental Trees of Hawaii is off the press. It treats all of the ornamental trees as well as fruit trees and also makes mention of shrubs and vines grown in Honolulu and other towns of this Territory. In this work the Forest Nurseryman, Mr. David Haughs, has aided the writer by securing specimens for identification. The book is profusely illustrated by half-tones and color plates.

During the summer of 1916, the writer was given a commission as a Special Agent of your Board and proceeded at his own expense to the Philippines, British Borneo, Celebes and Java for the purpose of plant introduction. Through the courtesy of Dr. F. W. Foxworthy, Dr. E. B. Copeland of the College of Agriculture at Los Banos, P. I., and Mr. Elmer D. Merrill, Government Botanist of the Philippines, the writer was enabled to introduce to Hawaii a number of valuable Philippine forest trees, as for example, members of the *Dipterocarp* Family which forms the largest percentage of the Philippine forests. They are the tallest trees in the Philippines and an idea can be formed of their importance when we learn that 90% of the forests of the Island of Mindoro is composed of members of that family. Hitherto efforts to introduce these plants have not been successful, because the seeds lose their germinating power after a few days, a great many even germinating on the tree. They are prolific seeders and when once established will reproduce themselves freely.

From Java the writer imported many fine flowering trees and palms, and deserving special mention, the *Amherstia nobilis*, considered to be the finest flowering tree in the world. All previous efforts of introducing this tree have failed because the seeds, which are produced very rarely, lose their germinating power rather quickly and other methods of reproduction have not proven successful. Through the kindness and generosity of Dr. Konings-

berger, Director of the Botanic Gardens of Buitenzorg, the writer was enabled to introduce a small tree of this species one year old into Hawaii. The Sealingwax palm, the "Queen of Palms," was also successfully introduced, and two specimens have already been planted out. Other plants worth mentioning are a fine, quick-growing shade tree with large yellow flowers, and species of *Brownea* and *Saracca*, next to *Amherstia*, the most beautiful flowering trees.

Respectfully submitted,

JOSEPH F. ROCK,  
Consulting Botanist.

Forestry

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TERRITORY OF HAWAII

# Board of Agriculture and Forestry

DIVISION OF FORESTRY

C. S. JUDD, Superintendent.

## REPORT

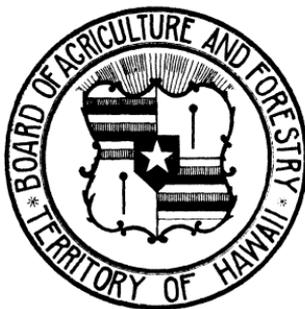
OF THE

# Division of Forestry

FOR THE

Biennial Period Ended December 31, 1918

Reprint from the Report of the Board of Commissioners  
of Agriculture and Forestry



The New Freedom Press  
Honolulu, T.H.  
1919



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# Division of Forestry

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## REPORT OF THE SUPERINTENDENT OF FORESTRY

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Honolulu, Hawaii, December 31, 1918.

The Board of Commissioners of  
Agriculture and Forestry,  
Honolulu, Hawaii.

Gentlemen: I have the honor to submit as follows the report of the Division of Forestry for the calendar years 1917 and 1918.

### INTRODUCTION.

The main activities of the Division during the past two years have been largely confined to the two important branches of forest work—protection and extension. The details of this work and what has been accomplished are set forth in the following pages.

The main underlying motive for the practice of forestry in these islands is the maintenance by forest influences of a continued and steady supply of water for the use of agricultural and domestic pursuits in the Territory. The protection and rehabilitation of the forest, therefore, for the beneficial effect which it exerts on the water supply, rather than the exploitation of the forest for timber, are striven for, and any factors which work against these main objects are detrimental to the best interests and welfare of the Territory.

The sooner this principle is understood and universally practiced by all owners of forest land in the Territory, the sooner will be attained the ultimate object of forestry in these islands. This is essential because of the intimate manner in which forest lands under different ownerships are intermingled on the several islands.

Fortunately during the past year one of the leading factors in the control of such lands, the Hawaiian Sugar Planters' Association, has seen fit to undertake the actual practice of forest protection and reforestation on forest lands under its control by estab-

lishing a Division of Forestry in its organization and by beginning work on the first unit in the Kohala Mountains. Deserved credit for the institution of this work is assigned to Commissioner W. M. Giffard, who prepared last summer a very able paper on the methods of organization for such work. The Division of Forestry of this Board will cooperate in whatever work is done by the Association wherever government forest reserve lands are involved.

In private work of this character, the Territory, represented by this Board, is more than willing to meet the private owner half-way in working out the details for any project and will gladly cooperate in any fencing project, in the employing of a ranger for mutual protection and patrol, and in nursery and reforestation projects, where government forest lands are situated on the same watershed requiring attention.

In the actual practice of forest work throughout the Territory during the past two years, several conclusions have been reached by the present incumbent at the head of the Division of Forestry which may be elucidated here. A large part of the executive work in connection not only with the demarcation of new forest reserves, which work, as will be seen later, has just been brought to a conclusion, but also with their actual field administration requires technical skill through personal effort. The simple tasks of fence repairing, driving out cattle and planting trees can be accomplished by the ordinary ranger or laborer, but the type of man at present available cannot be expected to plan and execute jobs, such as the proper selection of new nursery sites, etc., which require higher technical ability. Such work has therefore devolved upon the personal efforts of the only trained forester in this Division, and with a field of over half a million acres scattered over five different islands and separated by 360 miles of ocean and difficult land travel, not as much has been accomplished as is desired. The addition of one other technical man on the present force would make it possible to accomplish considerably more that awaits attention.

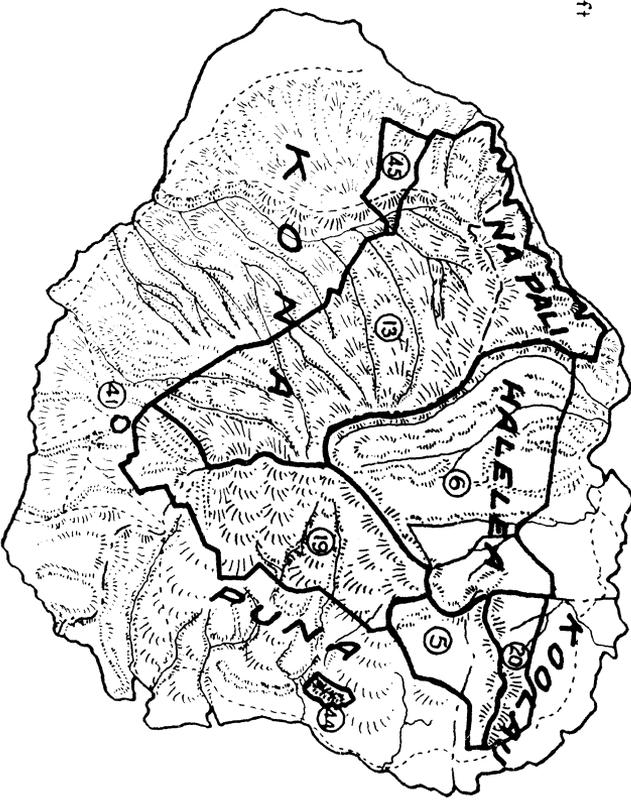
Because of the greater publicity given to the demarcation of new forest reserves through the calling of public hearings and publication of proclamations, the impression has obtained with some that this has constituted the chief work of the Division, and that, when once a reserve is established on paper, further work ceases. This has been far from the truth, although in some cases it has not been possible to perform certain complete work, such as fencing, because of the disinclination of the adjacent private owner to cooperate or because of lack of adequate appropriation, or because the land under an old lease has not yet reverted to the government. It is always the plan to follow the proclamation of a new

FOREST RESERVES  
ISLAND OF KAUAI  
Territory of Hawaii

Jan. 1919

Scale 1 in. = 40,000 ft

No.	Names
①	Ialelea
②	Kealia
③	Na Pali Kona
④	Lihue-Koloa
⑤	Molokaa
⑥	Papahāhāhala
⑦	Zoroa
⑧	Puu Ka Pele



Prepared by Govt. Survey Dept., 1919



reserve as speedily as possible with the necessary fencing and protection and large areas of established forest reserve lands are far from being mere paper reserves, for they are properly fenced and patrolled by rangers against trespass by man and beast, stock has been removed, and open areas have been reforested. The work of actual forest reserve administration has progressed at the same time with the establishment of new reserves.

During the past period of fourteen years since the setting apart of the first reserve, there have been constructed, through the efforts of the Division of Forestry so far as funds have permitted and through the cooperation of private owners and the Land Office by means of fencing clauses in general leases, a total of 40.26 miles of new stock-proof fences on government forest reserve boundaries and 17.85 miles of existing fences have been repaired, making a total to date of 58.11 miles of boundary made impassable to stock. Through cooperation with local residents hundreds of wild cattle, pigs and goats have been removed from forest reserve lands. Hundreds of acres of open land in the reserves have been replanted and at present there is a force of seven government forest rangers on active duty on these reserves patrolling for forest fires and trespass of all kinds, repairing old and building new fences, removing stock, planting trees and taking general care of the protected forest.

In the planting work the greatest attention has been given to reforesting areas which are on the watersheds supplying cities and communities with their domestic water supply as, for example, the Honolulu Watershed where in Nuuanu, Makiki, and Manoa Valleys large areas have been planted up to trees to maintain a continuous and assured flow of water for the city mains through the surface supply and artesian basins and for the cultivation of the important native food, taro.

In the planting work, it is not the number of trees that are actually set out that counts but the number of trees which through constant care and diligent and frequent weedings and cultivation are brought to such a state that their growth will no longer be hindered by rank grasses or weeds. This is the aim in all tree planting work done by the Division of Forestry.

## FOREST PROTECTION.

### ADMINISTRATIVE FIELD FORCE.

Increased protection has been given to forest reserve lands during the past two years by the appointment of an additional ranger on the island of Kauai and through certain changes in the personnel of the force. Ranger Kaina D. Lovell died on June 20, 1917, and was succeeded on August 1, by his son, Hosea K. Lovell as Forest Ranger for windward Kauai. On September 1, 1918,

W. V. Hardy was appointed Forest Ranger for Kauai in general and more particularly for the Waimea District. The three rangers for Oahu and one for Maui have remained the same with the exception of the additional appointment of Bruce Cartwright Jr. on August 1, 1917, as Honorary Forest Ranger for the enforcement of Rule IV of this Division on Oahu. On June 20, 1917, Ranger F. B. Dodge left our services to enlist in the navy and he was succeeded on September 28, 1917, by A. J. W. Mackenzie, who was appointed Forest Ranger for South Hawaii. These men have done good work in their respective districts in all lines of forest activity.

Now that the setting apart of the general forest reserve system has been accomplished, it will be possible to give greater impetus to the work of forest protection and extension in the form of fence building and tree planting. The services of two additional rangers for the Districts of Kau and Kona combined and for North Hilo, respectively, and of a ranger for the Kohala region in cooperation with the H. S. P. A. could be used to good advantage.

#### NEW FOREST RESERVES.

During the past two years the work of examining, describing, and setting apart forest reserves in the Territory, the essential first step in forest administration, was completed by the addition of nine new forest reserves comprising 44,476 acres, to the general reserve system, making a total of 47 reserves now established on the main islands throughout the group. These new forest reserves are as follows:

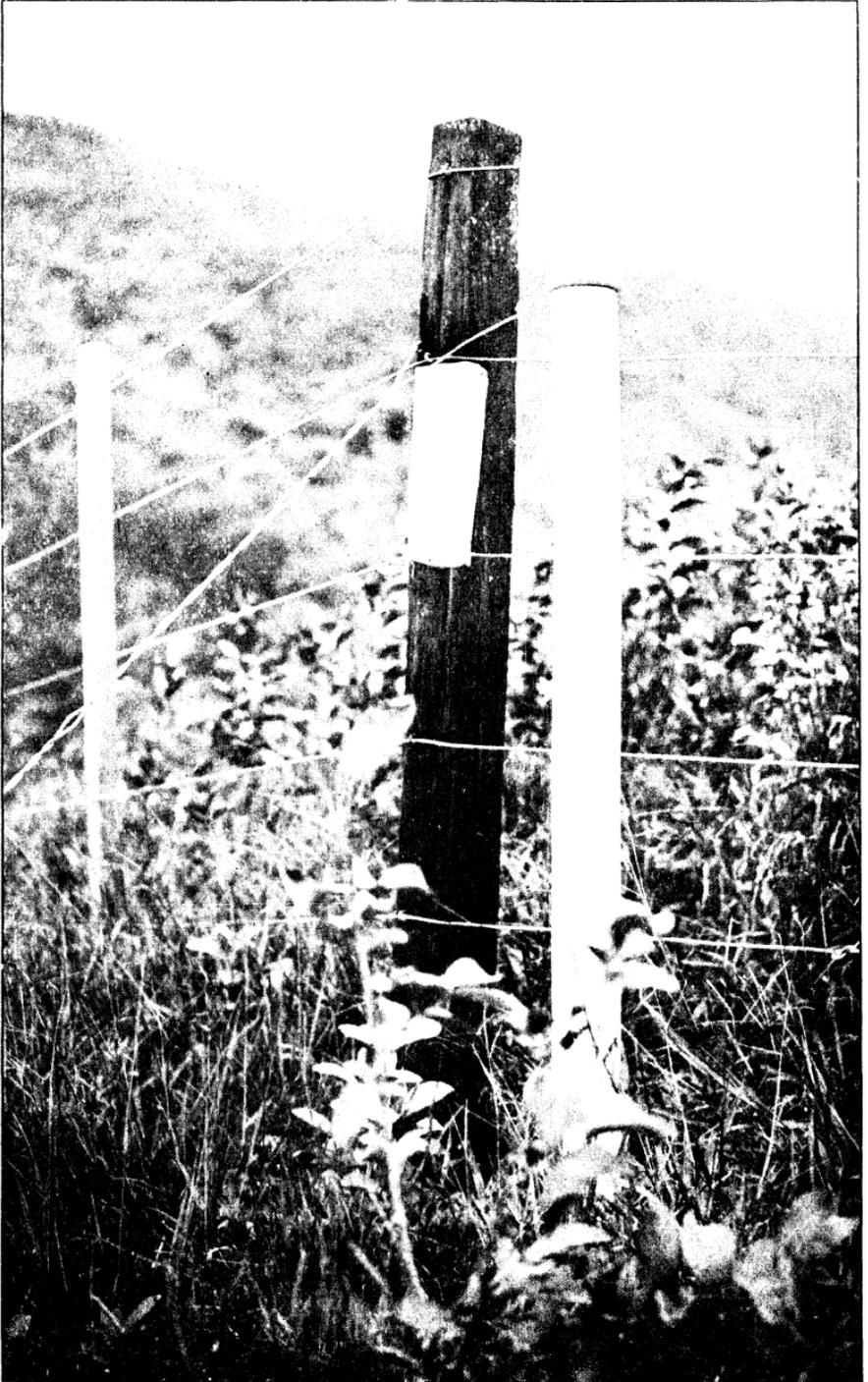
The Papapaholahola Spring Reserve in Kalaheo, Kona, Kauai, consisting of 54 acres of government land about the spring which supplies local residents with their water and most of which has already been planted up to trees by the Division of Forestry.

The Nonou Forest Reserve in Wailua, Puna, Kauai, consisting of 818 acres of government land on the ridge which parallels the coast and which is important for the conservation of water.

The Puu Ka Pele Forest Reserve in Waimea, Kauai, consisting of 4,900 acres of government land, which includes the scenic part of the Waimea Canyon and a large area of upland which is coming up to koa trees and is well worth protecting.

The Waiahole Forest Reserve in Koolaupoko, Oahu, consisting of 1,169 acres of which 96.5% is government land, which is important as a water-producing forest in that it embraces forest land which is a part of the Waiahole water tunnel system.

The Mokuieia Forest Reserve in Waialua, Oahu, consisting of 6,290 acres of government land above the private grants on the higher northern slopes of the Waianae Mountains which drain to



Standard Forest Reserve Metal Monument and Fence,  
Waiahole, Oahu.



the lower agricultural lands below where banana, rice, and sugar cane crops are irrigated by the 21 artesian wells which are supplied with water from this forested area.

The Hauula Forest Reserve, Koolauloa, Oahu, consisting of 9,193 acres, of which 12.4% is government land. This includes the government land of Hauula and the large privately owned valleys of Kaluanui, Punaluu and Kahana, which are heavily forested and are important as water producers.

The Panaewa Forest Reserve in South Hilo, Hawaii, consisting of 1,750 acres of government ohia forest extending from 4½ Miles out from Hilo along the Volcano Road to the Puna line.

The Keauohana Forest Reserve in Puna, Hawaii, consisting of 272 acres of government land bearing one of the most picturesque ohia forests on the famous drive to Kalapana.

The Olaa Forest Reserve in Puna, Hawaii, consisting of 20,030 acres of government land in the heavy wet forest of ohia, olapa, koa, loulou palms and tree ferns where homesteading has been unsuccessful and which has an important meteorological influence on the adjacent cane lands on the slopes below.

In addition to these nine new reserves, an area of 104 acres of government land was added to the Makua-Keaau Forest Reserve in Waianae, Oahu, and 263 acres of government land were added to the Makawao Forest Reserve in Hamakuapoko, Maui. On April 20, 1918, for reasons given elsewhere in this report, the island of Kahoolawe comprising 28,260 acres was withdrawn from the forest reserve and returned to the jurisdiction of the Land Commissioner and several minor withdrawals of a few acres were made for government road and exchange purposes.

The total number of forest reserves throughout the Territory is now 47, with a total area of 814,926 acres, of which 554,842 acres or 68% is government land. These are listed in the following table:

## FOREST RESERVES, TERRITORY OF HAWAII.

January 1, 1919.

Name.	No.	District.	Total Area		Area Private Land, Acres.	Date of Proclamation.
			Recommen- ded to be Reserved, Acres.	Area Govern- ment Land, Acres.		
ISLAND OF KAUAI.						
Halelea	6	Halelea	37,500	10,990	26,510	Aug. 24, 1914
Kealia	5	Puna	9,935	7,385	2,550	Mar. 9, 1906
Na Pali Kona	13	Na Pali and Kona	60,540	40,650	19,890	June 12, 1907
Lihue-Koloa	19	Puna and Kona	29,260	13,365	15,895	June 5, 1909
Molooa	20	Koolau	5,621	3,578	2,043	June 5, 1909
Papahalahola Spring	41	Kona	54	54		June 19, 1918
Nonou	44	Puna	818	818		Dec. 31, 1918
Puu Ka Pele	45	Waimea	4,900	4,900		Dec. 31, 1918
			148,628	81,740	66,888	

## ISLAND OF OAHU.

Kaipapau	1	Koolauloa	913	913		Nov. 10, 1904
Ewa	7	Ewa, Waianae and Waialua				
Waianae-kai	10	Waianae	28,550	5,151	23,399	Mar. 9, 1906
Lualualei	11	Waianae	3,653	3,546	107	Sept. 7, 1906
Pupukea	21	Waianae	3,743	3,743		Nov. 30, 1906
Nanakuli	28	Koolauloa	864	864		May 10, 1910
Makua-Keau	29	Waialua	1,010	1,010		June 4, 1913
Kuaokala	30	Waialua	*4,820	4,480	340	June 4, 1913
Honolulu Watershed	34	Waialua	434	434		June .., 1913
Kulionou	35	Honolulu	6,950	4,998	1,952	Oct. 13, 1913
Manoa Ranger Station	38	Honolulu	214	214		Feb. 13, 1914
Round Top	39	Honolulu	15	15		May 9, 1916
Waiahole	42	Honolulu	115	115		Aug. 10, 1916
Mokuleia	46	Koolaupoko	1,169	1,129	40	June 19, 1918
Haula	47	Waialua	6,290	6,290		Dec. 31, 1918
		Koolauloa	9,193	1,143	8,050	Dec. 31, 1918
			67,933	34,045	33,888	

## ISLAND OF MOLOKAI.

Molokai .....	26	44,674	13,268	31,406	Aug. 25, 1910
ISLAND OF MAUI.					
Koolau .....	4				
Hamakualoa .....		42,969	30,230	12,739	Aug. 24, 1905
Hana .....	12	14,825	13,767	1,058	Nov. 30, 1906
West Maui .....	14				
Lahaina, Kaanapali and Waialuku .....		44,482	19,147	25,335	Apr. 21, 1908
Hamakuapoko .....	15	12,093	2,093		Apr. 21, 1908
Waihou Spring .....	18	84	74	10	June 5, 1909
Kula .....	27	6,075	5,069	1,006	Sept. 11, 1912
Kipahulu .....	36	10,600	4,600	6,000	Aug. 20, 1914
		<u>121,128</u>	<u>74,980</u>	<u>46,148</u>	

## ISLAND OF HAWAII.

Hamakua Pali .....	2	18,940	16,333	2,607	Dec. 23, 1904
Hilo .....	3	110,000	60,223	49,777	July 24, 1905
Honuaula .....	8	665	665		Apr. 4, 1906
Kau .....	9	66,066	59,811	6,255	Aug. 2, 1906
Waiaha Spring .....	16	193	193		Apr. 21, 1908
Mauna Kea .....	17	66,600	66,600		June 5, 1909
Hauola .....	22	7	7		June 13, 1910
South Kona .....	24	36,952	29,260	7,692	May 17, 1911
Puna .....	25	19,850	19,850		June 29, 1911
Kohala Mt. .....	31	29,627	14,204	15,423	Oct. 13, 1913
Upper Waiakea .....	32	51,800	51,800		Oct. 13, 1913
Upper Oiaa .....	33	9,280	9,280		Oct. 13, 1913
Oiaa Forest Park .....	37	531	531		Aug. 20, 1914
Panaewa .....	40	1,750	1,750		Apr. 11, 1917
Keaohana .....	43	272	272		June 19, 1918
Oiaa .....	48	20,030	20,030		Dec. 31, 1918
		<u>432,563</u>	<u>350,809</u>	<u>81,754</u>	
TOTAL ALL ISLANDS .....		814,926	554,842	260,084	
			(68%)	(32%)	

\*Boundary modified and area enlarged from 4,716 to 4,820 by proclamation of Governor McCarthy, Dec. 31, 1918.

†Boundary modified and area enlarged from 1,830 to 2,093 by proclamation of Governor Pinkham, June 19, 1918.

## RULES AND REGULATIONS.

The rules and regulations for the protection and administration of forest reserve lands, already in force, have worked out so well that it has not been found necessary to add to them by the promulgation of any new rule. Under Rule II many permits have been issued to legitimize certain uses in forest lands, such as hunting wild game, which it was believed could be granted with due regard for the main purpose for which the reserves were created. The only arrests under our regulations were made by the police in February and March, 1918, when two men were apprehended for trespassing on the watershed in Nuuanu Valley in violation of Rule III. Each was fined \$10 and costs.

## PROTECTION OF BIRD LIFE.

Owing to depredations committed on certain small islands off the windward coast of Oahu, in which wild sea birds were killed for their feathers and their nests robbed of eggs, the 1917 Legislature passed Act 214 which gave this Board power to promulgate and enforce all necessary rules and regulations for the protection of bird, animal and vegetable life on the islands of Moku Manu, Moku Lua, Popoia, Manana, Kaohikaipu, Mokuhooniki and Kapapa. This Board accordingly on July 20, 1917, passed Rule IV of the Division of Forestry which was approved by the Governor on July 28, 1917, and went into effect immediately.

## DIVISION OF FORESTRY.

## RULE IV.

The Board of Commissioners of Agriculture and Forestry hereby make the following rule and regulation for the protection of bird, animal and vegetable life on certain islands of the Territory of Hawaii.

Section 1. It is unlawful for any person to hunt, trap, capture, wilfully disturb or kill any bird or any animal of any kind whatever, or to take, injure or destroy the eggs of any bird, or to cut, chop, burn, injure or destroy any vegetation on the islands of Moku Manu, Moku Lua, Popoia, Manana, Kaohikaipu, Mokuhooniki and Kapapa, except as authorized by written permit from the Superintendent of Forestry.

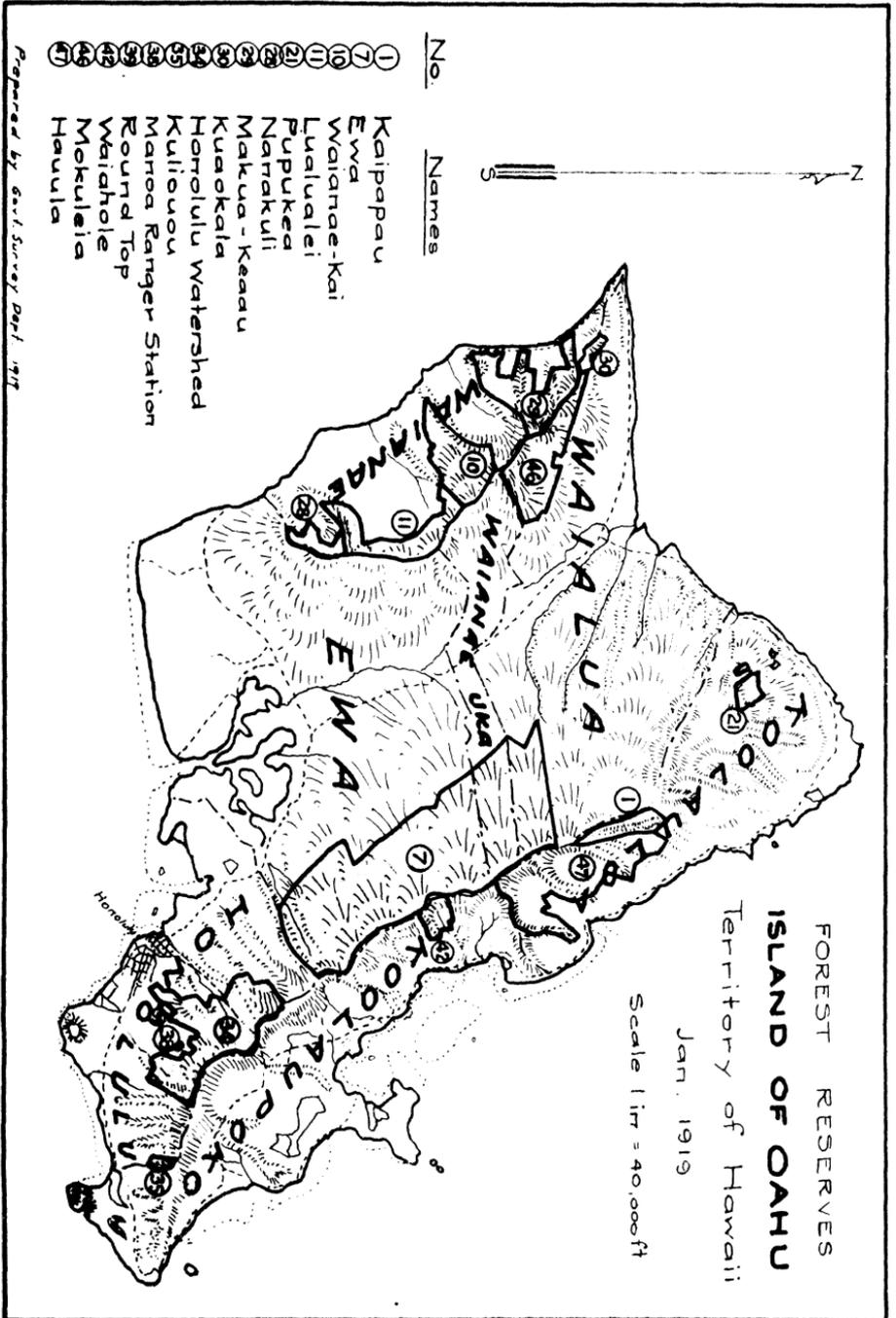
Section 2. The going on or being on said islands with intent to destroy, molest, disturb, or injure any bird, animal or vegetable life thereon without a written permit from the Superintendent of Forestry is forbidden and declared to constitute trespass punishable by fine.

Section 3. Any person violating the above rule shall be guilty of a misdemeanor and upon conviction thereof shall be punished by a fine not to exceed Five Hundred Dollars (\$500.00), as provided by Section 529, Revised Laws of Hawaii of 1915.

This rule shall take effect upon its approval by the Governor of Hawaii.

Approved this 28th day of July, 1917.

LUCIUS E. PINKHAM,  
Governor of Hawaii.





The birds consisting largely of the petrel and frigate bird which nest on these small rocky islands are sea scavengers and may therefore be considered beneficial, and for this reason it is desirable to protect them. Quadrupeds are found on only two of the islands, the indigenous rat on Popoia off Kawaihoa, Kailua, and wild rabbits on Manana off Makapuu Point. Moku Manu and Manana are most extensively populated by birds and only the migratory plover is found on Kaohikaipu off Makapuu and on Kapapa in Kaneohe Bay.

To enforce this rule and warn offenders against trespass, cloth and tin signs were made and posted on points along the Oahu coast where departures are usually made for these islands, and substantial wooden painted signs were placed somewhat at the risk of human life, on Kapapa, Popoia, Manana and the two islands of Moku Lua. An attempt was made to land on Moku Manu off Mokapu Point for the same purpose but had to be abandoned on account of engine trouble and the high sea that was running, and as yet there has been no opportunity to reach Mokuhooniki, which is off the eastern end of Molokai.

At the same time with the promulgation of Rule IV. Mr Bruce Cartwright, Jr., was appointed Honorary Forest Ranger to assist in the enforcement of this rule and in his interest in the protection of bird life he has rendered valuable assistance in bringing violators to justice. Mr. J. F. G. Stokes of the Bishop Museum has also rendered timely aid by supplying valuable information concerning bird habits and the use of his boat for posting signs.

In the enforcement of this rule there have been twenty-two arrests and convictions and these have had a very wholesome effect in preventing further trespass. In March, 1918, on information supplied to the police by Ranger Cartwright, 13 chauffeurs were arrested for going to Manana and killing rabbits without a permit and for robbing nests of eggs and molesting the birds which breed there. All pleaded guilty and were given a thirteen months' suspended sentence. In June of the same year, nine other people from Honolulu made an unauthorized visit to the same island and committed similar depredations. They were arrested by the police on the following day and upon appearance in the police court pleaded guilty and each was given a suspended sentence of 13 months.

#### FOREST FENCING.

The work of protecting forest reserve boundaries by fencing has progressed during the past two years as rapidly as attention could be given it. In most cases a personal examination of the boundary to determine just where the fence should be constructed and the amount of material required is necessary, and where pri-

vate land is involved negotiations must be made with the owner for cooperative fencing. Owing to the nature of the land short stretches of fence across a valley or over a ridge will protect large areas further back on the mountains and so far as possible the lines of new forest reserve boundaries have been laid out so that natural barriers, impassable to stock, are taken advantage of. In addition to the construction of new fences, attention has been given as well to the repairing of existing fences, for in this manner stock can effectively be kept out of a forest at comparatively small expense and a fence is not worth much unless it is stockproof.

The anthrax outbreaks which required my personal attention for several months during 1917 interfered somewhat with the fencing program. Many of the boundaries to be fenced are situated in out of the way places where it is hard to transport the posts and wire and where labor is scarce and hard to obtain, but it was found possible through the efforts of this Division and cooperation with private owners and the Land Office to construct during the biennial period 14.42 miles of new fence and repair 4.21 miles of existing fences on forest reserve boundaries, making a total of 18.63 miles of boundary adequately protected by the necessary stockproof fences.

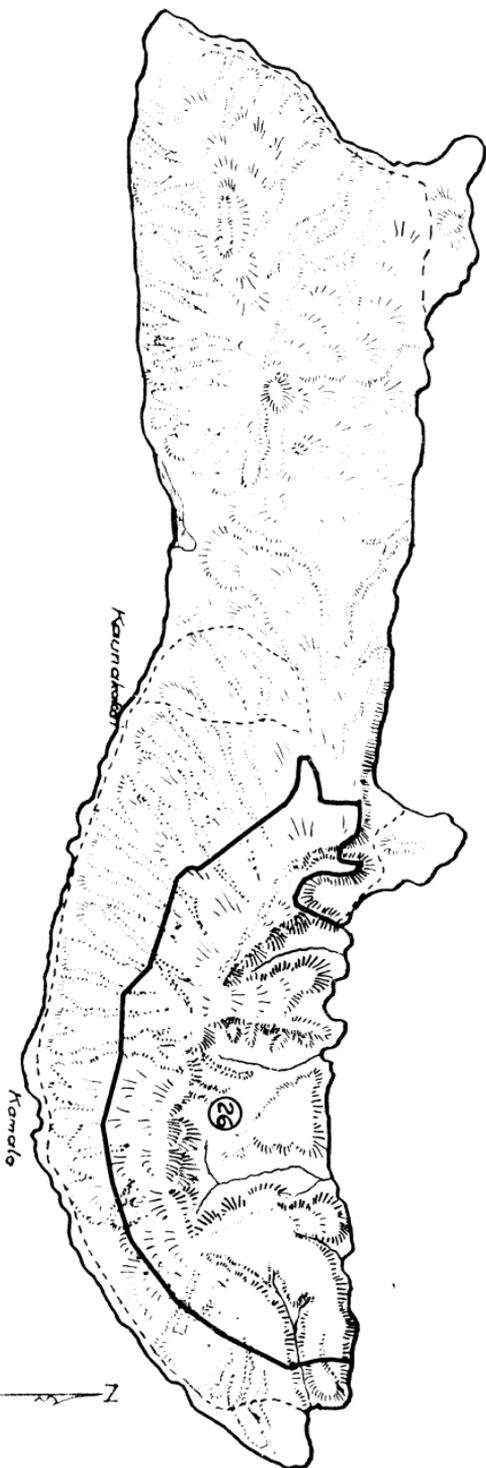
The fencing work in detail during the past two years was as follows:

FENCES CONSTRUCTED, 1917-1918.

Date Completed.	Island.	Reserve.	Location	Length (miles)
May, 1917	Oahu	Honolulu Watershed	Makiki	.08
Sept., 1917	Hawaii	Olaa Forest Park	Olaa	.48
Nov., 1917	Oahu	Nanakuli	Nanakuli	1.35
Dec., 1917	Hawaii	Hilo	Laupahoehoe	2.78
May, 1918	Hawaii	Hilo	Piha	3.42
July, 1918	Oahu	Waianae-kai	Waianae	.22
Aug., 1918	Maui	Makawao	Makawao	.89
Sept., 1918	Oahu	Waiahole	Waiahole	.59
Sept., 1918	Oahu	Hauula	Hauula	1.05
Dec., 1918	Hawaii	Olaa Forest Park	Glenwood	3.56
Total				14.42

FENCES REPAIRED, 1917-1918.

Date Completed.	Island.	Reserve.	Location	Length (miles)
April, 1917	Oahu	Honolulu Watershed	Nuuanu	.37
June, 1918	Oahu	Pupukea	Pupukea	1.19
Aug., 1918	Maui	Makawao	Makawao	.53
Nov., 1918	Maui	Makawao	Olinda	1.31
Dec., 1918	Oahu	Waiahole	Waiahole	.81
Total				4.21



FOREST RESERVE  
**ISLAND OF MOLOKAI**

Territory of Hawaii

Jan. 1919

Scale 1 in. = 30,000 ft.

No	Name
26	Molokai

Prepared by Gov't Survey Dept 1919





As a rule, where suitable local posts of a lasting nature are not obtainable, the standard redwood seven-foot post is used in all fencing work of the Division of Forestry and the very best wire obtainable, a No. 6 special extra heavy galvanized smooth wire, is strung to these posts so as to produce a fence of the most lasting character. During the war the price of such posts and of wire has doubled so that fencing in a substantial manner now costs at least \$500 per mile. In the construction of the fence at Glenwood, Hawaii, reenforced concrete posts, which were picked up in Hilo for 60 cents each, a cheaper price than for redwood posts, were used in order to test their lasting quality as compared with the locally grown ohia posts.

Considerable difficulty has been experienced in securing the fulfillment of covenants in General Leases of Territorial grazing lands which require fences to be built on the boundaries of adjacent forest reserves. As a rule most lessees are mindful of their solemn obligations in this respect and build the fences promptly, but a few have flagrantly disregarded the fencing clause and, in spite of the matter having been called repeatedly to the attention of the Commissioner of Public Lands, the required fences still remain unbuild. Among such cases are General Leases No. 730 and 837, in which fences on the boundary of the Makua-Keaanu Forest Reserve and the Kulionou Forest Reserve, respectively, on Oahu, were required by the lease to have been built in 1914, but as yet not a post hole has been dug.

#### REMOVAL OF WILD STOCK FROM RESERVES.

The protection of a forest reserve does not end, however, in the construction of a stock-proof fence on its boundaries. This must be followed up by the removal of all stock which still remain in the forest. Before the last gap in a boundary fence is built a drive is made of all cattle, tame or wild, which can be removed in this manner, and locked gates are left at strategic points for the removal of whatever tame cattle may inadvertently get through after the fence is built. The chief enemy of our indigenous water-producing forest is the bullock and the damage which he does to our Hawaiian forest with the destructive results that follow were discussed at length in an article entitled "Forestry as Applied in Hawaii"\* issued from this office last spring. Tame cattle as a rule can readily be driven out or roped and led out but when they have become wild the most feasible method of removal is in gunny sacks. As a rule the owners of branded wild cattle have been given an opportunity to remove their stock from forest reserve lands by a specified date, after which the Division has felt free to remove them in the manner deemed most advisable. In this

\*The Hawaiian Forester and Agriculturist, Vol. XV, No. 5, May, 1918.

way a considerable amount of wild stock has been eliminated from forest reserves. Where the owner of branded wild cattle is unknown, or cannot be located, more difficulty may be encountered and legislation to authorize the killing of such cattle, without compensation, but after published notice, is desirable.

Since the hunting of wild animals on a forest reserve, except as authorized by permit from the Superintendent of Forestry, by Rule II constitutes trespass punishable by a fine, permits have readily been issued to responsible parties to shoot cattle, when the way is clear, and pigs and goats in the reserves on the several islands. Complete returns on the number of wild animals killed in this manner are not obtainable but from the reports which have reached this office through the rangers and otherwise, it is certain that during the past two years at least 129 wild cattle, 397 wild pigs and 141 wild goats (exclusive of Kahoolawe) have been shot or killed on or removed from government lands in forest reserves on Kauai, Oahu, and Hawaii. A condition is included in each permit requiring that as full use as possible be made of the meat of such animals, and in this manner the forest reserves have helped out considerably in the food supply.

#### FOREST FIRES.

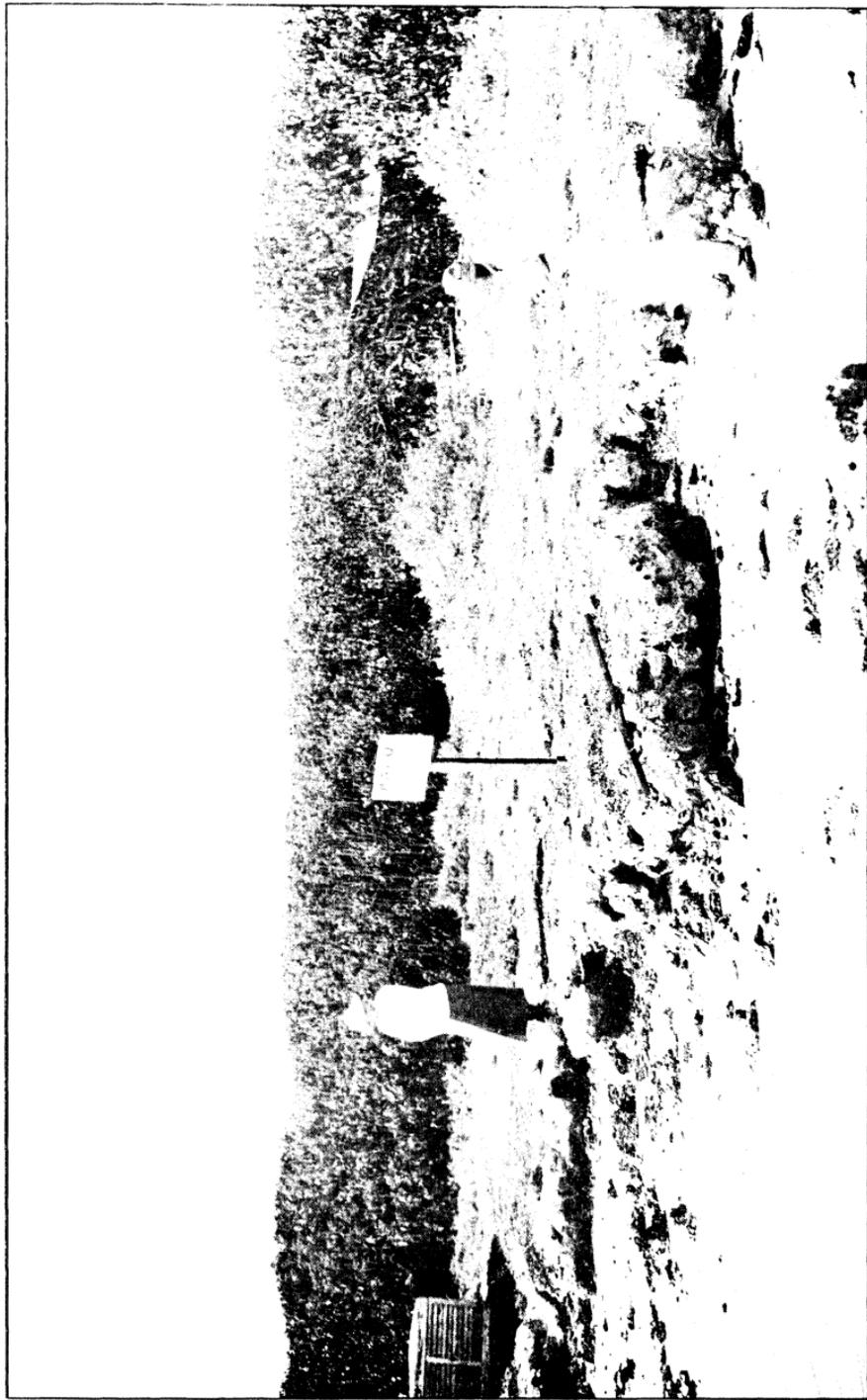
During the past two years, in spite of some unfavorable weather conditions, we were fortunate in having no serious forest fires which did any extensive damage, and only a few grass fires, the dates and localities of which were as follows:

June 25, 1917.—Ewa Forest Reserve, Oahu. A fire which started from smoking out a bee tree spread at 11 a.m. on the military reservation of Waianae-uka on the South Fork of the Kaula River and burned over about 50 acres of grass land and ferns with a few clumps of trees before it was gotten under control by nightfall through the efforts of two troops of the Fourth Cavalry and 90 prisoners of war.

August 19, 1917.—Maili Ridge, Oahu. A small grass fire started on the Leilehua plateau, but was extinguished the same day by U. S. troops.

August 28, 1917.—Piipihonua, near Hilo, Hawaii. A fire escaped from a Hawaiian burning brush and burned over about 50 acres of open and scrub forest land. Laborers from nearby plantations under the direction of Fire Warden John A. Scott succeeded in getting the fire under control after a few days' work.

September 16, 1917.—Waikapu Valley, Maui. A fire burned over 10 acres of waste land covered with pili grass and lantana, but was extinguished in a few hours.



Popoia. One of the Small Bird Islands off Oahu Protected by Rule IV.



November 9, 1918.—Ewa Forest Reserve, Oahu. A grass and brush fire occurred from causes unknown on the same area on the military reservation as the fire of June 25, 1917. About 25 acres were burned over before it was extinguished in two hours by a troop of cavalry assisted by a shower of rain.

During the dry period of 1917 new cloth fire warning notices were printed and distributed to the District Fire Wardens, who posted them at conspicuous points where fires were apt to occur.

In August, 1917, the menace of homesteaders' clearing fires and the dry condition of the woods at Laupahoehoe, Hawaii, made it advisable to appoint Mr. H. S. Rickard as Assistant Fire Warden and he rendered valuable services in preventing many small forest fires in this region. A number of new Fire Wardens were appointed throughout the Territory to take the place of those who had either died, resigned, or moved away from their districts.

A revised list of District Fire Wardens, together with the District Foresters, who look out for the interests of forestry in general, is presented at the end of this report.

### FOREST EXTENSION.

The official setting apart of forest reserves, the fencing of their boundaries where necessary, and the elimination of stock must be followed up with the reestablishment of the forest cover by artificial means wherever it has been so badly depleted that it will not come back naturally. This is accomplished by planting trees. In this work the native koa and other indigenous trees have largely been used, but attempts have been made as well to obtain new species which will be suitable for covering our watersheds.

### TREE INTRODUCTION.

We must naturally turn to all parts of the tropical world for new species, and a variety of new trees have been introduced by the Division during the past two years not only to determine which are suitable as watershed cover to supplement our native forest but which will produce valuable timber on areas where water conservation is not a factor. In this work of tree introduction Consulting Botanist Mr. J. F. Rock has been of material assistance. In April, 1917, 37 trees of 20 different species of trees which he brought from the Philippines were planted out on Tantalus in order that they might serve as a future source of seed for distribution throughout the Territory. These are important timber trees of the Philippine Islands which are profuse seeders and which probably will be suitable for watershed protection. They were permanently staked out and tagged so as to retain their identity. The

Consulting Botanist also supplied this Division with a quantity of seed of the Sau Tree, *Albizzia moluccana* from British North Borneo. This is a very rapidly growing tree which is already showing up very well with us.

Experiments with the growing of the Benguet pine, *Pinus insularis*, which we have raised from seed sent to us by the Director of Forestry at Manila, P.I., have proved that it will not grow to any size at our lower levels, but does very well at elevations of 6,000 feet on Hawaii. The seed of the Molave, *Vitex parviflora* which he has also sent have germinated well, and show good promise of succeeding here.

The Australian red cedars, *Cedrela australis*, introduced in 1916 and distributed to 22 different places in the islands, are doing remarkably well and in some localities have grown at the rapid rate of 11 feet in 15 months.

In August 1917, 39 different species of eucalypts, acacias, and other Australian trees raised from seed secured by Mrs. C. C. Kennedy and kindly presented to this Division were planted out on the Manoa Ranger Station to test their adaptability to the region.

During the same month two boxes of New Zealand trees were received from Hon. E. Mitchelson of Auckland and a part were set out on the Manoa Ranger Station. Among these are the kauri pine, rimu or red pine, *Dacrydium cupressinum*, and other important trees of New Zealand.

From trees growing in Honolulu we have obtained seed of the gum arabic, *Acacia arabica* and khair, *Acacia catechu*, and have raised young trees for distribution. These are two valuable Indian trees which are suitable for planting in the drier parts of these islands. Seedlings of the logwood have been similarly handled.

A supply of seed of the karaka tree, *Corynocarpus laevigata* was secured from the 1918 crop at Halemanu, Kauai, and distributed to forest rangers and inhabitants of the higher elevations on Maui and Hawaii for planting. Several pounds were also donated to the H. S. P. A. for use in their new forestry operations.

#### TREE PROPAGATION AND DISTRIBUTION.

The nurseries for the propagation and distribution of trees have continued to be maintained at Honolulu, Homestead, Kauai, and Hilo, Hawaii, and have done good service in supplying homesteaders, agriculturists, inhabitants of army posts, ranchers, and plantations throughout the Territory with forest, shade and ornamental trees. The total number of trees so distributed fell about a quarter of a million short of the number sent out during the previous two years but amounted to 651,411 trees. Shortage of labor for tree planting operations partly accounted for this de-

Plate 4.



Repairing Forest Reserve Boundary Fence at Lualualei, Oahu.



crease. Further details of this work are given in the report of the Forest Nurseryman.

#### ARBOR DAY.

Arbor Day as usual was celebrated in 1917 on November 16 and in 1918 on November 22. This is participated in mostly by school children whom we have attempted to assist in the beautification of their school grounds not only by furnishing them with trees for planting free of cost but also with advice as to their care and protection.

The numbers of trees distributed from the government nurseries for planting on Arbor Day during the last two years were as follows:

Nurseries	1917	1918	Total
Government Nursery, Honolulu .....	10,490	10,500	20,990
Sub-Nursery, Homestead, Kauai .....	1,287	1,125	2,412
Sub-nursery, Hilo, Hawaii .....	334	339	673
<b>Total</b> .....	<b>12,111</b>	<b>11,964</b>	<b>24,075</b>

This distribution is about 5,000 trees less each year than the average annual tree distribution during the past twelve years.

#### NEW FOREST NURSERY.

During July 1918, as a step in the extension of tree planting work on the forest reserves, a new nursery was established in the Lualualei Forest Reserve on the west slope of the Waianae Mountains, Oahu, just below Kolekole Pass. A small house for the accommodation of laborers was constructed and water was piped to the house and nursery terraces from the nearby perennial stream. Most of the seedlings are started in the Makiki Nursery and shipped down in seed boxes to this new nursery where they are transplanted and held until of sufficient size for planting out. The planting gang of Hawaiian laborers which in May 1918 had completed the reforestation of all open government forest reserve lands in Manoa Valley was shifted to this new locality where the forest cover should be reestablished because of the benefit which it will exert on the valuable springs and small streams in this comparatively dry region. This site was also selected because of the opportunity which it presents for testing out the trees which are best suited to the drier situations in these islands and for obtaining knowledge and experience along this line which at present are lacking.

A similar expansion of reforestation work is desirable at other places in the islands and it is hoped that sufficient funds will be available to permit the establishment of new nurseries with their accompaniment of tree planters on the Kula Forest Reserve, Maui, the Mokuleia Reserve, Oahu, and at Piihonua on the Hilo Watershed, Hawaii.

## TREE PLANTING ON FOREST RESERVES.

The tree planting work done by the Division of Forestry during the past two years has been confined almost wholly to watershed areas and particularly to the water-producing region back of Honolulu, for it is only from a completely forested watershed that the best results in the way of an even and continuous flow of water can be obtained. The operations of the Division have extended over five different regions and a total of 44,444 trees have been planted and cared for on forest reserves at Makiki and Tantalus, Manoa, and Lualualei on Oahu and at the Papaholahola Spring and Kamalomaloo on Kauai. In this planting, in addition to the miscellaneous species listed below, a total of 21,138 koa trees were set out. This native tree is used in the belief that it is quite suited to planting on situations where there is a well drained soil and that it forms a good cover since it allows native shrubs and ferns to come up in its shade. The koa responds readily to nursery treatment and the only difficulty which we have had is the inability to secure seed in large quantities because of an insect which riddles the pods before the seed is even ripe.

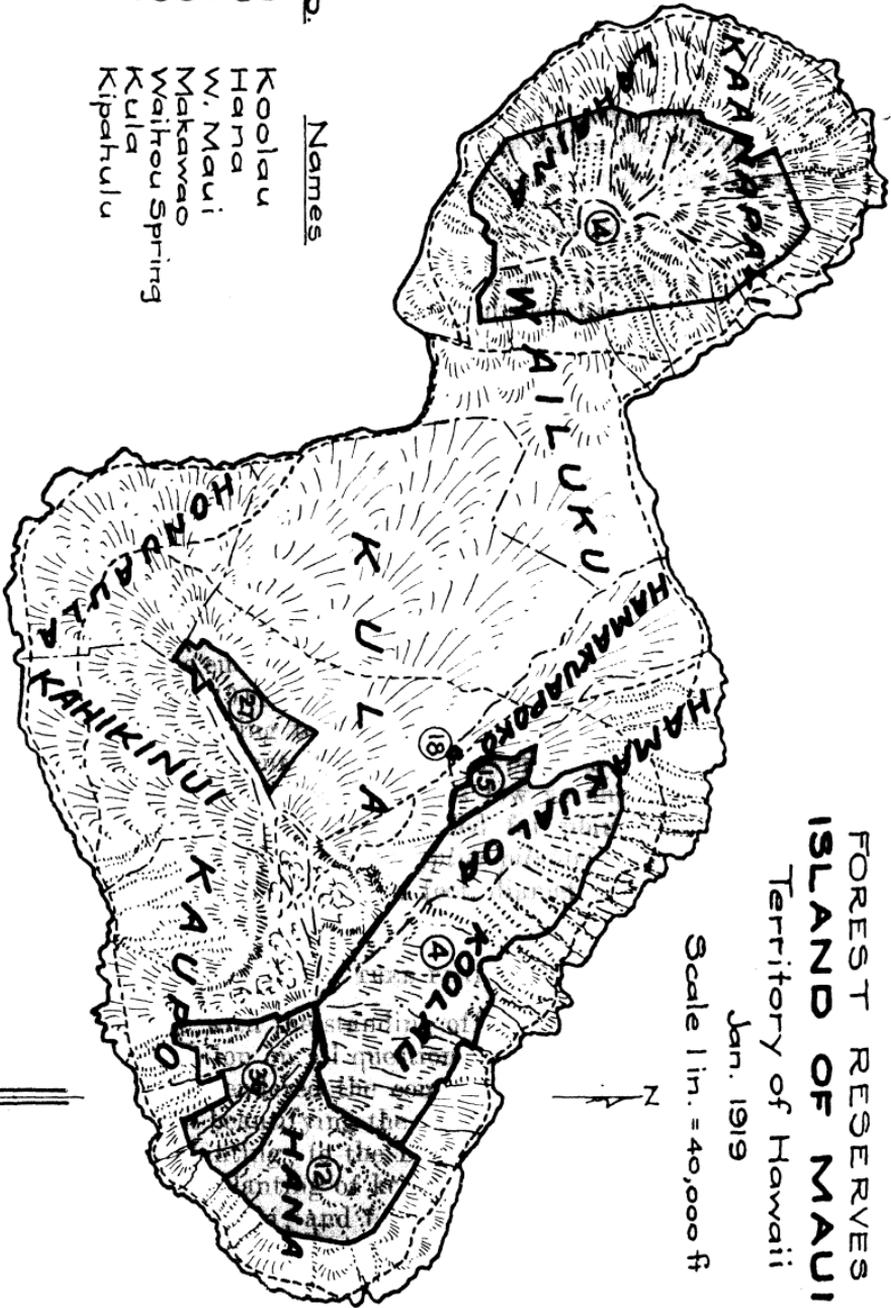
On the Honolulu Watershed Forest Reserve, Oahu, the reforestation of the open places in the Makiki Valleys, begun in 1913, was continued by the planting out of 8,796 koa on the slopes and 3,304 trees of various species at the lower ends of the valley bottoms. Among the latter were 1,484 mahogany and 686 yellow poinciana trees which were planted 8 by 8 feet apart in December, 1917, and May, 1918, respectively, to test their growth under close planting conditions. The koa trees which were first planted on Sugar Loaf are now five years old and constitute a healthy forest with a complete crown canopy. On this same reserve all of the open government lands in Manoa Valley were reforested in the sixteen months ended May, 1918. On approximately 63 acres there were set out 8,516 koa trees and 5,011 trees of other species among which were Australian tea trees, papala kepaui, African tulip, banyan, Australian red cedar, sau tree, Japanese cedar, silk oak, Cook pine and Benguet pine.

On the Lualualei Forest Reserve, Oahu, the planting which began in July, 1918, included a total of 5,304 trees among which were 3,826 koa and the following dry region trees: wiliwili, gum arabic, black locust, yellow poinciana, kassod and logwood. On a part of the Pupukea Forest Reserve, Oahu, 2,934 trees of various species were set out under contract in December, 1918, on water Reserve A. by Libby, McNeill & Libby on land which had formerly been cultivated in pineapples.

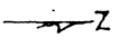
On Kauai, the planting work was continued on the Kealia Reserve by Ranger Lovell by the setting out of 5,232 trees consist-

Prepared by Gov't. Survey Dept., 1919

No.	Names
①	Koolau
②	Hana
③	W. Maui
④	Makawao
⑤	Waihou Spring
⑥	Kula
⑦	Kipahulu



FOREST RESERVES  
**ISLAND OF MAUI**  
 Territory of Hawaii  
 Jan. 1919  
 Scale 1 in. = 40,000 ft





ing of silk oak, swamp mahogany, lemon gum, ironwood, and Japanese cedar and on the Papapaholohola Spring Reserve near Kalaheo by two laborers working under the direction of Mr. W. D. McBryde by the planting of 5,347 silk oak, swamp mahogany, Japanese cedar, Norfolk Island pine and other species.

Efficient citizen tree planters are hard to obtain, but as they are available and if funds will allow, it is planned to extend the reforestation work on the protected reserves where the forest cover is broken, paying the greatest attention to water producing areas.

#### RESULTS OF EXPERIMENTAL PLANTING.

During the past two years it has been found possible to examine the results of planting experiments established by my predecessor with funds contributed by the Forest Service of the U. S. Department of Agriculture. One of these experiments consisted of the planting of temperate zone conifers on Haleakala, Maui, at elevations of from 6,700 to 9,000 feet. The best growth was found in Plot I at the lowest elevation where more favorable conditions as to soil and moisture exist. Here the Jeffrey pine of California showed up best with a maximum height of 11 feet and diameter of 3½ inches after eight years of growth, followed by Coulter pine, Jack pine, Scotch pine, Norway spruce, incense cedar, and white pine with a height of 5 feet and a diameter of one inch. The other experiment was the eucalyptus plantation in Nuuanu Valley, Honolulu, established in 1911, in which all of the trees were measured five years after planting to determine their growth and volume. Many of the 18 different kinds of eucalypts did so poorly under the unfavorable conditions, yielding as low as only .12 cord per acre, that they cannot be recommended for planting in similar situations. The Blackbutt, *Eucalyptus pitularis*, showed up the best with a maximum height of 34 feet, diameter of 6 inches and yield of 4.51 cords per acre.

#### ADVICE ON TREE PLANTING.

In accordance with the standing offer of the Division to give advice and information on all questions connected with tree planting, assistance was rendered the commanding officer at Schofield Barracks, Oahu, in beautifying the reservation by furnishing trees and advice as to planting; to the Dowsett Company in furnishing and supervising the planting of koa trees on the new streets in the Dowsett Tract, Honolulu; and to the Oahu Country Club in supplying hau and willow cuttings, and koa and other trees for beautifying the Nuuanu golf links. Advice in tree planting has also been given by the Forest Nurseryman to many others who have called upon this Division for assistance.

## TREE PLANTING ON PRIVATE LANDS.

In order to keep track of the general progress of forestry in the Territory reply post cards are sent out each year to all tree planters with the request that they return the number and species of trees planted and the purpose of planting. These figures, while not complete, because all tree planters cannot be reached, are analyzed and the results published every two years. For the biennial period just ended the total number of trees planted, as shown in the list which follows, was 1,632,598. This is only 171,130 trees short of the number planted in 1915 and 1916.

NUMBER OF TREES PLANTED IN THE TERRITORY OF HAWAII  
in 1917 and 1918.

## KAUAI.

	1917	1918	Total
Gay and Robinson .....	1,500	3,205	4,705
Grove Farm Plantation .....	20,000	21,500	41,500
Hawaiian Sugar Co. ....	40,000	20,000	60,000
Isenberg, Rev. Hans .....	50		50
Kekaha Sugar Co. ....	505		505
Kilauea Sugar Plantation Co. ....	11,250	5,500	16,750
Knudsen Bros. ....	6,300	40,200	46,500
Lihue Ranch .....	4,278		4,278
Makee Sugar Co. ....	10,543	8,250	18,793
McBryde Sugar Co. ....	9,459	4,593	14,052
Territory of Hawaii .....	6,784	3,795	10,579
	<hr/>	<hr/>	<hr/>
	110,669	107,043	217,712

## OAHU.

Cooke, Mrs. C. M. ....	300	1,230	1,530
Dowsett Company .....	381		381
Ewa Plantation Co. ....		247	247
Hawaiian Pineapple Co. ....	4,000	9,000	13,000
Hawaii Preserving Co. ....	6,000	3,000	9,000
Honolulu Plantation Co. ....	20,110		20,110
Judd, Mrs. A. H. B. ....	200		200
Kahuku Plantation Co. ....		5,000	5,000
Kemoo Farm .....	100		100
Koolau Agricultural Co. ....	500		500
Kunia Development Co. ....	500		500
Laie Plantation .....	1,154	300	1,454
Marconi Wireless Tel. Co. ....	600		600
Sandwich Islands Honey Co. ....	17,000	20,000	37,000
Territory of Hawaii .....	18,065	15,800	33,865
United States Army .....	5,500	6,994	12,494
Wahiawa Water Co. ....	15,200	1,000	16,200
Waiialua Agricultural Co. ....	70,801	78,712	149,513
	<hr/>	<hr/>	<hr/>
	160,411	141,283	301,694

## MOLOKAI.

	1917	1918	Total
Baldwin Home .....	50		50

## LANAI.

Lanai Company .....	1,912	406	2,318
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## MAUI.

Baldwin, Mrs. H. A. ....	1,600	650	2,250
East Maui Irrigation Co. ....	200		200
Grove Ranch .....	1,000		1,000
Haleakala Ranch .....	915	9,734	10,649
Hawaiian Comm. & Sugar Co. ....	1,400	1,000	2,400
Honolua Ranch .....	12,050	24,000	36,050
Krauss, Mr. F. G. ....	423	73	496
Maui Agricultural Co. ....	425,000	400,950	825,950
Pioneer Mill Co. ....	5,060	8,000	13,060
Wailuku Sugar Co. ....	10,700	20,923	31,623
	<hr/>	<hr/>	<hr/>
	458,348	465,330	923,678

## HAWAII.

Gamalielson, Mr. J. E. ....	52		52
Greenwell, Mr. F. R. ....	1,000		1,000
Hakalau Plantation Co. ....	542		542
Hamakua Mill Co. ....	32,260	15,000	47,260
Hawaiian Agricultural Co. ....	9,591	9,185	18,776
Hawaii Consolidated R. R. ....	100		100
Hawi Mill and Plantation Co. ....	5,875	1,660	7,535
Homesteaders .....		6,188	6,188
Honokaa Sugar Co. ....	10,000		10,000
Hutchinson Sugar Plantation Co. ....		740	740
Kaiwiki Sugar Co. ....	200		200
Kohala Sugar Co. ....	12,000	5,000	17,000
Niulii Mill and Plantation .....	1,200	3,000	4,200
Onomea Sugar Co. ....		500	500
Paaubau Sugar Plantation Co. ....	2,000	8,000	10,000
Pacific Sugar Mill .....	10,000		10,000
Parker Ranch .....	39,689	11,710	51,399
Puakea Plantation Co. ....	500	1,000	1,500
Vieira, Mr. J. S. ....	44		44
Waiakea Mill Co. ....	110		110
	<hr/>	<hr/>	<hr/>
	125,163	61,983	187,146
Total for all islands .....	856,553	776,045	1,632,598

The leading species planted and the purpose of planting are given in the following table:

NUMBER OF TREES PLANTED IN THE TERRITORY OF HAWAII  
IN 1917 AND 1918 BY SPECIES AND PURPOSE OF PLANTING.

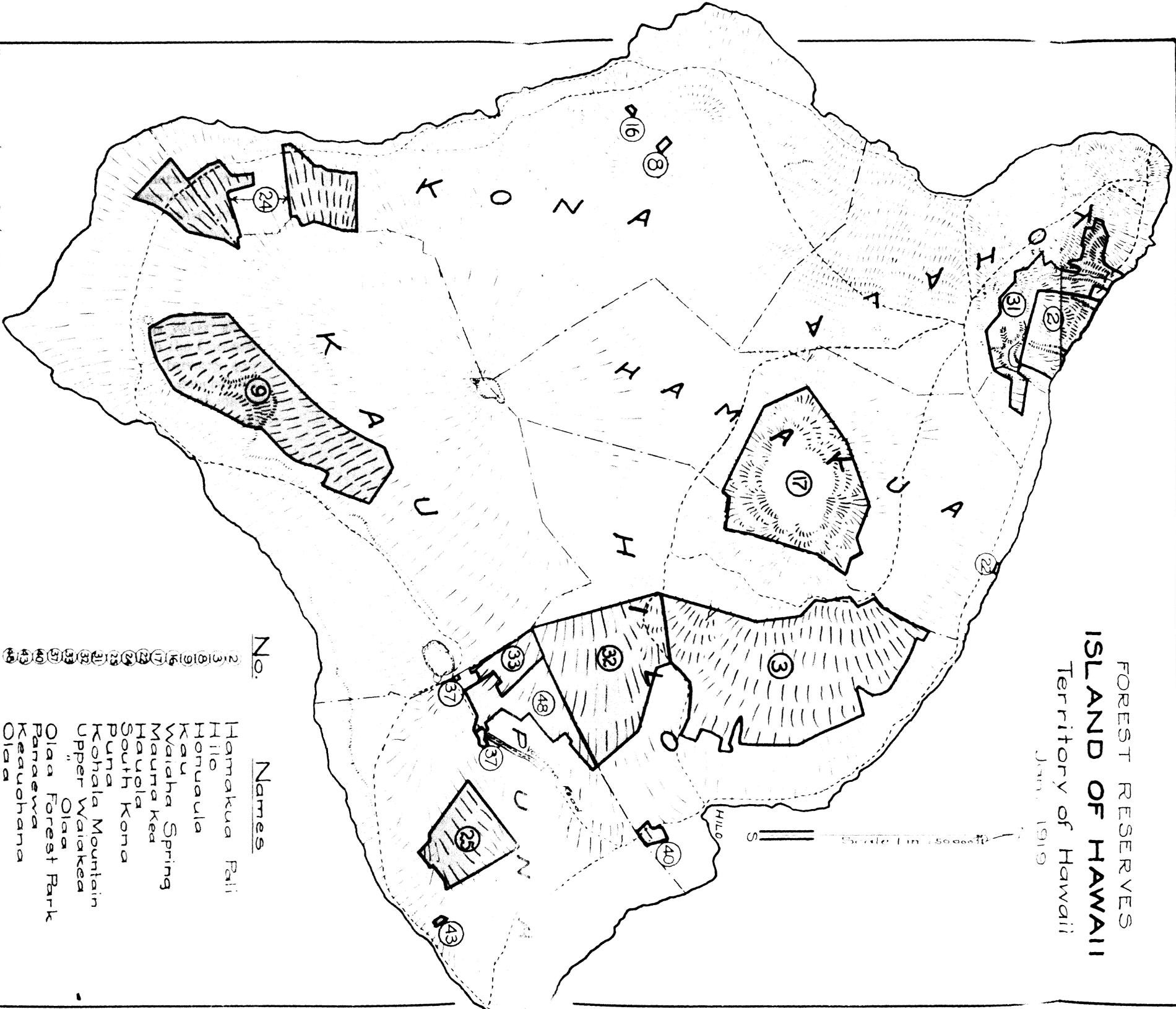
Species	Purpose of Planting.						Total
	Cover	Fuel	Wind- break	Orna- ment	Timber		
	1917						
Swamp mahogany.....	385,743	79,519	8,081	25,600	900	499,843	
Ironwood .....		60,604	53,900	20,520		135,024	
Eucalyptus spp. ....		26,116	44,604		15,000	85,720	
Blue gum .....		42,000	3,000	450	2,500	47,950	
Algaroba .....		20,590				20,590	
Other spp. ....	2,547		60	7,514	5,557	15,678	
Lemon gum .....	15,000	172				15,172	
Silk oak .....	4,833	9,894				14,727	
Koa .....	12,656			272		12,028	
Japanese cedar .....					8,921	8,921	
<b>Totals.....</b>	<b>420,779</b>	<b>238,895</b>	<b>109,645</b>	<b>54,356</b>	<b>32,878</b>	<b>856,553</b>	
	1918						
Swamp mahogany ...	285,837	23,172	17,895	16,000		342,904	
Blue gum .....	149,358	9,000				158,358	
Ironwood .....	1,313	73,821	51,455	10,000		136,589	
Red gum .....	13,800	38,515	18,794			71,109	
Other spp. ....	6,676		1,000	24,327		32,003	
Lemon gum .....	12,000	2,278				14,278	
Koa .....	8,482					8,482	
Eucalyptus spp. ....		5,248	175	400		5,823	
Silk oak .....	1,910	756		700		3,366	
Algaroba .....		818	2,075	200		3,093	
Japanese cedar .....					40	40	
<b>Totals .....</b>	<b>479,376</b>	<b>153,608</b>	<b>91,394</b>	<b>51,627</b>	<b>40</b>	<b>776,045</b>	

From the above it will be observed that the swamp mahogany, *Eucalyptus robusta*, is still the most popular tree for general planting and constitutes over 50 per cent of the total planted during the two years. The red gum, *Eucalyptus rostrata*, is said to withstand drought still better, however, and produces a more valuable wood, and is gaining in popularity with tree planters. Koa is also coming into greater prominence for planting on watersheds, the only difficulty being that good seed is hard to obtain on account of insect infestation.

During the previous two years, 44 per cent of the total number of trees planted were for the purpose of reestablishing a cover on watershed areas. That greater attention has lately been paid to reforestation for this purpose is evidenced by the fact that during the two years just ended the total number of trees planted on watershed areas constituted over 55 per cent of the total.



FOREST RESERVES  
**ISLAND OF HAWAII**  
 Territory of Hawaii  
 Jan., 1919



No.	Names
1	Hamakua Pali
2	Hilo
3	Honuaula
4	Kau
5	Waiaha Spring
6	Maunakea
7	Hauola
8	South Kona
9	Puna
10	Kohala Mountain
11	Upper Waialea
12	Olaa
13	Olaa Forest Park
14	Panaewa
15	Keauohana
16	Olaa
17	
18	
19	
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Prepared by Geo. J. Sargent, Sept., 1918



acres of good pili grass by restricted grazing. This the new lease allows, but only after the extermination of the goats, which must be accomplished during the first year. The whole purpose of the lease is to develop, conserve and improve the island rather than to exploit it.

#### KOKEE CAMPS.

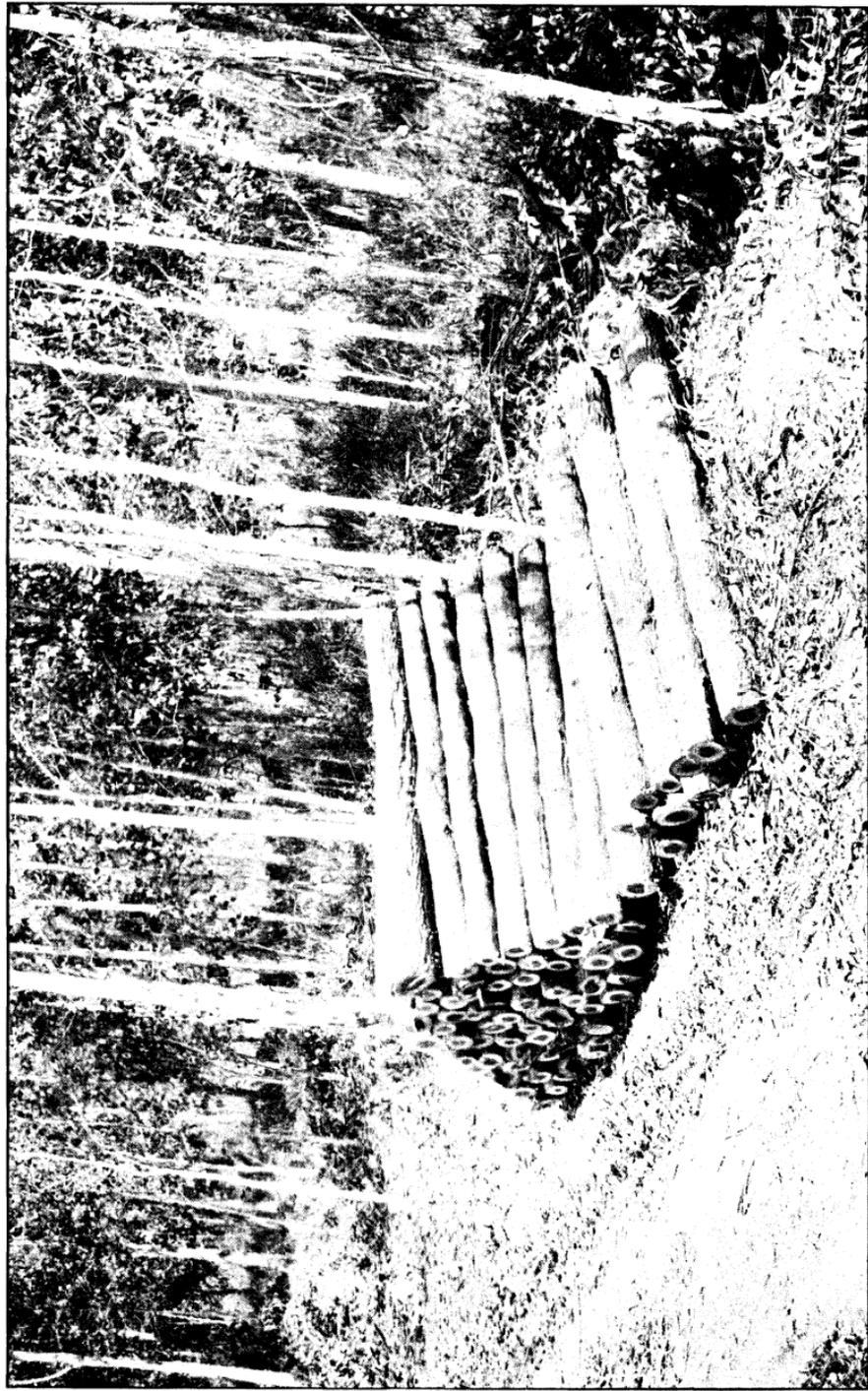
A new departure for the Division was instituted during 1918, when at the expiration of a government lease, certain mountain meadow lands near the Kokee Stream and Halemanu on Kauai, within the Na Pali-Kona Forest Reserve, Kauai, at an elevation of 3,500 feet came under the jurisdiction of this Board. In response to requests from those who desired the privilege of camping out in this invigorating climate in the same manner that camping privileges are extended to many thousands on mainland National Forests, a total of 47 camping sites were surveyed out in the open areas along mountain streams and a form of permit which will safeguard the best interests of the forest and protect individual permittees was approved. These permits are for ten years and the annual charge for unimproved sites is based on the nominal rate of \$10 per acre. The camp sites vary in size from .3 to 2.0 acres and are situated not far from the scenic beauties of Waimea Canyon, where the rainfall is not excessive and the nights are always cool. A good opportunity is presented here for those who desire a change from the lowlands in a cooler climate amidst pleasant surroundings. Kokee Camps are at present accessible over a passable automobile road which in all probability will be improved in the near future.

#### FIRST TERRITORIAL FAIR EXHIBIT.

Along with the other divisions of this Board, the Division of Forestry presented an exhibit at the First Territorial Fair, held at Kapiolani Park on June 10 to 15, 1918, which brought forth favorable comment from all who viewed it. In addition to the exhibits of young forest seedlings and transplants, native and introduced woods and bamboos, and maps showing forest reserves, a working erosion model was operated to show the beneficial effect of a forest cover on the runoff. By this model it was possible to bring home to the people in a very telling manner the lesson of the disastrous results of deforestation on watersheds and the valuable part which our native forest plays in the conservation of water and the importance of absolute forest protection in these islands.

#### PLANT PESTS.

Efforts have been made during the past two years to assist



Durable Posts Cut from Eight Year Old Bloodwood Trees. *E. aciculatus*  
*corumbosa*, Grown in the Dry Land District, Waipio, Oahu



in the eradication of plant pests by destroying them on our own grounds and sending out warnings against their spread elsewhere. One of these, *Caesalpinia bonduc*, is a rambling climber with very sharp, hook-like spines, which upon invasion takes complete possession of everything within its reach. It has been in the islands for many years but fortunately is confined to a few localities. One of these was in Hering Valley in Makiki, but by persistent efforts in not only cutting and burning up all the plants and destroying the roots but also by destroying young seedlings which came up later, we have at last been able to eliminate it.

Another weed which spreads extensively and at an alarming rate is the Spiny Pig Weed, *Amaranthus spinosus*. As its name denotes, it bears a pair of very sharp thorns at the base of the leaves. Cattle will not eat the plant and shun the localities where it occurs. Upon detecting its unusually rapid spread in Manoa Valley attention to it was called in the May, 1917, "Hawaiian Forester and Agriculturist," with the advice that wherever found it be rooted out and burned before the seeds are ripe.

A new introduction, which it is hoped will not become established here, by the persistent efforts which have already been made to eradicate it, is the Morning Glory, or Bindweed, *Convolvulus arvensis*, which was discovered last fall on Maui. A warning against it was published in the November, 1918, "Hawaiian Planters' Record," and upon investigation by Ranger Lindsay it was found to be confined to two small patches along the Kahului Railway in Paia. This leads one to believe that it came in with hay or some other feed stuff. It is a troublesome weed on cultivated fields in the Atlantic States and California, and it would be very unfortunate if it became established here.

Chance introductions such as this are apt to occur in spite of all precautions but by exerting our best efforts in their eradication upon discovery and by apprising the people of the necessity of doing likewise it is believed that a great deal can be accomplished to prevent their establishment in these islands where we already have our share of plant pests.

#### PUBLICATIONS.

The following have been published by the Division of Forestry during the past two years in addition to the monthly and annual reports and special articles which have appeared in "The Hawaiian Forester and Agriculturist," the official monthly magazine of the Board:

- April 6, 1917. "Report of the Division of Forestry for the Biennial Period Ending December 31, 1916."
- July 28, 1917. Rule IV, Division of Forestry.
- August, 1917. Botanical Bulletin No. 4, "The Ohia Lehua Trees of Hawaii," by Joseph F. Rock, Consulting Botanist.
- May, 1918. "Forestry as Applied in Hawaii," by C. S. Judd, Superintendent of Forestry. Reprint from "The Hawaiian Forester and Agriculturist," Vol. XV, No. 5.

## SUMMARY.

In conclusion, it is a pleasure to report that progress has been made in the two main activities of the Division, forest protection and forest extension. The work of examining, surveying, and setting aside the main forest reserve system has been concluded and the reserves which are shown on the maps printed with this report, now include 814,926 acres, 68 per cent. of which is government land. On the four main islands seven forest rangers are on duty protecting and administering government forest reserve lands and they have had a hand in the construction and repairing of 18.63 miles of reserve boundary fences and the elimination of much wild stock during the biennial period. Tree planters are gradually reforesting open areas in the reserves mainly in regions where water for city and domestic use is required. For the continuation of these lines of work an adequate appropriation for the coming biennial period will be greatly appreciated and more particularly for a few additional forest rangers, for more extensive fencing, and for the establishment of new forest nurseries accompanied by tree planting.

Respectfully submitted,

C. S. JUDD,  
 Superintendent of Forestry and Chief  
 Fire Warden.

## LIST OF DISTRICT FIRE WARDENS

### CHIEF FIRE WARDEN.

C. S. JUDD, Superintendent of Forestry, ex-officio.

### DEPUTY FIRE WARDEN AT LARGE.

DAVID HAUGHS, in and for the Territory of Hawaii.

### DISTRICT FIRE WARDENS.

#### KAUAI.

A. MENEFOGLIO, in and for Wainiha Valley, District of Halelea.

W. F. SANBORN, in and for the District of Halelea, excepting Wainiha Valley.

L. D. LARSEN.

GEORGE HUDDY, Assistant District Fire Warden. In and for the District of Koolau, excepting the land of Anahola.

E. M. CHEATHAM, In and for the portion of the Districts of Koolau and Puna, extending from the land of Anahola to the land of Olohena, inclusive.

C. H. WILCOX, In and for that portion of the District of Puna, south of and including the land of Wailua.

FRANK A. ALEXANDER, In and for that portion of the District of Kona, extending from the Hanapepe Valley to the Puna District line.

B. D. BALDWIN, In and for that portion of the District of Kona lying between and including the Waimea, Poomau, and Kauaikinana Valleys on the west and the Hanapepe Valley on the east.

ERIC A. KNUDSEN, In and for the District of Na Pali and that portion of the District of Kona, lying to the west of Waimea, Poomau, and Kauaikinana Valleys.

#### OAHU.

F. S. LYMAN, JR., In and for that portion of the District of Koolauloa from the Waialua District line to and including the land of Kaunala.

ANDREW ADAMS, In and for that portion of the District of Koolauloa lying to the north and east of the land of Kaunala.

W. H. CLEGHORN, In and for that portion of the District of Koolaupoko, extending from the Koolauloa District line to the land of Heeia.

WM. HENRY, In and for that portion of the District of Koolaupoko, extending from and including the land of Heeia to the land of Kailua.

JOHN HERD, In and for that portion of the District of Koolaupoko, extending from and including the land of Kailua to Makapuu Point.

CHARLES H. BAILEY, In and for that portion of the District of Kona, extending from Makapuu Point to Palolo Valley.

JOSEPH K. KAPONO, In and for Palolo Valley, District of Kona.

C. MONTAGUE COOKE, In and for Manoa Valley, District of Kona.

- W. M. GIFFARD, In and for that portion of the District of Kona lying between Pauoa and Manoa Valleys.
- L. A. MOORE, In and for Nuuanu Valley, District of Honolulu.
- WM. WEINRICH, In and for that portion of the District of Ewa lying to the West of the main government road.
- JAMES GIBB, In and for that portion of the District of Ewa lying between the lands of Moanalua and Waiawa.
- H. BLOOMFIELD BROWN, In and for that portion of the District of Ewa lying to the east of the main government road between the land of Waipio and the Kaukonahua Gulch.
- A. A. WILSON, In and for that portion of the District of Waialua, lying between the Kaukonahua and Helemano Gulches.
- GEORGE M. ROBERTSON, In and for that portion of the District of Waialua lying between the Helemano and Opaaula Gulches.
- GEORGE WILSON, In and for that portion of the District of Waialua lying between the Opaaula Gulch and the Koolauloa District line.
- F. MEYER, In and for that portion of the District of Waianae lying to the west of the Waianae Mountains.

#### MOLOKAI.

- JAMES MUNRO, In and for that portion of the Island of Molokai lying to the west of Wailau Valley and the land of Mapulehu.
- C. C. CONRADT, In and for that portion of the Island of Molokai including and lying to the east of Wailau Valley and the land of Mapulehu.

#### LANAI.

- GEORGE C. MUNRO, In and for the Island of Lanai.

#### MAUI.

- A. W. COLLINS, In and for the District of Lahaina.
- DAVID T. FLEMING, In and for the District of Kaanapali.
- C. E. S. BURNS, In and for the District of Wailuku.
- F. F. BALDWIN, In and for the District of Hamakuapoko and the west half of the District of Hamakualoa.
- W. F. POGUE, In and for the east half of the District of Hamakualoa and that portion of the District of Koolau lying to the west of Makapipi Gulch.
- MARION CABRAL, In and for that portion of the District of Koolau lying to the east of Makapipi Gulch.
- JOHN CHALMERS, In and for the District of Hana.
- JOHN FASSOTH, In and for the District of Kipahulu.
- L. VON TEMPSKY, In and for the Districts of Kula and Kaupo.

#### HAWAII.

- G. C. WATT, In and for that portion of the north half of the District of Kohala extending from the land of Kaauhuhu to the Hamakua District line.
- SAM P. WOODS, In and for that portion of North Kohala extending from the northern boundary of the land of Kawaihae I. to and including the land of Kaauhuhu.

- A. W. CARTER, In and for the District of South Kohala.
- W. P. NAQUIN, In and for the western part of the District of Hamakua extending to the west from the boundary of the land of Paauhau to the boundary of the land of Kukaiau.
- DONALD S. MACALISTER, In and for that portion of the District of Hamakua extending from and including the land of Kukaiau to the Hilo District line.
- JOHN M. ROSS.
- H. S. RICKARD, Assistant District Fire Warden, In and for that portion of the District of Hilo extending from the Hamakua District to the land of Makahanaloa.
- JOHN T. MOIR, In and for that portion of the District of Hilo extending from and including the land of Makahanaloa to the land of Kikala.
- JOHN A. SCOTT, In and for that portion of the District of Hilo extending from the Puna District line to and including the land of Kikala.
- C. F. ECKART, In and for the District of Puna.
- JAMES CAMPSIE, In and for that portion of the District of Kau extending from the Puna District line to and including the land of Punaluu.
- GEORGE GIBB, In and for that portion of the District of Kau extending from the land of Punaluu to the Kona District line.
- R. A. McWAYNE, In and for that portion of the District of Kona extending from the Kau District line to and including the land of Kaapuna.
- T. C. WHITE, In and for that portion of the District of Kona extending from the land of Kaapuna to and including the land of Hookena.
- L. P. LINCOLN, In and for that portion of the District of Kona extending from the land of Hookena to and including the land of Kaawaloa.
- T. C. WHITE, In and for that portion of the District of Kona extending from the land of Kaawaloa to and including the land of Kahaluu.
- JOHN A. MAGUIRE, In and for that portion of the District of Kona extending from the land of Kahaluu to the Kohala District line.

#### FOREST RANGERS.

##### Kauai.

- W. V. HARDY.
- HOSEA K. LOVELL, For the Island of Kauai.

##### Oahu.

- DAVID KAPIHE, In and for Tantalus and Makiki and Pauoa Valleys.
- E. H. HIPPLE, In and for Palolo, Manoa, and Nuuanu Valleys.
- JOHN PILILAAU, In and for the Waianae District.

##### Maui.

- JAMES LINDSAY, For the Island of Maui.

##### Hawaii.

- A. J. W. MACKENZIE, For the Island of Hawaii.

**HONORARY FOREST RANGERS.**

W. H. SHIPMAN, In and for the District of Puna and Hilo, Hawaii.  
 BRUCE CARTWRIGHT, JR., For the enforcement of Rule IV, Division  
 of Forestry, on Oahu.

**DISTRICT FORESTERS.****Kauai.**

Albert S. Wilcox, L. D. Larsen, C. H. Wilcox, Edward Broadbent,  
 Rev. J. M. Lydgate, Walter D. McBryde, Eric A. Knudsen, B. D.  
 Baldwin.

**Oahu.**

Andrew Adams, L. L. McCandless, John Herd, Paul R. Isenberg, W.  
 W. Goodale.

**Molokai.**

James Munro, C. C. Conradt.

**Lanai.**

George C. Munro.

**Maui.**

A. W. Collins, F. F. Baldwin, W. F. Pogue, L. von Tempsky, Dr. J.  
 H. Raymond, D. T. Fleming, John Fassoth.

**Hawaii.**

G. C. Watt, A. W. Carter, W. P. Naquin, John M. Ross, John A.  
 Scott, George Gibb, W. R. Castle, James Campsie, John A. Maguire.

## REPORT OF THE FOREST NURSERYMAN

Honolulu, Hawaii, December 31, 1918.

Superintendent of Forestry,  
Honolulu, Hawaii.

Dear Sir: I respectfully submit the following report for the years 1917 and 1918:

### COLLECTION AND EXCHANGE OF SEED.

We have had many applications from abroad during the past two years for seed of our exotic and indigenous plants. From Australia we received a large number of orders for algaroba seed, *Prosopis juliflora*. From other countries the demand was principally for flowering trees and shrubs. We have received in exchange seed such as different kinds of ficus, junipers, cypress, and a number of species of the pine family, etc.

### TREES DISTRIBUTED FROM GOVERNMENT NURSERIES DURING 1917 AND 1918.

Oahu:		1917		
Honolulu:				
	Seedlings	Trans-plants	Pot Grown	Total
Sold .....		1,377	1,366	2,743
Gratis				
Arbor Day .....			10,490	10,490
Forest Reserves .....	6,000	5,000	1,495	12,495
Homesteaders .....	7,100	2,350	640	10,090
Military Posts .....		2,500	3,000	5,500
Parks .....			300	300
Schools .....			850	850
Street Planting .....			432	432
Miscellaneous .....	9,000	1,034	1,370	11,404
	22,100	12,261	19,943	54,304
Hawaii sub-nursery, including Arbor Day .....				7,568
Kauai sub-nursery, including Arbor Day .....				8,087
Plantation companies, etc. ....				283,550
				353,509

Oahu:		1918.		
Honolulu:				
Sold .....		830	1,795	2,625
Gratis				
Arbor Day .....			10,500	10,500
Homesteaders .....	3,000	2,803	712	6,515
Forest Reserves .....	7,700	2,050	286	10,036
Military Posts .....		5,390	1,604	6,994
Parks .....			55	55
Schools .....		250	1,266	1,516
Street and Road Planting ...	2,400		724	3,124
Miscellaneous .....	1,000	1,890	3,927	6,817
	14,100	13,213	20,869	48,182

Hawaii sub-nursery, including Arbor Day .....	6,188
Kauai sub-nursery, including Arbor Day .....	6,010
Plantation companies, etc. ....	237,522
	<hr/>
	297,902

Total Tree Distribution, 1917 and 1918, 651,411.

#### Government Realizations.

1917.	
Sale of Plants .....	\$ 41.85
Rent of Office, Nursery Grounds .....	420.00
	<hr/>
	\$461.85
1918.	
Sale of Plants .....	\$ 45.55
Rent of Office, Nursery Grounds .....	420.00
Sale of aged horse .....	50.00
	<hr/>
	\$515.55

#### Preservation and Extension of Forestry and Forest Reserves.

1917.	
Rent and Fees .....	\$212.50
Sale of black sand .....	52.25
Sale of posts from Tantalus .....	2.25
	<hr/>
Total .....	\$267.00
1918.	
Rent and Fees .....	\$210.25
Sale of black sand .....	181.00
	<hr/>
Total .....	\$391.25

Government realizations are deposited with the Treasurer at the end of each month. Collections on account of Preservation and Extension of Forestry and Forest Reserves are deposited with the Treasurer at the end of each quarter, and go into the special fund.

#### PLANTATION COMPANIES AND OTHER CORPORATIONS.

The number of trees ordered by plantation companies and other corporations during 1918 was not so large as in some of the past years. The falling off, no doubt, was due to the scarcity of labor on most of the plantations.

The following is a list of trees distributed during the past two years:

	1917	1918	Total
Eucalyptus robusta .....	127,300	95,200	222,500
" citriodora .....	20,100	25,500	45,600
" globulus .....	1,550	42,700	44,250
" rostrata .....	15,000	34,000	49,000
" resinifera .....	3,000	10,000	13,000
" crebra .....	38,000	.....	38,000
" rudis .....	.....	10,000	10,000
" pilularis .....	5,050	.....	5,050
Casuarina equisetifolia .....	51,000	18,200	69,200
" quadrivalvis .....	3,250	1,000	4,250
Grevillea robusta .....	10,000	.....	10,000
Swietenia mahogani .....	1,000	.....	1,000
Cryptomeria Japonica .....	5,000	.....	5,000
Miscellaneous .....	3,300	922	4,222
Total .....	283,550	237,522	521,072

## MAKIKI STATION.

The work at this station consisted principally of transplanting trees into boxes, pots and tin cans, mixing and sterilizing soil to be used for seed raising and transplanting at this station and at the Nursery on King Street.

A great deal of saw mill work is done at this station which consists of cutting up wood for seed and transplant boxes, laths for making crates for shipping plants, fence posts, etc.

## HONOLULU WATERSHED.

During the year 1917, 6,054 koa, 300 kukui, and 1,484 mahogany trees were planted, and during 1918, 2,742 koa, and 686 yellow poinciana trees were planted in the Makiki Valleys on the Honolulu Watershed. Other work consisted in rooting out pests. The *Caesalpinia bonduc* is almost exterminated both in Hering and Opu Valleys.

For about three months during the summer of 1918 the men employed on the watershed were transferred to the Tantalus forest for the purpose of cutting away and pruning the trees along the road. This was done at the request of people who had occasion to use the road who complained about the very bad condition of the road through the forest. They complained that owing to the dense shade caused by the trees, the road never had a chance to dry up, consequently the soil got churned into mortar by the wagons and became so deep in parts that it was next to impossible to get over it with any kind of a vehicle. The work was certainly appreciated by the people using the road, and the good effect was plainly observed a few weeks after the work was done. Considerable work has been done on the trails running through the watershed. There are long stretches of trails that require to be kept

open, not only for the convenience of those who may want to use them but as a protection during the summer months against fires.

NURSERY AND GROUNDS.

The propagation and distribution of plants has been carried on with the aid of one man with occasional help from two seed boys and the yard man during the busy season. On the grounds up to about eighteen months ago High Sheriff Jarrett provided us with two trusties to help in keeping the grounds in good condition. Owing to not having men whom he could trust to send us we have been deprived during the past eighteen months of that much needed help. After the prison help was withdrawn it became necessary to employ two extra men. The regular yardman being often required to do rough carpentry work, pipe fixing and assisting at the saw mill in Makiki, etc., left the ground during the great part of the time to be kept in order by two men.

The wooden curbing laid about twelve years ago along the walks is fast decaying, and has disappeared entirely from a number of places. New curbing ought to be laid so that the parking around the buildings and the part used by the public could be kept in a more presentable condition.

Respectfully submitted,

DAVID HAUGHS,  
Forest Nurseryman.

## REPORT OF THE CONSULTING BOTANIST

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Honolulu, Hawaii, December 31, 1918.

The Board of Commissioners of  
Agriculture and Forestry,  
Honolulu, Hawaii.

Gentlemen: I beg to submit my report as Consulting Botanist for the biennial period ended December 31, 1918.

During the summer of 1917 the writer visited Southern California for the purpose of acquainting himself with the large nurseries existing in Santa Barbara. He collected seeds in the various gardens in Southern California, and purchased numerous plants from the nurseries in Santa Barbara. The plants purchased were nearly all ornamental not as yet cultivated in the Territory. Among them were quite a number of palms, and also vines of which the most noteworthy were *Bignonia Kerere*, one of the handsomest and largest flowering bignonia known to the writer, and *Vitis capensis*, a South African ornamental grape with very handsome foliage. They have been planted out on the College of Hawaii campus where they are thriving well. At about the same time quite a number of valuable plants were presented to the writer for the Territory by the Conservatories of the Golden Gate Park, San Francisco, California. Among them were several species of palms, Aroids, Pandanaceae, etc.

After his return to the islands he visited Hawaii with Commissioner Giffard and the Superintendent of the Golden Gate Park Conservatories for the purpose of collecting seeds of native plants intended for exchange purposes.

In August, 1917, the Board published Botanical Bulletin No. 4, "The Ohia Lehua Trees of Hawaii," being a revision of the Hawaiian species of the genus *Metrosideros*, with especial reference to the Hawaiian species and varieties. It is a 76 page bulletin with 31 plates, and is based on the researches by the writer on material in the Board's herbarium now in the safe keeping of the College of Hawaii. In 1917 he also published a book on "The Ornamental Trees of Hawaii." While not an official publication, it is intimately connected with the work done by the writer as Consulting Botanist.

Seeds of numerous species of plants were imported by the writer and turned over to the Board. He personally collected quantities of seed of *Acacia arabica*, a very valuable dry district

tree, from a tree growing in Mrs. Mary E. Foster's garden on Nuuanu Avenue. These seeds were distributed to numerous individuals throughout the Territory. He also imported seeds of various species of *Atriplex*, (Salt bushes) from the Agricultural Station at Giza, Egypt. These were distributed to various ranches in the islands, especially to the dry district (sheep) ranches, as on Molokai.

He also rendered services in determining plants for the Board and other parties in the Territory. It may be remarked that he completed his monograph on the Hawaiian lobelias, based partly on material in the Board of Agriculture herbarium. A duplicate set of the plants properly identified and labeled has been turned over to the Board. The monograph is being published by the Bernice P. Bishop Museum and comprises over 400 pages and 218 plates.

He also prepared a bulletin on "The Arborescent Indigenous Legumes of Hawaii," which is ready to go to press as Botanical Bulletin No. 5 of the Board of Agriculture and Forestry. It may also be of interest to note that the writer has prepared a paper treating all the leguminous plants found in the Territory, both cultivated and wild. The paper will be published with illustrations by the Hawaiian Sugar Planters' Experiment Station.

In cooperation with the Board of Health, at the request of the Executive Officer of the Board of Agriculture and Forestry, the writer has determined medicinal plants collected by a kahuna and has cooperated with the Board of Health in making a list of Hawaiian plants known to be of medicinal value.

During the summer of 1918, the writer visited the islands of Hawaii and Maui for the purpose of collecting and making notes on Hawaiian forest conditions. In conjunction with Mr. A. J. W. Mackenzie, the Forest Ranger at 29 Miles, Hawaii, he spent two days traversing and exploring the forest reserve lands near Kulani, entering the forest below 29 Miles, and ascending to the top of Kulani on the slopes of Mauna Loa.

While on Maui he ascended Haleakala and entered the forest reserve back of Puunianiau as well as the forest reserves north-east of Olinda to Waikamoi and Puohaokamoa. The condition of the forest near Waikamoi is not so good as that of Puohaokamoa. Numerous weeds have made their appearance which are penetrating into the forest, notably Hilo grass. As it was a very clear day the writer could overlook the whole forested area on that side of Haleakala into Keanae and the numerous dead ohia trees at an elevation of 3,500 feet to 4,000 feet gave the landscape a sad appearance. At Puohaokamoa the forest is in splendid condition, sphagnum moss covers the ground and the trunks of trees, the whole making a very formidable and impenetrable jungle.

On west Maui the writer ascended the summit of Mauna Eeke in company with Mr. H. B. Penhallow of Wailuku. The day was perfect and the writer took many photos and notes, and collected many plants. Mauna Eeke is a great flat depression with much standing water—large pools with islands. The whole vegetation is very stunted and only a few inches high, with the exception of the true lobelias which measure several feet in height. The vegetation is mainly composed of a species of silversword which abounds by the thousands, lobelias, geraniums, violets, scaevola, rushes and grasses, all peculiar to that mountain summit. The vegetation is somewhat different from that of Puukukui, 1000 feet higher than Eeke, silversword are very sparingly represented on the former mountain, while thousands of individuals inhabit the latter. Eeke is furrowed by many volcanic fissures of enormous depth as well as many huge volcanic circular blow holes on the margins of which we find the true lobelias very numerous.

He also visited Waihee Valley. The trail was entirely overgrown so that it was necessary to walk in the stream bed. The vegetation is very dense and there is no danger of forest extermination, so long as the summit swamps back of the valleys are not tampered with.

Respectfully submitted,

JOSEPH F. ROCK,  
Consulting Botanist.



TERRITORY OF HAWAII

# Board of Agriculture and Forestry

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DIVISION OF FORESTRY

C. S. JUDD, Superintendent

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## REPORT

OF THE

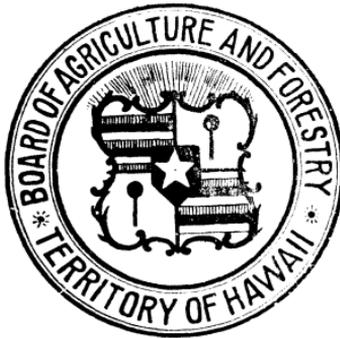
# Division of Forestry

FOR THE

Biennial Period Ended December 31, 1920

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Reprint from the Report of the Board of Commissioners  
of Agriculture and Forestry



HONOLULU, HAWAII  
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# Division of Forestry

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## REPORT OF THE SUPERINTENDENT OF FORESTRY

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Honolulu, Hawaii, December 31, 1920.

The Board of Commissioners of  
Agriculture and Forestry,  
Honolulu, Hawaii.

Gentlemen: I have the honor to submit as follows the report of the Division of Forestry for the calendar years 1919 and 1920.

### INTRODUCTION.

As in past years, the work of this Division has naturally been along two main lines—forest protection and forest extension—and the details of work accomplished during the past two years in these two directions as well as in subsidiary activities are set forth in the following pages.

The chief value of the native Hawaiian forest, that of exerting a very beneficial influence on the run-off by preventing excessive floods and assuring a steady supply of water in springs, streams and artesian basins, has been explained many times in these and in other reports and is fairly well understood by all in this Territory, especially by those who are engaged in agricultural pursuits and are dependent on a sure and steady water supply. This principle, therefore, does not require further elucidation at this time.

The ways and means of maintaining and rehabilitating the native forest so that it will perform this function to its highest degree involve the problems which the Division of Forestry is working on and which are dealt with in this report.

Except for a few areas of private lands within forest reserve boundaries, which have, by provision of law, been turned over to the control of this Board for a term of years, the activities of this Division in the line of forest protection have necessarily and legally been confined entirely to lands within the reserves which are owned by the Territory. As a result of the peculiar system of Hawaiian land surveys, private lands are indiscriminately interspersed with government lands in the re-

serves. When it comes to the administration and protection of a reserve the work of this Division is thereby hampered and the result is unsatisfactory unless the owner of the private land cooperates to the fullest extent in the protection of his forest. An example of this failure to cooperate in forest protection occurs on Hawaii, where a large cattle ranch utilizes, as a pasture, a section of forest land within the recommended boundaries of the largest forest reserve on the island. Such a situation requires the construction and maintenance of fences which, in the mind of a forester, are entirely uncalled for and results in the destruction of the forest on the private land as the inevitable result of grazing.

Eventually, and the sooner the better, the title to all privately owned lands within the finally established boundaries of forest reserves should be acquired by the Territory so that situations, like the above-cited example, will be impossible and so that each reserve can be treated as a unit. In this manner only can the reserves be protected and administration facilitated with the most satisfactory results. To accomplish this, large appropriations will have to be made for acquiring the lands, and provision will have to be made by the Territory for an additional force of efficient men to manage them.

The Hawaiian Sugar Planters' Association is representative of the progressive cooperation which is possible in the care of the native forest. The forestry division of that association has made a good start in the proper direction by giving a section of the Kohala Mt. Forest Reserve on Hawaii better protection against the inroads of stock and by the establishment of two tree nurseries which are supplying trees for the reforestation of the open private lands in this reserve. The Division of Forestry is working in close cooperation with that association on this project. Similar cooperative work has already begun in connection with the Hilo Forest Reserve and the water producing reserves on Oahu.

## FOREST PROBLEMS.

In the administration of the Hawaiian forest reserves as protection forests the immediate problems of the greatest magnitude which confront this Division consist of the adequate protection of the native forest against the inroads made by fire, man, invasive vegetation and stock and of the reforesting of denuded areas.

Under the first group, the fire menace fortunately is comparatively small, owing to the damp condition of the forest, which is maintained naturally except during unusually dry seasons. Intentional damage by man, such as timber trespass, is



Photo by Rock.

Moss-covered ohia lehua tree at Kilohana, Na Pali-Kona Forest Reserve, Kauai. Elevation 4,023 feet. Showing combination of trees and undergrowth ideal for the conservation of water.



practically negligible and is soon stopped because of the ease of apprehension. The carrying of seeds of undesirable and invasive vegetation, such as Hilo grass, into the mountains unconsciously by trampers, who are thus responsible for the insidious spread of such plants into the native forest with dire results, constitutes, however, a far more serious menace, as will be seen later on in this report.

The protection of the forest against inroads by stock is and will remain for some time the chief work of the Division. This is accomplished, first, by the construction of new and the maintenance of existing fences on exposed boundaries to keep out stock, and, second, by the riddance of stock within fenced reserves. The susceptibility of the native forest, with its combination of shallow-rooted trees, undergrowth of ferns and vines, and ground cover of mosses and small plants (an ideal combination for preventing excessive run-off and converting surface drainage by percolation into sub-drainage) to damage by stock is so well known to all that it is unnecessary to repeat that one can not have a perfect native forest and stock on the same land. Grazing in the native forest simply starts the damage which is followed up by invasions of fast growing grasses, fungus and insect damage, and other attendant ills. The native forest, however, even when partially damaged in this manner, will recuperate to a large extent when given protection and it is well worth while to fence and keep out stock if there is a nucleus of native forest on the land. Nature works more rapidly than man by the process of natural tree reproduction and far more can be accomplished under most circumstances by protecting and giving the native forest a chance to rehabilitate itself than by the laborious and expensive process of artificial reforestation represented by tree planting.

Where land areas have been so completely deprived of their forest cover that natural reproduction can not be expected within a reasonable time the process of tree planting by human effort must be employed. This is especially true where forest denudation has been succeeded by the invasion of a fast growing ground cover, such as Hilo grass, which would greatly hinder the germination of naturally sown tree seeds. In this problem is involved the question of introducing, planting, and finally selecting (a long process) new species of vigorously growing trees which will produce a suitable forest cover, in combination with undergrowth, for water conservation and which will give quicker and better results than the shallow-rooted and susceptible indigenous species. The elimination of undesirable ground cover such as Hilo grass by shading out or by other means also comes in here for a share of attention. Experiments on this problem will be undertaken by this Division during 1921.

What the Division has done during the past two years toward the solution of these problems is shown in this report.

### ADMINISTRATIVE FIELD FORCE.

At the beginning of the two-year period the Division had only seven forest rangers to look after the 557,344 acres of government forest land under its control, or one ranger for every 80,000 acres. At the end of the period eleven rangers were on the roster, or at the rate of one ranger for every 50,000 acres. The changes in the ranger force were as follows:

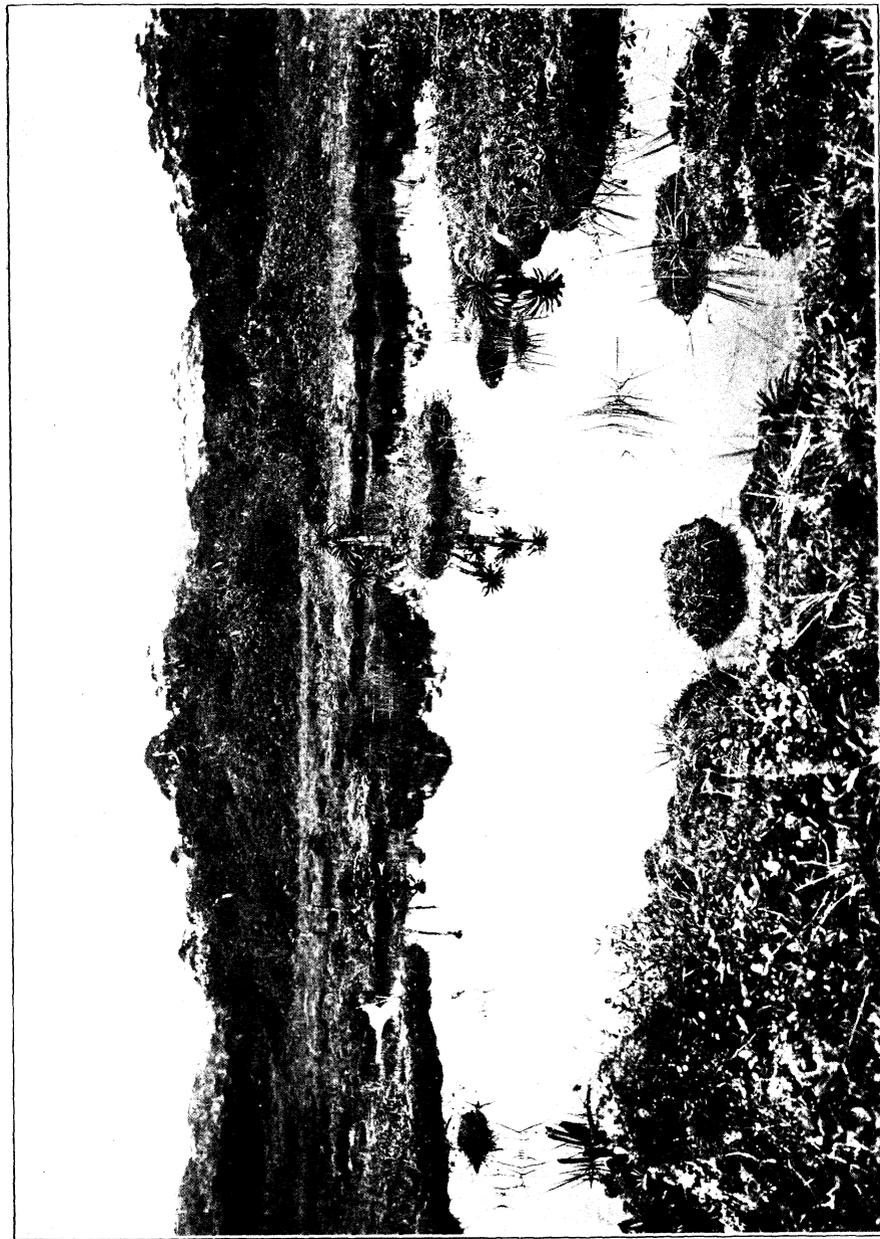
Ranger W. V. Hardy served on Kauai until June, 1920, when he resigned because of his departure from the Territory. The position has been left vacant until a qualified successor can be secured and an appropriation has been requested for such a man for the coming biennial period. Ranger Hosea K. Lovell is the other ranger on the windward side of Kauai.

On Oahu, Ranger Daniel Kapahu succeeded John Pililaau on February 1, 1919, as ranger for the Waianae District and on May 24, 1920, J. P. Pico was appointed honorary forest ranger for the Waianae-kai Reserve. On December 13, 1920, V. L. Ellis was appointed Forest Ranger at Large and will be assigned to duty on the other islands where needed as well as on Oahu. The other two rangers for this island are David Kapihi and E. H. Hipple.

On Maui, Ranger James Lindsay devotes almost his entire time to the Division's forest nursery at Haiku and another competent man for general ranger work is much needed for this island.

On Hawaii, Antone P. Aguiar was on April 14, 1919, appointed Forest Ranger to protect the forest on the Panaewa Reserve on the Volcano Road; on October 6, 1919, Charles E. Stone was appointed forest ranger for the reserves in Kau and South Kona; and on June 1, 1920, Harry L. Denison was appointed forest ranger to protect and administer the Kohala Mt. and Hamakua Pali Forest Reserves in cooperation with the Hawaii Sugar Planters' Association. The fourth ranger on Hawaii is A. J. W. Mackenzie. Another efficient ranger is much needed for the Hilo Reserve and unless an appropriation for this position is secured the plans made for the proper and very necessary protection of this reserve will unfortunately have to be abandoned.

During the early stages of changing the reserves from mere paper reserves to actual forest lands under administration it was necessary with the meager appropriations to limit the choice of rangers to local residents who had homes in the immediate vicinity of the reserves in their charge and who could devote a



Alakai Swamp, Na Pali-Kona Forest Reserve, Kauai. The source of many of the streams on the Garden Island.

Photo by Rock.



part of their time to the general care of the land. The law requiring that only citizens can be employed also limited the choice of men to elderly Hawaiians or old white men because vigorous young citizens could not be secured for the salary offered. This condition obtains today to some extent, although the recent appointment of the Forest Ranger at Large, an energetic young man who devotes all of his time to the work is a step toward the end at which this Division is aiming, viz., the employment as forest rangers of energetic young citizens, preferably those who have had some technical forest training, who will devote all their time to the work and who will be furnished quarters at or near the forests where their work lies. The sooner adequate appropriations are made to carry this plan completely into effect the sooner will conditions on the forest reserves be whipped into proper shape.

A distinct addition to the staff was the appointment of Mr. Charles J. Kraebel, a graduate of the Michigan Forest School, veteran of the great war, and endowed with many years' experience with the U. S. Forest Service on the Pacific Coast. Mr. Kraebel began his duties in the Territory on June 23, 1920, and already has such a good grasp on the forest situation that much additional work, which had necessarily been delayed, has been accomplished by his personal efforts.

## FOREST PROTECTION.

### POLICY.

During the biennial period the Division established two policies on doubtful points which deserve mention here.

The first of these, established in August, 1919, is to treat the government lands in forest reserves throughout the Territory so that they will serve as sanctuaries for wild game of the feathered tribe where pheasants, chickens and other birds may breed and multiply unmolested. No permits to hunt birds on government lands in forest reserves have been issued, therefore, since the establishment of this policy and all such hunting is held as trespass. The only exception to this rule was made in October of the same year, when it was pointed out that the only place on Maui where the ordinary sportsman could hunt wild pheasants was in the Kula Forest Reserve and that an injustice was being done by the rule. Permits have been therefore issued for hunting pheasants on this reserve only during the open season. It is felt that the beneficial effects of this general policy will soon be felt by the natural increase of wild birds in the foothill country of the forest reserves.

The second was the stand taken in December, 1920, that,

no matter how desirable it was to foster the new industry of making starch from tree ferns, no tree ferns would be allowed to be cut for this purpose on any government lands and that all permission for such a privilege would consistently be refused. This attitude was taken on well founded grounds because from careful observation it is apparent that no matter what care may be taken the removal of tree ferns would not only upset the delicate balance of nature found in the native forest, but would result in other attendant ills such as the opening up of the forest floor to the sunlight, the detrimental drying out of the shallow-rooted system of the trees, and the introduction of deleterious foreign grasses and weeds of an invasive nature. The native forest must be regarded as a valuable asset in itself when left alone and can not survive if it is to be exploited for starch or stock grazing.

#### FOREST RESERVE CHANGES.

No new reserves were proclaimed during the period, this work having already been accomplished in the main. Several changes were, however, made in existing reserves for purposes of releasing agricultural and park land, defining more appropriate boundaries, and perfecting certain exchanges.

On April 2, 1919, the Governor signed a proclamation withdrawing 415 acres of land along the edge of Waimea Canyon from the Puu Ka Pele Forest Reserve, Kauai, and subsequently issued an executive order turning the land over to the County of Kauai as a public recreational and camping park. The withdrawal of this area from the reserve for this purpose was approved by the Board on March 10, 1919, on application from the Kauai Chamber of Commerce, the Kauai Planters' Association, and the Kauai County Board of Supervisors. The area is situated on the brink of the famous and spectacular Waimea Canyon at an elevation of 3,500 feet and is accessible by automobile over a road which is soon to be improved. Water has been piped to the land, which will be opened to campers during the coming summer season.

The only other changes, five in number, were consummated by proclamations signed by Governor McCarthy on June 21, 1920. These were as follows:

1. The addition of 30,000 square feet of land along the Volcano Road, acquired by exchange from F. G. Snow, to Sec. C of the Oloa Forest Park Reserve, Hawaii.

2. The withdrawal of 83.10 acres of agricultural land from the Oloa Forest Reserve, Hawaii, near 24 Miles on the Volcano Road.

3. The withdrawal of 3,230 square feet of land on Tantalus



Photo by Rock.  
The steep cliffs along the northwest coast of Kauai. Showing conditions in the Na Pali-Kona Forest Reserve. Native lauhala (Pandanus) trees growing almost to the water's edge.



Heights within the Honolulu Watershed Forest Reserve, Oahu, desired by the Land Commissioner for exchange purposes.

4. A modification of the lower boundary of the Lihue-Koloa Forest Reserve, Kauai, to release agricultural land and conform to an established fence line across the lands of Hanamaulu and Wailua, making a net reduction in area of 658 acres.

5. A modification of the boundaries of the Kealia Reserve, Kauai, to release agricultural land and make certain boundary lines more definite, making a net reduction in area of 885 acres.

With these changes, the present total area in the 47 forest reserves throughout the Territory now amounts to 817,114 acres, which is about 20 per cent of the total land area of all the islands. As will be seen in the following table, only 68 per cent of the land in forest reserves, or 557,344 acres, belongs to the Territory.

#### SUMMARY OF FOREST RESERVE AREAS.

Island	Number of Reserves	Private Acres	Government Acres	Total Acres	Per Cent
Kauai	8	66,574	80,096	146,670	18%
Oahu	15	33,888	34,045	67,933	8%
Molokai	1	31,406	13,268	44,674	6%
Maui	7	46,148	74,980	121,128	15%
Hawaii	16	81,754	354,955	436,709	53%
Totals	47	259,770	557,344	817,114	100%
Per Cent	...	32%	68%	100%	

The problem of inspecting, fencing, planting, and otherwise managing more than half a million acres of government forest land located in mountainous country and scattered over five different islands, the furthestmost 360 miles apart, is not as simple as if the areas were located in one compact accessible body.

Although the main bulk of forest reserve land has been set aside, there remain a few additional areas to be created. One of these is the forest land along the cliffs of Waimanalo and Kailua on Oahu, which will soon be reported on. It is planned also to add more forest land to the Hilo Reserve on Hawaii as soon as the survey can be made. It is most desirable also to secure and add to the Kohala Mt. Reserve on Hawaii an area of over 4,000 acres of land on an important watershed which is being denuded of its forest by grazing.

The following table gives the acreage of each reserve and at the end of this report there is set forth in detail the name and acreage of each land in each forest reserve in the Territory.

**LIST OF FOREST RESERVES, TERRITORY OF HAWAII.**

January 1, 1921.

Name of Reserve	No.	Area Recommended		Date of Proclamation
		Private Land, Acres	Government Land, Acres	
<b>ISLAND OF KAUAI.</b>				
Halelea	5	26,510	10,990	Aug. 24, 1914
Kealia	6	2,470	9,050	Mar. 9, 1906
Na Pali-Kona	13	19,890	60,540	June 12, 1907
Lihue-Koloa	19	15,661	28,602	June 5, 1909
Moloaa	20	2,043	5,621	June 5, 1909
Papahāhāhola	41	.....	54	June 19, 1918
Nonou	44	.....	818	Dec. 31, 1918
Puu Ka Pele	45	.....	4,485	Dec. 31, 1918
		<hr/>	<hr/>	
		66,574	80,096	146,670
<b>ISLAND OF OAHU.</b>				
Kaipapau	1	.....	913	Nov. 10, 1904
Ewa	7	23,399	5,151	Mar. 9, 1906
Waianae-kai	10	107	3,653	Sept. 7, 1906
Lualualei	11	.....	3,743	Nov. 30, 1906
Pupukea	21	.....	864	May 10, 1910
Nanakuli	28	.....	1,010	June 4, 1913
Makua-Keaau	29	340	4,480	June 4, 1913
Kuaokala	30	.....	434	June 4, 1913
Honolulu Watershed	34	1,952	4,998	Oct. 13, 1913
Kuliouou	35	.....	214	Feb. 13, 1913
Manoa Ranger Station	38	.....	15	May 9, 1916
Round Top	39	.....	115	Aug. 10, 1916
Waiahole	42	40	1,129	June 19, 1918
Mokuleia	46	.....	6,290	Dec. 31, 1918
Hauula	47	8,050	1,143	Dec. 31, 1918
		<hr/>	<hr/>	
		33,888	34,045	67,933

ISLAND OF MOLOKAI.

Molokai .....	26	31,406	13,268	44,674	Sept. 11, 1912
ISLAND OF MAUI.					
Koolau .....	4	12,739	30,230	42,969	Aug. 24, 1905
Hana .....	12	1,058	13,767	14,825	Nov. 30, 1906
West Maui .....	14	25,335	19,147	44,482	Apr. 21, 1908
Makawao .....	15	.....	2,093	2,093	June 5, 1909
Waihou Spring .....	18	10	74	84	Sept. 11, 1912
Kula .....	27	1,006	5,069	6,075	Aug. 20, 1914
Kipahulu .....	36	6,000	4,600	10,600	
		<hr/>	<hr/>	<hr/>	
		46,148	74,980	121,128	

ISLAND OF HAWAII.

Hamakua Pali .....	2	2,607	16,333	18,940	Dec. 23, 1904
Hilo .....	3	49,777	60,223	110,000	July 24, 1905
Honuaula .....	8	.....	665	665	Apr. 4, 1906
Kau .....	9	6,255	60,839	67,094	Aug. 2, 1906
Waiaha Spring .....	16	.....	193	193	Apr. 21, 1908
Mauna Kea .....	17	.....	66,600	66,600	June 5, 1909
Hauola .....	22	.....	7	7	June 13, 1910
South Kona .....	24	7,692	29,260	36,952	May 17, 1911
Puna .....	25	.....	19,850	19,850	June 29, 1911
Kohala Mt. ....	31	15,423	14,204	29,627	Oct. 13, 1913
Upper Waiakea .....	32	.....	55,000	55,000	Oct. 13, 1913
Upper Olaa .....	33	.....	9,280	9,280	Oct. 13, 1913
Olaa Forest Park .....	37	.....	532	532	Aug. 20, 1914
Panaewa .....	40	.....	1,750	1,750	Apr. 11, 1917
Keaouhana .....	43	.....	272	272	June 19, 1918
Olaa .....	48	.....	19,947	19,947	Dec. 31, 1918
		<hr/>	<hr/>	<hr/>	
		81,754	354,955	436,709	
TOTAL ALL ISLANDS.....					
		259,770	557,344	817,114	
		<hr/>	<hr/>	<hr/>	
		32%	68%	100%	

## RULES AND REGULATIONS.

The present rules and regulations for the protection and administration of government lands in the forest reserves have worked out well and have proven so satisfactory that it has not been necessary to make any changes in them during the period under review.

In March, 1919, two Orientals were arrested in Wood Valley, Kau, Hawaii, for violating paragraph (b) of Rule II by allowing livestock to graze in the Kau Forest Reserve. Each was given a suspended sentence of 13 months by the district magistrate. In October of the same year two Orientals were arrested for cutting grass within the area around the reservoirs in Nuuanu Valley on Oahu on which trespass is prohibited by Rule III. They pleaded guilty in the Honolulu police court and were given suspended sentences of 13 months.

## PROPOSED RULE V.

The alarming rate at which Hilo grass is spreading along cut trails in the mountains of Oahu, due to the seed being carried into the native forest on the trousers and shoes of trampers, and the trepidation with which I view the disastrous results to the undergrowth and eventually to the native trees, more particularly on the steep watershed areas immediately back of Honolulu, led me early in February, 1920, to prepare Rule V, which contemplates the exclusion of the public from the native forest on the steep mountain slopes at the head of Palolo and Manoa Valleys.

The retention of the native forest growth and its preservation in the healthiest possible condition on this area is of the utmost importance for the perpetuation of the streams and springs arising thereon and contributing to the water supply of Honolulu, and I consider it of the utmost importance to give this forest the greatest protection possible. It will be far cheaper to stop the damage now rather than to try to reforest the area at prohibitive cost after the growth has been destroyed by the further spread of this invasive grass.

The excluding of persons from the area, thereby stopping the further importation of Hilo grass seed, is the necessary first step toward eliminating the grass from the trail and adjacent areas to which it has spread. Unless trampers are kept off the trail and the entire area it will be useless even to start this control work.

This proposed rule has received the hearty endorsement of the Hawaiian Sugar Planters' Association and, that it might be discussed before adoption, a public hearing was on June 9, 1920,

Plate IV.



Photo by Kraebel.  
Water and dense forest growth along Kalakaoo stream above Akaka Falls, Kaiwika, in the Hilo Forest Reserve, Hawaii.



held on the subject. This hearing was well attended and the grave danger of the ruination of the native forest by the spread of Hilo grass brought in, in seed form, and scattered along the trail by the feet of trampers was pointed out by forest experts. Opposed to this were the arguments that the Olympus-Konahuanui trail should be kept open as a tourist asset and for the use of local recreationists.

Rule V was presented to you for consideration in a special report dated April 19, 1920, and its adoption was again strongly recommended to you in my routine report for June, 1920. It is at this time called again to your attention, and I respectfully urge its adoption so that the control work can be initiated before the task becomes too herculean.

#### FOREST FENCING.

The task of protecting forest boundaries exposed to stock by the construction of fences has progressed almost as rapidly during the period as in the previous two years. Since in most cases a personal examination of the proper line to be fenced must first be made and detailed arrangements perfected for hauling material and supplying labor, and owing to the widely-scattered and comparatively inaccessible locations of fencing projects and the necessity often of determining on the right line by a survey, the fencing problem is not the simple one that might be imagined in which rapid progress can be made. The necessity of turning my attention early in 1920 to the insect control work in Oloa, Hawaii, and later on in the year an enforced leave of absence due to ill health interfered greatly with the fencing program that I had laid out. In spite of this, the Division has on its own initiative, and in cooperation with private owners and the Land Office, effected the construction of 10.79 miles of new fencing and the repairing of 5.27 miles of existing fences on exposed forest reserve boundaries during the past two years, making a total of 16.06 miles of boundary receiving proper protection, as shown in the tables which follow. This brings the fencing work up to 74.17 miles during the past 10 years.

There are about 17 miles of reserve boundaries in immediate need of fencing, and it is earnestly hoped that the Legislature will appropriate sufficient funds to accomplish this most important work during the coming biennial period.

## FENCES CONSTRUCTED, 1919-1920.

Date Completed.	Island.	Reserve.	Location.	Length (Miles).
Feb., 1919....	Hawaii.....	Kau.....	Kiolakaa .....	1.00
Mar., 1919....	Oahu.....	Makua-Keaau.....	Keaau .....	.84
Mar., 1919....	Oahu.....	Makua-Keaau.....	Makua .....	1.07
June, 1919....	Hawaii.....	Kohala Mt.....	Pololou .....	.13
July, 1919....	Hawaii.....	Olaa Forest Park.....	Sec. C .....	.30
Aug., 1919....	Hawaii.....	Olaa Forest Park.....	Sec. A .....	.19
Sept., 1919....	Maui.....	Kula.....	Papaanui .....	2.68
Oct., 1919....	Hawaii.....	Olaa Forest Park.....	Sec. C .....	.28
Dec., 1919....	Maui.....	Kula.....	Waiohuli .....	1.40
Jan., 1920....	Oahu.....	Kuliouou.....	Valley .....	.40
Sept., 1920....	Hawaii.....	Olaa Forest Park.....	Sec. C .....	.25
Nov., 1920....	Hawaii.....	Kau.....	Kaalaiki .....	.61
Dec., 1920....	Hawaii.....	Olaa Forest Park.....	Sec. C .....	1.64
Total.....				10.79

## FENCES REPAIRED, 1919-1920.

Date Completed.	Island.	Reserve.	Location.	Length (Miles).
Feb., 1919....	Kauai.....	Moloaa.....	Moloaa .....	3.00
Oct., 1919....	Kauai.....	Papapaholahola.....	Papapaholahola .....	.38
Jan., 1920....	Oahu.....	Kuliouou.....	Valley .....	.71
Jan., 1920....	Oahu.....	Kuliouou.....	Maunaloa .....	.71
Dec., 1920....	Oahu.....	Waianae-kai.....	Homesteads ...	.47
Total.....				5.27

## REMOVAL OF STOCK FROM RESERVES.

Following the fencing of reserve boundaries comes the important work of ridding the forest of stock within the fenced areas. Permits to hunt wild quadrupeds in the reserve have been freely issued to responsible parties. Reports from these, which are by no means complete, show that during the past two years 384 wild goats, 55 wild cattle, and 435 wild pigs, a total of 874 wild animals, have been killed on forest reserves.

In cooperation with ranchers and plantations cattle which were tractable have been driven out of reserves. At the present time, tame cattle getting into reserves either accidentally through broken places or by the malicious design or the negligence of the owners, constitutes a greater nuisance and results in greater damage to the reserves than that caused by wild cattle. To strengthen the position of the Division of Forestry in carrying out this important feature of forest protection it is desirable to amend the present law (second sentence in Sub-section 9 of Section 481, R. L. H. 1915) by substituting the following:

"After a forest reservation, duly set apart and established, has been completely fenced, and after thirty days' public notice,

Plate V.

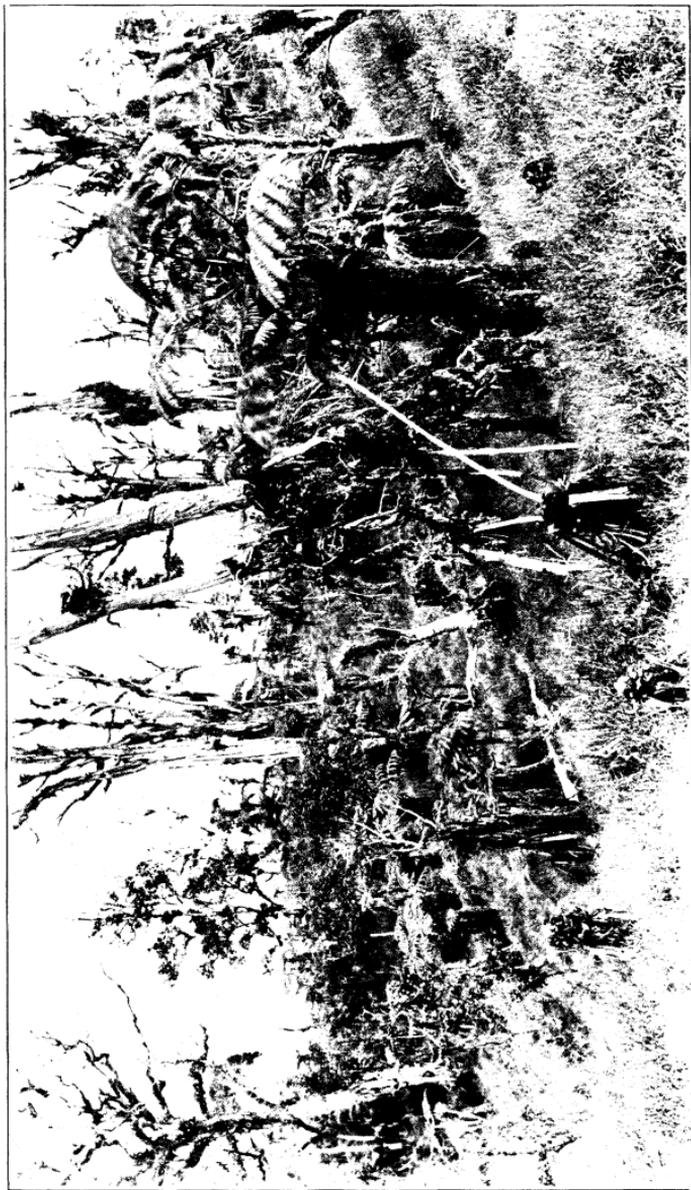


Photo by Kruebel.  
Leased land below the Hilo Forest Reserve, Honomu, Hawaii. Showing forest destruction  
due to cattle grazing followed up by invasion of Hilo grass.



five insertions, of such accomplishment has been given by publication in a newspaper of general circulation in the county or city and county where such reservation is situated, the owner or lessee of land in such reservation, if such land be privately-owned and the agents of the board of agriculture and forestry in all cases where the land is so set apart and established as a forest reservation, whether from privately-owned lands or public lands, may without further notice remove, shoot, or destroy any and all cattle of any description found on any such forest land in the Territory without compensation to the owner."

This is made urgent by a recent opinion from the Attorney General (No. 950) in which he holds (1) that a violation of a regulation of this Board constitutes a criminal offense and to secure a conviction therefor all the elements of a criminal offense, including that of guilty knowledge or willfulness, must be shown and (2) that this Board is without authority to impose by regulation a penalty in the nature of liquidated damages for trespass by cattle on forest reserves.

#### FOREST FIRES.

During the biennial period there have been perhaps more fires than usual, due to the two comparatively dry years, but none of them fortunately did any considerable or extensive damage to native forest growth. The following fires were reported:

**FEBRUARY 27, 1919:** Ohikea section of Kapapala Ranch, Kau, Hawaii. Fire of unknown origin burned over 1,500 acres of mostly grass land, but was extinguished the same day by ranch cowboys and laborers from Pahala Plantation under Fire Warden James Campsie.

**FEBRUARY 29, 1919:** Wailau, at the edge of the Kau Forest Reserve, Hawaii. A fire of unknown origin burned over 40 acres of forest land with considerable damage to undergrowth and a quantity of ohia trees. Men under Fire Wardens George Gibb and James Campsie soon extinguished it.

**MAY 6, 1919:** Pupukea Forest Reserve, Oahu. During some pineapple clearing operations a fire jumped the fire guard and burned over 40 acres of grass, damaging a few clumps of trees. Laborers working under Fire Warden F. S. Lyman extinguished it the same night.

**JULY 6, 1919:** Lihue, Honouliuli, Oahu. A bee-hive thief set fire to the grass with his smoking torch. The fire spread over 75 acres of grassland with practically no damage to trees. It was extinguished the same day by soldiers and laborers under Mr. A. W. Eames and Fire Warden A. A. Wilson.

**JULY 6, 1919:** A fire started on this day, presumably by pig hunters, burned over about 5,500 acres of pasture land in

Kaohē and Kaholalele, on the slopes of Mauna Kea, Hamakua, Hawaii, at an elevation of 5,000 to 7,000 feet. In spite of all efforts it continued to burn for approximately two months before it was extinguished by rains.

AUGUST, 1919: During this month two small fires, less than one acre each in extent, and which caused practically no damage, were extinguished almost at once by Ranger Hardy in the Na Pali-Kona Reserve, Kauai.

OCTOBER 1, 1919: A grass fire on the ridge in Nuuanu Valley adjacent to the Country Club, started by brush burners, swept over an area of 20 acres of grass and brush land on the slope, but was extinguished in three hours by the fire department and men working under Deputy Fire Warden Haughs.

NOVEMBER 9, 1919: Wainiha, Kauai. A fire started along the ditch trail burned over an area of staghorn fern, but was soon extinguished by men under Fire Warden A. Menefoglio.

JANUARY 25, 1920: Halawa, Oahu. A fire of unknown origin burned over 25 acres of steep open grass land on the ridge, but stopped the same night as soon as it reached the damper vegetation.

FEBRUARY 12, 1920: Pololou Gulch, Kohala Mt. Reserve, Hawaii. A fire was started by a small boy in the gulch bottom and the wind carried it up the west side of the gulch through the underbrush. Laborers under the direction of Manager J. A. McLennan promptly rushed to the scene and, fighting the fire from 8 a. m. to 4 p. m., succeeded in extinguishing it before it had done any considerable damage.

MAY 1, 1920: Woodlawn, Manoa Valley, Oahu. A fire started to clear land for the planting of pineapples jumped the fire guard at 3 p. m. and burned over about 10 acres of grass and ferns on a hillside. It was extinguished in 2½ hours by local men and officers from the Government Nursery.

MAY 11, 1920: Waiakea, Hawaii. A fire started from a cane trash fire and burned over about 300 acres of grass, brush, and young ohia trees on private land on the 1880 flow near Hilo. Very little of the old forest was touched, and it was extinguished the next day by men working under Fire Warden James Henderson and Ranger Mackenzie.

MAY 27, 1920: Koolau Forest Reserve, Maui. The first fire in 16 years in this wet forest started at 3:30 p. m. at Nahiku between Kapaula and Waiohue gulches, but was put under control by 7 p. m. the same day by men working under Fire Warden W. F. Pogue. Above the ditch it burned over 20 acres of forest in the reserve and below the ditch and outside of the reserve it burned over 175 acres.

JUNE 9, 1920: Olaa, Hawaii. A surface fire spread rap-

Plate VI.

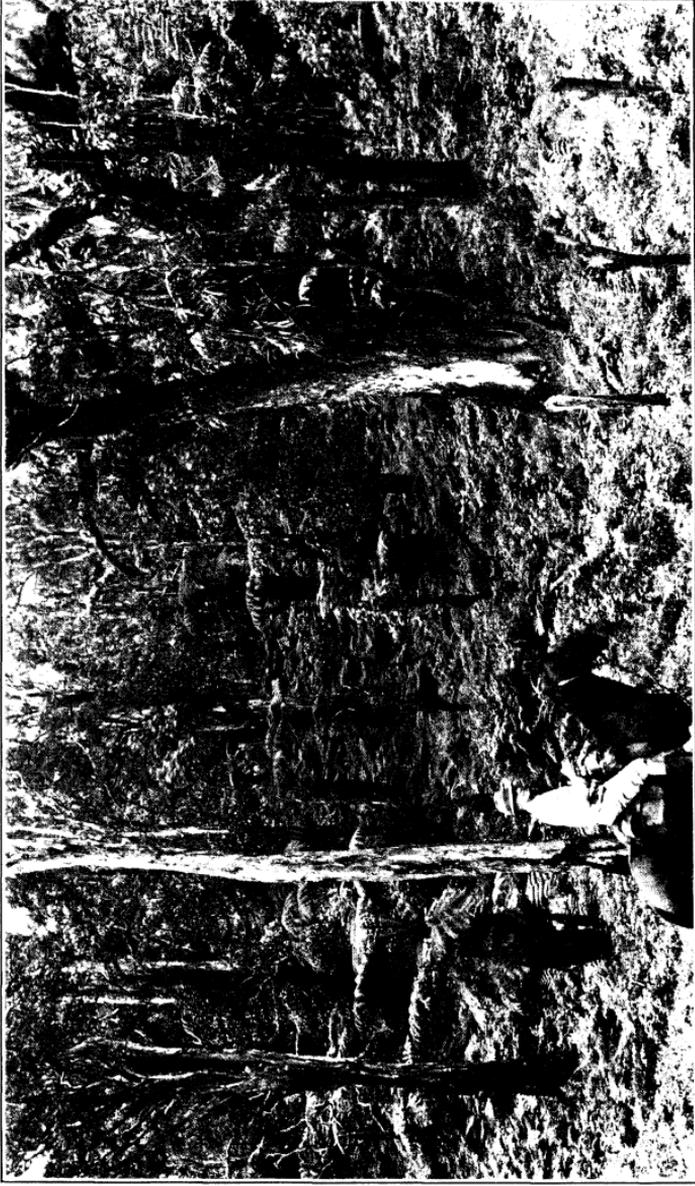


Photo by Kraebel.

Luxuriant growth of trees and ferns on the protected government land of Laupahoehoe within the Hilo Forest Reserve, Hawaii. The adjacent grazing land absolutely lacks such growth.



idly over about 100 acres of private brush land in the region from 22 to 24 Miles near the Volcano Road, but was placed under control the same day by men working with Forest Ranger Mackenzie.

The voluntary District Fire Wardens appointed by the Board have rendered efficient and prompt service to the Territory and I wish here to express to them my appreciation of their faithful performance of duty in carrying out the forest fire laws. A number of new Fire Wardens were appointed during the period to replace those who had died, resigned or moved away.

A revised list of District Fire Wardens, and of honorary District Foresters and Forest Rangers, is presented at the end of this report.

## FOREST EXTENSION.

### BOTANY.

Mr. J. F. Rock, as Consulting Botanist, continued to render the Division valuable services by contributing two botanical bulletins, Nos. 5 and 6, which have been published and issued by the Division; an article on the poisonous plants of Hawaii, which appeared in the March and April 1920 "Forester," and a manuscript containing a revised list of Hawaiian names of plants (soon to be published) and by securing seed of new and valuable ornamental and forest trees from tropical countries for propagation by this Division.

Among the seed importations made by Mr. J. F. Rock was a consignment of 7 pounds of seed of one of the chaulmoogra oil trees, *Hydnocarpus anthelminticus*, received from Siam on November 27, 1920. The young seedlings resulting from this shipment are coming along nicely and when ready will be planted out in favorable places for the express purpose of supplying seed for the production of the oil which, when refined by the Dean process, will be used locally for the cure of leprosy.

For the purpose of record, mention is made here of the discovery by the Superintendent of Forestry on January 23, 1919, at Keaau, Oahu, at an elevation of 950 feet above the sea, of the mamani tree, *Sophora chrysophylla*. Small trees of these species were in both flower and fruit, which made the identification positive. So far as it is known, this is the first time that the mamani has been found on Oahu.

A working herbarium of specimens of native trees has been started by the Division of Forestry and will be added to as opportunity affords, so as to enable the staff to become better acquainted with our forest flora. Seeds of the native species and

especially the rare ones such as the native red cotton, *Kokia Rockii Kauaiensis*, are also collected on field trips so as to determine their ease of propagation, rate of growth, and adaptability for use in reforestation projects.

Seedling trees are now being assembled for use in planting out in the Makiki Valleys with the idea of establishing there, if a sufficient appropriation for labor is made, an accessible arborum of classified and labelled trees, amounting to several thousand different kinds, from all tropical parts of the globe, which will in time serve as a living reference library for botanists and will be the wonder and admiration of visiting tourists and scientists.

#### TREE INTRODUCTION.

The importation of seed of new species from the other parts of the tropical world has been continued during the period, and the resulting seedlings when ready have been planted out in a variety of situations to determine their usefulness in our reforestation work in the solution of the great problem of reclothing with a forest growth areas which have been so badly denuded that they will not come back naturally to native species.

Cooperation has been rendered the Hawaiian Sugar Planters' Association in its project of securing and introducing fertilizing wasps so as to make possible the local production of fertile seed on our *Ficus* trees by sending the Board's Entomologist to Hong Kong and India.

The forestry division of the Hawaiian Sugar Planters' Association has also been quite active in the importation of seed of new species and has propagated a large variety of trees which are new to this Territory and which will be planted out in various situations with the same object in view. These two divisions have been working in close cooperation on these lines and have made frequent interchanges of seeds and seedlings.

The beneficial results of tree introduction to overcome the difficulty of securing supplies of seed have been obtained in the case of two valuable trees from specimens of which now growing in these Islands we are able to secure fresh seed and are therefore independent of importations. One of these, the Australian red cedar, *Cedrela australis*, a valuable timber tree introduced from Australia in 1914, began to produce abundant supplies of fertile seed in the summer of 1919. The other is the African tulip tree, *Spathodea campanulata*, a popular and handsome ornamental tree introduced from Madagascar on April 15, 1916, which in August, 1920, only four years after planting, is now producing good seed on a large number of individual trees.

In the efforts to disseminate seedlings of the valuable kauri pine, *Agathis australis*, throughout the Territory for the produc-



Photo by Judd.  
Kaari pine (*Agathis australis*) at the Government Nursery, Honolulu.  
Age 35 years. Height 66 feet. Diameter 25 inches.



tion of timber, two shipments of seed of this conifer were obtained through the efforts of Mr. Adolph Moritzson from Mr. E. Phillips Turner, Secretary of the Department of Forestry at Wellington, New Zealand. The germination of the several pounds of seed planted resulted in almost complete failure and only two seedlings were produced. It would seem, therefore, that for the propagation of this desirable timber tree we must depend upon the crop of seeds produced only at intervals by the mature trees already in these Islands.

During the latter part of December in the years 1919 and 1920, the Division was able to gladden the hearts of many children by supplying Christmas trees cut from a plantation of Japanese cedar, *Cryptomeria Japonica*, planted out in Makiki Valley in December, 1917, with this very object in view.

All sympathetic Honolulu residents were very sorry to see the original algaroba tree, *Prosopis juliflora*, in the Catholic Cathedral grounds on Fort street, Honolulu, cut down on October 23, 1919, to make room for the new Knights of Columbus building. Imported in 1828, this parent tree had stood there for 91 years as an object of historical interest and a monument to Father Bachelot, who introduced it. Perhaps no other tree the world over has been responsible for greater benefits than this original algaroba, for from it, by the distributing agency, mainly of stock, there has been established on the lee shores throughout these Islands extensive forests which now cover approximately 90,000 acres of what used to be barren land, but which by reason of this tree now produce an annual crop of about 30,000 cords of exceedingly valuable fuel wood, over \$160,000 worth of honey, and an enormous yield of beans which furnish a valuable fattening food for stock at a time when the long, dry summer has exhausted the grass supply.

#### TREE PROPAGATION AND DISTRIBUTION.

The Division of Forestry has now in active operation seven tree nurseries on the four main islands, as follows:

1. Kalaheo Nursery, Kauai, in charge of Joe Rita, Jr.
2. Government Nursery, Honolulu, Oahu, in charge of David Haughs.
3. Makiki Nursery, Honolulu, Oahu, in charge of David Haughs.
4. Waiahole Nursery, Koolaupopo, Oahu, in charge of Alfred Rocha.
5. Mikilua Nursery, Waianae, Oahu, in charge of J. K. Luka.
6. Haiku Nursery, Maui, in charge of James Lindsay.
7. Hilo Nursery, Hawaii, in charge of Bro. Matthias Newell.

The nurseries numbered 4 and 5 are devoted to the production of trees for the exclusive use of planting on forest reserves, while all of the others produce trees for this purpose and for supplying the demands of homesteaders, agriculturists, army posts, ranches, and plantations throughout the Territory for forest, shade, fruit and ornamental trees and vines and shrubs.

Cognizant of the danger of disseminating insect pests to the other islands by shipping plants in soil, this Division early in 1919 voluntarily discontinued this practice. This was followed by the passing on June 1, 1919, of Rule XX of the Division of Plant Inspection, which prohibited the shipping of plants in soil from Oahu to the other islands except in very unusual cases. Hitherto, the demand for trees on the other islands was largely supplied from the Honolulu nurseries, and in order to meet this demand locally a new nursery was established in June, 1919, at Haiku, Maui, and the nursery in Hilo relocated and enlarged in the fall of 1920.

There were distributed from the nurseries, as will be seen in the report of the Forest Nurseryman, a total of 292,081 trees in 1919 and 223,966 trees in 1920, or a total of 516,047 during the two years. This is 135,364 trees less than during 1917 and 1918, but this difference can well be accounted for by the strike which made labor scarce and expensive and the two dry years which made conditions unfavorable for tree planting.

#### ARBOR DAY.

Arbor Day, as in previous years, was designated by proclamation of the Governor and celebrated by appropriate exercises and tree planting mostly by school children on November 21 in 1919 and on November 19 in 1920.

The number of trees distributed from the government nurseries for planting on Arbor Day during the last two years was as follows:

Nurseries.	1919.	1920.	Total.
Kalaheo Nursery, Kauai .....	.....	200	200
Government Nursery, Honolulu .....	6,292	4,370	10,662
Haiku Nursery, Maui .....	.....	920	920
Hilo Nursery, Hawaii .....	.....	1,215	1,215
Totals.....	6,292	6,705	12,997

On the 1919 Arbor Day, 1,390 children, and on the 1920 Arbor Day, 1,732 children of a number of different races called in person at the Government Nursery and were given one tree each for planting.

Plate VIII.



Photo by Hosmer.  
The original algaroba tree in Hawaii, now gone.



## TREE PLANTING ON FOREST RESERVES.

By the efforts of this Division there were planted out during the two-year period almost twice the number of trees that was planted in the previous biennium. A total of 71,641 trees of 37 different species was set out on 11 different forest reserves on Kauai, Oahu, and Maui. From the list which follows it will be seen that an attempt has been made to start a great variety of trees in a number of places in order to determine the ones best suited to different localities so that attention can be centered on these in future plantings.

*Trees Planted in Forest Reserves in 1919 and 1920.*

Red gum ( <i>Eucalyptus rostrata</i> )	13,843
Koa ( <i>Acacia koa</i> )	12,573
Australian red cedar ( <i>Cedrela australis</i> )	10,351
Red mahogany ( <i>Eucalyptus resinifera</i> )	8,707
Yellow poinciana ( <i>Peltophorum inerme</i> )	4,737
Ironwood ( <i>Casuarina equisetifolia</i> )	3,537
Bloodwood ( <i>Eucalyptus corymbosa</i> )	2,984
Ironbark ( <i>Eucalyptus crebra</i> )	2,713
Swamp mahogany ( <i>Eucalyptus robusta</i> )	1,844
Silk oak ( <i>Grevillea robusta</i> )	1,842
Johore fig ( <i>Ficus sp.</i> )	1,842
Monkey-pod ( <i>Samanea saman</i> )	1,292
Cook pine ( <i>Araucaria Cookii</i> )	1,062
Logwood ( <i>Haematoxylum campechianum</i> )	757
Kauri pine ( <i>Agathis australis</i> )	640
Mahogany ( <i>Swietenia Mahogani</i> )	579
Molave ( <i>Vitex parviflora</i> )	330
Japanese cedar ( <i>Cryptomeria Japonica</i> )	310
Khair tree ( <i>Acacia catechu</i> )	247
Kassod ( <i>Cassia siamea</i> )	220
Mountain albizzia ( <i>Albizzia montana</i> )	212
Sappan ( <i>Caesalpinia sappan</i> )	180
Wiliwili ( <i>Erythrina monosperma</i> )	170
Tall fig ( <i>Ficus altissima</i> )	141
Blackwood ( <i>Acacia melanoxylon</i> )	100
Banyan ( <i>Ficus retusa indica</i> )	88
Lime ( <i>Citrus medica acida</i> )	85
Peepul tree ( <i>Ficus religiosa</i> )	50
Chinese banyan ( <i>Ficus retusa</i> )	50
Narra ( <i>Pterocarpus indicus</i> )	37
Wood-oil tree ( <i>Aleurites Fordii</i> )	35
Red sandalwood ( <i>Adenanthera pavonina</i> )	27
Camphor ( <i>Cinnamomum camphora</i> )	25

Aralia ( <i>Brassaia actinophylla</i> ) .....	17
Arabian teak ( <i>Cordia amplifolia</i> ).....	14
Naio, bastard sandalwood ( <i>Myoporum Sandwi-</i> <i>cense</i> ) .....	7
Rimu, red pine ( <i>Dacrydium cupressinum</i> ).....	2
Total.....	<hr/> 71,641

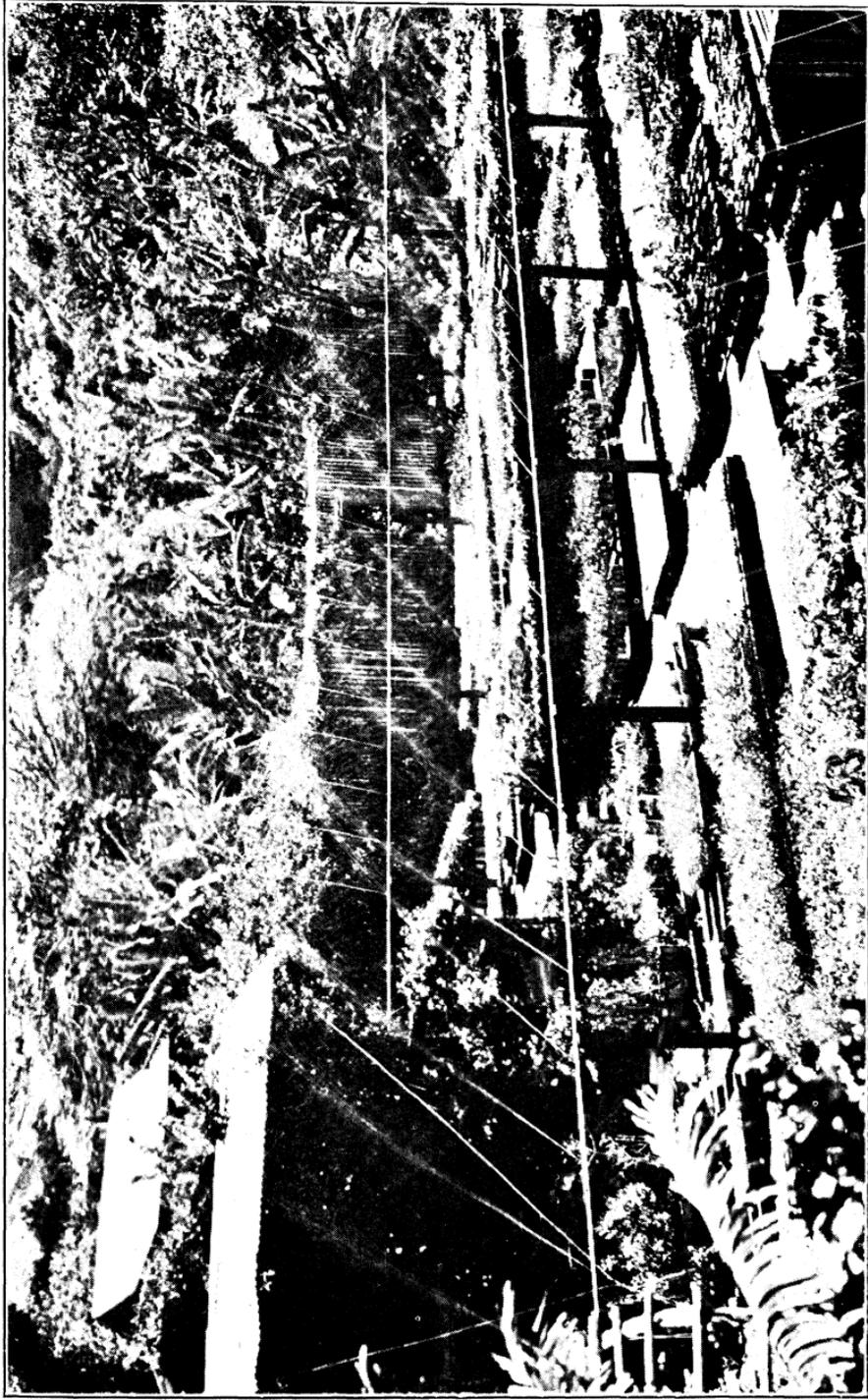
On Kauai, swamp mahogany and silver oak were planted on the Kealia Reserve, and at the Papapaholahola Spring Reserve, swamp mahogany, ironwood, and Australian blackwood trees were set out.

On Oahu the planting of koa trees has been continued on the Honolulu Watershed in the Makiki Valleys, and this species has been found so far to take hold on the well-drained slopes here and in Manoa Valley and to grow faster and form a better cover than any introduced species. In a protected pocket back of Sugar Loaf 835 Australian red cedar trees were set out in June and July, 1920, to determine their growth and behavior at that elevation.

The largest plantings have been made at Mikilua, Waianae, in the Lualualei Forest Reserve, Oahu, where a gang of seven Hawaiian tree planters have set out during the two years 57,512 trees of 22 different species in the effort to strike on a number of trees best suited to the region. At the summit of Kolekole Pass the native koa has been planted and is growing well. On the middle slopes a variety of trees such as monkeypod, yellow poinciana, kassod, silk oak, sappan, ironwood, banyans, Australian red cedar, and Cook pine have been used with success, and on the lower dry foothills the drought-resisting khair, logwood, and wiliwili and the more valuable eucalyptus such as red gum, bloodwood, red mahogany, and ironbark have been planted. The results of the planting in this region, which has now been going on for only 2½ years, are already making a marked change in the landscape, and I am confident that the beneficial effect of this planted forest on a more continued and steady supply of water in Mikilua Valley will be apparent in a few years.

A row of highland ironwood trees was set out inside of the new forest reserve fence in Keaau Valley, Waianae, in March, 1919, and 555 red gum trees were similarly planted along the new fence in Kuliouou Valley in February, 1920.

At Waiahole, Oahu, 2,764 trees of 17 different varieties have been planted out during the period on a fenced portion of the forest reserve by the only faithful day laborer who could be secured in the district. Among the species which are growing well here are the molave and narra from the Philippines, Arabian teak, the native bastard sandalwood (*Naio*), Cook pine, Japan-



Makiki Nursery, Honolulu, showing Skinner system of irrigation.



ese cedar, and the kauri pine. Of the last, which is the valuable timber tree from the north island of New Zealand, 640 trees have been planted out, with a 10 by 10-foot spacing, to determine their habits and rate of growth in plantation formation.

At Paumalu, on the Pupukea Reserve, 500 banyan, koa, and Australian red cedar trees were planted out in December, 1920, under an agreement whereby in return for the use of certain lands for pineapples, trees will be planted on other parts of this reserve each year. In this manner, all open spaces on this reserve will be reforested within five or six years.

On Maui, Ranger Lindsay has planted out the mountain albizzia and Australian red cedar trees on the Makawao and Kula Reserves.

It is hoped that by the use of this diversity of species in many different localities a number of valuable and fast-growing trees can be determined upon by observation for future use in reforestation projects.

#### ADVICE ON TREE PLANTING.

A large part of the time of the Forest Nurseryman is devoted to giving advice and assistance connected with tree planting, and this Division always stands ready to do all within its power and means to help the public in this worthy work. In addition to this, the Superintendent on May 16, 1919, prepared and submitted to the President of Oahu College, at his request, a planting scheme for the Punahou campus, with recommendations and a list of trees for planting, in which Hawaiian species of trees and shrubs were favored almost exclusively. He has also, in cooperation with the Outdoor Circle, assisted the Commanding General at Schofield Barracks by advising on the beautification of the new officers' quarters by the planting of suggested trees and shrubs. Advice on the use of hedge plants and vines for certain purposes at Fort Armstrong and Fort De Russy was also given.

#### TREE PLANTING THROUGHOUT THE TERRITORY.

As in past years, an attempt has been made to ascertain the number of trees planted throughout the Territory and the purposes for which the planting was done. The results for the past two years, while not complete, are shown in the following table and indicate that there has been a falling off of over half a million trees planted, when compared with the previous biennium. Disturbed labor conditions and the two dry years are no doubt responsible for this.

TREES PLANTED IN THE TERRITORY OF HAWAII  
IN 1919 AND 1920.

	1919.	1920.	Total.
<b>Kauai:</b>			
Gay & Robinson .....	1,250	3,720	4,970
Grove Farm Plantation .....	30,500	.....	30,500
Hawaiian Sugar Co. ....	20,000	.....	20,000
Kilauea Sugar Plantation Co. ....	10,000	34,974	44,974
Knudsen Bros. ....	.....	1,000	1,000
Koloa Sugar Co. ....	.....	2,767	2,767
Makee Sugar Co. ....	9,250	5,395	14,645
McBryde Sugar Co., Ltd. ....	4,211	4,086	8,297
Territory of Hawaii .....	2,174	.....	2,174
	77,385	51,942	129,327
<b>Oahu:</b>			
California Packing Corporation .....	4,000	.....	4,000
Cooke, Mrs. C. M. ....	.....	74	74
Ewa Plantation Co. ....	283	449	732
Hawaiian Pineapple Co. ....	101,000	3,000	104,000
Honolulu Lighthouse .....	.....	78	78
Koolau Agricultural Co. ....	.....	10,514	10,514
Laie Plantation .....	600	500	1,100
Marconi Wireless Tel. Co. ....	24	.....	24
Oahu Sugar Co. ....	.....	10	10
O. R. & L. Co. Ranch .....	2,328	620	2,948
Robinson, J. L. P. et al. ....	.....	250	250
Territory of Hawaii .....	30,474	38,775	69,249
U. S. Army .....	5,000	8,395	13,395
U. S. Navy .....	.....	1,077	1,077
Wahiawa Water Co. ....	1,600	300	1,900
Waialua Agricultural Co. ....	26,030	100	26,130
	171,339	64,142	235,481
<b>Lanai:</b>			
Lanai Company .....	1,000	1,700	2,700
<b>Maui:</b>			
Haleakala Ranch Co. ....	.....	7,135	7,135
Hawaiian Commercial & Sugar Co. ...	1,000	1,000	2,000
Honolua Ranch .....	55,000	13,000	68,000
Krauss, F. G. ....	40	.....	40
Maui Agricultural Co. ....	234,600	116,350	350,950
Pioneer Mill Co. ....	5,000	3,275	8,275
Pogue, W. F. ....	250	890	1,140
Territory of Hawaii .....	.....	218	218
Wailuku Sugar Co. ....	23,213	31,041	54,254
	320,103	174,609	494,712
<b>Hawaii:</b>			
Hakalau Plantation Co. ....	124	924	1,048
Hamakua Mill Co. ....	.....	37,200	37,200
Hawaiian Agricultural Co. ....	30,000	32,320	62,320
Hawaii Consolidated Railway .....	212	.....	212



Children of many races calling at Government Nursery, Honolulu, for trees to plant on Arbor Day.  
Photo by Kraebel.



Hawaiian Irrigation Co. ....	300	500	800
Hawi Mill and Plantation Co. ....	3,600	3,500	7,100
Hilo Sugar Co. ....		15	15
H. S. P. A. Experiment Station.....		5,500	5,500
Hutchinson Sugar Plantation Co. ....	1,050		1,050
Kaiwiki Sugar Co. ....	50	1,500	1,550
Kohala Sugar Co. ....	24,000	15,000	39,000
Laupahoehoe Sugar Co. ....		1,220	1,220
Niulii Mill & Plantation ....		460	460
Onomea Sugar Co. ....		50	50
Paaupau Sugar Plantation Co. ....	5,000	10,000	15,000
Parker Ranch ....	3,800	14,781	18,581
Union Mill Co. ....		6,430	6,430
	<u>68,136</u>	<u>129,400</u>	<u>197,536</u>
Total for all Islands.....	636,963	420,093	1,057,056

The same figures arranged according to the principal species planted and the purpose of planting are as follows:

TREES PLANTED IN THE TERRITORY OF HAWAII IN 1919 AND 1920, SHOWING SPECIES AND PURPOSE OF PLANTING.

Species.	Purpose of Planting				
	Watershed Cover.	Fuel.	Wind- break.	Orna- ment.	Total.
<b>1919:</b>					
Swamp mahogany .....	203,424	54,044	3,350	15,000	275,818
Blue gum .....	38,400	106,050	.....	.....	144,450
Ironwood .....	16,793	80,862	25,387	10,000	133,042
Red gum .....	.....	22,800	12,282	1,000	36,082
Miscellaneous .....	8,879	600	4,931	3,573	17,983
Eucalyptus spp. ....	1,968	13,782	2,212	.....	17,962
Koa .....	8,556	.....	.....	.....	8,556
Silk oak .....	2,448	622	.....	.....	3,070
Totals.....	<u>280,468</u>	<u>278,760</u>	<u>48,162</u>	<u>29,573</u>	<u>636,963</u>
<b>1920:</b>					
Ironwood .....	16,549	8,563	78,141	3,449	106,702
Swamp mahogany ....	47,868	42,601	4,000	2,480	96,949
Blue gum .....	55,500	3,200	.....	.....	58,700
Red gum .....	31,661	1,000	14,110	800	47,571
Miscellaneous .....	26,121	250	998	7,398	34,767
Araucaria spp. ....	15,562	.....	.....	78	15,640
Eucalyptus spp. ....	5,095	6,821	.....	575	12,491
Australian red cedar..	11,059	.....	.....	100	11,159
Ficus spp. ....	8,883	.....	.....	90	8,973
Red mahogany .....	8,707	.....	.....	.....	8,707
Java plum .....	.....	7,500	1,055	.....	8,555
Koa .....	6,114	.....	525	.....	6,639
Algaroba .....	3,000	240	.....	.....	3,240
Totals.....	<u>236,119</u>	<u>70,175</u>	<u>98,829</u>	<u>14,970</u>	<u>420,093</u>

From the above tables it will be observed that tree planting for the purpose of establishing a forest cover on watersheds still holds the lead, and that while the number of trees planted in 1920 was 216,870 less than in 1919, there was a far greater variety of trees in large numbers used for planting, indicating the desire to improve on the species used in past years.

## MISCELLANEOUS ACTIVITIES.

### COOPERATION WITH THE LAND OFFICE.

In matters pertaining to lands in and near forest reserves there has been the closest cooperation with the Land Office, especially in land exchanges and the requiring of fencing in general leases which abut forest reserves. Technical assistance and advice have also been rendered the Land Office in connection with algaroba-cutting licenses at Waianae, Oahu and Kihei, Maui, by prescribing and directing the thinnings so that the remaining trees will put on more growth and produce bigger yields of honey, beans and wood.

### COOPERATION WITH THE NATIONAL PARK SERVICE.

This Division has attempted to give every possible assistance to federal officials in charge of the Hawaii National Park so as to make easier their task of placing sections of the park under administration. From April 19 to 30, 1919, at the request of Governor McCarthy, I accompanied Mr. Stephen T. Mather, Director of the National Park Service, and his party on an inspection of the Kilauea and Haleakala Sections of the park, giving information and assistance in the inspection of the lands. From March 20 to April 3, 1920, at the direction of the Acting Governor, I was with Mr. Horace M. Albright, Supervisor of the Yellowstone National Park and Field Assistant to the Director, as the special representative of the Territory in inspecting all three sections of the Hawaii National Park and in viewing the park possibilities of Waimea Canyon, Kauai. Our itinerary took us to Kilauea, the 1920 Kau flow, Puuhuluhulu, Puu Ulaula, where one night was spent at an elevation of 10,300 feet on the slopes of Mauna Loa, and Kona, on Hawaii; to Iao Valley and to the top of and through the crater of Haleakala, on Maui; and to Waimea Canyon and Kalalau Valley, on Kauai. Mr. Albright was more than pleased with the scenic aspect and possibilities of every place he saw, but left with the opinion that a National Park is not a present necessity at Waimea Canyon in view of the arrangements which have been made by this Division and the County of Kauai for giving the people an opportunity to visit



Photo by Kruebel.

Pun Kailio in the Lualualei Forest Reserve on the Waianae side of Kolekole Pass, Oahu, where the Division of Forestry is reforesting the dry slopes for the conservation



the canyon and to camp in its vicinity, which abounds in such a variety of splendid recreational opportunities. Assistance was also rendered Mr. Albright by securing maps and information pertaining to the acquisition of private lands within the Kilauea Section and to government lands for the purpose of enlarging the present area of this section.

#### KOKEE CAMPS, KAUAI.

The area in the Na Pali-Kona Forest Reserve, on Kauai, at the bracing elevation of 3,500 feet, in the region of Kokee and Halemanu, which has been opened to campers, has been enjoyed by a large number of lovers of the out-doors during the two seasons. A total number of 37 revocable ten-year permits have been issued for the camping sites, which vary from 0.3 acre to 2 acres in size; seven permits have been revoked for non-payment of rent or upon request; and 30 permits were in effect on January 1, 1921. Substantial new improvements have been made on 10 of the camp sites. Complaints against non-compliance with the sanitary regulations were investigated in November, 1919, and the situation was satisfactorily adjusted.

#### FAIR EXHIBITS.

The Division participated in the Second Territorial Fair held in Honolulu on June 9 to 14, 1919, and in the Maui County Fair held at Kahului on October 21 to 23, 1920, by exhibiting its display of seedling and transplant trees, wood specimens and working erosion model to show the beneficial effect of a forest cover on the runoff. The exhibits attracted greater attention and more favorable comment than ever, and were much admired as instructive object lessons by all who saw them.

#### EDUCATION.

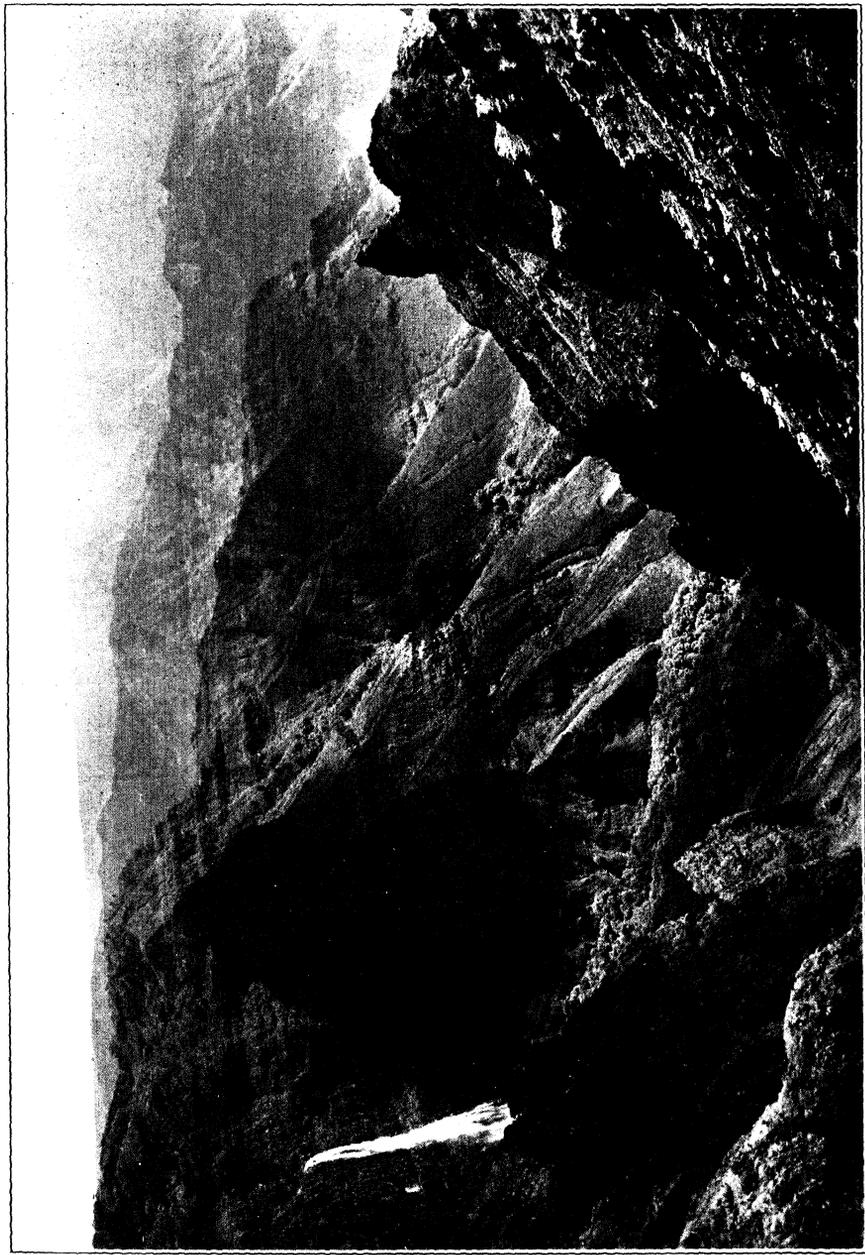
In addition to featuring the educational side of forestry at these fairs, special lectures on forestry have been given by the Superintendent as follows: At the Territorial Summer School held at Kilauea, Hawaii, two courses of lectures were given from August 1 to 18, 1919, on (1) "Elementary Forestry" and (2) "The Hawaiian Forests." On October 27 and 29 and November 1, 1919, three lectures on "Forestry in Hawaii" were given at the short course for plantation men held at the College of Hawaii under the joint auspices of the College and the Hawaiian Sugar Planters' Association. These lectures covered the beneficial effects of forests in general, a description of the native Hawaiian forests, their susceptibility to injury and the functions

they perform, and methods of protecting them, and they were printed in the November, 1919, "Forester." On October 16, 1919, I began fortnightly instructions in forestry, at the request of the Commanding General of the Hawaiian Department, at the vocational school for enlisted men at Schofield Barracks, alternating with the practical instruction given by the Forest Nurseryman. This course, which lasted for two months, covered a detailed study of three leading species of trees and the practical nursery work of raising them from seed. On November 20, 1919, I gave a luncheon talk before the Rotary Club on Arbor Day.

#### PUBLICATIONS.

The following bulletins and articles, in addition to the monthly and annual reports which have appeared in the official magazine of the Board, "The Hawaiian Forester and Agriculturist," have been published by the Division of Forestry during the past two years:

- January, 1919—"Eucalyptus Plantation. Report on Experimental Plantation," by C. S. Judd, Superintendent of Forestry.
- February, 1919—"On Government Forest-Reserve Lands at Kulani, Hawaii," by J. F. Rock, Consulting Botanist.
- March 17, 1919—"Report of the Division of Forestry for the Biennial Period Ended December 31, 1918."
- March, 1919—"A Volume Table for Algaroba," by C. S. Judd, Superintendent of Forestry.
- June, 1919—"The Arborescent Indigenous Legumes of Hawaii," Botanical Bulletin No. 5, by J. F. Rock, Consulting Botanist.
- June, 1919—"The Hawaiian Genus *Kokia*—A Relative of the Cotton," Botanical Bulletin No. 6, by J. F. Rock, Consulting Botanist.
- September, 1919—"The Kukui or Candlenut Tree," by C. S. Judd, Superintendent of Forestry.
- November, 1919—"Forestry in Hawaii." 1. The beneficial effects of forests. 2. The native Hawaiian forests. 3. Methods of forest protection. By C. S. Judd, Superintendent of Forestry.
- February, 1920—"The Koa Tree," by C. S. Judd, Superintendent of Forestry.
- March, 1920—"The Poisonous Plants of Hawaii," by J. F. Rock, Consulting Botanist.
- March, 1920—"The Australian Red Cedar," by C. S. Judd, Superintendent of Forestry.
- April, 1920—"The Wiliwili Tree," by C. S. Judd, Superintendent of Forestry.



Waipoo Falls at the head of Waimea Canyon, near the Kokee Camps in the Pun Ka Pele Forest Reserve, Kauai. Photo by Rock.



May, 1920—"The Makiki Nursery," by C. S. Judd, Superintendent of Forestry.

June, 1920—"The Kauri Pine," by C. S. Judd, Superintendent of Forestry.

November, 1920—"Exhibit at the Maui County Fair," by C. J. Kraebel, Assistant Superintendent of Forestry.

December, 1920—"Algaroba Seed Germination Tests," by C. S. Judd, Superintendent of Forestry.

In course of publication—"Revised List of Hawaiian Names of Plants," by J. F. Rock, Consulting Botanist.

#### SUMMARY.

In conclusion, it is a pleasure to assert that by the efforts of this Division during the past two years much progress has been made in converting the forest reserves from mere delineations on paper to protected forest areas actually under administration. The task of putting them into the best possible shape is no small undertaking, and your assistance in the work of forest protection is respectfully solicited by lending your best efforts for securing appropriations which will adequately compensate the present force, enable the appointment of three new much-needed forest rangers, and make possible the construction of fences which are now needed on forest reserve boundaries to prevent the ravages of stock, for strengthening by legislative action the present law concerning the riddance of stock from forest reserves; and for the adoption of the proposed rule to prevent the further spread of Hilo grass on the Honolulu watershed.

It is recommended that the future work of this Division be confined as closely as possible to actual work on the forest reserves.

Respectfully submitted,

C. S. JUDD,  
Superintendent of Forestry and Chief Fire Warden.

# LIST OF FIRE WARDENS, TERRITORY OF HAWAII

## CHIEF FIRE WARDEN.

C. S. JUDD, Superintendent of Forestry, ex-officio.

## DEPUTY FIRE WARDENS AT LARGE.

DAVID HAUGHS, in and for the Territory of Hawaii.  
C. J. KRAEBEL, in and for the Territory of Hawaii.

## DISTRICT FIRE WARDENS.

### KAUAI.

- A. MENEFOGLIO, in and for Wainiha Valley, District of Halelea.  
W. F. SANBORN, in and for the District of Halelea, excepting Wainiha Valley.  
L. D. LARSEN, in and for the District of Koolau, excepting the land of Anahola.  
E. M. CHEATHAM, in and for that portion of the District of Koolau and Puna extending from the land of Anahola to the land of Olohena, inclusive.  
H. D. SLOGGETT, in and for that portion of the District of Puna south of and including the land of Wailua.  
F. A. ALEXANDER, in and for that portion of the District of Kona extending from Hanapepe Valley to the Puna District line.  
B. D. BALDWIN, in and for that portion of the District of Kona lying between and including the Waimea, Poomau, and Kauaikinana Valleys on the west and Hanapepe Valley on the east.  
E. A. KNUDSEN, in and for the District of Na Pali and that portion of the District of Kona lying to the west of Waimea, Poomau, and Kauaikinana Valleys.

### OAHU.

- KARSTEN THOT, in and for that portion of the District of Koolauloa from the Waialua District line to and including the land of Kaunala.  
ANDREW ADAMS, in and for that portion of the District of Koolauloa lying to the north and east of the land of Kaunala.  
FRANK VAUGHAN, in and for that portion of the District of Koolaupoko extending from the Koolauloa District line to the land of Heeia.  
FRANK ANDRADE, in and for that portion of the District of Koolaupoko extending from and including the land of Heeia to the land of Kailua.  
JOHN HERD, in and for that portion of the District of Koolaupoko extending from and including the land of Kailua to Makapuu Point.  
CHARLES LUCAS, in and for that portion of the District of Kona extending from Makapuu Point to Palolo Valley.  
JACK NAIWI, in and for Manoa Valley, District of Kona.  
C. M. COOKE, in and for Manoa Valley, District of Kona.  
L. A. MOORE, in and for Nuuanu Valley, District of Honolulu.  
WM. WEINRICH, in and for that portion of the District of Ewa lying to the west of Kamehameha Highway.

- JAMES GIBB, in and for that portion of the District of Ewa lying between the lands of Moanalua and Waiawa.
- H. BLOOMFIELD BROWN, in and for that portion of the District of Ewa lying to the east of Kamehameha Highway between the land of Waipio and Kaukonahua Gulch.
- A. A. WILSON, in and for that portion of the District of Waialua lying between Kaukonahua and Helemano Gulches.
- G. M. ROBERTSON, in and for that portion of the District of Waialua lying between Helemano and Opaaula Gulches.
- GEORGE WILSON, in and for that portion of the District of Waialua lying between Opaaula Gulch and the Koolauloa District line.
- ERNEST BRECHT, in and for that portion of the District of Waianae lying to the west of the Waianae Mts.

#### MOLOKAI.

- JAMES MUNRO, in and for that portion of the Island of Molokai lying to the west of Wailau Valley and the land of Mapulehu.
- E. K. DUVAUCHELLE, in and for that portion of the Island of Molokai, including and lying to the east of Wailau Valley and the land of Mapulehu.

#### LANAI.

- G. C. MUNRO, in and for the Island of Lanai.

#### MAUI.

- A. W. COLLINS, in and for the District of Lahaina.
- D. T. FLEMING, in and for the District of Kaanapali.
- C. E. S. BURNS, in and for the District of Wailuku.
- F. F. BALDWIN, in and for the District of Hamakuapoko and the west half of the District of Hamakualoa.
- W. F. POGUE, in and for the east half of the District of Hamakualoa and that portion of the District of Koolau lying to the west of Makapipi Gulch.
- MARION CABRAL, in and for that portion of the District of Koolau lying to the east of Makapipi Gulch.
- JOHN CHALMERS, in and for the District of Hana.
- JOHN FASSOTH, in and for the District of Kipahulu.
- L. VON TEMPSKY, in and for the District of Kula and Kaupo.

#### HAWAII.

- G. C. WATT, in and for that portion of the north half of the District of Kohala extending from the land of Kaauhuhu to the Hamakua District line.
- S. P. WOODS, in and for that portion of North Kohala extending from the northern boundary of the land of Kawaihae I. to and including the land of Kaauhuhu.
- A. W. CARTER, in and for the District of South Kohala.
- W. P. NAQUIN, in and for the western part of the District of Hamakua extending to the west from the boundary of the land of Paauhau to the boundary of the land of Kukaiau.

D. S. MACALISTER, in and for that portion of the District of Hamakua extending from and including the land of Kukaiau to the Hilo District line.

JOHN M. ROSS.

JOE J. IGNACIO, Assistant District Fire Warden, in and for that portion of the District of Hilo extending from the Hamakua District to the land of Makahanaloa.

JOHN T. MOIR, in and for that portion of the District of Hilo extending from and including the land of Makahanaloa to the land of Kikala.

JAMES HENDERSON, in and for that portion of the District of Hilo extending from the Puna District line to and including the land of Kikala.

A. J. WATT, in and for the District of Puna.

JAMES CAMPSIE, in and for that portion of the District of Kau extending from the Puna District line to and including the land of Punaluu.

GEORGE GIBB, in and for that portion of the District of Kau extending from the land of Punaluu to the Kona District line.

R. A. McWAYNE, in and for that portion of the District of Kona extending from the Kau District line to and including the land of Kaapuna.

T. C. WHITE, in and for that portion of the District of Kona extending from the land of Kaapuna to and including the land of Hookena.

A. C. DOWSETT, in and for that portion of the District of Kona extending from the land of Hookena to and including the land of Kaawaloa.

T. C. WHITE, in and for that portion of the District of Kona extending from the land of Kaawaloa to and including the land of Kahaluu.

A. J. STILLMAN, in and for that portion of the District of Kona extending from the land of Kahaluu to the Kohala District line.

#### FOREST RANGERS.

##### Kauai.

HOSEA K. LOVELL, for Kanai.

##### Oahu.

DAVID KAPIHI, for Tantalus and Makiki.

E. H. HIPPLE, for Palolo, Manoa and Nuuanu.

DANIEL KAPAHU, for Waianae District except Waianae Valley.

##### Maui.

JAMES LINDSAY, for Maui.

##### Hawaii.

A. J. W. MACKENZIE, for Olaa.

CHARLES E. STONE, for South Kona and Kau.

ANTONE P. AGUIAR, for the Panaewa Reserve.  
 HARRY L. DENISON, for the Kohala Mt. and Hamakua Pali Reserves.

**FOREST RANGER AT LARGE.**

V. L. ELLIS, for the Territory of Hawaii.

**HONORARY FOREST RANGERS.**

J. P. PICO, for the Waianae-kai Reserve, Oahu.  
 B. CARTWRIGHT, JR., for the enforcement of Rule IV. on Oahu.

**NURSERY AGENTS.**

JOE RITA, JR., Kalaheo, Kauai.  
 A. ROCHA, Waiahole, Oahu.  
 JAMES LINDSAY, Haiku, Maui.  
 BRO. M. NEWELL, Hilo, Hawaii.

**DISTRICT FORESTERS.**

**Kauai.**

L. D. Larsen, E. Broadbent, J. M. Lydgate, W. D. McBryde, E. A. Knudsen, B. D. Baldwin.

**Oahu.**

Andrew Adams, L. L. McCandless, John Herd, W. W. Goodale.

**Molokai.**

James Munro and E. K. Duvauchelle.

**Lanai.**

G. C. Munro.

**Maui.**

A. W. Collins, F. F. Baldwin, W. F. Pogue, L. von Tempsky, J. H. Raymond, D. T. Fleming, John Fassoth.

**Hawaii.**

G. C. Watt, A. W. Carter, W. P. Naquin, J. M. Ross, George Gibb, and James Campsie.

## LANDS IN FOREST RESERVES.

## TERRITORY OF HAWAII.

January 1, 1921.

Island of Kauai.

Name of Reserve	Name of Land	Private Land, Acres	Government Land			Total Acres
			Leased Acres	Unleased Acres	Total Acres	
NA PALI KONA No. 13 Proclaimed June 12, 1907	Haena .....	500	....	....	....	500
	Hanakapiai .....	....	....	130	130	130
	Na Pali ... ..	....	....	10,340	10,340	10,340
	Milolii .....	....	5,808*	....	5,808	5,808
	Waimea ... ..	....	....	24,372	24,372	24,372
	Makaweli ..	10,030	....	....	....	10,030
	Hanapepe ..	9,360	....	....	....	9,360
		19,890	5,808	34,842	40,650	60,540
PUU KA PELE No. 45 Proclaimed Dec. 31, 1918	Waimea ... ..	....	....	1,800	1,800	1,800
	Waimea ... ..	....	2,685*	....	2,685	2,685
			....	2,685	1,800	4,485
PAPAPA- HOLAHOLA SPRING No. 41 Proclaimed June 19, 1918	Kalaheo ... ..	....	....	54	54	54
LIHUE- KOLOA No. 19 Proclaimed June 5, 1909	Hanapepe ..	10	....	....	....	10
	Wahiawa ..	2,060	....	15	15	2,075
	Kalaheo ... ..	....	....	1,275	1,275	1,275
	Lawai .....	350	....	....	....	350
	Koloa .....	980	....	....	....	980
	Haiku .....	2,900	....	....	....	2,900
	Hanamaulu ..	9,361	....	....	....	9,361
	Wailua .....	....	....	11,231	11,231	11,231
	N. Olohena .	....	....	150	150	150
Waipouli ..	....	....	270	270	270	
		15,661	....	12,941	12,941	28,602
NONOU No. 44 Proclaimed Dec. 31, 1918	Wailua Uka ..	....	....	214	214	214
	Wailua Kai ..	....	361†	....	361	361
	Waipouli and	....	42‡	....	42	42
	N. Olohena .	....	201‡	....	201	201
	S. Olohena .	....	....	....	....	....
		....	604	214	818	818

## Island of Kauai—Continued.

Name of Reserve	Name of Land	Private Land, Acres	Government Land			Total Acres
			Leased Acres	Unleased Acres	Total Acres	
KEALIA No. 6 Proclaimed Mar. 9, 1906	Kapaa .....	....	....	2,290	2,290	2,290
	Kealia .....	2,470	....	....	....	2,470
	Kamaloma- loo .....	....	....	630	630	630
	Anahola ...	....	....	3,660	3,660	3,660
		2,470	....	6,580	6,580	9,050
MOLOAA No. 20 Proclaimed June 5, 1909	Aliomanu ..	125	....	....	....	125
	Moloaa ....	8	....	....	....	8
	Papaa-Mo- loaa .....	....	....	2,160	2,160	2,160
	Pilaa .....	40	....	....	....	40
	Papaa .....	5	....	....	....	5
	Papaa .....	....	....	1,418	1,418	1,418
	Kahili .....	475	....	....	....	475
	Kilauea ...	1,390	....	....	....	1,390
	2,043	....	3,578	3,578	5,621	
HALELEA No. 5 Proclaimed Aug. 24, 1914	Kalihiwai ..	5,685	....	....	....	5,685
	Hanalei ...	....	....	8,340	8,340	8,340
	Waioli ....	....	....	2,650	2,650	2,650
	Waipa .....	800	....	....	....	800
	Lumahai ...	8,975	....	....	....	8,975
	Wainihi ...	11,050	....	....	....	11,050
	26,510	....	10,990	10,990	37,500	
Totals for Kauai .....	66,574	9,097	70,999	80,096	146,670	

\*Lease expires June 1, 1921.

†Lease expires July 1, 1921.

‡Lease expires January 14, 1921.

## Island of Oahu.

Name of Reserve	Name of Land	Private Land, Acres	Government Land, Acres*	Total Acres
KUAOKALA No. 30 Proclaimed June 4, 1913	Kuaokala .....	....	434	434
MAKUA-KEAAU No. 29 Proclaimed June 4, 1913	Kahanahaiki ....	....	970	970
	Makua .....	....	1,660	1,660
	Ohikilolo .....	340	....	340
	Keaau .....	....	1,850	1,850
		340	4,480	4,820
WAIANA-E-KAI No. 10 Proclaimed Sept. 7, 1906	Waianae-Kai ....	....	3,546	3,546
	Waianae Grants .	107	....	107
		107	3,546	3,653
LUALUALEI No. 11 Proclaimed Nov. 30, 1906	Lualualei .....	....	3,743	3,743
NANAKULI No. 28 Proclaimed June 4, 1913	Nanakuli .....	....	1,010	1,010
KULIOUOU No. 35 Proclaimed Feb. 13, 1914	Kuliouou .....	....	214	214
MANOA RANGER STATION No. 38 Proclaimed May 9, 1916	Kahoiwai .....	....	15	15
ROUND TOP No. 39 Proclaimed Aug. 10, 1916	Makiki .....	....	115	115
HONOLULU WATERSHED No. 34 Proclaimed Oct. 13, 1913	Palolo .....	....	910	910
	Manoa .....	....	780	780
	Makiki .....	....	563	563
	Kalawahine .....	....	255	255
	Nuuanu .....	....	2,160	2,160
	Kalihi .....	....	330	330
	Scattered in above	1,952	....	1,952
		1,952	4,998	6,950

## Island of Oahu—Continued.

Name of Reserve	Name of Land	Private Acres Land,	Government Land, Acres*	Total Acres
EWA No. 7 Proclaimed Mar. 9, 1906	Halawa .....	3,846	....	3,846
	Aiea .....	....	383	383
	Kalauao .....	1,538	....	1,538
	Waimalu .....	2,238	....	2,238
	Waiiau .....	1,320	....	1,320
	Waimano .....	....	790	790
	Manana .....	1,090	....	1,090
	Waiawa .....	4,040	....	4,040
	Waipio .....	5,080	....	5,080
Waianae-Uka ....	4,247	....	4,247	
Wahiawa .....	....	3,978	3,978	
		23,399	5,151	28,550
WAIAHOLE No. 42 Proclaimed June 19, 1918	Makawai .....	....	889	889
	Kapikokau .....	....	54	54
	Waianu I .....	....	186	186
	Makawai Apanas	5	....	5
	Waianu I Apana .	1	....	1
	Waianu I, Portion	2	....	2
Hanakea .....	32	....	32	
		40	1,129	1,169
HAUULA No. 47 Proclaimed Dec. 31, 1918	Kahana .....	3,920	....	3,920
	Punaluu			
	L. C. A.'s ....	28	....	28
	Punaluu .....	2,950	....	2,950
	Makaua .....	48	....	48
	Waiono .....	47	....	47
	Kaluanui .....	1,033	....	1,033
Makao .....	24	....	24	
Hauula .....	....	1,143	1,143	
		8,050	1,143	9,193
KAIPAPAU No. 1 Proclaimed Nov. 10, 1904	Kaipapau .....	....	913	913
PUPUKEA No. 21 Proclaimed May 10, 1910	Pupukea-Paumalu	....	864	864
MOKULEIA No. 46 Proclaimed Dec. 31, 1919	Mokuleia .....	....	5,850	5,850
	Kawaihapai ....	....	320	320
	Kealia .....	....	120	120
			....	6,290
Totals for Oahu .....		33,888	34,045	67,933

\*There are no leased government lands in any reserve on Oahu.

Island of Molokai.

Name of Reserve	Name of Land	Private Land, Acres	Government Land			Total Acres
			Leased Land, Acres	Unleased Land, Acres	Total Acres	
MOLOKAI No. 26 Proclaimed Sept. 11, 1912	Ioli .....	156	....	....	....	156
	Naiwa .....	70	....	....	....	70
	Kahanui ...	317	....	....	....	317
	Kalamaula .	....	....	1,621	1,621	1,621
	Kahanui G-3437 ...	1,048	....	....	....	1,048
	Kaunakakai	965	....	....	....	965
	Kapaakea ..	....	....	220	220	220
	Kamiloloa 1	....	....	490	490	490
	Kamiloloa 2	....	....	550	550	550
	Makakupaia mauka ...	....	....	490	490	490
	Makakupaia makai ...	654	....	....	....	654
	Kawela ....	3,850	....	....	....	3,850
	Makolelau .	253	....	....	....	253
	Kamalo ....	1,600	....	....	....	1,600
	Kapualei	923	....	....	....	923
	Kamueli }					
	Wawaia }	....	....	163	163	163
	Puaahala ..					
	Kaamola ...	33	....	....	....	33
	Keawanui ..	182	....	....	....	182
	W. Ohia ...	172	....	....	....	172
	E. Ohia ...	....	220*	....	220	220
	Manawai ...	416	....	....	....	416
	Kahananui ..	....	182†	....	182	182
	Ualapue ...	....	194†	....	194	194
	Kaluaaha ..	694	....	....	....	694
	Mapulehu ..	1,007	....	....	....	1,007
	Ili o Punaula	152	....	....	....	152
	Pukoo .....	....	....	124	124	124
	Kupehe ....	63	....	....	....	63
	Ahaino 1 ..	....	....	96	96	96
	Ahaino 2 ..	100	....	....	....	100
	Honomuni ..	415	....	....	....	415
	Kawaikapu	67	....	....	....	67
	Kainalu ...	572	....	....	....	572
	Puelehe ...	14	....	....	....	14
	Puniuohua 1	2	....	....	....	2
	Puniuohua 2	2	....	....	....	2
	Waiialua ...	627	....	....	....	627
	Moanui ....	282	....	....	....	282
	Honouliwai .	....	....	378	378	378
	Honoulimaloo	175	....	....	....	175
	Lupehu ....	83	....	....	....	83
	Pohakupili .	9	....	....	....	9
	Mokea .....	218	....	....	....	218
	Keopukau- uku .....	16	....	....	....	16
	Keopukaloa	810	....	....	....	810
Halawa ....	7,190	....	....	....	7,190	
Wailau ....	....	8,540‡	....	8,540	8,540	
Pelekunu ..	4,512	....	....	....	4,512	
Waikolu ...	3,400	....	....	....	3,400	
Makanalua .	142	....	....	....	142	
Kahanui G-3539 ..	215	....	....	....	215	
	31,406	9,136	4,132	13,268	44,674	
Totals for Molokai .....	31,406	9,136	4,132	13,268	44,674	

\*Lease expires August 17, 1923.

‡Lease expires June 28, 1928.

†Lease expires January 1, 1925.

## Island of Maui.

Name of Reserve	Name of Land	Private Land, Acres	Government Land			Total Acres
			Leased Acres	Unleased Acres	Total Acres	
WEST MAUI No. 14 Proclaimed April 21, 1908	Ukumehame and Olowalu	....	....	7,655	7,655	7,655
	Launiupoko.	1,455	....	....	....	1,455
	Puehuchu ..	440	....	....	....	440
	Kauaula ...	1,455	....	....	....	1,455
	Kuia, Pan- ewa and Paunau ..	....	....	2,100	2,100	2,100
	Paunau ....	210	....	....	....	210
	Kuholilea ..	120	....	....	....	120
	Puuiki .....	....	....	205	205	205
	Halakaa ...	255	....	....	....	255
	Wahikuli ..	....	....	1,550	1,550	1,550
	Hanakaoo .	720	....	....	....	720
	Honokowai .	....	....	1,410	1,410	1,410
	Kahana and Mahinahina.	330	....	....	....	330
	Mailepai ...	120	....	....	....	120
	Alaeloa ....	30	....	....	....	30
	Honokahua Honolua and Honokohau .	5,720	....	....	....	5,720
	Kahakuloa .	....	....	5,900	5,900	5,900
	Waihee ....	4,220	....	....	....	4,220
	Kou .....	....	....	285	285	285
	Hananui ...	200	....	....	....	200
Waiehu ....	1,190	....	....	....	1,190	
Wailuku ...	4,935	....	....	....	4,935	
Waikapu ..	3,935	....	....	....	3,935	
Polipoli ....	....	....	42	42	42	
		25,335	....	19,147	19,147	44,482
KULA No. 27 Proclaimed Sept. 11, 1912	Papaanui ..	....	....	370	370	370
	Kamaole ...	....	....	612	612	612
	Waiohuli- Keokea ..	....	....	2,450	2,450	2,450
	Kaonoulu ..	804	....	....	....	804
	Alae 1 and 2	202	....	....	....	202
	Alae 3 and 4	....	....	70	70	70
	Waiakoa ...	....	....	1,567	1,567	1,567
		1,006	....	5,069	5,069	6,075
WAIHOU SPRING No. 18 Proclaimed June 5, 1909	Makawao ..	....	....	74	74	74
	Makawao ..	10	....	....	....	10
		10	....	74	74	84
MAKAWAO No. 15 Proclaimed Apr. 21, 1908	Makawao ..	....	....	2,093	2,093	2,093

## Island of Maui—Continued.

Name of Reserve	Name of Land	Private Land, Acres	Government Land			Total Acres
			Leased Acres	Unleased Acres	Total Acres	
KOOLAU No. 4 Proclaimed Aug. 24, 1905	*Opana } ..	10,899	....	....	....	10,899
	*Peahi } ..					
	*Haiku } ..					
	*Halehaku .	1,840	....	....	....	1,840
	Honopu-W. .	....	....	....	....	....
	Makaiwa . .	....	....	4,800	4,800	4,800
	E. Makaiwa- Keopuka . .	....	....	1,400	1,400	1,400
	Honomanu . .	....	....	2,000	2,000	2,000
	Keanae, mauka . . .	....	8,750†	....	8,750	8,750
	Wailua 1-2 .	....	1,280†	....	1,280	1,280
	Wailua- Ulaino . . .	....	3,000†	....	3,000	3,000
	Wailua- Ulaino . . .	....	....	9,000	9,000	9,000
		12,739	13,030	17,200	30,230	42,969
HANA No. 12 Proclaimed Nov. 30, 1906	Hana Forest	....	....	11,572	11,572	11,572
	W. Hono- maele . . . .	187	....	....	....	187
	E. Hono- maele . . . .	....	....	130	130	130
	Kawela- Kaeleku . .	....	....	65	65	65
	Wakiu . . . .	....	....	18	18	18
	Aleamai . .	357	....	....	....	357
	Haneoo . . .	84	....	....	....	84
	Kakio . . . .	....	....	700	700	700
	Waiohonu . .	....	....	33	33	33
	Puukai-Papa- hawahawa .	....	....	68	68	68
	Muolea . . .	430	....	....	....	430
	Koali-Puu- haoo . . . .	....	....	600	600	600
	Wailua . . .	....	....	270	270	270
	Puaaluu . . .	....	....	311	311	311
	1,058	....	13,767	13,767	14,825	
KIPAHULU No. 36 Proclaimed Aug. 20, 1914	Kaumakani- Papauluana .	....	....	550	550	550
	Alaiki . . . .	....	....	180	180	180
	Alaenui . . .	5,705	....	....	....	5,705
	Kakahale- Kokoo . . .	....	....	98	98	98
	Kukuiula . .	....	....	797	797	797
	Kukuiula (Grs.) . . .	295	....	....	....	295
	Kaniaula . .	....	....	2,975	2,975	2,975
	6,000	....	4,600	4,600	10,600	
Totals for Maui . . . . .	46,148	13,030	61,950	74,980	121,128	

\*Surrendered to the custody of the Board of Agriculture and Forestry November 12, 1906, under the provisions of Sec. 490, R. L. H., 1915, for the period to February 26, 1923.

†Lease expires February 26, 1923.

## Island of Hawaii.

Name of Reserve	Name of Land	Private Land, Acres	Government Land			Total Acres	
			Leased Acres	Unleased Acres	Total Acres		
KOHALA MT. No. 31 Proclaimed Oct. 13, 1913	Awini .....	500	....	....	....	500	
	Awini .....	....	....	100	100	100	
	Honokane ..	5,410	....	....	....	5,410	
	Pololu .....	....	....	1,000	1,000	1,000	
	Makanika- hio 1 .....	64	....	....	....	64	
	Makanika- hio 2 .....	71	....	....	....	71	
	Waiapuka ..	197	....	....	....	197	
	Niulii .....	560	....	....	....	560	
	Makapala ..	530	....	....	....	530	
	Aamakao ..	710	....	....	....	710	
	Halawa .....	493	....	....	....	493	
	Halelua .....	15	....	....	....	15	
	Nunulu .....	38	....	....	....	38	
	Lamaloloa- Kaiholena	140	....	....	....	140	
	Lamaloloa ..	....	....	24	24	24	
	Kawaihae I.	....	....	3,370	3,370	3,370	
	Kawaihae II.	120	....	....	....	120	
	Puukawai- wai-Panc- luukia-Kapia	....	....	....	360	360	360
	Pauahi .....	....	....	....	150	150	150
	Momoualoha .	....	....	....	130	130	130
	Onli .....	190	....	....	....	190	
	Lanikepu ..	25	....	....	....	25	
	Lanikepu ..	....	....	....	435	435	435
	Waikoloa ..	250	....	....	....	250	
	Puukapu .....	....	....	....	8,385	8,385	8,385
	Waipio .....	3,560	....	....	....	3,560	
	Lalakea .....	1,540	....	....	....	1,540	
	Kukuihaele .	10	....	....	....	10	
	Waikoekoe .	1,000	....	....	....	1,000	
	Kamoku ....	....	....	20 <sup>1</sup>	....	20	20
Keaa .....	....	....	230 <sup>1</sup>	....	230	230	
		15,423	250	13,954	14,204	29,627	
HAMAKUA- PALI No. 2 Proclaimed Dec. 23, 1904	Muliwai ...	....	....	3,575	3,575	3,575	
	Waimanu and Laupa- hoehoe 1 .	....	....	4,943	4,943	4,943	
	Waimanu kuleanas .	61	....	....	....	61	
	Waimanu homesteads	196	....	....	....	196	
	Waimanu ..	....	200 <sup>2</sup>	....	200	200	
	Laupahoe- hoe 2 .....	2,350	....	....	....	2,350	
	Nakooka ...	....	....	....	1,640	1,640	1,640
	Apua .....	....	....	....	1,260	1,260	1,260
	Waikapu ...	....	....	....	1,980	1,980	1,980
	Honopue ...	....	....	....	2,220	2,220	2,220
	Awini .....	....	....	....	515	515	515
			2,607	200	16,133	16,333	18,940

## Island of Hawaii—Continued.

Name of Reserve	Name of Land	Private Land, Acres	Government Land			Total Acres
			Leased Acres	Unleased Acres	Total Acres	
HAUOLA No. 22 Proclaimed June 13, 1910	Hauola . . . .	. . . .	. . . .	7	7	7
MAUNA KEA No. 17 June 5, 1909	Kaohe . . . . .	. . . .	. . . .	66,600	66,600	66,600
HILO No. 3 Proclaimed July 24, 1905	Humuula . . . . .	. . . .	. . . .	3,901	3,901	3,901
	Kahoahuna . . . . .	. . . .	. . . .	46	46	46
	Waipunalei . . . . .	1,470	. . . .	. . . .	. . . .	1,470
	Laupahoehoe					
	Weloka . . . . .	. . . .	. . . .	11,845	11,845	11,845
	Maulua . . . . .	7,989	. . . .	. . . .	. . . .	7,989
	Waikumalo-					
	Maulua . . . . .	. . . .	. . . .	790	790	790
	Piha . . . . .	. . . .	. . . .	3,780	3,780	3,780
	Nanue . . . . .	145	. . . .	. . . .	. . . .	145
	Honohina . . . . .	5,555	. . . .	. . . .	. . . .	5,555
	Opea-Peleau . . . . .	. . . .	. . . .	230	230	230
	Umauma . . . . .	1,561	. . . .	. . . .	. . . .	1,561
	Kamaee-					
	Wailua . . . . .	. . . .	. . . .	930	930	930
	Hakalau . . . . .	9,826	. . . .	. . . .	. . . .	9,826
	Wailea-					
	Kaiwika . . . . .	. . . .	. . . .	3,834	3,834	3,834
	Honomu-					
	Kuhua . . . . .	. . . .	. . . .	926	926	926
	Makahalanaloa . . . . .	3,949	. . . .	. . . .	. . . .	3,949
	Onomea . . . . .	773	. . . .	. . . .	. . . .	773
	Kahalii . . . . .	183	. . . .	. . . .	. . . .	183
Papaikou . . . . .	10,269	. . . .	. . . .	. . . .	10,269	
Pahoehoe . . . . .	176	. . . .	. . . .	. . . .	176	
Paukaa . . . . .	6,221	. . . .	. . . .	. . . .	6,221	
Kikala . . . . .	90	. . . .	. . . .	. . . .	90	
Kalalau . . . . .	918	. . . .	. . . .	. . . .	918	
Puueo . . . . .	436	. . . .	. . . .	. . . .	436	
Piihonua . . . . .	. . . .	33,941 <sup>3</sup>	. . . .	33,941	33,941	
Punahoa . . . . .	216	. . . .	. . . .	. . . .	216	
		49,777	33,941	26,282	60,223	110,000
UPPER WAIAKEA No. 32 Proclaimed Oct. 13, 1913	Piihonua . . . . .	. . . .	3,800 <sup>3</sup>	. . . .	3,800	3,800
	Waiakea . . . . .	. . . .	. . . .	51,200	51,200	51,200
			3,800	51,200	55,000	55,000
PANAEWA No. 40 Proclaimed Apr. 11, 1917	Waiakea . . . . .	. . . .	. . . .	1,750	1,750	1,750
OLAA No. 48 Proclaimed Dec. 31, 1918	Olaa . . . . .	. . . .	. . . .	11,061	11,061	11,061
	Olaa . . . . .	. . . .	8,589 <sup>4</sup>	. . . .	8,589	8,589
	Olaa . . . . .	. . . .	99 <sup>5</sup>	. . . .	99	99
	Olaa . . . . .	. . . .	100 <sup>5</sup>	. . . .	100	100
	Olaa . . . . .	. . . .	98 <sup>6</sup>	. . . .	98	98
			8,886	11,061	19,947	19,947

## Island of Hawaii—Continued.

Name of Reserve	Name of Land	Private Land, Acres	Government Land			Total Acres
			Leased Acres	Unleased Acres	Total Acres	
UPPER OLA A No. 33 Proclaimed Oct. 13, 1913	Olaa . . . . .	....	....	9,280	9,280	9,280
OLA A FOREST PARK No. 37 Proclaimed Aug. 20, 1914	Olaa . . . . .	....	....	532	532	532
PUNA No. 25 Proclaimed June 29, 1911	Makuu- Kaohe ...	....	....	18,350	18,350	18,350
	Kaimu- Kehena } Kapaahu- Kamaili }	....	....	1,500	1,500	1,500
	....	....	....	19,850	19,850	19,850
KEAUO- HANA No. 43 Proclaimed June 19, 1918	Keauohana .	....	....	272	272	272
KAU No. 9 Proclaimed Aug. 2, 1906	Puumakaa- Kiolakaa ..	....	5,750 <sup>7</sup>	....	5,750	5,750
	Waiohinu ..	....	....	10,740	10,740	10,740
	Kahilipalini	165	....	....	....	165
	Kawala- Kaunamano.	....	....	380	380	380
	Kioloku ....	....	....	216	216	216
	Hionaa- Hokukano- mauka .....	....	....	345	345	345
	Kaalaiiki ...	....	....	10,705	10,705	10,705
	Hilea-nui ..	2,620	....	....	....	2,620
	Hilea-iki ...	37	....	....	....	37
	Ninole- Wailau ..	....	....	6,140	6,140	6,140
	Punaluu ....	1,275	....	....	....	1,275
	Mohoeka 1-2	....	....	1,876	1,876	1,876
	Moaula- Kopu- Makaka ..	....	....	7,382	7,382	7,382
	Moaula- Kopu- Makaka ..	....	46 <sup>8</sup>	....	46	46
	Paaauu ....	1,675	....	....	....	1,675
	Kaauhuhuula	....	....	3,009	3,009	3,009
	Kuaiwa ....	483	....	....	....	483
Kaalaala- Makakupu	....	....	7,204	7,204	7,204	
Kapapala ..	....	....	7,046	7,046	7,046	
		6,255	5,796	55,043	60,839	67,094

## Island of Hawaii—Continued.

Name of Reserve	Name of Land	Private Land, Acres	Government Land			Total Acres
			Leased Acres	Unleased Acres	Total Acres	
SOUTH KONA No. 24 Proclaimed May 17, 1911	Kaohe .....	....	....	1,555	1,555	1,555
	Kaohe 4 .....	760	....	....	....	760
	Kukuiope .....	....	....	2,760	2,760	2,760
	Olelomoana 1 .....	810	....	....	....	810
	Olelomoana-Opihahali .....	....	2,400 <sup>9</sup>	1,485	3,885	3,885
	Kipahoehoe .....	....	....	4,590	4,590	4,590
	Honomalino .....	....	....	2,540	2,540	2,540
	Kapua .....	6,122	....	....	....	6,122
	Kaulana-mauna ...	....	....	2,060	2,060	2,060
	Manuka ...	....	....	11,870	11,870	11,870
		7,692	2,400	26,860	29,260	36,952
HONUAAULA No. 8 Proclaimed Apr. 4, 1906	Honuaula ..	....	....	665	665	665
WAIAHA SPRING No. 16 Proclaimed Apr. 21, 1908	Waiaha 2 ..	....	....	193	193	193
Totals for Hawaii .....		81,754	55,273	299,682	354,955	436,709

<sup>1</sup>Lease expires September 8, 1928.

<sup>2</sup>Lease expires November 22, 1922.

<sup>3</sup>Lease expires March 21, 1921.

<sup>4</sup>Lease expires February 5, 1932.

<sup>5</sup>Lease expires May 9, 1932.

<sup>6</sup>Lease expires November 22, 1932.

<sup>7</sup>Lease expires May 24, 1923.

<sup>8</sup>Lease expires June 16, 1921.

<sup>9</sup>Lease expires June 9, 1926.

## SUMMARY.

Island	No. of Reserves	Private Land, Acres	Leased Government Land, Acres	Unleased Government Land, Acres	Total Government Land, Acres	Total All Lands, Acres
Kauai .....	8	66,574	9,097	70,999	80,096	146,670
Oahu .....	15	33,888	....	34,045	34,045	67,933
Molokai ...	1	31,406	9,136	4,132	13,268	44,674
Maui .....	7	46,118	13,030	61,950	74,980	121,128
Hawaii ....	16	81,754	55,273	299,682	354,955	436,709
Totals ...	47	259,770	86,533	470,898	557,344	817,114

## REPORT OF THE FOREST NURSERYMAN

Honolulu, Hawaii, December 31, 1920.

Superintendent of Forestry,  
Honolulu, Hawaii.

Dear Sir: I respectfully submit the following report for the calendar years 1919 and 1920:

### COLLECTION AND EXCHANGE OF SEED.

The collecting of seed has been continued with the aid of two boys. A number of trees raised from seed received through our exchange system and from individuals are now bearing. A plentiful supply of seed of the following species can be collected: *Juniperus bermudiana*, introduced by Mr. Gerrit P. Wilder, *Juniperus australis*, received through our exchange system from Jamaica, and the African tulip tree, *Spathodea campanulata*, the seed of which was received by Mr. C. S. Judd from Madagascar in 1916. From two pods we were able to propagate 2,000 seedlings which were distributed to people all over the islands. The first trees of this species which we have noticed bearing seed were found during August, 1920, at different localities in the Makiki District, University of Hawaii grounds and at other places in and around the city. The Australian red cedar, *Cedrela australis*, introduced by Mr. E. C. Smith in 1914, seeded during 1919 for the first time. Other trees of recent introduction may also be found bearing seed.

### TREES DISTRIBUTED FROM GOVERNMENT NURSERIES DURING 1919 AND 1920.

Oahu: 1919.

Makiki and King St. Nurseries:

	Seed- lings	Trans- plants	Pot Grown	Total
Sold .....	1,000	450	1,732	3,182
Gratis				
Arbor Day .....	.....	.....	6,392	6,392
Forest Reserves .....	17,900	3,260	6,031	27,191
Homesteaders .....	3,000	1,300	4	4,304
Military Posts .....	19,200	5,913	2,093	27,206
Parks .....	.....	.....	52	52
Schools .....	.....	.....	80	80
Street Planting .....	.....	.....	949	949
Miscellaneous .....	24,000	9,000	3,084	36,084
	<hr/> 65,100	<hr/> 19,923	<hr/> 20,417	<hr/> 105,440

	Seed- lings	Trans- plants	Pot Grown	Total
<b>Kauai:</b>				
Kalaheo Nursery, Including Arbor Day .....	.....	.....	3,602	3,602
<b>Maui:</b>				
Haiku Nursery, including Arbor Day .....	40,500	.....	.....	40,500
<b>Hawaii:</b>				
Hilo Nursery, including Arbor Day .....	.....	6,303	6,000	12,303
	105,600	26,226	30,019	161,845
<b>Plantation Companies, Etc.</b> .....	103,000	16,300	10,936	130,236
Totals .....	208,600	42,526	40,955	292,081
	<u>1920.</u>			

**Oahu:****Makiki and King St. Nurseries:**

Sold .....	.....	700	1,336	2,036
Gratis				
Arbor Day .....	.....	.....	4,370	4,370
Forest Reserves .....	31,200	9,816	5,209	46,225
Homesteaders .....	.....	100	340	440
Military Posts .....	4,000	3,200	2,803	10,003
Schools .....	141	.....	.....	141
Street Planting .....	.....	412	.....	412
Miscellaneous .....	.....	2,005	2,550	4,555
	35,341	16,233	16,608	68,182

**Kauai:**

Kalaheo Nursery, including Arbor Day .....	.....	.....	7,896	7,896
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**Maui:**

Haiku Nursery, including Arbor Day .....	11,100	10,330	1,163	22,593
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**Hawaii:**

Hilo Nursery, including Arbor Day .....	500	1,113	6,234	7,847
--	-----	-------	-------	-------

	46,941	27,676	31,901	106,518
<b>Plantation Companies, Etc.</b> .....	114,600	2,550	298	117,448

Totals .....	161,541	30,226	32,199	223,966
--------------	---------	--------	--------	---------

Total Tree Distribution 1919 and 1920.....516,047

**Government Realizations.**

Turned into the Treasury.

1919.

Sale of Plants .....	\$ 67.60
Rent of Office, Nursery Grounds .....	455.00
Rebate on Drugs Returned .....	123.33
Price of Magazine Returned .....	3.00
Two Days' Labor not Performed (Haiku) .....	3.23
<b>Total .....</b>	<b>\$ 652.16</b>

1920.

Sale of Plants, Government Nursery .....	\$ 35.80
Sale of Plants, Kalaheo Nursery, Kauai .....	98.25
Rent of Office, Nursery Grounds .....	420.00
<b>Total .....</b>	<b>\$ 554.05</b>

**Special Funds.**

Preservation and Extension of Forestry and Forest Reserves.

1919.

Rents and Fees .....	\$ 156.00
Sale of Black Sand, Makiki, Oahu .....	178.50
Sale of Cord Wood, Olaa, Hawaii .....	154.25
Sale of Charcoal, Tantalus, Oahu .....	114.75
Kokee Camps, Kauai—Fees .....	305.61
<b>Total .....</b>	<b>\$ 909.11</b>

1920.

Rents and Fees .....	\$ 212.50
Sale of Black Sand, Makiki, Oahu .....	297.50
Sale of Charcoal, Tantalus, Oahu .....	8.92
Kokee Camps, Kauai—Fees .....	489.08
<b>Total .....</b>	<b>\$1,008.00</b>

**Animal Industry Revolving Fund.**

To Sale of Vaccines, 1919 .....	\$ 448.25
To Sale of Vaccines, 1920 .....	1,645.35

## PLANTATION COMPANIES AND OTHER CORPORATIONS, ETC.

The number of trees distributed to plantation companies and other corporations during 1919 and 1920 amounted to 247,684, as follows:

	1919.			1920.			Total
	Seedlings	Transplants	Pot Grown	Seedlings	Transplants	Pot-Grown	
<i>Eucalyptus resinifera</i> .....	5,500	.....	.....	5,500	25,000	.....	25,000
<i>crebra</i> .....	4,500	.....	.....	4,500	.....	.....	.....
<i>pyramidalis</i> .....	15,000	.....	.....	15,000	11,800	.....	11,800
<i>citriodora</i> .....	10,000	.....	.....	10,000	7,000	.....	7,000
<i>globulus</i> .....	12,000	.....	.....	12,000	20,000	.....	20,000
<i>robusta</i> .....	45,000	.....	.....	45,000	29,000	.....	29,000
<i>rostrata</i> .....	16,000	.....	.....	16,000	5,400	.....	5,400
<i>rudis</i> .....	10,000	.....	.....	10,000	2,000	.....	2,000
<i>Catalpa</i> sps. ....	.....	.....	.....	.....	4,400	.....	4,400
<i>Cedrela australis</i> .....	.....	.....	36	36	10,000	.....	10,000
<i>Casuarina equisetifolia</i> .....	.....	.....	.....	.....	.....	298	2,848
<i>Ficus religiosa</i> .....	1,000	.....	.....	1,000	.....	.....	.....
<i>Cryptomeria japonica</i> .....	10,000	.....	1,200	11,200	.....	.....	.....
Totals .....	129,000	.....	1,236	130,236	114,600	2,550	117,448

Total for two years—247,684

## MAKIKI STATION.

The regular work at the Makiki station consisted of mixing and sterilizing soil, transplanting seedlings, propagating by cuttings, sawing up wood for seed and transplant boxes, etc.

The proposed arboretum which is to be located in and will eventually occupy the whole of upper Makiki and Hering Valleys is certainly a step in the right direction. A good collection of trees, shrubs and vines are to be found already in and around the station and will form the nucleus of the arboretum. When the whole of both valleys are occupied with different kinds of trees properly tagged with their common and scientific names, the collection will not only be of interest and benefit to arboriculturists but also to many visitors who are always anxious to learn the names and history of the trees to be found growing in these islands.

## HONOLULU WATERSHED.

The work on the watershed consisted of clearing and extending trails, rooting out pests, planting trees and assisting at Makiki station during bad weather. As most of the land being planted consists of rocky and precipitous patches, the work of reforestation is consequently slow. This land, however, is not suitable for anything else and the clothing of every available spot with trees adds to the cover on the watershed and should in time assist in the preservation and probable increase of our much needed water supply. The number of trees planted on the watershed during the past two years was 4,416 in 1919 and 3,502 in 1920 or a total of 7,918 trees. These consisted of koa, mahogany and Australian red cedar.

## SUB-NURSERIES.

It became necessary to enlarge and better equip our sub-nurseries on the other islands, after the passage of Rule XX of the Division of Plant Inspection, forbidding the shipping of trees from Oahu to any of the other islands with soil about their roots. The object of this rule is a precaution against the transportation of insect pests and diseases liable to be introduced from foreign countries. Honolulu being the principal port of entry for vessels trading with other countries makes Oahu more liable than any of the other islands to be first infested.

## HILO SUB-NURSERY.

The writer made two trips to Hilo for the purpose of assisting in the starting of a new nursery large enough to supply the

island of Hawaii with all kinds of trees and other plants desired. Consequently the nursery was moved from the Catholic Mission School to the Animal Quarantine Station, two miles out from the center of Hilo. This nursery has been in charge of Brother Matthias Newell for a number of years as shall also the new nursery at the Animal Quarantine Station. A good start has been made at the new nursery. A potting shed and small office has been built, water has been laid on the ground and tables and benches for holding seedlings, transplants and pot-grown plants have been installed. Supplies of different kinds of seeds suitable for the demand have been forwarded from time to time from Honolulu; also a quantity of plants packed and shipped in moss. The new nursery will be in good running order in a short time now and the whole island can be supplied from this nursery.

We appreciate very much the kind assistance rendered by Dr. H. B. Elliot, who has done everything in his power to help the work along. We are therefore indebted to him for such courtesies and help as he has rendered in making the establishment of this new nursery a success.

#### MAUI SUB-NURSERY.

The writer made two visits to Maui for the purpose of assisting in the starting of a nursery to supply Maui and Molokai with trees.

Mr. James Lindsay, Forest Ranger, was appointed to take charge of the nursery which is located at his residence at Haiku. Additional equipment had to be installed, a new potting shed and stands and benches built, water laid on and general tools for operating the work supplied.

This nursery is now in very good running order and has a large supply of many species on hand for distribution.

#### KAUAI SUB-NURSERY.

The nursery at Kalaheo, in charge of Joe Rita, Jr., has not been visited by the writer since the new law took effect, but a visit is contemplated in the near future. Seeds have been supplied at intervals and we expect to give him additional equipment so as to increase the output of this nursery.

#### ADVICE AND ASSISTANCE.

The writer has been called upon to make a large number of visits and give advice on tree planting and other subjects by people living in and around the city. All the different military posts on Oahu have been visited a number of times at the request

of the officers for advice on the planting and improvement of their respective posts.

#### NURSERY GROUNDS.

The parking around the offices and the park part of the grounds has been kept in order by two men, with assistance occasionally from an additional man at odd times who is generally employed doing such work as attending to the fixing of pipes, doing rough carpenter work, etc., both at the Government Nursery on King Street and at the Makiki Nursery.

#### YEARBOOKS AND VEGETABLE SEED.

From our delegate in Congress we have received the usual consignments of U. S. Department of Agriculture yearbooks and vegetable seeds. These have been distributed throughout the Territory and have been much appreciated by recipients. A large supply of fresh seed is now on hand as well as back numbers of the yearbook which we will be glad to send out to applicants.

Respectfully submitted,

DAVID HAUGHS,  
Forest Nurseryman.



TERRITORY OF HAWAII

# Board of Agriculture and Forestry

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DIVISION OF FORESTRY

C. S. JUDD, Superintendent

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REPORT

OF THE

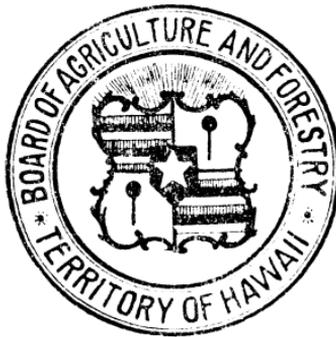
# Division of Forestry

FOR THE

Biennial Period Ended December 31, 1922

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Reprint from the Report of the Board of Commissioners  
of Agriculture and Forestry



HONOLULU, HAWAII  
PARADISE OF THE PACIFIC  
1923



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*Forestry Lib.*  
*Gift*  
*Prof. S. T. Dana*  
*8-9-1930*

# Division of Forestry

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## REPORT OF THE SUPERINTENDENT OF FORESTRY

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Honolulu, Hawaii, January 22, 1923.

Board of Commissioners of  
Agriculture and Forestry,  
Honolulu, Hawaii.

Gentlemen: I have the honor to submit as follows the report of the Division of Forestry for the calendar years 1921 and 1922.

### INTRODUCTION.

The work of the Division during the past two years has been concentrated on the more important forest problems and it has been possible to make greater progress than ever before in the two main lines of forest work falling to this Division which involve forest protection and extension.

The protection of the native water-conserving forest on our mountain slopes against damage by stock is and will for some time remain to be the chief work of the Division. This is accomplished chiefly by fencing forest reserve boundaries and either driving out or exterminating all stock within fenced areas.

The adjusting of reserve boundaries so as to exclude agricultural land and take in all forest land that should be protected, a necessary step in order to correct old general descriptions and keep up to the times, has proceeded as a preliminary requirement to the establishment of the final, protected boundary.

The planting of trees on denuded areas within protected reserves to supplement natural reforestation has followed as the final step toward rehabilitating the forest land under our control.

In all of these activities, as well as in other related work, greater results have been accomplished than in any other two year period.

## FIELD FORCE.

Probably one of the greatest problems now confronting this Division is the difficulty of securing efficient forest rangers and a start has been made in its solution. The needs of our field work call for men with sufficient education to make an intelligent report, with a sense of responsibility, self-reliance and initiative, who can be depended upon, with infrequent inspections, to devote themselves honestly to the work and act with efficiency and dispatch on the ground. With the appropriations available, this is largely a matter of selecting and training field personnel and of bringing out and utilizing the best men have in them under the driving power of responsibility. As a source of supply we must eventually turn toward our local university for the fundamental training of men for this position and through the efforts of this Division a start was made along this line during this past year in forestry education which it is hoped will be continued so that, as in the Philippines, we can train our own native sons for our own forest service.

In order to bring the ranger force up to the best possible standard of efficiency under existing conditions, it was found necessary to make a number of changes in personnel. On Oahu the services of two inefficient rangers were terminated and one new ranger appointed and on Hawaii two ranger positions were combined into one and transferred to a capable and energetic officer. This has resulted in reducing the ranger force to the most efficient men and it is felt that with the seven now on the active payroll, more is being accomplished than hitherto.

As each of these rangers manages on the average over 120,000 acres of forest reserve land, it can readily be seen that there is more than enough work for this limited field force. If adequate protection is to be given to our forest reserves, and no one can deny the necessity of this, it is essential that provision be made for the appointment of four more rangers, one for each of the main islands.

The greatest progress in field improvements have resulted solely from the personal efforts of efficient and intelligent field officers. In this respect Ranger L. W. Bryan and my assistant, C. J. Kraebel, have accomplished a surprisingly large amount of excellent results in the field on account of their untiring devotion and well directed energies and it is a pleasure here to acknowledge my appreciation of their services. Mr.

PLATE I.



Photo by Kraebel.

Upper Ahoa Falls on one of the numerous streams emanating from the Hilo Forest Reserve, Hawaii.



Kraebel, in particular, by his two and a half years' experience in the Hawaiian forests has become a very valuable officer whose ability should be recognized and whose services should be retained by a substantial increase in salary.

## FOREST PROTECTION.

### FOREST RESERVE CHANGES.

Two new forest reserves have been proclaimed and substantial additions made to several existing reserves while a few minor withdrawals of land have been made for administrative purposes.

On June 28, 1921, 5.44 acres were withdrawn from the Honolulu Watershed forest reserve on Oahu in order to return certain land to the jurisdiction of the Commissioner of Public Lands for building sites.

On March 20, 1922, a similar withdrawal of .07 acre was made from the same forest reserve.

A large amount of field work was consummated on January 3, 1923, when Governor Farrington signed proclamations for the following five projects:

The new Waimanalo Forest Reserve on Oahu, consisting of 3,349 acres of land in Kaneohe, Kailua and Waimanalo was set apart.

The new Waiakea Forest Reserve on Hawaii, consisting of 11,660 acres of land owned entirely by the government, surrounding the new Waiakea homesteads, but suitable only for forest purposes, was set apart.

A large section of government forest land at the mauka end of Waiakea was added to the Upper Waiakea Forest Reserve on Hawaii bringing the area of this reserve up to 62,862 acres.

The boundaries of the Hilo Forest Reserve on Hawaii were adjusted to take in more unoccupied government forest land and the total area enlarged to 111,750 acres.

From the Puukapele Forest Reserve, 485 acres and from the Na Pali-Kona Forest Reserve, 230 acres were withdrawn so as to make an enlargement of 715 acres in the Puukapele Park on Kauai to include the tunnel and pipe line and place more camping sites under the control of the County of Kauai.

These changes have increased the number of forest reserves to a total of 49 with a combined area of 841,015 acres, 68 per cent of which or 579,936 acres, is land belonging to the Territory.

## SUMMARY OF FOREST RESERVE AREAS.

Island	Number of Reserves	Private Acres	Government Acres	Total Acres	Per Cent
Kauai .....	8	66,574	79,381	145,955	17.3%
Oahu .....	16	35,824	35,453	71,277	8.5%
Molokai .....	1	31,406	13,268	44,674	5.3%
Maui .....	7	46,148	74,980	121,128	14.4%
Hawaii .....	17	81,127	376,854	457,981	54.5%
Totals.....	49	261,079	579,936	841,015	100.0%
Per Cent....		32%	68%	100%	

A list of forest reserves throughout the Territory showing the name and area of each, arranged by islands, is presented in Appendix No. 1 of this report.

## HILO FOREST RESERVE.

The biggest single piece of work accomplished during the period was a complete overhauling of the Hilo Forest Reserve on Hawaii. This had awaited a time when competent assistance was available and was started by my assistant and completed by Ranger Bryan. Climatic conditions made progress in field work on this reserve possible only during the dry months of the year. A preliminary examination of the lower or makai boundary which is approximately 35 miles long was made by Mr. Kraebel in the Fall of 1920, a definite location and resurvey of this boundary was made from May to December, 1921, and this was followed by the construction of fences on the new line wherever the forest was exposed to the attacks of stock. This required an endless amount of negotiations with the owners of adjacent lands who were induced to coöperate in the fencing.

The net result of this work which has taken the best part of two years has been to add 1,750 acres of forest land to the reserve, establish a definite dead-line boundary beyond which no trespass is to occur, erect fences on 9.08 miles of boundary with 2.60 miles still to be fenced to make the reserve absolutely protected, and plant 25,146 trees in open parts of the reserve.

This is a sample of what should be done with many reserves that are in need of attention but it is possible of accomplishment only when efficient field men are available. In this particular case the work was important because eleven sugar plantations producing one-fifth of the total sugar output of the Ter-



Photo by Kraebel.

Survey crew running the boundary of the Hilo Forest Reserve through the jungle at Paukaa, Hawaii.



ritory depend upon the water coming from this reserve for their operations.

LANDS TO BE ACQUIRED.

When privately-owned lands are included within a forest reserve as an integral management unit, the proclamation recommends that such private lands be protected and managed as reserve lands. In some cases, however, the owners have not felt disposed to comply with this recommendation and use the lands at times for grazing purposes with consequent detriment to the forest growth. Under such circumstances it is desirable for the government to acquire control of the land in order to give it the needed protection. The following is a list of lands which it is desirable for the Territory to acquire for the reason given above:

Oahu, Honolulu Watershed Forest Reserve	Acres
Portion of Kamaikai.....	260
Molokai, Molokai Forest Reserve	
Ilohi .....	166
Kahanui (L. C. A. 7,755).....	326
Naiwa .....	67
Kahanui (Gr. 3,437).....	1,048
Hawaii, Hilo Forest Reserve	
Waipunalei .....	1,704
Mauluanui .....	1,907
	<hr/>
Total area to be acquired.....	5,478 acres

FOREST FENCING.

The fencing of forest reserve boundaries in need of protection against stock has proceeded as rapidly as the field force could give it attention and a great advance has been made during the two years over all other periods.

During the biennium new fences have been constructed on 29.48 miles of forest boundary and 29.70 miles of existing fences have been repaired. This is 18.69 miles of new fences constructed and 24.43 miles of fences repaired more than during the previous two year period. Since 1910, when this activity of forest work began, the Division has caused the building of 80.53 miles of new fences and has repaired 52.82 miles of existing fences. Where the line to be fenced crosses government land only, the Division constructs the fence but where the adjacent land is privately owned the usual method is to secure the cooperation of the owner and share the cost. In some cases,

where the adjacent government land is leased a condition in the lease requires the lessee to do the fencing.

A preliminary estimate of the fencing required to be done in the near future amounts to approximately 10 miles.

A list of fencing projects completed and of repairs made to fences during the past period is presented in Appendix No. 2 of this report.

#### REMOVAL OF STOCK FROM RESERVES.

Reports from responsible permittees who have been allowed to hunt on government lands in forest reserves show that 471 wild pigs, 211 wild goats, and 46 wild cattle or a total of 728 wild animals have been exterminated on such lands during the past two years. These reports are by no means complete and it is safe to say that a great many more animals were killed but not reported.

Whenever tame cattle have gained access to forest reserves through broken fences or otherwise the owners have been notified and required to remove them at once. In some instances advantage has been taken of the new law (Act 222) passed by the last Legislature and agents of this Board have removed the cattle and required the owners to pay a fine of \$5.00 per head. A statement of the cattle removal laws is presented in Appendix No. 3, of this report.

#### GOAT CONTROL.

An investigation and special report was made and forwarded to the Governor during the past year on the wild goat menace throughout the Territory. The basis for this report, in addition to general observations, was the participation, in June, 1922, in a two day goat drive chiefly by boy scouts on the government leased lands of Puuanahulu and Puuwaawaa, Hawaii, which resulted in exterminating 7,000 wild goats. The conclusions reached in this report are that the unchecked wild goat population constitutes a real menace to forest and grazing interests in the Territory, especially on Hawaii and Maui, that the most feasible way to control this pest is to conduct extensive drives and to follow them up by extermination by expert hunters, that the land owners and Territory should coöperate in this work, and that \$20,000 should be appropriated as the government's share in this undertaking.

PLATE III.



Photo by Judd.

Kaala Peak, Oahu, from the Makaha side which, above 2800 feet, supports an undisturbed native forest.



## WATERSHED PROTECTION.

The present rules and regulations have been effective in governing the management of government lands in forest reserves and have required no amendments. Many arrests have been made in enforcing these rules, chiefly for the offense of cutting grass without permission.

One new rule was added to the list. This is Rule V, approved by the Governor on May 13, 1922 (See Appendix No. 4) which pertains to the protection of the forest growth and protection from contamination of the waters on the portion of the Honolulu watershed at the head of Palolo and Manoa Valleys. After full consideration of all conditions, it was felt that the struggling forest on this area would have a better chance for existence if all people were kept off the area and our view was supported by those who are intimately acquainted with the delicacy of the native forest. There was naturally some opposition to the promulgation of the rule by those who were accustomed to tramp through the area which was brought out in two public hearings, but it is gratifying to report that the rule has been accepted with good grace.

## FOREST FIRES.

During the period seventeen forest and grass fires which covered a total of 946 acres were reported. Most of these only burned over grassland and in only a few instances was damage done to forest growth. The cause of each fire was investigated and while it was extremely difficult to secure evidence, two arrests were made and two convictions secured.

Most of these fires were promptly extinguished by the efforts of the honorary District Fire Wardens appointed throughout the Territory who have rendered efficient services and to whom my thanks are gratefully extended. The roster of fire wardens has been kept up to full strength by frequent appointments to replace those who have died, resigned or moved away. A revised list of District Fire Wardens and of other officials follows as Appendix No. 5, of this report.

On account of special fire hazards, notices were published requiring permits to start fires in the following regions:

May 1 to December 31, 1921, East Hawaii, from Waipio Valley to Kau, Hawaii.

June 19, 1922, until further notice, Districts of Ewa and Waialua, Oahu.

July 11, 1922, until further notice, East Hawaii, from Waipio Valley to Kau, Hawaii.

## FOREST EXTENSION.

### TREE PLANTING ON FOREST RESERVES.

An impetus was given to tree planting on forest reserves on the four main islands during the past two years and not only were more trees planted but many new areas received attention. A total of 109,442 trees of 120 different species was planted in 1921 in 12 different places in 11 forest reserves and in 1922 in 29 different places in 15 forest reserves in addition to 13 different places in the Hilo Forest Reserve. This is 37,801 trees and 83 species more than were planted out during the previous two years. A list of trees planted in forest reserves during the period is contained in Appendix No. 6.

Koa has been the leading species used with a total of 23,649 trees set out. Tree planting at Mikilua in the dry section of the Waianae Range on Oahu has continued. Here, among other species, over 16,000 logwood trees have been planted and so far this tree has shown the best growth. In addition to being a ground cover, it is valuable for its dyewood and offers excellent pasturage for bees. The lemon-scented gum-tree has been planted ten feet apart along several of the forest reserve boundaries following fencing so that its white trunk will in time mark the line from afar. At an elevation of 6,000 feet in the land of Laupahoehoe within the Hilo Forest Reserve on Hawaii 2,000 Benquet pine trees (*Pinus insularis*) which were raised with the kind assistance of Mr. A. W. Carter were planted out in May, 1921. The boy scouts of Troop 4 have undertaken to reforest the grassy slopes near the summit of Tantalus and during the year have planted and cared for 213 koa trees which are doing well in this exposed situation.

An investigation and report by my assistant shows that the afforestation on the intermediate slopes of Haleakala and Mauna Kea with temperate zone conifers which was done by my predecessor ten years ago has been successful in so far that it proves these trees will grow there. The Coulter pine of California has made the best showing with a maximum height growth of 17 feet and a crop of cones. The white pine of the east and

PLATE IV.



A portion of the Honolulu Watershed Forest Reserve from Tantalus Drive.

Photo by Kraehel.



the incense cedar of the Pacific Coast also stand out among the most successful of all the trees experimented with. The rate of growth of these three and of others and their vigorous appearance in their inhospitable, windswept sites compare favorably with the growth of similar species in their native habitat on the mainland.

Among the promising new trees set out and distributed widely is the tesota bean or desert ironwood (*Olneya tesota*) of Arizona which is a valuable dry land tree and should supplement the local range of the algaroba. The yokewood tree of Jamaica (*Catalpa longissima*) develops early here and promises to be of value as a fence post tree. The evergreen tamarisk (*Tamarix articulata*) of the Sahara desert has been sent for and it is believed will prove to be a valuable windbreak tree for the dry regions where pineapples are planted because it is deep-rooted and fast growing.

Encouragement in the growing of the Queensland nut (*Macadamia ternifolia*) has been given in the form of an agreement with an interested party who has begun the planting of 20 acres with this tree on the Round Top Forest Reserve for the crops which will be borne. A total of 1,507 nut trees have been planted so far on this land and on other reserves.

#### CHAULMOOGRA OIL PLANTATION.

Of particular interest is the plantation of chaulmoogra oil producing trees which was established in the Waiahole Forest Reserve on Oahu with the idea that the Territory will in time produce its own chaulmoogra oil for the treatment of leprosy. The planting of the 2,980 trees began in December, 1921, and was completed in August, 1922. A spacing of 20 by 20 feet was used and the plantation covers approximately 27 acres. Where it was feasible, the ground was first prepared by plowing and harrowing and cultivation since planting has been kept up. A windbreak has been planted on the outside boundary and on exposed slopes koa trees have been interplanted to protect the oil trees. The trees usually fruit in about eight years from planting, the oil being pressed out of the large seeds.

The seed for these trees was secured by Mr. J. F. Rock, formerly employed by the Board. The bulk of the trees, numbering 2,050, consist of the Maikrabao (*Hydnocarpus anthelmintica*) from Siam. These are showing the best growth and some are now four feet high. The Kalaw tree (*Taraktogenos*

*Kurzii*) is represented by 850 trees grown from seed sent to us by Mr. Rock from the Upper Chindwin in Burma and 80 *Hydnocarpus castanea* trees from seed secured in the Martaban Hills in Lower Burma comprise the balance. The latter, however, are not doing so well. In addition to these 383 trees of the false chaulmoogra (*Gynocardia odorata*) from the Chittagong Hills have also been planted on the higher slopes.

#### TREE PROPAGATION AND DISTRIBUTION.

The four main tree nurseries of the Division at Kalaleo on Kauai, Honolulu on Oahu, Haiku on Maui, and Hilo on Hawaii have continued to operate during the period to supply the demands for trees for planting on forest reserves, homesteads, ranches, plantations and army posts throughout the Territory under the direction of the Forest Nurseryman, Mr. David Haughs. Both the Haiku and Hilo Nurseries have been improved by the installation of steam soil sterilizers and in other ways so as to facilitate the propagation of forest, shade and ornamental trees.

There were distributed from these four nurseries, as will be seen in the Forest Nurseryman's report, a total of 225,600 in 1921 and 197,951 trees in 1922, or a total of 423,551 trees during the two years.

#### TREE PLANTING THROUGHOUT THE TERRITORY.

As in previous years, an attempt has been made to ascertain the total number of trees planted throughout the Territory. Reports for the calendar year 1921, which are summarized in Appendix No. 7 of this report, while probably not complete, show that 383,460 trees were planted out. This is somewhat of a falling off from previous years, which may be accounted for by hard times, but it is expected that more than this number were planted out in 1922, the returns for which have not all come in and hence are not yet available.

#### ARBOR DAY.

Arbor Day, as in previous years, was celebrated on November 18, 1921, and on November 17, 1922, the dates designated by proclamation of the Governor, by appropriate exercises in the schools and by tree planting. As in past years, our nurseries provided trees for planting on these occasions and distributed 6,384 trees and 12,534 trees respectively for the two days or

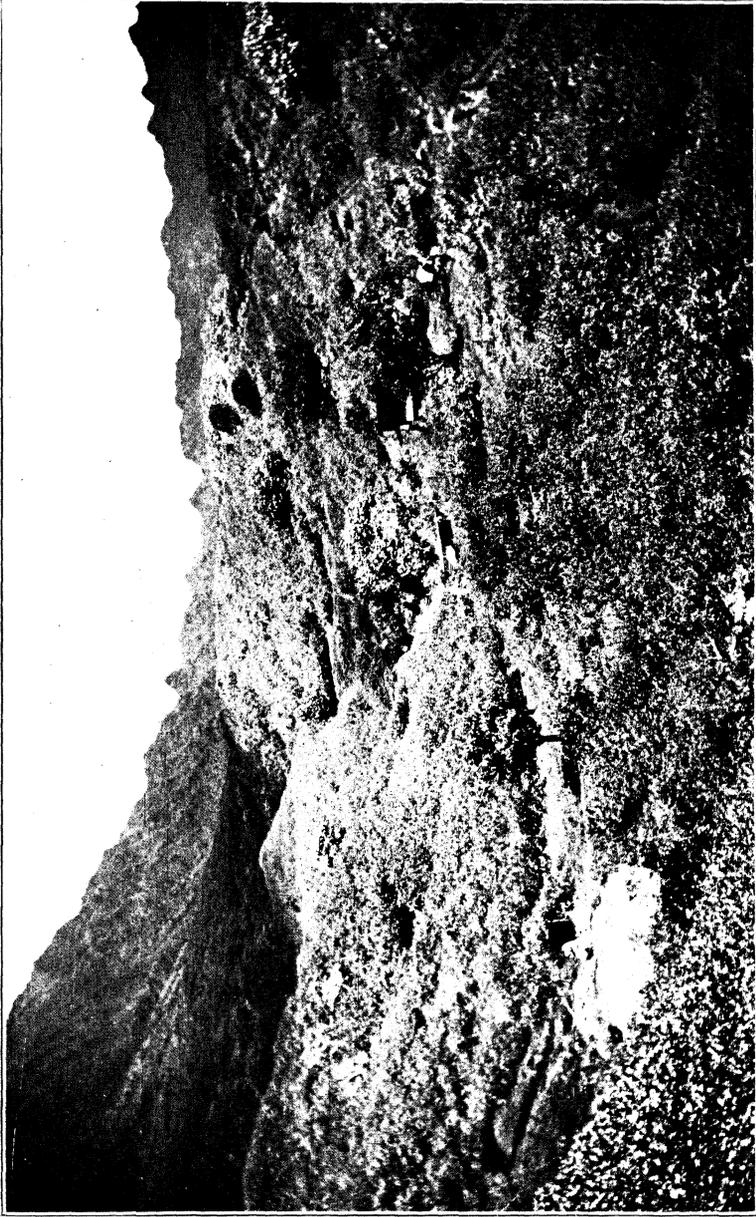


Photo by Kraebel.  
Kalihi Valley in the Honolulu Watershed Forest Reserve where water is being developed for the city supply and where reforestation work must soon be undertaken.



a total of 18,918 trees. On November 15, 1922, I talked to the pupils of Punahou Academy on the origin and purpose of Arbor Day and two days later assisted the children in getting better acquainted with the trees on the campus.

### OTHER ACTIVITIES.

In addition to the main lines of work falling under the general subjects of forest protection and extension, attention has been given, as time could be spared, to other activities.

#### COÖPERATION.

There has been close coöperation in forest work with the Hawaiian Sugar Planters' Association, particularly in planting work, by the frequent exchange of seedlings and seed and in the protection of lands in reserves, especially the Hilo Forest Reserve where, on account of the layout, both privately-owned and government lands must be treated as a unit.

We have also coöperated with the Land Office and private estates and corporations in the fencing of boundaries to protect forest reserve lands and with the U. S. Geological Survey and National Park Service by the interchange of maps and information.

#### FAIR EXHIBITS.

This Division was represented by a rather elaborate exhibit of forest subjects at the fourth annual county fair at Kahului, Maui, on October 13 to 15, 1921, but on account of the need for economy was able to send only a small collection of trees to the fifth county fair on October 12 to 14, 1922. Each exhibit, however, was awarded a special prize.

#### RECLAIMING GRASSLAND.

An experiment to determine whether areas covered with Hilo grass could be reclaimed by shading out the grass through the establishment of a stand of haole koa trees (*Leucaena glauca*) under various treatments was run for a year in Nuuanu Valley. It was found that seed sown in the grass gave no germinating results whatever. Seed sown on plowed land gave 12% germination at the end of six months but the rank growth of grass during the second half of the year reduced this to 4%. Seed sown on the burned and plowed land gave 14% germination which was

reduced to 6% at the end of the year. The conclusion is that little may be expected in shading out the grass by attempting to establish a stand of these trees by seed sowing no matter how the ground is prepared.

#### LECTURES AND TALKS.

On April 1, 1922, my assistant talked to the students at the University of Hawaii taking the short course in pineapple culture and on April 8, 1922, to the horticulture class. On October 19, 1922, I talked to those enrolled in the short course for sugar plantation men on the necessity for forest protection in the islands.

#### INSTRUCTION IN FORESTRY.

In the effort to get some instruction in forestry started at the University of Hawaii so that eventually our own native sons may be trained for forest work in our islands and at the request of the President of this Board and of the University, my assistant and I gave a course of instruction in forestry to fourteen members of the junior and senior classes of the University during the first semester from September 13, 1922, to January 17, 1923, which consisted of two lectures and one field period weekly and embraced the subjects of the history of forestry, forest protection, forest mapping, dendrology, forest planting, silvics and forest mensuration. The field work embraced actual nursery work and tree planting, the height, diameter, and volume measurements of trees, the mapping of woodlands by plane table and traverse board, and the identification in the field of native and introduced trees.

The work was undertaken in addition to our regular official duties and necessitated the devotion of much of our personal time in lecture preparation. The services were cheerfully rendered however, in the hope that the foundations have been laid for regular forestry instruction at the University and will be continued next year by a regularly employed instructor.

#### PUBLICATIONS.

The following pamphlets and articles, in addition to the monthly and annual reports which have appeared in the official magazine of the Board, "The Hawaiian Forester and Agriculturist," have been published by the Division of Forestry during the past two years:



Photo by Kraebel.

Concrete flume on Oahu showing expensive construction justified by the high value of water from a private forest reserve.



- “Thinning Algaroba Forests,” by C. S. Judd, February, 1921.
- “Report of the Division of Forestry for the Biennial Period Ended December 31, 1921.” March, 1921.
- “Reclaiming Grassland,” by C. S. Judd, March and September, 1921.
- “Hawaiian Forests and Trails,” by C. S. Judd, April, 1921.
- “The Alahee Tree,” by C. S. Judd, June, 1921.
- “Working Plan for Mammalua Forest Reserve,” by C. S. Judd, July, 1921.
- “The Hilo Forest Reserve,” by C. S. Judd, August, 1921.
- “Alagaroba Wood,” by C. S. Judd, October, 1921.
- “Bird Introductions,” by C. S. Judd, November, 1921.
- “The Fourth Maui County Fair,” by C. S. Judd, November, 1921.
- “Kilauea National Park Trees,” by C. S. Judd, December, 1921.
- “Forestry in the Hawaiian Islands,” by C. S. Judd, December, 1921.
- “Mauna Kea Plant List,” by C. J. Kraebel, January, 1922.
- “Chaulmoogra Oil Plantation,” by C. S. Judd, March, 1922.
- “Italian Cypress Seed Study,” by C. J. Kraebel, April, 1922.
- “Reclaiming Grassland” (Second Progress Report), by C. S. Judd, April, 1922.
- “Rule V—Division of Forestry,” May, 1922.
- “Report on Experimental Forest Planting at High Altitudes of Maui and Hawaii,” by C. J. Kraebel, July, 1922.
- “Lands to be Acquired on Molokai Forest Reserve,” by C. S. Judd, August, 1922.
- “The Tesota Bean Tree—A new Tree Introduction,” by C. S. Judd, October, 1922.
- “Goat Control in Hawaii,” by C. S. Judd, November, 1922.
- “The Hilo Forest Reserve,” by C. S. Judd, November, 1922.
- “The Primitive Hawaiian and His Forest,” by C. S. Judd, December, 1922.
- “Kipuka Puaulu, the Bird Forest of Hawaii National Park,” by C. J. Kraebel, December, 1922.

## SUMMARY.

The progress in forest work that it is a pleasure to report as having been made during the past two years is due mainly

to the personal efforts of efficient field men and the accomplishment of the large amount of field work along the lines of forest protection and forest extension that awaits attention must necessarily depend upon the continuance and enlargement of this working field force. Whatever assistance you may be able to render in obtaining this will be very much appreciated.

Respectfully submitted,

C. S. JUDD,  
Superintendent of Forestry and Chief Fire Warden.

PLATE VII.



Photo by Krachel.

White pine (*Pinus strobus*) at 6,500 feet on Haleakala,  
Maui, eleven years old.



## LIST OF FOREST RESERVES, TERRITORY OF HAWAII.

January 6, 1923.

Name of Reserve	No.	Private Land Acres	Government Land Acres	Total Area Acres	Date of Proclamation
<b>KAUAI.</b>					
Halelea .....	5	26,510	10,990	37,500	Aug. 24, 1914
Kealia .....	6	2,470	6,580	9,050	Mar. 9, 1906
Na Pali-Kona .....	13	19,890	40,420	60,310	June 12, 1907
Lihue-Koloa .....	19	15,661	12,941	28,602	June 5, 1909
Moloaa .....	20	2,043	3,578	5,621	June 5, 1909
Papahāhāhola .....	41	.....	54	54	June 19, 1918
Nonou .....	44	.....	818	818	Dec. 31, 1918
Puukapele .....	45	.....	4,000	4,000	Dec. 31, 1918
		<hr/>	<hr/>	<hr/>	
		66,574	79,381	145,955	
<b>OAHU</b>					
Kaipapau .....	1	.....	913	913	Nov. 10, 1904
Ewa .....	7	23,399	5,151	28,550	Mar. 9, 1906
Waianae-kai .....	10	107	3,546	3,653	Sept. 7, 1906
Luahualei .....	11	.....	3,743	3,743	Nov. 30, 1906
Pupukea .....	21	.....	864	864	May 10, 1910
Nanakuli .....	28	.....	1,010	1,010	June 4, 1913
Makua-Keaau .....	29	340	4,480	4,820	June 4, 1913
Kuaokala .....	30	.....	431	431	June 4, 1913
Honohulu Watershed .....	34	1,952	4,993	6,945	Oct. 13, 1913
Kū'ouou .....	35	.....	214	214	Feb. 13, 1913
Manoa Ranger Station .....	38	.....	15	15	May 9, 1916
Round Top .....	39	.....	115	115	Aug. 10, 1916
Waiahole .....	42	40	1,129	1,169	June 19, 1918
Mokuleia .....	46	.....	6,290	6,290	Dec. 31, 1918
Haunā .....	47	8,050	1,143	9,193	Dec. 31, 1918
Waiamanalo .....	49	1,936	1,413	3,349	Jan. 3, 1923
		<hr/>	<hr/>	<hr/>	
		35,824	35,453	71,277	



## APPENDIX NO. 2.

## FENCES CONSTRUCTED, 1921-1922.

Completed	Island	Reserve	Location	Length Miles
Feb., 1921	Oahu	Hon. Watershed	Palolo	.09
Mar., 1921	Hawaii	Honuaula	Honuaula	1.60
June, 1921	Hawaii	Olaa Forest Park	Sec. C.	2.52
June, 1921	Maui	Koolau	Nahiku	1.96
July, 1921	Maui	Kula	Waiohuli	.71
July, 1921	Kauai	Lihue-Koloa	Kalaheo	.33
Sept., 1921	Hawaii	Olaa Forest Park	Sec. C.	.56
Oct., 1921	Oahu	Waiahole	Waiahole	.89
Oct., 1921	Hawaii	Olaa	Olaa 24 Miles	.82
Nov., 1921	Hawaii	Hilo	Laupahoehoe	1.79
Dec., 1921	Hawaii	Hilo	Honohina	.73
Feb., 1922	Hawaii	Hilo	Kaiwiki 2	.36
Mar., 1922	Hawaii	Olaa Forest Park	Sec. A.	.01
Apr., 1922	Hawaii	Hilo	Opea-Peleau	.48
May, 1922	Oahu	Kuliouou	Kuliouou	.07
June, 1922	Oahu	Hon. Watershed	Palolo-Nuuanu	.07
June, 1922	Hawaii	Hilo	Kaiwiki 3	.43
June, 1922	Hawaii	Hilo	Kahoahuna	.22
June, 1922	Hawaii	Olaa Forest Park	Sec. C.	.23
July, 1922	Hawaii	Hilo	Kaupakuea	.12
July, 1922	Hawaii	Hilo	Punahoa 2	.98
July, 1922	Hawaii	Mauna Kea	Mauna Kea	2.88
Aug., 1922	Hawaii	Olaa	Olaa 22 Miles	1.11
Sept., 1922	Hawaii	Hilo	Piha	.77
Sept., 1922	Hawaii	Kau	Waiohinu	.67
Oct., 1922	Hawaii	Hilo	Kaiwiki 2	.20
Oct., 1922	Hawaii	Hilo	Kaiwiki 2	.14
Oct., 1922	Hawaii	Hilo	Honomu	.14
Oct., 1922	Hawaii	Hilo	Humuula	.25
Oct., 1922	Hawaii	Olaa	Olaa 24 Miles	1.13
Nov., 1922	Hawaii	Kau	Kaunamano	.87
Dec., 1922	Kauai	Puukapele	Puukapele	1.00
Dec., 1922	Hawaii	Olaa	Olaa 23 Miles	.28
Dec., 1922	Maui	Kula	Polipoli	2.60
Dec., 1922	Hawaii	Hilo	Laupahoehoe	.18
Dec., 1922	Hawaii	Hilo	Laupahoehoe	.32
Dec., 1922	Hawaii	Hilo	Waikaumalo	1.40
Dec., 1922	Hawaii	Hilo	Piihonua	.57
Total				29.48

## FENCES REPAIRED, 1921-1922.

Completed	Island	Reserve	Location	Length Miles
Jan., 1921	Oahu	Waianae-kai	Waianae	.94
Jan., 1921	Oahu	Kuliouou	Kuliouou	.06
Mar., 1921	Oahu	Hauula	Hauula	.28
May, 1921	Oahu	Lualualei	Lualualei	1.24
June, 1921	Maui	Koolau	Nahiku	.59
July, 1921	Oahu	Makua-Keeau	Keeau	.17
Oct., 1921	Hawaii	Olaa Forest Park	Sec. A.	7.24
Nov., 1921	Hawaii	Olaa Forest Park	Sec. C.	5.44

Dec., 1921...Kauai...Kealia and Moloaa...Kealia and Moloaa...	1.02
June, 1922...Oahu...Kuliouou.....Kuliouou .....	.46
Sept., 1922...Hawaii...Kau.....Waikooloa .....	.47
Sept., 1922...Hawaii...Kau.....Paumakao .....	.80
Sept., 1922...Oahu...Lualualei.....Lualualei .....	1.86
Oct., 1922...Hawaii...Olaa Forest Park...Sec. A. ....	4.11
Nov., 1922...Hawaii...Olaa Forest Park...Sec. C. ....	1.98
Dec., 1922...Kauai...Kealia and Moloaa...Kealia and Moloaa...	3.04
Total.....	29.70

### APPENDIX NO. 3.

#### LAWS RELATING TO THE REMOVAL OF LIVE STOCK FROM FOREST RESERVES.

(Sec. 481, R. L. H. 1915). It shall be the duty of the Board:

9. FENCING AND EXCLUSION OF STOCK. To secure as speedily as possible, either by private cooperation or by public appropriation, the erection and maintenance of fences to exclude live stock from forest reservations, and the removal from such reservations of the live stock running thereon, including the killing the same if necessary.

(Act 65, S. L. 1919). BRANDED WILD CATTLE. When branded wild cattle are found on any such forest land in the Territory, which land is fenced and duly set apart and established as a forest reservation, the owner or lessee of such land, if such land be privately owned, and the agents of the board of agriculture and forestry, in all cases where the land is so set apart and established as a forest reservation, whether from privately owned lands or public lands, may remove, shoot, or destroy such cattle without compensation to the owner, after sixty days' public notice, ten insertions, of such intended action has been given by publication in a newspaper of general circulation in the county or city and county where such cattle are found.

(Act 222, S. L. 1921). 9A. REMOVING AND HOLDING OF CATTLE. The agents of the board may at any time without notice to the owner or owners remove any and all cattle found on any such forest reserve and may hold and care for all such cattle in some convenient place at the expense of the owner or owners, subject to the lien for charges and expenses herein provided for. The owner or owners of such cattle shall pay to the board the sum of five dollars per head for each animal so removed from such forest reserve, together with the pro rata proportion of the expenses incurred in so removing and caring for them, which amounts shall be and constitute a lien on such cattle until the said charges and costs are paid. After such cattle have been removed and held as aforesaid the owner or owners shall be personally notified of this fact, if the owners be known, and shall be notified of the total amount of the charges and expenses to be paid for the release of such cattle. The board shall also in all cases, where the owner is unknown or cannot be found, cause a statement and notice to be published in a newspaper of general circulation published in the county or city and county in which such cattle are held, which statement shall set forth the general description and the brand or brands of all such cattle so removed and held, as aforesaid, and shall notify the owner or owners and the public generally that unless the charges and costs to be specified in said notice shall have been paid on or before the date

therein specified, which date shall not be less than two weeks from the date of the last publication of such notice, the cattle therein described will be sold at public auction for cash to the highest bidder for the purpose of satisfying the lien on the same for the costs and charges in said notice set forth. Said notice shall be published once a week for four consecutive weeks (five insertions). If the said charges and costs, together with such additional expenses that may have been incurred since the first publication of said notice, be not paid before the date stated in said notice, said cattle shall on that date be sold, as aforesaid, and all charges and other expenses shall be satisfied out of the proceeds of such sale and the balance paid to the owner or owners of such cattle. If no claim be made for any such balance within sixty days after the date of sale, the same shall be deposited in the treasury as a governmental realization and all private rights therein and thereto shall be thereafter forever barred.

9B. NOTICE AND REMOVAL OF CATTLE. Any person, firm or corporation who or which shall receive actual notice from the board of commissioners of agriculture and forestry, or its agent or agents, that one or more cattle belonging to such person, firm or corporation have been found to be and are running on any forest reserve as defined in Subsection 9 hereof, excepting in the case of the owner of the land, and who or which shall fail or neglect within ten days after the receipt of such notice to remove such cattle from any such forest, or to shoot or destroy, the same, shall be deemed guilty of a misdemeanor and punished by a fine of ten dollars for each animal belonging to such person, firm or corporation thereafter found on any such forest reservation and proven to have been running thereon at the time of the service of such notice. If any such cattle as to which notice has been served on the owner or owners, as aforesaid, shall, after the expiration of the said ten days' notice, be not removed and shall be found running on any such forest reserve, the said board of commissioners of agriculture and forestry, or its agent, may remove, shoot or destroy the same without compensation to the owner. All cattle found running on any such forest reserve shall be deemed prima facie to be the property of the person, firm or corporation whose brand if any it bears.

9C. FINES AND CHARGES IN SPECIAL FUND. All fines, costs and other charges imposed and/or collected pursuant to this section shall be deposited in the treasury of the territory for the use of said board for forestry purposes and all such sums as may be so collected and deposited are hereby appropriated for those purposes.

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#### APPENDIX NO. 4.

#### TERRITORY OF HAWAII.

#### BOARD OF COMMISSIONERS OF AGRICULTURE AND FORESTRY.

#### RULE V. DIVISION OF FORESTRY.

The Board of Commissioners of Agriculture and Forestry hereby makes the following rule and regulation for the purpose of protecting the forest growth and protecting from contamination the waters on the Palolo-Manoa Drainage Reservation, within the Honolulu Watershed Forest Reserve. Oahu:

Section 1. All persons are hereby prohibited from allowing any stock to enter or graze and all persons are hereby prohibited from

entering or going upon that portion of the Honolulu Watershed Forest Reserve known as the "Palolo-Manoa Drainage Reservation," hereinafter described; Provided, however, that this prohibition shall not apply to any duly appointed forest rangers and other persons employed by the Territory of Hawaii, by the City and County of Honolulu, and by the United States while in the discharge of their official duties.

#### Palolo-Manoa Drainage Reservation.

Beginning at the South corner of this piece, the East corner of Lot 12, Palolo Homesteads, and on top of ridge between Waiomao and Waialae Nui, the coördinates of said point of beginning referred to Government Survey Trig. Station "Rocky Hollow" on the ridge between Waiomao and Kekio being 685.5 feet South and 2482.2 feet East as shown on Government Survey Registered Map No. 2554, and running by true azimuths:

1. 130° 00' 791.0 feet along Lot 12, Palolo Homesteads to South corner of Lot 13;
2. Thence along and around Lot 13, Palolo Homesteads by the following azimuths and distances:
  - (a) 218° 20' 128.0 feet to a rocky point on side of pali;
  - (b) 156° 21' 999.0 feet to XIII marked on a large rock on edge of stream;
  - (c) Thence up along middle of stream to + on rock in stream, the direct azimuth and distance being: 168° 05' 440.0 feet;
  - (d) 121° 10' 368.0 feet to top of ridge between Waiomao and Kekio;
3. Thence up middle of ridge along Kekio on the following direct azimuths and distances:
  - a) 214° 40' 1690.0 feet to "Kaheka";
  - (b) 211° 42' 1217.0 feet to the South corner of land owned by the Government
4. 151° 40' 4100.0 feet across valley along remaining portions of Kekio and Koea to a point on the ridge between Palolo and Manoa Valleys
5. Thence 960 feet more or less down middle of ridge along Kekio to the East corner of Grant 152, to Punahou School, at a place called "Keanapoe"
6. Thence 2000 feet more or less down "Keanapoe" ridge along Grant 152 to Southeast corner of Grant 3619, to Helen Boyd;
7. 192° 15' 850.0 feet across mouth of Waiakeakua Valley and along Grant 3619
8. 208° 30' 1010.0 feet up along ridge along Grant 3619;
9. Thence 1000 feet more or less up along ridge along Grant 116 to E. H. Rodgers;
10. Thence 1600 feet more or less across Naniuapo Valley along Grant 116, L. C. A. 11029 to I. Stevenson, and Grant 154 to E. H. Rodgers, to the top of Luaalaea ridge;
11. Thence 625 feet more or less down along Luaalaea ridge;
12. Thence 550 feet more or less down slope along government land of Luaalaea to Luaalaea Falls;
13. Thence 1100 feet more or less across government lands of Luaalaea and Waihi-iki to Waihi-iki Falls;
14. Thence 1000 feet more or less across government lands of Waihi-iki and Waihi to Waihi-nui Falls;
15. Thence due West up slope to top of ridge on the Eastern boundary of Land Court Petition No. 338 (Geo. R. Carter, Petitioner);

16. Thence up along middle of ridge along Land Court Petition No. 338 to Government Survey Trig. Station "Kaumuhonu" on the ridge between Manoa and Nuuanu Valleys;
17. Thence up along middle of said ridge along Luakaha to its junction with the main Koolau Range, at a peak called "Konahuanui."
18. Thence along the watershed of the Koolau Range across the head of Manoa Valley to the junction of Manoa and Palolo Valleys at a peak called Mt. Olympus;
19. Thence along same across the head of Palolo Valley to the ridge bounding Palolo and Waialae Valleys;
20. Thence down the middle of said ridge along Waialae-nui to the point of beginning.

AREA 1,480 ACRES, MORE OR LESS.

Section 2. Any person violating the above rule shall be guilty of a misdemeanor and upon conviction thereof shall be punished by a fine not to exceed five hundred dollars (\$500.00), as provided by Section 529, Revised Laws of Hawaii of 1915.

Section 3. This rule shall take effect upon its approval by the Governor.

Adopted on December 6, 1921, by the Board of Commissioners of Agriculture and Forestry.

A. L. C. ATKINSON,  
President.

Approved this 13th day of May, 1922.  
Honolulu, T. H.

W. R. FARRINGTON,  
Governor of Hawaii.

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APPENDIX NO. 5.

LIST OF FIRE WARDENS. TERRITORY OF HAWAII.

**CHIEF FIRE WARDEN.**

C. S. JUDD, Superintendent of Forestry, ex-officio.

**DEPUTY FIRE WARDENS AT LARGE.**

DAVID HAUGHS, in and for the Territory of Hawaii.

C. J. KRAEBEL, in and for the Territory of Hawaii.

**DISTRICT FIRE WARDENS.**

**KAUAI**

A. MENEFOGLIO, in and for Wainiha Valley, District of Halelea.

W. F. SANBORN, in and for the District of Halelea, excepting Wainiha Valley.

L. D. LARSEN, in and for the District of Koolau, excepting the land of Anahola.

E. M. CHEATHAM, in and for that portion of the District of Koolau and Puna extending from the land of Anahola to the land of Olohena, inclusive.

H. D. SLOGGETT, in and for that portion of the District of Puna south of and including the land of Wailua.

F. A. ALEXANDER, in and for that portion of the District of Kona extending from Hanapepe Valley to the Puna District Line.

- B. D. BALDWIN, in and for that portion of the District of Kona lying between and including the Waimea, Poomau, and Kauaikinana Valleys on the west and Hanapepe Valley on the east.
- E. A. KNUDSEN, in and for the District of Na Pali and that portion of the District of Kona lying to the west of Waimea, Poomau, and Kauaikinana Valleys.

#### OAHU.

- KARSTEN THOT, in and for that portion of the District of Koolauloa from the Waialua District line to and including land of Kaunala.
- ANDREW ADAMS, in and for that portion of the District of Koolauloa lying to the north and east of the land of Kaunala.
- FRANK VAUGHAN, in and for that portion of the District of Koolau-poko extending from the Koolauloa District line to the land of Heeia.
- FRANK ANDRADE, in and for that portion of the District of Koolau-poko extending from and including the land of Heeia to the land of Kailua.
- JOHN HERD, in and for that portion of the District of Koolaupoko extending from and including the land of Kailua to Makapuu Point.
- CHARLES LUCAS, in and for that portion of the District of Kona extending from Makapuu Point to Palolo Valley.
- JACK NAIWI, in and for Palolo Valley, District of Kona.
- C. M. COOKE, in and for Manoa Valley, District of Kona.
- J. A. WILDER, in and for Tantalus, District of Kona.
- L. A. MOORE, in and for Nuuanu Valley, District of Honolulu.
- H. BLOMFIELD BROWN.
- S. TANIGAW, ASSISTANT, in and for that portion of the District of Ewa lying to the west of Kamehameha Highway.
- JAMES GIBB, in and for that portion of the District of Ewa lying between the lands of Moanalua and Waiawa.
- H. BLOMFIELD BROWN.
- LEONG CHONG, ASSISTANT, in and for that portion of the District of Ewa lying to the east of Kamehameha Highway between the land of Waipio and Kaukonahua Gulch.
- A. A. WILSON, in and for that portion of the District of Waialua lying between Kaukonahua and Helemano Gulches.
- G. M. ROBERTSON, in and for that portion of the District of Waialua lying between Helemano and Opaepala Gulches.
- GEORGE WILSON, in and for that portion of the District of Waialua lying between Opaepala Gulch and the Koolauloa District line.
- ERNEST BRECHT, in and for that portion of the District of Waianae lying to the west of the Waianae Mts.

#### MOLOKAI.

- JAMES MUNRO, in and for that portion of the Island of Molokai lying to the west of Wailau Valley and the land of Mapulehu.

- E. K. DUVAUCHELLE, in and for that portion of the Island of Molokai, including and lying to the east of Wailau Valley and the land of Mapulehu.  
 L. THORNTON LYMAN, in and for central Molokai.

#### LANAI.

- G. C. MUNRO, in and for the Island of Lanai.

#### MAUI.

- C. E. S. BURNS, in and for the District of Lahaina.  
 D. T. FLEMING, in and for the District of Kaanapali.  
 J. A. GIBB, in and for the District of Wailuku.  
 F. F. BALDWIN, in and for the District of Hamakuapoko and the west half of the District of Hamakualoa.  
 W. F. POGUE, in and for the east half of the District of Hamakualoa and that portion of the District of Koolau lying to the west of Makapipi Gulch.  
 MARION CABRAL, in and for that portion of the District of Koolau lying to the east of Makapipi Gulch.  
 GEORGE GIBB, in and for the District of Hana.  
 JOHN FASSOTH, in and for the District of Kipahulu.  
 ROBERT VON TEMPSKY, in and for the District of Kula and Kaupo.

#### HAWAII.

- G. C. WATT, in and for that portion of the north half of the District of Kohala extending from the land of Kaauhuhu to the Hamakua District line.  
 S. P. WOODS, in and for that portion of North Kohala extending from the northern boundary of the land of Kawaihae I. to and including Kaauhuhu.  
 A. W. CARTER, in and for the District of South Kohala.  
 W. P. NAQUIN, in and for the western part of the District of Hamakua extending to the west from the boundary of the land of Paauhau to the boundary of the land of Kukaiau.  
 D. S. MACALISTER, in and for that portion of the District of Hamakua extending from and including the land of Kukaiau to the Hilo District line.  
 JOHN M. ROSS.  
 JOE J. IGNACIO, ASSISTANT, in and for that portion of the District of Hilo extending from the Hamakua District to the land of Makahanaloa.  
 JOHN T. MOIR, in and for that portion of the District of Hilo extending from and including the land of Makahanaloa to the land of Kikala.  
 JAMES HENDERSON, in and for that portion of the District of Hilo extending from the Puna District line to and including the land of Kikala.  
 A. J. WATT, in and for the District of Puna.  
 JAMES CAMPSIE, in and for that portion of the District of Kau extending from the Puna District line to and including the land of Punaluu.  
 WM. CAMPSIE, in and for that portion of the District of Kau extending from the land of Punaluu to the Kona District line.

- R. A. McWAYNE, in and for that portion of the District of Kona extending from the Kau District line to and including the land of Kaapuna.
- T. C. WHITE, in and for that portion of the District of Kona extending from the land of Kaapuna to and including the land of Hookena.
- A. C. DOWSETT, in and for that portion of the District of Kona extending from the land of Hookena to and including the land of Kaawaloa.
- T. C. WHITE, in and for that portion of the District of Kona extending from the land of Kaawaloa to and including the land of Kahaluu.
- A. J. STILLMAN, in and for that portion of the District of Kona extending from the land of Kahaluu to the Kohala District line.

### FOREST RANGERS.

#### Kauai.

HOSEA K. LOVELL, for Kauai.

#### Oahu.

V. L. ELLIS, Forest Ranger at Large.  
ALFRED ROCHA, Windward Oahu.

#### Hawaii.

A. J. W. MACKENZIE, for Olaa.  
CHARLES E. STONE, for South Kona and Kau.  
ANTONE P. AGUIAR, for the Panaewa Reserve.  
L. W. BRYAN, Hilo and Kohala Mt. Reserve.

### HONORARY FOREST RANGERS.

J. P. PICO, for the Waianae-kai Reserve, Oahu.  
B. CARTWRIGHT, for the enforcement of Rule IV, on Oahu.

### NURSERY AGENTS.

JOE RITA, JR., Kalaheo, Kauai.  
JAMES LINDSAY, Haiku, Maui.  
BRO. M. NEWELL, Hilo, Hawaii.

### DISTRICT FORESTERS.

#### Kauai.

L. D. Larsen, E. Broadbent, W. D. McBryde, E. A. Knudsen. B. D. Baldwin.

#### Oahu.

Andrew Adams, L. L. McCandless, John Herd, W. W. Goodale, J. A. Wilder.

#### Molokai.

James Munro, E. K. Duvauchelle, L. Thornton Lyman.

## Lanai.

G. C. Munro.

## Maui.

F. F. Baldwin, W. F. Pogue, J. H. Raymond, D. T. Fleming.

## Hawaii.

G. C. Watt, A. W. Carter, W. P. Naquin, J. M. Ross and, James Campsie.

## APPENDIX NO. 6

## TREES PLANTED IN FOREST RESERVES IN 1921 AND 1922.

Koa ( <i>Acacia koa</i> ).....	23,649
Logwood ( <i>Haematoxylum campechianum</i> ).....	16,591
Port Jackson fig ( <i>Ficus rubiginosa</i> ).....	9,992
Ironbark ( <i>Eucalyptus crebra</i> ).....	7,001
Red gum ( <i>Eucalyptus rostrata</i> ).....	6,845
Lemon gum ( <i>Eucalyptus citriodora</i> ).....	5,197
Ironwood ( <i>Casuarina equisetifolia</i> ).....	4,254
Swamp mahogany ( <i>Eucalyptus robusta</i> ).....	3,906
Moreton Bay fig ( <i>Ficus macrophylla</i> ).....	3,106
Silk oak ( <i>Grevillea robusta</i> ).....	2,604
Miscellaneous species (120).....	2,570
Australian red cedar ( <i>Cedrela australis</i> ).....	2,485
Benguet pine ( <i>Pinus insularis</i> ).....	2,313
Chaulmoogra ( <i>Hydnocarpus anthelmintica</i> ).....	2,050
Rough-leaved fig ( <i>Ficus nota</i> ).....	2,050
Queensland nut ( <i>Macadamia ternifolia</i> ).....	1,507
Flame tree ( <i>Brachychiton acerifolium</i> ).....	1,280
Cook pine ( <i>Araucaria Cookii</i> ).....	1,204
Blackbutt ( <i>Eucalyptus pilularis</i> ).....	1,185
Elm-leaved fig ( <i>Ficus ulmifolia</i> ).....	1,100
Japanese cedar ( <i>Cryptomeria Japonica</i> ).....	1,093
Chaulmoogra ( <i>Taraktogenos Kurzii</i> ).....	885
Kamani-leaved fig ( <i>Ficus calophylloides</i> ).....	850
Cedar fig ( <i>Ficus hennecana</i> ).....	850
Mahogany ( <i>Swietenia mahogani</i> ).....	681
Eugenia fig ( <i>Ficus eugenioides</i> ).....	600
Camar fig ( <i>Ficus camarinensis</i> ).....	600
Forsten fig ( <i>Ficus forstenii</i> ).....	500
False chaulmoogra ( <i>Gynocardia odorata</i> ).....	383
Ti ( <i>Cordyline terminalis</i> ).....	310
Soap-berry ( <i>Sapindus saponaria</i> ).....	300
Weeping fig ( <i>Ficus haematoarpa</i> ).....	200
Red mahogany ( <i>Eucalyptus resinifera</i> ).....	192
Juniper ( <i>Juniperus Bermudiana</i> ).....	189
Jamaica yokewood ( <i>Catalpa longissima</i> ).....	150
Kauri pine ( <i>Agathis robusta</i> ).....	146
African tulip ( <i>Spathodea campanulata</i> ).....	128
Chaulmoogra ( <i>Hydnocarpus castanea</i> ).....	114
Arizona cypress ( <i>Cupressus arizonica</i> ).....	100
Allspice ( <i>Pimenta officinalis</i> ).....	87
Lime ( <i>Citrus medica acida</i> ).....	52

Chir pine ( <i>Pinus longifolia</i> ).....	39
Uhiuhi ( <i>Mezouneurum Kauaicense</i> ).....	35
Juniper ( <i>Juniperus australis</i> ).....	29
Black myrobalan ( <i>Terminalia Chebula</i> ).....	25
Tesota bean ( <i>Olneya tesota</i> ).....	15
Total.....	109,442

## APPENDIX NO. 7.

## TREES PLANTED IN THE TERRITORY OF HAWAII IN 1921.

<b>Kauai:</b>	
Gay and Robinson .....	10,290
Hawaiian Sugar Co.....	2,000
Dora R. Isenberg.....	31
Kilauea Sugar Plantation Co.....	24,958
Knudsen Bros. ....	250
Lihue Plantation Co.....	3,000
Makee Sugar Co.....	1,955
McBryde Sugar Co. ....	3,568
Territory of Hawaii.....	4,003
Total.....	50,055
<b>Oahu:</b>	
California Packing Corporation.....	455
Ewa Plantation Co.....	332
Hawaiian Pineapple Co.....	5,000
H. S. P. A. Experiment Station.....	14,543
Laie Plantation .....	9
Oahu Sugar Co.....	8,013
Radio Corporation .....	100
Territory of Hawaii .....	36,627
U. S. Army .....	16,400
Waialua Agricultural Co.....	100
	81,579
<b>Molokai:</b>	
American Sugar Co.....	550
<b>Lanai:</b>	
Lanai Co., Ltd.....	3,000
<b>Kahoolawe:</b>	
Kahoolawe Ranch .....	3,800
<b>Maui:</b>	
East Maui Irrigation Co.....	500
Haleakala Ranch .....	8,043
Hawaiian Commercial and Sugar Co.....	675
Honolua Ranch .....	6,300
Kaeleku Sugar Co.....	500
Maui Agricultural Co.....	91,144
Pioneer Mill Co.....	1,000
Pogue, W. F.....	350
Territory of Hawaii.....	14
Wailuku Sugar Co. ....	32,268
	140,794

**Hawaii:**

Hakalau Plantation Co.....	3,710
Halawa Plantation .....	200
Hamakua Mill Co.....	19,450
Hawaiian Agricultural Co.....	33,343
Hawaii Consolidated Railway.....	500
Hawi Mill and Plantation Co.....	4,500
Honokaa Sugar Co.....	3,700
Hilo Sugar Co.....	447
Kaiwiki Sugar Co.....	4,700
Laupahoehoe Sugar Co.....	6,562
Pacific Sugar Mill.....	3,450
Parker Ranch .....	9,408
Puu Oo Ranch .....	1,200
Territory of Hawaii.....	3,617
Union Mill Co.....	8,895
	<hr/>
	103,682
Total for all Islands.....	383,460

## REPORT OF THE FOREST NURSERYMAN

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Honolulu, Hawaii, December 31, 1922.

Superintendent of Forestry,  
Honolulu, Hawaii.

Dear Sir: I respectfully submit the following report for the calendar years 1921 and 1922:

### COLLECTION AND EXCHANGE OF SEED.

The collecting and exchange of seed has been continued and a great many orders from botanic gardens and other institutions have been filled. We have also received some valuable exchanges, notably, seed of the Talipot palm (*Corypha umbraculifera*) from the Director of the Botanic Gardens, Ceylon. This palm only fruits once in its lifetime, when it reaches the age of 50 or 60 years, after which it dies. Another valuable introduction was seed of a Bamboo (*Dendrocalamus sikkimensis*) received from the Royal Botanic Garden at Sibpur near Calcutta, India. This plant is used locally in India as an article of food. A number of other species of more or less importance have been received through exchange and are being experimented with.

### TOURISTS.

Many tourists call at the Nursery in search of seed of our flowering trees, shrubs and other plants. Cuttings of hibiscus, crotons, acalyphas, panax, etc., are in great demand also, and we have supplied a great many tourists with packages of these free of charge.

### TREES DISTRIBUTED FROM GOVERNMENT NURSERIES DURING 1921 AND 1922.

1921.

#### Makiki and King Street Nurseries:

	Seed- lings	Trans- plants	Pot Grown	Total
Sold .....	.....	1,700	3,045	4,745
Gratis				
Arbor Day .....	.....	.....	5,028	5,028
Forest Reserves .....	13,700	17,080	5,761	36,541
Homesteaders .....	500	100	60	660

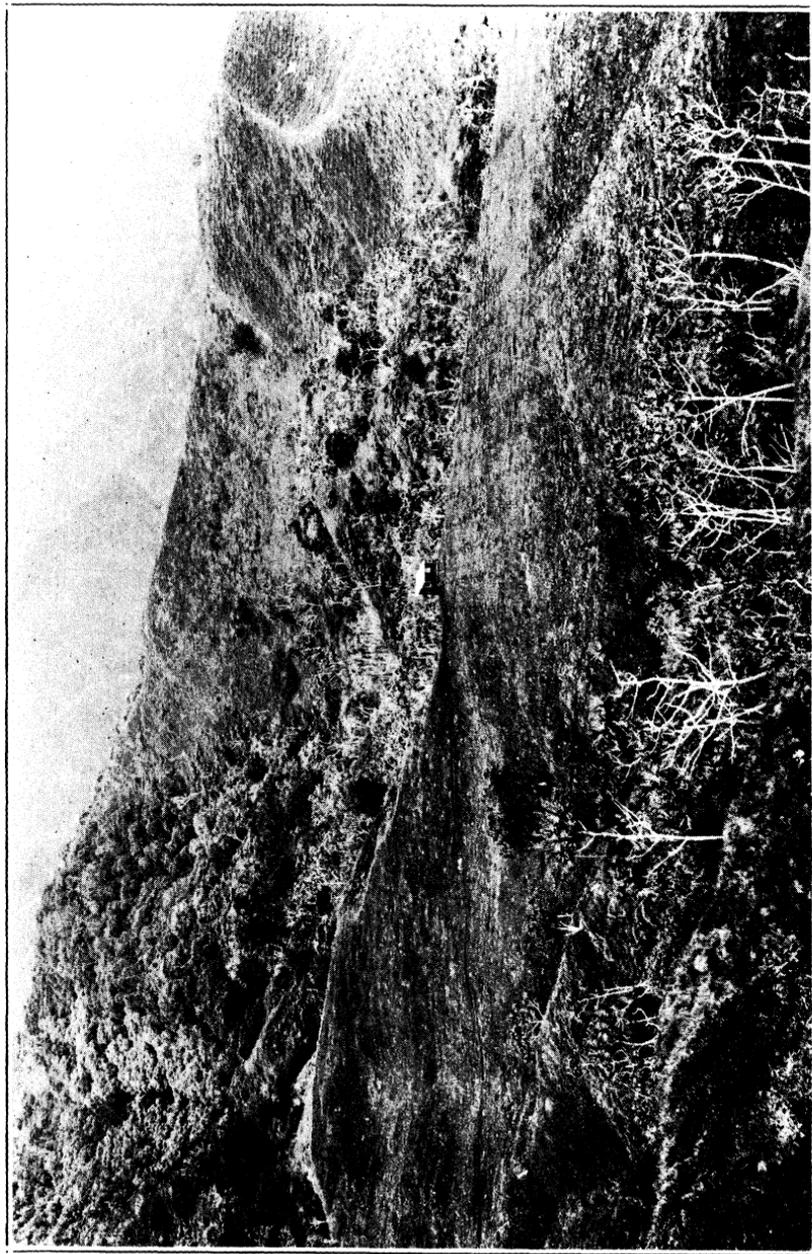


Photo by Judd.

A part of the plantation of chaulmoogra oil producing trees on the Waiahole Forest Reserve, Oahu, covering 27 acres.



Military Posts .....	.....	1,050	7,608	8,658
Schools .....	.....	.....	17	17
Street Planting .....	.....	.....	12	12
Miscellaneous .....	6,900	7,400	1,587	15,887
Honolulu Watershed .....	.....	.....	3,681	3,681
	21,100	27,330	26,799	75,229
Plantations Companies, etc...	.....	9,000	2,210	11,210
Total for Makiki and King Street Nurseries .....	21,100	36,330	29,009	86,439
<b>Kauai:</b>				
Kalaheo Nursery .....	8,000	.....	17,696	25,696
<b>Maui:</b>				
Haiku Nursery .....	49,400	15,368	1,611	66,379
<b>Hawaii:</b>				
Hilo Nursery .....	21,500	21,901	3,685	47,086
Total for Sub Nurseries.....	78,900	37,269	22,992	139,161
Total for Makiki and King Street Nurseries .....	21,100	36,330	29,009	86,439
Total for all Nurseries.....	100,000	73,599	52,001	225,600
<b>Oahu:</b>				
				1922.
<b>Makiki and King Street Nurseries:</b>				
Sold .....	.....	1,300	380	1,680
Gratis				
Arbor Day .....	.....	.....	7,140	7,140
Forest Reserves .....	38,900	7,620	3,632	50,152
Military Posts .....	.....	100	8,453	8,553
Schools .....	.....	.....	190	190
Miscellaneous .....	2,500	2,550	7,327	12,377
Honolulu Watershed .....	.....	.....	3,054	3,054
	41,400	11,570	30,176	83,146
Plantation Companies, etc.....	10,000	4,800	1,465	16,265
Total for Makiki and King Street Nurseries .....	51,400	16,370	31,641	99,411
<b>Kauai:</b>				
Kalaheo Nursery .....	3,000	1,000	16,932	20,932
<b>Maui:</b>				
Haiku Nursery .....	500	11,872	4,533	16,905
<b>Hawaii:</b>				
Hilo Nursery .....	25,600	34,105	998	60,703
Total for Sub-Nurseries.....	29,100	46,977	22,463	98,540
Total for Makiki and King Street Nurseries .....	51,400	16,370	31,641	99,411
Total for all Nurseries.....	80,500	63,347	54,104	197,951

## PLANTATION COMPANIES AND CORPORATIONS, ETC.

Species and number of trees sent from Makiki and King Street Nurseries during 1921 and 1922.

	1921.			
	Seed- lings	Trans- plants	Pot Grown	Total
Ironwood ( <i>Casuarina equisetifolia</i> ).....	.....	7,400	500	7,900
Swamp Mahogany ( <i>Eucalyptus robusta</i> )..	.....	.....	250	250
Red Gum ( <i>Eucalyptus rostrata</i> ).....	.....	.....	100	100
Mahogany ( <i>Swietenia mahogani</i> ).....	.....	.....	1,100	1,100
Cook Pine ( <i>Araucaria cookii</i> ).....	.....	.....	380	380
Avocado pear ( <i>Persea americana</i> ).....	.....	.....	115	115
Papaia ( <i>Carica papaya</i> ).....	.....	.....	250	250
Assorted fruit and flowering trees.....	.....	.....	1,115	1,115
	.....	7,400	3,818	11,210
1922.				
Ironwood ( <i>Casuarina equisetifolia</i> ).....	5,000	3,500	.....	8,500
Monkey Pod ( <i>Samanea saman</i> ).....	.....	.....	100	100
Swamp Mahogany ( <i>Eucalyptus robusta</i> )..	5,000	1,300	.....	6,300
Australian Red Cedar ( <i>Cedrela australis</i> )	.....	.....	765	765
Assorted fruit and flowering trees.....	.....	.....	600	600
	10,000	4,800	1,465	16,265
Total for two years.....				27,475

## GOVERNMENT REALIZATIONS

Turned into the Treasury.

1921.	
Sale of plants.....	\$ 175.87
Rent of Office Nursery Grounds.....	420.00
Miscellaneous .....	5.39
Total.....	\$ 601.26
1922.	
Sale of plants.....	\$ 521.15
Rent of Office and Nursery Grounds.....	420.00
Sale of Ford car.....	150.00
Sale of Oakland car.....	110.00
Total.....	\$1,201.15

## SPECIAL FUNDS.

Preservation and Extension of Forestry and Forest Reserves.

1921.	
Rents .....	\$ 728.36
Black sand sales .....	263.00
Total.....	\$ 991.36

1922.	
Rents .....	\$ 647.20
Cordwood sales .....	181.50
Black sand sales.....	361.50
Fines .....	75.00
Permits .....	1.00
<b>Total.....</b>	<b>\$1,266.20</b>

Animal Industry Revolving Fund.

1921	
General receipts .....	\$2,735.32
1922.	
General receipts .....	4,883.33
<b>Total.....</b>	<b>\$7,618.65</b>

MAKIKI STATION.

The work at this station has been done by two men who do the transplanting, mixing and sterilizing soil, making boxes, etc. Another man is employed principally for the purpose of growing corn and vegetables for the use of the Entomologist in experimenting with parasites, etc.

All the wood used for making seed and transplant boxes is cut from trees which we are able to collect in and around the city. Empty packing cases which we can obtain for a few cents each are also cut up for seed and transplant boxes at our small saw mill at this station. Steam is the power used to drive the mill and we also use steam for sterilizing all the soil we use at this station and also at the Nursery on King Street. We can always obtain enough dead trees for firewood which makes it economical to produce steam.

HONOLULU WATERSHED.

The work done on the watershed consisted of planting trees, exterminating pests, keeping open and making new trails and clearing off and preparing ground for the arboretum in Makiki Valley. We have started the planting of Koa, Kukui, etc., on the upper part of Makiki Valley, and land around the station ground is being cleared for other species. Along the south side of Hering Valley and along the top, although very rough and rocky, where enough soil could be found Koa trees were planted and they are making a splendid growth. It is slow work planting trees in land like this but since the trees have started and are making such a good showing we are of

the opinion that it is well worth while. A number of other parts similar to the part mentioned are still barren and it would certainly be a benefit to those sections of the watershed to have them clothed with trees.

#### SUB NURSERIES.

Considerable improvements have been made at the different Sub Nurseries. At the Hilo Nursery, a soil sterilizer and also a five horse power steam boiler and engine were erected early in 1921 and later a circular saw attached to the engine was installed for the purpose of cutting up wood for making seed and transplant boxes, etc. A propagating house, similar to the two in use at our Nursery on King Street, was built and has proved to be of much value in raising seedlings. This Nursery is now well equipped and should be able to produce enough trees to supply the Island of Hawaii for some time to come.

At the Haiku Nursery on Maui a new sterilizer similar to the one in Hilo was installed.

At the Kalahaeo Nursery on Kauai a new site was selected and the Nursery moved from the bottom of the gulch to a better site close by the main road, making it more convenient for people to call for trees and also more convenient for Joe Rita, Jr., who is in charge; his house being close by.

The writer paid a visit of inspection to the Kalahaeo Nursery in February, 1921.

Two visits were made in the same year to the Haiku Nursery, one in July and another in October, the latter being made during the "Maui Fair."

In 1922 two visits were made to the Hilo Nursery, one in January and the other in April. One visit was made to Maui Nursery during the fair in October, the writer being called to the Fair at the request of the Fair Director for the purpose of assisting in judging the flowers and plants.

#### ADVICE AND ASSISTANCE.

Many requests for advice and assistance are continually being made. The officers of the different military posts especially are very anxious to have their respective posts laid out and planted properly. The writer makes regular visits when time permits to all the posts and the officers in charge show their appreciation by assisting in transportation, etc.

PLATE IX.

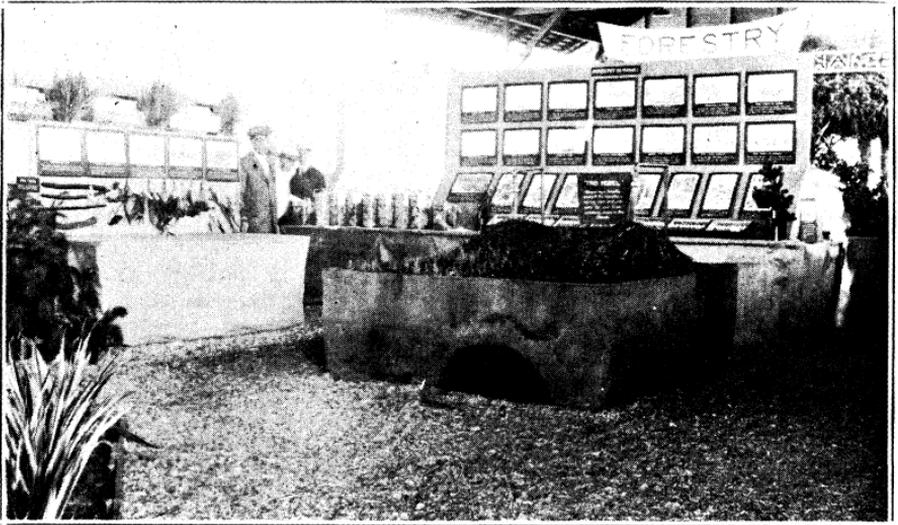


Photo by Krachel.

A part of the forestry exhibit at the fourth Maui County fair.



## YEAR BOOKS AND VEGETABLE SEEDS.

Our delegate in Congress has remembered us by forwarding the usual consignment of U. S. Department of Agriculture year books and vegetable seed. The demand for these is increasing and we hope that the supply may be kept up.

Respectfully submitted,

DAVID HAUGHS,  
Forest Nurseryman.





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1911-  
1922

Hawaii (Ter) Board  
of ... Agriculture  
and Forestry.  
Report (reprint  
from)  
1911-1922.

Comm. Bindery		5-10-60

