
**AN INVENTORY OF NON-NATIVE TIMBER RESOURCES
IN THE FOREST RESERVES OF KAUAI**

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Executive summary:

In 1998, a comprehensive inventory of non-native timber resources was conducted within the Puu Ka Pele, Na Pali-Kona, and Lihue-Koloa Forest Reserves on the island of Kauai. Primary survey objectives included producing accurate forest type maps, estimating marketable wood volume, and assessing the extent of timber losses sustained due to hurricane damage.

Mapping efforts revealed that non-native timber resources on Kauai were comprised of 178 timber stands in 25 forest types, occupying approximately 2,190 acres in Forest Reserves, and 200 acres within State Parks and other areas. Forest sampling was conducted by random sampling of fixed radius plots in selected stands.

The sum of volume in all forest types exceeded 4,300,000 net cubic feet, or approximately 21,500,000 net board feet assuming a conversion factor of five board feet per cubic foot. The survey intensity and resulting volume analyses of this study were designed to provide guidelines for long-term forest management, and were not intended to be the sole basis for conducting timber sales.

Eucalyptus saligna and *E. microcorys* appeared to be well suited to the growing conditions found in Western Kauai, with mean annual increment (MAI) values ranging between 150-300 gross ft³ acre⁻¹ year⁻¹. *E. robusta*, Southern pines, and other minor species have not grown as well in their current locations, with mean annual increments typically ranging between 30-90 gross ft³ acre⁻¹ year⁻¹. Hurricane damage was negligible in Southern Pine stands, whereas stands of Eucalyptus and related species sustained heavy damage.

Introduction:

From July to September 1998, The Hawaii Forestry and Communities Initiative (HFCI) timber survey crew conducted an inventory of publicly held non-native timber resources on Kauai. The primary objectives of the inventory were to provide:

1. Accurate forest type maps.
2. Volume estimates of commercial timber resources.
3. An assessment of timber losses sustained due to hurricane damage.

A majority of the surveyed timber resources were located on lands managed by the Division of Forestry and Wildlife (DOFAW). The primary concentration of DOFAW-managed non-native timber was located within Puu Ka Pele Forest Reserve, west of State Route 550 (Kokee Road). Most of the remaining timber acreage was located in adjacent stands that exist within Na Pali-Kona Forest Reserve and Waimea Canyon State Park. Hereafter, the geographic area containing timber stands from these areas is referred to as the West Kauai survey area. The remaining timber stands were located west of Wailua in the Lihue-Koloa Forest Reserve, hereafter referred to as the East Kauai survey area.

The first comprehensive inventory of plantation timber on Kauai reported merchantable wood volume of approximately 2,000,000 cubic feet on State lands (Honda et al., 1967). A second survey of plantations that were established after 1960, or had tree diameters ranging from 5-11” in the 1967 report, assessed smaller trees as a biomass resource (Division of Forestry, 1979). The latter survey revealed more than 3,500,000 gross cubic feet of plantation timber volume on Kauai in what were then relatively young timber stands.

Non-native timber stands in the West Kauai survey area were located primarily on ridge tops having an east-west orientation, and within an elevation range of 1000-3500 feet. Average annual rainfall on these ridge tops ranges from approximately 30-55 inches, with rainfall positively correlated to elevation. Most soils in the area are ash-derived silty loams from the Mahana and Oli Series, or basalt-derived clay loams from the Niu and Puu Opae Series (Soil Conservation Service, 1972). These soils are classified as well drained.

The structure of vegetation communities in the West Kauai survey area approximated Lowland Mesic Shrublands and Lowland Mesic Forests (Wagner et al., 1990). Excluding planted non-native species, overstory trees included koa (*Acacia koa*) and ohia (*Metrosideros polymorpha*). Aalii (*Dodonaea viscosa*), pukiaawe (*Styphelia tameiameia*), uluhe (*Dicranopteris linearis*), *Lantana camara*, guava (*Psidium* spp.), molasses grass (*Melinis minutiflora*), and ukiuki (*Dianella sandwicensis*) are common understory and groundcover species.

Non-native timber stands in the East Kauai survey area were located in undulating terrain within an elevation range of 700-1000 feet. Average annual rainfall ranges from approximately 100-155 inches. Most soils in the area are alluvial silty clays in the Hanalei and Hanamaulu Series’, or basalt-derived silty clays of the Pooku Series (Soil Conservation Service, 1972). These soils are classified as poorly drained to well drained depending on local topography.

The vegetation community in the East Kauai survey area is a diverse mosaic dominated by alien species. Excluding planted non-native species, overstory trees included Molucca albizia (*Paraserianthes falcataria*) and remnant ohia. Guava, *Melastoma* spp., and various ferns were common understory and groundcover species.

Survey methodology:

Planting maps, harvest maps, satellite imagery and aerial photographs were used to develop initial timber stand boundaries. During field inventory work, the survey crew verified and updated these boundaries while concurrently assigning forest types to each stand based on primary timber species, age, and stand composition.

A survey plot grid was created for the island of Kauai with one point for every five acres. Plot sampling was concentrated in stands of commercially important species, and in larger stands to facilitate sampling efficiency (72% of all stands were smaller than 15 acres).

Circular sample plots were 0.10 acres in size, with a fixed radius of 37.24 feet. All tree species larger than 5.5" diameter at breast height (DBH) were measured as "main plot" trees. Each plot tree was numbered and measured for DBH. Total height and defect assessments were recorded for every fifth tree of each species encountered on the plot. Defects were visually estimated and recorded as a percentage deduction of wood volume for the bottom-, middle-, and top-third of the tree. Regeneration data were recorded by tallying all tree stems in a DBH range of 1.6-5.5" within a nested 0.05 acre (26.33 feet in radius) "sub-plot."

Three primary overstory, understory, and groundcover species on or near each plot point were recorded in order of decreasing abundance. These data did not represent actual stem counts. Other descriptive data collection included slope, aspect, and weather conditions.

Survey data were analyzed using Forestry Projection System software version 5.3a (Forest Biometrics, 1998). Gross wood volume calculations represented volume from tree base to tree tip. Merchantable wood volume calculations were based on 16 foot log sections, a minimum top diameter of four inches, a stump height of one foot, and a minimum DBH of eight inches. Net wood volume calculations were based on merchantable wood volume minus deductions due to tree defects. Defect percentages were calculated using the formula:

Defect (%) = $(V_m - V_n / V_m)$, where V_m = merchantable volume, and V_n = net volume.

Once the initial survey was completed, all stand acreage and plot data were post-stratified by forest type. Acreage from unique or very small stands that had not been sampled were assigned to the forest type which best approximated their stand structure. Volume calculations were based on data from all cruised stands within each forest type. These data were subsequently used to predict volume in non-cruised stands of the same type. Though certain species are currently considered non-merchantable (Appendix A) due to either poor quality or availability, they are included in volume summaries.

Only one local taper profile was available for volume analyses of species encountered during this survey, necessitating the use of taper profiles from alternate species and regions (Appendix B).

Survey results:

The 1998 timber plantation map contains 178 timber stands totaling 2,386 acres, excluding clearings (Figures 1a & 1b). Total wood volume in 1998 exceeded 4,300,000 net cubic feet (Table 1). All mapped stands were stratified into 25 unique forest types based on dominant overstory tree species, age and stand structure, allowing type-level volume summaries (Table 2). Additional detail for type-level volume data are presented in Appendix C. Approximately 56% of net wood volume occurred on only 34% of the surveyed acreage (forest type codes of "33" or higher). These stands contained a high proportion of total volume due to relatively high tree stocking and large tree size. The remaining 44% of net wood volume occurred on 66% of the surveyed acreage (forest type codes of "22" or lower). The latter forest types included stands that had poor survival or growth, were poorly stocked, were recently planted,

Figure 1a. Non-native timber resources represented by primary overstory species - West Kauai.

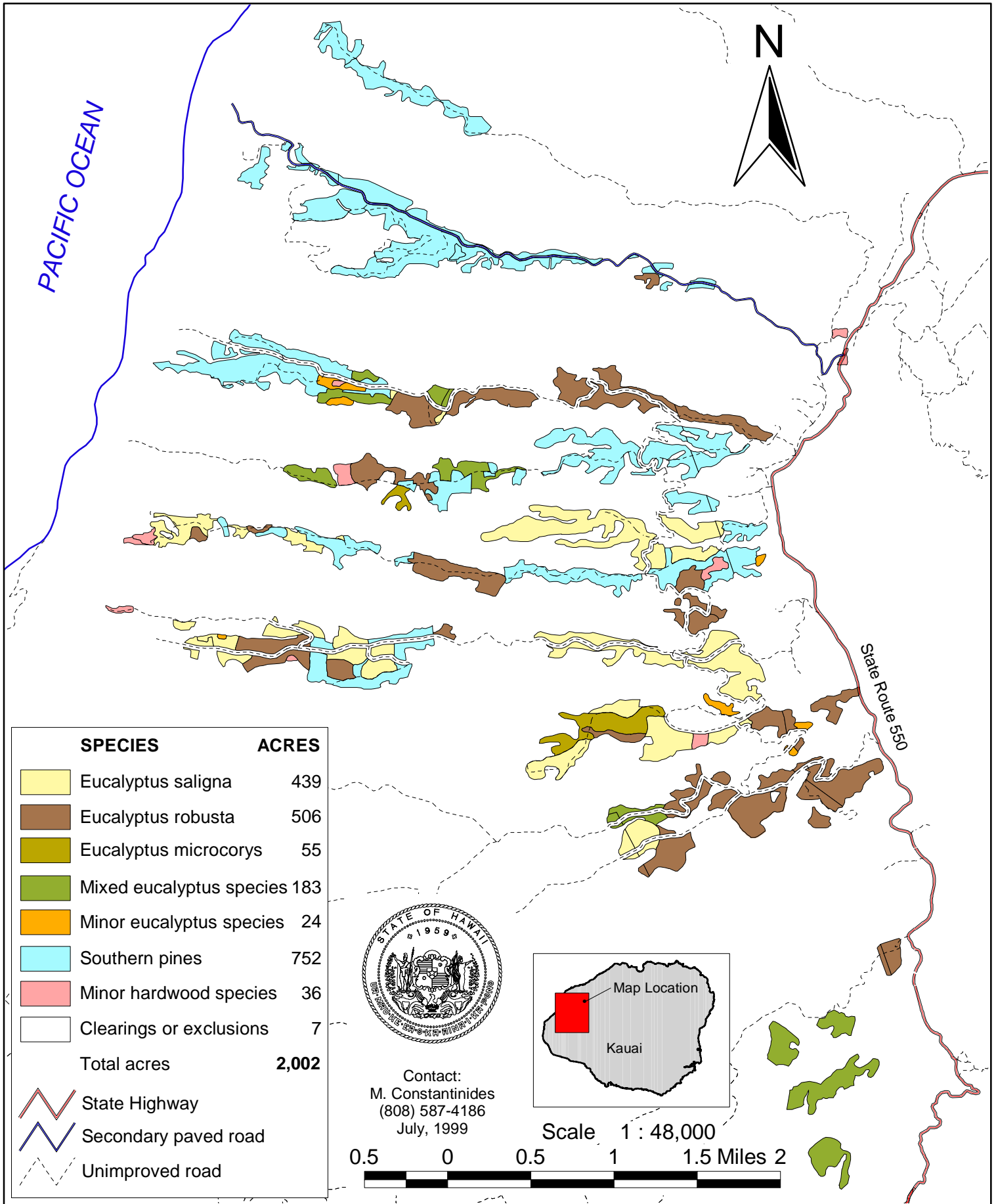
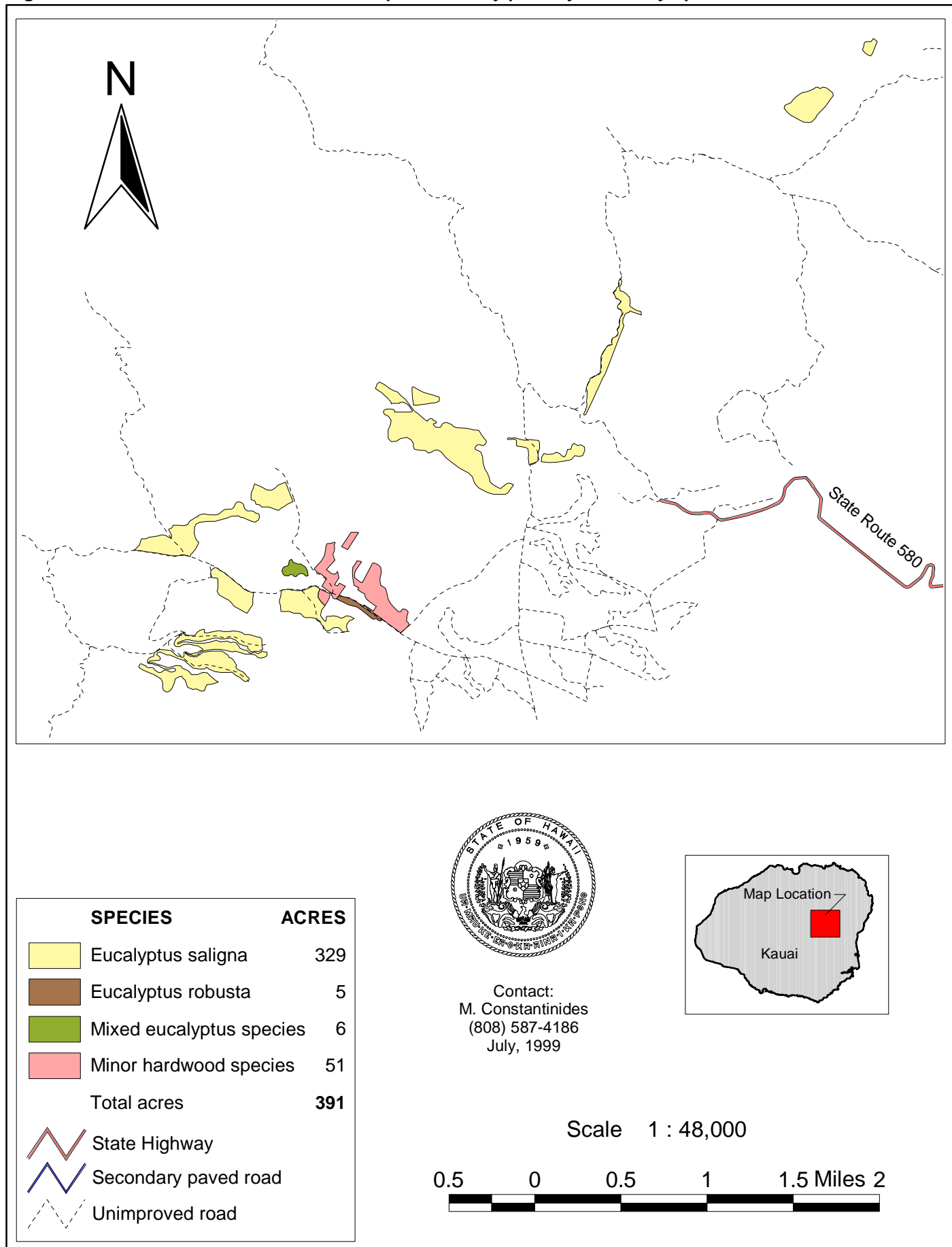


Figure 1b. Non-native timber resources represented by primary overstory species - East Kauai.



or had sustained considerable hurricane damage. If the entire inventory of surveyed trees were harvested at once and cut into sixteen foot logs, wood volume in log diameter classes of 4-8", 8-12", and 12+" would equal 1,802,376, 1,443,376, 1,105,710 net cubic feet, respectively (41%, 33%, and 26% of the total net volume, respectively).

Table 1. Volume summary for timber resources by primary species. Values in parentheses represent nearest whole percentages of area and volume totals.

Species	Total Acres	Total net volume (ft ³)
Eucalyptus robusta	510 (21)	960,507 (22)
E. saligna	769 (32)	1,144,231 (26)
E. sideroxylon	11 (0)	6,603 (0)
E. microcorys	55 (2)	74,905 (2)
Mixed eucalyptus	188 (8)	385,373 (9)
Lophostemon confertus	9 (0)	11,099 (0)
Melaleuca quinquenervia	51 (2)	122,771 (3)
Pinus elliottii	399 (17)	900,275 (21)
Pinus taeda	156 (7)	536,975 (12)
Mixed pines	195 (8)	208,723 (5)
Acacia confusa	8 (0)	NA (0)
Casuarina equisetifolia	8 (0)	NA (0)
Unknown eucalyptus	4 (0)	NA (0)
Grevillia robusta	21 (1)	NA (0)
Pinus radiata	2 (0)	NA (0)
Out or Non-stocked	7 (0)	NA (0)
Total	2,393	4,351,462

Volume results expressed in units of mean cubic feet per acre were derived from statistical sampling, and are therefore estimates. Standard error (SE) analyses provide one tool for assessing the strength of the field survey data. In the sampled forest types, standard error values rarely exceeded 20 percent of the mean (Table 3). Confidence intervals associated with standard error estimates represent the range of net volume per acre that is 80% likely to contain the true mean volume per acre for each forest type.

While individual stands were assigned to forest types based on the dominant overstory species, type level volume data also included components of secondary species (Table 4). Most forest types had only one or two principal species components.

Within the non-native timber plantations, few ohia and koa trees were left standing during initial land clearing operations. As a result of this practice, non-native species comprised

Table 2. Descriptive statistics for timber types in the Kauai timber survey. Age data represent original planting date, while stocking and DBH data represent all tree species with a minimum DBH of 2 inches. Maximum DBH data represent planted, non-native trees only.

Species & Type Description	Net Acres	Age in Years	Stocking Trees ac ⁻¹	DBH Range	Mean DBH	--Mean ft ³ ac ⁻¹ --		Total net volume (ft ³) by log minimum diameter class			Row Sub-Totals	
						Gross	Net	4-8"	8-12"	> 12"		
Eucalyptus robusta												
ER00 Recent plantings / sapling stands	47	NA	1,248	2-22	5	1,750	884	31,179	9,499	701	41,379	
ER11 Low volume pole and saw timber	174	37-62	504	2-40	8	2,353	1,281	96,691	71,285	55,058	223,034	
ER44 Moderate volume pole and saw timber	171	59-65	545	2-22	9	2,860	1,726	138,127	133,488	23,413	295,027	
ER55 Moderate volume saw timber	119	59	270	2-38	14	4,734	3,382	58,327	93,720	249,021	401,068	
Sub-Total ER:	511							324,324	307,992	328,192	960,507	
Eucalyptus saligna												
ES11 Low volume pole and saw timber	669	13-33	420	2-39	8	2,433	1,191	371,960	303,938	121,251	797,149	
ES22 Low to moderate volume pole timber	36	18	619	2-18	6	2,956	1,970	37,560	27,146	6,397	71,103	
ES55 Moderate volume saw timber	63	18	376	2-32	9	5,547	4,367	42,302	43,426	190,251	275,979	
Sub-Total ES:	768							451,822	374,510	317,899	1,144,231	
Eucalyptus sideroxylon												
EE00 Recent plantings / sapling stands	11	NA	587	2-20	6	1,304	579	5,540	299	764	6,603	
Sub-Total EE:	11							5,540	299	764	6,603	
Eucalyptus microcorys												
EM22 Low to moderate volume pole timber	55	18	903	2-20	7	2,993	1,362	64,466	10,440	0	74,905	
Sub-Total EM:	55							64,466	10,440	0	74,905	
Mixed eucalyptus												
EX44 Moderate volume pole and saw timber	188	51-55	207	2-34	11	2,739	2,048	81,097	111,929	192,348	385,373	
Sub-Total EX:	188							81,097	111,929	192,348	385,373	
Lophostemon confertus												
LC11 Low volume pole and saw timber	9	27-59	350	2-23	11	3,289	1,261	1,258	3,920	5,921	11,099	
Sub-Total LC:	9							1,258	3,920	5,921	11,099	
Melaluca quinquenervia												
MQ55 Moderate volume saw timber	48	65	240	2-41	16	4,231	2,552	17,190	31,872	73,708	122,771	
MQ22 Low to moderate volume pole timber	3	65	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Sub-Total MQ:	51							17,190	31,872	73,708	122,771	

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Table 2. Continued.

Species & Type Description	Net Acres	Age in Years	Stocking Trees ac ⁻¹	DBH Range	Mean DBH	--Mean ft ³ ac ⁻¹ -- Gross	Net	Total net volume (ft ³) by log minimum diameter class			Row Sub-Totals	
								4-8"	8-12"	> 12"		
Pinus elliottii												
PE22 Low to moderate volume pole timber	296	34-37	240	2-23	8	1,876	1,463	279,624	139,624	12,926	432,174	
PE33 Moderate to high volume pole and saw timber	104	37-39	404	2-25	10	5,264	4,523	220,161	187,706	60,234	468,101	
Sub-Total PE:	400							499,785	327,330	73,160	900,275	
Pinus taeda												
PT22 Low to moderate volume pole timber	41	34-38	233	2-15	8	1,634	1,221	25,415	24,768	0	50,182	
PT33 Moderate to high volume pole and saw timber	115	37-39	277	2-28	11	4,784	4,226	167,914	205,160	113,719	486,793	
Sub-Total PT:	156							193,328	229,928	113,719	536,975	
Mixed pines												
PX22 Low to moderate volume pole timber	195	34-38	212	2-15	8	1,396	1,070	163,566	45,157	0	208,723	
Sub-Total PX:	195							163,566	45,157	0	208,723	
Other non-surveyed types												
AC11 Acacia confusa	8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
CE22 Casuarina equisetifolia	8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
EZ11 Unknown Eucalyptus	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
GR11 Grevillia robusta	16	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
GR33 Grevillia robusta	5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
PR22 Pinus radiata	2	39	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Sub-Total:	43											

Total forested acreage: 2,387

Net volume summary:
Cubic foot totals by log diameter and timber type class.

Type Class	----Log minimum diameter----				Total
	Acres	4-8"	8-12"	> 12"	
00	58	36,719	9,798	1,465	47,981
11	880	469,909	379,142	182,230	1,031,281
22	636	570,631	247,134	19,323	837,088
33	224	388,075	392,866	173,953	954,894
44	359	219,223	245,417	215,760	680,401
55	230	117,819	169,018	512,980	799,817
Total	2,387	1,802,376	1,443,376	1,105,710	4,351,462

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Table 3. Cruise precision analyses for the Kauai timber survey. Volume data are presented in gross cubic feet.

Forest Type	Acres	Sample Plots	Mean ----ft ³ ac ⁻¹ ----	SE	% SE	---80 % CI---	
						Low ----ft ³ ac ⁻¹ ----	High ----ft ³ ac ⁻¹ ----
ER00	47	10	1,750	205	12	1,466	2,034
ER11	174	25	2,353	129	5	2,183	2,523
ER44	171	4	2,860	137	5	2,636	3,084
ER55	119	14	4,734	631	13	3,882	5,586
ES11	669	57	2,433	146	6	2,243	2,623
ES22	36	5	2,956	328	11	2,453	3,459
ES55	63	5	5,547	1,279	23	3,586	7,508
EE00	11	3	1,304	416	32	519	2,089
EM22	55	6	2,993	245	8	2,631	3,355
EX44	188	12	2,739	531	19	1,785	3,693
LC11	9	3	3,289	180	5	2,950	3,628
MQ55	48	6	4,231	801	19	3,049	5,413
PE22	296	22	1,876	117	6	1,721	2,031
PE33	104	11	5,264	393	7	4,725	5,803
PT22	41	6	1,634	307	19	1,181	2,087
PT33	115	11	4,784	613	13	3,943	5,625
PX22	195	14	1,396	175	13	1,160	1,632
XX00	7	0	NA	NA	NA	NA	NA

SE = standard error; % SE = standard error / mean volume per acre * 100
80 % CI = 80 percent confidence interval

ER = Eucalyptus robusta; ES = E. saligna; EE = E. sideroxylon; EM = E. Microcorys;
EX = Mixed eucalyptus; LC = Lophostemon confertus; MQ = Melalucaquin quenervia;
PE = Pinus elliottii; PT = Pinus taeda; PX = Mixed pines;
XX = open or cleared area; NA = not applicable

Table 4. Component net volume by forest type in the Kauai timber survey.

Type	--mean ft ³ ac ⁻¹ --			-----Component net volume per acre by species* (ft ³ ac ⁻¹)-----													
	Acres	Gross	Net	% Net	ER	ES	EE	EM	EN	LC	MQ	PE	PT	MP	AK	PF	OTH
ER00	47	1,750	884	51	857			5					5	3	8		5
ER11	174	2,353	1,281	54	1,162	28		7			33	9	4	1	17		19
ER44	171	2,860	1,726	60	1,726												
ER55	119	4,734	3,382	71	3,382												
ES11	669	2,433	1,191	49	10	969					19				12	177	5
ES22	36	2,956	1,970	67		1,672		298									
ES55	63	5,547	4,367	79		4,228		72									67
EE00	11	1,304	579	44	11		568										
EM22	55	2,993	1,362	46	21	105		1,236									
EX44	188	2,739	2,048	75		21		870	1,149								8
LC11	9	3,289	1,261	38						1,261							
MQ55	48	4,231	2,552	60	208						2,344						
PE22	296	1,876	1,463	78								1,337			3		123
PE33	104	5,264	4,523	86								4,410			112		
PT22	41	1,634	1,221	75									1,120		59		42
PT33	115	4,784	4,226	88								117	3,996		92		21
PX22	195	1,396	1,070	77								705	341				24
XX00	7	NA	NA														

AK = Acacia koa; ER = Eucalyptus robusta; ES = E. saligna; EE = E. sideroxylon; EM = E. Microcorys;
 EN = E. paniculata; EX = Mixed eucalyptus; LC = Lophostemon confertus; MP = Metrosideros polymorpha
 MQ = Melalucaquin quenervia; PE = Pinus elliottii; PF = Paraserianthes falcateria; PT = Pinus taeda; PX = Mixed pines;
 XX = open or cleared area; NA = not applicable; OTH = other species

100% of the primary overstory species recorded at sample plots. Koa, and to a lesser extent ohia, were observed as secondary overstory species at 6% and 1% of all sampled plot points, respectively.

Other tree species observed and measured in minor quantities during the survey, included Formosa koa (*Acacia confusa*), silk oak (*Grevillia robusta*), Monterey pine (*Pinus radiata*), and ironwood (*Casuarina equisetifolia*). No detailed volume or distribution analyses were conducted for these species due to their scattered occurrence.

Silk oak was the most common and widely distributed secondary overstory species within the West Kauai study area, while other species were found in localized concentrations (Figure 2a). Molucca albizia (*Paraserianthes falcateria*) was clearly the most common secondary overstory species in the East Kauai study area, indicating that this species can rapidly spread and colonize disturbed sites (Figure 2b). Molucca albizia was notably absent in stands of paperbark (*Melaleuca quinquenervia*), which were well established when albizia first colonized the area.

Relative abundance data for understory species revealed that guava is common throughout the West Kauai study area (Figure 3a). This species appears to be highly shade tolerant as it was commonly found under well-stocked and mature stands of timber. Other commonly recorded understory species were tree seedlings found under parent trees of the same species. In the East Kauai survey area, *Melastoma* spp., guava, and Molucca albizia dominated the forest understory (Figure 3b).

Alien species were most common in the groundcover layer of the West Kauai study area (Figure 4a). Both *Lantana camara* and molasses grass (*Melinis minutiflora*) were widespread, though the latter occurred almost exclusively under a pine overstory. Though less common, the native species pukiawe and ukiuki also had a wide distribution in West Kauai. Various ferns and guava were the primary components of the groundcover layer in the East Kauai study area (Figure 4b).

Discussion and planning implications:

The non-native timber plantings on Kauai exhibited a wide range of growth potential both within, and among species. Site adaptation and climatic conditions appeared to be the primary factors that influenced stand growth potential. Current within-species productivity differences can not be attributed to varying stand management or maintenance, since little has been conducted historically.

In order to compare productivity of different species, representative stands within the most important commercial forest types were selected for mean annual increment (MAI) analyses (Table 5). Among the non-native plantation species, MAI values were highest for the eucalypts, commonly ranging from 150-300 ft³ ac⁻¹ yr⁻¹. One exception was *Eucalyptus robusta*, for which MAI did not exceed 80 ft³ ac⁻¹ yr⁻¹ in any stand. At elevations above 2400

Figure 2a. Secondary overstory species at sample plot locations in the West Kauai survey area.

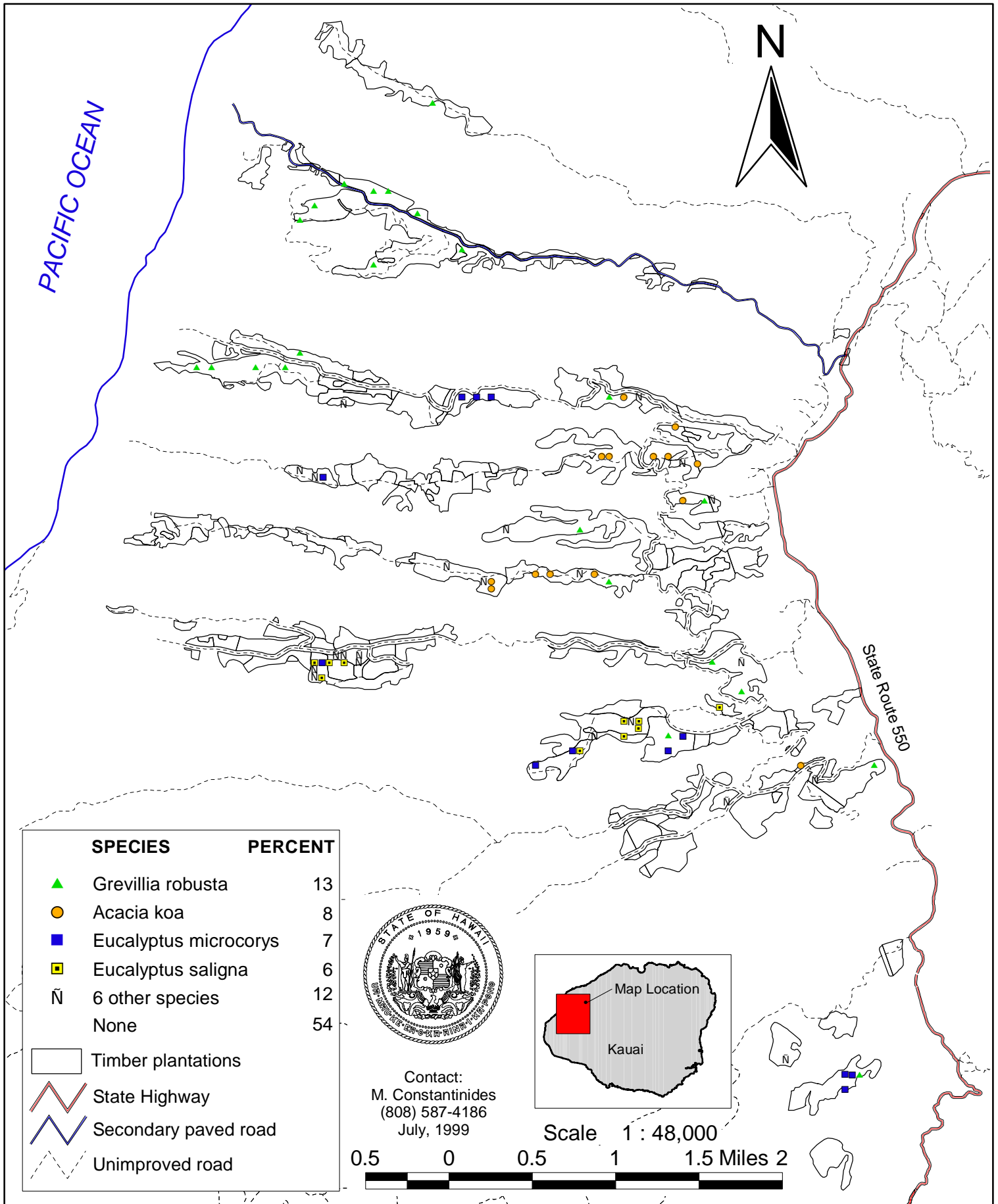


Figure 2b. Secondary overstory species at sample plot locations in the East Kauai survey area.

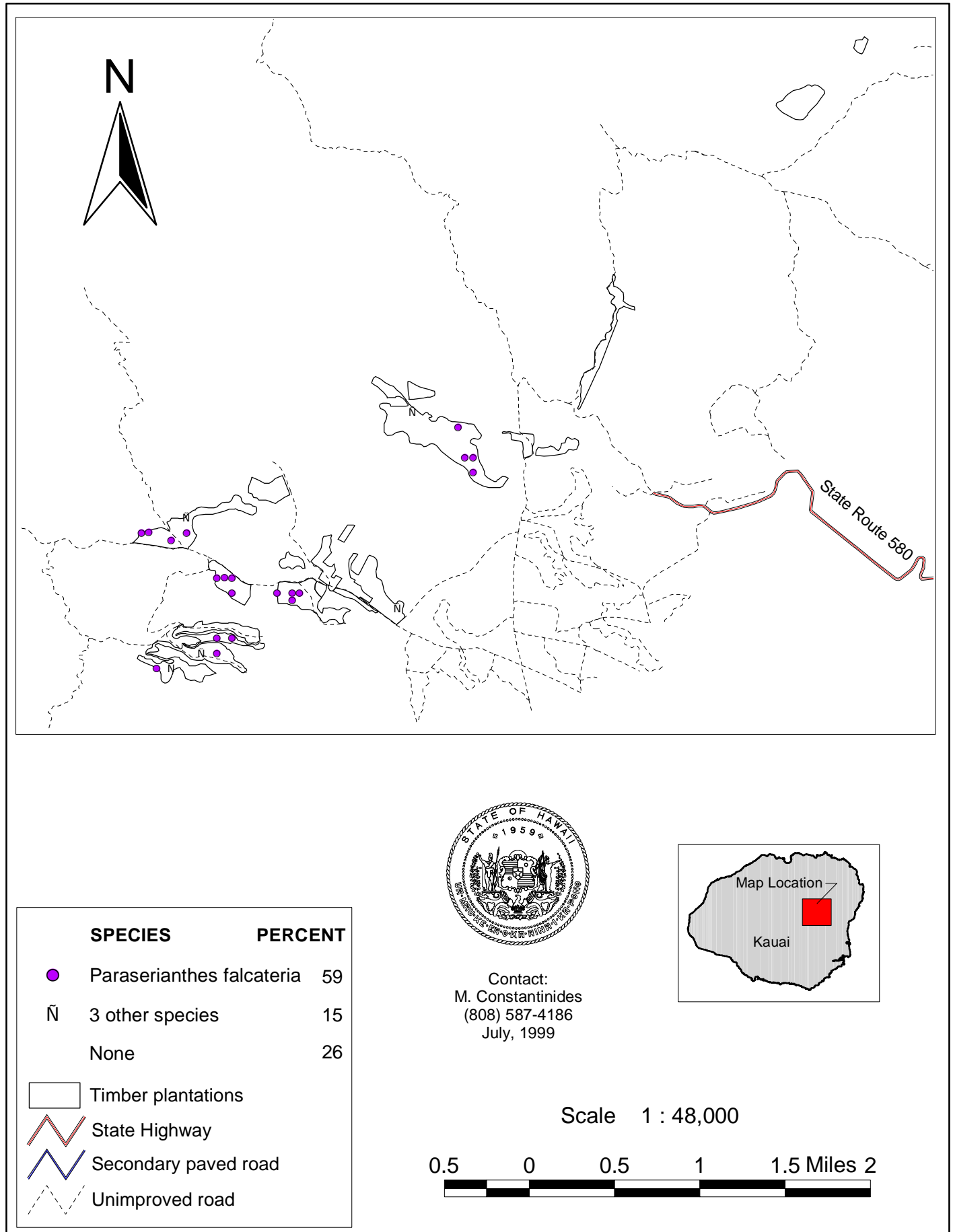


Figure 3a. Primary understory species at sample plot locations in the West Kauai survey area.

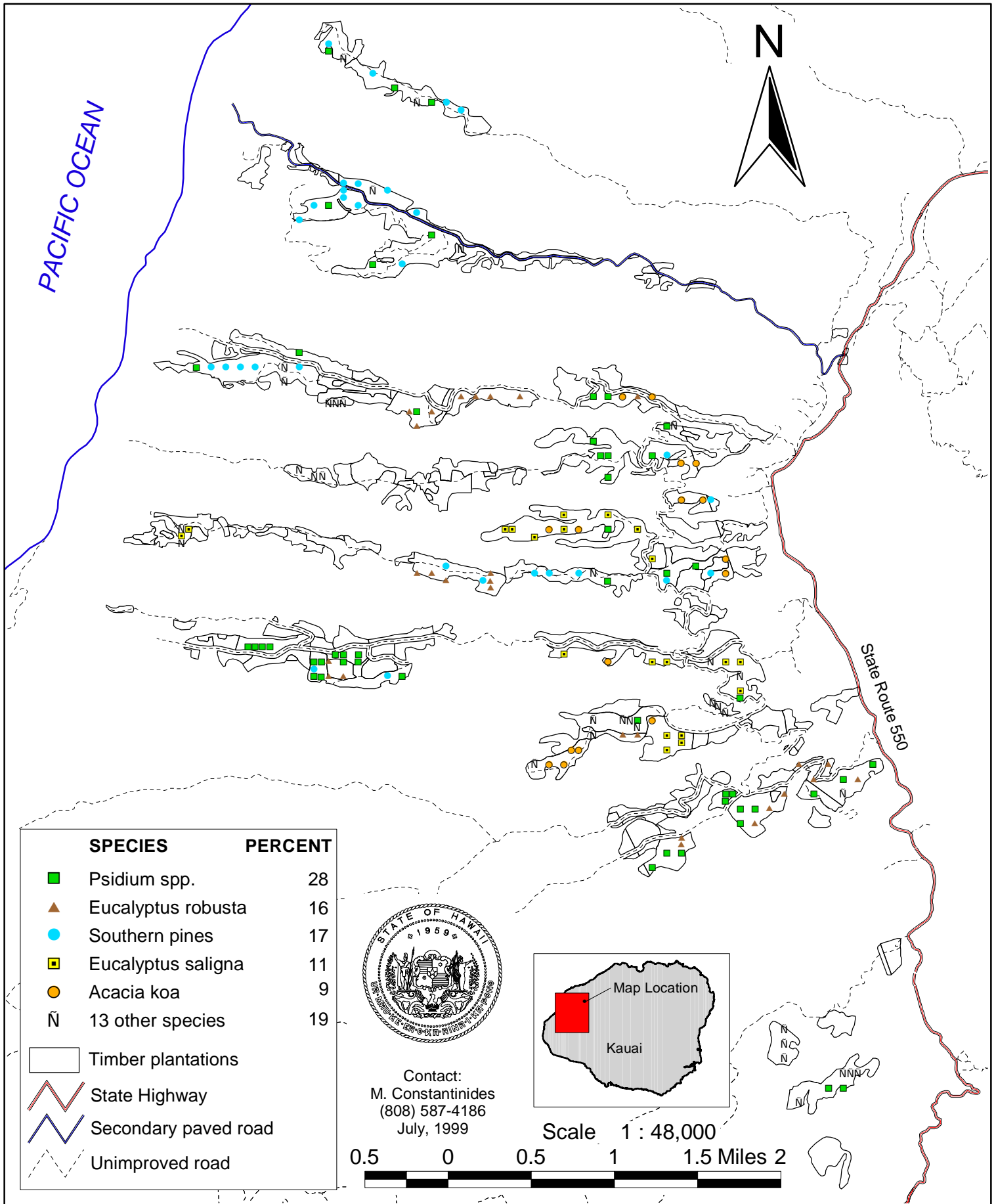


Figure 3b. Primary understory species at sample plot locations in the East Kauai survey area.

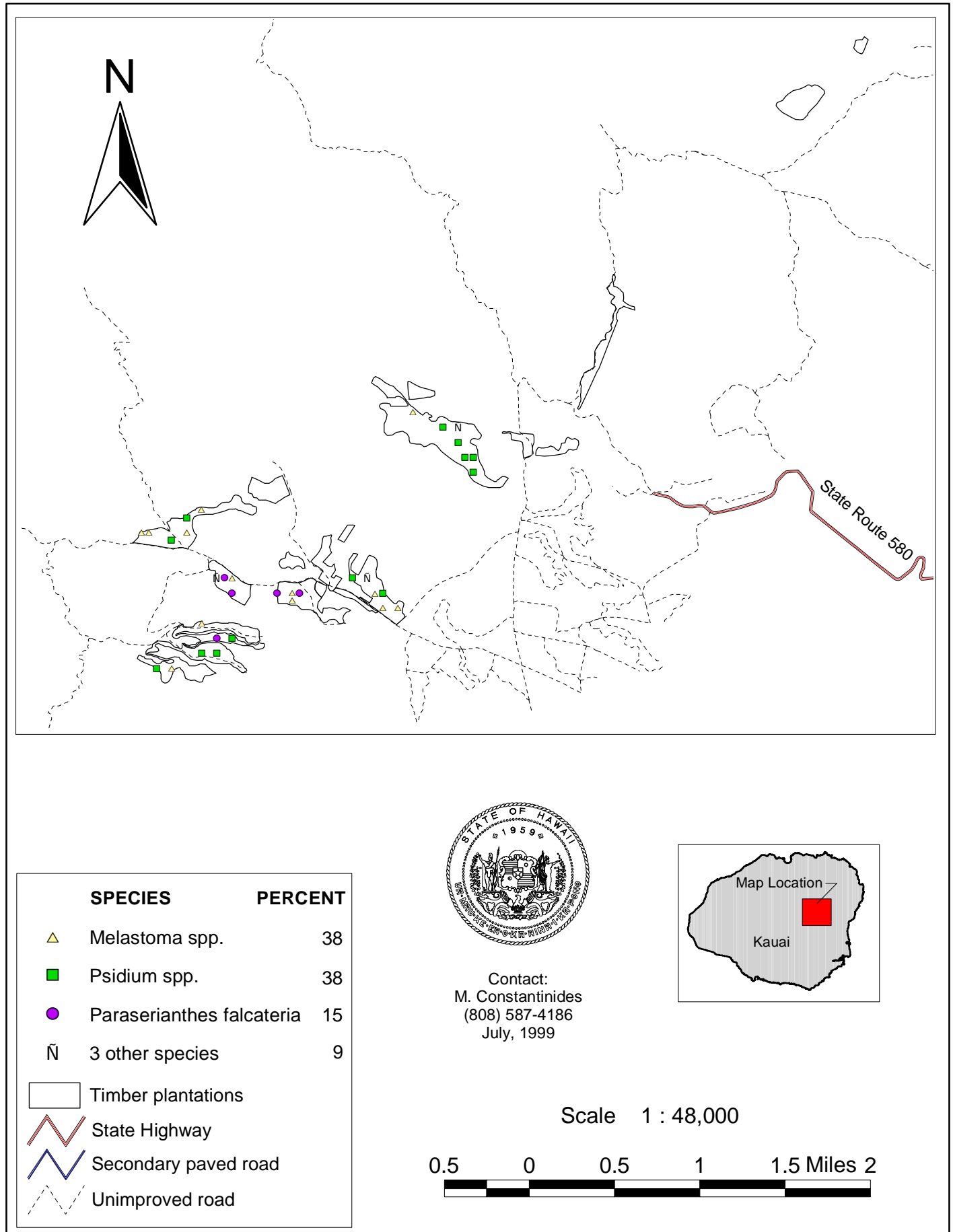


Figure 4a. Primary groundcover species at sample plot locations in the West Kauai survey area.

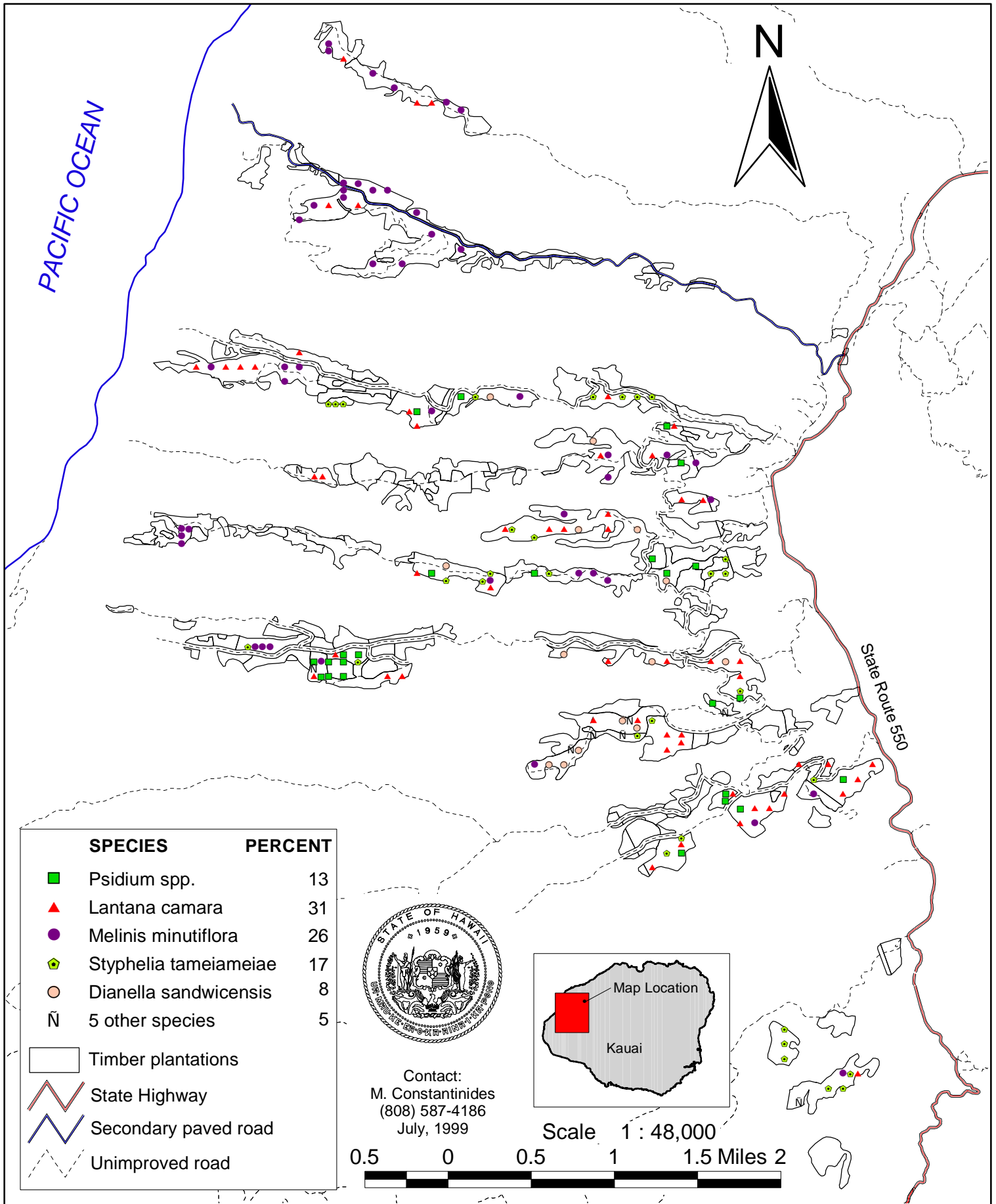


Figure 4b. Primary groundcover species at sample plot locations in the East Kauai survey area.

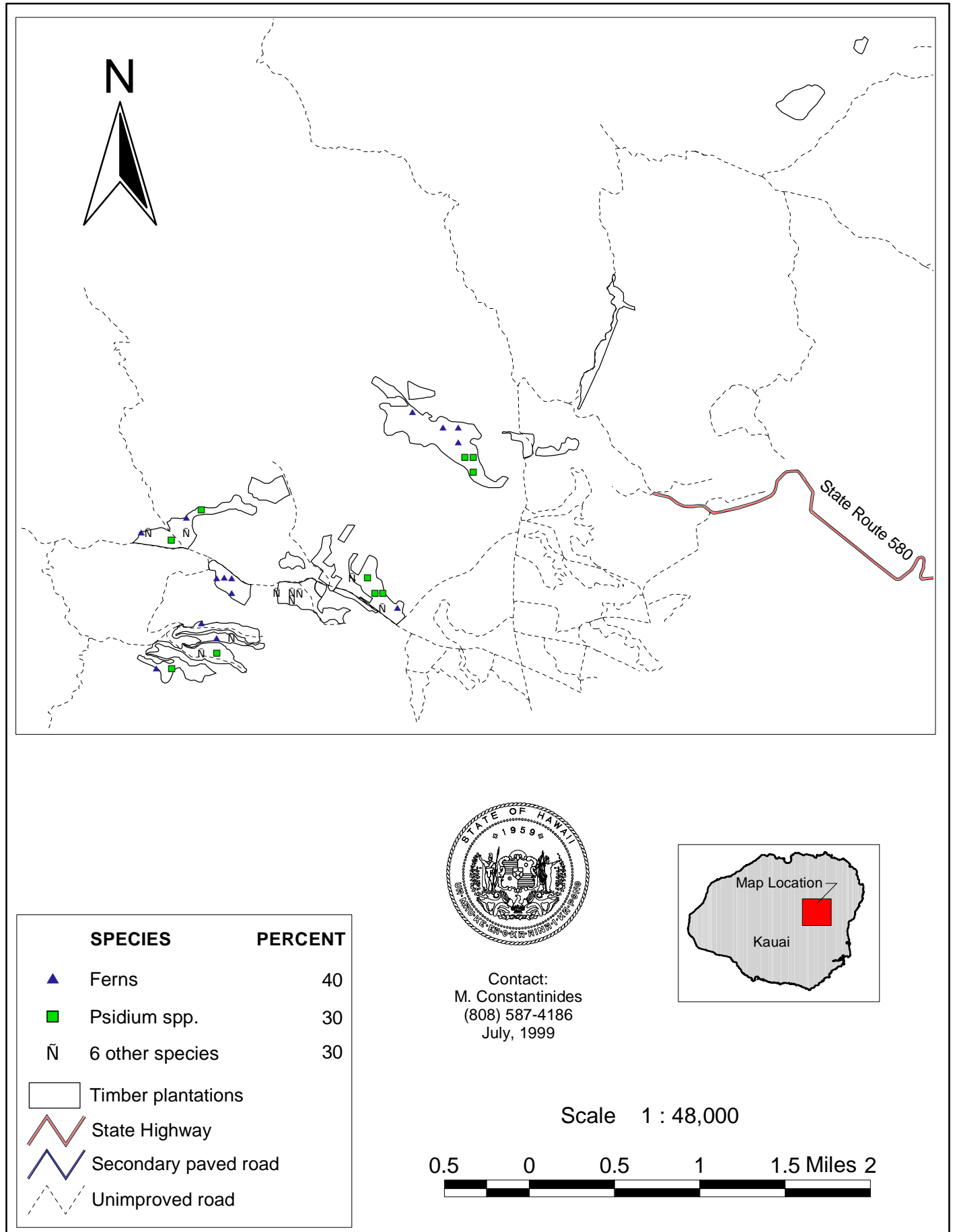


Table 5. Mean annual increment (MAI) analyses for selected stands in the Kauai timber survey based on 1998 data. Data for each forest type exclude all secondary species components, and represent trees with a minimum DBH of two inches.

Species & Type	Stand ID	Net Acres	Age Plots (Yr)	Trees Per Acre	Maximum DBH	Mean DBH	Basal Area (ft ²)	Gross volume (ft ³ ac ⁻¹)	MAI (ft ³ ac ⁻¹ yr ⁻¹)	
Eucalyptus robusta										
ER11	2012	19	4	62	398	29	9	177	2,014	32
ER11	2436	18	4	59	472	21	9	195	2,367	40
ER44	2362	25	4	59	545	22	9	214	2,848	48
ER55	2027	36	6	59	255	38	15	317	4,713	80
Eucalyptus saligna										
ES11	2415	92	10	29	562	35	8	186	3,362	116
ES11	2507	86	7	32	83	39	14	90	1,518	47
ES22	2460	23	5	18	619	18	6	138	2,954	164
ES55	2464	34	5	18	376	38	9	169	5,547	308
Eucalyptus microcorys										
EM22	2461	48	6	18	903	20	7	230	3,010	167
Mixed eucalyptus										
EX44	2003	15	3	51	297	26	11	199	4,763	93
Lophostemon confertus										
LC11	2019	6	3	59	350	23	11	215	3,289	56
Melaleuca quinquenervia										
MQ55	2220	31	6	65	240	41	16	343	4,230	65

Table 5. Continued.

Species & Type	Stand ID	Net Acres	Plots	Age (Yr)	Trees Per Acre	Maximum DBH	Mean DBH	Basal Area (ft ²)	Gross volume (ft ³ ac ⁻¹)	MAI (ft ³ ac ⁻¹ yr ⁻¹)
Pinus elliottii										
PE22	2317	141	9	37	229	23	9	99	1,996	54
PE22	2446	34	7	34	216	19	8	72	1,368	40
PE33	2414	38	5	37	534	18	8	188	4516	122
Pinus taeda										
PT22	2301	23	3	34	177	14	8	65	1076	32
PT33	2388	58	6	39	302	20	9	142	3657	94
Mixed pines										
PX22	2354	72	8	36	192	13	7	51	886	25
PX22	2302	48	6	34	239	15	9	102	2010	59

feet in the West Kauai study area, southern pines had MAI values approaching, and sometimes exceeding $100 \text{ ft}^3 \text{ ac}^{-1} \text{ yr}^{-1}$. MAI values for all other species and southern pines below 2400 feet were very low.

Low MAI values for *E. robusta* may be misleading for some stands because they were the oldest within the study area, and may have stagnated. Other stands are clearly stunted in growth, indicating that *E. robusta* is not suited to site conditions in its current planting range. *E. robusta* grows well in a wide range of other soil-elevation combinations statewide, so long as annual rainfall is high. The relatively dry climate within the West Kauai study area is probably the primary factor for poor performance of *E. robusta*. Though less pronounced than in *E. robusta*, inhibited growth of other eucalypts and the southern pines is apparent at the drier low elevation areas of the West Kauai Study area. Productivity for several of the timber species studied would probably increase significantly with intensified stand management and modified species-site selections in future rotations.

Some MAI values for stands in the same forest type were very different (Table 5). It is important to note that MAI calculations were conducted on a gross volume basis, while stands were assigned to forest types based on current stand structure and net volume. Many trees that had broken tops as the result of hurricane damage are still living. Gross volume (and MAI) calculations for these trees include theoretical volume above the break point to an estimated former height, while net volume calculations do not.

Defect deductions attributed to form and rot versus hurricane damage were not quantitatively separated during the survey. However, field observations from the survey crews indicated that a vast majority of deductions were associated with hurricane damage. Analyses of defect deductions revealed high levels of hurricane damage for all timber types with the exception of southern pines (Table 6). The southern pines proved to be most resistant to wind damage, suffering minor defects ranging from 2% to 5%. The eucalypts were heavily impacted, with most species sustaining volume losses of 20% or more. The single stand of surveyed brushbox (*Lophostemon confertus*) sustained the heaviest hurricane damage with a volume loss of 57%. Of the nearly four thousand trees measured during this survey, approximately 25% had broken tops associated with hurricane damage (Table 7). Species level analyses of percentage of trees with broken tops paralleled the defect deductions discussed above.

Qualitative data collection for the relative abundance of primary and secondary species in the study areas revealed a predominance of non-native timbers, underlain by invasive non-native weed species. If current commercial timber resources are harvested, control of these weed species will probably require significant resources during planting and establishment of future timber plantations.

Total wood volume estimates for surveyed non-native timber resources exceeded 4,300,000 net cubic feet, or approximately 21,500,000 net board feet. Forest types coded "22" or lower could be considered to represent pre- or non-commercial timber acreage as of 1998 due to their low volume or heterogeneous composition. Well-stocked stands in these forest types

Table 6. Defect analyses for forest types measured during the Kauai timber survey.

Species & Type Description		--Mean ft ³ ac ⁻¹ --		
		Merch	Net	% Defect
Eucalyptus robusta				
ER00	Recent plantings / sapling stands	1,081	884	18
ER11	Low volume pole and saw timber	1,901	1,281	33
ER44	Moderate volume pole and saw timber	2,421	1,726	29
ER55	High volume pole and saw timber	4,372	3,382	23
Eucalyptus saligna				
ES11	Low volume pole and saw timber	1,799	1,191	34
ES22	Low to moderate volume pole timber	2,145	1,970	8
ES55	High volume pole and saw timber	5,146	4,367	15
Eucalyptus sideroxylon				
EE00	Recent plantings / sapling stands	691	579	16
Eucalyptus microcorys				
EM22	Low to moderate volume pole timber	2,003	1,362	32
Mixed eucalyptus				
EX44	Moderate volume pole and saw timber	2,547	2,048	20
Lophostemon confertus				
LC11	Low volume pole and saw timber	2,930	1,261	57
Melaluca quinquenervia				
MQ55	High volume pole and saw timber	3,790	2,552	33
Pinus elliottii				
PE22	Low to moderate volume pole timber	1,516	1,463	3
PE33	Moderate to high volume pole and saw timber	4,638	4,523	2
Pinus taeda				
PT22	Low to moderate volume pole timber	1,285	1,221	5
PT33	Moderate to high volume pole and saw timber	4,397	4,226	4
Mixed pines				
PX22	Low to moderate volume pole timber	1,097	1,070	2

could have significant commercial value in future years, while others will have salvage potential at best unless they are replaced. Forest types coded “33” or higher contained a majority of timber resources with current commercial value, where total net volume exceeded 2,400,000 cubic feet, or approximately 12,000,000 board feet.

Table 7. Analyses of plot trees with broken tops. Occurrence of broken tops can almost exclusively be attributed to hurricane damage.

Species	-----Trees-----		
	Total	Broken	% Broken
Eucalyptus robusta	991	360	36
Eucalyptus saligna	838	244	29
Eucalyptus sideroxylon	39	4	10
Eucalyptus microcorys	314	147	47
Eucalyptus paniculata	79	20	25
Lophostemon confertus	59	58	98
Melaleuca quinquenervia	143	46	32
Pinus elliottii	759	10	1
Pinus taeda	328	16	5
Acacia koa	89	2	2
Grevillia robusta	109	33	30
Paraserianthes falcateria	144	21	15
Total	3,892	961	25

The surveyed timber stands represent a readily accessible resource due to comprehensive road networks, which would facilitate implementation of intensive forest management activities. Though some roads have become overgrown, they could be easily cleared prior to future operations. However, slopes exceeding 25% are common in the West Kauai study area, so operation of vehicles and heavy equipment would be restricted by slick road conditions during rainy periods.

Analyses of survey precision indicated that reported timber volumes were moderately robust. Hurricane damage caused considerable heterogeneity in stand structure, and the current commercial value of many stands will be dependent on the extent to which successful salvage and replacement operations can be implemented.

Minor acreage of non-native timber stands included in the scope of this study fall under the management or ownership of organizations other than DOFAW (Appendix D).

The volume data in this report are not intended to be the sole basis for negotiation of timber sale contracts, but rather a guideline to long term timber management planning within the surveyed areas. Careful weighing or scaling of timber removed from harvest sites is highly recommended for all harvest contracts.

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Appendix A. Botanical classification for species tallied during the timber survey.

TREE SPECIES

<u>Latin genus and species</u>	<u>Common name</u>
<i>Acacia confusa</i>	Formosa koa
<i>Acacia koa</i>	Koa
<i>Acacia mearnsii</i>	Black wattle
<i>Aleurites moluccana</i>	Kukui
<i>Casuarina equisetifolia</i>	Ironwood
<i>Eucalyptus deglupta</i>	Mindanao Gum
<i>Eucalyptus paniculata</i>	Grey Ironbark
<i>Eucalyptus microcorys</i>	Tallow-wood
<i>Eucalyptus robusta</i>	Swamp mahogany
<i>Eucalyptus saligna</i>	Sydney blue gum
<i>Eucalyptus sideroxylon</i>	Red Ironbark
<i>Grevillia robusta</i>	Silk oak
<i>Leucaena leucocephala</i>	Koa-haole
<i>Lophostemon confertus</i>	Brushbox
<i>Melaleuca quinquenervia</i>	Paper bark
<i>Metrosideros polymorpha</i>	Ohia
<i>Myrica Faya</i>	Firetree
<i>Paraserianthes falcateria</i>	Molucca Albizia
<i>Pinus elliottii</i>	Slash pine
<i>Pinus radiata</i>	Monterey pine
<i>Pinus taeda</i>	Loblolly pine
<i>Schinus terebinthifolius</i>	Christmas berry

UNDERSTORY AND GROUND COVER SPECIES

<u>Latin genus and species</u>	<u>Common name</u>
<i>Dianella sandwicensis</i>	Ukiuki
<i>Dicranopteris linearis</i>	Uluhe fern
<i>Dodonaea viscosa</i>	Aalii
<i>Freycinetia arborea</i>	Ieie
<i>Lantana camara</i>	Lantana
<i>Melastoma</i> spp.	Melastoma family
<i>Melinis minutiflora</i>	Molasses grass
<i>Nephrolepis multiflora</i>	Sword fern
<i>Psidium</i> spp.	Guava
<i>Styphelia tameiameia</i>	Pukiawe

Appendix B. Species assignments by taper profile class for volume analyses.

Species analyzed using a Hawaiian *Flindersia brayleyana* taper profile:

1. *Acacia confusa*
2. *Acacia koa*
3. *Acacia mearnsii*
4. *Aleurites moluccana*
5. *Casuarina equisetifolia*
6. *Grevillia robusta*
7. *Leucaena leucocephala*
8. *Metrosideros polymorpha*
9. *Myrica faya*
10. *Paraserianthes falcateria*
11. *Schinus terebinthifolius*

Species analyzed using a Hawaiian *Eucalyptus saligna* taper profile:

1. *Eucalyptus microcorys* (bark thickness coefficients 1.5 times those of *E. saligna*)
2. *E. paniculata* (bark thickness coefficients 1.5 times those of *E. saligna*)
3. *E. robusta* (bark thickness coefficients 2.0 times those of *E. saligna*)
4. *E. saligna*
5. *E. sideroxylon* (bark thickness coefficients 1.5 times those of *E. saligna*)
6. *Lophostemon confertus*
7. *Melaleuca quinquenervia* (bark thickness coefficients 2.0 times those of *E. saligna*)

Species analyzed using a Hawaiian *Eucalyptus grandis* taper profile:

1. *Eucalyptus deglupta*

Species analyzed using a Pacific Northwest *Pinus contorta* (lodgepole pine) taper profile:

1. *Pinus elliottii*
2. *Pinus taeda*

Appendix C. Stand tables by forest type.

Guidelines for interpreting stand table data:

1. Stand tables summarize sample plot analyses using one-inch DBH classes. Statistics provided for each DBH class include trees per acre, basal area per acre (ft²), average tree height (feet), and cubic foot volume per acre. Gross cubic volume represents the tree bole from tree base to tree tip. Merchantable wood volume calculations were based on 16 foot log sections, a minimum top diameter of four inches, a stump height of one foot, and a minimum DBH of eight inches. Net wood volume represents merchantable volume minus deductions due to tree defects.
2. For each forest type, statistics are first presented by tree species. The last row of each species section gives a species summary (species codes typically use the first initial from both genus and species names). The species summary shows average DBH, total trees per acre, total basal area per acre, and total volume per acre.
3. After all species for a particular forest type have been listed, two final rows provide type level summary statistics. The first row represents all trees with a DBH of two inches or larger. The second row represents only trees with a minimum DBH of eight inches. Type level summaries show average DBH, total trees per acre, total basal area per acre, and total volume per acre. Type level volume totals may differ slightly from those reported in Tables 2-4 & 6 due to rounding errors.

Forest type ER00: Recent *Eucalyptus robusta* plantings/sapling stands.

	DBH (in)	Average Height (ft)	----- Values per acre -----				
			Number of Trees	Basal Area	---- Volume (ft ³) ----	Net	
<i>Eucalyptus robusta</i>							
	2	9	626	14	80	0	0
	4	17	242	21	146	0	0
	6	31	72	14	138	0	0
	7	31	43	11	115	0	0
	8	30	33	12	113	90	69
	9	41	25	11	138	118	114
	10	45	19	10	140	123	110
	11	34	15	10	107	94	77
	12	45	12	9	127	115	96
	13	42	7	6	81	74	59
	14	79	4	4	94	89	68
	15	52	3	4	55	51	48
	16	47	4	6	76	71	46
	17	48	2	3	43	40	38
	18	50	1	2	25	23	18
	19	51	4	8	115	107	84
	22	55	1	3	40	38	23
ER summary:	5	49	1113	148	1641	1039	857
<i>Eucalyptus microcorys</i>							
	9	47	1	0	6	5	5
EM summary:	9	47	1	0	6	5	5
<i>Metrosideros polymorpha</i>							
	9	32	1	0	6	5	3
MP summary:	9	32	1	0	6	5	3

Appendix C (Continued).**Forest type ER00 (Continued):**

	DBH (in)	Average Height (ft)	Number of Trees	Basal Area	Values per acre		
					Gross	Merch	Net
					Volume (ft3)		
<i>Eucalyptus saligna</i>							
	2	6	12	0	3	0	0
	4	17	8	1	5	0	0
	7	36	1	0	3	0	0
ES summary:	3	12	21	1	13	0	0
<i>Acacia koa</i>							
	2	5	42	1	0	0	0
	4	9	6	1	4	0	0
	6	60	3	1	12	0	0
	8	29	1	0	4	3	2
	10	28	1	1	6	5	5
AK summary:	4	11	54	4	40	20	8
<i>Grevillia robusta</i>							
	9	42	1	0	6	5	5
GR summary:	9	42	1	0	7	6	5
<i>Pinus taeda</i>							
	2	5	6	0	0	0	0
	9	29	1	0	6	5	5
PT summary:	4	8	7	1	6	5	5
<i>Pinus elliottii</i>							
	2	8	42	1	7	0	0
	4	24	4	0	3	0	0
	6	40	1	0	3	0	0
	7	47	3	1	16	0	0
PE summary:	3	13	50	2	31	0	0
-- Type Level Summary --							
All trees:	4.8		1248	158	1750	1081	884
Merch trees:	11.1		136	92			

Forest type ER11: Low volume *Eucalyptus robusta* pole and saw timber.

	DBH (in)	Average Height (ft)	Number of Trees	Basal Area	Values per acre		
					Gross	Merch	Net
					Volume (ft3)		
<i>Eucalyptus paniculata</i>							
	11	18	0.8	1	4	3	0
EN summary:	11	18	0.8	1	4	4	0
<i>Eucalyptus saligna</i>							
	2	5	5.6	0	0	0	0
	4	15	1.6	0	1	0	0
	8	40	0.4	0	2	1	1
	9	45	0.8	0	5	5	4
	12	45	1.2	1	15	14	14
	14	63	0.4	0	9	9	8
ES summary:	6	19	10	2	35	31	28

Appendix C (Continued).

Forest type ER11 (Continued):

	DBH (in)	Average Height (ft)	----- Values per acre -----			
			Number of Trees	Basal Area	---- Volume (ft3) ----	---- Merch Net
<i>Eucalyptus microcorys</i>						
	2	11	4	0	0	0
	8	62	1.2	0	8	7
	9	25	1.2	1	5	4
	10	15	0.8	0	3	0
EM summary:	6	22	7.2	1	18	14
<i>Eucalyptus robusta</i>						
	2	23	156.8	3	26	0
	4	27	84.8	7	62	0
	6	39	28.6	6	64	0
	7	43	19.5	5	66	0
	8	22	16.5	6	46	35
	9	29	14.2	6	60	49
	10	39	14.9	8	98	85
	11	26	10.4	7	61	52
	12	39	11.7	9	109	98
	13	58	8.5	8	130	121
	14	36	13	14	154	139
	15	54	4.8	6	92	86
	16	33	5.7	8	81	73
	17	12	6	10	64	52
	18	39	5.6	10	117	107
	19	77	4	8	166	159
	20	42	4.4	10	118	109
	21	27	3.2	8	69	60
	22	100	1.2	3	84	81
	23	34	0.8	2	23	21
	24	34	0.8	3	25	23
	25	34	1.6	5	56	50
	26	53	1.6	6	85	80
	27	35	0.8	3	32	29
	28	80	0.8	3	71	68
	29	35	1.2	6	56	50
	30	35	0.8	4	40	36
	36	36	0.4	3	29	26
	40	36	0.4	3	36	32
ER summary:	9	40	423	180	2134	1733
<i>Melaleuca quinquenervia</i>						
	2	5	1.6	0	0	0
	6	12	0.4	0	0	0
	7	25	0.4	0	0	0
	11	47	0.8	1	7	6
	24	126	0.4	1	40	39
MQ summary:	10	30	3.6	2	50	47
<i>Metrosideros polymorpha</i>						
	2	9	2.4	0	0	0
	6	25	0.4	0	0	0
	7	29	0.4	0	1	0
	8	32	0.4	0	1	1
MP summary:	4	15	3.6	0	4	1

Appendix C (Continued).

Forest type ER11 (Continued):

	DBH (in)	Average Height (ft)	----- Values per acre -----			
			Number of Trees	Basal Area	---- Volume (ft3) ----	---- Merch Net
<i>Acacia koa</i>						
	2	5	4	0	0	0
	4	8	2.4	0	1	0
	6	24	1.6	0	3	0
	7	17	0.4	0	1	0
	8	8	0.8	0	2	0
	9	40	0.4	0	2	2
	13	32	1.2	1	13	12
	14	36	0.4	0	6	5
AK summary:	7	14	11.2	3	32	21
<i>Acacia mearnsii</i>						
	10	51	0.4	0	3	3
AW summary:	10	50	0.4	0	4	4
<i>Schinus terebinthifolius</i>						
	2	23	5.6	0	1	0
ST summary:	2	23	5.6	0	1	0
<i>Grevillia robusta</i>						
	2	5	8.8	0	0	0
	4	7	4.8	0	5	0
	6	12	0.8	0	1	0
	8	18	0.4	0	1	0
	11	28	0.4	0	3	2
	12	42	1.2	1	14	13
	13	34	0.4	0	4	4
	14	37	0.4	0	5	5
	16	42	0.4	1	8	7
GR summary:	6	11	17.6	3	45	35
<i>Casuarina equisetifolia</i>						
	2	5	4.8	0	0	0
	4	9	0.8	0	0	0
	7	22	0.8	0	2	0
CE summary:	3	7	6.4	0	3	0
<i>Pinus taeda</i>						
	2	7	8	0	1	0
	4	22	3.2	0	2	0
	6	37	0.8	0	2	0
	7	42	0.4	0	2	0
	9	58	0.4	0	4	4
PT summary:	4	16	12.8	1	13	4
<i>Pinus elliottii</i>						
	2	11	0.8	0	0	0
	8	60	0.4	0	3	3
	10	69	0.4	0	6	5
PE summary:	7	38	1.6	0	10	9
-- Type Level Summary --						
All trees:	8.4		503	194	2353	1901
Merch trees:	14.4		148	169		1281

Appendix C (Continued).**Forest type ER44: Moderate volume *Eucalyptus robusta* pole and saw timber.**

DBH (in)	Average Height (ft)	----- Values per acre -----					
		Number of Trees	Basal Area	---- Volume (ft3) ----	Merch	Net	
<i>Eucalyptus robusta</i>							
2	5	185	4	0	0	0	
4	8	105	9	61	0	0	
6	17	27.5	5	38	0	0	
7	61	22.5	6	103	0	0	
8	26	5	2	15	12	9	
9	38	20	9	103	87	82	
10	40	27.5	15	184	161	138	
11	43	27.5	18	238	213	180	
12	28	35	27	261	228	135	
13	55	25	23	370	342	302	
14	49	22.5	24	346	320	212	
15	7	5	6	56	38	19	
16	55	15	21	329	308	197	
17	67	2.5	4	74	70	66	
18	60	10	18	296	280	174	
19	62	5	10	170	161	99	
21	66	2.5	6	108	103	65	
22	53	2.5	7	97	91	41	
ER summary:	8	55	545	214	2860	2421	1726

-- Type Level Summary --							
All trees:	8.5		544	214	2860	2421	1726
Merch trees:	13		205	189			

Forest type ER55: Moderate volume *Eucalyptus robusta* saw timber.

DBH (in)	Average Height (ft)	----- Values per acre -----					
		Number of Trees	Basal Area	---- Volume (ft3) ----	Merch	Net	
<i>Melaleuca quinquenervia</i>							
2	6	1.4	0	0	0	0	
4	16	1.4	0	0	0	0	
7	37	2	1	6	0	0	
MQ summary:	5	22	4.9	1	7	0	0

<i>Metrosideros polymorpha</i>							
2	5	5.7	0	0	0	0	
4	7	1.4	0	1	0	0	
MP summary:	3	5	7.1	0	1	0	0

<i>Acacia koa</i>							
2	6	1.4	0	0	0	0	
6	30	1.4	0	3	0	0	
AK summary:	4	18	2.9	0	3	0	0

<i>Grevillia robusta</i>							
2	5	7.1	0	0	0	0	
4	7	1.4	0	1	0	0	
GR summary:	2	5	8.6	0	1	0	0

Appendix C (Continued).

Forest type ER55 (Continued):

DBH (in)	Average Height (ft)	----- Values per acre -----					
		Number of Trees	Basal Area	---- Volume (ft3) ----	Merch	Net	
<i>Eucalyptus robusta</i>							
2	5	67.1	1	0	0	0	
4	7	27.1	2	19	0	0	
6	29	7.1	1	13	0	0	
7	29	7.6	2	19	0	0	
8	30	4.9	2	16	13	13	
9	21	5	2	17	13	0	
10	13	9	5	33	26	0	
11	69	10.9	7	141	129	125	
12	10	3.6	3	18	14	6	
13	41	2.9	3	32	29	18	
14	63	8.6	9	165	154	154	
15	55	5.7	7	111	104	79	
16	44	11.7	16	213	197	174	
17	20	7.9	12	101	84	12	
18	46	5.7	10	135	125	100	
19	24	7.3	14	124	107	35	
20	55	4.4	10	149	141	96	
21	18	7.3	18	156	123	0	
22	54	5	13	198	186	159	
23	104	6	17	475	461	438	
24	35	5.7	18	187	169	125	
25	40	7.4	25	288	264	219	
26	67	2.9	11	188	179	122	
27	69	2.1	9	155	148	100	
28	71	2.1	9	169	162	109	
29	87	1.4	7	146	141	124	
30	123	3.6	18	543	529	508	
31	75	1.4	7	144	138	92	
32	77	0.7	4	78	74	54	
34	79	1.4	9	179	172	124	
35	81	0.7	5	96	92	66	
36	82	0.7	5	102	98	70	
38	100	1.6	12	294	285	245	
ER summary:	15	71	246.6	294	4720	4372	3382

-- Type Level Summary --							
All trees:	14.2		270	296	4734	4372	3382
Merch trees:	19.5		137	287			

Forest type ES11: Low volume *Eucalyptus saligna* pole and saw timber-hurricane damage.

<i>Eucalyptus deglupta</i>							
ED summary:	11	22	0.2	0	1	1	0
	11	10	0.2	0	1	1	0

<i>Eucalyptus robusta</i>							
	2	11	0.7	0	0	0	0
	4	30	0.7	0	0	0	0
	6	45	0.4	0	0	0	0
	7	50	0.2	0	0	0	0
	10	63	0.2	0	1	1	1
	11	67	0.2	0	2	2	1
	18	80	0.2	0	6	6	6
ER summary:	7	37	2.5	1	13	10	10

Appendix C (Continued).

Forest type ES11 (Continued):

DBH (in)	Average Height (ft)	----- Values per acre -----					
		Number of Trees	Basal Area	---- Gross	Volume (ft3) Merch	---- Net	
<i>Eucalyptus saligna</i>							
2	133	67.4	1	57	0	0	
4	68	44.2	4	82	0	0	
6	50	14.4	3	50	0	0	
7	59	14.6	4	81	0	0	
8	75	12.4	4	113	98	90	
9	59	12.6	6	119	106	88	
10	39	10.9	6	90	80	70	
11	54	8.1	5	105	96	59	
12	42	6	5	74	67	39	
13	58	7.1	7	136	127	85	
14	48	6.9	7	129	120	68	
15	34	5.6	7	91	83	58	
16	20	3.8	5	52	44	5	
17	26	3.4	5	59	51	0	
18	45	3.9	7	111	104	80	
19	35	3.3	7	86	78	41	
20	36	2.3	5	66	60	29	
21	110	1.1	3	91	89	0	
22	130	0.9	3	105	102	102	
23	26	0.5	2	16	14	8	
24	25	0.7	2	24	21	12	
25	72	1.1	4	85	81	60	
26	7	0.2	1	7	4	2	
27	24	0.5	2	24	20	12	
28	24	0.2	1	9	7	4	
29	62	0.2	1	16	15	14	
30	24	0.4	2	21	17	10	
32	23	0.2	1	12	9	5	
35	22	0.2	1	14	11	7	
39	22	0.2	1	18	14	8	
ES summary:	9	43	232.9	110	1956	1532	969
<i>Metrosideros polymorpha</i>							
2	5	1.4	0	0	0	0	
4	6	0.7	0	1	0	0	
9	22	0.2	0	0	0	0	
MP summary:	4	6	2.3	0	2	1	0
<i>Melaleuca quinquenervia</i>							
2	5	11.6	0	0	0	0	
4	10	9.5	1	5	0	0	
6	21	3.2	1	4	0	0	
7	27	2.1	1	5	0	0	
8	34	1.5	1	5	4	4	
9	47	0.8	0	5	4	3	
10	28	0.8	0	4	3	3	
12	45	0.6	0	5	5	4	
13	48	0.2	0	2	2	1	
14	52	0.2	0	2	2	2	
MQ summary:	5	14	30.4	4	41	23	19

Appendix C (Continued).

Forest type ES11 (Continued):

	DBH (in)	Average Height (ft)	----- Values per acre -----				
			Number of Trees	Basal Area	---- Volume (ft3) ----	---- Merch Net	
<i>Acacia koa</i>							
	2	16	7.7	0	1	0	0
	4	25	10.2	1	9	0	0
	6	70	0.9	0	4	0	0
	7	32	0.9	0	3	0	0
	9	39	0.2	0	1	1	0
	10	41	0.2	0	1	1	1
	11	43	0.2	0	1	1	1
	22	65	0.2	0	10	9	8
AK summary:	4	25	20.4	2	32	14	12
<i>Acacia mearnsii</i>							
	2	9	3.9	0	0	0	0
	4	14	1.4	0	0	0	0
	6	20	1.2	0	2	0	0
	7	20	0.4	0	0	0	0
	8	21	0.2	0	0	0	0
AW summary:	4	12	7	1	5	0	0
<i>Grevillia robusta</i>							
	2	5	4.6	0	0	0	0
	4	10	0.7	0	0	0	0
	6	20	0.2	0	0	0	0
	7	49	0.4	0	1	0	0
	8	32	0.2	0	0	0	0
	9	9	0.2	0	0	0	0
	10	35	0.4	0	2	2	0
	12	38	0.2	0	1	1	1
GR summary:	5	11	6.7	1	9	5	3
<i>Aleurites moluccana</i>							
	7	15	0.2	0	0	0	0
	9	27	0.2	0	0	0	0
	11	33	0.2	0	1	1	0
	13	40	0.2	0	2	2	1
AO summary:	10	29	0.7	0	5	4	2
<i>Paraserianthes falcataria</i>							
	2	91	63.5	1	38	0	0
	4	68	24.2	2	45	0	0
	6	59	6.3	1	25	0	0
	7	59	4.7	1	27	0	0
	8	61	3.9	1	30	26	22
	9	71	3.2	1	35	31	26
	10	52	1.9	1	20	18	18
	11	74	0.4	0	6	5	0
	12	50	0.5	0	7	6	5
	13	42	0.9	1	12	11	10
	14	45	2	2	35	32	24
	15	47	0.5	1	11	10	7
	17	46	0.2	0	4	4	3
	18	46	0.2	0	5	4	4
	22	100	0.4	1	29	29	27
	25	79	0.2	1	14	14	14
	27	43	0.2	1	14	13	11
PF summary:	5	62	113.1	17	365	210	177

Appendix C (Continued).**Forest type ES11 (Continued):**

	DBH (in)	Average Height (ft)	----- Values per acre -----			
			Number of Trees	Basal Area	---- Volume (ft3) ----	---- Merch Net
<i>Cryptomeria japonica</i>						
CJ summary:	2		0.4	0	0	0
	2		0.4	0	0	0
<i>Pinus taeda</i>						
PT summary:	2	7	1.1	0	0	0
	4	20	1.4	0	0	0
	6	36	0.2	0	0	0
	4	16	2.7	0	2	0
<i>Pinus elliottii</i>						
PE summary:	2	6	0.4	0	0	0
	8	37	0.2	0	0	0
	5	16	0.5	0	1	0
-- Type Level Summary --						
All trees:	7.7		419	137	2433	1799
Merch trees:	13.5		113	113		1191

Forest type ES22: Low to moderate volume *Eucalyptus saligna* pole timber.

	DBH (in)	Average Height (ft)	----- Values per acre -----			
			Number of Trees	Basal Area	---- Volume (ft3) ----	---- Merch Net
<i>Eucalyptus saligna</i>						
ES summary:	2	10	48	1	7	0
	4	29	24	2	22	0
	6	63	30.2	6	128	0
	7	69	22.4	6	145	0
	8	43	16.4	6	93	79
	9	76	20.6	9	242	218
	10	75	16.2	9	233	215
	11	70	12	8	195	182
	12	73	6.2	5	125	117
	13	52	8.2	8	142	133
	14	78	8.2	9	238	226
	15	80	6	7	203	194
	16	83	4	6	158	151
	17	84	4	6	181	174
	18	86	2.2	4	113	109
	9	74	228.6	91	2233	1803
<i>Eucalyptus robusta</i>						
ER summary:	2	5	28	1	0	0
	4	15	4	0	2	0
	6	28	4	1	7	0
	7	35	4	1	11	0
	4	12	40	3	21	0

Appendix C (Continued).**Forest type ES22 (Continued):**

	DBH (in)	Average Height (ft)	----- Values per acre -----				
			Number of Trees	Basal Area	---- Volume (ft3) ----	---- Merch Net	
<i>Eucalyptus microcorys</i>							
	2	6	52	1	16	0	0
	4	18	44	4	29	0	0
	6	55	12	2	42	0	0
	7	42	8	2	31	0	0
	8	55	20	7	123	0	0
	9	10	8	4	28	21	0
	10	53	6	3	59	53	48
	11	57	6	4	75	69	62
	12	83	8	6	163	153	144
	13	87	2	2	47	44	41
EM summary:	6	53	166	36	618	342	298
<i>Acacia koa</i>							
	2	15	132	3	21	0	0
	4	24	44	4	38	0	0
	6	30	4.2	1	9	0	0
	7	33	4.2	1	14	0	0
AK summary:	3	26	184.4	9	84	0	0
-- Type Level Summary --							
All trees:	6.4		619	138	2956	2145	1970
Merch trees:	11.4		133	95			

Forest type ES55: Moderate volume *Eucalyptus saligna* saw timber.

	DBH (in)	Average Height (ft)	----- Values per acre -----				
			Number of Trees	Basal Area	---- Volume (ft3) ----	---- Merch Net	
<i>Eucalyptus saligna</i>							
	2	5	132	3	0	0	0
	4	17	44	4	33	0	0
	6	49	28	5	96	0	0
	7	46	12	3	54	0	0
	8	54	18	6	124	106	92
	9	62	8	4	79	70	60
	10	75	10	5	144	132	123
	11	77	8	5	142	133	128
	13	71	8	7	183	173	145
	14	93	2	2	68	65	65
	15	115	2	2	94	91	78
	18	97	2	4	115	111	99
	22	122	2	5	209	204	173
	23	125	6	17	697	680	578
	24	127	2	6	256	250	216
	26	131	2	7	307	300	260
	27	160	2	8	398	391	365
	28	135	2	9	363	354	306
	29	137	2	9	392	383	331
	31	140	2	10	454	444	383
	32	142	4	22	972	951	820
ES summary:	103	113	298	146	5191	4847	4228

Appendix C (Continued).**Forest type ES55 (Continued):**

	DBH (in)	Average Height (ft)	----- Values per acre -----				
			Number of Trees	Basal Area	---- Volume (ft3) ----	Merch	Net
<i>Eucalyptus microcorys</i>							
	2	4	20	0	0	0	0
	4	5	8	1	0	0	0
	38	55	2	16	244	228	71
EM summary:	10	8	30	17	244	228	72
<i>Acacia koa</i>							
	2	5	8	0	0	0	0
AK summary:	2	5	8	0	0	0	0
<i>Grevillia robusta</i>							
	2	7	12	0	2	0	0
	4	22	4	0	3	0	0
	7	46	4	1	18	0	0
	10	60	2	1	24	21	18
GR summary:	5	22	22	3	49	22	19
<i>Casuarina equisetifolia</i>							
	2	10	12	0	1	0	0
	6	50	2	0	8	0	0
	10	69	4	2	53	48	48
CE summary:	5	27	18	3	63	48	48
-- Type Level Summary --							
All trees:	9.1		375	169	5547	5146	4367
Merch trees:	17.5		89	150			

Forest type EX44: Moderate volume mixed eucalyptus pole and saw timber.

	DBH (in)	Average Height (ft)	----- Values per acre -----				
			Number of Trees	Basal Area	---- Volume (ft3) ----	Merch	Net
<i>Eucalyptus microcorys</i>							
	2	4	36.7	1	0	0	0
	4	5	11.7	1	0	0	0
	6	6	3.3	1	0	0	0
	7	7	3.3	1	7	0	0
	8	10	1.7	1	4	3	2
	9	12	3.3	1	10	8	0
	10	16	3.3	2	14	12	0
	14	35	1.7	2	21	19	19
	15	48	0.8	1	16	14	6
	16	85	1.7	2	61	58	58
	17	72	1.7	3	58	56	55
	19	62	0.8	2	31	29	21
	20	67	0.8	2	37	35	26
	21	42	3.3	8	108	100	84
	22	85	0.8	2	56	54	44
	23	125	2.5	7	262	256	206
	24	86	0.8	3	67	64	49
	26	85	0.8	3	76	73	56
	32	120	0.8	5	156	152	112
	34	90	0.8	5	132	127	124
EM summary:	11	37	80.6	51	1124	1068	870

Appendix C (Continued).

Forest type EX44 (Continued):

	DBH (in)	Average Height (ft)	----- Values per acre -----			
			Number of Trees	Basal Area	---- Volume (ft ³) ----	---- Net
<i>Eucalyptus paniculata</i>						
	2	5	28.3	1	0	0
	4	7	13.3	1	10	0
	6	8	5	1	8	0
	7	33	7.4	2	23	0
	8	52	5.8	2	35	29
	9	25	2.5	1	10	9
	10	33	1.7	1	10	9
	11	48	4.2	3	44	40
	12	13	2.5	2	14	12
	13	110	1.7	2	51	49
	14	71	8.3	9	201	190
	15	52	4.2	5	86	80
	16	55	5	7	123	116
	18	70	4.2	7	160	152
	19	63	1.7	3	64	61
	20	8	1.7	4	30	22
	21	68	1.7	4	83	79
	22	102	1.7	4	133	129
	23	72	0.8	2	52	50
	24	88	1.7	5	136	131
	25	76	1.7	6	128	123
	26	78	0.8	3	70	67
	28	95	0.8	4	97	94
EN summary:	12	64	106.6	79	1579	1450
<i>Eucalyptus saligna</i>						
	2	12	1.7	0	0	0
	13	81	0.8	1	21	20
ES summary:	8	35	2.5	1	22	21
<i>Acacia koa</i>						
	2	5	1.7	0	0	0
	4	7	1.7	0	1	0
AK summary:	3	6	3.3	0	1	0
<i>Grevillia robusta</i>						
	2	8	1.7	0	0	0
	10	60	0.8	0	9	8
GR summary:	6	25	2.5	0	10	9
<i>Casuarina equisetifolia</i>						
	2	5	3.3	0	0	0
	4	7	1.7	0	1	0
CE summary:	3	5	5	0	1	0
<i>Acacia confusa</i>						
	2	5	6.7	0	0	0
AC summary:	2	5	6.7	0	0	0
-- Type Level Summary --						
All trees:	10.8		207	132	2739	2547
Merch trees:	16.8		79	123		2048

Appendix C (Continued).

Forest type PE22: Low to moderate volume *Pinus elliotii* pole timber.

	DBH (in)	Average Height (ft)	----- Values per acre -----			
			Number of Trees	Basal Area	---- Volume (ft3) ----	---- Merch Net
<i>Eucalyptus microcorys</i>						
	2	4	1.8	0	0	0
	4	5	0.9	0	0	0
	7	6	0.5	0	0	0
	8	6	0.5	0	2	1
	14	13	0.5	0	3	3
	15	15	0.9	1	9	7
EM summary:	9	8	5	2	15	12
<i>Grevillia robusta</i>						
	2	8	12.7	0	2	0
	4	17	9.1	1	6	0
	6	31	5	1	12	0
	7	51	4	1	19	0
	8	48	2.9	1	18	15
	9	18	1.2	1	5	4
	10	32	1.4	1	9	8
	12	60	1.4	1	22	21
	13	61	1.7	2	33	31
	14	52	0.9	1	18	16
	15	67	0.5	1	12	12
GR summary:	23	68	0.5	1	29	28
	7	27	41.1	11	190	137
<i>Schinus terebinthifolius</i>						
	2	7	1.8	0	0	0
	4	19	1.8	0	1	0
ST summary:	3	13	3.6	0	2	0
<i>Pinus elliotii</i>						
	2	7	16.4	0	4	0
	4	19	20	2	13	0
	6	38	16.1	3	56	0
	7	42	24.1	7	125	0
	8	47	23	8	170	152
	9	45	26.2	12	236	216
	10	52	20.8	11	251	234
	11	57	14.1	9	217	204
	12	55	15.2	12	269	253
	13	56	5	5	104	98
	14	60	2.7	3	68	65
	15	65	2.6	3	80	76
	16	67	0.5	1	15	15
	19	72	0.5	1	22	21
	20	52	0.5	1	18	17
PE summary:	9	57	187.6	78	1655	1355
<i>Acacia koa</i>						
	7	33	0.5	0	1	0
	9	50	0.5	0	3	3
AK summary:	8	41	0.9	0	5	3
<i>Acacia mearnsii</i>						
	4	14	0.9	0	0	0
	13	56	0.5	0	8	7
AW summary:	8	28	1.4	0	9	8

Appendix C (Continued).**Forest type PE22 (Continued):**

	DBH (in)	Average Height (ft)	----- Values per acre -----				
			Number of Trees	Basal Area	---- Volume (ft3) ---- Gross	Merch	Net
			-- Type Level Summary --				
All trees:	8.4		239	92	1876	1516	1463
Merch trees:	10.6		124	76			

Forest type PE33: Moderate to high volume *Pinus elliottii* pole and saw timber.

	DBH (in)	Average Height (ft)	----- Values per acre -----				
			Number of Trees	Basal Area	---- Volume (ft3) ---- Gross	Merch	Net
			<i>Pinus elliottii</i>				
	2	7	21.8	0	4	0	0
	4	23	49.1	4	36	0	0
	6	50	35.7	7	153	0	0
	7	42	24.1	6	123	0	0
	8	59	42	15	371	335	335
	9	63	27.4	12	322	298	271
	10	59	31.8	17	428	399	379
	11	66	25.5	17	456	430	429
	12	75	24.9	20	580	552	551
	13	72	16.3	15	425	405	405
	14	81	16.5	18	541	518	513
	15	79	12.5	15	456	437	437
	16	78	7.7	11	309	296	295
	17	77	1.8	3	79	76	76
	18	85	3.5	6	187	180	180
	19	76	2.8	6	147	141	141
	20	90	1	2	66	64	62
	23	95	2.2	6	186	180	176
	25	97	1.6	6	160	154	151
PE summary:	10	81	348.3	186	5038	4473	4410
			<i>Melaleuca quinquenervia</i>				
	7	39	1.8	1	6	0	0
MQ summary:	7	39	1.8	1	6	0	0
			<i>Metrosideros polymorpha</i>				
	2	5	1.8	0	0	0	0
	4	6	3.6	0	0	0	0
	6	10	0.9	0	1	0	0
	8	15	1.8	1	5	4	0
	9	19	0.9	0	3	2	0
	11	25	0.9	1	6	5	0
MP summary:	6	11	10	2	17	13	0
			<i>Eucalyptus robusta</i>				
	2	9	7.3	0	0	0	0
	6	41	0.9	0	2	0	0
ER summary:	3	13	8.2	0	3	0	0
			<i>Acacia mearnsii</i>				
	7	32	0.9	0	3	0	0
AW summary:	7	32	0.9	0	3	0	0

Appendix C (Continued).**Forest type PE33 (Continued):**

DBH (in)	Average Height (ft)	----- Values per acre -----					
		Number of Trees	Basal Area	---- Volume (ft3) ----	Merch	Net	
<i>Acacia koa</i>							
	2	33	7.3	0	1	0	0
	4	37	5.5	0	6	0	0
	6	50	3.6	1	12	0	0
	7	32	1.8	0	6	0	0
	8	50	0.9	0	5	4	4
	9	32	3.6	2	20	17	17
	10	36	6.5	4	48	42	28
	11	42	0.9	1	9	8	8
	12	41	1.8	1	21	19	16
	14	65	0.9	1	22	20	19
	16	42	0.9	1	19	18	14
	17	40	0.9	1	21	19	3
AK summary:	8	38	34.6	13	196	152	112
-- Type Level Summary --							
All trees:	9.6		403	202	5264	4638	4523
Merch trees:	11.8		237	181			

Forest type PT22: Low to moderate volume *Pinus taeda* pole timber.

DBH (in)	Average Height (ft)	----- Values per acre -----					
		Number of Trees	Basal Area	---- Volume (ft3) ----	Merch	Net	
<i>Pinus taeda</i>							
	4	13	13.3	1	8	0	0
	6	21	10	2	22	0	0
	7	8	18.3	5	45	0	0
	8	48	10	3	74	0	0
	9	52	18.3	8	182	167	167
	10	42	10	5	98	90	90
	11	47	20	13	267	248	235
	12	46	6.7	5	101	94	94
	13	42	15	13	236	219	219
	14	61	8.3	9	210	200	199
	15	77	3.3	4	119	114	114
PT summary:	10	50	133.3	70	1366	1135	1120
<i>Metrosideros polymorpha</i>							
	2	7	3.3	0	0	0	0
	4	13	6.7	1	4	0	0
MP summary:	3	11	10	1	5	0	0
<i>Acacia koa</i>							
	4	12	3.3	0	2	0	0
	7	24	1.7	0	4	0	0
	11	27	1.7	1	12	10	8
	12	53	3.3	3	50	46	34
	13	42	1.7	2	24	22	16
AK summary:	10	32	11.7	6	93	79	59

Appendix C (Continued).**Forest type PT22 (Continued):**

DBH (in)	Average Height (ft)	----- Values per acre -----					
		Number of Trees	Basal Area	---- Volume (ft3) ----	Merch	Net	
<i>Grevillia robusta</i>							
	2	39	10	0	2	0	0
	4	34	40	3	42	0	0
	6	32	10	2	24	0	0
	7	32	5	1	16	0	0
	8	47	3.3	1	20	17	15
	9	15	5	2	19	15	0
	10	40	3.3	2	27	24	15
	12	30	1.7	1	15	13	10
GR summary:	6	32	78.3	14	170	71	42

-- Type Level Summary --							
All species:	8.4		233	90	1634	1285	1221
Merch trees:	11.3		101	70			

Forest type PT33: Moderate to high volume *Pinus taeda* pole and saw timber.

DBH (in)	Average Height (ft)	----- Values per acre -----					
		Number of Trees	Basal Area	---- Volume (ft3) ----	Merch	Net	
<i>Pinus taeda</i>							
	2	6	20	0	0	0	0
	4	17	10.9	1	7	0	0
	6	56	9.4	2	44	0	0
	7	42	15.5	4	78	0	0
	8	54	22.4	8	184	166	166
	9	51	15.7	7	154	142	128
	10	59	17.5	10	237	221	186
	11	66	14.5	10	257	243	237
	12	73	13.6	11	312	296	283
	13	88	17.3	16	538	515	509
	14	84	15.5	17	529	508	508
	15	122	9.4	11	510	494	494
	16	86	9.4	13	408	393	393
	17	95	3.6	6	193	187	187
	18	97	5.1	9	302	292	290
	19	67	2.7	5	126	121	120
	20	95	3.9	9	271	262	262
	21	90	1.8	4	129	125	125
	28	108	0.9	4	112	108	102
PT summary:	102	209.1	PT..	11	4401	4079	3996

<i>Pinus elliottii</i>							
	6	52	0.9	0	4	0	0
	8	59	0.9	0	8	7	7
	10	64	0.9	0	13	12	12
	13	70	0.9	1	23	22	22
	15	75	0.9	1	31	30	30
	19	75	0.9	2	46	45	45
PE summary:	13	66	5.5	5	127	117	117

<i>Eucalyptus microcorys</i>							
	2	6	1.8	0	0	0	0
EM summary:	2	6	1.8	0	0	0	0

Appendix C (Continued).**Forest type PT33 (Continued):**

	DBH (in)	Average Height (ft)	----- Values per acre -----				
			Number of Trees	Basal Area	---- Volume (ft3) ----	Merch	Net
<i>Eucalyptus robusta</i>							
	2	4	5.5	0	0	0	0
	7	5	1.8	0	0	0	0
	18	8	0.9	2	11	8	0
	22	12	0.9	2	16	12	0
ER summary:	10	6	9.1	5	28	21	0
<i>Metrosideros polymorpha</i>							
	9	20	0.9	0	3	2	0
MP summary:	9	20	0.9	0	4	3	0
<i>Acacia koa</i>							
	2	9	5.5	0	0	0	0
	4	23	10.9	1	9	0	0
	6	32	1.8	0	4	0	0
	7	38	2.7	1	10	0	0
	8	41	1.8	1	10	8	8
	9	57	1.8	1	16	14	14
	10	47	0.9	1	9	8	7
	11	56	0.9	1	11	10	9
	13	42	1.8	2	26	24	18
	15	55	0.9	1	21	19	15
	16	57	0.9	1	25	23	18
AK summary:	7	31	30	9	146	111	92
<i>Grevillia robusta</i>							
	4	7	3.6	0	3	0	0
	9	25	0.9	0	4	3	0
	25	64	0.9	3	65	62	20
GR summary:	11	20	5.5	4	73	66	21
<i>Myrica faya</i>							
	2	6	7.3	0	0	0	0
	4	17	7.3	1	5	0	0
MF summary:	3	12	14.5	1	6	0	0
-- Type Level Summary --							
All trees:	10.6		276	169	4784	4397	4226
Merch trees:	13		171	158			

Forest type PX22: Low to moderate volume mixed Southern pines pole timber.

	DBH (in)	Average Height (ft)	----- Values per acre -----				
			Number of Trees	Basal Area	---- Volume (ft3) ----	Merch	Net
<i>Metrosideros polymorpha</i>							
	4	18	1.4	0	1	0	0
MP summary:	4	18	1.4	0	1	0	0
<i>Acacia koa</i>							
	7	32	0.7	0	2	0	0
AK summary:	7	32	0.7	0	2	0	0

Appendix C (Continued).

Forest type PX22 (Continued):

	DBH (in)	Average Height (ft)	----- Values per acre -----				
			Number of Trees	Basal Area	---- Volume (ft3) ----	---- Merch Net	
<i>Pinus taeda</i>							
	2	13	1.4	0	0	0	
	4	25	5.7	0	4	0	
	6	37	6.4	1	21	0	
	7	38	5	1	23	0	
	8	47	5.7	2	41	37	
	9	40	5.7	3	45	41	
	10	49	7.9	4	89	82	
	11	53	3.6	2	52	49	
	12	65	3.6	3	73	69	
	13	59	1.4	1	31	29	
	14	62	0.7	1	18	17	
	15	65	0.7	1	21	20	
PT summary:	9	47	47.9	20	423	348	341
<i>Pinus elliottii</i>							
	2	6	5.7	0	1	0	0
	4	18	21.4	2	13	0	0
	6	38	10.7	2	36	0	0
	7	45	15	4	80	0	0
	8	46	22.1	8	158	141	141
	9	50	15	7	144	132	132
	10	39	14.3	8	135	124	119
	11	43	11.4	8	138	128	128
	12	48	3.9	3	61	57	57
	13	61	2.9	3	64	60	59
	14	64	1.8	2	47	45	44
	15	66	0.7	1	22	21	20
PE summary:	8	46	125	46	905	712	705
<i>Grevillia robusta</i>							
	2	5	15.7	0	0	0	0
	4	7	7.1	1	7	0	0
	6	35	3.6	1	9	0	0
	7	10	0.7	0	1	0	0
	8	21	3.2	1	11	8	4
	10	28	2.1	1	13	11	8
	11	31	1.4	1	11	10	7
	13	25	0.7	1	7	6	3
GR summary:	6	13	34.6	6	62	37	24
<i>Leucaena leucocephala</i>							
	4	18	1.4	0	1	0	0
LL summary:	4	18	1.4	0	1	0	0
<i>Acacia confusa</i>							
	4	18	1.4	0	1	0	0
AC summary:	4	18	1.4	0	1	0	0
-- Type Level Summary --							
All trees:	7.9		212	73	1396	1097	1070
Merch trees:	10		108	59			

Appendix C (continued)

Forest type EE00: Recent *Eucalyptus sideroxylon* plantings/sapling stands.

	DBH (in)	Average Height (ft)	----- Values per acre -----				
			Number of Trees	Basal Area	---- Volume (ft3) ----	---- Merch Net	
<i>Eucalyptus robusta</i>							
	6	30	3.3	1	6	0	0
	7	33	3.3	1	9	0	0
	11	53	3.3	2	34	30	11
ER summary:	8	39	10	4	50	31	11
<i>Eucalyptus sideroxylon</i>							
	2	89	306.7	7	163	0	0
	4	52	126.7	11	169	0	0
	6	43	36.7	7	100	0	0
	7	51	13.3	4	59	0	0
	8	35	13.3	5	57	47	42
	9	33	16.7	7	87	75	71
	10	36	13.3	7	92	80	59
	12	8	3.3	3	22	15	13
	13	29	13.3	12	131	115	101
	14	28	3.3	4	37	32	28
	15	27	3.3	4	42	36	30
	16	26	3.3	5	47	41	34
	17	26	3.3	5	52	45	38
	19	25	3.3	7	64	55	46
	20	52	3.3	7	119	111	98
EE summary:	6	29	563.3	94	1246	660	568
<i>Acacia confusa</i>							
	2	89	13.3	0	7	0	0
AC summary:	2	89	13.3	0	8	0	0
-- Type Level Summary --							
All trees:	5.5		586	98	1304	691	579
Merch trees:	12.2		83	68			

Appendix C (Continued).

Forest type LC11: Low volume *Lophostemon confertus* pole and saw timber-hurricane damage.

DBH (in)	Average Height (ft)	----- Values per acre -----					
		Number of Trees	Basal Area	---- Volume (ft3) ----	Merch	Net	
<i>Lophostemon confertus</i>							
2	5	113.3	2	0	0	0	
4	6	40	3	51	0	0	
7	20	6.7	2	16	0	0	
9	16	10	4	39	32	10	
10	27	26.7	15	166	143	59	
11	10	23.3	15	126	96	0	
12	20	13.3	10	103	86	0	
13	20	30	28	273	228	22	
14	10	23.3	25	204	157	0	
15	32	6.7	8	103	93	55	
16	77	10	14	371	354	281	
17	62	10	16	342	324	154	
18	55	23.3	41	801	755	226	
19	44	3.3	7	103	96	55	
20	82	6.7	15	402	387	305	
23	56	3.3	10	183	173	88	
LC summary:	11	59	350	215	3289	2930	1261
-- Type Level Summary --							
All trees:	10.6		349	215	3289	2930	1261
Merch trees:	14.1		189	207			

Forest type MQ55: Moderate volume *Melaleuca quinquenervia* saw timber.

DBH (in)	Average Height (ft)	----- Values per acre -----					
		Number of Trees	Basal Area	---- Volume (ft3) ----	Merch	Net	
<i>Eucalyptus robusta</i>							
6	72	1.7	0	5	0	0	
9	48	1.7	1	11	9	8	
10	64	3.3	2	34	30	28	
11	65	1.7	1	19	18	17	
12	67	1.7	1	26	24	23	
17	71	1.7	2	49	46	44	
23	76	1.7	5	95	91	86	
ER summary:	13	66	13.3	13	242	222	208

Appendix C (Continued).

Forest type MQ55 (Continued):

DBH (in)	Average Height (ft)	----- Values per acre -----					
		Number of Trees	Basal Area	---- Gross	Volume (ft3) Merch	---- Net	
<i>Melaleuca quinquenervia</i>							
2	22	50	1	8	0	0	
4	27	36.7	3	27	0	0	
6	41	5	1	11	0	0	
7	31	13.3	4	35	0	0	
8	47	11.7	4	57	46	44	
9	12	1.7	1	4	3	0	
10	33	3.3	2	19	16	12	
11	34	1.7	1	11	10	7	
12	34	3.3	3	28	25	18	
13	10	6.7	6	41	31	0	
14	35	6.7	7	78	70	60	
15	36	1.7	2	22	20	14	
16	36	8.3	12	129	117	82	
17	37	1.7	3	29	26	18	
18	60	6.7	12	199	187	146	
19	37	3.3	7	73	66	46	
20	55	8.3	18	281	265	222	
21	15	5	12	86	74	0	
22	55	6.7	18	268	253	152	
23	38	5	14	160	146	102	
24	39	1.7	5	58	53	36	
25	50	6.7	23	311	291	231	
26	56	5	18	278	262	190	
27	25	5	20	184	155	0	
28	39	1.7	7	79	72	49	
29	40	1.7	8	84	77	53	
30	40	1.7	8	90	82	57	
31	40	3.3	17	194	176	121	
32	40	3.3	19	206	187	129	
34	42	3.3	21	241	220	166	
36	41	1.7	12	131	118	81	
39	55	3.3	28	379	354	188	
41	41	1.7	15	172	154	106	
MQ summary:	16	43	226.7	330	3988	3569	2344

-- Type Level Summary --							
All trees:	16.2		240	343	4231	3790	2552
Merch trees:	21.4		133	334			

Appendix C (Continued).

Forest type EM22: Low to moderate volume *Eucalyptus microcorys* pole timber.

	DBH (in)	Average Height (ft)	----- Values per acre -----			
			Number of Trees	Basal Area	---- Volume (ft3) ----	---- Merch Net
<i>Eucalyptus saligna</i>						
	2	6	3.3	0	0	0
	4	18	3.3	0	2	0
	6	35	1.7	0	4	0
	13	76	1.7	2	41	38
	14	80	1.7	2	49	47
	15	84	1.7	2	59	56
ES summary:	9	41	13.3	6	157	143
<i>Eucalyptus robusta</i>						
	13	51	1.7	2	24	22
ER summary:	13	51	1.7	2	24	23
<i>Eucalyptus microcorys</i>						
	2	101	326.7	7	195	0
	4	49	166.7	15	211	0
	6	38	61.7	12	154	0
	7	28	41.7	11	115	0
	8	42	56.7	20	283	236
	9	39	55	24	324	280
	10	59	31.7	17	333	301
	11	36	46.7	31	390	347
	12	15	38.3	30	236	197
	13	16	21.7	20	163	139
	14	21	15	16	147	124
	15	55	6.7	8	145	136
	17	20	1.7	3	24	19
	19	19	1.7	3	30	25
	20	18	1.7	4	35	28
EM summary:	7	25	873.3	221	2792	1837
<i>Acacia koa</i>						
	2	101	3.3	0	2	0
	4	49	3.3	0	4	0
AK summary:	3	75	6.7	0	7	0
<i>Grevillia robusta</i>						
	2	8	3.3	0	0	0
	4	28	3.3	0	3	0
	7	57	1.7	0	9	0
GR summary:	4	26	8.3	1	13	0
-- Type Level Summary --						
All trees:	6.8		903	230	2993	2003
Merch trees:	10.9		283	183		1362

Appendix D. Timber resources located on lands that are not managed by DOFAW.

<u>Forest type</u>	<u>Acres</u>	<u>Managing organization</u>
ER11	3.4	State Parks
ER44	50.4	
ER55	42.4	
ES11	1.6	
EZ11	3.6	
GR33	5.0	
LC11	1.8	
PE33	29.7	
PT33	28.5	
Total:	166.4	

<u>Forest type</u>	<u>Acres</u>	<u>Managing organization</u>
PE22	24.2	Pacific Missile Range Facility

<u>Forest type</u>	<u>Acres</u>	<u>Managing organization</u>
ER11	1.6	Department of Hawaiian Home Lands
ES55	6.0	
EX44	2.6	
Total:	10.2	